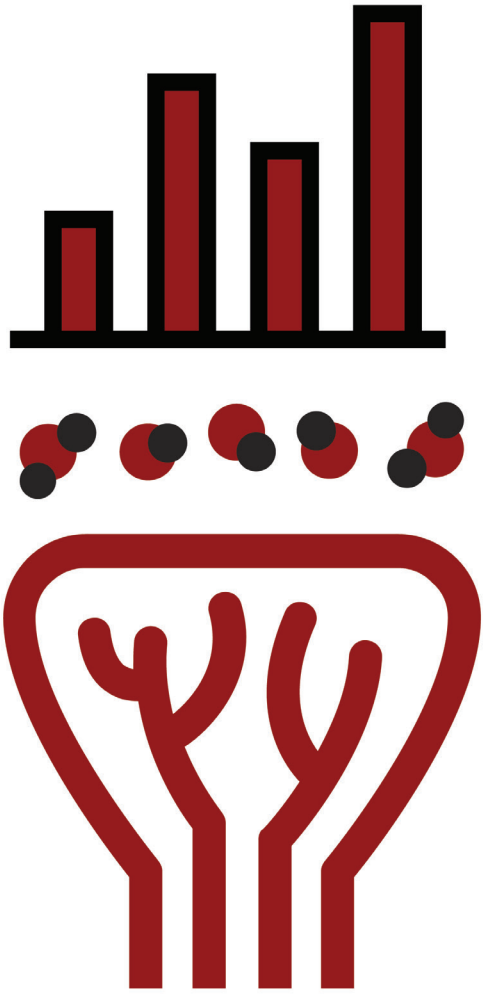

TEXAS TECH UNIVERSITY
HEALTH SCIENCES CENTER

33rd GRADUATE SCHOOL OF BIOMEDICAL SCIENCES

STUDENT RESEARCH WEEK

NEURO: New Experiences Unfold Research Opportunities

TEXAS TECH UNIVERSITY
HEALTH SCIENCES CENTER™

Graduate School *of* Biomedical Sciences

33rd Annual Student Research Week
March 9-12, 2021
Texas Tech University Health Sciences Center (TTUHSC)
Lubbock, Texas

The Graduate School of Biomedical Sciences 2021 Student Research Week Committee

Director: Mariacristina Mazzitelli
Vice Director of Marketing: Emily Vanderpool
Vice Director of Poster Competition: Nicholas Evans
Vice Director of Operations & Judging: Peyton Presto

Website design and maintenance: Danny Boren, Graduate School of Biomedical Sciences
Communications and social media: Mark Hendricks, Office of Communications & Marketing; Leslie Fowler, Graduate School of Biomedical Sciences
Speaker arrangements: Leslie Fowler, Graduate School of Biomedical Sciences
Abstract book design: Deidra Satterwhite, Office of Student Life
Student Research Week Banquet: Morganna Kellogg and Dalia Martinez-Marin, Graduate School of Biomedical Sciences Graduate Student Association

The 2021 Student Research Week Committee would like to extend their warmest thanks to the following for their contributions and support in making Student Research Week a great success this year:

The Graduate School of Biomedical Sciences staff: Leslie Fowler, Pam Johnson, Tres Boren, and Ashlee Rigsby
The Office of Student Life: Deidra Satterwhite
The Office of Communications and Marketing: Junior Jimenez and Mark Hendricks
The Office of the President: Bryce Looney
The School of Medicine Office of the Dean: Charity Donaldson
The departments of cell biology and biochemistry, pharmacology and neuroscience, immunology and molecular microbiology, cell physiology and molecular biophysics, medical education and graduate medical education; Graduate School of Biomedical Sciences at Lubbock, Abilene, and Amarillo, the School of Medicine, the School of Nursing, the School of Health Professions, the School of Pharmacy, the Office of Interprofessional Education, and Texas Tech University.

Dr. Beverly Chilton for establishing the Bette B. Chilton scholarship in honor of her mother.

We also are very grateful to all the TTUHSC faculty and staff for their guidance and support.

Information about TTUHSC, including information about the Graduate School of Biomedical Sciences, can be found at www.ttuhsc.edu.

Friday, March 12, 2021

KEYNOTE LECTURES

Susan Amara

Time: 9:00 - 10:00 a.m.

Bryan Roth

Time: 1:00 - 2:00 p.m.

STUDENT SPEAKERS

Time: 10:15 a.m. - 12:00 p.m.

Pharmacological activation of NFAT3 signaling to curtail 'Ethanol induced' loss of CSE and neurdevelopmental toxicity in neuroblasts

Ashlesha Walchale, Graduate Student, Lubbock

Identification of the bupropion binding site in GLIC using site-directed mutagenesis

Dubem Onyejegbu, Medical Student, Lubbock

The Differences in Site-Specific Tissue Stiffness between Healthy and Plantar Fasciopathy

YoRong Chen, Health Professions, Lubbock

Assessing the effects of COVID-19-induced hypoxia and ACE2 signaling on the human blood-brain barrier in vitro

Sree Pooja Varahachalam, Graduate Student, Amarillo

Assessing Conformational Changes in P-type ATPases with Voltage Clamp Fluorometry

Victoria Young, Graduate Student, Lubbock

Utilizing cardiac index as a predictor of hemodynamic and cardiovascular stress in patients with pulmonary hypertension

Benjamin Daines, Medical Student, Lubbock

PKA signaling: a friend or foe to pediatric medulloblastoma

Itishree Kausinik, Graduate Student, Abilene

TABLE OF CONTENTS

TEXAS TECH UNIVERSITY
HEALTH SCIENCES CENTER™

Greetings!

It is my great pleasure to welcome everyone to the 2021 (Virtual) Student Research Week on March 9th-12th. The theme for this year's 33rd Annual Student Research Week event is "NEURO: New Experiences Unfold Research Opportunities." We are extremely proud this year to host two outstanding and highly distinguished keynote speakers: Dr. Bryan Roth, MD-PhD Michael Hooker Distinguished Professor in the Department of Pharmacology at the University of North Carolina Chapel Hill, Director of the National Institute of Mental Health Psychoactive Drug Screening Program, and member of the National Academy of Medicine of the National Academy of Sciences (2014); and Dr. Susan Amara, PhD Scientific Director of the Intramural Research Program at the National Institute of Mental Health, and member of the National Academy of Sciences (2004).

I am extremely indebted to the 2021 Student Research Week Organizing Committee: Mariacristina Mazzitelli (Director), Emily Vanderpool (Director of Marketing), Peyton Presto (Director of Operations), Nicholas Evans (Poster Competition Coordinator), Morgana Kellogg (GSA President) and Dalia Martinez- Marin (GSA Vice-President). They have all done a tremendous job! I am particularly grateful for the hard work and assistance from Leslie Fowler, Pam Johnson, Ashlee Rigsby, Deidra Satterwhite, the Department of Pharmacology and Neuroscience, and the entire GSBS staff. Also special thanks to Dr. Neugebauer, the host department chair, and Dr. Betsy Jones for coordinating activities with the School of Medicine, all faculty, staff, and GSBS students for their efforts and time. Finally, I would also like to thank President Lori Rice-Spearman, Chancellor Mitchell, Dean Berk, Dean Evans, Dean Smith, Dean Sechrist, and Drs. Varma, Prien, Sizer, Grisham, Altenberg, Byrd, Philips, Thekkumkara, Ganapathy, Abbruscato, Dissanaike, Jumper, Srivastava, and Bergeson for their support that has made this event possible.

This year SRW will be held as an exclusively virtual event due to Covid-19 pandemic. Nevertheless, the GSBS and the GSA are very excited about hosting a virtual Student Research Week Banquet- The Roaring 20's. Funds raised from donations and a silent auction will be used to support student scholarships. We are grateful to all donors for their help in making this special event possible. Special thanks to the GSA committee, especially the GSA President Morgana Kellogg, for organizing and hosting the event this year.

Please join this year's Student Research Week and attend all the great presentations. It is a wonderful opportunity to meet our students, learn about their work, and discuss research in general. This year we have a special IPE session on COVID-19 Awareness featuring: Nicole Hines, R.N., MSN, CIC; Dr. Ron Cook, DO, MPH, FAAFP, MBA; Dr. Darrin D'Agostino, DO, MPH, MBA; Dr. Ebtesam Islam, MD-PhD; Dr. Jeff Dennis, PhD; Dr. Sharilyn Almodovar, PhD; Dr. Jacob Nichols, MD; and Dr. Trey Morris, MD.

The past year has been full of challenges, but I am immensely proud of our students, faculty and staff. Everyone has displayed amazing resilience, compassion, diligence, and dedication. Let's greet all of our speakers and celebrate our 33rd Annual Student Research Week with fully packed Zoom sessions. Thanks much and all the best!

Brandt L. Schneider, Ph.D.
Dean of the Graduate School of Biomedical Sciences

TEXAS TECH UNIVERSITY
HEALTH SCIENCES CENTER™

Welcome!

On behalf of the Student Research Week (SRW) committee, we'd like to welcome you to the 33rd annual (Virtual) Student Research Week 2021: "NEURO: New Experiences Unfold Research Opportunities". This is an annual event organized by the Texas Tech University Health Sciences (TTUHSC) Graduate School of Biomedical Science (GSBS), Lubbock Campus. SRW is an incredible event that brings together students from different TTU and TTUHSC schools and campuses; giving them the opportunity to present their research, win awards, and meet with keynote speakers throughout the week. During the virtual SRW, students have the opportunity to present a poster detailing their research and learn about scientific discoveries from distinguished visiting keynote speakers.

Each year, SRW features a new theme highlighting advances in various areas of biomedical research. This year's theme is "NEURO: New Experiences Unfold Research Opportunities" and is hosted by the Department of Pharmacology and Neuroscience. Two outstanding biomedical scientists will give keynote addresses on Friday, March 12th, highlighting this topic. Bryan Roth, MD, PhD Michael Hooker Distinguished Professor in the Department of Pharmacology at the University of North Caroline Chapel Hill, Director of the National Institute of Mental Health Psychoactive Drug Screening Program, and member of the National Academy of Medicine of the National Academy of Sciences (2014). Roth received his MD/PhD in Medicine and Biochemistry from the St. Louis University Medical School, he subsequently trained in pharmacology (NIH), molecular biology, and psychiatry at Stanford. Among Roth's major discoveries include the discovery of the 5-HT2B serotonin receptor as the molecular target responsible for drug-induced valvular heart disease, the discovery of the kappa-opioid receptor as the molecular target for salvinorin A's psychoactive actions and the development and validation of the widely used chemogenetic technology DREADDs (Designer Receptors Exclusively Activated by Designer Drugs). Susan Amara received the Ph.D. in Physiology and Pharmacology from the University of California, San Diego and held faculty positions at Yale University School of Medicine, at the Vollum Institute in Portland Oregon and as a Howard Hughes Medical Institute Investigator at Yale and Oregon. Amara is currently the Scientific Director of the Intramural Research Program at the National Institute of Mental Health. Work in her laboratory has focused on the structure, function, and cellular physiology of neurotransmitter transporters, including glutamate transporters as well as the biogenic amine transporters, major targets for psychostimulant drugs and antidepressants. These scientists are outstanding researchers and they fully represent this year's theme with their discoveries and achievements. SRW committee encourages everyone to attend their seminars on Friday, followed by the Virtual Roundtable with the Speakers and poster awards ceremony.

The SRW poster competition, starting the afternoon of Tuesday, March 9th, gives students the opportunity to present their research and view the research of other students in a conference-like atmosphere. There will be students from all TTU and TTUHSC campuses, with over 260 students presenting their research this year. We would like to invite everyone to visit the posters posted online on Sakai to learn about ongoing student research projects.

SRW would not be possible without the tireless and dedicated efforts of numerous people working to make it the success it is. We would like to thank the faculty and staff of the GSBS, the Offices of Student Services and Marketing and Communications, the School of Medicine, and the Department of Pharmacology and Neuroscience. We would also like to thank President Rice-Spearman, Chancellor Mitchell and Drs. Scheider, Prien, Neugebauer, Berk, Varma, Ashcraft, and Jones. Lastly, we'd like to thank all of the participants in the 33rd annual Student Research Week, whose ideas and shared research are what make this such a successful event each year.

Sincerely,
The 33rd Annual Student Research Week Committee

Mariacristina Mazzitelli, Emily Vanderpool, Nicholas Evans, and Peyton Presto

33RD ANNUAL TTUHSC STUDENT RESEARCH WEEK SCHEDULE

TUESDAY, MARCH 9, 2021

1:00pm - 4:00pm	***Poster Session I***

WEDNESDAY, MARCH 10, 2021

9:00am - 12:00pm	***Poster Session II***
1:00pm - 4:00pm	***Poster Session III***

THURSDAY, MARCH 11, 2021

9:00am - 12:00pm	***Poster Session IV***
1:00pm - 4:00pm	***Poster Session V***

FRIDAY, MARCH 12, 2021

9:00am - 10:00am	***Susan Amara***
10:15am - 12:00pm	***Student Speakers***
12:00pm - 1:00pm	***Lunch & IPE Discussion***
1:00pm - 2:00pm	**Bryan Roth**
2:00pm - 2:30pm	***Roundtable with Speakers***
2:30pm - 3:00pm	***Banquet Video***
3:00pm - 3:30pm	***Remarks from TTUHSC Leaders***
3:30pm	***Award Ceremony & Silent Auction***

SPEAKERS

Susan Amara, Ph.D.

Scientific Director of the Intramural Research Program
National Institute of Mental Health

Dr. Amara is currently the Scientific Director of the Intramural Research Program at the National Institute of Mental Health. She received a BS from Stanford University, a PhD in Physiology and Pharmacology from the University of California, San Diego and has previously held faculty positions at Yale University School of Medicine, at the Vollum Institute in Portland Oregon and as a Howard Hughes Medical Institute Investigator at Yale and in Oregon. Prior to moving to NIH she served as the Thomas Detre Chair of Neurobiology and Distinguished Professor at the University of Pittsburgh School of Medicine. She also serves as an Associate Editor for the Annual Review of Pharmacology and Toxicology and is the editorial board of PNAS. She is a member of the National Academy of Sciences (2004), a fellow of the American Association for the Advancement of Science (2007) and a past-President of the Society for Neuroscience (2011). From 2010 to 2011, she has served on the Board of Scientific Counselors for the National Institute on Drug Abuse (NIDA) and for the National Institute on Alcohol Abuse and Alcoholism, as a Secretary-Treasurer of ASPET. Her main research interests are the parts of the brain that get activated when people take certain addictive drugs, specifically attention deficit hyperactive disorder (ADHD) medicine (Adderall and Ritalin), cocaine, and antidepressants. Amara's laboratory examined the impact of psychostimulant and antidepressant drugs on the signaling properties, physiology and regulation of two families of sodium-dependent neurotransmitter transporters, which are the biogenic amine and the excitatory amino acid carriers.

Bryan Roth, MD, Ph.D.

Distinguished Professor,
UNC School of Medicine;
Director of Psychoactive Drug Screening Program,
National Institute of Mental Health

Bryan L. Roth MD, PhD is the Michael Hooker Distinguished Professor of Pharmacology at the University of North Carolina, Chapel Hill School of Medicine, Director of the National Institute of Mental Health Psychoactive Drug Screening Program, and member of the National Academy of Medicine of the National Academy of Sciences (2014). Trained as a Psychiatrist and biochemist, Dr. Roth has published more than 400 papers in the general area of the molecular pharmacology of drug actions, including a large number of papers published in Science, Nature and Cell over the past decade. Among Dr. Roth's major discoveries include the discovery of the 5-HT2B serotonin receptor as the molecular target responsible for drug-induced valvular heart disease, the discovery of the kappa-opioid receptor as the molecular target for salvinorin A's psychoactive actions and the development and validation of the widely used chemogenetic technology DREADDs (Designer Receptors Exclusively Activated by Designer Drugs). Dr. Roth has received a number of honors including the Goodman and Gilman Award for Receptor Pharmacology (ASPET; 2016) and election to the National Academy of Medicine of the National Academy of Sciences (2014). Dr. Roth also given many endowed lectures focused on pharmacology including the Goodman, Koppyani and Philip S. Portoghese Lectures. Dr. Roth has also been named a Thompson Reuters 'Highly Cited Scientist' in Pharmacology and in Biology and Biochemistry.

JUDGES

Abraham Al-Ahmad, Ph.D.
Pharmaceutical Sciences

Emily Bailey
Public Health

Khalid Benamar, Ph.D.
Pharmacology and Neuroscience

Susan Bergeson, Ph.D.
Cell Biology and Biochemistry

Michael Blanton, Ph.D.
Pharmacology and Neurocience

Ion Alexandru Bobulescu, M.D.
Cell Biology and Biochemistry

Theresa Byrd, DrPH
Public Health

Beverly Chilton, Ph.D.
Cell Biology and Biochemistry

Gail Cornwall, Ph.D.
Cell Biology and Biochemistry

John W. Culberson, M.D.
Family and Community Medicine

Jeff Dennis, Ph.D.
Public Health

Jannette Dufour, Ph.D.
Cell Biology and Biochemistry

Cheryl Erwin, JD, Ph.D.
Medical Education

Nadezhda German, Ph.D.
Pharmaceutical Sciences

John Griswold, M.D.
Surgery

Lan Guan, M.D., Ph.D.
Cell Physiology and Molecular Biophysics

Josee Guindon, Ph.D., DVM
Pharmacology and Neuroscience

Abdul Hamood, Ph.D.
Immunology & Molecular Microbiology

Shyanne Hefley, Ph.D.
Pediatrics

George I. Henderson, Ph.D.
Pharmacology and Neuroscience

Hutton Jones, M.S.
Research Commercialization

Cynthia Jumper, M.D., M.P.H.
Public Health

Min Kang, PharmD
Pediatrics

Gurvinder Kaur, Ph.D.
Cell Biology and Biochemistry

Michelle Keyel, Ph.D.
Cell Biology and Biochemistry

Takaki Kiritoshi, Ph.D.
Pharmacology and Neuroscience

Cassie Kruczek, Ph.D., M.S.
Medical Education

Subodh Kumar, Ph.D.
Garrison Institute on Aging

Irene La-Beck, Pharm.D.
Pharmaceutical Sciences

Josh Lawrence, Ph.D.
Pharmacology and Neuroscience

Hongjun (Henry) Liang, Ph.D.
Cell Physiology and Molecular Biophysics

Clinton MacDonald, Ph.D.
Cell Biology and Biochemistry

Raul Martinez-Zaguilan, Ph.D.
Cell Physiology and Molecular Biophysics

Barry Maurer, M.D., Ph.D.
Cell Biology and Biochemistry

Constantinos Mikelis
Pharmaceutical Sciences

Vijayan Murali, Ph.D.
Internal Medicine

Srinivas Nandana, Ph.D.
Cell Biology and Biochemistry

Volker Neugebauer, M.D., Ph.D.
Pharmacology and Neuroscience

Kumar Palle, Ph.D.
Cell Biology and Biochemistry

Girijesh K Patel, Ph.D.
Cell Physiology and Molecular Biophysics

Igor Ponomarev, Ph.D.
Pharmacology and Neuroscience

Trey Putnam, Pharm.D.
Pharmaceutical Sciences

Bhagavathi Ramasubramanian, Ph.D.
Internal Medicine

Fahmida Rasha, Ph.D.
Immunology and Molecular Microbiology

Rial Rolfe, Ph.D.
Immunology and Infectious Diseases

Kendra Rumbaugh, Ph.D.
Surgery

Ashish Sarangi, MD
Psychiatry

Cameron Smith, J.D., CLP
Research Commercialization

Julie St. John, DrPh, MA
Public Health

Scott Trasti, DVM
Laboratory Animal Research Center

Manisha Tripathi, Ph.D.
Cell Biology and Biochemistry

Ina Urbatsch, Ph.D.
Cell Biology and Biochemistry

Alice Villalobos, Ph.D.
Medical Education

CRITERIA FOR SCIENTIFIC RESEARCH

SIGNIFICANCE/ INTRODUCTION:

1. Current hypothesis is clearly defined.
2. Sufficient background is presented for understanding of the study.
3. Significance of the problem under investigation is clearly indicated.
4. Hypothesis is clearly stated.

METHODS:

1. Methods utilized are clearly explained.
2. Experimental design is valid for question addressed. (Are there any methods that would be better utilized?)

RESULTS:

1. Results are clearly stated.
2. Controls are addressed and appropriate.
3. Figures/tables clearly convey intended information.
4. Presented hypothesis has been sufficiently addressed by results and/or future experiments. (All needed experiments have been mentioned.)

CONCLUSIONS/DISCUSSION:

1. Conclusions are clearly described.
2. Conclusions are supported by observations and literature background.
3. Directions for future investigation or management of similar cases are indicated/discussed.

PRESENTATION /RESPONSE TO QUESTIONS:

1. Overall style of the presentation is effective (delivery/eye contact).
2. Presenter uses time effectively
3. Presenter answers questions in an organized, concise, and accurate fashion.
4. Presenter offers additional insight to discussion.

CRITERIA FOR CASE PRESENTATIONS

SIGNIFICANCE/ INTRODUCTION:

1. Case history is clearly defined.
2. Sufficient patient background and literature is presented for understanding the medical problem.
3. Significance of the problem under investigation and rationale for reporting the case is clearly indicated. Uniqueness of the case study is clearly explained.

METHODS:

1. Clinical test used are clearly explained. Any unusual test performed include the laboratory's ranges of normal values.
2. Approach to the problem presented by this patient is appropriate. Though process of determining appropriate diagnosis, including differential diagnoses, is explained.

RESULTS:

1. Patient clinical results presented are pertinent and clearly presented.
2. Diagnosis presented is sufficiently addressed by results/future clinical work.

CONCLUSIONS/DISCUSSIONS:

1. Conclusions are clearly described.
2. Conclusions are supported by observations and literature background.
3. Recommended treatment and outcome of treatment are discussed (if applicable.
4. Directions for future investigation or management of similar cases are indicated.

PRESENTATION/RESPONSE TO QUESTIONS:

1. Overall style of the presentation is effective (delivery/eye contact).
2. Presenter uses time effectively
3. Presenter answers questions in an organized, concise, and accurate fashion.
4. Presenter offers additional insight to discussion.

CRITERIA FOR LITERATURE REVIEW

SIGNIFICANCE/ INTRODUCTION:

1. Thorough evaluation of existing literature is performed
2. Gap in knowledge is identified
3. Rationale for literature review is novel and clear
4. Objectives/aims are clearly defined

METHODS:

1. Complex search strategies are used (subject headings, multiple keywords used, etc.)
2. Multiple databases are used
3. Methods are clearly defined

RESULTS:

1. Literature is well organized and explained
2. Review is placed in broader context
3. Diverse results synthesized into something new and relevant
4. Summary table or graph is present, easy to understand, and visually appealing
5. References are appropriately cited

CONCLUSIONS/DISCUSSION:

1. Clear synthesis of project findings
2. Importance of findings is addressed
3. Future directions are clearly listed

PRESENTATION /RESPONSE TO QUESTIONS:

1. Overall style of presentation is effective (eye contact, clear delivery, etc.)
2. Presenter uses time effectively
3. Presenter answers questions in an organized, concise, and accurate fashion
4. Presenter offers additional insight to discussion

PARTICIPANTS

GRADUATE STUDENTS YEARS 1-2

Tanisha Basu
Caroline Black
Trevor Burrow
Shelby Corbitt
Rebecca Gabrilska
Shreyas Gaikwad
Courtney Katz
Mosharaf Mahmud Syed
Sarah Miller
Hallie Morton
Stephany Navarro
Nhi Nguyen
Tasmin Rahman Omy
Peyton Presto
Neha Sawant
Sadisna Shahi
Tyler Sniegowski
Emily Vanderpool
Aashlesha Walchale
Rachel Washburn

GRADUATE STUDENTS YEARS 3+

Jiwasmika Baishya
Kevin Bass
Henry Blanton
Josue Enriquez
Sarah Hernandez
Taylor Hibler
Valeria Jaramillo-Martinez
Itishree Kaushik
Morgana Kellogg
Ksenija Korac
Taylor Lenzmeier
Dalia Martinez-Marin
Mariacristina Mazzitelli
Caitlyn Myers
Bradley Schniers
Ryan Sweazey
Emily Wright
Victoria Young

SCHOOL OF PHARMACY

Iqra Pervaiz
Sree Pooja Varahachalam

MEDICAL STUDENTS YEARS1-2 | GRADUATE MEDICAL SCIENCES | MASTER OF PUBLIC HEALTH

Hussain Abidi
Habib Abla
Jonathan Abraham
Veena Agusala
Hisham Ali
Kiran Ali
Kiana Banafshay
Vishal Bandaru
Bryan Bashrum
Jaxon Baum
Benjamin Becker
Elisa Biondo
Emma Brackett
Evan Bradshaw
Whitney Brantley
Elizabeth Brown
Chris Bruce
Stephanie Bui
Michael Carey
Maribel Castro
Jason Chen
Andrew Chen
Angela Chen
Kevin Chin
Laxmi Chintakayala
Erin Choi
John Ciubuc
Reagan Collins
Brandon Couch
Kristina Cross
Brigid Cruser
Ben Daines
Michael Dang
Hannah Daniel
Vanessa Davis
Zoe Davis
Daniel De Simon
Rodan Devega
Samantha Dillawn
Jeremy Doan
Travis Dowdle
Tochi Eboh
Elizabeth Eichman
Abigail Ellington
Adrian Falco
Emily Fine
Riley Fortner
Bernardo Galvan
Riya Ganji
Ana Garcia
Asher George
Alec Giron
Joseph Greene
Holly Grossman
Brady Gunter
Delton Hall
Craig Hannon
Kenneth Hardy
Caleb Hawkes
Dan Hayward
Katherine Holder
Joey Holzer
Omid Hosseini
Abigail Jackson
Adrian Jacobparayil
Neil Jain
Thomas Jarman
Albin John
Daemar Jones
Lewis Kelly
Shazma Khan
Sonia Khan
Abdurrahman Kharbat
Dalynn Kim
Rachel Kortman
Riya Koshy
Christopher Le
En-Dien (Samuel) Liao
Hector Linares Garcia
Dallin Low
Elleana Majdinasab
Brianna Marschke
Harrison Marsh
Kirby Mateja
Sarah Matsunaga
Adin Mizer

Erin Morris
Vianne Nanez
Cristina Natha
Tommy Ngo
Dalena Nguyen
Anormeh Noamesi
Ozman Ochoa
Michelle Onuoha
Shannon Pan
Shree Patel
Parth Patel
Daniel Payberah
Cody Perry
Gabrielle Plata
Mohammed Pourghaed
Abigail Raef
John Rafael
Stefan Raicevic
Malvika Ramesh
Nikita Rao
Sanjana Rao
Nandini Ray
Sparsh Ray
Soumya Reddy
Riley Reich
Erin Rice
Austin Rodgers
Jaremy Rodriguez
Stephen Rossettie
Anna Sabu-Kurian
Niki Sankoorikkal
Emily Sargent
Shayan Sarrami
Anudeeksha (Anu) Satheeshkumar
Madison Schoeberl
Kaylee Schrader
Alexis Schuck
Jake Sellers
Miriam Shayeb
Shyam Sheladia
Susan Sherali
Arham Siddiqui
Michelle Terry
Aaron Thomas
Gene Thompson
Christina Tompkins
Michael Tran
Mariana Trevino
Brittany Tu
Jessyca Turner
Varun Vemulapalli
Rachel Vopni
John Wall
Haven Ward
Daniel Wood
Adam Wynn
Tiffany Xu
Madeline Young
Alex Zapata
Christina Zhu

MEDICAL STUDENTS YEARS 3-4

Zain Ali
Mahmud Alkul
Layan Al-Sukhni
Rohan Anand
Sabiha Armin
Anna Bowman
Ellen Brown
Luis Castro
Sarah Choi
Nathan Chow
Victoria Chu
E.L. Domingo-Johnson
Kristen Fain
Callie Fort
Joshua Frost
Andres E Guerrero Criado
Emily Hecox
Brianna Hope
Landon Hope
Bella Kalayilparampil
Alfred Kankam
Cimron Kashyap
Ryan Keck
Rebecca Kusko
Shanshan Lee
Christine Lin
Rachel Lowe
Cameron Ludwig
Megan Mikkelson
Nitish Mittal
Anna Nevels
Dubem Onyejegbu
Dhruv Patel
Joshua Peterson
Christopher Peterson
Kyla Petrie
Jasmin Rahesh
Elsy Rivera
Alexsandra Rojas
Esha Singhal
Seth Swinney
Ilina Terziyski
Caroline Thompson
Aurelio Vargas
Diana Vo
Anisa Wakil
Brooke Walterscheid
Ellen Wilson
Justine Yamashiro
San Zadoo

RESIDENTS & CLINICAL FELLOWS

KaKa Adams
Dominique Gagnon
Amanda Huggett
Kenneth Iwuji
Heather Layher
Ryan Lurtsema
Dylan Maldonado
Arunee Motes
Jeremy Purser
Rafael Rosalez
Ashish Sarangi
Kerala Saugh
Eri Shoji
Tysen Weber

SCHOOL OF HEALTH PROFESSIONS

YoRong Chen
Sukanya Sarangi

UNDERGRADUATE

Georgia Rae Atkins
Caroline Biltz
Sai Pranathi Bingi
Alondra Chavez
Mikaela Daum
Mark Gao
Isaiah George
Andrew Ibrahim
Andrea Perez
Rebecca Schneider
Daniel Xue

JUDGING GROUPS

Judging Group 1 - Tuesday, March 10, 2021

(All the following times are PM!)

Time	Name
1:00-1:15	Schuck, Alexis
1:15-1:30	Pan, Shannon
1:30-1:45	Payberah, Daniel
1:45-2:00	Rao, Sanjana
2:00-2:15	Rice, Erin
BREAK	
2:45-3:00	Thompkins, Christina
3:00-3:15	Tran, Michael
3:15-3:30	Trevino, Mariana
3:30-3:45	Vemulapalli, Varun
3:45-4:00	Rossettie, Stephen

Judging Group 2 - Tuesday, March 10, 2021

(All the following times are PM!)

Time	Name
1:00-1:15	Ali, Kiran
1:15-1:30	Bruce, Chris
1:30-1:45	Carey, Michael
1:45-2:00	Chin, Kevin
2:00-2:15	Devega, Rodan
2:15-2:30	Ellington, Abigail
BREAK	
2:45-3:00	Giron, Alec
3:00-3:15	Hannon, Craigh
3:15-3:30	Holder, Kate
3:30-3:45	Ward, Haven

Judging Group 3 - Tuesday, March 10, 2021

(All the following times are PM!)

Time	Name
1:00-1:15	Jain, Neil
1:15-1:30	Ynn, Adam
1:30-1:45	Le, Christopher
1:45-2:00	Morris, Erin
2:00-2:15	Low, Dallin
2:15-2:30	Majdinasab, Elleana
BREAK	
2:45-3:00	Marschke, Brianna
3:00-3:15	Liao, En-Dien (Samuel)
3:15-3:30	Natha, Cristina
3:30-3:45	Ngo, Tommy
3:45-4:00	John, Albin

Judging Group 4 - Tuesday, March 10, 2021

(All the following times are PM!)

Time	Name
1:00-1:15	George, Asher
1:15-1:30	Grossman, Holly
1:30-1:45	Hall, Delton
1:45-2:00	Hayward, Dan
2:00-2:15	Jarman, Thomas
2:15-2:30	Kharbat, Abdurrahman
BREAK	
2:45-3:00	Kortman, Rachel
3:00-3:15	Marsh, Harrison
3:15-3:30	Mateja, Kirby
3:30-3:45	Mizer, Adin
3:45-4:00	Nanez, Vianne

Judging Group 5 - Tuesday, March 10, 2021

(All the following times are PM!)

Time	Name
1:00-1:15	Patel, Parth
1:15-1:30	Pourghaed, Mohammed
1:30-1:45	Choi, Erin
1:45-2:00	Dowdle, Travis
2:00-2:15	Rao, Nikita
2:15-2:30	Reddy, Soumya
BREAK	
2:45-3:00	Sankoorikkal, Niki
3:00-3:15	Satheeshkumar, Anudeeksha (Anu)
3:15-3:30	Schoeberl, Madison
3:30-3:45	Schrader, Kaylee
3:45-4:00	Sheladia, Shyam

Judging Group 1A - Wednesday, March 11, 2021

(All the following times are AM!)

Time	Name
9:00-9:15	Banafshay, Kiana
9:15-9:30	Biondo, Elisa
9:30-9:45	Bradshaw, Evan
9:45-10:00	Castro, Mirabel
10:00-10:15	Cross, Kristina
10:15-10:30	Ray, Nadini
BREAK	
10:45-11:00	Vopni, Rachel
11:00-11:15	Matsunaga, Sarah
11:15-11:30	Basu, Tanisha
11:30-11:45	Castro, Luis
11:45-12:00	Chu, Victoria

Judging Group 2A - Wednesday, March 11, 2021

(All the following times are AM!)

Time	Name
9:00-9:15	Chen, Jason
9:15-9:30	Chen, Andrew
9:30-9:45	Davis, Zoe
9:45-10:00	Reich, Riley
10:00-10:15	Ochoa, Ozman
10:15-10:30	Baum, Jaxon
BREAK	
10:45-11:00	Rodgers, Austin
11:00-11:15	Rodriguez, Jaremy
11:15-11:30	Wall, John
11:30-11:45	Wood, Daniel
11:45-12:00	Noamesi, Anormeh

Judging Group 3A - Wednesday, March 11, 2021

(All the following times are AM!)

Time	Name
9:00-9:15	Linares Garcia, Hector
9:15-9:30	Sabu-Kurian, Anna
9:30-9:45	Onuoha, Michelle
9:45-10:00	Choi, Sarah
10:00-10:15	Lin, Christine
10:15-10:30	Onyejegbu, Dubem
BREAK	
10:45-11:00	Petrie, Kyla
11:00-11:15	Anand, Rohan
11:15-11:30	Brown, Ellen
11:30-11:45	Frost, Joshua
11:45-12:00	Guerrero Criado, Andres

Judging Group 4A - Wednesday, March 11, 2021

(All the following times are AM!)

Time	Name
9:15-9:30	Couch, Brandon
9:30-9:45	Daniel, Hannah
9:45-10:00	Eichman, Elizabeth
10:00-10:15	Greene, Joseph
10:15-10:30	Hawkes, Caleb
BREAK	
10:45-11:00	Jones, Daemar
11:00-11:15	Sellers, Jake
11:15-11:30	Tu, Brittany
11:30-11:45	Zhu, Christina
11:45-12:00	Collins, Reagan

Judging Group 5A - Wednesday, March 11, 2021

(All the following times are AM!)

Time	Name
9:15-9:30	Al-Sukhni, Layan
9:30-9:45	Armin, Sabiha
9:45-10:00	Bowman, Anna
10:00-10:15	Chow, Nathan
10:15-10:30	Domingo-Johnson, E.L.
BREAK	
10:45-11:00	Fain, Kristen
11:00-11:15	Hope, Brianna
11:15-11:30	Hope, Landon
11:30-11:45	Kalayilparampil, Bella
11:45-12:00	Kashyap, Cimron

Judging Group 1B - Wednesday, March 11, 2021

(All the following times are PM!)

Time	Name
1:00-1:15	Fort, Callie
1:15-1:30	Kankam, Alfred
1:30-1:45	Peterson, Christopher
1:45-2:00	Wakil, Anisa
2:00-2:15	Zadoo, San
2:15-2:30	Shoji, Eri
BREAK	
2:45-3:00	George, Isaiah
3:00-3:15	Xue, Daniel
3:15-3:30	Ganji, Riya

Judging Group 2B - Wednesday, March 11, 2021

(All the following times are PM!)

Time	Name
1:00-1:15	Abla, Habib
1:15-1:30	Bandaru, Vishal
1:30-1:45	Dang, Michael
1:45-2:00	Davis, Vanessa
2:00-2:15	Fortner, Riley
2:15-2:30	Gunter, Brady
BREAK	
2:45-3:00	Hardy, Kenneth
3:00-3:15	Holzer, Joey
3:15-3:30	Kelly, Lewis
3:30-3:45	Plata, Gabrielle
3:45-4:00	Sarangi, Sukanya

Judging Group 3B - Wednesday, March 11, 2021

(All the following times are PM!)

Time	Name
1:00-1:15	Hecox, Emily
1:15-1:30	Keck, Ryan
1:30-1:45	Ali, Zain
1:45-2:00	Rivera, Elsy
2:00-2:15	Singhal, Esha
2:15-2:30	Terziyski, Ilina
BREAK	
2:45-3:00	Yamashiro, Justine
3:00-3:15	Mikkelson, Megan
3:15-3:30	Thompson, Caroline
3:30-3:45	Walterscheid, Brooke
3:45-4:00	Chen, YoRong

Judging Group 4B - Wednesday, March 11, 2021

(All the following times are PM!)

Time	Name
1:00-1:15	Rojas, Alexsandra
1:15-1:30	Vargas, Aurelio
1:30-1:45	Vo, Diana
1:45-2:00	Wilson, Ellen
2:00-2:15	Swinney, Seth
2:15-2:30	Alkul, Mahmud
BREAK	
2:45-3:00	Gao, Mark
3:00-3:15	Ibrahim, Andrew
3:15-3:30	Perez, Andrea
3:30-3:45	Schneider, Rebecca
3:45-4:00	Biltz, Caroline

Judging Group 5B - Wednesday, March 11, 2021

(All the following times are PM!)

Time	Name
1:00-1:15	Chen, Angela
1:15-1:30	Ciubuc, John
1:30-1:45	Koshy, Riya
1:45-2:00	Xu, Tiffany
2:00-2:15	Rafael, John
2:15-2:30	Ray, Sparsh
BREAK	
2:45-3:00	Sarrami, Shayan
3:00-3:15	Rahesh, Jasmin

Judging Group 6A - Thursday, March 12, 2021

(All the following timings are AM!)

Time	Name
9:00-9:15	Turner, Jessyca
9:15-9:30	Kim, Dalynn
9:30-9:45	Abraham, Jonathan
9:45-10:00	Agusala, Veena
10:00-10:15	Ali, Hisham
10:15-10:30	Jacobparayil, Adrian
BREAK	
10:45-11:00	Becker, Benjamin
11:00-11:15	Brantley, Whitney
11:15-11:30	Chintakayala, Laxmi
11:30-11:45	Ramesh, Malvika
11:45-12:00	De Simon, Daniel

Judging Group 7A - Thursday, March 12, 2021

(All the following timings are AM!)

Time	Name
9:00-9:15	Shayeb, Miriam
9:15-9:30	Terry, Michelle
9:30-9:45	Thomas, Aaron
9:45-10:00	Thompson, Gene
10:00-10:15	Zapata, Alex
10:15-10:30	Hosseini, Omid
BREAK	
10:45-11:00	Bui, Stephanie
11:00-11:15	Cruser, Brigid
11:15-11:30	Dillawn, Samantha
11:30-11:45	Falco, Adrian
11:45-12:00	Galvan, Bernardo

Judging Group 8A - Thursday, March 12, 2021

(All the following timings are AM!)

Time	Name
9:00-9:15	Gabrilska, Rebecca
9:15-9:30	Gaikwad, Shreyas
9:30-9:45	Katz, Courtney
9:45-10:00	Mahmud Syed, Mosharaf
10:00-10:15	Miller, Sarah
10:15-10:30	Morton, Hallie
BREAK	
10:45-11:00	Navarro, Stephany
11:00-11:15	Nguyen, Nhi
11:15-11:30	Omy, Tasmin Rahman
11:30-11:45	Presto, Peyton
11:45-12:00	Shahi, Sadisna

Judging Group 9A - Thursday, March 12, 2021
(All the following timings are AM!)

Time	Name
9:00-9:15	Peravaiz, Iqra
9:15-9:30	Pooja Varahachalam, Sree
9:30-9:45	Corbitt, Shelby
9:45-10:00	Sniegowski, Tyler
10:00-10:15	Walchale, Aashlesha
10:15-10:30	Washburn, Rachel
BREAK	
10:45-11:00	Sweazey, Ryan
11:00-11:15	Young, Victoria
11:15-11:30	Myers, Caitlyn
11:30-11:45	Schniers, Bradley
11:45-12:00	Mazzitelli, Mariacristina

Judging Group 10A - Thursday, March 12, 2021
(All the following timings are AM!)

Time	Name
9:00-9:15	Purser, Jeremy
9:15-9:30	Rosalez, Rafael
9:30-9:45	Huggett, Amanda
9:45-10:00	Iwuji, Kenneth
10:00-10:15	Layher, Heather
10:15-10:30	Lurtsema, Ryan
BREAK	
10:45-11:00	Adams, Kaka
11:00-11:15	Gagnon, Dominique
11:15-11:30	Maldonado, Dylan
11:30-11:45	Patel, Dhruv
11:45-12:00	Peterson, Joshua

Judging Group 6B - Thursday, March 12, 2021
(All the following timings are PM!)

Time	Name
1:00-1:15	Brackett, Emma
1:15-1:30	Raef, Abigail
1:30-1:45	Doan, Jeremy
1:45-2:00	Khan, Shazma
2:00-2:15	Khan, Sonia
2:15-2:30	Daines, Ben
BREAK	
2:45-3:00	Jackson, Abigail
3:00-3:15	Fine, Emily
3:15-3:30	Eboh, Tochi
3:30-3:45	Raicevic, Stefan
3:45-4:00	Garcia, Ana

Judging Group 7B - Thursday, March 12, 2021
(All the following timings are PM!)

Time	Name
1:00-1:15	Brown, Elizabeth
1:15-1:30	Bashrum, Bryan
1:30-1:45	Abidi, Hussain
1:45-2:00	Nguyen, Dalena
2:00-2:15	Perry, Cody
2:15-2:30	Sargent, Emily
BREAK	
2:45-3:00	Sherali, Susan
3:00-3:15	Patel, Shree
3:15-3:30	Black, Caroline
3:30-3:45	Burrow, Trevor
3:45-4:00	Siddiqui, Arham

Judging Group 8B - Thursday, March 12, 2021
(All the following timings are PM!)

Time	Name
1:00-1:15	Baishya, Jiwasmika
1:15-1:30	Bass, Kevin
1:30-1:45	Blanton, Henry
1:45-2:00	Enriquez, Josue
2:00-2:15	Hernandez, Sarah
2:15-2:30	Hibler, Taylor
BREAK	
2:45-3:00	Jaramillo-Martinez, Valeria
3:00-3:15	Kaushik, Itishree
3:15-3:30	Kellogg, Morgana
3:30-3:45	Wright, Emily
3:45-4:00	Korac, Ksenija

Judging Group 9B - Thursday, March 12, 2021
(All the following timings are PM!)

Time	Name
1:00-1:15	Lenzmeier, Taylor
1:15-1:30	Martinez-Marin, Dalia
1:30-1:45	Motes, Arunee
1:45-2:00	Sarangi, Ashish
2:00-2:15	Saugh, Kerala
2:15-2:30	Weber, Tysen
BREAK	
2:45-3:00	Atkins, Georgia Rae
3:00-3:15	Bingi, Sai Pranathi
3:15-3:30	Chavez, Alondra
3:30-3:45	Daum, Mikaela
3:45-4:00	Vanderpool, Emily

Judging Group 10B - Thursday, March 12, 2021
(All the following timings are PM!)

Time	Name
1:00-1:15	Kusko, Rebecca
1:15-1:30	Lee, Shanshan
1:30-1:45	Lowe, Rachel
1:45-2:00	Ludwig, Cameron
2:00-2:15	Mittal, Nitish
2:15-2:30	Nevels, Anna

BASU, TANISHA

Impact of Calorie Restricted Diet on Dementia and Alzheimer's Disease: Focus on Gut Microbiota

Tanisha Basu, Erika Orlov, Hallie Morton, Murali Vijayan and P. Hemachandra Reddy

Alzheimer's disease (AD) is a neurodegenerative condition that affects an estimated 5.8 million Americans. It is the 6th leading causing of death in the United States and is estimated to be the 3rd most common cause of death for elderly. Among the Alzheimer's research community, it is a growing interest to investigate the possible implications of lifestyle, primarily nutrition, on preventing and/or managing dementia. Calorie restriction (CR) aims at reducing the total calorific value of daily food intake. It is a popular nutritional treatment approach that has shown positive effects on reducing the risk factors of chronic conditions like diabetes, cardiovascular diseases and obesity. Our study is designed to discuss the existing evidence on the impact of CR on dementia and AD and propose the gaps in research in this field that need to be further investigated. We surveyed studies conducted on both human and animal models, which showed a significant positive association between CR and the delayed onset or progression of dementia. Mouse studies have shown to reduce the amyloid-beta (Aβ) plaque formation in the brain, which is one of the most important pathological hallmarks of AD. Several clinical studies have investigated the effects of various nutritional interventions involving some form of CR on cognitive decline and dementia, to show statistically significant results. CR is considered a means of improving metabolic health and reducing inflammatory cytokines and research suggests that they can both help improve cognitive status and dementia in elderly. There is also evidence to suggest that CR helps slow down changes in age-related gut microbiota, which in turn reduce Aβ accumulation and slow down cognitive decline. We mainly focused on this novel approach in which links can be established between gut and brain health. Our study identifies that there is still a huge scope for research in this field to understand the extent of the benefits of CR on dementia and AD.

School: Texas Tech University

BLACK, CAROLINE

Chronic Wound Polymicrobial Communities and the Impact to Antimicrobial Susceptibility

Caroline Black^1, Catherine Wakeman^1 & Allie Clinton Smith^2; Department of Biological Sciences^1 and Honors Studies^2, Texas Tech University

Recent advances in sequencing technologies have demonstrated that many chronic infections are polymicrobial in nature. In polymicrobial communities, multiple species interact and can synergize activities, leading to decreased antibiotic efficacy and worse patient outcomes. Chronic wounds are known to be polymicrobial biofilm-associated infections, and are highly refractory to clinical treatment. While there is an extensive body of literature demonstrating changes to antimicrobial efficacy in response to the biofilm environment, there is a notable paucity of studies examining the effects of polymicrobial synergism. This project investigates the shifts to antimicrobial efficacy of four clinically relevant wound pathogens (Staphylococcus aureus, Pseudomonas aeruginosa, Acinetobacter baumannii, and Enterococcus faecalis) when grown in a polymicrobial community. When comparing antimicrobial susceptibility in the monomicrobial verses polymicrobial condition, shifts in antimicrobial efficacy were observed. This demonstrates that current clinical methods for determining antibiotic susceptibility may not fully represent the clinical environment. Acknowledging the role of the polymicrobial community in infectious processes and their impact on antimicrobial susceptibility is crucial in order to more effectively treat patients and manage chronic infections.

School: Texas Tech University

BURROW, TREVOR

The Frequency of the Alternative Lengthening of Telomeres Across Tumor Histologies as Determined by the C-Circle Assay

Trevor Burrow, Shawn Macha, Balakrishna Koneru, Merrill Raju, Vanda Yazdani, C. P. Reynolds

The National Cancer Institute (NCI) projected new cancer cases to reach 1.8m in 2020. Approximately 10-15% of cancers do not express telomerase, and instead, use the alternative lengthening of telomeres (ALT) mechanism to achieve replicative immortality. ALT cancers typically have poor outcomes, but recently, our lab has identified unique molecular vulnerabilities in ALT cancers. Assays to identify ALT cancers will facilitate clinical trials of investigational drugs targeting ALT cancers. ALT PML bodies (APBs) and C-circles are characteristic markers for ALT. APBs are analyzed via IF-FISH, by counting PML co-localization foci at telomeres to determine ALT status. Previous studies implemented APB analysis to determine the landscape of ALT across tumor histologies. It was shown that sarcomas, and other tissues of neural crest or mesenchymal origin, comprise the majority of ALT cases.

C-circles, self-primed circular extrachromosomal telomeric DNA repeats, are a sensitive and specific biomarker for ALT. The C-circle Assay (CCA) consists of an isothermal phi-polymerase reaction that selectively amplifies C-circles, which are then detected by qPCR. ALT cancers have a significantly higher telomeric signal, due to the selective amplification. We utilized the CCA to determine ALT frequency in pediatric and adult solid tumors. A total of 1,162 samples yielded an ALT prevalence of 14.6%, with ALT+ frequency ranging from 73.6% in osteosarcomas to 1.3% in renal cancers.

Using the CCA we have demonstrated that a variety of pediatric and adult cancers are ALT+. Based on our sample cohort, we estimate > 250,000 new ALT cases occur each year in the US. Thus, ALT cancers comprise a large cross section of cancers that could share a common targetable molecular mechanism across histologies. If ALT cancers are shown to be susceptible to novel therapies in pre-clinical studies, the CCA may be employed as a companion diagnostic to identify patients likely to respond to such therapies.

School: Graduate School of Biomedical Sciences

CORBITT, SHELBY

Efficacy of Subject Specific Anki Decks in Educating First-Year Medical Students

Shelby Corbitt and Daniel Webster PhD

Biology of Cells and Tissues (BCT) has the highest number of failed exams of the first-year medical school curriculum at TTUHSC. The third unit of the course focuses on histology, which is traditionally taught through a combination of lectures and labs. We propose that Anki, an online flashcard program that uses spaced repetition to enhance long-term retention, could serve as a valuable supplemental resource in this course. The goal of this study was to determine if a BCT-specific histology Anki deck could enhance student performance and relieve stress.

The students were given an optional pre-quiz to take within the first 24 hours of the histology unit. The Anki deck was created from lecture notes and tissue sample images from faculty or Aperio, an online histology data base. A post-quiz was released two days prior to the unit exam to assess performance. The post-quiz results were separated by those who reported using the deck frequently and those who used it infrequently. A student satisfaction survey was administered to assess the perceived usefulness of the deck.

Analysis of the pre and post-quiz scores showed a statistically significant increase in the post-quiz scores overall ($p=0.0001$), regardless of usage of the deck. When comparing the post-quiz scores of the students who used the deck and those that did not there was no statistically significant difference ($p=0.3760$). Of the students surveyed, 93% reported finding the deck a helpful resource, and 82% reported that it relieved some of their stress.

These findings suggest that the use of the BCT-specific histology Anki deck did not have a significant impact on student academic performance when compared to those who utilized other methods. However, it was perceived by students as a helpful learning supplement that relieved some stress.

School: Graduate School of Biomedical Sciences

GABRILSKA, REBECCA

Genome-Wide Association Studies of the Human Chronic Wound Microbiota

Rebecca Gabrilska, Craig Tipton, Kendra Rumbaugh, Caleb Phillips

Impaired wound healing has been shown to be associated with the wound microbiota, however what role host genetics contribute to microbial composition of wounds is less clear. Microbiome genome-wide association studies (mbGWAS) can provide insight into host genetic factors that may influence bacterial community structure. Previous work has shown that the alpha diversity of chronic wound microbiota is significantly associated with specific human genomic loci. In this study, we perform an extension of this two-stage mbGWAS cohort, testing association of the relative abundances of multiple wound-relevant bacteria with patient genotype. We identified 5 bacterial taxa significantly associated with single nucleotide polymorphisms in the host genome. Interestingly, these taxa are all categorized as obligate anaerobes which have been shown to be associated with severe, non-healing wounds. For example, Porphyromonas is associated with a variant in fibroblast growth factor 17, where members of this family are known to play a role in tissue repair. Identification of correlated biomarkers may provide new mechanistic insight into microbe-host interactions and may serve as predictive risk factors to guide personalized management for chronic wound patients.

School: Graduate School of Biomedical Sciences

GAIKWAD, SHREYAS

Immunosuppressive role of atovaquone in triple negative breast cancer through modulation of ribosomal protein S19

Shreyas Gaikwad, Nehal Gupta, and Sanjay K Srivastava

Triple negative breast cancer (TNBC) treatment using immunotherapy has faced challenges such as the immune evasive nature of the tumors, making it difficult to achieve a significant response. One of the mechanisms involved in immunosuppression by the tumors is through ribosomal protein S19 (RPS19). RPS19 facilitates the recruitment of immunosuppressive MDSCs in tumors, which generate cytokines such as TGF-β and IL-10. RPS19 also induces the generation of regulatory T cells (T-regs). Therefore, immune system modulation could be one of the potential strategies for TNBC treatment. We evaluated the effect of atovaquone, an anti-protozoal drug, in three independent breast tumor models. Following oral administration of atovaquone, we observed a reduction of 45%, 70% and 42% in HCC1806, CI66, and 4T1-paclitaxel-resistant (4T1-PR) breast tumor growth respectively. We analyzed the proliferation of MDSCs and T-regs as well as expression of TGF-β and IL-10 in the in vivo models. Ex vivo analysis of the HCC1806 tumors revealed a reduction of 70% and 30% MDSC population in tumor and blood, respectively. In mice bearing CI66 and 4T1-PR tumors, we observed 25% reduction in tumor MDSCs. ELISA analysis revealed reduced expression of TGF-β and IL-10 in tumor lysates. Additionally, flow cytometric analysis of tumor lysates showed a reduction in T-reg population and, the western blotting analysis showed reduced expression of RPS19. Considering the observed effects on immunosuppressive components, our study provides impetus to further explore the immunotherapeutic effects of atovaquone.

School: Graduate School of Biomedical Sciences

IQRA, PERVAIZ

Brain microvascular endothelial cells are sensitive to hypoglycemia, and partially rescued by ketone bodies

Iqra Pervaiz, Abraham J. Al-Ahmad

Glucose represents the main source of energy of the CNS. Glucose transport inside the CNS is occurring mostly via the blood-brain barrier (BBB) via the presence of several glucose transporter isoforms (GLUTs). Although glucose metabolism has been mostly investigated in the lens of astrocyte-neurons axis, the fate of glucose and its metabolism at the BBB remains elusive.

GLUT1 deficiency syndrome (GLUT1DS) is autosomal dominant haploinsufficiency characterized by mutations in SLC2A1 resulting in impaired GLUT1 expression and activity indicated by epileptic seizures, intellectual disabilities, and movement disorders. Adoption of a ketogenic diet (KD) remains the main medical intervention. Yet, the effect of hypoglycemia and ketone bodies on the BBB function remains unclear. CTR90F and CTR65M iPSC derived BMECs were used in this study. Changes in GLUTs expression was assessed by immunofluorescence and flow cytometry, change in glucose uptake was assessed using 14Cglucose, change in glycolytic flux using SeahorseXF24 flux analyzer, and changes in the barrier function by transendothelial electrical resistance (TEER) and permeability to fluorescein. Cells were supplemented with ketone bodies (4uM beta-hydroxybutyrate and 1mM acetoacetate) for 24 hours. Our data suggest that a decrease in glucose level upregulates the expression of GLUT1 and GLUT3 isoforms in our BMECs monolayers, accompanied by a decrease in glucose uptake, alterations in tight junction complex, as well as a decreased cell metabolic activity and glycolytic flux resulting in a partial recovery of the barrier function under mild hypoglycemia and a partial recovery of the glycolytic flux. No significant changes in glucose uptake were observed in our model following treatment with KB. Our study suggests that BMECs may rely on glycolysis as the main source of energy, a decrease in blood glucose may have a detrimental effect on the barrier function. Supplementation with KB partially relieved such symptoms.

School: Graduate School of Biomedical Sciences

KATZ COURTNEY

Development of polymeric nanodiscs to support membrane proteins

Courtney L. Katz, Hariong Ma, Hongjun Liang

Membrane proteins (MPs) play diverse roles in health and disease. The function of MPs relies heavily on their structure and movement within the lipid bilayer. Detailed structural and mechanistic studies of MPs commonly require use of purified proteins, and for simplicity, studies are most frequently performed with the MPs in detergent, in the absence of membrane. However, this can alter protein stability, structure, and function. Reconstitution of purified MPs in liposomes is routinely used, however, the stability of liposomes is limited by their fluidic nature, and their large size and restricted accessibility to the inside interferes with optical and functional measurements, respectively. Lipid nanodiscs (LNDs) consisting of a nanoscale lipid bilayer 'patch' encased by two membrane scaffolding proteins (MSP) were designed to overcome some of these problems. However, LNDs still have limitations related to long-term stability and use in spectroscopic studies. Styrene maleic acid (SMA) block copolymers have been used to replace MSPs in the nanodisc platform, and recently, zwitterionic styrene maleic amides (zSMA) were developed in our lab to eliminate the buffer compatibility issues of commercial SMAs. Additionally, our lab has developed new polymeric nanodiscs (PNDs) where the membrane lipid bilayer is replaced by a synthetic copolymer membrane surrounded by MSPs. In this project, we work towards combining the positive properties of PNDs and zSMAs to improve on nanodisc platforms to support MPs structure and function. We will establish protocols to produce a fully synthetic polymer nanodisc (SNDs) using different zSMAs and synthetic polymeric membranes. As a model test, we will study the dependence of the proteorhodopsin (PR) photocycle on membrane structure and composition within SNDs using flash photolysis. Success will produce new polymeric nanodiscs to support MP structure and function, and to develop new therapeutic carriers.

School: Graduate School of Biomedical Sciences

MAHMUD SYED, MOSHARAF

Role of EGR1 in the development and progression of Benign Prostatic Hyperplasia (BPH)

Mosharaf Mahmud Syed, B.S.^1, Girijesh Kumar Patel, Ph.D.^1, Sayanika Dutta, M.S.^1, Jonathan Welsh, B.S.^1, Irfan Warraich, M.D.^3, Simon Hayward, Ph.D.^4, Omar Franco, M.D., Ph.D.^4, Robert Matusik, Ph.D.^5, Srinivas Nandana, Ph.D.^1,2, and Manisha Tripathi, Ph.D.^1,2

^1Department of Cell Biology and Biochemistry, Texas Tech University Health Sciences Center, Lubbock, TX.; ^2Department of Urology, Texas Tech University Health Sciences Center, Lubbock, TX.; ^3Department of Pathology, Texas Tech University Health Sciences Center, Lubbock, TX.; ^4NorthShore University HealthSystem, Evanston, IL.; ^5Department of Urology, Vanderbilt University Medical Center, Nashville, TN.

The prevalence of benign prostatic hyperplasia (BPH) is around 50% for men between the ages 51-60, and 90% for men over 80 years. Clinically, BPH is associated with lower urinary tract syndrome (LUTS) causing obstructive and irritative symptoms. BPH is characterized by enhanced proliferation of stromal and epithelial cells of the transition zone of the prostate. The molecular effectors/signaling mechanisms that orchestrate BPH are largely elusive. Therefore, a detailed understanding of the molecular mechanisms that underlie BPH development and progression will shed light on the potential therapeutic modalities to target BPH. Towards this goal, we performed an RNA-sequencing of tissue samples from human BPH patients and normal prostatic tissue. The RNA-seq analysis revealed an upregulation of EGR1, a transcription factor, that responds to stimuli including growth factors, cytokines etc. Interestingly, EGR1 interacts with TBX2, a transcription factor that we previously reported plays a key role in prostate cancer progression. q RT-PCR based expression analysis in epithelial and stromal cell lines derived from human BPH tissue revealed that EGR1 is expressed in both the epithelial and stromal components of BPH, while TBX2 is expressed in the stromal BPH cells. We further validated the RNA-seq data with immunohistochemical analysis wherein we observed increased EGR1 expression in human BPH tissue compared with normal control tissue. We are currently investigating how EGR1 promotes BPH pathogenesis by genetically modulating EGR1 expression in BPH cells, and how EGR1 modulation affects the downstream effectors, as well as how EGR1 signaling impinges on TBX2 signaling to promote BPH pathogenesis. Our hypothesis is that the interplay of EGR1 and TBX2 signaling drives BHP development and progression. The long-term goal of our studies is to develop effective therapeutic modalities against BPH by gaining an understanding of the molecular drivers of the disease.

School: Graduate School of Biomedical Sciences

MILLER, SARAH

Molecular mechanism of diabetes associated with mutations in the insulin signal peptide

Sarah C. Miller, Elena B. Tikhonova, Andrey L. Karamyshev

Insulin is a peptide hormone secreted from the pancreas in response to increased levels of blood glucose. It is synthesized as a precursor, preproinsulin, which contains a signal peptide required for its secretion. Mutations in preproinsulin's signal peptide are associated with insulin deficiency in either permanent neonatal diabetes mellitus or mature onset diabetes of the young. We propose that insulin depletion in these cases is the result of RAPP, a ribosome-associated protein quality control pathway. Using other secretory proteins as examples, our lab has shown that during RAPP, the inefficient interaction between the signal recognition particle (SRP) and the signal peptide results in the preemptive and specific degradation of secretory protein mRNAs. To test the role of RAPP in insulin biosynthesis, we created five constructs for each disease-associated signal peptide variant – R6C, R6H, P9R, L13R, A24D, and an artificial version, L10R. Site-specific photo-crosslinking experiments during in vitro translation demonstrate a differential interaction between SRP and preproinsulin according to the location of the mutation. When expressed in cultured human cells, these variants lead to reduced insulin mRNA levels, suggesting RAPP activation. To determine how insulin mRNA stability may be dependent on SRP interaction, we disrupted this interaction by using RNA interference to silence a critical SRP subunit, SRP54, in cultured human cells. When SRP54 is depleted, insulin mRNA levels decreased by close to fifty percent, which is less severe in comparison to other secretory proteins we have tested and implies the existence of a rescue mechanism for insulin. In conclusion, the study demonstrates that RAPP is involved in the molecular mechanism of diabetes associated with mutations in the insulin signal peptide, and it also suggests that insulin biosynthesis may rely on two mechanisms, SRP-dependent and SRP-independent, for its secretion.

School: Graduate School of Biomedical Sciences

MORTON, HALLIE

Impact of lifestyle factors on cognitive function in Alzheimer's Disease animal models

Hallie Morton, Sudhir Kshirsagar, Subodh Kumar, and P. Hemachandra Reddy

Alzheimer's disease (AD) is an age-dependent, late-onset neurodegenerative disease characterized by a progressive decline in cognitive function. Several studies of mouse models of AD found that a diet supplemented with antioxidants and regular exercise reduced amyloid beta (Aβ) and phosphorylated tau (p-tau) pathologies. Further research into the impact of a healthy diet and regular exercise on Aβ and p-tau mouse models of AD could reveal a relationship between lifestyle factors and cognitive function.

School: School of Medicine

NAVARRO, STEPHANY

Glycogen availability and pH variation influence the growth of vaginal Lactobacilli and Gardnerella species

Stephany Navarro, Habib Abla, Betsaida Delgado, Jane A. Colmer-Hamood, Gary Ventolini, Abdul N. Hamood

Bacterial vaginosis (BV), is the most common vaginal infection in women of reproductive age. Previous studies showed that, in women diagnosed with BV, a shift in the population of Lactobacillus and Gardnerella species occurs. The exact mechanism for this phenomenon is not clearly defined. Gardnerella vaginalis (GV) exists within the vaginal microflora of healthy women, but their numbers are extremely low compared with those of the Lactobacillus. Prior to the onset of BV, either host, bacterial factors, or both, increase the vaginal pH to 4.5. We hypothesize that environmental changes within the vagina, specifically the availability of nutrients and pH variation, influence the microbial population. The vaginal pH of healthy women is 3.8- 4.2 favoring the growth of lactobacilli while that of women with BV is 4.5 or above, favoring the growth of GV. Metabolism of free glycogen within the vaginal fluid is likely to be essential for the growth and colonization of vaginal microbiota. In this study, we utilized the medium simulating vaginal fluid (MSVF) to assess the growth of three lactobacilli strains (L. Jensenii, L. gasseri, and L crispatus) as well as GV in the presence of different glycogen concentrations and under three pH condition (pH 4, 4.5, and 5). MSVF contains glucose (10g/L) and glycogen (10g/L) as carbon sources. In the absence of glycogen and with the exception of L. gasseri, which grew under pH 5.0 only, none of the tested strains grew under any pH condition. Under pH 4.0 and with the exception of L. Jensenii, none of the tested strains grew in the presence of either 5 or 10% glycogen. With the exception of L. crispatus, which only grew at pH 5, all tested strains grew in the presence of either 5 or 10% glycogen under pH 4.5 and 5.0. These results suggest that: 1) Within the vagina, glycogen is essential for the growth of different Lactobacilli as well as GV, and 2) Vaginal pH influences the ability of the strains to utilize glycogen.

School: Graduate School of Biomedical Sciences

NGUYEN, NHI

ZAN transcripts in human germ cells defy somatic cell rules for destruction by nonsense-mediated decay.

Nhi T. Nguyen and Daniel M. Hardy, Department of Cell Biology & Biochemistry, Texas Tech University Health Sciences Center

Nonsense-mediated decay (NMD) is a translation-coupled quality control process in eukaryotic cells that surveys mRNAs and degrades them if they exhibit target features, such as premature translation-termination codons (PTCs), that may result from errors in pre-mRNA splicing. NMD thus prevents synthesis of truncated proteins that can perturb normal cellular processes. We previously characterized human testis cDNAs encoding zonadhesin (gene: ZAN), a mosaic protein in the sperm acrosome that mediates species-specific recognition of the egg's zona pellucida. Species diversity of ZAN reflects its species-specific function in egg recognition and, in turn, a contribution to speciation in mammals. In characterizing ZAN expression in human germ cells, we identified six mRNA variants represented by PCR products amplified using primers flanking exons 42-44 in the spliced zonadhesin transcript. Two of the six PCR products (Variants 1 and 4) corresponded to the sequences of two phage clones obtained by traditional library screening. Comparison to genomic sequence revealed that the six variants each derived from unique pre-mRNA splicing events among exons 42-44, but only Variants 3 and 6 maintained ORFs through to the site of normal translation termination in exon 48. Reading frameshifts in Variants 1, 2, 4, and 5 introduced PTCs in exon 44, well upstream of the normal site, thus making these mRNAs candidates for NMD. Indeed, ZAN annotation by others predicted that only Variants 3 and 6 were likely to be abundant enough to be translated, a prediction inconsistent with our phage cloning results. To resolve this discrepancy and determine if variant expression varies between individuals, we surveyed ZAN mRNAs expressed in testes of multiple males by PCR spanning the 3' end. The results confirmed that variants 1 and 4 predominate in human testes and that their predominance is consistent among individuals. Thus, these ZAN mRNA variants evade NMD, suggesting that the "rules" governing

School: Graduate School of Biomedical Sciences

OMY, TASMIN RAHMAN

Upregulated LYL1 promotes Epithelial ovarian Cancer (EOC) growth, metastasis, and therapeutic resistance

Tasmin R. Omy1, Swetha Prddibhotla1, Shirisha Jonnalagadda1, Chinnaduari Mani1, Mark Reedy2, and Komaraiah Palle1

Affiliation: 1Department of Cell Biology and Biochemistry, Texas Tech University Health Sciences Center, 3601 4th Street, Lubbock, TX, 79430-6540, USA.; 2Department of Obstetrics and Gynecology, Texas Tech University Health Sciences Center, 3601 4th Street, Lubbock, TX, 79430-6540, USA.

Approximately 90% of ovarian cancer (OC) is Epithelial ovarian Cancer (EOC) subtype claiming ~15,000 lives in the United States annually, making it the deadliest cancer in women. Due to the asymptomatic characteristics and lack of early detection methods, most cases are diagnosed at an advanced stage. Standard treatment options include surgical resection of tumors, followed by chemotherapy alone or in combination and in some cases, radiation therapy but the overall survival rate of patients has not changed in the last few decades. Lymphoblastic Leukemia-Derived Sequence 1 (LYL1) is a polypeptide that harbors basic helix-loop-helix transcription factor, a DNA binding motif and dysregulated in many cancers including EOC. Computational analysis of TCGA data for EOC patients' using the cBioportal showed an interesting observation, LYL1 gene is amplified not mutated in EOC, and is associated with poor prognosis of patients. Consistent with the genomic amplification, expression of LYL1 was also found to be >5 fold upregulated in EOC. Importantly, EOC patients with overexpressed LYL1 (n=202) displayed decreased survival probability ($p = 0.003$) compared to the patients with a low level of LYL1 expression (n=1640). To confirm this analysis, we did LYL1 downregulation in OC cell lines by siRNA/shRNA and found decreased clonogenicity, invasion, and reduced DNA-damage responses. Whereas, LYL1 upregulation resulted in increased invasion and clonogenicity. Further studies using immunoprecipitation indicated CREB1 and LMO2 as binding partners of LYL1 in EOC cell line. LYL1 binding to the promoter regions of ID4 and EGR1 was revealed by ChIP assay. Collectively, our studies indicate, upregulated LYL1 in EOC promotes tumor progression and metastatic phenotypes. Further, upregulated LYL1-mediated transcriptional reprogramming alters DNA damage signaling and oncogenic signaling pathways that may promote stemness phenotype aiding in chemoresistance and disease recurrence is a challenge

School: Graduate School of Biomedical Sciences

PRESTO, PEYTON

Sex differences in brain neuroimmune signaling related to pain: Molecular and behavioral effects

Peyton Presto, Igor Ponomarev, and Volker Neugebauer

Chronic pain is a prevalent national healthcare issue, yet many knowledge gaps exist in regard to brain mechanisms of pain, particularly neuroimmune signaling and sexual dimorphisms. Although alterations in neuroimmune signaling has been linked to chronic pain at the spinal cord level, including strong evidence for sex-specific immune involvement, the molecular mechanisms of neuroimmune responses in the brain in a pathological pain state are poorly understood. The amygdala is a limbic brain center that plays a key role in the emotional-affective dimensions of pain and pain modulation. The main goal of the present study was to determine the effects of exogenously induced neuroimmune response within the amygdala on pain-related behaviors and mRNA expression levels. Polyinosinic-polycytidilic acid (poly I:C) is a potent immunostimulant and known viral mimetic. Here we tested the hypothesis that direct poly I:C administration into the amygdala will induce a neuroimmune response that causes significant and potentially sexually dimorphic behavioral and molecular changes. Poly I:C or vehicle control was stereotaxically delivered into the amygdala of male and female rats. Sensory thresholds, emotional responses, and anxiety- and depression-like behaviors were measured one week after drug administration. Amygdala tissues were then extracted to measure mRNA expression levels of known neuroinflammatory markers. Our findings identified poly I:C as a useful tool in investigating sex differences in amygdala neuroimmune responses and pain-related behaviors. Comparison of the poly I:C effects with those of a neuropathic pain model would provide insight into the role of neuroimmune signaling in amygdala pain mechanisms because similar patterns may suggest an involvement of neuroimmune signaling in neuropathic pain. Identification of brain mechanisms of pain will aid in the development of sex-specific therapeutic strategies of chronic neuropathic pain relief.

School: Graduate School of Biomedical Sciences

SHAHI, SADISNA

Structural activity relationship approach on a novel compound for the treatment of triple negative breast cancer.

Sadisna Shahi^1, Wei Wang^2, Racheal G. Akwii^1, Paul C. Trippier^3-5, Constantinos M. Mikelis^1, Ruiwen Zhang^2, Nadezhda A. German^1,6

1^Department of Pharmaceutical Sciences, Texas Tech University Health Sciences Center, Jerry H. Hodge School of Pharmacy, Amarillo, TX, USA; 2^College of Pharmacy, University of Houston, Houston, TX, USA.; 3^Department of Pharmaceutical Sciences, College of Pharmacy, University of Nebraska Medical Center, Omaha, NE, USA; 4^Fred & Pamela Buffett Cancer Center, University of Nebraska Medical Center, Omaha, NE, USA.; 5^UNMC Center for Drug Discovery, University of Nebraska Medical Center, Omaha, NE, USA.; 6^Center of Excellence for Translational Neuroscience and Therapeutics, Texas Tech University Health Sciences Center, Lubbock, TX

Triple-negative breast cancer (TNBC) lacks three common receptors that drive most breast cancer growth: progesterone, estrogen, and human epidermal growth factor receptor 2 (HER2). Because of this, neither hormonal therapy nor HER2 based treatment is effective in the treatment of TNBC. Major traits of TNBC is higher metastatic and recurrence rate. About 28% of TNBC patients are likely to suffer from brain metastases, a complication that decreases their survival rate when compared to patients suffering from other types of breast cancer. At the same time, TNBC is sensitive to chemotherapy, although none of the existing oncology agents are active against all subtypes of TNBC. Thus, novel anticancer agents with the activity profile against different subtypes of TNBC are needed.

Our lab has identified a novel class of anticancer agents that is effective against MDA-MB-231 cell lines. These first-in-class compounds cross the blood-brain barrier both in vitro and in vivo with the optimized toxicological profile. They can reduce the tumor growth in vivo by greater than 95%. Here, we report the synthesis and biological evaluation of the new set of analogs, designed to evaluate the effect of structural modifications on the potency of compounds.

School: Graduate School of Biomedical Sciences

SNIEGOWSKI, TYLER

Expression profile and functional characterization of SLC38A5 in pancreatic ductal adenocarcinoma

Tyler Sniegowski, Yangzom D. Bhutia and Vadivel Ganapathy

Pancreatic ductal adenocarcinoma (PDAC) is lethal. Based on the Human Protein Atlas database, SLC38A5 is significantly upregulated in PDAC and correlates with poor patient survival. SLC38A5 is a Na+-coupled, electroneutral amino acid transporter that transports glutamine, serine, glycine, and methionine that are essential for glutaminolysis and one-carbon metabolism that the cancer cells are addicted to. More interestingly, since the transport function is coupled to H+ efflux, it prevents intracellular acidification within the cancer cells. Furthermore, SLC38A5 is also a c-Myc target. Thus, it makes sense as to why cancer cells would love to upregulate SLC38A5 as a part of their tumor-promoting gene expression program. Since our laboratory mainly focuses on amino acid transporters and its relevance to PDAC growth and development, we were interested to validate the online data using PDAC cell lines, patient-derived xenografts (PDXs) and organoids and to further characterize their functions. Interestingly, our q-PCR and Western blotting data clearly showed a significant upregulation in SLC38A5 mRNA and protein, respectively, in the PDAC cell lines, PDXs, and organoids, relative to their normal counterparts. Radiolabeled uptake studies using tritiated serine, glutamine, and glycine as the amino acid substrate in SLC38A5-high PDAC cell lines showed that the expression correlated to function. Macropinocytosis, an alternate mechanism of acquiring nutrients is a hallmark of KRAS-mutated cells wherein the NHE1 isoform of the Na+/H+ plays a key role. Since SLC38A5 is functionally very similar to NHE1, we were curious to check whether SLC38A5 also induces macropinocytosis and our studies convincingly show that it is the case. Our future work involves investigating the tumor promoting role as well as understanding the molecular mechanisms of its upregulation with the goal that SLC38A5 could be used as a viable drug target to treat PDAC.

School: Graduate School of Biomedical Sciences

SREE POOJA, VARAHACHALAM

Assessing the effects of COVID-19-induced hypoxia and ACE2 signaling on the human blood-brain barrier in vitro

Sree Pooja Varahachalam, Dr. Al-Ahmad

Background: COVID-19 is an acute respiratory distress syndrome that has been affecting over 100 million people worldwide and resulted in the deaths of over 2 million. It is a disease induced by infection from SARS-CoV-2, which infect cells by binding through the cell surface protein ACE2 (angiotensin-converting enzyme 2) and resulting in severe lung injury. Such severe lung injury often results in the onset of systemic hypoxia in 20% of patients, requiring oxygen and ventilators. In addition to its effect on pulmonary function, about 30% of patients experience various neurological symptoms. We speculate that such neurological symptoms may be a consequence of a dysfunction of the blood-brain barrier (BBB). Our main hypothesis is that COVID-19 directly or indirectly negatively impacts the barrier function. Methods: An in vitro of the human BBB using induced pluripotent stem cells (iPSCs) was used in this study. Such a model was exposed to various levels of hypoxia (1,5 and 10%) for up to 24 hours. In addition, normoxic cells were treated with Angiotensin II (AngII) or Angiotensin 1-7 (a byproduct degradation of AngII by ACE2). Changes in the barrier function were assessed using TEER, permeability to fluorescein, and immunofluorescence, whereas ACE2 shedding in cell culture medium was assessed by ELISA. Results: Mild (10%) hypoxia was sufficient to induce loss of barrier function. Secretion of ACE2 under hypoxia followed a biphasic pattern, with the highest levels at 5 and 10%. Ang II and Ang1-7 had little effect on the barrier function under normoxic conditions. Discussion: Our preliminary data suggest that our human model of the BBB express ACE2 and negatively respond to mild hypoxia by a decreased barrier function. Such loss was correlated with increase ACE2 shedding. We are currently investigating changes in ACE2 expression and how Ang II and Ang 1-7 may rescue the barrier function under hypoxic stress.

School: Graduate School of Biomedical Sciences

VANDERPOOL, EMILY

Sinusitis: It's "Snot" So Simple Towards Developing a Murine Model of Chronic Rhinosinusitis

Emily J. Vanderpool & Kendra P. Rumbaugh, Ph.D.

Chronic Rhinosinusitis (CRS) is an enervating disease that impacts 15% of American adults. CRS is characterized by nasal discharge, facial pain and pressure, hyposmia or anosmia, and/or nasal blockage that persists for 12 weeks or more. It is thought to be a result of the interplay between inflammation and biofilm-associated infection. Biofilms are complex groups of microorganisms protected by extracellular polymeric substance (EPS), which shields constituent organisms from immune action and contributes to their antibiotic tolerance. Current interventions for CRS patients attempt to manage sino-nasal symptoms and/or treat biofilm-associated bacteria using traditional antibiotics. Without relief, patients turn to repeated, invasive surgical procedures. Developing new treatments that reduce or disperse biofilms in CRS patients would not only address symptoms but would target the underlying disease etiology. For this reason, we aim to develop a novel murine model of CRS in order to test the efficacy of biofilm dispersal agents. Towards this goal, we tested the use of surfactant treatment to mimic CRS sino-nasal inflammation in mouse nasal cavities. Citric acid zwitterionic surfactant (CAZS) has been shown previously to degrade cilia and cause sino-nasal irritation. We hypothesized that following exposure to commonly isolated CRS bacteria (Staphylococcus aureus, Pseudomonas aeruginosa, and Haemophilus influenzae), surfactant treated mice would sustain higher bacterial load in the nasal cavity than untreated mice. Treatment groups had CAZS applied to the nares 24 hours before bacterial inoculation. Five days post-bacterial inoculation, nasal cavities were collected to quantify colony forming units per gram. Results indicate that surfactant treatment does not impact the retention of Staphylococcus aureus. We plan to continue this work by evaluating the effect of other inflammatory pre-treatments on induction of sino-nasal inflammation and bacterial retention.

School: Graduate School of Biomedical Sciences

WALCHALE, AASHLESHA

Sodium Valproate induces Redox imbalance via EAAC1 in Immediate Neuronal Precursors

Aashlesha Walchale1, Praneetha Panthagani1, Xiaobo Liu1, Sambantham Shanmugam1, Brent Kisby1, Susan E. Bergeson1, Srivatsan Kidambi2, Lenin Mahimainathan3, George Henderson1, Madhusudhanan Narasimhan1

1Dept. of Pharmacology and Neuroscience, TTUHSC, Lubbock, Texas-79430.; 2 Dept. of Chemical and Biomolecular Engineering, Univ. of Nebraska, Lincoln, NE-685883.; 3Dept. of Pathology, UT Southwestern Medical Center, Dallas, TX-75390.

Autism Spectrum Disorders (ASD) is a complex brain disorder that affects 1 in 59 births, it involves interaction of both genetic (33%) and environmental (55%) factors. Sodium valproate (VPA) is a drug used to treat epilepsy and mood disorders, prenatal administration of this drug enhances the risk of newborns to ASD. Redox alterations are strongly correlated to the interactions between the different toxic exposures and ASD-related clinical outcomes. Cysteine, Glutamate and Glycine amino acids are required for the synthesis of glutathione (GSH), a vital antioxidant essential for regulating neuroblasts viability in the growing brain. Cysteine is transported by Excitatory Amino Acid Transporter 3 (EAAC1/Slcla1). Thus, we wanted to investigate the relationship of the EAAC1 pathway to ASD-related molecular phenotype in response to VPA. Spontaneously immortalized rat neuroblasts from embryonic day-18 brain cortex were utilized for the current study. VPA at varying concentrations (0.2, 0.5, 1, 2, 4mM) were used. Cell viability was decreased significantly by 25% at 4 mM concentration. VPA treatment significantly increased the ROS and H2O2 levels in neuroblasts. Similarly, 4mM VPA significantly reduced EAAC1 at protein level and also GSH levels (p<0.05) in neuroblasts. Silencing of EAAC1 using siRNA further enhanced the VPA-induced ROS levels and reduced the GSH levels in neuroblasts. These results indicate that EAAC1 play a critical role in in redox maintenance in the undifferentiated neuronal precursors and can be viewed as basis to study the in vivo gene-environment (EAAC1-VPA drug exposure) interaction in ASD.

School: Graduate School of Biomedical Sciences

WASHBURN, RACHEL

Complement inhibitory protein production by xenogeneic Sertoli cells is necessary for their survival of hyperacute rejection

Rachel L. Washburn, Gurvinder Kaur, Jannette M. Dufour

Transplantation is an important procedure used to treat organ failure associated with various diseases. In 2019 nearly 113,000 patients awaited transplants while under 35,000 transplants were performed. Utilizing pig organs offers an endless supply of transplantable tissue, but xenografts are rapidly destroyed by hyperacute rejection (HAR). The complement system (C") is the primary mediator of HAR and is activated by preformed-antibody binding to xenoantigens. C" consists of proteins that undergo proteolytic cleavages resulting in insertion of the membrane attack complex (MAC) to cause lysis of the target cell. We have found that Sertoli cells (SC) survive xenotransplantation without immunosuppressive drugs. SC are immune privileged cells found in testes that physiologically function to protect germ cells from autoimmune destruction. The goal of this study was to examine the mechanisms SC use to survive C". Neonatal porcine SC (NPSC) transplanted into rats survived as xenografts and immunohistochemistry of surviving grafts show C3 deposition and no MAC deposition, suggesting SC inhibit C" after activation. Using a Human serum (HS)-C" cytotoxicity assay, we confirmed SC survive activated C". We also identified that SC express two C" inhibitory proteins (CIP): membrane cofactor protein (MCP) and decay accelerating factor (DAF). mRNA and protein quantification indicated elevated expression of these CIP by NPSC as compared to porcine islets, which are killed by C". We knocked down expression of MCP and DAF using shRNA to confirm their importance. Less than 10% of these cells survived exposure to the HS-C" cytotoxicity assay, indicating MCP and DAF are important in NPSC xenograft survival in vitro. We intend to investigate other CIP produced by SC and confirm their role in SC-mediated C" inhibition. Data gained from these experiments will be critical in determining the mechanism of SC immune-privilege and could increase the viability of allo- and xenografts clinically.

School: Graduate School of Biomedical Sciences

GRADUATE STUDENTS 3+ YEARS

BAISHYA, JIWASMIKA

Identification of defensive mechanisms in Pseudomonas aeruginosa required for polymicrobial growth

J. Baishya, H. A. Mahmud, B. Perez, J. P. Morris, K. P. Nguyen, C. A. Wakeman

Microbial communities may consist of different species of microorganisms occupying overlapping niches. These microorganisms attempt to outcompete each other to reduce competition in terms of limited nutrients and space via secretion of a range of molecules. The functions of these molecules can be toxic against other species, or protective for the producer species. In that direction, this project is designed to identify novel genes that encode defensive molecules in Pseudomonas aeruginosa in response to microbial species it may encounter within the various environmental or infectious niches it occupies. In our experiments, we have used GFP-labelled Cryptococcus neoformans and S. aureus as our model organisms for discovering P. aeruginosa's defensive genes by exploring its growth in co-culture conditions. The soil fungus, C. neoformans, and the human pathogen, S. aureus, produces many toxic molecules against P. aeruginosa. By relying on this mechanism, we co-cultured these microbial species with a commercially available transposon-mutant library of P. aeruginosa to identify mutants that were growth defective. Mutants were selected after three sequential co-culture screenings where only the mutants that were selected at the end of a screening were included in the next one. In our results, we have identified multiple P. aeruginosa genes that make it susceptible to either C. neoformans or S. aureus or both. These identified genes are associated with a range of bacterial mechanisms such as amino acid biosynthesis, nucleotide biosynthesis, transmembrane transportation, transcriptional and translational regulation, etc. Identifying these mechanisms and unravelling their role(s) in P. aeruginosa's antimicrobial susceptibility is pivotal to exploring P. aeruginosa's interspecies interactions.

School: Texas Tech University

BASS, KEVIN

GPR109A for Prevention/Treatment of Breast Cancer: Ketogenic Diet versus Niacin

Kevin Bass, Sabarish Ramanathan, Valdivel Ganapathy

The classical ketogenic diet (KD) was developed to treat children with intractable epilepsy in the 1920s and is defined by a ratio of 4:1 or 3:1 grams of fat to combined grams of carbohydrate and protein. A modified and currently popular version of the KD has been defined as carbohydrate restriction of <50-100 grams per day and elevated blood concentrations of beta-hydroxybutyrate (BHB, a ketone) of >0.5 mM (normal BHB concentrations are around 0.1 mM). This KD has been proposed as an effective treatment of many nontransmissible diseases, including cancer. The KD has many biological effects that might make it suitable as an adjunctive cancer therapy, but these mechanisms remain incompletely understood and KD's clinical efficacy unestablished. Activation of G-protein-coupled receptor GPR109A by niacin, a pharmacological ligand, has been shown to suppress tumor growth by inducing apoptosis in preclinical breast and colon cancer models. We find that the ketogenic diet (compared to standard chow) as well as niacin administered orally increase the time of onset of breast cancer in a spontaneous, transgenic breast cancer model in C57Bl/6J mice, as well as the tumor load over time, with trends toward a lower tumor burden and weight at time of sacrifice. Furthermore, we find that mice with GPR109A knockout show decreased tumor volumes in two xenograft models, suggesting that the role of GPR109A in the host for tumor growth may be opposite of that in the cancer cells themselves. These findings are consistent with previous data showing that GPR109A expression is dramatically reduced in breast cancer cell lines of epithelial origin compared with immortalized breast epithelial cells, as well as with TCGA omics data showing a close correlation between survival and tumor staging on the one hand and GPR109A expression on the other.

School: Graduate School of Biomedical Sciences

BLANTON, HENRY

The G-protein coupled estrogen receptor agonist G1 antagonizes the anti-allodynic effects of the cannabinoid receptor agonist CP 55,940 in a cisplatin model of chemotherapy-induced neuropathic pain using ovariectomized female mice

Henry Blanton, Melissa McHann, Josee Guindon

Among states with the legalized medical use of cannabis, pain relief is the most common reason for use among both men and women (Boehnke et al., 2019). Sex has consistently been demonstrated to be a contributing factor to both pain and response to analgesics, however, the impact of sex on cannabinoid pharmacology is still a relatively new field of study, especially in humans. Previous studies in rodent models have generally suggested that females may be more sensitive to cannabinoid-mediated analgesia than males and that this sensitivity may be mediated by female sex hormones, particularly estrogen (Blanton et al., 2021). This study sought to address the hypothesis that estrogen-mediated effects on cannabinoid actions may be mediated in part by the G-protein coupled estrogen receptor (GPER). To test this hypothesis C57BL6J female mice were ovariectomized and allowed to recover for thirty days prior to testing. A neuropathic pain state was induced through weekly delivery of the chemotherapeutic agent cisplatin, for a total of four injections. Pain hypersensitivity (allodynia) in the hind paws of the mice was evaluated through von Frey and acetone modalities of mechanical and cold allodynia. The anti-allodynic effects of a GPER agonist (G1) and a cannabinoid receptor agonist (CP 55,940) were evaluated alone, and in combination, for four weeks of daily administration to evaluate both the acute and chronic effects of these drugs. The cannabinoid receptor agonist CP 55,940 relieved mechanical and cold allodynia, but tolerance to this analgesic effect developed over the course of the experiment. Conversely, the GPER agonist G1 potentiated mechanical and cold allodynia when delivered alone, and antagonized the anti-allodynic effects of CP 55,940 when the two drugs were co-administered. These results suggest that in states of high estrogen, the analgesic effects of cannabis, or cannabinoids, may be diminished via activity at the G-protein coupled estrogen receptor (GPER).

School: Graduate School of Biomedical Sciences

ENRIQUEZ, JOSUE

Influence of Host Genetics in a Mouse Model of Acute Graft vs. Host Disease

Josue Enriquez*, Connor Jordan*, Kathryn Furr and Matthew B. Grisham

Allogeneic hematopoietic stem cell transplantation (HSCT) is a potentially life-saving treatment for hematological malignancies and blood disorders. However, success of this treatment is limited by the development of a multi-organ inflammatory disease called acute graft versus host disease (aGVHD) in ~50% of the patients undergoing HSCT. Acute GVHD is known to cause bone marrow (BM) and lymphoid tissue damage resulting in prolonged lymphopenia, anemia and thrombocytopenia that may greatly increase the risk of infections, bleeding and death. Currently all models of aGVHD use inbred mice as surrogates for genetically diverse humans. Unfortunately, development of aGVHD in these genetically constrained mice may not accurately recapitulate the immuno-pathogenesis in outbred humans. Objective: Quantify and compare aGVHD-induced BM and spleen damage in inbred vs. genetically diverse outbred mice. Methods: Allogeneic C57Bl6 (Bl6) CD4+ T cells (20,000 T cells/g b.w.) were injected (i.p.) into sub-lethally irradiated (450 cGy) inbred Bl6-H2-Ab1bm12 (BM12) recipients (Bl6→BM12) or into outbred CD1 recipients. Results: Adoptive transfer of allogeneic Bl6 T cells into BM12 recipients induced remarkable weight loss at 20 days-post T cell transfer that was associated with severe anemia, pancytopenia and thrombocytopenia when compared to their syngeneic controls (BM12→BM12). Total cell numbers in BM and spleen were dramatically reduced in these mice that was associated with significant loss of T cells, B cells, RBCs, myeloid cells and NK cells. Histopathological inspection confirmed severe hypocellularity in BM and spleen. In contrast, adoptive transfer of allogeneic Bl6 T cells into sub-lethally irradiated outbred CD1 mice failed to induce weight loss, anemia and cytopenia. BM- and spleen-associated cell numbers were not reduced when compared to irradiated CD1 controls. Conclusion: Genetically diverse outbred mice are resistant to aGVHD-induced BM failure and spleen hypoplasia.

School: Graduate School of Biomedical Sciences

HERNANDEZ, SARAH

Uncovering Essential Interacting Factors in alpha-Synuclein Biogenesis

Sarah M. Hernandez^1,2, Elena B. Tikhonova^1, Andrey L. Karamyshev^1

Parkinson's disease (PD) is the second most common neurodegenerative disorder and is rated as the 18th leading cause of death in the world. PD is categorized as a Synucleinopathy, a group of neurodegenerative disorders that are characterized by the presence of intracellular inclusions known as Lewy bodies. Lewy bodies are composed of aggregated protein alpha-Synuclein (aSyn). Understanding why aSyn is aggregating is a crucial step in developing preventative therapies for PD and other neurodegenerative disorders. Our hypothesis is that alterations of aSyn interacting partners during translation leads to its misfolding and aggregation, causing disease. In PD, these alterations in interacting partners can be due to a mutation in aSyn itself (familial PD) or by defects in the interacting partners (sporadic PD). aSyn clinical mutations present in familial PD (A30P, E46K, H50Q, G51D, A53E, and A53T) are all present within N-terminus, the region of the protein where early co-translational interaction events take place. The major goal of this study is to identify possible interacting partners of aSyn during its translation. Site-specific photo-crosslinking experiments show that aSyn interacts with multiple factors during its synthesis on the ribosome. Using predictive examination through Ingenuity Pathway Analysis (IPA), we also demonstrate the existence of a complex network consisting of more than a hundred potential aSyn interacting partners. They include chaperones, chaperonins, modifying factors, and others. To experimentally test the involvement of some of these factors, as well as components of the RAPP protein quality control pathway, in aSyn biogenesis, we selectively knocked down these proteins in cultured human cells. The data demonstrate that loss of a number of interacting partners (SRP, chaperones Hsp70 and Hsp60, chaperonin TRiC/CCT, and NAC) results in the altered expression of aSyn, suggesting that they are involved in aSyn biogenesis.

School: Graduate School of Biomedical Sciences

HIBLER, TAYLOR

Tregs, Transplants, and TGF-β: How Sertoli cells prevent acute graft rejection

Taylor Hibler, Gurvinder Kaur, Jannette M. Dufour

A promising alternative treatment for type 1 diabetes is islet transplantation. However, this procedure requires harsh immunosuppressive drugs that can inhibit insulin production and result in infections and cancers. Thus, there is a need for an alternative treatment that is equally protective but less damaging. Interestingly, when allogeneic islets are co-grafted with Sertoli cells (SC) 59% of the islet grafts survive upwards of 100 days with no immunosuppressive drugs. T regulatory cells (Tregs) have previously been shown to aid in allograft survival and TGF-β has been found to be important in allograft survival and Treg induction. The goal of this study was to determine the role of Tregs and TGF-β in SC prolongation of allograft survival. Significantly higher numbers of CD4+ and CD8+ Tregs were detected via flow cytometry and immunohistochemistry (IHC) in surviving SC grafts compared to rejecting control grafts. In control grafts, CD8+ Tregs were not detected and CD4+ Tregs were not detected until day 20, suggesting they appeared after rejection was initiated. Additionally, when Tregs were depleted in vivo via anti-CD25 monoclonal antibody, 100% of SC grafts without Tregs rejected within 20 days. Excitingly, 57% of SC grafts in Treg depleted mice survived. Flow cytometry revealed that all of the surviving grafts had Tregs, indicating that SC can induce Tregs from naïve T cells and that these Tregs are critical for SC graft survival. IHC analysis of SC grafts revealed the presence of pSMAD2 (an indicator of active TGF-β) at early time points in surviving SC allografts. BALB/c SC were then transplanted into SMAD2/3 floxed mice and control mice. 100% graft rejection was seen in SMAD2/3 floxed mice, while 100% survival was seen in control mice. Combined, this data demonstrates that SC promote graft survival in a Treg/TGF-β dependent manner. Further study of the mechanism of SC allograft protection will lead to improved islet graft survival.

School: Graduate School of Biomedical Sciences

JARAMILLO-MARTINEZ, VALERIA

Structural insights and classification of the disease-causing mutations in human Na^+- coupled citrate transporter (NaCT) using a homology modeling approach

Valeria Jaramillo-Martinez, Vadivel Ganapathy, Ina L. Urbatsch

Citrate is an important metabolite involved in the tricarboxylic acid (TCA) cycle and is used as a bridge between carbohydrate and fatty acid metabolism. Neurons, however, are unable to synthesize citrate and other TCA cycle intermediates, thus rely on specialized transporters such as the Na+-coupled citrate transporter (NaCT, gene name SLC13A5). Loss-of-function mutations in SLC13A5 are closely associated with early infantile epileptic encephalopathy (EIEE25), which can lead to speech difficulty, limited motor progress, developmental delay and teeth defects in newborns. Therefore, a comprehensive understanding of the biophysics of NaCT is essential to understanding the EIEE25 disease. Homology models are available based on a distant relative from bacteria, VcINDY. Our model, in contrast to other models, was created using multiple templates within Robetta. This increases the accuracy of the model if the template contains less than 40% sequence identity, as is the case for VcINDY. In addition, Robetta uses the Rosetta de novo structure prediction method to generate presumed domains for uncovered regions of less than 200 amino acids in length. Using this full-length model, we probe the locations of the 18 disease-causing missense mutations and propose a new mutant classification based on their theoretically predict phenotype in terms of protein synthesis, trafficking, and transport activity. G219R, the most prevalent mutation in the patient population, was classified as a mutation leading to folding and trafficking defects. The prediction gives opportunity to develop ‘correctors’ that may restore protein folding in the endoplasmic reticulum, and promote trafficking of NaCT to the cell surface, reminiscent of the F508del mutation in cystic fibrosis. This new information should pave the way for future design and development of novel therapeutics to restore the loss-of-function of the mutant transporters as a treatment strategy for patients with EIEE25.

School: Graduate School of Biomedical Sciences

KAUSHIK, ITISHREE

PKA signaling: a friend or foe to pediatric medulloblastoma

Itishree Kaushik and Sanjay K. Srivastava

Pediatric brain tumor is the leading cause of cancer-related deaths in pediatric patients ranging 0-19 years of age. Medulloblastoma is one of the most commonly occurring brain tumor in children. Sonic hedgehog (Shh) activated subgroup of medulloblastoma is considered to be highly aggressive and metastatic in nature. Recent studies and oncomine, a cancer microarray database has shown that GABAA receptor is down regulated in pediatric medulloblastoma. In this study, we have evaluated the anti-cancer effects of an anthelmintic drug 'moxidectin' a GABAA receptor agonist. Treatment of medulloblastoma cells with moxidectin, resulted in reduced Protein kinase A (PKA) activity. Leading to the inhibition of Gli1, a major transcription factor of non-canonical Shh signaling. Moxidectin has inhibited the proliferation of Daoy, UW426, UW228, ONS76, and PFSK1 medulloblastoma cells and significantly induced apoptosis in a concentration and time dependent manner in all the cell lines. Western blotting and immunofluorescence microscopy demonstrated that moxidectin treatment significantly induced GABAA receptor expression and inhibited cAMP mediated PKA signaling. As a result, the non-canonical activation of Gli1 and its downstream effector molecules such as Pax-6, Oct-4, Sox-2 and Nanog were also inhibited by moxidectin treatment. Efficacy of moxidectin was also evaluated in subcutaneous and intracranial medulloblastoma tumor models. Our results demonstrated that daily oral administration of 2.5 mg/kg moxidectin suppressed the growth of medulloblastoma tumors by 55-70% in subcutaneous and intracranial models. Ex-vivo analysis of tumors by western blotting, IHC, TUNEL and H&E staining revealed that moxidectin suppressed medulloblastoma tumor progression by inhibiting PKA/Gli1 signaling axis indicating the significance of this pathway in medulloblastoma progression. To our knowledge, this study for the first time focuses on GABAA receptor agonist mediated PKA/Gli1 signaling inhibiti

School: School of Pharmacy

KELLOGG, MORGANA

Role of SRP RNA in the Regulation of Aberrant Protein Production

Morgana K. Kellogg1,2, Elena B. Tikhonova1,2, Andrey L. Karamyshev1,2

1 Department of Cell Biology and Biochemistry; 2 Graduate School of Biomedical Sciences, Texas Tech University Health Sciences Center

The signal recognition particle (SRP) is a targeting factor for secretory and membrane protein trafficking. It consists of six protein subunits arranged on a long, non-coding RNA called 7SL or SRP RNA. SRP recognizes an N-terminal hydrophobic signal sequence of nascent protein substrate and targets dependent proteins to the endoplasmic reticulum. This process is critical, and its disruption causes a number of human diseases. When SRP cannot recognize a signal sequence, a specific pre-emptive mRNA degradation quality control pathway is activated. This process is called Regulation of Aberrant Protein Production (RAPP). We hypothesize that 7SL RNA has distinct functions in SRP complex formation and stability, and consequently the RAPP response. Indeed, we demonstrate that depleting 7SL RNA in cells affects the transcriptional and translational levels of SRP subunits, as well as activates the RAPP response degrading mRNAs of the SRP-dependent proteins. 7SL depletion also leads to altered ribosomal profiles and decreased quantity of some ribosomal proteins, indicating that alterations in 7SL RNA have global consequences. We complemented 7SL RNA-depleted cells with recombinant SRP54, leading to overexpression of SRP54, the most critical subunit for recognition and a sensor for RAPP, and analyzed its effect on 7SL RNA-deficient cells. Our data suggest 7SL RNA is important for crucial SRP functions, and provokes pre-emptive mRNA quality control with dysfunction, leading to ribosomal stress.

School: Graduate School of Biomedical Sciences

KORAC, KSENIJA

Carbidopa as a Novel and Targeted Single-Agent Chemo-Immunotherapy for Pancreatic Cancer

Ksenija Korac, Yangzom D. Bhutia

Pancreatic ductal adenocarcinoma (PDAC) is the most lethal of all cancers with a survival rate only in single digits. Treatment options are limited and have very low success rate. Our laboratory has identified SLC6A14, an amino acid transporter, to be significantly upregulated in PDAC. Using □-MLT as a blocker, we have demonstrated SLC6A14 to be a good therapeutic target for PDAC. PDAC is also characterized by an immune-suppressive environment wherein the antigen-presenting dendritic cells and tumor-draining lymph nodes express higher indoleamine-2, 3-dioxygenase 1 (IDO1) which contributes to immune-suppression. IDO1 is a tryptophan (Trp)-catabolizing enzyme and its increased activity in DCs depletes tryptophan in the surroundings, suppresses proliferation of T-cells, and enables tumor cells to evade the immune system. Our question is - can we target both SLC6A14 in the tumor cells and IDO1 in the immune cells, with a single agent, to treat PDAC? Our aim here is to identify an FDA-approved drug that could target both SLC6A14 and IDO1. Our laboratory identified Carbidopa, an FDA-approved drug, to have an anticancer property. Carbidopa is used in combination with L-DOPA to treat Parkinson's disease. Carbidopa's structural similarity to □-MLT (SLC6A14 blocker) and phenylhydrazine (IDO1 inhibitor) implicates that it could have the ability to target both SLC6A14 and IDO1, which will further be explored in this study.

School: Graduate School of Biomedical Sciences

LENZMEIER, TAYLOR

Lactobacillus gasseri concentrated supernatant eliminates wound pathogen's dual biofilms

Taylor Lenzmeier, Sahar Mirza, John Zak, Jane Colmer-Hamood, and Abdul Hamood

In the US, chronic wounds, including; pressure ulcers, vascular ulcers, and diabetic foot ulcers, affect approximately 6.5 million patients with an annual treatment cost of higher than $25 billion. Within chronic wounds, the infecting bacterial pathogens including Staphylococcus spp., Acinetobacter baumannii, Klebsiella oxytoca, and Pseudomonas spp. exist within protective structures termed biofilms. Results from several studies indicated the importance of probiotics in treating urogenital tract, middle ear, and gut infections. We recently demonstrated the potential of concentrated supernatant from Lactobacillus gasseri in preventing sepsis from P. aeruginosa infection. We hypothesize that the supernatant eliminates dual-pathogens biofilm formed by S. aureus and either P. aeruginosa, A. baumannii, or K. oxytoca within infected wounds. We grew L. gasseri in de Man, Rogosa and Sharpe (MRS) broth, harvested the supernatant, and concentrated it or the MRS broth by lyophilization to create L. gasseri lyophilized supernatant (LGLS) and MRS broth lyophilized (MRSBL), respectively. We determined the level of D/L lactic acid within the LGLS and acidified the MRSBL accordingly (MRSBLa). Titration experiments revealed that in comparison with MRSBLa, the lowest concentrations of LGLS that inhibited the planktonic growth of S, aureus, P. aeruginosa, A. baumannii, and K. oxytoca were 40, 30, 30, and 20 ug/ml respectively. Using Lubbock Chronic Wound Biofilm Model (LCWBM), which mimics biofilms within the chronic wound, we assessed the effect of the LGLS on dual biofilms formed by S. aureus and either P. aeruginosa, A. baumannii, or K. oxytoca. Compared to MRSBLa, 50-ug/mL of LGLS eliminated 24-hour dual biofilms formed by S. aureus and any of the above described pathogens. These results suggest the potential of LGLS in eliminating polymicrobial biofilms formed within infected wounds.

School: Texas Tech University

MARTINEZ-MARIN, DALIA

Identifying mechanisms of drug resistance in neuroblastoma by transcriptomic expression profiling of neuroblastoma patient-derived xenografts

Dalia Martinez-Marin, Kristyn McCoy, Jonas Nance, Wan Shi Chen, Diana Ixtlamati-Nava, Nick Rohr, C. Patrick Reynolds

Neuroblastoma(NB) is the most frequent extracranial solid tumor in children, half of which result in death, despite multimodality treatment. To determine if differentially expressed genes(DEGs) in primary tumors can be used as a biomarker for NB chemoresponse we studied 25 NB patient-derived xenografts(PDXs) that were treated with cyclophosphamide(cylo)+topotecan(topo). At conclusion, tumor growth was charted and each model was categorized into 5 drug response groups. RNA-seq analysis, on samples established prior to therapy or at disease progression, did not reveal any significant DEGs. DEGs between different response groups demonstrated a unique pattern among responders compared to the non-responders (NR)(p<0.005). Functional enrichment was analyzed to identify classes of genes that are over-represented in our data. Pathway analyses were used to estimate inter-gene correlation among DEGs and identify specific gene sets related to drug response and cancer. Genes with known involvement in drug responses among various cancers were then filtered out from the whole gene set. Primers were designed for RT-qPCR for all DEGs found with FC>2 & FDR<0.05. Interestingly, ALDH2 and FYN exhibited a stepwise decrease as drug response increases. Additionally, there were a handful of highly expressed genes in the NR group when compared to other response groups(p<0.005). SMYD3 shows the most promise as a predictor of chemoresistance in NB. It is highly expressed in NR PDXs compared to responder PDXs(p<0.005),and in patient data those with high expression of SMYD3 have a significantly lower 5-year survival rate(p<0.005). Current knockdowns of SMYD3 in patient-derived cell lines have significantly re-sensitized these cell lines to cyclo+topo(p<0.005), and agonists to this gene have increased cyclo-topo resistance(p<0.05). We will continue interrogating these DEGs with a goal of identifying a gene expression signature that identifies patients who will respond poorly to cyclo+topo.

School: Graduate School of Biomedical Sciences

MAZZITELLI, MARIACRISTINA

Optogenetic manipulation of amygdala CRF neurons modulates pain- related behaviors in a rodent model of neuropathic pain

M. Mazzitelli1, V. Yakhnitsa1, V. Neugebauer1, 2, 3,

1Pharmacology and Neuroscience, Texas Tech University Health Sciences Center, Lubbock, TX; 2Garrison Institute on Aging, Texas Tech University Health Sciences Center, Lubbock, TX; 3Center of Excellence for Translational Neuroscience and Therapeutics, Texas Tech University Health Sciences Center, Lubbock, TX

The amygdala is a limbic area critically involved in pain-related emotional-affective disorders and pain modulation. The central nucleus of amygdala (CeA) serves as a major output nucleus of the amygdala. CeA activity is increased and mechanistically linked to pain-related behaviors in different pain conditions. One of the CeA cell types contains corticotropin releasing factor (CRF). The CRF system is critically involved in the modulation of pain and affective disorders. Hence, we focused on the effects of optogenetic activation or silencing of CeA-CRF neurons on pain related behaviors under normal and neuropathic pain conditions.

Anxiety-like behavior (elevated-plus maze), emotional responses (audible and ultrasonic vocalizations evoked by innocuous and noxious stimuli of the hind paw) and mechanical withdrawal thresholds were measured in adult normal and neuropathic rats (4 weeks after spinal nerve ligation, SNL). For optogenetic activation or silencing of CRF neurons, a Cre-inducible viral vector (DIO-AAV) encoding light sensitive molecules (channel rhodopsin 2, ChR2 or enhanced Natronomonas pharaonis halorhodopsin, eNpHR3.0) was injected stereotaxically into the right CeA of transgenic Crh-Cre rats. Animals were allowed to recover for channel expression. For wireless optical stimulation of ChR2 or eNpHR3.0 expressing CRF-CeA neurons, an LED optic fiber delivering blue (473 nm) or yellow (590 nm) light was stereotaxically implanted into the right CeA.

Optical activation of CeA-CRF neurons increased vocalizations and mechanical sensitivity and induced anxiety like-behaviors under normal conditions, whereas optical silencing of CeA-CRF neurons decreased vocalizations and ameliorated anxiety-like behaviors, but had no effects on withdrawal thresholds, in the neuropathic pain model.

These findings provide evidence for an important role of CeA-CRF neurons in the formation and modulation of pain-related behaviors.

School: Graduate School of Biomedical Sciences

MYERS, CAITLYN

Antimicrobial Functions of the Epididymal Amyloid Matrix

Caitlyn Myers, Gail A. Cornwall

Experiment design: The purpose of our study is to assess the cognitive behavioral changes in 12-month-old wild-type (WT) and age-matched transgenic Tau mice (P301L strain) when given regular treadmill exercise and/or injections of molecule Mitochondria-targeted antioxidant, Ubiquinone (MitoQ). Methods: The mice were divided into four groups: 1) No treatment, 2) Treadmill exercise, 3) MitoQ and 4) Treadmill exercise + MitoQ for WT and Tau mice. Treadmill and Treadmill + MitoQ groups were run at 22 cm/sec for 30 minutes every weekday for 3 weeks. MitoQ and Treadmill + MitoQ groups were injected intraperitoneally with 5 μM of MitoQ, two times a week during the running period. After this time, cognitive behavior was assessed using Morris Water Maze (MWM), a test for the hippocampal spatial learning and memory. Results: MWM data was analyzed comparing the control group against the treated groups in both Tau and WT mice. Analysis of Tau mice showed that Treadmill (P=0.0286), MitoQ (P=0.0014), and Treadmill + MitoQ (P=0.0045) latency to find platform was significantly reduced when compared to control mice. In WT, Treadmill (P=0.03) and Treadmill + MitoQ (P=0.0279) mice performed better than control mice. Conclusion: Our study suggests that lifestyle factors such as physical exercise and diet have a positive impact on cognitive function in AD. We cautiously propose that healthy lifestyle factors could alleviate the pathological changes of aging associated with AD patients.

School: Graduate School of Biomedical Sciences

SCHNIERS, BRADLEY

PepT1: tumor promoter and novel drug target to treat pancreatic cancer

Bradley K. Schniers, Yangzom D. Bhutia

Pancreatic ductal adenocarcinoma (PDAC) currently has a 5 year survival rate of only 7%. Our research over PepT1, a proton-coupled oligopeptide transporter that transports a wide array of di/tri-peptides and peptidomimetic drugs, has discovered PepT1 to be upregulated in PDAC. To investigate its tumor promoting role, PepT1 was knocked down using an shRNA lentiviral plasmid; after which, loss of PepT1 was confirmed using qPCR, Western blot, and [3H]GlySar uptake to assess function. Colony formation assay and subcutaneous xenograft studies were conducted to study the role PepT1 has in PDAC growth. The absence of PepT1 reduced the colony formation ability and significantly reduced the tumor volume as compared to control cells. Pharmacological inhibition of PepT1 with Glibenclamide, a sulfonylurea, also stunted tumor growth significantly. While this is significant in targeting PDAC, the mechanism of PepT1 upregulation in PDAC remains unknown. The PDAC tumor microenvironment (TME) is acidic and hypovasular, with MCT1 and MCT4 exporting lactate from cancerous cells. Since the PDAC TME lacks blood supply, PDAC cells must attain nutrients through other means. Lactate upregulates matrix metalloproteinases (MMP's), which break down collagen in the extracellular matrix (ECM) to tripeptides, which are further hydrolyzed into dipeptides by dipeptidyl peptidase IV (DPPIV). Prior research found that PepT1 has an amino acid responsible element (AARE) in the promoter region that regulates PepT1 expression in response to available dipeptides. Upregulation of MMP's and DPPIV provide dipeptides that upregulate PepT1 expression and function, and can be further broken down to amino acids for DNA and protein synthesis. Further, amino acid deprivation and re-stimulation regulates PepT1 expression and function. Summarily, loss of PepT1 attenuates PDAC proliferation, while downstream effects of lactate and correlating dipeptides upregulate PepT1 expression and function.

School: Graduate School of Biomedical Sciences

SWEAZEY, RYAN

The Regulatory Membrane Protein Fxyd6: Localization In The Cns And Interaction With The Na+,K+-Atpase

Ryan Sweazey, Pablo Artigas

The Na+,K+-ATPase (NKA) is ubiquitous in the membranes of all animal cells where it generates the Na+ and K+ gradients necessary for cell excitability. It consists of one α and one β subunit, and often, a FXYD regulatory subunit. Seven FXYD family members may interact with αβ dimers, which in turn may form by association of distinct αxβy combinations (α1-α4, β1-β3). Isoform expression presents with tissue-, cell- and subcellular specificity. Each FXYD isoform alters the apparent affinities for transported ions of α1β1 isoforms. We used co-immunoprecipitation and confocal immunofluorescence microscopy in mouse hippocampus and cerebellum, as well as in human SH-SY5Y neuroblastoma cells, to determine the interaction and localization of the brain-specific FXYD6. FXYD6 polyclonal antibodies prominently stained the Purkinje cells (bodies and dendrites) and the molecular layers of the cerebellar cortex, as well as the CA1 pyramidal and the dentate gyrus of the hippocampus.The strongest FXYD6 staining appears to be perinuclear and intracellular. We performed co-immunoprecipitation followed by Western-blot analysis to determine whether FXYD6 has specific α interacting partners and found that in hippocampus, cerebellum and SH-SY5Y cells FXYD6 pulled down both α1 and α3 (reciprocally α1 and α3 pulled FXYD6 down). The kinetic effects of FXYD6 association with α1β1 or α3β1 were evaluated in oocytes expressing these isoforms, utilizing the two-electrode voltage clamp and patch clamp electrophysiology. FXYD6 produced several effects: 1) Significantly reduced (2-4-fold) the number of a1β1 and α3β1 at the membrane surface leading to diminished NKA current, 2) reduced the apparent Na+I affinity in α1β1 (~2-fold) and 4) increased the turnover rate of α1β1. Current experiments aim to refine FXYD6 cellular localization, protein interactions, and physiologic function with more accuracy.

School: Graduate School of Biomedical Sciences

WRIGHT, EMILY

A case study examining chronic wasting disease wild North American deer

Emily A. Wright1, Emma K. McDonald1, Emma K. Roberts1, Matthew J. Buchholz2, Robert D. Bradley1,3, Daniel M. Hardy4, and Warren C. Conway2

1Department of Biological Sciences, Texas Tech University, 2Department of Natural Resources Management, Texas Tech University, 3Natural Science Research Laboratory at the Museum of TTU, 4Department of Cell Biology & Biochemistry, Texas Tech University Health Sciences Center

Spongiform encephalopathies are neurodegenerative diseases caused by the spontaneous or induced folding of cellular prion protein PrPC into an alternate conformation, PrPSc (Sc=scrapie), that aggregates to form pathological amyloid. These diseases occur by three distinct mechanisms: 1) familial, in which disease alleles are inherited, 2) sporadic, in which mutations arise spontaneously, and 3) transmissible, in which infectious PrPSc passes between individuals. Transmissible prion diseases include scrapie in sheep, bovine spongiform encephalopathy (BSE) in cattle, variant Creutzfeldt-Jakob Disease (vCJD) in humans, and chronic wasting disease (CWD) in cervids. Because different PrP gene (PRNP) alleles encode amino acid polymorphisms that confer predisposition to prion diseases (white-tailed deer: Q95H, G96S, A116G; mule deer: S225F), we hypothesize that susceptibility to CWD will vary by geographically-based genetic diversity in cervids, which have arisen in part from historical inter-species hybrid formation and stock transplantation. Accordingly, we aim to establish a PRNP allele database, determine if PRNP allele distribution is consistent with mitochondrial haplotype geographic distribution and inferred hybridization history, and predict whether deer species in different geographic regions will differ in susceptibility to CWD. Identifying susceptible populations will help mitigate risk of transmission to humans. Though no such transmission has been documented, consumption of BSE meat caused the first cases of vCJD, thus handling and consumption of CWD deer meat may pose a risk to human health, especially considering that harvested, infected cervids may be clinically asymptomatic. This is the first exploratory study to examine allelic variation in PRNP of wild deer species across the U.S. Further, several populations (California, Alaska) that have yet to be documented with CWD will be first described in this study.

School: Texas Tech University

YOUNG, VICTORIA

A Shared Conformational Dance in the P-type 2 ATPase Family Studied with Voltage Clamp Fluorometry.

Victoria Young & Pablo Artigas

Cellular survival requires ion gradients built by the Na^+/K^+-pump (NKA), a member of the P-type 2 ATPase subfamily, which includes structurally similar enzymes with catalytic subunits containing 10 transmembrane segments (M1-M10), like the sarcoplasmic/endoplasmic reticulum Ca2^+-ATPase (SERCA). Both enzymes alternate between phosphorylated & dephosphorylated states of two major conformations: cytoplasmic-facing E1 & extracytoplasmic-facing E2. Despite their similarities, the M1-M2 region of SERCA moves in a piston-like manner as SERCA opens to release Ca2^+ to the luminal side. This M1-M2 movement is absent in NKA structures. To investigate the movement of M1-M2 in NKA, we engineered double cysteine mutants to evaluate disulfide crosslinking in two-electrode voltage clamped Xenopus oocytes. We observed that D126C in M2 & R977C in the M9-M10 loop preferred to crosslink in E2P instead of E1P(3Na), a result inconsistent with distances in NKA crystal structures. To characterize M1-M2 movement, we used voltage-clamp fluorometry, where single-cysteine mutants were labeled with tetramethylrhodamine-6-maleimide (TMRM). TMRM-tagged mutants in the M1-M2 loop produced state-dependent fluorescence changes ranging from 0.5 ± 0.5% to 19 ± 5%, suggesting large movement of the M1-M2 region. Mutational analysis identified multiple quenching tryptophans contributing to these changes. Because there were no changes in fluorescence with R977C-tagged-TMRM & to avoid complication from multiple quenchers, we introduced tryptophans, one at a time, in M1-M2. This novel approach showed that two fluorescence-change maxima at D126W & L130W, on the same helix side. All M2-introduced tryptophans giving fluorescence change quenched TMRM in E2P (unquenched in E1P(3Na)). These observations indicate that M2 moves outward as Na^+ is deoccluded as the pump transits from E1P(3Na)↔E2P+Na^+, a mechanism consistent with crosslinking results & with proposals for other P-type 2 ATPases.

School: Graduate School of Biomedical Sciences

MEDICAL STUDENTS YEARS 1-2 | GRADUATE MEDICAL SCIENCES | PUBLIC HEALTH

ABIDI, HUSSAIN

Assessment of Gender Preference in Surgeons in Patients Pursuing Aesthetic Body Plastic Surgery

Hussain Abidi BS., M.B.A, Soumya Reddy BS., Nicole Van Spronsen BS., Tanir Moreno MS., Joshua Demke M.D., Deepak Bharadia M.D.

An understanding of patients' gender preferences is critical in order for plastic surgeons to leverage how they market certain procedures to patients, as well as their website appeal and social media presence. Previous studies conducted on gender preference have shown patients' biases when choosing a provider. However, this gender bias has not been gauged in the realm of body plastic surgery procedures. The purpose of this study is to investigate the preferences the general public has for the gender of their plastic surgeon for aesthetic body procedures. This study is a prospective, survey-based study that evaluates general demographics, previous patient experience with plastics procedures, interest in these procedures, and gender preference of surgeon for each procedure (breast augmentation, reduction mammoplasty, mastopexy, liposuction, abdominoplasty). All survey participants were asked what their most important factor in selecting a surgeon was. If a bias was present, participants were asked to provide reasoning. The survey was distributed to participants via institutional email and social media. Inclusion criteria consisted of participants of age 18 and older. A total of 224 survey responses were obtained. Amongst these, 78% of survey participants were self-identified females while 21.5% were self-identified males. The majority of this population (73.9%) selected that they had no preference for physician gender. Of the participants that selected a preference, there were many varied responses for the reasoning behind their gender preference. Out of 40 male participants, there was no preference for a male surgeon. This study shows there was no significant gender-preference, although a portion of the participants showed bias in certain procedures. This study's limitations include sample size due to the COVID-10 pandemic. Understanding these preferences and their reasoning can be helpful to surgeons in strategically marketing to their target patient populations.

School: School of Medicine

ABLA, HABIB

Contribution Of A Spaced-Repition Flashcard Deck To Student Preparedness And Wellness In A Pass-Fail Medical School Block.

Habib Abla and Daniel R. Webster*

The COVID-19 pandemic has impacted both the mode of delivery of essential concepts by educators and the ability of students to digest and retain them. As a result, we developed a spaced-repetition flashcard deck (Anki) customized to the biochemistry unit of the Biology of Cells and Tissues block at TTUHSC. Our goal was to discern if such a resource would aid student retention of essential concepts as well as provide an improved student attitude toward the block.

First-year medical and Masters students were asked if they thought a customized Anki deck would be helpful. Due to the overwhelmingly positive response (88.6%) the Anki deck was constructed. The deck was built using the previous year's faculty-developed instructional material. A 10-question quiz was delivered both at the beginning and at the end of the unit to gauge student performance. Finally, a survey was administered to students at the end of the unit that assessed the degree to which the deck was used, its usefulness in preparing for the unit exam, and other metrics related to student anxiety and engagement with the material.

Ninety-five percent of respondents reported using our study deck. Over half of the students reported that it contributed to at least 50% of their study time. Seventy-six percent reported that it was either Very Helpful or Extremely Helpful in studying for the exam, 81% percent replied that the deck increased their engagement with the material, and 64% responded that the deck reduced their anxiety throughout the unit. Performance on the Anki deck post-quiz was significantly higher for the Anki users vs. the non-users ($p=0.039$), using a two-sample t-test.

Maintaining academic performance while addressing student wellness during this medical crisis is challenging. The use of this deck served, in part, to overcome these challenges and may provide a critical supplementary resource for students in future years.

School: Graduate School of Biomedical Sciences

ABRAHAM, JONATHAN

Ponseti Casting and Soft Tissue Release for the Initial Treatment of Non-Idiopathic Clubfoot

Jonathan Abraham, MSII; Jon Cooper Wall, Jr, MD, PGY-4; Cody Beaver, MD; Michel Diab, MD

Ponseti casting has universally been accepted as the gold standard for treatment of idiopathic clubfoot. Conversely, primary treatment for non-idiopathic clubfoot has not been established. Traditionally, these feet have been treated with primary soft tissue release (STR) and serial casting. However, this approach has led to variable success often times requiring secondary surgery. Recently, the Ponseti method has been used to treat non-idiopathic clubfoot and mid-term results from several institutions have been promising. The purpose of this study is to compare the treatment outcomes following primary STR and Ponseti casting.

An IRB-approved retrospective study of patients treated for non-idiopathic clubfoot between 2005 and 2020 was conducted. Patients were included if they began treatment before the age of 2 and had at least one year of follow up. Patients were placed into either the STR group or Ponseti group and variables of interest were documented. Data was analyzed using Mann-Whitney U test for continuous variables.

A total of 33 children with 57 neuromuscular/syndromic clubfoot were identified of which 9 (15 feet) were treated with STR and 24 (42 feet) were treated with Ponseti casting. Patients treated with STR were found to have significantly more surgeries performed over the course of treatment than those treated with Ponseti casting ($p = .001$) with an average of 4.2 surgeries in the STR group and 1.5 surgeries in the Ponseti group. Extracapsular procedures were performed in 100% of the STR group and 97.6% of the Ponseti group ($p = .55$). Intracapsular procedures were performed in 100% of the STR group and 50% of the Ponseti group ($p = .001$).

The Ponseti method should serve as the primary approach in the initial treatment of non-idiopathic clubfoot as it can reduce the risk of future invasive intracapsular surgery, decrease complication rate, and shorten anesthesia and surgery times when surgical treatment is necessary.

School: School of Medicine

AGUSALA, VEENA

CHF outcomes in Ethnic groups: Do they differ?

Veena Agusala MS2, Dr. Nandini Nair

Considering established social and ethnically-based determinants of health, African-American and Hispanic congestive heart failure patients will display overall worse outcomes post-intervention with greater risk of developing hypertension, diabetes, COPD, and renal insufficiency.

By 2017, CHF was a contributing cause to 1 in 8 deaths according to the CDC[4]. In addition, racial disparities continue to pose a major issue in healthcare. While the incidence of CHF is equally frequent in men and women, African-Americans are 1.5 times more likely to develop heart failure than Caucasians[2].

By recording ethnicity as well as outcome variables commonly associated with CHF patient health, we hope to find possible areas of care to improve.

We utilized a standard chart review for data collection from charts of all patients of each ethnic group: African-American, non-Hispanic White, Hispanic, all with a history of CHF intervention at UMC in the last 2 years. The data points collected included survival, ejection fraction, BMI, age, gender, renal function, and comorbidities. We characterized outcomes based on the development of significant comorbidities: hypertension, diabetes, COPD, and renal insufficiency.

The study population was 46.8% female and 53.2% male, with a mean BMI of 31.1 (obese).

As hypothesized, Hispanic patients were most likely to have diabetes already before intervention ($p=.001$), to develop diabetes post intervention ($p=.001$), and to develop hypertension post discharge ($p=.008$). In contrast, non-Hispanic White patients were most likely to have COPD before intervention ($p=.001$), and to develop COPD after CHF discharge ($p=.001$).

UMC patient data reflects racial and ethnic disparities in patients post- CHF intervention, in addition to a dangerously elevated average BMI. Racial and ethnic differences in risk of developing comorbidities post-intervention must be considered in treatment.

School: School of Medicine

ALI, HISHAM

Medical Support for the National Socialist (Nazi) Agenda in Germany: A Tragic and Cautionary Tale

Hisham Ali, Regina Baronia MD, M.Ed., Terry McMahon MD, Thomas McGovern EdD

The tragedies that occurred during the era of National Socialism in Germany serve as a stark reminder of how healthcare and public policy can be manipulated in a manner that ultimately results in horrific outcomes. The period from the 1920s to 1940s in Germany, marked by the transition of power from a failing Weimer Republic to a new National Socialist government, was characterized by many economic and racially motivated changes. Although it is more straightforward to place blame for these tragedies on Nazi political leaders, the role of medical professionals and researchers should not be overlooked or forgotten. Economic crisis in the late 1920s and the overcrowding of psychiatric hospitals in Germany were underlying factors of the incoming shift from science to pseudoscience to criminal science. Growing theories of racial hygiene and social Darwinism placed blame of the nation's problems on a German subpopulation- the mentally and physically ill, at first, and then the Jewish people and other minority groups. The growing eugenics movement, although not unique to Germany in the 1920s, became the target of these pseudoscientific theories. Compulsory sterilization of mentally ill populations gave way to the Aktion T4 euthanasia program which served as the building block for the Nazi concentration camps. Physicians, many of whom were members of the Nazi party, often played key roles in these programs and sought to fill the professional void left by their Jewish colleagues who had fled from Germany. Additionally, clear and evident connections have been made between medical research and the National Socialism "euthanasia" program that resulted in the deaths of "useless eaters". How could a group of professionals sworn to protect and do right by their patients have traversed to the opposite extreme? The goal of this review is to understand how a government can marginalize and target a subset of its population in the perceived interest of the health of a nation.

School: School of Medicine

ALI, KIRAN

COVID-19 Hospitalized Patients' Demographic Parameters and Outcomes

Kiran Ali, MBA, Sanjana Rao, BS, Jeff Dennis, MD, Gilbert Berdine, MD, Victor Test, MD, Kenneth Nugent, MD, Haneen Mallah, MD

The severity of COVID-19 ranges from asymptomatic subclinical infections to severe acute respiratory failure requiring mechanical ventilation. Patients admitted to the hospital have increased mortality rates and patients requiring intensive care have significantly increased mortality rates. Multiple factors influence these outcomes. This study used simple demographic information available on admission to evaluate possible associations between these variables and outcomes, including mortality and length of stay. Clinical outcomes in 63 patients admitted to a tertiary care hospital in West Texas were reviewed. Older patients, patients admitted from nursing homes, and patients admitted to medical intensive care units had increased mortality. Unadjusted analysis indicated that males had increased mortality. Adjusted analysis indicated that males spent nearly 5 days longer in the hospital than females. In summary, age, chronic illness requiring nursing home placement, and acute severe illness requiring intensive care unit admission identify patients with worse prognoses. In addition, males will likely have a longer length of hospital stay.

School: School of Medicine

BANAFSHAY, KIANA

Facial Chemical Burn—Literature Review and Primer for the Facial Plastic Surgeon

Kiana Banafshay, BSA, Rahul Varman, MD

Facial burn injuries make up a considerable portion of morbidities across the globe. Facial burn injuries not only leave many of its victims disfigured but also impact the victim's social and psychological well-being as well. While most literature focused on different aspects of facial acid burn, no prior literature focuses on facial plastics surgical management of the facial chemical trauma patient. To accomplish this, we completed a literature compilation review of surgical and aesthetic medicine management. We summarized data on etiology, epidemiology, burn classification, chemicals used, management techniques, outcomes, complications, and ongoing studies. We report interesting findings and trends, including male-dominated victims in many countries, increased use of new flap techniques in current years, and development of new medicinal chemicals to combat changes. Techniques involved in microtia and micrognathia surgery are suggested for use in reconstruction as well. While most injuries remain non-fatal, implementing timely surgical treatment is especially critical. Therefore, this literature and systematic review of concepts and techniques for facial chemical trauma can help guide future management and studies to improve outcomes for the target population.

School: School of Medicine

BANDARU, VISHAL

Medical Student Resource Analysis During Biology of Cells and Tissues

Riley Fortner, Vishal Bandaru, Dr. John Pelley

Texas Tech University's School of Medicine core curriculum for their entering first year medical students includes Biology of Cells and Tissues (BCT). Due to COVID-19, many of the in-person lectures, histology labs, and tests were changed to either a hybrid (online and in-person) or solely online medium. Consequently, different medical learning tools, resources, are used to learn information became more critical to students' individual learning. We propose that certain resources would better convey material to students.

During BCT, a voluntary response survey was sent to gauge class performance, personality type, and resource preference. Intuitive and sensing (N/S) personality traits were derived from Jung's Personality model as possible influences. In addition, class performance was asked to assess possible resource influences.

First, determining resource preferences required a one-way ANOVA using helpfulness and frequency of resource use on a scale of 1-5. We found p=3.19E-63 and p=6.25E-63 for helpfulness and frequency, respectively. Since the p-values were significant, we determined whether frequency and helpfulness were related by running a linear regression. The r^2 coefficient was 0.995 and y=0.966x, implying a strong linear correlation between the two, ergo, frequency and helpfulness are related. Finally, a two-way ANOVA with replacement tested influence of personality on helpfulness and frequency. A p=0.232 and p=0.608 for helpfulness and frequency, respectively, implied that frequency and helpfulness were not related to N/S personality. Class performance data was inconclusive due to lack of low-performance response.

Next year, modules will be created for resource recommendation based on the survey data collected this year and satisfaction surveys will be carried out after the medical school class of 2025 finishes BCT. Study habits and performance data needs to be analyzed to a greater extent to determine the impact they have on resource usage.

School: Graduate School of Biomedical Sciences

BASHRUM, BRYAN

Patient Risk Factors for Medication Inaccessibility in a Student-Run Free Clinic Setting

Bryan Bashrum, Stephanie Bui, Roald Credo, Ayushi Chintakayala, Alexander Zapata, Brianna Marschke, John Rafael, Aaron Thomas, Fiona Prabhu, Kelly Bennett

The Free Clinic at Lubbock Impact (TFC), a student-run free clinic affiliated with the TTUHSC, provides interdisciplinary healthcare services to uninsured patients in West Texas. Due to COVID-19 restrictions and administrative challenges, TFC has not offered free pharmacy services since March 2020. This report aims to identify which patient demographics face the greatest risk of being unable to obtain medications. This knowledge can enable free clinics to develop more targeted interventions to improve medication access for underserved patients. All free clinic patients within the past 3 years were contacted via phone and/or mail to provide survey responses. A total of 1,586 phone calls were made, resulting in 133 unique patient responses. Demographic data were used to determine whether any specific groups are more heavily impacted by the absence of free pharmacy services. Chi-square analyses were conducted to identify patient risk factors for being unable to access medications. 74% of respondents had previously received free medications from TFC pharmacy. 59% of respondents cited challenges to accessing prescribed medications without free pharmacy access. Age was found to be a statistically significant (p=0.0009) predictor for inability to access medications, specifically for those in the 45-55 years age group. Income level, ethnicity, and sex did not demonstrate any correlation with medication access. Employment and access to reliable transportation were correlated with better access to medications, although the results were not statistically significant (p=0.14, 0.24). These survey results helped to identify which patient populations may need more support in accessing medications: patients who are between the ages 45-55, unemployed, or lack reliable transportation. Future clinic interventions aim to target the needs of these groups, such as coordinating transportation or expanding enrollments in free Prescription Assistance Program.

School: School of Medicine

BAUM, JAXON

Knowing Our Status: Educating Medical Students on Sexually Transmitted Infections and Local Resources for Clinical Applications

Ozman J. Ochoa, M.S.; Jaxon T. Baum, B.S.; Fiona Prabhu, M.D

Populations of lower socioeconomic status are disproportionately affected by a myriad of illnesses due to factors such as lack of healthcare access or education. To help address this need, medical students frequently volunteer at local free/low-cost clinics to better serve populations that would otherwise have no access to appropriate care. Students at the Texas Tech University Health Sciences Center School of Medicine (TTUHSC SOM) have engaged in such endeavors by volunteering at the Lubbock Impact Free Clinic which serves uninsured patients in the community. While the clinic offers different services for treatment, it currently does not provide testing for Sexually Transmitted Infections (STIs), which have a significant prevalence in under-served communities. Clinic volunteers may miss opportunities to care for patients with STIs if they are not able to recognize the different signs and symptoms of STIs, how to treat STIs, how to discuss care, and where to refer patients for clinical testing. The awareness of this gap in care was ascertained through a Needs-Based Survey (NBS). This project aims to address the need for volunteer knowledge on STI testing resources through two-part educational intervention: First, students will elect to partake in an STI Educational Training Session where they will learn about the different testing locations throughout Lubbock, as well as the signs, symptoms, and treatment available for them. Second, students will have the opportunity to apply this knowledge through a Standardized Patient (SP) encounter. Pre and Post-education sessions and SP encounter surveys will be administered to obtain the usefulness of these interventions for future application to different patient demographics.

School: School of Medicine

BECKER, BENJAMIN

Intelligence of Children with Repair Cleft Palate: A retrospective chart review study.

Benjamin Becker, Bailey Harvey, Sueann Lee Ph.D.

Cleft deformities are known to have detrimental effects on an affected individual, especially symptoms that are physical, psychological, and intellectual in nature. The goal of this study was to examine intelligence amongst patients diagnosed with and treated for CL/P. A total of 115 medical charts of patients between ages 3 and 18 years old were screened and reviewed in this retrospective study for their TONI/PTONI scores, and compared to gender, urban versus rural home town, cleft type, and speech therapy. Mean TONI/PTONI scores was higher in males, in patients who lived in urban hometowns, patients diagnosed with unilateral incomplete cleft, and those who received speech therapy, though these differences were statistically insignificant. This data will be useful when providing individualized care and ensuring that the best possible treatment has been received by those patient populations in need. Further research must be conducted using a larger patient sample size in order to prove statistical significance and confirm application to the real-world population.

School: School of Medicine

BIONDO, ELISA

Diseases Caused by ATP1A1 Mutations

Giovanna Ababioh, Lois Mendez, Kerri Spontarelli, and Elisa Biondo

The Na^+/K^+ pump (NKA) is a multisubunit essential cell-membrane transporter that uses ATP hydrolysis to extrude 3Na^+ and import 2K^+ against their electrochemical gradients. Multiple isoforms of each subunit type are expressed with tissue-specific distribution with disease mutations found in the genes ATP1A1 (α_1), ATP1A2 (α_2), ATP1A3 (α_3), and FXYD2 (ɣ). Although there are comprehensive reviews of diseases caused by ATP1A2 and ATP1A3 mutations, there are no reviews focused on those caused by ATP1A1 mutation. We reviewed over 80 articles describing the effects of mutations in the ATP1A1 gene, which can cause primary aldosteronism (PA), Charcot-Marie-Tooth (CMT) Type 2, hypomagnesemia accompanied by seizures and cognitive delay (HASCD), and complex spastic paraplegia (CSP). In PA, the Renin-Angiotensin-Aldosterone System is dysregulated and aldosterone is produced irrespective of renin. Seven distinct missense mutations in ATP1A1 were recently linked to axonal CMT2. Two additional mutations produce intermediate CMT, apparently through dominant-negative effects. Three more mutations in ATP1A1 were recently linked to hypomagnesemia with cognitive delay and seizures which is resistant to supplementation of Mg^+2. CSP presents with upper motor neuron signs when another mutation leads to loss of NKA function. While the above mutations lead to impaired NKA function, their pathophysiological mechanisms remain unclear. Future research should address whether patients with ATP1A1-linked neuropathies also have elevated aldosterone levels, as expected from the presence of these germline mutations in all cells within the body. Studies to understand each ATP1A1 mutation-linked disease, will likely require a combination of various heterologous expression systems, patient-derived or genetically modified pluripotent cells, and genetically modified mouse models. These will help to develop new patient-specific treatments for these debilitating diseases.

School: School of Medicine

BRACKETT, EMMA

Characterization of Amino Acid Substitutions in the Binding Site of Bupropion in GLIC

Dubem Onyejegbu, Jessica Shepherd, Elham Pirayesh, Akash Pandhare, Zackary R. Gallardo, Michaela Jansen, Emma Brackett

The Gleobacter ligand-gated ion channel (GLIC) is a pentameric ligand gated ion channel (pLGIC) that is a homolog to the eukaryotic Cys-loop receptor superfamily. Cys-loop eukaryotic ion channels include serotonin receptor, GABA receptor, and nicotinic acetylcholine receptor. GLIC, a cationic selective ion channel, has been used to investigate structure and function of eukaryotic pLGICs. GLIC is proton activated channel that contains an extracellular and transmembrane domain. Bupropion, an atypical antidepressant, and smoking cessation drug has been shown to non-competitively inhibit pLGICs. For therapeutic use, bupropion blocks the reuptake of dopamine and norepinephrine in the brain. GLIC mutants were used to analyze and determine the binding site and important residues in the ion channel for bupropion to better understand the mechanism of action of the atypical antidepressant. A construct was formed by site-directed mutagenesis of the transmembrane domain of GLIC with the intent to impede the binding of bupropion to the channel. The construct was injected and expressed in Xenopus oocytes. Two-electrode Voltage Clamp was used to calculate the pH_50, which is the proton concentration needed to cause half of maximal activation of GLIC mutants. Following the determination of pH_50, bupropion was added to the solution to determine its ability to bind and inhibit the mutated channel. Cysteine scanning was preformed to identify key residues in the binding site of bupropion to GLIC. Further studies need to be done to compare the binding site on GLIC to its eukaryotic homologs to better understand bupropion's mechanism of action of so its therapeutic uses are well understood and can be adjusted accordingly.

School: School of Medicine

BRADSHAW, EVAN

Most Common Types of Local Flap Use in Reconstruction of Lateral Facial Defects: A Systematic Review

Evan Bradshaw

Local flaps have become a common practice for reconstructive surgeons in the craniofacial region due to their reliability and versatility. The proliferation of the general technique has inevitably brought with it a proliferation of many specific types of local flaps. This review aimed to consolidate the most commonly reported on types of local flaps for the lateral face anatomical region and to present new techniques in the literature. An initial search on the PubMed database was conducted using keywords related to "local flap" and "lateral face". The inclusion criteria for an article to be included are as follows: be written in English, involve a lateral facial defect, describe use of a local flap in the reconstruction of the defect, use a sample size greater than or equal to 5, record patient follow up beyond 5 months, document complication rates, not be a book chapter, review, or meta analysis, and be published after 1/1/1970. After the initial search, two reviewers evaluated each of the 2,448 results with the inclusion criteria above, and any discrepancies were decided on by a third reviewer with experience in the field of reconstructive craniofacial surgery. Upon review, many types of local flaps were found to be used with overall good results, however the cervicofacial and rotational flaps seem to be the workhorses of the technique. Further research could be aimed at compiling a meta-analysis of success rates of different flap types in the lateral facial region and elsewhere.

School: School of Medicine

BRANTLEY, WHITNEY

Effect of BMI on large bore chest tube vs pigtail catheter

M. Logan Warren, Whitney Brantley, Samudani Dhanasekara, Robyn Richmond

Pigtail catheters (PCs) and large bore chest tubes (LBCTs) have been found to have similar efficacy rates in patients with pneumothorax (PTX), hemothorax (HTX), or hemopneumothorax (HPTX). However, literature exploring factors that contribute to failures in tube thoracostomy is limited. The purpose of our study was to compare the BMI and the failure rates of PCs and LBCTs in traumatic PTX, HTX, and HPTX. We hypothesized that an increased BMI directly correlates to an increased risk of PC complication and failure rate. A Level 1 trauma center registry was queried to include all trauma patients that underwent PC or LBCT thoracostomy between June 2015-April 2020. Clinical outcomes of the two groups were compared using independent sample t-tests and Chi square tests. To evaluate outcomes in relation to BMI, each variable was regressed on BMI in a series of univariate logistic regression models and multiple logistic regression models that included the type of intercostal tube as a categorical covariate performed using R. Out of 183 patients, 54 had PC and 129 had LBCT. There was no significant difference in demographic parameters between the two groups except BMI, which was significantly high in the LBCT group. BMI significantly predicted an increase in 30d-morbidity and mortality in univariate logistic regression models. These associations remained significant after controlling for the type of intercostal tube. However, BMI failed to significantly predict all other examined variables including tube failure, post-tube PTX and readmission rates. Our hypothesis that an increased BMI directly correlates to an increased risk of PC complication and failure rate did not hold true based on our findings. However, our findings indicated that with increasing BMI, there is an increment of 30d-morbidity and mortality related with intercostal tube placement. As obesity is rising in the US, surgeons must prepare to anticipate complications related with either PC or LBCT placement.

School: School of Medicine

BROWN, ELIZABETH

Curriculum mapping to facilitate curricular renewal: The Immune System

Elizabeth Brown, Emily Sargent, Abigail Jackson, and Michaela Jansen

The medical school curriculum at TTUHSC School of Medicine consists of four years with the first two years constituting the basic sciences or pre-clerkship curriculum and the last two years constituting the core clerkships and additional clinical training. Here we mapped the curriculum content for the pre-clerkship curriculum. At present the SOM is embarking on a journey to renew the curriculum. The current curriculum begins with two general foundational courses (Clinically Oriented Anatomy and Biochemistry, Cells and Tissues) and then enters a curriculum that is a combination of discipline and organ-system-based curriculum. Students are first introduced to the normal physiological function of the major organ systems during year one and then revisit these systems for coverage of the pathophysiology and treatment of disease during year two. The SOM curriculum revision will continue to start with Anatomy and General Principles and then proceed in a strictly organ-system based manner combining physiology and pathophysiology for each organ system while integrating relevant concepts of biochemistry, cell biology and histology. We used the United States Medical Licensing Examination (USMLE) Step 1 content outline and mapped the content lists against the detailed contents of the blocks. The curriculum mapping facilitated the identification of gaps and redundancies, as well as the relative quantification of instructional methods used. For the immune system, we found that development and regulation of the adaptive immune response, immunoglobulins, and specific immunodeficiencies were overrepresented. However other topics were underrepresented such as termination of the immune response, certain biologically active antibodies, vaccine adverse effects, age and immunity, and some specific drugs effects. Our detailed curriculum inventory provides an essential framework to optimize and refine content representation and distribution during the current curricular renewal phase.

School: School of Medicine

BRUCE, CHRIS

Assessing Readability of Online Breast Reconstruction Resources - A Comparison Between DIEP and TRAM Autologous Reconstruction Flaps

J. Christian Bruce, MBA; Mariana Treviño; Nicole Van Spronsen; Deepak Bharadia, MD MPH

Internet resources have become a mainstay in the modern patient's search for health information. Thus, it is vital that such resources maintain adequate literacy levels in order to maximize patient understanding and empowered decision making. It has been noted in previous studies that online resources regarding postmastectomy breast reconstruction are of low readability and understandability. However, none have evaluated specifically the literacy of online resources regarding two of the most common procedures within autologous breast reconstruction, the more technically involved form of reconstruction. This study sought to discover the readability of online, patient-directed resources regarding Deep Inferior Epigastric Perforator (DIEP) and Transverse Rectus Abdominis Muscle (TRAM) breast reconstruction using a multimetric health literacy analysis. We hypothesized that online materials regarding DIEP flap and TRAM flap would yield literacy scores above the 6th-grade reading level recommended by the AMA and NIH. We also hypothesized that DIEP flap resources (representing free flap procedures) would yield higher literacy requirements than those regarding TRAM flap (representing pedicled flap procedures). A google search was performed using the following terms: "DIEP breast reconstruction" and "TRAM breast reconstruction". The first 15 results representing patient-directed, non-sponsored websites then underwent a multimetric analysis using a variety of readability formulae, followed by statistical analysis. Results showed that for all metrics, both DIEP and TRAM resources were above the 6th -grade reading level, with TRAM resources having higher average reading grade levels than those for DIEP. Based on these results, we concluded that more work is needed to simplify online resources regarding autologous breast reconstruction options and make them more understandable for patients, particularly for TRAM flap reconstruction (and likely other pedicled flap procedures).

School: School of Medicine

BUI, STEPHANIE

Combating Technology Frustration Through Tablet Integration: A Novel Implementation of Telemedicine in a West Texas Student-Run Free Clinic

Bui, Stephanie, MBA; Rafael, John, MBA; Zapata, Alexander, BS; Marschke, Brianna, BS; Thomas, Aaron, MS; Fine, Emily, BS; Bashrum, Bryan, BS; Prabhu, Fiona, MD; Bennett, Kelly, MD

Introduction: The outbreak of the novel Coronavirus (COVID-19) led to policies aimed at preventing its spread, subsequently affecting healthcare delivery methods. Telemedicine thus became more utilized to deliver care remotely. While telemedicine can increase access to care, its utilization involves technology not every patient has. The Free Clinic at Lubbock Impact (TFC), a student-run free clinic affiliated with the Texas Tech University Health Sciences Center (TTUHSC), implemented a new telemedicine model in May 2020 to provide care for the underserved regions of West Texas. TFC understood, however, factors such as a lack of internet or paucity of video-streaming devices that would preclude patients' abilities to utilize TFC's services. The clinic thus integrated the use of tablet computers to increase access to care.

Methods: In May 2020, $3500 worth of tablets and accessories were purchased for use at TFC and were implemented in the second week of TFC's telemedicine protocol. Patients were screened during appointment scheduling for the tablet's need for the visit. Tablet usage was integrated in a process adhering to strict COVID-19 safety protocols , and patients utilized them in a socially distant location under TFC's broadband.

Results: As of January 2020, a total of 84 telemedicine visits were completed using tablet, comprising 20.3% of all telemedicine appointments since implementation. Additionally, 95% of the weekly clinic nights involved at least 1 tablet, and as many as 56% of patients on any given night utilized a tablet for their visit.

Conclusion: TFC has offered patients unable to utilize telemedicine for any reason increased access by offering tablet usage for visits. For clinics with populations who may experience similar barriers to care, such interventions may bridge the technological divide and increase their healthcare utilization.

School: School of Medicine

CAREY, MICHAEL

Neurosurgical management of foramen magnum stenosis in pediatric achondroplasia patients: a literature review

Michael A. Carey, M.S.

Achondroplasia is a skeletal dysplasia that arises from an autosomal dominant or de novo gain of function mutation of the FGFR3 gene which results in dysfunctional endochondral bone growth and short stature. Additionally, abnormal cartilage growth in the basicranium of achondroplastic infants may result in foramen magnum stenosis (FMS). A serious complication related to a narrow foramen magnum is cord compression which brings a substantial risk for sudden death. Urgent foramen magnum decompression, specifically a suboccipital craniectomy with possible cervical laminectomy is the intervention of choice for these patients. Fifty publications related to the neurosurgical management of FMS in infants with achondroplasia were evaluated for this literature review. The results are the current state of knowledge for the assessment of FMS, indications for surgical intervention, the suboccipital craniectomy technique, and the surgical outcomes and complications for infants with achondroplasia.

School: School of Medicine

CASTRO, MARIBEL

Potential effects of EGCG, Curcumin, Omega-3, and Lycopene in the Treatment of Neuropathic Pain and Proposed Molecular Mechanisms: A Review of the Literature

^1Maribel Castro, ^1Luis F Castro, ^2,3,4,5Volker Neugebauer, ^4,5,6Chwan-Li Shen

^1Department of Medical Education, ^2Department of Pharmacology and Neuroscience, ^3Garrison Institute on Aging, ^4Center of Excellence for Translational Neuroscience and Therapeutics, ^5Center of Excellence for Integrative Health, ^6Department of Pathology, Texas Tech University Health Sciences Center, Lubbock, TX 7943

Neuropathic pain (NP) is a chronic condition that affects millions of people around the world. Epidemiological studies have estimated the prevalence for this condition to be between 3% to 17% of the world population. There are several causes of NP. Among the most common ones are metabolic disorders such as diabetic peripheral neuropathy, nerve compression, traumatic spinal cord injuries, as well as autoimmune and infectious etiologies. Nerve injury in NP generally leads to neuroinflammation and neuroplastic changes in peripheral and central neurons associated with sensitization and hyperexcitability. The current mainstay of therapy attempts to decrease spontaneous pain, allodynia, and hyperalgesia by decreasing hyperexcitability of peripheral neurons or modulating pain processing in central neural circuits . However, current treatment options do not provide adequate relief of pain and/or are accompanied by a large range of unwanted side effects.

As a result, many recent studies have attempted to identify bioactive compounds with anti-inflammatory and anti-oxidant properties that can be used as either adjunctive or monotherapy to attempt to reduce unwanted side effects while maintaining adequate chronic pain control. In this review, we focused on these bioactive compounds, namely, green tea extract Epigallocatechin Gallate (EGCG), omega-3, curcumin, and lycopene.

After a thorough review of the literature these bioactive compounds were found to exert their effects in peripheral sensory neurons, spinal dorsal horn neurons, and microglia. EGCG, omega-3, and curcumin decrease secretion of inflammatory cytokine release including IL-6, TNF-α, IL-1β via NF-κB pathway. Curcumin, EGCG, and lycopene serve as antioxidants by increasing activity of catalase, SOD, glutathione and decreasing nitric oxide and free radical generation. These compounds show promising results, but further research is needed to investigate mechanisms and therapeutic effects in human subjects.

School: School of Medicine

CHEN, ANDREW

Targeted Muscle Reinnervation for Surgical Pain Management in Amputees

Cameron Cox, BBA; Joash R. Suryavanshi, BA; Desirae McKee, MD; Andrew Chen, BS; Bradley Osemwengie, BA; Brendan J. MacKay, MD

Amputees are often left with chronic localized pain due to symptomatic neuromas in the residual limb. Targeted Muscle reinnervation (TMR) is a novel procedure that involves the transfer of residual nerves from amputated limbs to new muscle targets. While TMR has been shown to significantly reduce neuroma pain and can facilitate the use of sophisticated prostheses, the majority of literature covers animal studies, military populations, or the institution where TMR was developed.

Patients who underwent TMR for neuroma treatment or prevention were included. Overall pain score, phantom pain, stump pain, and nerve pain were recorded using the VAS pain scale. PROMIS forms for Pain Intensity, Quality, Interference, and Behavior were collected when possible.

37 patients with TMR in 42 limbs were included. Four patients had TMR on multiple limbs – 1 had 4-limb TMR, 1 had bilateral upper extremity amputations, and 2 had bilateral lower extremity amputations. The average age was 48.2 (range: 19-64). 25 patients (67.6%) were male. In our cohort, there were 16 upper extremity amputations (10 right, 6 left) and 26 lower extremity amputations (13 right, 13 left). Mean overall, phantom, stump, and nerve pain were 2.0 (range: 2-9), 2.9 (range: 0-10), 1.4 (range: 0-10), and 2.2 (range: 0-10), respectively at most recent follow up (n = 30, mean = 8.9 months, range: 0.2-29.1). Average PROMIS scores for Pain Intensity, Quality, Interference, and Behavior were 49.4, 52.9, 55.2, and 52.2, respectively at most recent follow up (n = 16, mean = 10.2 months, range 0.2-29.1). Average patient-reported percent improvement was 78.3% (n = 13, range: 25-100%).

All patients in this case series showed improvement of neuropathic pain symptoms after TMR, without complication related to the procedure. This study further establishes TMR as an effective therapy for the management of symptomatic neuromas in amputees.

School: School of Medicine

CHEN, ANGELA

Foix-Chavany-Marie Syndrome due to Unilateral Anterior Opercular Infarction with Leukoaraiosis

Katherine Rivas, Jie Pan, Angela Chen, Bailey Gutierrez, Parunyou Julayanont

FCMS is a cortical-subcortical pseudobulbar palsy characterized by impairment of facio-masticatory-pharyngo-glosso-laryngeal voluntary movement with preservation of automatic and involuntary movements. FCMS is typically caused by vascular insults on the bilateral anterior opercular or adjacent subcortical areas. Acute onset of FCMS secondary to a unilateral lesion is extremely rare. An 83-year-old right-handed woman presented with sudden onset of severe dysarthria, dysphagia and left facio-brachio-crural weakness. Neurological examination revealed severe spastic dysarthria, left upper motor neuron type of facial paralysis and left-sided hemiparesis. Emotional facial movement was intact with disturbed volitional facial movement. She had no aphasia, alexia or agraphia. A swallowing evaluation confirmed severe oropharyngeal dysphagia. MRI brain showed acute infarction on the right frontal operculum and preexisting extensive bilateral leukoaraiosis without evidence of brainstem lesion. During the two-week follow-up her symptoms had partially improved. An acute unilateral anterior opercular lesion can decompensate preexisting bilateral or contralateral corticobulbar-subcortical lesions and can result in the typical features of FCMS. This case demonstrates a favorable recovery of FCMS secondary to a unilateral lesion compared to bilateral lesions.

School: School of Medicine

CHEN, JASON

MSD Patient Compliance to Physician Advised Behavior Changes

Jason Chen^1, Chwan-Li Shen^2,3,4, Julie St-John^2,5, and Jeff Dennis^2,6

1 School of Medicine, Texas Tech University Health Sciences Center, Lubbock, TX 79430; 2 Center of Excellence for Integrative Health, Lubbock, TX 79430; 3 Center of Excellence for Translational Neuroscience and Therapeutics, Lubbock, TX 79430; 4 Department of Pathology, School of Medicine, Texas Tech University Health Sciences Center, Lubbock, TX 79430; 5 Julia Jones Matthews Department of Public Health, Graduate School of Biomedical Sciences, Texas Tech University Health Sciences Center, Abilene, TX 79601; 6 Julia Jones Matthews Department of Public Health, Graduate School of Biomedical Sciences, Texas Tech University Health Sciences Center, Lubbock, TX 79430

Approximately half of all adult Americans suffer from musculoskeletal disorders (MSD). Significant risk factors include poor diet, obesity, and insufficient physical exercise. Studies show that lifestyle change education and interventions reduce MSD risk factors. However, little is known about the relationship between physician advice for behavior change, patient education level, and behavior change by MSD patients.

This study explores the association between physician advice for lifestyle change and reported behavior change in people who have musculoskeletal pain. Additionally, it examines the association between education level and adherence to physician advice for behavior change

This study used data from the 2017 National Health Interview Survey, a nationally representative cross-sectional survey of non-institutionalized U.S. adults. Analysis was limited to adults who reported a limitation due to musculoskeletal problems (n=2,672). Outcomes included physician recommendations to change physical activity, change diet, or lose weight, and whether they enacted these behavioral changes. Adjusted logistic regression models examined whether compliance with doctor's instructions differed by gender and/or education level

Adjusted models show patients advised to change physical activity, diet, and weight were more likely to report attempting those behaviors. Education was positively associated with likelihood of complying with physician advice to increase physical activity. Among those not advised to change behaviors by a physician, education was positively associated with current behavior change attempts

This study suggests that physician recommendations are relevant predictors of reported behavior change in individuals with MSD. Although education plays an important role in this association, the relationship is complex and multifaceted. Future studies should explore how compliance may be impacted by physician message type

School: School of Medicine

CHIN, KEVIN

Post-Intervention Effects of Tai Chi and Qi Gong on Depression Scores: A Systematic Review and Meta-Analysis

Kevin, Chin, Haven Ward, Chathurika Dhanasekara, Dale Dunn, Chwan-Li Shen, Chanaka Kahathuduwa

Background: Tai Chi and Qi Gong are mind-body interventions with positive effect on psychological well-being. The purpose of this study was to establish the beneficial effects of exposure to at least 3 weeks of Tai Chi or Qi Gong on depressive scores in a systematic review and meta-analysis.

Methods: Peer-reviewed studies covering the effects of Tai Chi and Qi Gong on depressive or anxiety symptoms were searched on PubMed, Medline, ProQuest, Scopus, and Web-Of-Science databases. A screening process was implemented, which included two independent researchers assessing the studies for eligibility. Full text articles of prospective controlled trials examining the effects of > 3 weeks of Tai Chi or Qi Gong on depressive symptoms were identified. Studies were evaluated for risk of bias per the Cochrane handbook. Pre- and post-intervention depressive symptoms of intervention and control groups were extracted. DerSimonian Liard random-effects meta-analyses were performed using the meta package in R (4.0.3).

Results: Out of the 1,306 studies that emerged upon an initial database search, 74 studies met eligibility (mean exposure 31.53±37.10 hours; range 5-312). Tai-Chi training significantly decreased standardized depression scores compared to the controls (Cohen's d = -0.30, [-0.42, -0.17]). Similarly, Qi Gong training also significantly decreased standardized depression scores vs. controls (Cohen's d = -0.39, [-0.51, -0.26]).

Discussion: Exercises which focus on mindfulness such as Tai Chi and Qi Gong seem to have a moderate effect in alleviating depression. Our findings should promote increased recommendation of these mind-body interventions to reduce clinical as well as subclinical depression. Future meta-regression analyses should examine the differential effects of mind-body interventions based on socioeconomic factors and symptom severity. Furthermore, future randomized trials should compare the effectiveness of these interventions vs. anti-depressive medications.

School: School of Medicine

CHEN, YORONG

Shearwave elastography measured differences between unembalmed and embalmed knee tissue stiffness.

Cameron C. Bassett PT DPT1, Kerry K. Gilbert PT ScD1, Troy L. Hooper PT ATC PhD1, Roger James PhD FACSM1

INTRODUCTION: Cadavers are valuable resources for education, research, and clinical simulation, however, there is no quantitative data to compare cadaver tissue stiffness relative to the embalming condition. This research provides recommendations for unembalmed and embalmed cadaver use based on quantitative in situ tissue stiffness using shearwave elastography (SWE).

MATERIALS AND METHODS: Tissue stiffness values of the patellar tendon (PT), vastus medialis oblique (VMO) and superficial medial collateral ligament (sMCL) were measured in 10 cadavers (5 unembalmed and 5 embalmed) using SWE at five and 20° of knee flexion. Intrarater reliability was analyzed using the intraclass correlation coefficient (ICC (3, 3)). The SWE data of the embalmed conditions and knee flexion angles were analyzed using a two-way mixed ANOVA.

RESULTS: Good intrarater reliability measures found for the PT (ICC (3, 3) = 0.969), VMO (ICC (3, 3) = 0.976), and sMCL (ICC (3, 3) = 0.826). Tissue stiffness measurements were significantly different between embalming conditions for the PT and VMO (PT p < 0.001; VMO p = 0.008), but sMCL data is inconclusive. There were no significant tissue stiffness differences between five and 20° of knee flexion (PT p=0.473; VMO p=0.598; sMCL p=0.348).

CONCLUSION: The SWE reliably measured cadaveric tissue stiffness and found greater stiffness values in embalmed cadaver tissues for the PT and VMO. Tissue stiffness does not appear to change between five and 20° of knee flexion. Based on tissue behavior, embalmed cadavers are recommended for educational study and unembalmed cadavers are recommended for research and clinical simulation.

School: School of Health Professions

CHINTAKAYALA, LAXMI

EMERGENCY MEDICAL CARE AMONG FREE CLINIC PATIENTS DURING THE COVID-19 PANDEMIC

Laxmi Chintakayala MBA, Brianna Marschke, Abigail Ellington, Riya Koshy, Alexander Zapata, Stephanie Bui MBA, Bryan Bashrum, John Rafael, Aaron Thomas MS, Fiona Prabhu MD, Kelly Bennett MD

Throughout the COVID-19 pandemic, access to medical care for uninsured patients has drastically decreased, partly due to the closure and decreased operations of student-run free clinics. This study evaluates the extent of emergency medical care services sought by the Lubbock Impact Free Clinic's patient population during the COVID-19 pandemic.

A survey of patients who visited the free clinic between 2017-2020 was conducted via telephone or mail and recorded in SurveyMonkey. Inclusion criteria were uninsured patients, ages 18-64. Demographic parameters, chronic conditions, access to healthcare, and amount of Emergency Department (ED) visits before and during the pandemic were evaluated via descriptive statistics through Excel.

Of the 98 included patients, 52.58% reported they have had difficulty finding accessible healthcare since the pandemic began. 52.04% needed to be seen but weren't, mostly due to costs (33.33%) or fear of contracting coronavirus (26.98%). 30.61% patients reported they have been to the ED, and 68.29% of those reported that they would have sought care at our free clinic instead had it been fully running as normal. The demographics of those who frequented the ED when unable to access primary care largely included those who are Caucasian (46.42%) or Hispanic (42.86%), unemployed (57.14%), and have a household income under $25,000 (71.43%).

The pandemic left the Lubbock Impact Free Clinic closed from March-May 2020 except for telephone appointments for medication refills, until it was then reopened for only telemedicine operations. These limitations drastically affected our patients' access to care and increased ED usage for non-emergent conditions. Free clinics reduce the use of more costly healthcare by uninsured individuals through both preventative care and decreased ED utilization. This study highlights the need for adequate and accessible healthcare for uninsured populations through free clinics, especially during this pandemic.

School: School of Medicine

CHOI, ERIN

Schwachman-Diamond-Like Syndrome Clinical Mutations in Signal Recognition Particle

Erin S. Choi 1,2, Morgana K. Kellogg 2,3, Alondra Chavez 2,4, Elena B. Tikhonova 2, Andrey L. Karamyshev 2

1 TTUHSC School of Medicine; 2 Department of Cell Biology and Biochemistry, TTUHSC; 3 Graduate School of Biomedical Sciences, TTUHSC; 4 CISER (Center for the Integration of STEM Education and Research), Texas Tech University

Misfolded and mistargeted proteins are cytotoxic and are the underlying cause of many human diseases. Improper folding or translocation can lead to protein aggregation or loss of their expression, demonstrating that protein targeting plays an important role in cells. Many secretory proteins use the Signal Recognition Particle (SRP) dependent pathway for their targeting and transport. Usually, these secretory proteins are synthesized as precursors with N-terminal signal sequences that are recognized by SRP. The ribosome, polypeptide nascent chain, and SRP complex is then targeted to the endoplasmic reticulum for processing. Loss or lack of SRP recognition of the signal sequence triggers a protein quality control pathway called Regulation of Aberrant Protein Production (RAPP). The RAPP pathway scans for nascent chain interactions with SRP. An insufficient interaction activates mRNA degradation preventing synthesis of defective proteins. Recently, studies have identified mutations in SRP that lead to a rare disease called Schwachman-Diamond-like syndrome. Schwachman-Diamond-like syndrome is characterized by severe neutropenia, pancreatic insufficiency, delayed skeletal maturation, and intellectual disabilities. The detailed mechanism of this disease and the effect of reported mutations on SRP function are unknown, however some cellular proteins needed for neutrophil maturation could be SRP targets. The goal of this study is to investigate the effect of reported clinical mutations on SRP function and provide more detail on the possible mechanism of Schwachman-Diamond like syndrome. For this purpose, we constructed a SRP54 plasmid, introduced clinical mutations, and using human cultured cells as a model, we analyzed the expression of known SRP substrates.

School: School of Medicine

CIUBUC, JOHN

A Rare Case of MAPL

John Ciubuc PhD, Jasmin Rahesh MBA MS, Ellen Wilson, Atif Khan MD, Anass Dweik MD, Praveen Tumula MD, Rahul Chandra MD

Mixed phenotypic acute leukemia (MPAL) comprises of both lymphoid and myeloid markers or blasts in a single population. Diagnostic criteria hinges on classifications provided by identifying these lineages based on cytogenetic markers taken throughout the disease course. We describe an interesting presentation of a patient who had first presented with Acute Myeloid leukemia (AML) but 8 weeks later transformed into Early precursor T cell ALL (ETP-ALL). Cytogenetics were taken throughout the course of the cancer and confirmed the presence of a CD34 precursor cell marker. This transformation and cytogenic markers indicated a pluripotent progenitor cell origin confirming the diagnosis of MAPL. This case highlights a pluripotent progenitor origin with initial presentation as AML (myeloid clone) and later as ALL after initial partial response to AML therapy due to clonal evolution.

School: School of Medicine

COLLINS, REAGAN

Use of an Autologous Cell Harvesting System for Soft Tissue Reconstruction of Necrotizing Soft Tissue Infection

Reagan Collins, Nicole Van Spronsen, Brandon Couch, Liza Garcia, Deepak Bharadia MD & John Griswold MD FACS

Necrotizing soft tissue infections (NSTIs) are severe infections that cause rapidly progressing destruction of fascia and subcutaneous tissues leaving the patient with a very large soft tissue defect necessitating surgical closure. ReCell, an autologous cell harvesting device, provides an array of epithelial cells from a small split-thickness biopsy to be used in place of or in addition to split thickness skin grafting (STSG). We present a case of a 56-year-old male with extensive NSTI surgically managed with serial debridement, ReCell application in conjunction with STSG, and Integra placement with positive post-operative outcomes.

A 56-year-old male was transferred to the emergency department at our institution for an extensive NSTI to the right upper extremity and chest. Immediately, he was taken to the operating room (OR) for extensive debridement. The patient returned to the OR three additional times during his hospital course for excisional debridement and split thickness skin grafting (STSG). Surgical intervention on post admission days 34 and 51 included ReCell use over the graft and placement of Integra in addition to the excisional debridement and STSG. Post admission day 70, his last graft takedown was performed with 95% take. The patient was discharged the following day to a rehabilitation facility without need for additional reconstruction.

At his 2 week follow up, the patient was healing well with limited right upper extremity range of motion but continued improvement seen with physical and occupational therapy.

Due to the patient's significant soft tissue defect, a unique reconstructive plan was required. ReCell should be considered as a treatment modality for significant soft tissue defects including those of NSTIs.

School: School of Medicine

COUCH, BRANDON

Carotid Artery Stenting Utilizing the Mo.Ma Device: The Texas Tech Experience

Ozman J. Ochoa, M.S.; Brandon Couch; Mohammad M. Ansari, M.D.

Introduction: While surgical options are available for treatment of Coronary Artery Disease (CAD), Carotid Artery Stenting (CAS) can be a viable intervention for patients deemed high risk for surgery. Serious complications can arise with CAS, which is why embolic protection devices such as the Mo.Ma Device have been useful in reducing incidences of Transient Ischemic Attacks (TIA), and strokes. Because of these benefits, a prospective case series of seven patients who underwent CAS through Mo.Ma guidance was conducted to evaluate the procedural details and outcomes.

Methods: Seven complicated MOMA protection CAS procedures were reviewed from 2016 to 2018 who were deemed high risk for surgery. Demographics of the patients were taken as well as different comorbidities including Hypertension (HTN), History of Smoking (HOS), Atrial Fibrillation, Diabetes Mellitus (DM), CAD, and TIA. Records of different Aortic Arch Types (AAT), degree of stenosis, procedural data, and follow-ups were also taken.

Result: 2/7 patients were female and 5/7 were male with an average age of 65 years and BMI of 26.29. Risk factors and comorbidities included 71.43% had a HOS, 85.1% had HTN, 28.57% had Atrial Fibrillation, 42.86% had DM, 42.86% had CAD, and 71.43% had TIA. 33.33% had AAT-1, 16.67% had AAT-II, and 50% had AAT-III. Average percentage of stenosis was 85.37%. Average length of stay was 2.3 days and 100% of patients had perioperative periods without stroke including 2-3 year follow-ups.

Conclusion: The proximal protection MOMA device provides a safe and effective means for CAS in patients deemed high risk for surgery with zero incidence of complications and postoperative stroke.

School: School of Medicine

CROSS, KRISTINA

Melatonin in Early Treatment for COVID-19: A Narrative Review of Current Evidence and Possible Efficacy

Laveena Sehgal, Dylan M. Landis, Kristina M. Cross, J. Drew Payne

To date, there are no FDA approved medications for treatment of early COVID-19 infection. Recently, use of melatonin, a naturally occurring tryptophan-derivative synthesized in the pineal gland and immune cells, has been suggested as an early treatment option for COVID-19. Melatonin has known anti-inflammatory, immunomodulatory, and protective antioxidant mechanisms that may attenuate the severity of COVID-19 symptoms. The aim of the present narrative review is to discuss the use of melatonin as an early treatment option on the first day of diagnosis for COVID-19. The MeSH terms “COVID-19” and “viral diseases” were manually searched on PubMed and relevant articles were included. Results showed that melatonin acts to reduce damaging reactive-oxygen-species mediated damage, cytokine-induced inflammation, and lymphopenia in viral diseases similar to COVID-19. These conclusions provide evidence for potential benefits in COVID-19 treatment as early as the day of diagnosis.

School: School of Medicine

CRUSER, BRIGID

An Analysis of Stress Management Methods Amongst MS1's

Giovanna Ababioh, Benjamin Becker, Brigid Cruser, Marcus D. Gonzalez

The transition into medical school is a major step for many incoming students. The struggle of trying to juggle school, family life, physical and spiritual health can significantly impact a student's well-being. To cope with these significant stressors, students may turn to unhealthy outlets that may ultimately prove to be harmful. We sought to answer the questions of what are the different types of stress management methods utilized by first year medical students at TTUHSC? And, if they don't utilize TTUHSC resources, why not? We hypothesized alcohol use to be a popular coping mechanism. We also expected students' familiarity with TTUHSC resources to correspond with their likelihood to use said resources.

We sent a survey to the first-year medical students at TTUHSC that asked 11 questions regarding stress levels, coping mechanisms, and their thoughts regarding TTUHSC resources. We received a total of 117 responses. Our results indicate that first year medical students at TTUHSC are under a great deal of stress, with 49% of the respondents ranking their stress during the academic year as an 8 or higher out of 10. When asked about how they cope with stress, students cited exercise and solitary activities as the most popular methods. Students engaged in these two activities with an average frequency of 3.5 days of the week. Results indicate that drinking is not a popular method of coping with stress. The average frequency for drinking was about .5 days per week, with the average amount being 2 standard drinks. Students rated their familiarity with and confidence in TTUHSC mental health resources as an average of about a 4 out of 5. However, when asked how likely they would be to seek help for mental health if needed, the average response was a 3 out of 5, with the most common response being only a 2 out of 5. This indicates that there is a disparity between how stressed students are and their willingness to utilize TTUHSC resources.

School: School of Medicine

DAINES, BEN

The clinical and hemodynamic implications of low cardiac index in patients undergoing evaluation for pulmonary hypertension

Benjamin Daines BS, Omid Hosseini BSA, Sanjana Rao BS, Sofia Prieto MD, John Abdelmalek MD, Mohammed Elmassry MD, Pooja Sethi MD, Victor Test MD, Kenneth Nugent MD

Cardiac index (CI) is a hemodynamic assessment of cardiac output based on body surface area. CI provides insight into the progression of pulmonary hypertension (PH) and is used as a marker of overall disease severity. Despite the association between PH and CI, little is known about the specific alterations in laboratory values, cardiac stress, and hemodynamics due to low CI imposed on PH. In this study, we analyzed a cohort of patients with PH to determine the additional hemodynamic and cardiovascular stress due to low CI.

This cohort includes 131 patients referred to the pulmonary vascular disease clinic at TTUHSC. Patients with appropriate indications underwent right heart catheterization. Sixty patients had echocardiography prior to catheterizations to determine right heart strain. Low CI was defined as < 2.5 L·min^−1·m^−2 according to WHO risk criteria. Hemodynamic summary scores were calculated using a recent publication by McLaughlin et al. Information, including demographics, catheterization data, echocardiography data, and laboratory results, was analyzed.

Patients with low CI had significantly less negative left ventricular global strain (-12.1 ± 3.1 vs -14.7 ± 4.8) and left ventricular free wall strain (-12.4 ± 4.8 vs -15.1 ± 5.1) indicating worse cardiac function. Low CI was associated with significantly lower mixed venous oxygen saturation (59.0 ± 8.1% vs 64.0 ± 7.5%). Patients with low CI had significantly higher logBNP values and hemodynamic summary scores. The low CI cohort was 2.2 times more likely to have coronary artery disease.

Patients with PH and low CI had significantly worse cardiac function due to greater left ventricular strain. The low CI cohort faced greater hemodynamic stress indicated by elevated hemodynamic summary scores. These observations suggest patients with PH and low CI are more likely to face additional hemodynamic and cardiovascular pathology warranting right heart catheterization.

School: School of Medicine

DANG, MICHAEL

Use of 3D Human Anatomy Modules to Facilitate Medical School Learning in the Era of COVID-19

Michael Dang, Brandt Schneider, Keith Bishop, Gurvinder Kaur

Cadaveric dissection is essential to TTUHSC's curriculum for first year medical students (MS1s). The advent of COVID-19 led to restrictions that limited in-person dissections. This necessitated an increased reliance on using distance-learning resources. One such resource, Complete Anatomy (CA), a 3D anatomy atlas application, has not been extensively studied under COVID-19 restrictions. Our aim was to develop online 3D Modules to supplement TTUHSC's dissection labs to enhance student learning outcomes. 3D modules for the abdomen, pelvis/perineum, and lower limb were constructed via CA. Each module served as an interactive compendium for the respective dissection lab. Modules consisted of "Lectures" that displayed anatomical structures that MS1s were expected to identify in their dissection manuals. Each module also included "Quizzes" that assessed the MS1's knowledge after completion of the related Lecture. MS1s were provided with these modules to use in preparation for dissection before labs, as a guide during labs, and to consolidate information after labs. A survey was given to the MS1s after the conclusion of the unit to assess their satisfaction and engagement with the modules. CA modules were used by 82% (n = 130) of MS1s as a study resource. 62% of the MS1s found the modules to be "Extremely Useful", with 0% of them responding "Not Useful." Analysis of CA quiz performance revealed a strong correlation with summative practical exam scores (r = 0.40, p<0.0001). Additionally, no exam performance differences on the in-house practical exam and the NBME were observed between this year's and last year's class. Collectively, these data indicate that the incorporation of 3D modules may have positively supplemented cadaveric dissection labs. MS1s used the CA modules frequently and found them to be useful in their medical education under COVID-19 restrictions.

School: Graduate School of Biomedical Sciences

DANIEL, HANNAH

Teaching Unit 2 Clinically Oriented Anatomy During the COVID-19 Pandemic

Vanessa Davis, Gabrielle Plata, Gurvinder Kaur, Keith Bishop, and Brandt Schneider

To ensure student safety during COVID-19, the structure of Clinically Oriented Anatomy (COA) course changed significantly. Traditionally, first year medical students have 27 in person cadaveric dissection labs. In 2020, student dissection time was reduced by 66%. We hypothesized that in-person Unit 2 (Head and Neck) anatomy could be safely and successfully taught by implementing more online study resources to supplement the reduced time in the cadaver lab.

We focused on creating digital versions of in-person formative assessments. Pre-COVID, COA had nine Students Teaching Students (STS) sessions consisting of student led dissections followed by an in-person quiz. Teaching assistants (TAs) also created in-person formative practical exams that simulated actual cadaveric exams. To assist in making these aspects of COA virtual, we replaced in person STS quizzes and formative practical exams with online assessments. In addition, in the advent that the COVID pandemic prevented in-person exams, we created an emergency online Unit 2 summative practical and a Unit 2 image database with over 300 images to help in creating online exams.

Satisfaction surveys revealed that 88% (n=206) of responding students reported that our COVID-19 preparations were "very good-outstanding" and 90% (n=81) reported our online resources were "moderately-extremely useful" in reducing exam stress. When analyzing exam scores, we found the online TA formative practical exams significantly correlated (p<.0001) with summative practical exams (Unit 2 r=0.45). Furthermore, decreasing the number of dissections did not negatively impact exam scores.

Based on student satisfaction and exam scores, we conclude that our new online resources: 1) promoted successful virtual learning of necessary anatomical concepts; 2) reduced student exam stress, and 3) prevented a reduction of in person cadaveric dissection opportunities from adversely impacting student performance.

School: School of Medicine

DAVIS, VANESSA

Teaching Unit 2 Clinically Oriented Anatomy During the COVID-19 Pandemic

Vanessa Davis, Gabrielle Plata, Gurvinder Kaur, Keith Bishop, and Brandt Schneider

To ensure student safety during COVID-19, the structure of Clinically Oriented Anatomy (COA) course changed significantly. Traditionally, first year medical students have 27 in person cadaveric dissection labs. In 2020, student dissection time was reduced by 66%. We hypothesized that in-person Unit 2 (Head and Neck) anatomy could be safely and successfully taught by implementing more online study resources to supplement the reduced time in the cadaver lab.

We focused on creating digital versions of in-person formative assessments. Pre-COVID, COA had nine Students Teaching Students (STS) sessions consisting of student led dissections followed by an in-person quiz. Teaching assistants (TAs) also created in-person formative practical exams that simulated actual cadaveric exams. To assist in making these aspects of COA virtual, we replaced in person STS quizzes and formative practical exams with online assessments. In addition, in the advent that the COVID pandemic prevented in-person exams, we created an emergency online Unit 2 summative practical and a Unit 2 image database with over 300 images to help in creating online exams.

Satisfaction surveys revealed that 88% (n=206) of responding students reported that our COVID-19 preparations were “very good-outstanding” and 90% (n=81) reported our online resources were “moderately-extremely useful” in reducing exam stress. When analyzing exam scores, we found the online TA formative practical exams significantly correlated (p<.0001) with summative practical exams (Unit 2 r=0.45). Furthermore, decreasing the number of dissections did not negatively impact exam scores.

Based on student satisfaction and exam scores, we conclude that our new online resources: 1) promoted successful virtual learning of necessary anatomical concepts; 2) reduced student exam stress, and 3) prevented a reduction of in person cadaveric dissection opportunities from adversely impacting student performance.

School: Graduate School of Biomedical Sciences

DAVIS, ZOE

Lubbock Impact’s Lack of Impact: Analyzing Clinical Utilization with Access to Other Non-Medical Services in a West Texas Student-Run Free Clinic

1Davis, Zoe, BSA; 1Rafael, John, MBA; 1Riya Koshy, BS, 1Samuel Jackson, 1Zapata, Alexander, BS; 1Marschke, Brianna, BS*; 1Bui, Stephanie, MBA; 1Thomas, Aaron, MS; 1Fine, Emily, BS; 1Bashrum, Bryan, BS; 1,2Prabhu, Fiona, MD*; 1,2Bennett, Kelly, MD*

The COVID-19 pandemic disproportionately affected underserved populations not only through limited access to medical care but also via additional loss of other resources essential to their livelihood. The Free Clinic at Lubbock Impact (TFC), a student-run free clinic affiliated with the Texas Tech University Health Sciences Center (TTUHSC), regularly sees upwards of 25 uninsured adult patients every Wednesday evening through an interdisciplinary, education-centered patient approach. Lubbock Impact (LI), a non-profit community outreach ministry that provides other services that aid the underserved and houses TFC, became affected as well. We formulated an outreach method to gain novel insights on pandemic-related questions, and understand the knowledge and utilization of LI’s services outside TFC.

School: School of Medicine

DE SIMON, DANIEL

Evaluation of surgical outcomes of neonates undergoing surgery during their initial hospital stay in the level 4 Neonatal Intensive Care Unit (NICU) at Covenant Children's Hospital (CCH)

Daniel De Simon, MBA, Celeste Hollands, MD, Covenant Children's Hospital

The purpose of this study is to evaluate surgical outcomes of neonates undergoing surgery during their initial hospital stay in the level 4 Neonatal Intensive Care Unit (NICU) at Covenant Children's Hospital (CCH). The outcome variables measured are compared to a national quality database (pedi NSQIP) to identify areas that may require programmatic development.

This study is a retrospective chart review performed at CCH for NICU patients undergoing general pediatric surgical procedures during their NICU stay from 4/1/17-12/31/19. Outcome variables assessed include length of stay, time to full feeds, ventilator days, complications, and unplanned return to OR. Demographic data such as gestational age at birth, birthweight, and associated anomalies have also be collected.

School: School of Medicine

DEVEGA, RODAN

Potential Health Effects of Bioactive Compounds on Depression: A Review of the Literature

Rodan Devega, Daniel Payberah, Dr. Chanaka Kahathuduwa, Dr. Chwan-Li Shen

Major depressive disorder (MDD) is a mood disorder that is common in societies and cultures around the world. In the U.S. alone, an estimated 17.3 million adults have had at least one major depressive episode – representing 7.1% of all U.S. adults. The prevalence of major depressive episodes is higher among adult females (8.7%) compared to males (5.3%). Risk factors associated with MDD include trauma, medications, family history of depression, etc. It is characterized by feelings of persistent sadness, anhedonia, fatigue, suicidal ideation, etc. Current treatments for depression aim to alleviate symptoms via pharmacotherapy, psychotherapy, or a combination of the two. However, many medications involved with treating depression are accompanied by serious side-effects that have yet to be eliminated, such as sexual dysfunction, sedation, and weight gain. Because of these side-effects, studies have been performed to uncover the potential anti-depressant effects of less harmful bioactive compounds, so that they may be used in the treatment of MDD. Ultimately, this review describes the effects of common bioactive compounds, such as curcumin, saffron, garlic, resveratrol, tea, and omega-3 fatty acids on depression and highlights their potential mechanisms of action on the molecular level; which involves a combination of up-regulating antioxidant (ex. catalase and glutathione enzymes) and anti-inflammatory (ex. IL-10) pathways and down-regulating pro-inflammatory (ex. TNF-alpha, COX-2) pathways. For example, garlic was shown to inhibit MAO inhibitors and stimulate catecholamine synthesis; while curcumin was shown to inhibit pro-inflammatory pathways; and theaflavin was shown to stimulate antioxidant pathways. Overall, these results attenuated the symptoms of MDD, which were measured via experimental parameters such as free swim test (FST), tail suspension test (TST), etc. in animal models.

School: School of Medicine

DILLAWN, SAMANTHA

Caring for the Caregivers: Improving Medical Students' Understanding of a Vulnerable Population.

Chris Bruce, Samantha Dillawn, Alexis Schuck

According to a study by the American Association of Retired Persons (AARP) in 2019, 53 million Americans identified themselves as a caregiver to a child or adult with special needs. Caregivers are more likely to suffer from multiple health issues including acid reflux, hypertension, and heart disease; however, only 13% of caregivers reported being asked about their own well-being by a healthcare provider. In order to understand the extent of training medical professionals received regarding caregiver health, we surveyed medical students on their knowledge of caregivers and associated health risk factors. We then gave a presentation on caregiver health risks and support to see if this would help improve how informed students were about caregiver health. Our results indicated that education about caregiver needs improved medical students' understanding of caregivers and helped them feel more able to support them. We conclude that if similar training could be routinely integrated into medical student education, medical students may be more confident and better equipped for assisting caregivers when they encounter them, which may lead to an improvement in care for caregivers.

School: School of Medicine

DOAN, JEREMY

Essential Oils Effective in Eradication of 24-hour Preformed Biofilms

Jeremy Doan, BS, MBA; James C. Wang, MD, PhD; Callie L. Fort, MS, MBA, Joshua C. Demke, MD, Abdul N. Hamood, PhD, Ted Reid, PhD, Phat Tran, PhD

Objective: Allergic bacterial rhinosinusitis affects 30-60 million Americans each year and is often complicated by bacterial biofilm formation on mucosal epithelium. These biofilms allow for reduced immune clearance and elevated antibiotic resistance of pathogens. In prior studies, essential oils have been shown to exhibit antimicrobial and immunomodulatory effects both in vitro and ex vivo. The purpose of this study is to examine the antimicrobial effects of essential oils to eradicate 24-hour sinonasal bacterial biofilms.

Materials/Methods: 11 Pyrrla and Majestic pure aromatherapy essential oils (tea tree, orange, lemongrass, peppermint, rosemary, lavender, eucalyptus, clove leaf, lemon, cinnamon leaf, and frankincense) were tested on 24-hour preformed biofilms of Staphylococcus aureus (Sa), Escherichia coli (Ec), Pseudomonas aeruginosa (Pa), Klebsiella pneumoniae (Kp), Methicillin-Resistant Staphylococcus aureus (MRSA) strains 121, 139, and 716, Staphylococcus epidermidis (Se), and Acinetobacter baumannii (Ab). Colony-forming-unit assays were used to analyze the antimicrobial efficacy of the oils.

Results: Clove leaf and cinnamon leaf oils showed complete eradication of E. coli, S. aureus, S. epidermidis, K. pneumoniae, A. baumannii, and all MRSA biofilms (p<0.001). Clove leaf and cinnamon leaf oils also showed significant (p<0.001) inhibition of P. aeruginosa biofilms. Tea tree, peppermint, and lemon oils also showed complete eradication of certain biofilms (p<0.001).

Conclusion: This study suggests that certain essential oils are capable of eradicating a 24-hour preformed biofilm by sinonasal pathogens. Future studies examining the synergistic effects of essential oils and their antibacterial effects could be used to develop an alternative antimicrobial therapy for the management of rhinosinusitis.

School: School of Medicine

DOWDLE, TRAVIS

Initial CO2 Laser Treatment Practices for Hypertrophic Burn Scars Among Surgeons at ABA Burn Centers

Travis Dowdle, MSII; Kaylee Schrader, MSIII; Chris Bruce, MSII; Joshua Frost, MSIII; John Griswold, MD

Background: Scarring is a major clinical outcome of severe burn wound healing. Severe scars often persist and significantly diminish quality of life by disfigurement, pain, itchiness, and contractures restraining body and joint movement. In the last decade, laser therapy has become a popular treatment modality for severe burn scars, particularly the use of ablative fractional carbon dioxide (CO2) lasers.

Introduction: The efficacy of CO2 lasers for the treatment of hypertrophic burn scars has been established via systematic review and international guidelines. There is currently intense multidisciplinary interest regarding laser treatment utilizing CO2 laser therapy. However, there have been no attempts to query the 63 ABA (American Burn Association) centers across the United States regarding specific treatment parameters involving serious, sometimes high, total body surface area (TBSA) burns.

Methods: A Qualtrics survey consisting of 14 questions was administered to burn surgeons practicing at all 63 ABA burn centers across the U.S. Topics were assessed such as specific laser parameters (5), treatment preferences (2), peri-operative follow-up (5), scar assessment practices (1), and TBSA treatment tolerance (1).

Results: Exploratory, descriptive data was analyzed in collaboration with the Texas Tech University Health Sciences Center Biostatistics Department. Surgeons practicing at 27 of the 63 total ABA burn centers responded to our survey (43% response rate). Data elucidates the level of variance regarding current initial management of hypertrophic burn scars via CO2 laser treatment.

Conclusion: Our findings allow surgeons to study how their CO2 laser practices for hypertrophic burn scars compare to those of their colleagues at other ABA affiliated burn centers. Standardization of care when utilizing ablative fractional CO2 lasers should be further explored.

School: School of Medicine

EBOH, TOCHI

Do Demographic or Lifestyle Factors Explain the Differences in BMI and Obesity between US-born and Foreign-born Africans?

1Tochi Eboh, 2,3 Julie St-John, 3,4 Chwan-Li Shen, 3 Jeff Dennis

1 Department of Medical Education, 2 Center of Excellence for Integrative Health, 4 Department of Pathology, School of Medicine, Texas Tech University Health Sciences Center, Lubbock, TX 79430, 3 Department of Public Health, Graduate School of Biomedical Sciences, Texas Tech University Health Sciences Center, Lubbock, TX79430

The healthy immigrant hypothesis posits immigrants tend to be healthier when compared to non immigrant populations in a host country. With increased migration of foreign-born (FB) Africans to the US, little research has examined differences in obesity and BMI by nativity among persons of African ancestry living in the U.S. This study used a large U.S. dataset to explore these differences.

The research team used 2011-2018 National Health and Nutrition Examination Survey (NHANES) data to compare FB and US born Blacks age 25-79. Analysis examined multivariate regression to predict BMI and logistic regression to predict obesity. Duration in the U.S. among FB Blacks was coded in three categories: 0-9 years, 10-19 years, and more than 20 years.

Data was analyzed with STATA 15.1.

Adjusting for health behaviors and demographic factors, duration in the US was positively associated with BMI and obesity among FB Blacks, and highest in U.S. born Blacks. FB Blacks in living in the U.S. for less than 10 years exhibited BMI 5 kg/m^2 lower, on average, than U.S. born Blacks, adjusting for behaviors and demographics. Adjustment for lifestyle factors of education, alcohol use, dietary behaviors and physical activity did not attenuate the association between duration/nativity and BMI or obesity. Adjusted models predicting obesity found lowest odds of obesity among FB Blacks with 0-9 years in the U.S. (OR=0.25, p=0.01) compared to U.S. born Blacks.

Foreign-born Blacks had lower BMI and obesity prevalence compared to US born Blacks. However, this protective effect dimin-

ished with increased duration of stay in the US. Although differences in health behaviors between FB and U.S. born Blacks were expected to explain differences in BMI, these factors did not attenuate the effect of nativity on BMI and obesity. More research is needed to understand the mechanisms driving health disparities by nativity in the U.S. Black subpopulation.

School: School of Medicine

EICHMAN, ELIZABETH

Management of bilateral osteochondritis dissecans of the trochlea in a skeletally immature patient

Elizabeth Eichman (1), Benjamin Harris (2), M. Tyrrell Burrus, MD (3)

Osteochondritis dissecans (OCD) lesions are injuries that occur more commonly in the skeletally immature population. In most cases, the etiology is not well understood, but fortunately, many OCD lesions may heal on their own over time, particularly in skeletally immature patients with open physes. Conversely, if the lesion is considered unstable, surgical intervention may be required. This case demonstrates an especially rare presentation of bilateral OCD lesions within the lateral femoral trochlear facet. The lesions became symptomatic approximately 1 year apart without a specific injury. Non-operative treatment was not recommended in either case due to the size and instability of each lesion. The surgical treatment utilized an augmented microfracture technique. At 12- and 23- months after surgery, both knees remain asymptomatic and the patient has returned to their desired activities.

School: School of Medicine

ELLINGTON, ABIGAIL

Documenting and Describing Irritable Bowel Syndrome on Reddit

Abigail Ellington, B.S. and Dr. Sameer Islam, M.D.

The purpose of this study is to determine what people are posting on the internet page Reddit regarding their struggles with Irritable Bowel Syndrome. This will allow healthcare providers to have a better sense of what major concerns patients have and how to better address their needs. Using Reddit Pushshift API, posts on the subreddit page for IBS from May 2020 were accessed using seven different filters. These posts were then categorized by the tags specified in the post and subjectively by content. It was found that most of the posts were looking to discuss and ask questions regarding symptoms and symptom management. Additionally, many users did not include a tag in the posts; however, those that did most often used the tag “question.” Major conclusions that can be drawn from this study are that patients do not feel that their health care provider is taking their concerns seriously and that patients are not fully aware that IBS is different from patient to patient.

School: School of Medicine

FALCO, ADRIAN

Effectiveness of Student-Run Free Clinic Elective for Medical Students

Adrian Falco; Brianna Marschke; Fiona Prabhu, MD

Student-run clinics (SRCs) generally serve homeless, at-risk, and low-income populations for free or little cost. In addition to the benefits of providing care for vulnerable populations, SRCs provide students the ability for professional growth and increased patient and interprofessional communication skills. Many SRCs provide an elective for medical students that want to learn, volunteer, and care for at-risk populations; however, the effectiveness of these electives has scarcely been studied. First and second year medical students at the Texas Tech Health Sciences Center School of Medicine volunteered to participate in the Free Clinic Elective (n=19) which included five lectures and took place during the Fall 2020 semester. Although the sample size is limited, students reported the elective was an effective use of time and improved verbal and written communication skills as a medical student working in the SRC. Students also reported feeling more comfortable treating underserved populations such as the homeless, LGBTQ, POC and better able to define and identify how social determinants can impact the health of patients. Questions assessing the students' knowledge over the content of the material presented (paired-t test) generally presented with no significant difference between pre- and post-quizzes. This lack of difference could possibly be attributed to the low difficulty level of the questions.

School: School of Medicine

FINE, EMILY

A Student-run Smoking Cessation Program at a Free Clinic during the COVID-19 Pandemic.

Emily Fine, Rebecca Kernen, Kinsey Keith, Zach Sneed PhD, Dave Schroeder PhD, Fiona Prabhu MD

The Free Clinic Smoking Cessation Program is a four-week, educational program that helps uninsured adults in Lubbock County develop a greater understanding of addiction, habits, and support. The goal of this project was to determine if the Smoking Cessation Program could be successfully implemented at our student-run free clinic, especially with the adaptation of telemedicine due to the COVID-19 pandemic. Since the Smoking Cessation Program start date in March 2019, hundreds of patients have been screened for substance use at registration and through SBIRT (Screening, Brief Intervention, and Referral to Treatment), and those that exhibited a positive screening for cigarette smoking were asked if they would like to attend the Smoking Cessation Program. As of now, 17 patients have attended Week 1 of the class and two patients have quit smoking with the help of our program. As a result, 11.8% of participants were able to quit smoking through our program, which is higher than the national average quit rate of 7%. The remaining 15 patients, although they were not able to quit smoking nicotine altogether, reduced the number of cigarettes smoked per day after attending our program. With the onset of the pandemic in March 2020, we adapted our program to operate through telemedicine. Since transitioning to online, we have not had any new or existing patients attend our Smoking Cessation Program. Our clinic provides tablets for patients without telemedicine devices, but no patients have used them to attend Smoking Cessation Program. Potential limitations of the program include fewer recruitment opportunities due to The Free Clinic having a lower patient volume due to COVID-19. We also believe fewer personable interactions through online mediums rather than in-person conversations are a contributing factor. While the program was successful initially at The Free Clinic, telemedicine modifications have raised a variety of new and confounding issues.

School: School of Medicine

FORTNER, RILEY

An Analysis of Medical Student Resource Usage During Clinically Oriented Anatomy

Vishal Bandaru, Riley Fortner, John Pelley

TTUHSC SOM requires first year medical students to take COA during their first semester. With a growing pandemic and a large shift to online classes, resources and learning styles became more important than ever to a student's individual learning. To alleviate stress, we sought to determine whether certain resources were more effective. We propose that usage of the best resources would allow students to study more effectively.

During COA, a voluntary response survey was sent out to assess class performance, personality type, and student resource preferences based on helpfulness and frequency. Personality parameters were sensing and intuitive derived from Jung's personality model. A module that directs students' learning to highly rated resources and successful study habits will be created using the survey response data. A satisfaction survey will be carried out after the medical school class of 2025 completes COA.

A one-way ANOVA was used to determine whether resource usage is different amongst students. When evaluating resource helpfulness and frequency, we found p=3.057E-114 and p=1.018E-117, respectively, insinuating preferences in resource usage exist. Next, we plotted the resources according to their helpfulness and frequencies to determine correlation. An r^2 value of 0.995 shows a high correlation between helpfulness and frequency. A two-way ANOVA was used to determine whether sensing and intuitive types used different resources. The helpfulness and frequency data yielded p values of 0.405 and 0.0607, respectively (first level-resources and second level sensing/intuitive). The class performance data could not be evaluated due to lack of low performance response.

Future surveys will focus on similar data concerning the BCT and MOS courses. We will also look to determine whether personality type affected how students interacted with each resource. Performance data needs to be analyzed to a greater extent do determine the impact that resource usage has.

School: Graduate School of Biomedical Sciences

GALVAN, BERNARDO

Classic Clinical Descriptions of Disease: Curing Medical Education with a Dose of the Past

Bernardo Galvan, Katherine G Holder, Laxmi A Chintakayala, Sonia Y Khan, Erin S Choi, Steven L Berk MD

The importance of clinical skills, including obtaining patient history and performing physical examination, has been de-emphasized in the modern medical school curriculum. With advancements in diagnostic technologies, the clinical presentation of diseases in medical textbooks has been simplified, diminished, and largely replaced with detailed pathophysiology and laboratory findings. The implementation of the United States Medical Licensing Exam (USMLE) Step 1 has also contributed in pushing medical education towards classroom-based learning rather than clinical experience. Clinical skills competency is crucial to accurately diagnose patients and simultaneously lowers health care costs by not relying on unneeded diagnostic tests. To address this gap in medical knowledge, a group of students at Texas Tech University Health Sciences Center have assembled a website documenting classic clinical disease descriptions written by some of the renowned physicians from the 19th and 20th centuries including Osler, Flint, Gowers, and many more. This website will continue to grow, and will hopefully be a useful tool to professors, physicians, and medical students around the nation.

School: School of Medicine

GANJI, RIYA

Impact of COVID-19 on Mitochondrial-Based Immunity in Aging and Age-Related Diseases

Riya Ganji, P. Hemachandra Reddy, Ph.D.

The coronavirus disease 2019 (COVID-19) is caused by the severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) and has devastated the world as a pandemic. The likelihood of mortality from COVID-19 increases with age and presence of comorbidities such as diabetes mellitus, obesity, or Alzheimer's disease. Emerging evidence suggests that COVID-19 hijacks mitochondria of immune cells, replicates within mitochondrial structures, and impairs mitochondrial dynamics leading to cell death. Mitochondria are largely involved in maintaining cell immunity, homeostasis and cell survival/death. Increasing evidence suggests that mitochondria from COVID-19 infected cells are highly vulnerable, and vulnerability increases with age. Studying mitochondrial-based immunity against SARS-CoV-2 may give insight into why older individuals, with lessened mitochondrial efficiency, may be worse equipped to face COVID-19. Our study aims to explore these relationships, as well as the role of various age-related comorbidities such as diabetes, obesity, and neurological illnesses in increasing mortality rates amongst the elderly with COVID-19. We surveyed the data on SARS-CoV-2 and its susceptibility with individuals with age-related diseases. We also discussed possible remedies with a focus on healthy lifestyle.

School: School of Medicine

GARCIA, ANA

Chronic Depression and Prescription Likelihood as a Function of Race and Sex in a Low Income Clinic Sample

Ana Garcia, MS2, Billy Ulyses Philips Jr, PhD, Catherine Hudson, MPH, Michael Penuliar,MA

Background: The TTUHSC Free Clinic provides free healthcare to the uninsured population in Lubbock and surrounding area. This study provides insight into the frequency and reason for patient visits to the TTUHSC Free Clinic from June 2019-July 2020. This information was used to delve into the relationship between demographic factors of uninsured patients in West Texas and their health.

Procedure: Data came from the medical charts of patients that visited the TTUHSC Free Clinic from June 2019-July 2020. The information recorded included patients' total visits, race/ethnicity, income level, chronic conditions, chief complaints, and prescribed medications. Two logistic regression models of 460 patients were performed and analyzed.

Results: One model showed that race and gender contributed to a higher likelihood of chronic depression history. Analysis of the Free Clinic's patient data indicated that White patients were more likely to report a history of chronic depression than Hispanic and Black patients. Females over males were also more likely to report a history of chronic depression. A second model looked at the likelihood of prescribing antidepressants to patients with chronic depression. This found that Hispanics without a history of chronic depression were less likely than White patients with a similar mental health history to receive anti-depressants during their visit. There were no significant differences between White and Black patients.

Conclusion: The results showed that demographic of ethnicity and sex within a low-income population may be uniquely tied to chronic depression and the prescription of antidepressants. Increased research on free clinics can provide insight into the obstacles facing their patients. For example, Hispanic patients may not be getting the medicines they need due to stereotyped thinking or other factors. This information may lead to a better understanding of the role demographic factors play in determining diagnosis and treatment.

School: School of Medicine

GEORGE, ASHER

Frailty is an Independent Predictor of Any 90-day Complication following Robot-assisted Radical Prostatectomy for Prostate Cancer

Asher K. George, Erin Choi, Silvia Jakubski, Hasan Almekdash, Pranav Sharma

Introduction: Frailty stems from reduced physiological reserve that leads to an increased probability of adverse health outcomes and death. The Modified Frailty Index (MFI) evaluates 11 factors to measure preoperative frailty in patients undergoing major cancer surgery. We analyzed the association between MFI and 90-day postoperative complications in prostate cancer patients undergoing Robot-assisted Radical Prostatectomy (RaRP) for definitive treatment. Methods: We retrospectively identified 216 men who underwent RaRP at UMC from 2010 to 2020 for definitive treatment of prostate cancer. MFI was measured and calculated for each patient prior to surgery. Means were compared with the one-way ANOVA test and proportions with Pearson's Chi-square analysis. Multivariate logistic regression was performed to determine independent predictors of 90-day postoperative complications after RaRP. Results: Patients with higher preoperative MFI (>2) were more likely to be older in age (P= 0.047), have worse ECOG and Karnovsky performance status (P=0.018, and P<0.01, respectively), higher Charlson Comorbidity Index (P<0.01), and worse ASA score (P<0.01). Intraoperative variables and pathological characteristics were similar between MFI groups. Multivariate logistic regression showed that MFI >2 was an independent predictor of overall 90-day complications after surgery (odds ratio=2.93, 95% confidence interval=1.01-8.45, P=0.047). Conclusions: Prostate cancer patients with higher preoperative MFI scores were more likely to have a 90-day complication after RaRP. MFI should be assessed preoperatively for prostate cancer patients to determine risk of postoperative morbidity and the best treatment plan.

School: School of Medicine

GIRON, ALEC

Evaluation of Intranasal Calcitonin in Distal Radius Fractures

Alec Giron, Cameron Cox, Dr. MacKay, Dr. McKee

Calcitonin has a well-established physiologic role as a hormone that aids in cortical bone mineralization, while simultaneously inhibiting bone resorption. Few studies, however, have evaluated various methods of calcitonin administration with respect to pain reduction in fracture injuries. Calcitonin is known to mitigate pain through direct analgesic action. To better understand the potential role of calcitonin for reducing acute and/or chronic pain associated with osseous injuries, we reviewed the current literature regarding pain-related outcomes of calcitonin treatment. The contents of this review may guide future studies assessing the efficacy of calcitonin for pain relief following fractures.

The authors performed a systematic review of the MEDLINE and EMBASE databases using a comprehensive combination of keywords and search algorithm according to PRISMA guidelines. The literature search focused on clinical data regarding the efficacy of calcitonin as an analgesic in various fracture patterns.

In certain conditions, the use of calcitonin has demonstrated varying analgesic effects. It is believed to function by releasing Beta-endorphins, imparting direct analgesic effect on central nervous system. Intranasal calcitonin provides an accessible method for patients to receive treatment. The main limitation faced with injections was patient compliance, which is resolved with intranasal administration. Intranasal calcitonin offers up different pharmacokinetics, one that may include a more powerful analgesic effect compared to other routes of administration.

The current literature suggests that intranasal administration may result in improved patient analgesia following fracture injury. While rectal and parenteral methods show similar levels of analgesia, the improved patient compliance favors intranasal administration.

School: School of Medicine

GREENE, JOSEPH

Advanced hemodynamic support devices to aid in the treatment of arrhythmogenicity in cardiogenic shock and acute MI

Joseph Greene, MS1; Nitish Mittal, MS3; Ronnie Orozco, CCRP; Mohammad M Ansari, MD

Background: Impella CP is a temporary ventricular support device. This system is designed to reduce ventricular work and support heart recovery. We present a case of cardiogenic shock in acute MI where this device was utilized to unload an arrhythmogenic LV.

Statement of the Problem: Cardiogenic shock and severe arrhythmogenicity, a life threatening state, can be treated with the Impella ventricular support device.

Aims/Methods: Male, African American age 75 with a prior medical history of CVA, HTN, DM2, ESRD on dialysis, DLD, and former tobacco abuse presented to the emergency center following a witnessed cardiac arrest. Pre-arrival treatment by EMS included cardiopulmonary resuscitation, oxygen, inotropic agents, and approximately 7 defibrillations. Upon arrival in the EC the patient was non-responsive and in V FIB arrest. STEMI was appreciated on EKG and Cath Lab was activated. The patient was defibrillated again in the EC. After successful return of spontaneous circulation, the patient was transferred to the Cath Lab. During LHC an acutely thrombotic lesion in the proximal RCA was crossed, manual aspiration thrombectomy was performed, and a completely occluded RCA was successfully opened and stented with a drug eluting stent. An intra-aortic balloon pump was initially placed. During the procedure, the patient went into multiple episodes of V FIB arrest, coding on the Cath Lab table, and was defibrillated a further 15 times. At that time the decision was made to escalate the therapy and so the IABP was removed in favor of the Impella device. The patient left the Cath Lab in stable condition with an intact pulse without any arrhythmias or further defibrillation required.

Conclusions and Implications: This case demonstrates the use of an advanced mechanical support device, the Impella pump, to stabilize hemodynamics, perfuse end organs, and allow recovery of the heart in patients experiencing cardiogenic shock and has clear effects on arrhythmogenicity as well.

School: School of Medicine

GROSSMAN, HOLLY

Influence of Environmental Contaminants on Patients Undergoing IVF

L.L. Penrose, S. Khalili, D. Leung, K. Ahmad, S.D. Prien, H. Grossman, and E. Fine

OBJECTIVE: In past studies covering the impact of environment on fertility, differences were demonstrated in the number of available sperm, oocytes recovered, healthy oocytes, and atretic oocytes in patients living in rural and urban environments. However, fertilization rates and pregnancy outcomes were not influenced, suggesting that environmental factors may influence oocyte quality. As pollutants can affect hormone cascades, the objective of this study is to determine if hormone profiles differ in patients undergoing assisted reproductive technologies (ART) procedures in urban and rural environments.

METHODS: A chart review evaluating hormone profiles for ART procedure reports from 2014-2017 (N=163) was categorized into urban, mainly urban, mainly rural, and rural populations based on zipcode. Data included precycle profiles, down-regulation, maximum estrogen levels, and pregnancy outcomes. Data were recategorized between different environmental regions based on agrochemical use, grouped to correspond to periods of heavy agrochemical use, and analyzed for each hormone. Data were compared by ANOVA, independent t-test, or Chi-square.

RESULTS: No differences were found between the patient hormonal profiles for any hormone reviewed, regardless of their residential environment ($p=0.118$). Additionally, no difference was found between the hormonal profile of patients from different agricultural regions where agrochemical used varied in intensity ($p=0.077$). Finally, no differences were seen in the hormonal profiles of patients undergoing treatment cycles during periods of intense versus minimal agrochemical use ($p=0.127$).

CONCLUSION: Current data suggest that changes in oocyte quality are independent of hormonal profile and may be influenced during the hormone-independent stage of follicular development as follicles progress from the primordial to the primary stage of development.

School: School of Medicine

GUNTER, BRADY

Spaced Repetition and Imaging Comprehension: How Anki can improve study efficacy of cross-sectional and radiographic imaging material in medical school.

Brady Gunter, Brandt Schneider, Gurvinder Kaur

First year medical students (MS1s) in the Clinically Oriented Anatomy (COA) course are challenged with learning a large volume of cross-sectional and radiographic images. In previous years, this content was studied by passively viewing slides and images. We proposed that creating a study resource that utilizes spaced repetition to learn this information would be positively received by students and would improve test performance on questions related to the material.

All online imaging material available for study was compiled into a spaced repetition Anki flash card deck and was distributed to MS1's on the first day of each three-week unit. Results for test performance on imaging questions were compiled for the classes of 2023 (no Anki access) and 2024 (with Anki access). A survey was sent out to the class of 2024 to ascertain student satisfaction and utilization of the resource.

Student test performance on imaging material for the classes of 2023 and 2024 was compared for each COA unit. While there was an increase in the average score for each unit (ranging from 0.71 – 3.3%), the increase was not significant (Unit 1: $p = 0.9$, Unit 2: $p = 0.3$, Unit 3: $p = 0.5$). Responses to the survey indicate that greater than 50% of survey respondents utilized the deck in some capacity during each unit (62.3% for units 1 and 2, 55.8% for unit 3) and 57.4% of respondents ranked it at 5/5 on a scale of usefulness (96.3% ranked at least 3/5).

While test performance data does not indicate a significant increase in student performance, the average point biserial for cross-sectional or radiographic image questions increased suggesting that this resource may have aided the high performing students. This finding in addition to the positive student response and high rate of utilization suggests that we have created an effective new study resource for imaging material with high student favorability and utilization.

School: Graduate School of Biomedical Sciences

HALL, DELTON

Implementing a Fast-Track Extubation Protocol For Patients That Have Undergone Cardiac Surgery

Delton Hall; Cooper W. Phillips MD, FCCM; Jinesh Lachmansingh MD, FCCM; Tyson Verhaal MD

Fast-track extubation is the process of extubating patients that have undergone surgery within six hours post-operative. Fast-track extubation involving cardiac surgery is a relatively new concept, with one of the first studies emerging in 2013. Multiple studies have aimed for increasing hospital efficiency by decreasing mortality, hospital length of stay, adverse events, etc. However, the data is conflicting with previous research articles showing improvements in the variables listed previously and others showing no significant difference. The goal in this research study was to first construct an anesthesia protocol that was safe for patients and that reduced time to extubation to under six hours post-operative. Patients were selected for fast track extubation prior to the surgery; furthermore, the course of the operation ultimately determined if a patient was a candidate for fast track extubation. This approach reduced selection bias and prioritized patient safety. The control group received the same anesthetic approach, while the intervention group received an anesthetic approach that was tailored to the individual patient. Methadone was given before surgery by mouth in the intervention group if patients were able to tolerate the medication. Once in the ICU, the intervention group received Dexmedetomidine instead of Midazolam. An extubation deadline card was placed on ventilators as a reminder for time to extubation. Extubation was cleared by the ICU physician on staff, using general weaning parameters, and extubation was primarily done by the respiratory therapist on staff. Data shows that the control group (n=73) had an average time to extubation of 481 minutes (8h 1 min). The intervention group (n=27) had an average time to extubation of 347 minutes (5h 47 min). Using a t-test analysis assuming unequal variances, the data has a p-value of .002. There is significant difference in time to extubation when the interventions mentioned are applied.

School: School of Medicine

HANNON, CRAIG

Analysis of Patient Reported Outcomes Measures: An Assessment of Over 500 Studies

Craig Hannon, BS, Dr. Naila Dhanani, MD, Dr. Julie Holihan, MD, Dr. Oscar Olavarria, MD, Hailie Ciomperlik, BS, Cassandra Mohr, BS, Dr. Alex B. Haynes, MD, Dr. Mike K. Liang, MD

Quality of life (QOL) captured through patient reported outcome measures (PROMs) is important for clinical research and practice. Despite existing guidelines, it is unclear how often publications report and analyze PROMs optimally.

To evaluate how often peer-reviewed publications optimally report and assess PROMs.

This is an observational study of published clinical trials from 1996-2020, assessing PROMs, following the strengthening the reporting of observational studies in epidemiology (STROBE) guidelines. Article search was conducted using the PubMed database, (keyword "quality of life" or "patient centered outcomes") including human-based clinical studies reporting PROMs among two or more groups following an intervention prospectively. Optimal reporting was defined as (1) reporting baseline and follow-up PROMs and (2) analysis accounting for baseline and follow-up PROMs. Secondary outcomes included reporting and accounting for minimal clinically important difference (MCID).

1400 studies were included, 1061 (76%) randomized controlled trials, 179 (13%) prospective studies, and 160 (11%) retrospective studies with a median (IQR) sample size of 80 (113). Nearly half (42%) of these studies did not meet optimal reporting and analysis. Two-thirds (58%) employed PROMs with a validated MCID but most did not account for the MCID. While 68% of these studies were statistically positive, almost half (40%) had results that did not exceed the MCID. On regression analysis, we noted that more recent year of publication, higher impact factor of journal, statistician on study team, and geography/specialty were associated with optimal reporting.

Among published research using PROMs, suboptimal practices of reporting and analysis are prevalent. Nearly half of all studies do not adequately report and analyze PROMs. There is a need to improve the collection, reporting, and analysis of PROMs.

School: School of Medicine

HARDY, KENNETH

The effectiveness of high yield post-lecture quizzes on preclinical medical student study efficiency and stress reduction

Kenneth Hardy, Jannette Dufour

As technology and medical education advances, medical school curricula are in a constant state of change. One of the most recent changes has been shortening of preclinical years and thus condensation of lectures given in those years. Filtering out what the "important information" is often leaves the student responsible for more learning during independent study sessions. To remedy the need to understand complex concepts despite less hours of lecture, it may be beneficial to increase their learning efficiency using supported methods. One such method is providing low stress, post-lecture quizzes for students to gauge retention of important lecture information and actively engage with the material. For this project we will investigate the effect of post lecture quizzes on medical student study effectiveness and stress levels during renal physiology, and their contribution to preparedness for standardized exams. A needs assessment was sent out to the class who had taken renal physiology the previous year. Based on the assessment, post lecture quizzes were created using power point with each quiz covering one lecture and consisting of 5-7 concept-based questions. Each question was interactive with a detailed rationale explaining the concept, as well as the concept's big picture importance. The needs assessment indicated that 87.5% of students agreed that high yield post-lecture quiz questions for each lecture would be a helpful addition to the unit, with 67.5% of respondents strongly agreeing. At the end of renal physiology students will complete a post survey to determine the effect of the quizzes on study efficiency, stress levels, and exam preparedness. Pending results, this study may indicate that providing simple 5-7 question quizzes covering important lecture concepts will increase medical student study efficiency and reduce the stress of being responsible for learning more material independently. Both of which may increase preparedness for standardized exams.

School: Graduate School of Biomedical Sciences

HAWKES, CALEB

Robot-Assisted Radical Resection of Retroperitoneal Leiomyosarcoma in 69-year-old Male

Caleb Hawkes, Usman Nazeer, Allen Medway M.D.

Intro: Leiomyosarcoma is a rare type of soft tissue cancer that affects smooth muscle tissue in the retroperitoneum or the walls of the retroperitoneal veins. It is the second-most common form of the retroperitoneal sarcomas, often with a poor survival rate of 5-10 years post-operatively. Leiomyosarcomas are known to have a propensity for recurrent disease, which makes treatment difficult. Leiomyosarcomas are most common in the abdomen, but can occur anywhere in the body. Research suggests radical surgical resection to be the only possibility to improve survival rate.

Case Presentation: We present here the case of a 69-year-old male, with prior medical history of hypertension and family history of prostate disease, who presented with complete urinary retention. A CT was taken, showing a 9.8 cm retroperitoneal mass between right renal hilum and head of pancreas, arising from duodenal C-loop. The mass was later found to be a Stage IIIb conventional leiomyosarcoma of 12x9x7 cm, at a weight of 355 grams. Robot-assisted retroperitoneal mass resection was successfully performed, with the tumor being found to have a good surgical plane all around. The tumor was not attached to the duodenum, though there were small areas of attachment near and around the vena cava. During the resection, the surgeons were able to leave the vena cava completely intact. The patient currently is still free of recurrence and completed adjuvant radiation therapy one year from initial CT.

Conclusion: Leiyomysarcomas of a vascular origin account for less than 10% of soft tissue sarcomas. Patients with this type of vascular origin leiomyosarcoma tend to have worse disease-free and overall survival compared to leiomyosarcomas of non-vascular origin. Complete tumor resection and histological grade are the most important predictors of survival.

School: School of Medicine

HAYWARD, DAN

Risk Factors Associated with Chronic Pain After Amputation

Dan Hayward, MBA, Cameron Cox, BBA, Brendan MacKay, MD

Amputees, particularly those resulting from trauma, often experience chronic localized pain due to symptomatic neuromas in the residual stump. While techniques have been developed to treat or prevent neuroma formation, there is a high degree of variability between patients (without surgical treatments for neuroma) who may or may not progress to chronic phantom or stump pain.

To better understand the potentially modifiable factors influencing persistent pain in this population, we analyzed 163 amputee charts for predictive factors of chronic pain.

Mann-Whitney U tests were performed to assess relationships between most recent VAS pain scores and categorical variables, including diagnosed depression, diabetes, PTSD, and tobacco use. Pearson correlation coefficients were calculated to evaluate the relationship between final pain score and continuous variables: preoperative VAS pain score, VAS pain at discharge, and BMI.

Only tobacco use and discharge pain were significantly associated with increased long-term pain ($p = 0.016$). Pain at discharge from inpatient care was weak-moderately correlated with pain at the most recent follow-up ($R = 0.417$).

Our data suggest that physicians may consider preventative planning to address chronic pain potential in patients with high pain scores at discharge. Patients at risk for amputation, e.g., uncontrolled diabetics, would benefit from smoking cessation.

School: School of Medicine

HOLDER, KATHERINE

The Effect of COVID-19 on Immunity, Inflammation, and Mitochondrial Dynamic Equilibrium

Katherine Holder, Bernardo Galvan, Hemachandra Reddy

In the last months of 2019, a novel coronavirus now known as COVID-19 spread from Wuhan, China and engulfed the globe causing illness, economic collapse, and almost 1.5 million deaths to date. Data from the global outbreak supports that COVID does not affect all patient populations equally, causing asymptomatic infection in some and leading to critical illness with respiratory failure, shock, and multiple organ dysfunction in others. This study examines the impact of COVID-19 on immunity and mitochondrial function and provides a possible mechanism for disease severity in the immunocompromised COVID-19 cases.

At the cellular level, COVID-19 can invade and critically inhibit mitochondria via the ACE-2 receptor, contributing to disease progression and severity. Mitochondria perform crucial functions in regulating innate and adaptive immune response, development, and differentiation. Mitochondrion alter cellular respiration to effectively adapt macrophage response between pro-inflammatory and anti-inflammatory phenotypes. Since mitochondria are the chief cellular regulators of oxidative homeostasis, increased inflammation may lead to platelet damage and apoptosis as a result of mitochondrial dysfunction.

This study offers a possible mechanism for the increased severity of COVID-19 infections in patients with pre-existing age-related diseases and inflammation. The novel coronavirus may disrupt the dynamic equilibrium of mitochondria, subsequently impairing immune response. In patients where existing inflammation diminishes mitochondrial and immune function, COVID-19 infection proves to be exceptionally detrimental. This information may be useful in developing immune- and mitochondria-based therapies for COVID-19.

School: School of Medicine

HOLZER, JOEY

Effectiveness of Spaced Repetition Software (Anki) in Health Professions Education and its Ability to Reduce Student Anxiety

Joey Holzer

Introduction: Graduate students are always looking to improve their studying methods. Anki provides a program for students to practice flashcards by the means of spaced repetition. The program uses student self-assessment to show how often the user should see a certain card (spaced repetition). Anki could be an effective tool provided by the institution to help aid studying, improve test grades and cut study induced anxiety.

Methods: An Anki deck was created for Biology of Cells and Tissues (BCT) Unit 2 at TTUHSC. This deck was broken down into seven subdecks each corresponding to a single day of lecture and broken further into each individual hour of lecture. A voluntary pre-test of ten questions was given to the medical students prior to them receiving the Anki Deck. A voluntary post-test with eleven questions (the last question being a survey of how often the test taker utilized the Anki deck) was also administered to the medical students. A general survey was sent to the entire class which included questions of anxiety levels, effectiveness using the deck, and overall satisfaction.

Results: For the Pretest- The exam itself had an Avg. 46.09% (n=118). The post-test average raised to 80.04% (n=124) of those students who took the post-test, 111 used the Anki deck to help facilitate their learning. The general survey found similar results in that 91.5% (n=113) used the deck. Results showed 69.91% of those surveyed spent more than 1/4th of their time studying using the deck. 22.12% of students surveyed used the Anki Deck as their sole source of studying for the entire unit. 50% of students surveyed believed the Anki deck helped reduce their anxiety and over 68% feel they had retained the information better using Anki as a resource.

Discussion: The results from the pre to post-exam and general survey are evident that Anki could be a great study tool for educators in health professions to apply to their course content.

School: Graduate School of Biomedical Sciences

HOSSEINI, OMID

Improving Medical Students' Communication Skills and Understanding with People with Intellectual and Developmental Disabilities

Omid Hosseini, Sonia Khan, Adrian Jacobparayil, Luis F. Castro, Christopher Le, Sprash Ray, & Dr. Adaobi Kanu, MD

People with intellectual and developmental disabilities (IDD) continue to face barriers and access to healthcare within their communities. Awareness and communication skills should be incorporated early in medical education to allow healthcare workers to develop and enhance their proficiency. By integrating lectures, presentations, and patient-encounters related to communicating with people with IDD, healthcare workers can help take steps forward to help address these important health disparities by enhancing their communication abilities, awareness, and understanding.

Assessments were given to second-year medical students at Texas Tech University Health Sciences Center (TTUHSC) in Lubbock, TX to measure communication abilities and awareness in regards to people with IDD. Students were evaluated initially, given a lecture, and then re-evaluated.

Working with High Point Village, a local non-profit organization that provides an enrichment facility to adults with IDD, we were able to volunteer and interact with people with IDD, interview staff members, and learn how healthcare providers can improve their communication skills. We formulated a lecture and assessments that incorporate the principles conveyed by those at High Point Village.

Using a paired t-test we evaluated the difference in assessments after integrating the communication-related lecture. Students (N=37) assessment scores significantly differed between pre-assessment and post-assessment (t=7.198, df=36, p-value= <0.0001). The mean score between the groups increases by 11.08% after providing the lecture.

Introducing and developing communication skills pertaining to people with IDD should be integrated early in medical education. With continued progress, simple measures like this can slowly reduce the health disparities apparent among people with IDD.

School: School of Medicine

JACKSON, ABIGAIL

Curriculum mapping to facilitate curricular renewal: Neurosciences and Special Senses

Abigail Jackson; Elizabeth Brown; Emily Sargent; Michaela Jansen, PharmD, Ph.D.

The medical school curriculum at TTUHSC School of Medicine consists of four years. At present, the first two years constitute the basic sciences or pre-clerkship curriculum whereas the last two years constitute the core clerkships and additional clinical training. Here we mapped the curriculum content for the pre-clerkship curriculum. At present the SOM is embarking on a journey to renew the curriculum. The current curriculum begins with two general foundational courses (Clinically Oriented Anatomy and Biochemistry, Cells and Tissues) and then enters a curriculum that is a combination of discipline and organ-system-based curriculum. Students are first introduced to the normal physiological function of the major organ systems during year one and then revisit these systems for coverage of the pathophysiology and treatment of disease during year two. The SOM curriculum revision will continue to start with Anatomy and General Principles and then proceed in a strictly organ-system based manner combining physiology and pathophysiology for each organ system and at the same time integrating relevant concepts of biochemistry, cell biology and histology.

We used the United States Medical Licensing Examination (USMLE) Step 1 content outline and mapped the content lists against the detailed contents of the blocks. The curriculum mapping facilitated the identification of gaps and redundancies, as well as the relative quantification of instructional methods used. Our detailed curriculum inventory provides an essential framework to optimize and refine content representation and distribution during the current curricular renewal phase.

For the nervous system and special senses, we found that general anatomy and physiology of the nervous system was overrepresented (covered in detail more than once), and that development and dysfunction were underrepresented (not sufficiently covered or not covered at all).

School: School of Medicine

JACOBPARAYIL, ADRIAN

Predictors of Performance on USMLE Step 2 CK

Adrian Jacobparayil, Hisham Ali, Brian Pomeroy, MD,MEd, Regina Baronia, MD, Maria Chavez, MD, Yasin Ibrahim, MD*
*(Corresponding Author)

Background: In February 2020, the governing bodies of the United States Medical Licensing Exam (USMLE), announced the decision to change Step 1 scoring from a three-digit system to pass/fail designation. Previous studies theorized that Step 2 CK will become the numerical standard by which residency directors can quickly sort through program applicants. The goal of this study is to review prior research and identify significant factors associated with Step 2 CK outcomes.

Methods: Investigators conducted a systematic literature search using PubMed, Web of Science, Scopus, and ERIC. Key words were a combination of the following: "USMLE", "Step-2 CK", "score", "success", and "predictors". Inclusion criteria included US allopathic medical schools and articles published between 2005-2020.

Results: The initial literature search yielded 3,239 articles that were narrowed down to 51 articles. Positively correlated factors included Step 1 score, clinical block grades, Comprehensive Clinical Science Self-Assessments (CCSSA), Comprehensive Clinical Science Examination (CCSE), and volunteerism. Investigators observed a near perfect probability of passing Step 2 CK with a CCSE score of 90 or above. Results also showed a significant correlation ($r=0.684$, $p \leq 0.0001$) between scoring higher than 208 on Step 1 and passing Step 2 CK on first attempt. Factors such as clerkship sequence and pass/fail grading failed to correlate with Step 2 CK. Medical College Admission Test (MCAT) score (p < 0.01) and undergraduate grade point average (GPA) ($p = 0.01$) positively correlated while age displayed a negative correlation. Additionally, women typically scored higher on Step 2 CK than their male peers.

Conclusion: Study findings suggest that continuous learning and academic success throughout medical school positively influences on eventual Step 2 CK scoring. Performance on USMLE practice exams, Step 1, and clinical evaluations serve as positive predictors for Step 2 CK scores.

School: School of Medicine

JAIN, NEIL

Biomolecular Endotype Factors Involved In COVID-19 Airway Infectivity

Jain, Neil; Varman, Rahul; Tarbox, James; Nguyen, Tam

Objectives: To review the current knowledge of biomolecular factors surrounding otorhinolaryngeal illnesses and analyze their presence in COVID-19 virulence. Emphasis was placed on cytokines and vitamin D for determining susceptibility of illness.

Methods: A primary literature search of PubMed and Google Scholar for articles published between January 1, 2002 to May 31, 2020, was performed without language restrictions from May 8, 2020 to May 31, 2020. A focused second search was conducted from October 31, 2020 to November 2, 2020 for articles published between January 1, 2002 to October 31, 2020. Eligible articles were selected after evaluation of titles, abstracts, and references. A total of 45 were included in this review.

Results: Differing endotype classification schemes are used to determine cytokines present in chronic rhinosinusitis, asthma, and allergies. While immunologic responses and biomarkers are primary methods of differentiation, recent literature has also implicated geographic distribution of chronic rhinosinusitis patients in accounting for cytokine variations. The cytokines of interest (IL-4, IL-13, and INF-γ) present in the endotypes of these conditions may point towards protective mechanisms against COVID-19 through downregulation of the ACE2 receptor. These cytokines and Vitamin D highlight new areas of study for factors affecting SARS-CoV-2 virulence.

Conclusions: Further research is needed to understand the effects of Vitamin D and the various cytokines prevalent among endotypes of nasal/pharyngeal illnesses on COVID-19 pathogenesis. Findings may point towards epidemiologic trends of SARS-CoV-2 transmission and have future therapeutic indications.

School: School of Medicine

JARMAN, THOMAS

Objective Depression: The Search for Clinical Tools to Diagnose Major Depressive Disorder

Dan Hayward, MBA, Harrison Marsh, MBA, Thomas Jarman, BS

Major Depressive Disorder is a common psychological disorder and is frequently misdiagnosed. Currently, there is not an objective diagnostic tool for depression; clinicians must rely on their patient's symptoms in order to make a diagnosis. This study aimed to provide clinical values of select biomarkers to objectively differentiate between depressed and healthy controls. This study analyzed levels of Norepinephrine, Brain-Derived Neurotropic Factor, and cortisol in participant urine. Sixty-three adult men and women enrolled in the study. Each participant submitted a first-morning-void urine sample and responded to the standardized demographic questionnaire and depression inventory. The Beck Depression Inventory was used to classify participants along a continuum from healthy control to majorly depressed. Samples were tested for creatinine to assess kidney function and identify dilution factors for mathematical normalization. All analytes were measured using enzyme-linked immunosorbent assays. More women responded as depressed than their male counterparts (64% vs. 36%). Univariate linear regression analysis determined that no value in these urine analytes tested could reliably predict the BDI outcome. The data suggested that stress is not a primary cause of depression. Although this study did not find any correlation between depression severity and respective analyte levels, other analytes may provide reliable correlation and clinical utility as a tool to objectively diagnose Major Depressive Disorder.

School: School of Medicine

JOHN, ALBIN

Standards in Assessing Peripheral Nerves

Albin John, MBA BA, Stephen Rossettie, MBA BS, Cameron Cox, BBA, John Rafael, MBA BS, Brendan MacKay, MD

Neuritis often develops from chronic compression or traumatic injury. Peripheral nerve injuries can be difficult to diagnose, treat, and monitor given their often-subtle symptoms. When the status of nerves is not accurately assessed, treatment may be delayed or overlooked and can result in lasting functional deficits. Given that nerve assessments have the potential to impact diagnosis, intervention, and recovery of impaired nerves, a comprehensive view of the literature assessing their efficacy could ultimately assist surgeons in improving patient outcomes.

We performed a systematic review using a comprehensive combination of keywords and search algorithm according to PRISMA guidelines. The search was focused on clinical data regarding the assessment of peripheral nerves.

Nerve assessment objectives vary by nerve and injury level. Common assessment tools aim to address clinical domains, including: sensory function, motor function, pain/discomfort, neurophysiology, and patient-reported outcomes. It is clear that no single test is able to give a full clinical picture of nerve injury or recovery; however, practical considerations prevent performing every test at each visit. It is important to tailor assessment algorithms to obtain accurate and relevant data for individual patients.

As our understanding of nerve repair and generation evolves, so have tools for evaluating both the functional and morphological status of peripheral nerves. There is currently no consensus on the optimal assessment algorithm for peripheral nerve injuries. While many questions remain unanswered, this review may serve as a valuable resource to determine the appropriate tools for monitoring nerve function both pre and postoperatively. As the surgeons work to improve treatments for peripheral nerve injury and dysfunction, identifying the most appropriate measures of success could lead to improved patient outcomes.

School: School of Medicine

JONES, DAEMAR

The Use of an Inari Device to Effectively Treat Pulmonary Embolism

Daemar H. Jones; Bernardo Galvan; Katherine G. Holder; Mohammad M. Ansari, MD

Introduction: Blood clots that travel from deep veins can cause pulmonary embolism (PE) and can be life threatening. The portion of the lung that is blocked by the embolism becomes deficient of blood supply. This makes it much harder for the lungs to effectively provide oxygen to the body. The risk of death or other complications can be reduced through the active treatment, if caught early. Simple thrombectomy devices have been used as a solution for the treatment of PE. We describe our initial experience with the Inari thrombectomy device, here at Texas Tech University Health Sciences Center, through a case series of five patients that underwent the procedure.

Method: A total of five patients received the inari thrombectomy treatment in this case series. Demographics, medical histories, and HPI's were taken from the patients with PE prior to this treatment. Post-operative outcomes (O2 saturations before and after, specific labs, length of procedure, clot removal time, and radiology results) were analyzed amongst the patients for the effectiveness of the Inari thrombectomy device.

Results: 4/5 patients were male and 1/5 were female with an average age of 62 years. Average procedure time was 98.4 minutes. Average length of stay after procedure was 5.8 days. All patients tolerated the procedure well with no complications. There was a 100% success rate at follow up for all patients.

Conclusion: The experience of using the Inari thrombectomy device at TTUHSC showed promising and worthwhile results for the treatment of pulmonary embolism. Progression of this treatment on a wider population could be the next possible step.

School: School of Medicine

KELLY, LEWIS

Novel Use of 3-D Upper Extremity Model and Pathway Maps for Improved Medical Student Anatomical Comprehension

Lewis A. Kelly, Keith N. Bishop (PhD)

First year students at TTUHSC take Clinically Oriented Anatomy as their first block of medical school. Proper orientation of structures depicted in two-dimensional imagery can be difficult for students to decipher. It was recognized that there was a deficit of physical 3-D material covering the nerve and blood vessel pathways. The standard model is problematic because the plastic muscles limit visibility of these important pathways. The aim of our study was to provide students with a 3-D model that would offer clear positioning of the nerves and vessels in order to facilitate study and improve comprehension.

In coordination with the Methodology Lab at Preston Smith Library, a 3-D model of the bones of the upper limb from shoulder to hand was created. Various gauged copper wire was soldered together to create the appropriate routes for each of the structures as they run in the correct anatomical location through the arm. Designated colors for nerves and blood vessels with numbered tags allow for easier identification. A concept map, created in conjunction with the 3-D model, displays the nervous system pathways of the upper limb as well as their respective muscle innervations.

Following their unit exam, students were asked to complete a survey that assessed their satisfaction with the 3-D model and concept map. Based on the results, over 90% of students who used the resources (n=56) rated them as either "very useful" or "extremely useful" in preparing for the examinations. Of the students who utilized the upper limb model (n=33), 97% indicated that they found it "completely" easier to understand the pathways using a 3-D object versus a 2-D image.

According to the statistics from the survey, providing students with supplemental 3-D representations of the nervous and arterial pathways of the human body would facilitate a greater understanding of the course material.

School: Graduate School of Biomedical Sciences

KHAN, SHAZMA

The Prevalence of Latent Tuberculosis Infection in United States

Shazma Khan, Dr. Kenneth Nugent M.D.

Background: National statistics reported by the CDC included 8,916 cases of tuberculosis (TB) in 2019. Reduction in the number of active cases requires testing of close contacts and identification of patients with latent tuberculosis infections (LTBI). Optimal screening requires information about the demographics and characteristics of people who are more likely to have LTBI.

Methods: Information from the 2011–2012 National Health and Nutrition Examination Survey (NHANES), which surveys adults from a representative sample of the United States, was used to identify and determine the characteristics of participants with LTBI. LTBI in these participants was detected either by a positive skin test or a positive QuantiFERON blood test. Information about active TB cases in Texas was determined by reports from the Texas State Department of Health Services.

Results: The NHANES database for 2011-2012 included 9723 participants. Participants with a positive QuantiFERON test were more likely in the age group 45-64, male, foreign born, and have less than a high school education. Participants with a positive skin test had similar characteristics. Participants who had both tests positive were more likely to be in the age group 45-64, male, foreign born, and, Hispanic. In addition, they had diabetes, self-reported fair/poor health, and an educational level less than high school. In Texas, TB occurred more frequently in individuals older than 75 who were male and foreign born. Important clinical diagnoses associated included diabetes, alcohol abuse, correctional facility residence, non-injection drug use, positive HIV status, and homelessness.

Conclusions: The NHANES indicates that adults with LTBI are more likely to be men, foreign born, and have less than a high school education. Active cases of TB in the State of Texas have similar demographic characteristics and have important clinical disorders, including diabetes, HIV, alcohol abuse, incarceration, and homelessness.

School: School of Medicine

KHAN, SONIA

Tumor-Infiltrating Lymphocytes (TILs) as a Biomarker of Abscopal Effect after Cryoablation versus Resection

Sonia Y. Khan, Michael W. Melkus, Victoria Chu, Luis Brandi, Hafiz Khan, Rakhshanda Layeequr Rahman

Introduction: Morphological evaluation of tumor-infiltrating lymphocytes (TILs) in breast cancer is gaining momentum as evidence strengthens the clinical relevance of this immunological biomarker. We compared changes in TILs in the unmanipulated contralateral cancer after cryoablation versus resection of ipsilateral cancer as an assessment of abscopal effect in a murine model.

Methods: Balb/C mice were transplanted on each side with 1x10^6 cells of the highly metastatic triple negative breast cancer 4T1-12b-luciferase expressing cell line into the mammary fat pad near nipple 4 and 9. Tumor growth and metastasis were monitored by palpation, caliper measurements, and in vivo imaging for luminescence during the course of the experiment. At 2 weeks post-transplant, the left tumor was treated by either resection (n=5) or cryoablated (n=5) and 1 week later the untreated contralateral tumor was excised and scored for TILs by H&E-stained sections as described by International Immuno-Oncology Biomarker Working Group on Breast Cancer. The initial resected tumor was also scored and served as an unmanipulated tumor internal control. At 5 weeks post tumor treatment, the mice were re-challenged with 1x10^6 4T1-12b-luc cells subcutaneous in the upper left back and monitored for tumor growth and metastasis.

Results: The resected ipsilateral tumors TIL score compared with contralateral tumor TIL score a week after cryoablation or resection were compiled into a table. There was no correlation between tumor volume and TIL percentages. At 4 weeks post treatment, mice that underwent cryoablation had no recurrence, no metastasis and were able to prevent tumor growth when re-challenged, whereas 40% of mice that underwent resection had primary tumor recurrence with distant tumor growth.

Conclusion: The TIL score analysis in combination with tumor remission suggests that cryoablation induced an overall more robust and tumor specific TIL response than resection suggesting abscopal effect.

School: School of Medicine

KHARBAT, ABDURRAHMAN

Bilateral Asymmetry in the Upper Extremity

Abdurrahman F. Kharbat, MBA; Cameron Cox, BBA; Brendan Mackay, MD

In living patients, traumatic injury or tumor resection can create length alterations in the upper extremity (UE) bones requiring reconstruction. It is critical to maintain anatomical length of an injured limb to restore normal function. Direct measurement of the contralateral bone is often used for target length of reconstruction, but does not account for potential asymmetry. Given the importance of accurate length estimations and the paucity of data on living populations, we created a study to evaluate asymmetry of UE long bones by analyzing radiographic images of living patients. Bilateral X-ray images previously taken for either trauma or chronic osseous conditions were collected for subjects ages 2-81. After screening, 61 patients were included (19 humerus, 28 radius, 29 ulna). Three length measurements were taken of each bone. Median length of 3 serial measurements was used for analysis. Bootstrapping was performed to reach sample sizes of 200, 500, and 1000. Wilcoxon signed-ranks tests were performed to determine whether contralateral bones differed significantly in length. Mean absolute differences: 27.0mm humerus, 8.6mm radius, 7.5mm ulna. There was no clear trend favoring a longer side in any bone. 57.9% (11/19) had a right humerus longer than left, 60.7% (17/28) longer right radius, and 48.3% (14/29) longer right ulna. Wilcoxon Signed Rank tests: No significant differences between contralateral bones in direct measurement groups. In bootstrap samples, significant length differences were found in all sample sizes for the humerus and radius, but only in the 1000 sample for the ulna. Although the exact threshold is unclear, length alteration may negatively impact UE motor function and/or induce pain. In current reconstructive algorithms, asymmetry is not well accounted for. The data we present may help to develop improved length estimation algorithms, ultimately leading to improved patient outcomes.

School: School of Medicine

KIM, DALYNN

The association between positive psychological factors and undergraduate academic performance in medical students

Dalynn Kim, Tyler Morgan, Tiffany Xu, Ahmed Mohammed, Yasin Ibrahim, MD, Astik Joshi, MD, Regina Baronia, MD

Background: Psychological distress has been shown to negatively affect the academic performance of medical students. However, there are few studies that explore individual psychological factors and undergraduate academic performance of medical students. The goal of this study is to examine factors such as resilience, spirituality, and loneliness and their effects on academic performance of first year medical students.

Methods: First year medical students at TTUHSC were recruited into the study within the first two months of the academic year via electronic and physical bulletins. Subjects then completed a demographic and education questionnaire, a medical and psychiatric screening questionnaire, The Connor-Davidson Resilience Scale (CD-RISC 10) to measure resilience, a DeJong Gierveld short scale (DJG) to measure loneliness, the Duke University Religious index (DUREL) to measure spirituality/religiosity, an Engaged Living Scale (ELS) to measure engaged living, a Patient Health Questionairre (PHQ-9) to measure depressive symptoms, a Genaralized Anxiety Disorder scale (GAD-7) to measure anxiety symptoms, and a Psychological Wellbeing Scale (PWB) to measure aspects of wellbeing and happiness.

Results: This study's sample of 80 individuals included 27 males, and 45 Caucasian participants, and had a mean age of 23.6 ± 2.38 years. Linear correlations between each of SAT and MCAT scores and demographic as well as psychological variables were examined using R (version 4.0.3). SAT score negatively correlated with age ($r = -0.33$; $p = 0.01$). A statistical trend was observed for a negative association between MCAT and psychological wellbeing ($r = -0.20$, $p = 0.09$). All other examined correlations between SAT / MCAT and psychological measures were not significant. The observed negative association between SAT and age may have been driven, at least partially, by a change introduced to SAT scoring in 2016.

Conclusion: The negative trend of association between PSY and MCAT scores

School: School of Medicine

KORTMAN, RACHEL

Building a Hydroponic Garden for a Free Clinic Population

Rachel Kortman, Emily Fine, Kiran Ali, John Ciubuc, Shazma Khan, Susan Sherali, Brandon Ximenez

The Free Clinic, through the organization Lubbock Impact Soup Kitchen, provides a free, weekly meal to its patients and those in need within the Lubbock, TX community. With an average of 270-300 people served each week, providing cost-efficient and nutrient-dense food remains a weekly challenge for these organizations. Lubbock Impact's fresh produce costs were analyzed to determine whether implementing a hydroponic growing system in The Free Clinic would be beneficial for increasing access to and incorporating more fresh produce into the weekly meals without raising costs. A hydroponic garden replaces soil with a nutrient-rich water solution allowing the plants to have continuous access to nutrients. By utilizing water circulation, it increases the efficiency of the garden while simultaneously reducing the amount of resources and maintenance required to produce a sufficient amount of vegetables when compared to a traditional soil garden. Our hydroponics garden was built under a stairwell at Lubbock Impact to capitalize on an unused space without negatively impacting the square-footage of the entryway. In order to avoid poor growth, grow-lights were hung at various levels from the staircase to ensure proper lighting for maximal growth and produce yield. In this study, we found that Lubbock Impact purchased fresh produce every three out of four weeks, averaging $53.31 and 37.1lbs per week. Given that the cost and maintenance of the hydroponic system was covered by grants and it is placed inside the clinic, adding this system to increase fresh produce is both affordable and accessible to the patient population and community. Limitations to consider are that exact nutritional information of fresh produce purchased by Lubbock Impact is unknown and the amount of fresh produce thrown away each week is also unknown. Next steps will be to implement the system and see how it affects both cost and weight of weekly fresh produce at Lubbock Impact Soup Kitchen.

School: School of Medicine

KOSHY, RIYA

Telemedicine for the Underserved: A Case Study from a West Texas Student-Run Free Clinic

1Koshy, Riya, BS; 1Rafael, John, MBA*; 1Zapata, Alexander, BS*; 1Marschke, Brianna, BS*; 1Bui, Stephanie, MBA*; 1Thomas, Aaron, MS*; 1Fine, Emily, BS*; 1Bashrum, Bryan, BS*; 1,2Prabhu, Fiona, MD; 1,2Bennett, Kelly, MD

Background: The Free Clinic at Lubbock Impact (TFC), a student-run free clinic affiliated with the Texas Tech University Health Sciences Center (TTUHSC), regularly sees upwards of 25 uninsured adult patients every Wednesday evening through an interdisciplinary, education-centered patient approach. The coronavirus disease 2019 (COVID-19) pandemic restricted its scope of practice in March 2020 due to the addition of barriers to healthcare. With populations that depended on student-run free clinics not getting their healthcare needs met, TFC implemented a new model of care to meet the needs of the clinic's underserved populations in West Texas. This talk will focus on the various requirements that went into building and sustaining a telehealth system in the absence of electronic medical records (EMR), including timeline, partnerships, training, and patient reception.

Methods: In this oral presentation, we examine TFC's approach to building and scaling a telemedicine model of care while using a paper chart system during the COVID-19 pandemic, and offer lessons learned along with recommendations for similar student-run free clinics considering the transition to virtual care delivery.

Results: From May to December 2020, the clinic facilitated 298 telemedicine-specific appointments and completed another 150 appointments through phone.

Conclusion: The virtual nature has alleviated the burden of both patients and medical students who would otherwise be unable to utilize TFC for their healthcare and clinical education, respectively. Incorporation of telehealth into our clinic flow has been achieved with the existing care model in mind, making it a sustainable, long-term option for when patients are once again able to receive care in our physical clinic.

School: School of Medicine

LE, CHRISTOPHER

Literature Review of Treatment for Isolated Breast Cancer Locoregional Metastasis to Supracervical Lymph Nodes

Christopher Le, Yana Puckett

The incidence of ipsilateral supraclavicular lymph node metastasis (ISLM) in breast cancer patients predicts poor prognosis in patients. Currently, there are no randomized controlled trials or explicit guidelines to treat patients with ISLM. The purpose of this review is to provide an overview and analyze the different treatments for ISLM from the past 10 years. A literature search was performed in PubMed to select articles that describe results from different treatments of patients with ISLM. For inclusion in this review, studies must have been published between 2010 and 2020. There are conflicting studies whether systemic therapy with radiotherapy results in better outcomes than systemic therapy with surgery. Studies show that the dose of radiotherapy does not result in better outcomes in patients with ISLM. There is no consensus treatment for patients with ISLM. Future randomized controlled studies are required to definitively determine the best systemic treatment combination of radiotherapy and surgery to treat patients with ISLM.

School: School of Medicine

LIAO, EN-DIEN (SAMUEL)

Literature Review: A Proposed Algorithm on the Management of Rectus Sheath Hematoma

En-Dien (Samuel) Liao, Dr. Yana Puckett

Rectus Sheath Hematoma (RSH) is often overlooked with no clearly established protocol to manage the disease process. Furthermore, the literature on RSH can be old and outdated, not incorporating modern technological advances in medicine and imaging. We performed a literature review to identify the latest information on RSH management and to consolidate an algorithm to help guide modern RSH treatment. Current RSH classification, scoring system, algorithm, and other predictors for treatment plan are discussed.

School: School of Medicine

LINARES GARCIA, HECTOR

Increase in Child Abuse Injuries during the COVID-19 Pandemic in West Texas

Hector Garcia, MEng^1, Thomas G. Wyatt, D.O.^1, Amber Tucker, MSN, RN^2, and Sharmila Dissanaike, M.D.^1

1Department of Surgery, Texas Tech University Health Sciences Center, 2Trauma and Burn Service Department, University Medical Center, Lubbock, Texas

Indirect consequences of the COVID-19 pandemic in the US have included business closures, job losses and high unemployment. Nationwide, unemployment rates rose to 14.7% in April and have not yet returned to pre-pandemic levels.[1] Poverty rates have risen from 9.3% in June to 11.7% in November.[2] Attempts to reduce viral spread included prolonged school closures [3], which place significant stress on families, especially those that do not have resources to organize alternate forms of childcare. The pandemic itself has increased stress levels for nearly everyone.

Associations between poverty and child maltreatment have been previously reported [4] raising concern for a potential increase in child abuse during times of social and economic hardship. Through this report, we hope to underscore the need for continued vigilance by healthcare providers and educators in identifying cases of child abuse, as well as the need for additional initiatives to mitigate child maltreatment during times of socioeconomic stress.

School: School of Medicine

LOW, DALLIN

Countering COVID-19 vaccine hesitancy

Cody Perry, Adin Mizer, Adam Wynn, Cassie Kruczek, Dallin Low

Introduction: Many devastating diseases have been largely controlled or eradicated, especially in industrialized nations, due to the availability of safe, effective, and affordable vaccines. The COVID-19 pandemic has resulted in a horrific toll on human life and is devastating the global economy. To prevent the continued spread of COVID-19, efforts have begun to develop a COVID-19 vaccine. However, recent public polls have demonstrated concerns with the COVID-19 vaccine. To help understand these concerns, this review addresses the necessity of vaccines, vaccine safety and development, and vaccine hesitancy.

Methods: This review contains a compilation of data from several sources, including peer-reviewed journals, preprints, studies published in PubMed and the Cochrane Library, CDC and WHO guidelines, and broader web searches to retrieve up-to-date information. Studies selected were related to vaccine safety, production, and efficacy or COVID-19.

Results/Conclusion: To improve public acceptance of a COVID-19 vaccine, public health officials and healthcare professionals need to work with community leaders to create specialized strategies to overcome vaccine hesitancy. Such strategies could use both traditional and social media platforms in addition to physician-patient interactions. To maximize the number of individuals who receive the COVID-19 vaccine, these strategies should focus on dispelling potential myths and emphasize the benefits and safety of vaccination.

Key Words: COVID-19, SARS-CoV-2, vaccine, vaccine hesitancy, vaccine safety/efficacy

School: School of Medicine

MAJDINASAB, ELLEANA

Polymer-Encased Nanodiscs and Polymer Nanodiscs: New Platforms for Membrane Protein Research and Applications

Angela Chen, Elleana J. Majdinasab, Mariana C. Fiori, Hongjun Liang, and Guillermo A. Altenberg

Membrane proteins (MPs) are essential to many organisms' major functions. They are notorious for being difficult to isolate and study, and mimicking native conditions for studies in vitro has proved to be a challenge. Lipid nanodiscs are among the most promising platforms for MP reconstitution, but they contain a relatively labile lipid bilayer and their use requires previous protein solubilization in detergent. These limitations have led to the testing of copolymers in new types of nanodisc platforms. Polymer-encased nanodiscs and polymer nanodiscs support functional MPs and address some of the limitations present in other MP reconstitution platforms. In this review, we provide a summary of recent developments in the use of polymers in nanodiscs.

School: School of Medicine

MARSCHKE, BRIANNA

Review of Noninvasive Imaging to Assess Chemotherapy-Induced Neuromuscular Disorders

Brianna Marschke, BS, Suhas Pol, PhD, Kishor Bhende, MD

Background: Chemotherapy-induced peripheral neuropathy (CIPN) is a type of neuromuscular disorder that commonly negatively affects the quality of life of cancer patients. There are many different imaging techniques used in the diagnosis and assessment of CIPN, including EMG, muscle biopsy, MRI, and ultrasound. Although it is clinically important to monitor the extent of peripheral nerve damage to better treat patients, it is difficult to assess children due to their limited speech development and the invasive modality of some of the invasive imaging techniques. The purpose of this article is to review and report current knowledge of imaging techniques used to assess CIPN.

Methods: We conducted a retrospective review study at an academic medical center to identify specific features of chemotherapy-induced neuromuscular disorders. We performed a literature search via 'Pubmed' for relevant literature published in English from 2000-2020 using keywords "chemotherapy-induced peripheral neuropathy," "neuromuscular disease," and "diagnostic imaging." We included human studies of clinical trials and randomized controlled trials. In total, we analyzed 111 articles.

Results: Whereas imaging to assess, monitor, and diagnose CIPN in adults has been more thoroughly researched, imaging techniques that are successful and effective in children are scarce. Although progress has been made in identifying that the current gold standard of EMG and NCS to diagnose and monitor CIPN in pediatric populations is insufficient, there is still not an adequate technology that exists.

Conclusion: There is need for the expansion of noninvasive imaging techniques that are well-suited for children. New noninvasive imaging techniques that appear promising are still in early stages of development and will require significant advancements and trials to ensure their effectiveness, accuracy, sensitivity, and specificity.

School: School of Medicine

MARSH, HARRISON

Implications of Age on Social Media Utilization in Healthcare Practice Development: A Focused Study of Healthcare Faculty and Students

Harrison Marsh MBA, Mhd Hasan Almekdash, MA, MS, Ph.D., Stephen Rossettie MBA, Albin John MBA, Kassie Pelham MS, Brent Magers MHA, FACHE, FHFMA

Social media has revolutionized the way that people interact with each other and with businesses. Medical practices have yet to take full advantage of the reach of social media. This research study looked at data collected using an anonymous survey that was further supported by published literature in order to shed greater light on both the possible opportunities for social media usage in medical practices as well as the challenges of implementing it appropriately. The survey collected data from a diverse population of healthcare professional students, faculty, and physicians affiliated with Texas Tech University Health Science Center (TTUHSC). The data revealed social media usage across age groups, education levels, and occupations. Results from age group data was further examined in order to develop recommendations for burgeoning practices. Within this focus, the survey explored whether respondents, many of whom work within the health care system, would be open to social media utilization to improve healthcare delivery. Therefore, this study demonstrated the benefits, challenges, and opportunities of social media utilization when growing a medical practice.

As social media continues to grow, efficient utilization of the available platforms can help a medical practice reach out to a broader population and deliver personalized care. While the data collected in this study demonstrated an overwhelming interest in using social media in the medical field across all age groups, adoption willingness appears to be higher in younger respondents than with older respondents. Facebook is the most broadly accepted social media platform for healthcare applications. However, other social media platforms, such as Instagram, may be better tools for targeting younger generations. Medical practices should use social media pages to present content that is timely, relevant, and written in clear language familiar to the target audience.

School: School of Medicine

MATEJA, KIRBY

Pediatric Trauma Management: Development of Whole Blood Transfusion Protocols

Kirby Mateja

Background: Historically, whole blood transfusions have been an effective treatment for patients suffering massive hemorrhage following trauma. Despite whole blood successes, it presents major logistical problems for hospitals in terms of collection and storage and has been shown to increase the risk of transfusion-transmitted disease and plasma-associated transfusion reactions. The 1970s saw a rise in component therapy with a targeted ratio of packed red blood cells, platelets, and plasma which became the norm in transfusion protocols across the world - despite the drawbacks of using a more dilute blood mixture. Recently, there has been a resurgence in the use of whole blood replacement therapy in areas of the world with reduced access to component therapy. Preliminary studies have indicated that whole blood, despite the aforementioned drawbacks, may actually be the optimal resuscitation fluid for massive hemorrhage. Whilst several studies examine the use and establishment of whole blood transfusion protocols in adults, especially in military members, there is a paucity of information surrounding the use in children. Trauma and resultant hemorrhage are some of the leading causes of medically preventable death in children over the age of one. This retrospective study examines the use of replacement therapy in pediatric trauma cases in order to develop protocols and determine the resources needed.

Methods: This study examined the reason for administration, the amount of blood used and the outcomes of all pediatric trauma patients who either received a blood transfusion, required activation of massive transfusion protocol, or had emergency release blood available at Covenant Children's Hospital from 4/1/17-12/31/19. This information will be used to establish protocols outlining the use of whole blood transfusions in children.

Results: at the time of abstract submission the data was being analyzed by the CRI.

School: School of Medicine

MATSUNAGA, SARAH

The impact of prokinetics use on gastroesophageal reflux disease in children: a systematic review and meta-analysis

¶1Matsunaga, Sarah, BA; ¶2Rafael, John, MBA; 3Tsou, Po-Yang, MD, MPH

1Dartmouth Geisel School of Medicine, Hanover, NH, 2School of Medicine, Texas Tech University Health Sciences Center, Lubbock, TX, 3Department of Pediatrics, Driscoll Children's Hospital, Corpus Christi, TX, USA, ¶ The two authors contributed equally to this work

Gastroesophageal Reflux Disease (GERD) is commonly seen in children. The use of antacid could temporarily improve GERD symptoms but was associated with adverse effects and reported no long-term benefits. Our objective is to assess if prokinetics, a agent commonly used before the era of antacid, may be associated with better control of GERD for children.

A systematic review and meta-analysis of observational studies was performed to ascertain the association between the use of prokinetics and GERD among children. Major electronic databases were searched from inception through November 2020 using predefined index terms, including "GERD", "prokinetics" and "children". Standardized mean difference (SMD) between pre-treatment and post-treatment effect sizes were computed using Cohen and Rosenthal methods for the following outcomes: percentage of time with pH<4, number of reflux in 24 hours, and average duration (minute) of reflux. The Newcastle-Ottawa Scale was used for qualitative assessment. This study is reported according to MOOSE (Meta-analyses Of Observational Studies in Epidemiology).

Of 2046 articles identified, 41 studies were considered eligible. Cisapride was associated with less percentage of time with pH<4 (SMD 1.06, 95% CI: 0.86 - 1.25, p<0.001) and less frequent reflux in 24 hours (SMD 0.71, 95% CI: 0.48 - 0.93, p<0.001), but not shorter average duration of reflux (SMD 0.39, 95% CI: -0.11 - 0.75, p=0.147). Metoclopramide (SMD 0.63, 95% CI: 0.21 - 1.05, p=0.003) and bethanechol (SMD 1.90, 95% CI: 1.19 - 2.61, p<0.001) were associated with shorter average duration of reflux. Qualitative assessment found moderate concerns for bias.

The available evidence suggests cisapride, metoclopramide and bethanechol were associated with improved short-term control for symptoms due to GERD as compared with those without treatment in children.

School: Dartmouth College

MIZER, ADIN

Orthopaedic Surgery Total Joint Registry – Preliminary Outcomes of Knee and Hip Scores

Adin Mizer, Albin John, Stephen Rossettie, Bernardo Gonzalez, Elizabeth Eichman, Dr. Amanda Purcell, Dr. George Brindley

Introduction: The focus of this Total Joint Registry (TJR) is to provide more information about the best methods of treatment to improve outcomes total hip, knee, and shoulder replacement recipients. Over time, this registry will provide information about the summation of one's physiology, comorbidities and implant technology on surgical outcomes.

Methods: The population consists of patients of TTUHSC Orthopaedic Surgery receiving a primary total hip, knee, or shoulder arthroplasty by Dr. George Brindley, MD; Dr. Mark Jenkins, MD; Dr. Cyrus Caroom, MD; or Dr. Mathew Ferguson, MD. Data is collected pre-operation (pre-op), 6 weeks, 1 year, 3 years, 5 years and 10 years post-operation (post-op). A SF-36 health questionnaire is completed at each collection point and a Knee Society Score, Harris Hip Score or DASH Shoulder score is determined for patients receiving a knee, hip or shoulder replacement, respectively. Additionally, at the time of entry into the registry, the patient's comorbidities and pre-operative status are entered into the spreadsheet.

Results: For patients undergoing a total hip arthroplasty there was a statistically significant positive relationship between the change in pre-op to post-op hip scores and those without cardiac comorbidities. Despite difficulties presented by COVID-19, a sustainable operation and workflow for collection of patient information on this registry has been established. The presented preliminary data shows the potential of this registry in providing vital information to better understand predictive factors in total joint replacement surgery. The goal is to continue to expand the registry and contribute to improving patient outcomes.

Keywords: Registry, Total Joint Arthroplasty, Orthopaedics, Hip, Knee, Shoulder

School: School of Medicine

MORRIS, ERIN

Global Patterns and Outcome of Necrotizing Soft Tissue Infections: A Systematic Review and Meta-Analysis

Samudani Dhanasekara, MBBS, MS, PhD, Brianna Marschke, BS, Erin Morris, BS, Chanaka Kahathuduwa, MBBS, PhD, Sharmila Dissanaike, MD.

Objective: We performed the first systematic review/meta-analysis on published reports of necrotizing soft tissue infections (NSTIs) from across the globe.

Summary of Background Data: Frequency, microbiology, and outcomes of NSTIs vary based on locoregional and environmental factors; however, there has been no global survey of these patterns.

Methods: Peer-reviewed empirical studies examining rates of polymicrobial and monomicrobial NSTIs with microbial isolation were extracted along with geographical location using PubMed, Scopus, ProQuest, and Web of Science. Random-effects meta-analyses were performed and adjusted for publication bias. Meta-regression analyses examined moderator effects of risk factors.

Results: One-hundred and five studies (8718 total patients) were included. Pooled prevalence of polymicrobial and monomicrobial infections were 53% and 38%, respectively. Truncal NSTIs were commonly polymicrobial (p < 0.001), while monomicrobial infections prevailed in extremities (p = 0.008). Global prevalence of monomicrobial NSTIs was observed to increase by 1.1% annually (p = 0.003). Staphylococcus aureus emerged as the commonest organism globally, as well as in North America, Asia, Middle East and Africa, followed by Streptococcus pyogenes and Escherichia coli. Methicillin-resistant Staph. aureus (MRSA) accounted for 7.5% of NSTIs globally. Overall mortality rate was 18%, with no difference based on geographic region. Mortality has been decreasing globally over the last two decades (p = 0.052).

Conclusions: Though polymicrobial infections remain predominant worldwide, the incidence of monomicrobial infections is rising. MRSA infections are less common than previously reported. Overall mortality is lower than many prior reports. No mortality differences were noted between regions, despite major variations in available healthcare resources.

School: School of Medicine

NANEZ, VIANNE

Demographic Risk Factors for Decreased Women's Healthcare Screenings

Vianne Nanez, MPH, Brianna Marschke, BS, Riya Koshy, BS, Zoe Davis, BS, Aaron Thomas, BS, John Rafael, BS, Bryan Bashrum, BS, Stephanie Bui, BS, Alexander Zapata, BS, Fiona Prabhu*, MD, Kelly Bennett*, MD

The Free Clinic of Lubbock Impact: Texas Tech University Health Science Center, Lubbock, Texas, USA

Objective: Women require substantially more medical contact than their male counterparts. Because of this, women are considered higher risk, especially for those who are uninsured and without access to women's health resources. This study evaluates the use of women's health services among our free clinic patient population, assesses the need for women's health visits, and defines a set of demographic risk factors for patients needing access to women's healthcare.

Methods: A survey of patients who visited the student-run free clinic between 2017-2020 was conducted via telephone and recorded in SurveyMonkey. Inclusion criteria were uninsured female patients between the ages of 18-64. 70 responses were received, and risk factors for the increased need of women's health visits were evaluated based on demographic parameters via descriptive statistics with Excel.

Results: Of those who responded, only 20% were up to date on their women's health screenings, and 35% were without screenings for >5 years. Those without a recent exam in the past 5 years were mostly Caucasian (52%), ages 45-55 (46%) or 55-65 (44%), without reliable transportation (40%), and with a household income between $10,000-25,000 (48%).

Conclusions: This study identified specific demographic risk factors correlated with the female clinic patients that are behind on women's health screenings. A high percentage of patients without a recent exam were in the average diagnostic age for cervical cancer (50) and breast cancer (62). This knowledge will help guide how the clinic promotes services in the future and the population it targets.

School: School of Medicine

NATHA, CRISTINA

Connexin Hemichannel Inhibitors Based on Aminoglycosides

Cristina M. Natha, Varun Vemulapalli, Mariana C. Fiori, Cheng-Wei T. Chang and Guillermo A. Altenberg

Cristina and Varun are co-first authors, and we will be presenting together at SRW

Connexins are membrane proteins involved directly in cell-to-cell communication through the formation of gap-junctional channels. These channels result from the head-to-head docking of two hemichannels, one from each of two adjacent cells. Undocked hemichannels are also present at the plasma membrane where they mediate the efflux of molecules that participate in autocrine and paracrine signaling, but abnormal increase in hemichannel opening can lead to cell damage in disorders such as cardiac infarcts, strokes, deafness, cataracts, and skin diseases. For this reason, connexin hemichannels have emerged as a valid therapeutic target. Traditional hemichannel inhibitors are not ideal leads for the development of better drugs for clinical use because they are not specific and/or have toxic effects. Newer inhibitors are more selective and include connexin mimetic peptides, anti-connexin antibodies and drugs that reduce connexin expression such as antisense oligonucleotides. Re-purposed drugs and their derivatives are also promising because of the significant experience with their clinical use. Among these, aminoglycoside antibiotics developed in our laboratory have been identified as inhibitors of connexin hemichannels that do not inhibit gap-junctional channels. Here, we discuss connexin inhibitors with a focus on aminoglycoside antibiotics and our derivatives of kanamycin A that inhibit connexin hemichannels, but do not have antibiotic effect.

School: School of Medicine

NGO, TOMMY

Outcomes of Peripheral Nerve Repair in Non-transected and Partially Transected Nerves: A Review of the Literature

Cody Perry BS, Cameron Cox BBA, Tommy Ngo BS, Alexis Rounds MD, Brendan MacKay MD

Department of Orthopedic Surgery

Introduction: Peripheral nerve injuries (PNIs) are common and present with varying symptoms depending on the severity and nerves involved. While the mechanisms of nerve injury and regeneration have been well-described, current treatment algorithms fail to consistently achieve full functional recovery. Ineffective treatments for PNIs can result in disabling and long-lasting, or even irreversible complications for patients. The most prominent direct complications include chronic pain, hyperesthesia, cold intolerance, and compromised function secondary to motor and/or sensory deficits in the affected extremity. When patients are unable to return to full functional capacity, downstream effects such as loss of employment and cost of continued medical care may amplify reductions in quality of life and adverse psychological outcomes.

Methods: We conducted a systematic review of Pubmed and Google Scholar in accordance with PRISMA guidelines to define the current understanding of partial nerve injury presentation, non-surgical treatment, surgical repair techniques, and patient outcomes. Search words included “peripheral nerve injury”, “nerve repair”, “non-transected”, “partial-transection”, or “lesion in-continuity”, or “neuroma-in-continuity”.

Results: Several studies have been published that show moderate success for upper extremity in-continuity lesion repaired surgically, as a small majority of patients achieved at least a moderate (LSUHSC Grade of 3) degree of recovery. In addition, multiple reports demonstrated better outcomes for patients with intact nerves that were treated by neurolysis; or in some cases even complete transection repairs had better results.

Conclusion: Conclusion: There is no consensus gold standard on optimal approach to non-transected nerve injuries and treatment algorithms continue to evolve. Given the paucity of clinical data, this review may serve as a resource for physicians treating these difficult injuries.

School: School of Medicine

NGUYEN, DALENA

Awareness of Vaping and its Health Effects Among 1st and 2nd Year Medical Students

Neil Jain, Travis Chin, Hisham Ali, Dalena Nguyen

There has been a substantial increase in daily use of electronic cigarettes/vaping products among young adults in the United States over the last ten years. Recent studies have linked this use to "e-cigarette or vaping product use–associated lung injury" (EVALI) and other various pathologic toxicities. Unregulated and misleading techniques "such as mention of flavor, use of celebrity endorsements, and use of cartoons or animation", are commonplace in e-cigarette marketing. The Texas Medical Association has recently adopted regulation strategies for vaping similar to those of tobacco-based products.

This study targeted TTUHSC medical students and physicians to investigate awareness of the negative health effects of both forms of smoking as well as perceptions of vaping in the media. Participants were asked to answer a 10-question survey included within the TTUHSC School of Medicine P3-1 Honors Project Omnibus Survey. In total, 173 subjects responded to this survey. This study was approved for exempt review by the TTUHSC IRB.

More individuals identified that they knew peers that vape than use tobacco products. 73% determined that vaping constituted "smoking" and 57% believed it was a safer alternative to smoking. Only 36% reported that they were asked about vaping use by their physician. Almost all respondents agreed that the media portrays vape use too positively. Interestingly, 63% believed vaping was very harmful in the long term but only 15% believed the same in the short term. Cigarette second-hand smoke was deemed the most harmful across most criteria.

This study illustrates that even within the medical community there are misunderstandings regarding e-cigarette use. For future action, we recommend continuing to educate medical students on the negative health effects of vaping, prompt healthcare professionals to ask patients about vaping and encourage lawmakers to regulate the portrayal of vaping in the media.

School: School of Medicine

NOAMESI, ANORMEH

The influence of mental health and substance use disorders on the relation of migraine with self- directed violence in US women.

Anormeh Noamesi, MBChB , Olugbenga Olokede, MBBS , Noah De La Cruz, MPH, Rebecca Farias, MD and Duke Appiah, PhD MPH ,

(1)Texas Tech University Health Sciences Center, Abilene, TX, (2)Texas Tech University Health Sciences Center, Lubbock, TX.

Background: Self-directed violence (SDV) confers substantial risk for suicides. Migraine, which is characterized by severe recurring pain in the head, disproportionately affects women.

However, there's limited information on SDV among women of reproductive age who bear the greatest burden of migraine.

Objective: To evaluated the interplay of concomitant mental health and substance use disorder on the relation of migraine with SDV among US women of reproductive age.

Methods: We analyzed data from 96,081,435 hospitalizations among women aged 15-49 years from the National Inpatient Sample (2004-2015). International Classification of Disease-Ninth Revision codes were used to identify admission for migraine and other health conditions.

Logistic regression was used to estimate odds ratios (OR) and 95% confidence intervals (CI).

Results: A total of 2,494,797 cases of migraine were observed. A greater proportion of women with migraine were whites, obese, used tobacco products and had higher prevalence of epilepsy, suicide ideations (4.0 vs. 1.5%), substance use disorders (9.1 vs. 5.6%), mental health disorders (47.0 vs. 19.0%) than women without migraine. The odds of SDV was higher among

women with migraine (OR=2.32, CI: 2.26-2.40). Adjustment for demographic and behavioral/lifestyle factors, menstrual disorders, pregnancy, health conditions and violent assault attenuated the estimates (OR=1.18, CI: 1.15-1.21). Significant interactions were found for migraine with substance use (OR=5.18, CI: 4.48-6.00) or mental health (OR=14.94; CI:12.8-17.44) disorders.

Conclusion: We observed a significant relation between migraine and SDV, especially among women with mental health and substance use disorders. Clinicians should consider monitoring women with these characteristics for suicide risk.

School: Graduate School of Biomedical Sciences

OCHOA, OZMAN

Student Perceptions to Incorporation of Transgender Clinical Skills Training in Medical School Curriculum

Ozman J. Ochoa, M.S.; Jake Sellers, M.S.; Robert Coleman, M.S.; Abbie Raif, B.S.; Gurvinder Kaur, Ph.D

Clinical skills are an important aspect of medical training, and prior studies have indicated that early patient exposure could provide benefits in learning outcomes during medical education. Inclusion of transgender patient-focused clinical training in medical curriculum has become a growing necessity, as inequities in medicine have been identified relating to transgender-specific health needs. Studies have shown that students do not feel as if medical school provides adequate preparation for them to be completely comfortable to provide care for LGBTQ patients, and surveys of medical students from these studies recommend that enhanced clinical experience with LGBTQ patients should be implemented in their education. A needs based survey (NBS) sent to all medical students at Texas Tech University Health Science Center School of Medicine (TTUHSC SOM) demonstrated a student desire for more clinical training in medical education, and students feel a lack of pre-clinical exposure in working with transgender patients (TPs). Therefore, the aim of our study is to 1) utilize transgender SPs to facilitate clinical education and TP exposure in TTUHSC SOM medical students, and 2) investigate the associated effects on student confidence in working with TPs. We plan to survey participants before and after our transgender SP clinical simulation to study its effects toward student confidence in dealing with transgender specific patient encounters. While many studies exist outlining the need and implementation of LGBTQ training in medical school education, the literature lacks in examining change in medical student perspective due to specific clinical training with regards to transgender SPs. Our project hopes to provide insight to a possible educational intervention that addresses a perceived disparity regarding clinical experience in medical students.

School: School of Medicine

ONUOHA, MICHELLE

Prescription Assistance Programs at a Student-Run Free Clinic: Tips and Tricks to Run and Sustain Your Own

1^Michelle Onuoha BS, 1^Anna Sabu Kurian BS 1^John Rafael, MBA, 1^Stephanie Bui, MBA, 1^Nathan Chow, BS, 1^Annie Snitman, BS, 1^Emily Fine, BS, 1^Bryan Bashrum, BS 1,2^Kelly Bennett, MD*, 1,2^Fiona Prabhu, MD*

1^School of Medicine, Texas Tech University Health Sciences Center, Lubbock, TX, 2^Department of Family & Community Medicine, Texas Tech University Health Sciences Center, Lubbock, TX

Objective:The cost of prescription medications has risen significantly over the past few decades. For uninsured and underserved patients, this ultimately contributes to both higher disease burden and avoidable healthcare costs. One attempt to address medication affordability has been the provision of Prescription Assistance Programs (PAPs) by pharmaceutical companies, which supply eligible patients with medications at little or no cost. The Free Clinic at Lubbock Impact (TFC), a student-run free clinic staffed by volunteers from Texas Tech University Health Sciences Center in Lubbock, Texas to provide free medical care to the uninsured community, began utilizing PAPs through a volunteer coordinator with a goal of increasing patients' accessibility to medication. The result of TFC's efforts led to patient savings of $357,294.15 from February 2019-December 2020 alone. This oral presentation serves as a guide for individuals interested in understanding our program and establishing PAP coordination programs at their respective free clinics.

Methods:We will examine the logistical workflow, challenges, and solutions encountered by TFC's PAP coordination program throughout its 4 years of operation.

Results:This talk will focus on understanding PAPs, common conditions treated through PAP programs, and integration of PAP coordinators into clinic flow. Furthermore, we will discuss various requirements such as time, partnerships, staff members, documentation, and medication storage.

Conclusion:PAP coordinators at TFC offer patients accessibility and consistency in obtaining medication for the uninsured West Texas population. For individuals looking to utilize PAPs at a free clinic, it is crucial to have a comprehensive understanding of all factors related to the clinic's demographics and their common presenting conditions. PAP coordinators can become an integral part of any free clinic to increase medication accessibility and potentially improve adherence and quality of life.

School: School of Medicine

PAN, SHANNON

Meta-analysis of Positive Psychology Interventions on the Treatment of Depression

Shannon Pan, BA, Kiran Ali, MBA, Dr. Chanaka Kahathuduwa, M.B.B.S., M.Phil., Ph.D., Dr. Regina Baronia, MD M.Ed, Dr. Yasin Ibrahim, MD

This meta-analysis examined the efficacy of positive psychological interventions (PPIs) in treating depression in eleven articles. PubMed, Web of Science, and Clinical Key were used to identify papers published from 2010-2020 that utilized PPIs. Key terms were "positive psychology" AND "treatment of depression". Studies with adults with (a) depressive symptoms or (b) diagnosed clinical depression were included. A random effects model was used to compare PPIs and control groups on post- vs. pre-intervention differences in depression scores. Data analysis examined BDI-II, CES-D, and QIDS-SR16 scores. Findings show PPIs are effective in treating depressive symptoms, with significant improvements of depression scores when compared to control groups in all but one study. This was true for both post- vs. pre-intervention (pooled Cohen's d = -0.44, [-0.77, -0.11]) and follow-up- vs. pre-intervention analyses (pooled Cohen's d = -0.46, [-1.02, 0.09]). PPIs can improve accessibility and affordability of depression treatments.

School: School of Medicine

PATEL, PARTH

How to Survive

Parth Patel, Bernardo Galvan, Katherine G. Holder, and Dr. Laszlo Nagy

High-velocity projectile penetrating brain injuries have a high mortality rate in the pediatric population. For those that survive the initial trauma, medical and surgical management of their injuries is extremely complex and requires a specialized tailored approach. These patients are often left with life-long disabilities that include neuropsychiatric and motor deficits. The literature points to admission Glasgow Coma Scale, abnormal pupillary response to light, missile trajectory, and patency of basal cisterns as significant determinants of outcome. Ultimately, prompt neurosurgical intervention and luck are what most clinicians describe as the means to survive such injuries. With this study, we present a case series of 3 patients who suffered penetrating brain injuries with varying missile entry points, management, outcomes, and long-term effects. This case series highlights the high degree of variability seen in penetrating injuries to the most vital organ that makes us human.

School: School of Medicine

PATEL, SHREE

Lidocaine and Ketamine Use to Treat Procedural Pain in Burn Patients

Shree Patel, John Wall, Travis Dowdle, Vanessa Ku, Josh Frost, Ebrahim Payberah, John Griswold, MD, FACS

Introduction: Burn patients undergo repeated wound care procedures during their hospital stay. This can intensify the pain of their burn injury, which may develop into chronic pain. The proper management of procedural pain in burn patients improves quality of care and reduces procedure associated anxiety and distress. In this study, we will explore the use of analgesics such as lidocaine and ketamine as an alternative method to treat procedural pain compared to the traditional use of opioids.

Methods: Patients admitted to the UMC burn ward were administered IV ketamine and lidocaine or an opioid treatment prior to wound care treatments. Patient demographics, total burn surface area, verbal and non-verbal pain, and vitals were documented before, during, and after wound care treatments. Any lidocaine and ketamine associated complications were documented in patients post-treatment.

Results: Patients receiving the lidocaine and ketamine drug combination only reported significantly elevated pain scores at five minutes into the wound care procedures compared to patients receiving opioids. There was no significant difference between patients receiving the lidocaine and ketamine combination and patients receiving opioids in displayed levels of non-verbal pain behaviors. In the fifteen minutes prior to the wound care procedure through the first five minutes of the procedure, patients receiving the lidocaine and ketamine combination maintained increased heart rates compared to control morphine patients.

Discussion: Results from the study suggest that the combination drug therapy of lidocaine and ketamine had similar analgesic effects to traditionally used opioid therapeutics in the management of burn patient pain during wound care procedures. This indicates that the lidocaine and ketamine combined therapy may be a useful alternative to traditional opioid therapy use in reducing procedural pain in burn patients, thereby potentially lowering opioid dependency.

School: School of Medicine

PAYBERAH, DANIEL

The Effectiveness of Botulinum Toxin in the Prevention and Treatment of Tension-Type Headaches: A Systematic Review and Meta-Analysis

Daniel Payberah, Joanna Chyu, Chathurika Dhanasekara, Chwan-Li Shen, Chanaka Kahatuduwa

Affiliations: Daniel Payberah, School of Medicine, Texas Tech University Health Sciences Center, Lubbock, TX 79430; Joanna Y. Chyu, School of Medicine, University of Texas Medical Branch at Galveston, Galveston, TX 77555; Chathurika Dhanasekara, Department of Surgery, SOM, TTUHSC, Lubbock, TX 79430; Chanaka Kahathuduwa, Department of Psychiatry, SOM, TTUHSC; Department of Laboratory Sciences and Primary Care, SHP, TTUHSC; Center of Excellence for Integrative Health, TTUHSC; Center for Translational Neuroscience and Therapeutics, TTUHSC, Lubbock, TX 79430; Chwan-Li Shen, Department of Pathology & Center of Excellence for Integrative Health School of Medicine, Texas Tech University Health Sciences Center, Lubbock, TX 79430

Background: Tension-type headache (TTH) is the most common type of headache, with a lifetime prevalence up to 78%. Management of chronic TTH that is resistant to analgesics remains a challenge. Botulinum toxin type A (BTX-A), a paralytic used in treating migraines, remains an uncertain treatment for TTH. This study aimed to investigate the efficacy of BTX-A as a treatment on isolated TTH in a systematic review and meta-analysis.

Methods: PRISMA guidelines were followed. PubMed, Scopus, Web of Science, and ProQuest databases were searched to collect records regarding BTX-A and TTH, without language or date restrictions. Two independent reviewers used predetermined eligibility criteria to systematically screen records to include randomized, controlled clinical trials testing the efficacy of BTX-A on treating TTH. Eligible articles were assessed for risk of bias per the Cochrane handbook. Pre- vs. post-intervention intensity and frequency of TTH and the proportion of responders to treatment were extracted from intervention and control groups. DerSimonian Liard random-effects meta-analyses were performed using the meta package in R (4.0.2).

Results: Eight trials were included, totaling 564 study participants. Overall risks of bias were mixed, with most studies being low risk. Compared to placebo, BTX-A treatments showed improvement in headache intensity (Cohen's d = -0.81 [-1.56, -0.07], n = 262 participants, I^2 = 86%), a decrease in headache frequency (Δ = -2.92 days/month [-4.43, -1.41], n = 205 participants, I^2 = 51%), and a 64% greater probability of observing improvement in TTH (RR = 1.638 [1.075, 2.495], n = 305 events, I^2 = 15%).

Conclusion: While the results on the efficacy of BTX-A on TTH are promising, our results are limited by the high between-study heterogeneity, limited sample sizes, and the limited number of high-quality controlled trials. Future well-designed, adequately-powered, multi-center randomized controlled trials are warranted.

School: School of Medicine

PERRY, CODY

The Influence of Medical School Curriculum on Students' Perceptions Toward Opioids: A Program Evaluation

Cody Perry (MS2), Adam Wynn (MS2), Travis Dowdle (MS2), Chris Bruce (MS2), Keith Bishop (PhD)

From 1999 to 2018, around 450,000 people died from overdoses involving opioids in the United States. In 2018 alone, nearly 47,000 Americans died from this same cause. In the past year, the COVID-19 pandemic has understandably received a significant amount of attention from doctors, researchers, and many other individuals throughout the world. While this pandemic has occurred, however, the opioid epidemic has somewhat silently raged on. Some experts even feel the COVID-19 pandemic has amplified the opioid epidemic. For example, doctors are allowed to prescribe patients more opioids at a time during the pandemic, and suspected overdoses jumped 42% in May 2020 compared to May 2019. Needless to say, opioid abuse continues to be a major problem in the United States. Current medical students constitute some of the future healthcare professionals that will have to help deal with this opioid epidemic. Research has indicated, however, that medical students receive insufficient education on recognizing and treating opioid use disorders. The goal of this program evaluation is to determine how the Integrated Neurosciences (INS) course at Texas Tech University Health Sciences Center influences student-doctors' knowledge and attitudes of opioids and the opioid epidemic. A survey consisting of 26 questions was administered to MS2s before the beginning of the INS block, and again at the end of the INS block. Questions fell under 3 categories: demographic information (5), knowledge-based (6) and attitude-based (15). Statistical analysis will be used to compare pre-block responses to post-block responses to assess for significant changes. Data will be presented to show the influence of the INS course on student-doctor knowledge and attitudes toward opioids. Our findings will be evaluated in conjunction with the INS block directors to identify potential shortcomings in student learning and improve the quality of opioid-related care by these future physicians.

School: School of Medicine

PLATA, GABRIELLE

TEACHING UNIT 1 COA DURING THE COVID-19 PANDEMIC

Gabrielle Plata, Vanessa Davis, Gurvinder Kaur, Keith Bishop, and Brandt Schneider

The COVID pandemic has produced a major shift in medical education from in person to virtual learning. Because a hallmark of Clinically Oriented Anatomy (COA) is in-person cadaveric dissection, it is not conducive to online virtual learning. This project aimed to adapt COA for virtual learning to maintain a safe environment, while conserving the same learning experience and preserving in-person cadaveric dissection. A second part, an emergency online summative practical exam was developed as a contingency plan in case the pandemic prevented students from taking an in-person practical exam. Additionally, in-person Students Teaching Students quizzes and a Teaching Assistant led formative practical were moved online with new questions and images that preserved the question structure and distribution of material tested. A database of cadaver and model images was also created that may be utilized for future online examination. Two surveys assessed student satisfaction of the online resources. One survey to first-year medical students assessed the project's utility as a resource. A second survey to first-year medical students who previously took COA as graduate students, assessed the project's comparability to the in-person experience. The surveys indicated that 94% of respondents took the online formative practical exams and 83% found it to be "very-extremely useful" for summative exam preparation. Our online formative practical exams significantly correlated with the summative practical exam (r value-0.6, p<0.0001). In addition, 90% of survey participants reported that the online TA formative practical exams were "moderately-extremely useful" in reducing exam stress. In conclusion our results indicated that students found the online quizzes and TA formative practical exams to be excellent study tools for exam preparation and exam stress reduction.

School: Graduate School of Biomedical Sciences

POURGHAED, MOHAMMED

Association of Vitamin D insufficiency/deficiency with depression, obesity, and diabetes in an ethnically diverse population in West Rural Texas –A follow-up analysis of Project FRONTIER

Mohammed Pourghaed, Felipe Ramirez Velandia, Ashish Sarangi, John Culberson, M.D., and J. Josh Lawrence, PhD

Vitamin D (VD) deficiency (VDD; ≤20 ng/mL) and insufficiency (VDI; 21-29 ng/mL) are associated with numerous health disparities. Dysfunction in two major pathways lead to VDD/VDI: 1) failure to consume, absorb, and/or transport VD and 2) failure to produce VD via physiological processes. Expanding on a study by Johnson et al. (2010), we tested the hypothesis that a significant association exists between VD level and depression, Hispanic ethnicity, and comorbidities. Using 299 participants from Project FRONTIER, we examined the relationship between VD and depression using the using the Geriatric Depression Scale (GDS) and its four subfactors: apathy, cognitive impairment, dysphoria, and meaninglessness. Statistical comparisons were performed using Prism 8/9. We found that 184/299 (61.5%) had VDD/VDI. VD level correlated with GDS Total score (r = -0.1333, p=0.021); dysphoria (r = -0.19, p=0.001) and meaninglessness subfactors (r = -0.15; p=0.011) contributed too. Demographic analysis using logistic regression revealed that Hispanics (n=114) had lower VD level (p<0.0001) and higher depression (p<0.0001) than non-Hispanics (n=178). A correlation matrix revealed relationships between VD level and three co-morbidities: obesity (p=0.020), diabetes (p=0.002), and nicotine use (p=0.00022), as well as VD (p<0.0001) and multivitamin (p=0.0013) supplementation. Finally, using these variables, a multivariate regression model predicted VD level (R2=0.62). VD levels were associated with depression; GDS dysphoria and meaninglessness subdomains were the highest association. Collectively, our findings identify Hispanics at risk for VDD/VDI, especially those with co-morbidities. Moreover, high sufficient VD levels (95.5 ng/ml) predict optimal reduction of depression symptoms in this aging population. While the causal underlying mechanisms remain to be examined, this study provides strong rationale for screening for VDD/VDI when evaluating depressive symptoms in this aging population.

School: School of Medicine

RAEF, ABIGAIL

Awareness of the Female Athletic Triad in Middle School, High School, and College-Aged Students

Karishma Desai, Bernardo Galvan, Katherine Holder, Kwame Opoku, Abigail Raef, Mimi Zumwalt, M.D.

The Female Athlete Triad is a combination of disordered eating, menstrual irregularity, and low bone mass resulting in lifelong consequences for physically active females. The triad is caused by a caloric imbalance and is associated with significant medical morbidity. Awareness of the triad's symptoms could help young athletes and coaches identify the syndrome. Prompt identification and treatment are essential to prevent adverse health complications in young athletes. Originally, the goal of this study was to assess awareness and knowledge of the female athlete triad among middle school and high school students who attend a small private school in Lubbock, Texas; however, after identifying a need for education about this topic in the initial study group, this study was expanded to include college-aged sorority students at Texas Tech University.

School: School of Medicine

RAFAEL, JOHN

Composite Adrenal Cortical Tumor and Neuroblastoma in an Infant With a Heterozygous TP53 Germline Mutation

John Rafael1, MBA, Chibuzo O'Suoji1,2, MD, MS

1School of Medicine, Texas Tech University Health Sciences Center, Lubbock, TX, USA; 2Department of Pediatric Hematology and Oncology, Texas Tech University Health Sciences Center, Lubbock, TX, USA

Li-Fraumeni syndrome (LFS) is characterized by TP53 mutations and increases susceptibility to tumors, such as sarcoma, breast cancer, brain tumors, and adrenocortical tumor (ACT). Neuroblastoma (NB) is the most common malignancy of the adrenal medulla in infants and is notably associated with the N-myc gene amplification. Composite malignancy in adrenal glands or other organs is extremely rare and usually seen in adults; only a weak association between LFS and NB has been reported. Simultaneous ACT and GNB has only been reported in 6 other cases, all with varying TP53 mutations.

We herein report a 10-month-old Hispanic boy with no significant past medical history who presents with a right sided abdominal mass. The patient and father were in an altered terrain vehicle accident two months prior; the father died protecting the baby. On CT scan assessing trauma, a right sided adrenal mass was found incidentally. The patient was sent to the operating room for right adrenal resection and adrenalectomy, biopsy of the right para-aortic, pelvic, and iliac lymph nodes, and mediport placement, with no complications. The resections were submitted for a pathology workup, noting two separate tumors. The adrenal resection revealed sheets of pleomorphic, hyperchromatic nuclei with a fibrous capsule characteristic of an ACT; the para-aortic and pelvic lymph nodes showed poorly differentiated NB staining positive for chromogranin, synaptophysin, and CD56 on immunohistochemistry. Additional analysis revealed a wild-type TP53 expression pattern, and genetic testing of the neuroblastoma was negative for n-myc amplification. Germline genetic testing was performed, revealing a heterozygous TP53 germline c.818G>A, pArg273His mutation. The patient continues to be monitored for both tumors and, besides a mild anemia, continues to reach developmental milestones.

We report a composite NB and ACT in an infant associated with a TP53 c.818G>A, pArg273His mutation, the first of its kind.

School: School of Medicine

RAICEVIC, STEFAN

Creating a Cardiogenic Shock Database for West Texas and Eastern New Mexico: Plan for Retrospective Study and Analyze Lone Star Registry

Stefan Raicevic, Christopher Le, En Dien (Sam) Lao

Cardiogenic shock (CS) is a high acuity and hemodynamically diverse state of end organ hypoperfusion that is associated with multisystem organ failure. CS is pragmatically defined as a state in which ineffective cardiac output is caused by a primary cardiac disorder such as impairment in myocardium, valvulopathy, conduction disease, or pericardial disease. It is a clinical diagnosis characterized by persistent hypotension unresponsive to volume replacement accompanied by end organ hypoperfusion requiring intervention with pharmacological and/or mechanical support. Despite improving survival in recent years, patient morbidity and mortality remains high.

We aim to describe the clinical and procedural characteristics and outcomes of patients with cardiogenic shock who underwent mechanical hemodynamic support at the TTUHSC-University Medical Center from January 2015 to present. We will also compare certain clinical patient and procedural characteristics between patients with cardiogenic shock who underwent treatment with medical management without mechanical support.

Our methods involve retrospective chart review of all patients with cardiogenic shock treated with and without mechanical support. Mechanical support options analyzed include: intra-aortic balloon pumps, Impella 2.5, CP, RP and 5.0, and extracorporeal membrane Oxygenation (ECMO). We have built a database with clinical and procedural characteristics and plan to apply descriptive statistical analysis as well as ANOYA and logistic regression to compare between groups. The study will add to the body of knowledge regarding the utilization rate, feasibility, efficacy, and safety of temporary mechanical support in patients presenting with cardiogenic shock. This will be the first database study of its kind in West Texas and Eastern New Mexico. This will allow us to better understand the dynamics of cardiogenic shock in our community, so we can apply better treatment protocols.

School: School of Medicine

RAMESH, MALVIKA

Rlip loss poses a therapeutic target for treatment of Atopic Dermatitis

M. Ramesh, J. A. Tarbox, S. Singh, S. Awasthi; Texas Tech University Health Sciences Center, Lubbock, Texas

Rationale: Rlip knockdown protects p53 deficient mice from carcinogenesis and reduces inflammation. In Rlip null mice, increased oxidative stress alone was not enough to increase inflammation. Thus, Rlip is necessary to translate oxidative stress into inflammation. Rlip knockdown disrupts inflammatory signaling in atopic dermatitis through altering Th1/Th2 immune genes. Here we review potentially significant genes by analysis of RNA sequence pathways in a previously unknown role, atopic dermatitis, in relation to partial Rlip loss.

Methods: RNA sequencing (RNA-Seq) was conducted in wild-type and Rlip loss mice liver. RNA sequencing runs were performed in a Illumina HiSeq 2500 platform with HiSeq SBS V4 kits, and reads were aligned using Tophat v2.0 to mouse reference genome mm9.

RNA-Seq and genome analysis lead to the identification of various canonical pathways upregulated/downregulated by Rlip loss. Z scores, expressing the magnitude of regulation in a positive/negative manner, were attributed to each gene. Analysis of existing literature was conducted to identify new roles for these Rlip loss affected genes.

Results: Analysis of RNA-Seq shows the top differentially expressed upregulated genes involved in immunology canonical pathways are IL-13RA2, ACVR1C and ALDH3A1 with Z scores of 2.127, 2.107 and 1.947 respectively.

Conclusions: RNA-Seq analysis shows genes involved in immunologic pathways and inflammation are among the top affected by pharmacologic knockdown of Rlip. Upregulation of canonical pathways including IL-13RA2, ALDH3A1 and ACVR1C through Rlip inhibition could serve a therapeutic target for the treatment of atopic dermatitis through reduction of inflammation. Further studies are necessary to fully understand the mechanism behind this process.

School: School of Medicine

RAO, NIKITA

A literature review of repetitive transcranial magnetic stimulation for the treatment of depression during pregnancy

Nikita Rao, Michelle Terry, Manish Kumar, MD, Regina Baronia, MD

Background: Patients with prepartum depression are at increased risk for experiencing negative obstetric and neonatal outcomes. Repetitive transcranial magnetic stimulation (rTMS) is a safe and effective non-invasive treatment for major depressive disorder. However, data supporting safety and efficacy of use during pregnancy is limited. The purpose of this literature review was to synthesize current findings on rTMS as a mode of treatment for major depression during pregnancy.

Methods: PubMed, SCOPUS, and Web of Science databases were searched for the following keywords: transcranial magnetic stimulation, major depressive disorder, pregnancy. 32 peer-reviewed papers were screened for meeting inclusion/exclusion criteria; 13 were selected for analysis.

Results/Conclusions: rTMS appears to be a relatively safe and effective option for treating and maintaining remission of depressive symptoms during pregnancy. Current findings are limited, but show minimal adverse birth outcomes and treatment-associated side effects. More large-scale clinical studies are needed to further elucidate the benefits and drawbacks of rTMS as a treatment option for major depression during pregnancy.

School: School of Medicine

RAO, SANJANA

Analysis of Glucose Levels in Patients Hospitalized With COVID-19 During the First Phase of this Pandemic in West Texas

Sanjana Rao, Kiran Ali, Jeff Dennis, Gilbert Berdine, Victor Test, Kenneth Nugent

Background: Patients with hyperglycemia during hospitalization, especially during ICU hospitalizations, often have worse outcomes, even if they do not have a premorbid diagnosis of diabetes. High glucose levels can provide insight into the underlying pathogenesis of a disease and can contribute to tissue injury. Some patients with COVID-19 have hyperglycemia during hospitalizations.

Methods: The Infectious Disease and Control office at University Medical Center in Lubbock, Texas, provided a list of patients with a COVID-19 infection hospitalized between March 1 and May 15, 2020. The medical records were reviewed to collect information on age, gender, history of diabetes, and glucose levels on admission and through the first 7 days of hospitalization.

Results: This study included 63 patients with a mean age of 62.1 ± 14.1 years. Thirty-five patients (55.6%) were males. The in-hospital mortality rate was 30.2%. The mean admission glucose level was 129.4 ± 57.1 mg/dL in patients who survived (N = 47) and 189.6 ± 112.2 mg/dL in patients who died during hospitalization (N = 16, P = .007). An admission glucose greater than 180 mg/dL predicted mortality in a model adjusted for a diabetes, age, and male gender. The mean differences between the maximum and minimum glucose levels calculated over the first 7 days of hospitalization were 112.93 ± 115.4 (N = 47) in patients who survived and were 240.5 ± 97.7 (N = 15) in patients who died during hospitalization (P = .0003). A difference between the maximum and minimum glucose level greater than 105 mg/dL was associated with increased mortality.

Conclusions: Patients who died during hospitalization for COVID-19 had higher admission glucose levels than patients who survived. Larger differences between maximum and minimum glucose levels during the first 7 days of hospitalization were associated with increased mortality. These results suggest that high glucose levels identify patients at increased risk for mortality and warrant more study.

School: School of Medicine

RAY, NANDINI

Structural and Physiological Changes of the Aging Kidney and its Impact on Chronic Conditions

Nandini Ray, MBA; P. Hemachandra Reddy, PhD

Globally, individuals aged 65 and older are part of the fastest expanding population demographic, and as a result, a greater number of older patients are receiving diagnoses of impaired renal function. The purpose of this study is to summarize recent findings of the structural and functional differences between the normal and aging kidney, exhibit evolutionary changes in kidney structure and function, and demonstrate the role of aging in conditions such as diabetes, chronic kidney disease, and hypertension. Recent studies have shown that age-related loss of kidney function is associated with a host of hemodynamic, structural, and physiologic changes. Some of these changes include hemodynamic changes such as decreases in renal blood flow, glomerular filtration rate, and afferent arteriolar resistance; structural changes such as decreased renal mass, hyalinosis of arterial walls, increased sclerotic glomeruli, and tubulointerstitial fibrosis; and physiologic changes such enhanced responses to vasoconstriction and impaired responses to vasodilation. Many of these age-related changes affect the ability of the kidney to withstand and recover from injury and may predispose individuals in these populations to more progressive renal diseases. The purpose of our study is to discuss known structural and functional changes associated with the aging kidney and their role in chronic conditions along with their impact on SARS-CoV-2. We also discuss the potential therapeutic strategies to treat aged individuals with kidney health issues. We also discuss how healthy lifestyle, diet, and exercise can improve health conditions with aged kidneys.

School: School of Medicine

RAY, SPARSH

Immune Hypersensitivity in Association with COVID-19 Infection

Sparsh Ray, Tiffany Xu

People infected with COVID-19 may be asymptomatic or manifest a wide range of multiorgan dysfunction. The most common presenting symptoms are fever, fatigue, and dry cough. Neurological manifestations include impairment of the central nervous system, peripheral nervous system and/or skeletal muscle. Notably, Guillain-Barre (GBS) syndrome has been reported. GBS is due to immune-mediated demyelination of peripheral nerves. It can be associated with acute bacterial or viral infections. Presentation involves ascending motor paralysis of varying severity. Recently, rheumatoid factor (RF) was identified in a COVID-19 patient. Both bacterial and viral infections are reported to generate RF.

In this report, we note GBS and autoantibody generation developing in a patient infected with COVID-19. It is well recognized that COVID-19 is capable of generating profound immune stimulation including the cytokine release syndrome. GBS in association with COVID-19 has been reported. These previous reports noted a para-infectious presentation. Similarly, our patient developed GBS 2 weeks after the diagnosis of COVID-19 and while symptomatic from COVID-19. Additionally, our patient had transient elevation in circulating autoantibodies. These disparate immune reactions (GBS and autoantibody formation) supports hypersensitivity or aberrant immune activity following COVID-19 in our patient and support others observations in this regard. Whether these manifestations are a result of molecular mimicry or represent other potential mechanisms underlying immune hypersensitivity remain to be determined.

School: School of Medicine

REDDY, SOUMYA

Evaluation of Gender Preference for Surgeon Among Patients Seeking Aesthetic Facial Plastic Surgery

Soumya A. Reddy, B.S.A., Nicole Van Spronsen, B.S., Tanir Moreno, B.S., M.S., Hussain R. Abidi, B.S., M.B.A., Travis J. Cole, M.A., M.S., Deepak Bharadia, M.D., M.P.H. ; Joshua Demke, M.D.

Understanding patient preferences is vital in order for plastic surgeons to effectively market their expertise to their target patient population. Many studies have been conducted evaluating patient preferences for physicians within other specialties, but few studies have examined patient preferences for gender of their plastic surgeon in the realm of facial plastics procedures. This study aims to elucidate pre-existing gender preferences amongst the general public when selecting a plastic surgeon for aesthetic facial procedures. We conducted a prospective, survey-based study that evaluated demographics, prior experience with plastics procedures, interest in these procedures, and personal preference for surgeon gender for each individual procedure (blepharoplasty, facelift, nose reshaping, injectable fillers, and Botox^TM). Participants were also asked to present their reasoning for a gender preference (if present) via free response text. The survey was sent to participants via social media and institutional emails. Inclusion criteria consisted of ages 18 and older. A total of 224 survey responses were received. Of the 224 responses, 78% of survey participants were self-identified females while 21.5% were self-identified males. The majority of participants (73.9%) stated no preference for the gender of their surgeon. When preference was expressed, the gender preference amongst female participants was most significant when asked about injectable fillers and Botox^TM, for which a female surgeon was preferred. Of the 40 male participants, there was no significant preference for a male surgeon. Limitations of this study include small sample size due to the emergence of the COVID-10 pandemic, which prohibited the ability to survey the general public in places such as malls. Understanding these preferences and their underlying reasoning can help facial plastic surgeons market towards patients' needs in the future.

School: School of Medicine

REICH, RILEY

Focusing Medical Student Learning by Adding Lecture-Based Questions and a High-Yield Fact Sheet in Respiratory Physiology

Riley Reich, Jannette M. Dufour

Human physiology is a complex but important part of medical education. When studying the cascade of effects in human physiology, students can easily become lost amongst the extraneous details making it difficult for medical students to determine where to concentrate their learning. This is especially true for respiratory physiology. The aim of this medical education project was to determine whether high-yield fact sheets and lecture-based questions can help focus medical students learning in respiratory physiology. A needs assessment was sent to the previous students who took respiratory physiology at the Texas Tech Health Science Center, School of Medicine, specifically the graduating class of 2023. Resources were then created covering lecture material within the respiratory section of human physiology. To emphasize information important for medical students, the high-yield fact sheet outlined information pertaining to learning objectives stated by the faculty. Questions were created to test the understanding of the information from lectures and the high-yield fact sheet. The results of the needs assessment showed 92.5% of respondents were in favor of the addition of a high-yield fact sheet, 75% strongly agreeing the addition would be helpful. Out of the respondents for the lecture-based questions, 87.5% were in favor of the addition. Students currently taking the respiratory section of human physiology will be provided the created resources and another survey will be sent to them after completing this section to determine the importance and effectiveness of these resources for medical student learning. Based on the previous class's response to the needs assessment, that medical students feel the addition of a respiratory physiology high-yield fact sheet and lecture-based questions will be helpful. Once a post-survey is sent out to medical students after using the materials provided, we can determine whether the material helped students focus their studying.

School: Graduate School of Biomedical Sciences

RICE, ERIN

Geographic Heterogeneity in the Association of Varicella-Zoster Virus Seropositivity and Multiple Sclerosis: A Systematic Review and Meta-analysis

Erin M. Rice, M.Sc., Smathorn Thakolwiboon, M.D., Mirla Avila, M.D.

Background: Although there has long been a suspected association between varicella-zoster virus (VZV) and multiple sclerosis (MS), the connection has remained unclear. In this study, we performed a meta-analysis in an attempt to assess the association between VZV IgG serostatus and MS.

Methods: A literature search was performed using three databases: MEDLINE, EMBASE, and Cochrane. Eligible results included observational studies investigating the seroprevalence of VZV immunoglobulin G (IgG) in adults with MS versus non-MS controls. Two authors performed a screen of the search results, evaluating them for quality and relevant outcomes. Using a random-effect model, we estimated pooled odds ratios (ORs) and 95% confidence intervals (CIs).

Results: The literature search yielded 1,268 articles, 8 of which (2,266 MS patients and 1,818 controls) were eligible for inclusion in the meta-analysis. Evaluation of all included studies together showed no significant association between VZV IgG seropositivity and MS (OR 1.439; 95%CI, 0.503-4.118; p 0.497). However, when analyzed in subgroups based on geographical area, studies performed in Asian countries showed VZV IgG seropositivity was more common in MS patients than in controls (OR 4.470; 95%CI 1.959-10.203; p < 0.001). No significant association was found in European countries.

Conclusions: This study found evidence of an association between VZV IgG seropositivity and MS in Asian countries. Additional studies are warranted to ascertain factors impacting this association.

School: School of Medicine

RODGERS, AUSTIN

Medical Education Through Differential Diagnosis: An Algorithmic Approach to Instructing Medical Students

Rodgers, Austin D.; Dufour, Jannette M. Ph.D.; Pelley, John Ph.D.

The National Board of Medical Examiners (NBME) is the presiding body over assessing medical education competency in the United States. Along with subject specific exams, the NBME is also responsible for administering USMLE Step 1, the first medical licensing exam. These exams primarily employ vignette-style questions where students are presented with relevant patient information to create a differential diagnosis and then answer the question, a skill that many medical students struggle to develop. The goal of this project was to investigate the efficacy of differential diagnosis algorithms in preparing pre-clinical medical students for licensing exams.

A series of six (6) differential diagnosis sets for some of the most common clinical symptoms were created. Each set was composed of algorithms, notes, and quizzes that were administered before and after the set was given to students. The students took a four (4) question pre-quiz, and then watched a video describing how to use the algorithms by analyzing those questions. The students were then given time to study the algorithm and notes before taking a four (4) question post-quiz over similar, but different, pathologies.

Among first year medical students, performance significantly increased from an average of 28.3% (n=15) on the pre-quiz to 96.2% (n=13) on the post-quiz (P<0.0001). Among second year medical students, performance also significantly increased from an average of 53% (n=10) on the pre-quiz to 83% (n=9) on the post-quiz (P=0.0212).

Creation and administration of differential diagnosis algorithms to pre-clinical medical students is an effective way to educate these students about a range of similar pathologies. These sets could serve as a useful tool in preparing students for licensing exams, both through acquisition of clinical knowledge and via development of clinical reasoning skills.

School: Graduate School of Biomedical Sciences

RODRIGUEZ, JAREMY

Evaluating Student Satisfaction and Performance on the use of a Three-Dimensional Anatomy Atlas Under Pandemic Restrictions

Jaremy Rodriguez, Keith Bishop (Ph.D., PT)

Our current pandemic has placed many restrictions and limitations in student education, which included anatomy lab and dissection time at TTUHSC for first year medical students. Historically, students had the opportunity to dissect at a minimum of three times per week and had unlimited access to the student anatomy lab. This past year, students dissected only once per week and had limited lab access due to updated rules and regulations. Therefore, the aim of this project is to create virtual anatomy modules using a 3D anatomy atlas known as Complete Anatomy and determine the associated effects on student learning and performance in a time where this visual aid may have been needed the most. To achieve this goal, virtual anatomy modules were made within the application that covered material on the back, shoulders, axilla, arms, thorax, and the heart (unit 1). These labeled modules illustrated the different structures associated with each lab and they allowed the students to manipulate them in a three-dimensional space. To evaluate student satisfaction and effectiveness of these modules, a survey was released after the unit 1 lab practical exam and student grades were evaluated when comparing users and non-users of this application. According to the survey (n=120), about 87% of students rated these modules as “very useful” or higher with about 80% of them using these modules for each unit 1 lab. Further, there was no significant increase in student performance (p=0.7) when compared to non-users. In an additional survey (n=93), about 80% of them “agreed” or “strongly agreed” that these modules helped their learning and engagement during pandemic restrictions. Although there was no significant increase in performance, student satisfaction and enjoyment were high. Collectively, our data shows that virtual anatomical modules can help students stay engaged in their learning in times where lab access may be restricted, such as during our current pandemic.

School: Graduate School of Biomedical Sciences

ROSSETTIE, STEPHEN

Post-Operative Immobilization in Total Elbow Arthroplasty for Rheumatoid Arthritis: A Systematic Review of Outcomes

Stephen Rossettie MBA, Michael Polmear MD, John Scanaliato MD, Leon Nesti MD, PhD, John Dunn MD

Purpose: The purpose of this analysis is to determine the effect of length of immobilization following total elbow arthroplasty (TEA) for rheumatoid arthritis on the outcomes, complications, and survival of the implant.

Methods: A review of TEA literature was performed. Post-operative motion was categorized into three groups: no post-operative immobilization (group 1), short-term 2-5 days immobilization (group 2), and extended 7-14 days immobilization (group 3).

Results: Thirty-six articles reporting on 43 studies involving 2346 elbows in 2015 patients were included. Total complication rates were 23% at 8.9 years for group 1, 31% at 6.8 years for group 2, and 31% at 6.9 years for group 3. Survival rates were 79% at 15.3 years, 75% at 10.4 years, and 92% at 9.1 years for each group, respectively.

Conclusions: Total complication rates were lowest in elbows without postoperative immobilization. However, survival rates were greatest in elbows with extended postoperative immobilization.

Level of Evidence: IV, therapeutic

Key words: total elbow arthroplasty, rheumatoid arthritis, post-operative immobilization, complications, survival

School: School of Medicine

SABU-KURIAN, ANNA

The Drop-in Influenza Rates in the United States during the COVID-19 Pandemic

Anna Sabu Kurian, BS (1); Kripa Shrestha, MBBS, MPH, MS (2); Sharmila Dissanaike, MD, FACS, FCCM (2)

(1) School of Medicine, Texas Tech University Health Sciences Center, Lubbock TX, (2) Department of Surgery, Texas Tech University Health Sciences Center, Lubbock TX

Introduction: The COVID-19 pandemic in the United States has resulted in more than 346,000 deaths and 20 million infections in the year 2020. Standard public health recommendations during the pandemic include wearing of masks or face-coverings, rigorous hand hygiene, avoiding crowds especially indoors, and maintaining at least 6ft of physical distance. We hypothesized that the influenza rate would be lower in 2020-2021 compared to 2019-2020, as a side effect of prevention measures adopted during the COVID-19 pandemic.

Methods: The Influenza surveillance report database by the Centers for Disease Control (CDC) and Prevention was queried for reported influenza tests and results in clinical laboratories. Influenza data from 2019-2020 season (September 29, 2019- January 4, 2020) was compared with the 2020-2021 season (September 27, 2020- January 2, 2021) based on positive cases of Influenza subtype, and total number of tests performed in the United States.

Results: The weakly mean of the influenza test positivity rate in the 2020-2021 influenza season (0.0024 [95% CI, 0.0021-0.0028]) was lower when compared to 2019-2020 influenza season (0.10 [95 % CI, 0.05-0.15]). The weekly test positivity rate ratio was < 1 on all weeks of comparison, indicating a decreased risk of influenza in the 2020-2021 season compared to 2019-2020.

Conclusion: The authors believe the most likely explanation for this decline were measures taken across the nation to reduce the spread of COVID-19. There would be a public health benefit in recommending similar precautions during future influenza seasons, even after the pandemic has subsided.

School: School of Medicine

SANKOORIKKAL, NIKI

Assessing High-Risk Pregnant Women's Perception of their Personal Health Before and During Pregnancy

Niki Sankoorikkal, Joanna Steed, Frances Kellerman Hanson, Duke Appiah, PhD, MPH, Cornelia de Riese, M.D., Natalia Schlabritz-Lutsevich, M.D., PhD

A growing number of maternal deaths are related to pre-existing and often preventable disease. Population-based studies have documented increased risk for maternal morbidity and mortality among women with pre-existing conditions, including hypertension, heart disease, renal disease and diabetes. With the high occurrence of maternal morbidity and mortality occurring within the subset of pregnant women with pre-existing conditions, more needs to be done to educate this population on the risks associated with becoming pregnant while managing serious chronic health conditions. In order to better educate these women, we must learn more about their perceptions and opinions regarding their co-morbidities and the perceived impact that these conditions have on the success of their current or future pregnancies.

This study aims to assess the perception that high-risk pregnant women have regarding the severity of their pre-existing co-morbidities. In particular, we are interested in understanding how the pre-existing health conditions of high-risk pregnant women influence their decision to become pregnant. This study involves surveying high-risk pregnant women about their level of awareness of their pre-existing conditions, and the degree that their previous conditions impacted their decision to become pregnant. We also aim to understand if these high-risk pregnant women feel that their health-care providers could have better prepared them for the complications of pregnancy given their prior health conditions. We hope to better prepare women of reproductive age with pre-existing conditions for the challenges that arise with pregnancy in order to improve their informed decision making around pregnancy and their health.

School: School of Medicine

SRANGI, SUKANYA

Use of 3D printing in dentistry

Sukanya Sarangi BDS

3D Printing or Additive Manufacturing or Bioprinting is a technology that can produce complex shapes according to computer design using patient's anatomical data. The use of computer aid design (CAD) and computer aided manufacturing (CAM) technology has increased in recent years, as the demand for high-precision functional restorations has become a major trend in all aspects of dentistry. 3D Printing is a type of additive manufacturing in which materials are joined to make objects from 3D model data, usually layer upon layer. Once the CAD design is finalized, it is segmented into multislice images. For each millimeter of material, there are 5–20 layers, which the machine lays down as successive layers of liquid or powder material that are fused to create the final shape. Properties that distinguish 3-D printing from subtractive manufacturing are 1. Incremental vertical object build-up 2. No material wastage 3. Large objects produced 4. Passive production (i.e., no force application) 5. Fine details production. This poster describes the process of 3D Printing , the application of 3D Printing in different branches of Prosthodontics like Fabrication of Complete Denture , Maxillofacial Prosthesis , Implant surgery and Prosthodontics , Digital wax pattern build up for indirect restorations. Bioprinting reduces the need for artificial materials and uses more of living tissues and thus are better tolerated by body. This technology is still evolving and it contributes to brighten the future and widening the horizons of prosthodontics.

School: School of Health Professions

SARGENT, EMILY

Curriculum mapping to facilitate curricular renewal: Blood and Lymphatic System

Emily Sargent, Abigail Jackson, Elizabeth Brown, Michaela Jansen, PharmD-PhD

The medical school curriculum at TTUHSC School of Medicine consists of four years. At present, the first two years constitute the basic sciences or pre-clerkship curriculum whereas the last two years constitute the core clerkships and additional clinical training. Here we mapped the curriculum content for the pre-clerkship curriculum. At present, the SOM is embarking on a journey to renew the curriculum. The current curriculum begins with two general foundational courses (Clinically Oriented Anatomy and Biochemistry, Cells and Tissues) and then enters a curriculum that is a combination of discipline and organ-system-based curriculum. Students are first introduced to the normal physiological function of the major organ systems during year one and then revisit these systems for coverage of the pathophysiology and treatment of disease during year two. The SOM curriculum revision will continue to start with Anatomy and General Principles and then proceed in a strictly organ-system based manner combining physiology and pathophysiology for each organ system and at the same time integrating relevant concepts of biochemistry, cell biology, and histology.

We used the United States Medical Licensing Examination (USMLE) Step 1 content outline and mapped the content lists against the detailed contents of the blocks. The curriculum mapping facilitated the identification of gaps and redundancies, as well as the relative quantification of instructional methods used. For the blood and lymphatic system the topics of viral and bacterial lymphadenitis, congenital methemoglobinemia, cryoglobulinemia, and propylthiouracil were underrepresented. Our detailed curriculum inventory provides an essential framework to optimize and refine content representation and distribution during the current curricular renewal phase.

School: School of Medicine

SARRAMI, SHAYAN

Purpura fulminans can result in significant full-thickness wounds, posing a challenge in the pediatric population, given the paucity of donor sites for reconstruction. We present the case of an 11-month-old patient for whom TheraSkin®, a split-thickness skin allograft, was successfully implemented as a temporizing measure for a large leg wound.

Shayan Sarrami, BS, Andrew M. Ferry, BS, Edward P. Buchanan, MD, FACS, FAAP; Frank T. Gerow, MD, FAAP, John C. Koshy, MD

Purpura fulminans is characterized by the development of thromboses throughout the body and results in full-thickness skin necrosis. In cases with large areas of involvement, treatment can include debridement producing large defects necessitating reconstruction. Sizable areas of reconstruction in very young patients poses a challenge to the surgery team given the paucity of donor sites. We present a case of an 11-month old patient with a full thickness circumferential lesion of the right lower leg due to extensive debridement following purpura fulminans. TheraSkin®, a split-thickness skin allograft composed of living cells harvested postmortem and cryopreserved until use, was implemented as both a temporizing measure to promote appropriate wound contracture, and as a wound regeneration matrix. Three applications were used in total, and the resulting area requiring skin graft decreased from 192 cm2 to 60 cm2. Theraskin® application in pediatric patients can be used as a potential adjuvant to reconstruction in large full-thickness wounds when sizable resurfacing demands are encountered.

School: School of Medicine

SATHEESHKUMAR, ANUDEEKSHA (ANU)

Hydralazine use for the management of urgent and emergent hypertension in a medical intensive care unit

Anudeeksha Satheeshkumar BSA, Hunter Atkins MD, Sakolwan Suchartlikitwong MD, Kenneth Nugent MD, Ebtesam Islam MD/PhD

Hypertensive crises, including emergent or urgent hypertension, are a rare but life-threatening complication of uncontrolled hypertension. Hydralazine is one of several antihypertensive medications available for the treatment of hypertensive crises. Major U.S. guidelines on hypertension recommend conservative use of hydralazine – only for situations of preeclampsia or eclampsia with pregnancy – due to significant adverse effects and unpredictability in dose-response. A retrospective chart review was conducted on patients admitted to the medical ICU at University Medical Center in Lubbock, Texas, with urgent or emergent hypertension between January 1, 2017, and June 30, 2017. Demographic information - age and gender - and records of which antihypertensive medication(s) and route used were collected. Systolic blood pressure before and 2 hours after hydralazine administration - and whether it was given after an initial dose of another antihypertensive medication - was recorded. Patient comorbidities and contraindications for use were noted. Thirty-five patients were included in this study (1 patient result was excluded from certain calculations due to missing data). The mean age of patients was 53.4 +-12.5 years. Range was 22-74 years. Eight patients had initial treatment with hydralazine, and 29 out of 35 patients were given hydralazine when considering combination treatment. IV hydralazine was preferred over PO hydralazine (23 patients vs. 6 patients). Sixteen patients had comorbidities/contraindications for hydralazine use, but 12 patients received IV hydralazine and one patient received PO hydralazine. Hydralazine was not used in a guideline-directed manner in the medical ICU at our hospital. Physicians should regularly evaluate patients for the presence or absence of end-organ damage concurrent with a blood pressure >180/120 mmHg before considering which antihypertensive medication to use. Hydralazine should be reserved for special situations involving pregnancy.

School: School of Medicine

SCHOEBERL, MADISON

Vitamin D levels in pediatric patients undergoing chemotherapy

Madison Schoeberl^1, Megan Mikkelson^1, Eduardo Urias^2, Chris Scott^3, Jaehoon Lee^4, Chwan-Li Shen^5,^6, Mohamad M. Al-Rahawan^6,^7

^1 Department of Medical Education, TTUHSC School of Medicine, Lubbock, TX; ^2 Department of Graduate Medical Education, Las Palmas Del Sol Healthcare, El Paso, TX; ^3 Clinical Research Institute, TTUHSC, School of Medicine, Lubbock, TX; ^4 Department of Educational Psychology and Leadership, TTU College of Education, Lubbock, TX; ^5 Department of Pathology, TTUHSC School of Medicine, Lubbock, TX; ^6 Center of Excellence for Integrative Health, TTUHSC, School of Medicine, Lubbock, TX; ^7 Department of Pediatrics TTUHSC School of Medicine, Lubbock, TX

Vitamin D is essential for bone and immune health. Children with cancer are at risk of vitamin D deficiency. This study investigates if children with cancer are vitamin D deficient compared to matched controls and whether vitamin D levels worsen throughout the course of their cancer treatment. This prospective cohort study enrolled 17 children with cancer, who at enrollment were expected to receive chemotherapy for 6 months, along with 16 age-and-ethnicity-matched controls without a diagnosis of cancer. The serum levels of 25-hydroxycholecalciferol vitamin D (25D) were assessed at baseline (T1, both cancer and control groups) and 3-4 months and 6-8 months later (T2 and T3, cancer group only). Bivariate tests and general linear modeling were utilized to compare 25D at baseline between the two groups. Multilevel modeling was conducted to examine the fluctuation of 25D over time in children with cancer accounting for their age, ethnicity, cancer type, and season of measurement. The participants were 9.2 ± 4.8 years old, with BMI of 20.1 ± 6.3 kg/m^2. The majority were male (61%) and Hispanic (61%). The cancer and control groups did not differ in age, race, ethnicity, or BMI (all p>0.05). Blood samples from 44 cancer and 17 control subjects were collected. The levels of 25D did not differ between the cancer and control groups at T1, with or without controlling for covariables (both p>0.05), neither did it significantly vary over time among the cancer patients (p=0.60) —M ± SE = 28 ± 4 ng/ml at T1, 22 ± 4 ng/ml at T2, and 27 ± 4 ng/ml at T3 controlling for covariables. The current analysis of our ongoing study failed to find a correlation between cancer and its treatment and serum levels of 25D. Analysis of the complete data set may draw different results than this incomplete set. This study will proceed to assess the relationship between 25D and incidence of fever as a surrogate marker for infectious disease.

School: School of Medicine

SCHRADER, KAYLEE

Baseline Copper Levels Negatively Predict Outcomes of Burn Patients with Overweight and Obesity

Samudani Dhanasekara, MBBS, PhD; Kaylee Schrader, BS; Sheila Chandrahas, BS; Genesy Aickareth; Sharmila Dissanaike, MD; John Griswold, MD

Introduction: Overweight (OW) and obesity (OB) are increasing in the U.S. While burn patients with OW/OB may have high levels of oxidative stress compared to normal weight (NW) patients, the evidence on the effects of OW/OB on burn outcomes is equivocal. Copper (Cu) is essential for healing of burn wounds. Yet, high circulating Cu is an indicator of oxidative stress. Thus, baseline Cu is a potential biomarker that could identify OW/OB patients who are under high levels of oxidative stress and may have poor outcomes following burn injuries. We examined the interactive effects of Cu and OW/OB on outcomes of burn patients and hypothesized that higher Cu levels in individuals with OW/OB is associated with detrimental outcomes.

Methods: A retrospective review was performed on patients with burns ≥20% total body surface area admitted to the Burn Intensive Care Unit during 2015-2019. Patients were grouped according to BMI (i.e., NW, OW and OB). The interactions between baseline Cu and BMI groups on 1) lengths of ICU stay (ICUS), 2) overall hospital stay (LOS), and 3) number of operative procedures (ORPs) were examined in a series of multiple regression models using R.

Results: Of 160 patients that met eligibility, no significant differences were noted between BMI groups in demographics or mortality. Regression models revealed that NW patients with high baseline Cu levels had shorter ICUS (p<0.001), LOS (p=0.003), and lower ORPs (p = 0.001). While OW/OB were protective at low Cu levels, patients with OW/OB who had high baseline Cu levels had longer ICUS (p<0.001 and p=0.033), LOS (p=0.001 and p=0.063), and higher number of ORPs (p<0.001 and p=0.066).

Conclusions: High baseline Cu seems to be protective for burn patients with NW. However, high baseline Cu seems to be adversely associated with outcomes of burn patients with OW/OB, which indicates high oxidative stress. While further evidence is needed, caution is advised when supplementing Cu for burn patients with OW/OB.

School: School of Medicine

SCHUCK, ALEXIS

Potential Therapeutic Benefits of Capsaicin, EGCG and Green Tea Extract, Curcumin, and Ginger on Fibromyalgia: A Review of the Literature

Alexis Schuck^1, Christina Tompkins^2, Volker Neugebauer^3, Chwan-Li Shen^3

Fibromyalgia (FM) is a chronic syndrome afflicting 1% to 5% of the population and disproportionately affects females compared to males. It is a generalized pain disorder occurring at any age, usually consisting of functional somatic symptoms like fatigue, mood disorders, sleep disturbance, and pain and tenderness. In fact, FM diagnosis is principally based on widespread musculoskeletal pain present for at least three months and tenderness in at least 11 of 18 tender points. The etiopathogenesis of FM remains unclear, with genetic factors, environmental triggers, and neuromodulation all possibly contributing to the onset and course of this syndrome.

The current goals of treatment are to minimize pain symptoms and improve daily function using a multi-disciplinary approach, but the efficacy of these options is often unsatisfactory. Bioactive components may be used as adjunctive therapy in combination with current drugs, or perhaps even replace them. This review delineates the effects of commonly found bioactive compounds, including curcumin, capsaicin, ginger, and epigallocatechin gallate (EGCG) and green tea extract, on FM with an emphasis on potential mechanisms at the molecular and systemic levels.

The literature suggests these compounds exert their effects in post-synaptic neurons and the dorsal root ganglion to ultimately mitigate pain sensations. Specifically, curcumin, ginger, and EGCG inhibit the release of pro-inflammatory cytokines (TNF-α, IL-1β, and IL-6) by down-regulating the NF-κB signaling pathway. Capsaicin desensitizes the TRPV1 channel receptor in the dorsal root ganglion to decrease pain perception in human subjects. Although encouraging results were noted in this review, further cellular, animal, and human experiments are needed to fully understand the mechanism of action for each compound and eventually improve the treatment regimen for fibromyalgia.

School: School of Medicine

SELLERS, JAKE

Robotic-assisted laparoscopic pyelolithotomy with intracorporeal pyeloscopy in a horseshoe kidney

Jake Sellers, Asher George, Jaime Camacho, Allen Medway

Horseshoe kidneys are one of the most common congenital genitourinary malformations and can increase the complexity of common urologic procedures. In this poster, we aim to present a patient who underwent robotic assisted laparoscopic pyelolithotomy (RALP) with intracorporeal pyeloscopy and stone basketing to treat a stone burden located in the left lower pole of a horseshoe kidney. Benefits of RALP include expanded maneuverability, dexterity, and stability, which can prove helpful in such cases as complex kidney stone removal due to aberrant anatomy such as in our patient. Additionally, the minimally invasive nature of the surgery indicates a decreased chance for postoperative complications. Our procedure resulted in the successful treatment of this patient without any significant complications, and the thorough pyeloscopy confirmed no residual stones. As a result of the positive outcomes with this surgery, we believe that robotic assisted laparoscopic pyelolithotomy with intracorporeal pyeloscopy should be considered as a treatment option in similar cases of complicated kidney stone removal.

School: School of Medicine

SHAYEB, MIRIAM

The Application of Renaissance Humanism Concepts to the Development of Resilience in Medical Students

Miriam Shayeb, Cheryl Erwin, JD, PhD

Introduction: Several works of art, literature, and philosophy from the period of Renaissance Humanism highlight concepts that can serve as mechanisms of resilience in medical education. As a concept in positive psychology, resilience refers to the ability to cope with the various stressors of life. The work of Renaissance Humanists focused on individuals' ability to flourish amidst adversity, thereby exemplifying forms of resilience. The goal of this research was to review a broad range of sources by Renaissance Humanists that demonstrate how humanistic concepts can be applied as mechanisms of resilience.

Methods: EndNote software was used to create an annotated bibliography of thirty-nine primary and secondary sources from Renaissance Humanism and to categorize them based on their application to different humanistic concepts.

Findings: The Renaissance was a period of fertile humanism as well as political upheaval, plague, and crisis. Resilience was explored as a personal quality of the Renaissance thinkers. Several sources from this period exemplified how texts about science and medicine contributed to improvements in anatomical knowledge, expanded access to medical education, and demonstrated the importance of empathy in the practice of medicine. This application of knowledge combined with empathy can be useful in building resilience.

Conclusion: History does not predict the future, but it can enlighten it. The humanistic themes developed by Renaissance Humanists can enlighten our own challenging times as we live through a pandemic and as medical students are asked to adapt to changing demands and circumstances. An annotated bibliography of various artistic, literary, and scientific works of Renaissance Humanism was created for use in medical humanities courses and in further research. These sources exemplify concepts like practical knowledge, self-awareness, and empathy, which can serve as mechanisms to foster resilience among medical students.

School: School of Medicine

SHELADIA, SHYAM

Age-Related Chronic Diseases and Alzheimer's Disease in Texas: A Hispanic Focused Study

Shyam Sheladia, MS2 [1]* and P. Hemachandra Reddy, Ph.D [1-5]**

[1] Department of Internal Medicine, [2] Neuroscience & Pharmacology Department, [3] Neurology Department, [4] Public Health Department, [5] Department of Speech, Language and Hearing Sciences.

*Shyam Sheladia, MS2 will be the presenting author; **P. Hemachandra Reddy, Ph.D is the senior author

The emergence of age-related chronic diseases in the United States has led to the direct increase of Alzheimer's disease (AD) prevalence, which ultimately contributes to the development of dementia. Age-related chronic diseases such as cardiovascular disease, high cholesterol, diabetes, and kidney disease contribute to the advancement of dementia. Furthermore, unmodifiable risk factors such as advancing age and genetics as well as modifiable risk factors such as socioeconomic status, educational attainment, exercise, and diet further contribute to the development of dementia. The purpose of our study is to determine the links between age-related chronic diseases/risk factors and cognitive decline within the Hispanic population of Texas and rural West Texas.

We collected data associated with the prevalence of AD within the Hispanic population of Texas and rural West Texas. We also collected data related to the prevalence of age-related chronic diseases, unmodifiable risk factors, and modifiable risk factors which lead to the development of AD in the Hispanic population.

Our analysis showed that Hispanics face the greatest burden of dementia due to the increase in the prevalence of overall population age, predisposing genetics, age-related chronic diseases, low socioeconomic status, low educational attainment, as well as poor lifestyle choices. Additionally, Hispanics living within rural West Texas face the added challenge of finding appropriate healthcare services.

Although it is difficult to provide a solution to certain factors such as socioeconomic status; steps can be taken to provide education to the Hispanic population regarding lifestyle changes that can be made in order to significantly reduce the risk of developing age-related chronic diseases which lead to the development of AD. Furthermore, a sincere effort by the Texas government and major hospital systems should be made to provide adequate healthcare resources to the counties of rural West Texas.

School: School of Medicine

SHERALI, SUSAN

Investigating the Reluctance of Telemedicine Use in Geriatric Patients and Developing an Application With Accessibility Features that Could Improve the Patient and Provider Experience

Susan Sherali, Shivam Bhakta, Andrew Chen

While there is a plethora of telemedicine apps currently available in the market, none of these apps have been made with the interests of the geriatric population in mind. The number of Americans older than 65 has risen significantly, and it is projected this demographic will reach 95 million by 2060 according to the Bureau's Population Bulletin. The elderly population is in most need of access to healthcare today but, the technology available unfortunately may not be utilized or accessible by them because of its complexity and lack of clear instructions. Theoretically, major users of telehealth should be the elderly, but platforms targeting this population's needs are limited. To improve the telemedicine unreadiness in elderly patients, we believe there is a need to address the limitations of current telehealth platforms available and develop a platform geared toward accessibility and usability for elderly patients. The goal of our project is to develop a telemedicine app meeting the needs of the elderly population. We seek to design a user-friendly app taking into account the older generation's potential limitations including deficiencies in vision, hearing, and dexterity which may affect their use of technology. To design our app, we have interviewed/surveyed Geriatricians and other physicians that work with our target population. To build a prototype we used proto.io. Thus far, we have incorporated features that will be of value to the elder population based on exploratory research and feedback we received from physicians. The Covid-19 pandemic has led to a significant increase in virtually connecting patients and their doctors, but for many older adults, the shift has cut them off from care, rather than connecting them. Hence, we believe our telemedicine application will be a great asset to physicians and the elder population wanting to experience telemedicine.

School: School of Medicine

SIDDIQUI, ARHAM

Association between positive psychological factors and the prevalence of anxiety in medical students

Hisham Ali, Adrian Jacobparayil, Arham Siddiqui, Aastha Singh MD, Chanaka N. Kahathuduwa MBBS, MPhil, PhD, Marina Chavez MD, Regina Baronia MD, M.Ed, Yasin Ibrahim MD

Studies have shown that medical students have increased rates of anxiety compared to the general population and that this anxiety may be inversely associated with academic performance. This study aims to examine the association between positive psychological factors such as spirituality, resilience, loneliness, engaged living and the development of anxiety in medical students.

First year medical students were recruited into the study within the first two months of the academic year via electronic and physical bulletins. Subjects were asked to complete a demographic/education questionnaire and a medical/psychiatric screening questionnaire. In addition, students completed the CD-RISC 10 to measure resilience, the DeJong Gierveld short scale to measure loneliness, the DUREL to measure spirituality/religiosity, the ELS to measure engaged living, the PHQ-9 to measure depressive symptoms, the GAD-7 to measure anxiety symptoms, and the PSY scale to measure aspects of wellbeing and happiness.

Eighty students met the inclusion criteria and took part in the study. The sample had a mean GAD7 score of 4.34 ± 3.82 and mean ELSL, DUREL, ELS, CD-RISC 10, and PSY scores of 2.20 ± 1.57, 18.00 ± 7.44, 50.26 ± 7.25, 31.15 ± 4.42, 151.70 ± 14.56, respectively. GAD7 scores positively correlated with ELSL ($r = 0.34$, $p = 0.002$) and PHQ ($r = 0.57$, $p = 0.000$). GAD7 scores negatively correlated with ELS ($r = - 0.36$, $p = 0.001$), CD-RISC 10 ($r = -0.27$, $p = 0.02$), and PSY ($r = -0.32$, $p = 0.004$).

Depression and loneliness were positively correlated with anxiety scores. Standard of living and resilience were negatively correlated with anxiety. Age, standardized exams, and religiosity were not found to have a significant correlation to anxiety. These results provide the first point of reference in this longitudinal study to determine the associations between positive psychological factors and anxiety scores.

School: School of Medicine

TERRY, MICHELLE

Dynamic Cushioning: A Complex Relationship Between Obesity & Trauma Patients Undergoing Laparotomy

N. Tully^1 , M. Terry^1 , A. Tucker^2 , S. Dhanasekara^1 , C. Ronaghan^1 , R. Richmond^1 ; 1^Texas Tech University Health Sciences Center, Surgery, Lubbock, TEXAS, USA; 2^University Medical Center, Trauma Services, Lubbock, TX, USA

Introduction: Obesity is generally associated with worse outcomes in trauma patients. However, there is conflicting evidence regarding the effect that increasing BMI has over the short and especially long term on these patients. We hypothesized that increasing BMI has an initial protective effect, but ultimately ends in worse outcomes. Therefore, we sought to elucidate the effect BMI has on outcomes in trauma patients undergoing exploratory laparotomy.

Methods: A Level 1 trauma center registry was queried to include all trauma patients that underwent exploratory laparotomies between June 2015—April 2020. Demographic factors along with clinical details and outcomes were examined. Baseline characteristics of 3 patient groups defined by BMI categories (i.e., normal-weight, overweight, and obese) and complications were compared. Simple linear and logistic regression analyses were performed to examine the associations between BMI and each complication.

Results: Records of 206 trauma patients who underwent exploratory laparotomies were analyzed. There was no significant difference in demographics or injury severity score (ISS) between groups (Table 1). When each complication was regressed on BMI, significant positive effects were seen for ICU stay, hospital length of stay (LOS) and return to OR. More granularly, a per-unit increase in BMI conferred a log-odds increase of 0.056 in return to OR. These results indicated that BMI had a direct positive association with ICU LOS, hospital LOS and return to OR.

Conclusion: Our findings show that with increasing BMI, postoperative complications increase following laparotomy for trauma. As rates of obesity increase, trauma surgeons must be prepared to anticipate plans of care from patient presentation to well beyond discharge to cope with more complex postoperative and post-hospital clinical courses.

School: School of Medicine

THOMAS, AARON

Mental Health of Free Clinic Patients in a Pandemic

Aaron Thomas, MS2, MS, BS, Alexander Zapata, MS2, BS, John Rafael, MS2, MBA, BS, Bri Marschke, MS2, BS, Emily Fine, MS2, BS, Bryan Bashrum, MS2, BS, Stephanie Bui, MS2, MBA, BS, Abby Ellington, MS2, BS, Vianne Nanez, MS2, BS, Kelly Bennett, MD, Fiona Prabhu, MD, FAAFP

The Free Clinic (FC), a partnership between Lubbock Impact and the TTUHSC School of Medicine, adopted a telemedicine format during the COVID-19 pandemic to accommodate patients in Lubbock, Texas, a city with 38,541 COVID-19 cases and 501 deaths to date, seen in [1]-[3]. Studies have shown this pandemic to be associated with increased anxiety and depression, noted in [4]-[6]. This study was conducted to explore the mental health (MH) burden of the FC constituents during this pandemic, access to MH services in general, and awareness of telemedicine MH services provided by the FC. 1,586 patients seen from March 2017 to November 2020 were contacted to participate in a 36-question survey covering the FC's transition to telemedicine, patient demographic information, and patient MH. 133 responses were collected and analyzed using Surveymonkey.com software, with P <.05 demonstrating significance. The results showed that almost half of the respondents (48.12%) reported feeling more anxious or depressed since the pandemic began. Of the 82% of patients who wanted to access MH resources, over half (60.55%) have not yet been able to. In addition, half of the respondents were not aware of the telemedicine MH services offered at the FC (51.13%). Increased anxiety and depression were significantly impacted by admitted trouble finding accessible health care as well as not having been able to see a MH counselor since the pandemic began (P <.05). Increased anxiety and depression were not significantly impacted by age, sex, gender, employment-status, race/ethnicity, income, having reliable transportation, and insurance-status. These findings show that there is a large MH burden in the patient population from the pandemic. More must be done to advertise telemedicine MH services to the FC constituency to meet this increased MH burden. Next steps include increasing patient awareness of telemedicine MH services and investigating whether this improves patient MH.

School: School of Medicine

THOMPSON, GENE

A Student-Generated, Peer-Led Teaching Activity for Integrative Medicine in a Family Medicine Accelerated Track

Katie Alex, Brooklyn Anderson, Jeanette Cala, Sandra Chang, Kristine Chen, Chase Griffin, Thomas Jarman, Dallin Low, Kaitlyn Moseley, Regina Moyana, Denise Naude, Dalena Nguyen, Ben Sheets, Aaron Thomas, Gene Thompson, Brock Walker, Brandon Ximenez, Ron Cook, Betsy Jones

Purpose: TTUHSC's FMAT program includes a systems-based 8-week course between the M1 and M2 years that focuses on the top 24 diagnoses in primary care. The course includes a summer research project that addresses an innovation in medical education. Methods: For this initiative, FMAT students studied evidence related to the use of complementary and integrative medicine (CAM/IM) therapies. Focusing on the topic of each week, students were responsible for researching and educating peers about evidence-based therapies that are in common use or marketed to consumers. Each student gave a brief presentation that covered two IM therapies, including one nutritional supplement, noting indications, drug interactions, mechanism of action, sex- or gender differences, safety issues. Learning objectives for this activity included applying basic sciences and clinical content to integrative therapies; demonstrating clinical competencies that apply to basic science and clinical course content, and demonstrate critical thinking and synthesis of information. Results: Faculty and students are participated in pre-course assessments of knowledge and attitudes about integrative medicine therapies. Students also completed post-course assessments. Students' knowledge levels grew from pre- to post-, especially related to the use of nutritional supplements. Provider-based IM therapies (eg, reiki, acupuncture) were less understood overall. Respondents' comfort levels in answering patient questions about IM therapies and agreement that medical education should prepare learners to use CAM/IM also increased. Conclusions: This project reflects a successful approach to embedding self-directed learning into an ongoing course and addressed CAM/IM therapies, which are often not covered well in the medical curriculum. Using physician and scientist faculty expertise to guide discussion, the project challenged students to integrate CAM/IM information within each week's system theme & diagnoses.

School: School of Medicine

TOMPKINS, CHRISTINA

Analgesic Effects of GSPE, Soy and Genistein, Naringin, and Omega-3 PUFA in the Treatment of Fibromyalgia and Possible Molecular Mechanisms: A Review of the Literature

1Christina Tompkins, ^1Alexis Schuck, 2,3,4,5Volker Neugebauer, 4,5,6Chwan-Li Shen

1Department of Medical Education, 2Department of Pharmacology and Neuroscience, 3Garrison Institute on Aging, 4Center of Excellence for Translational Neuroscience and Therapeutics, 5Center of Excellence for Integrative Health, 6Department of Pathology, Texas Tech University Health Sciences Center, Lubbock, TX 7943

Fibromyalgia (FM), characterized by widespread pain, is a complex disorder that negatively impacts the quality of life of millions of Americans. Current treatment options for fibromyalgia are limited. Opioid analgesics can result in opioid use disorder while long-term drug use brings unwanted side effects and toxicities. The goals of treatment are to mitigate central pain amplification and minimize symptoms since no cure is available.

Recent studies have shown diet-derived bioactive compounds have anti-inflammatory, antioxidant, anti-apoptotic, and immunomodulatory properties. This review discusses the effects of commonly consumed bioactive compounds, including grape seed extract, soy and genistein, omega-3 PUFA, and naringin on fibromyalgia with an emphasis on both possible molecular and systemic mechanisms and their likeness to current drug regimens.

After a thorough literature review, these bioactive compounds were found to significantly decrease FM-related inflammation through an analgesic manner in CNS neurons, DRGs, serum, immune cells, skeletal muscle, and mitochondria. Downregulated pro-inflammatory cytokine production, modulated superoxide catalase pathways, inhibited lipid peroxidation, and decreased immune cell recruitment were noted with bioactive compound supplementation in in vitro, animal, and human studies. GSPE and naringin affected monoamine modulators in a similar manner as current FM drugs. GSPE, naringin, and soy and genistein also acted similarly to current anticonvulsant drugs through inhibiting excitatory neurotransmissions.

These bioactive compounds have great potential as non-narcotic analgesic treatment options for FM as adjunctive therapy to mitigate drug tolerance and dosage. Although further research is warranted to determine their optimal bioavailability and therapeutic effect in humans, this approach would allow a more inclusive treatment regimen to patients facing healthcare barriers or high pharmaceutical drug costs.

School: School of Medicine

TRAN, MICHAEL

Defective Autophagy and Mitophagy in Aging and Alzheimer's Disease

Michael Tran, P. Hemachandra Reddy

Aging is the time-dependent process that all living organisms go through characterized by declining physiological function due to alterations in metabolic and molecular pathways. Many decades of research have been devoted to uncovering the cellular changes and progression of aging and have revealed that not all organisms with the same chronological age exhibit the same age-related declines in physiological function. In assessing biological age, factors such as epigenetic changes, telomere length, oxidative damage, and mitochondrial dysfunction in rescue mechanisms such as autophagy all play major roles. Recent studies have focused on autophagy dysfunction in aging, particularly on mitophagy due to its major role in energy generation and reactive oxidative species generation of mitochondria. Mitophagy has been implicated in playing a role in the pathogenesis of many age-related diseases, including Alzheimer's disease, Parkinson's, Huntington's, and amyotrophic lateral sclerosis. My work discusses the mechanisms of autophagy and mitophagy and how defects in these pathways contribute to the physiological markers of aging and AD. I also examined how mitochondrial dysfunction, abnormal mitochondrial dynamics, impaired biogenesis, and defective mitophagy are related to aging and AD progression. My work highlights recent studies of amyloid beta and phosphorylated tau in relation to autophagy and mitophagy in AD.

School: School of Medicine

TREVINO, MARIANA

Readability Assessment of Online Patient Resources For Skin Cancer Reconstruction

Mariana Treviño, Jon Christian Bruce, Tanir Moreno, Deepak Bharadia MD, MPH

Effective patient education is a crucial component of patient-centered care. Educating patients allows them to make informed decisions about their care and increases the likelihood of adherence to a treatment plan. Although there is an extensive amount of information available to improve patient knowledge, it is often limited by level of comprehension. The American Medical Association (AMA) recommends that the readability of patient-directed materials should not exceed a sixth grade reading level. However, evidence suggests that the majority of information available for patient education is written at a reading level that is above that of the average US adult. While a number of studies have analyzed the readability levels of Mohs surgery, a treatment option for the removal of certain types of skin cancer, none have covered excisional surgery options including local skin flaps and skin grafts. We hypothesized that the online resources for skin cancer reconstruction, skin grafts, and local skin flaps will yield a reading level above the sixth grade. The top 16 non-sponsored websites were looked at for the following search terms: "skin cancer reconstruction", "skin graft", and "local skin flap". The text was analyzed using a variety of readability formulae including Flesch-Kincaid Grade Level, Gunning-Fog index, Coleman-Liau index, SMOG, Automatic Readability index, Fry score, FORCAST, and Flesch Reading Ease. The readability analysis for the resources under these terms yielded an average reading level higher than the recommended sixth grade reading level. Based on these results, the readability level for the resources of each of the search terms was remarkedly poor and are written at a reading level above that of the average American. This indicates that patients may not understand the information presented to them. Increasing the readability of these resources offers an opportunity to improve patient understanding of health information and patient-centered care.

School: School of Medicine

TU, BRITTANY

Choroid Plexectomy for Hydrocephalus Management in a Pediatric Patient with Pilocytic Astrocytoma

Reagan Collins, Brittany Tu, Laszlo Nagy MD

Choroid plexectomy is a debated surgical intervention for treatment of hydranencephaly and chronic infected hydrocephalus. We present a case of a 2-year-old with multiple shunt revisions and hydrocephalus secondary to pilocytic astrocytoma. He presented with new somnolence, vomiting, and abdominal distension 5 months post partial tumor resection, with a history of shunt revisions and infections related to his chemotherapy induced low white blood cell count. He underwent choroid plexus coagulation and resection. 18 months post choroid plexectomy, the patient continues to meet neurodevelopmental milestones and is shunt independent. While ventricular shunt placement is the most common course of treatment, choroid plexectomy should be considered as an alternative treatment of hydrocephalus secondary to other neurological disorders, to avoid the recurrent infections seen with shunt placement.

School: School of Medicine

TURNER, JESSYCA

Applying Diffusion of Innovation to the Texas Mother Friendly Worksite Program: Does early adoption lead to lower rates of infant mortality?

Jessyca Turner, MPH; Julie St. John, DrPH, MPH, MA, CHWI; Jeff Dennis, PhD; Chwan Li-Shen, PhD

Background: In 2018, the infant mortality rate (IMR) in Texas was 6.93 deaths per 1,000 infants—fluctuating the past three decades. Research has shown breastfeeding as a strong predictor of infant mortality due to a strong relationship between infant mortality and early initiation of breast milk. Past research strongly recommends effective policies focused on early initiation of breastfeeding. In response, Texas created the Texas Mother Friendly Worksite Program (TMFWP) in 1995, fully implemented in 1998; mother-friendly worksites proactively support employees choosing to breastfeed and meet criteria set by the TMFWP. Yet, little research has explored the potential impact of the rate of adoption of the TMFWP by employers on county-level IMRs. It is hypothesized that infant mortality will decline as the number of TMFWP sites increase.

Methods: This observational study used secondary data from the CDC Wonder data set (IMR) and from the TMFWP (annual number of worksites who adopted the policy) for two large metropolitan counties in Texas—Bexar and Travis Counties—from 2003-2018. Multivariate regression analysis examined a potential linear relationship between IMR and four independent variables of interest in this study. The researchers compared the □□2 of two models to evaluate the regression models and identify the best-predicted model that significantly explains the variance in IMR.

Results: After controlling for year and number of sites, Travis County had a lower infant mortality rate by 1.27. For every additional site added, infant mortality went down by 0.006 (p=0.005).

Conclusion: Our findings suggest TMFWP may contribute to reduction of the IMR in Texas. Future research should explore additional Texas counties to examine effects of the TMFWP more broadly. The TMFWP initiative should use the results of the present study to encourage and promote adoption of the program by new Texas businesses.

School: School of Medicine

VEMULAPALLI, VARUN

Connexin Hemichannel Inhibitors Based on Aminoglycosides

Cristina M. Natha, Varun Vemulapalli, Mariana C. Fiori, Cheng-Wei T. Chang and Guillermo A. Altenberg

Varun Vemulapalli and Cristina Natha are co-first authors and will be presenting together at SRW

Connexins are membrane proteins involved directly in cell-to-cell communication through the formation of gap-junctional channels. These channels result from the head-to-head docking of two hemichannels, one from each of two adjacent cells. Undocked hemichannels are also present at the plasma membrane where they mediate the efflux of molecules that participate in autocrine and paracrine signaling, but abnormal increase in hemichannel opening can lead to cell damage in disorders such as cardiac infarcts, strokes, deafness, cataracts, and skin diseases. For this reason, connexin hemichannels have emerged as a valid therapeutic target. Traditional hemichannel inhibitors are not ideal leads for the development of better drugs for clinical use because they are not specific and/or have toxic effects. Newer inhibitors are more selective and include connexin mimetic peptides, anti-connexin antibodies and drugs that reduce connexin expression such as antisense oligonucleotides. Re-purposed drugs and their derivatives are also promising because of the significant experience with their clinical use. Among these, aminoglycoside antibiotics developed in our laboratory have been identified as inhibitors of connexin hemichannels that do not inhibit gap-junctional channels. Here, we discuss connexin inhibitors with a focus on aminoglycoside antibiotics and our derivatives of kanamycin A that inhibit connexin hemichannels, but do not have antibiotic effect.

School: School of Medicine

VOPNI, RACHEL

Use of Anti-microbial-coated Catheters in Preventing Catheter-associated UTIs: A Review for Clinicians and Medical Providers

Rachel Vopni, MS1, MD/MPH Candidate, Alesia Voice, MS4, MD Candidate, Cornelia S. de Riese, MD, Dept. of OB-GYN, Odessa, Texas, Werner T. de Riese, MD/PhD, Dept. of Urology, Lubbock, Texas

Catheter-associated urinary tract infections (CAUTIs) due to indwelling catheter use is a significant burden in health care and are therefore a concern for all medical providers. Different catheter coatings have been studied for their potential to reduce the risk of CAUTIs. The purpose of this review is to provide a meta-analysis of clinical studies to determine the efficacy of coated catheters in preventing CAUTIs as a resource for medical practitioners and clinicians.

A literature search was conducted on PubMed using the terms “catheter”, “coated”, and “urinary tract infection”. Inclusion criteria were randomized prospective clinical studies of coated (experimental) versus uncoated (control) catheters published in English between the years 2000-2020. T-test and odds-ratio analysis were applied for meta-analysis of the data.

Eight studies met inclusion criteria. Reported clinical trials used silver, silver salt, nitrofurantoin, nitrofurazone, and metal-alloy coatings for urinary catheters. We hypothesized that there was no mean difference between experimental and control groups across studies in rates of CAUTIs. A two-sample t-test showed the critical t value (2.13) was not exceeded by the t score (0.22), and the p value = 0.83 (>0.05), indicating that the use of coated catheters did not statistically significantly reduce risk of UTI.

This meta-analysis, the first one of its kind performed on randomized prospective clinical trials for the last 20 year, demonstrated no statistically significant advantage of anti-microbial coated catheters over standard catheters in preventing CAUTIs. This study provides a reference for clinicians and potential future researchers in any future study of catheter coatings which, while the materials themselves have shown promise as antimicrobial agents, are not currently indicated or supported for clinical use and CAUTI risk reduction.

School: School of Medicine

WALL, JOHN

Use of a Three-Dimensional Anatomy Atlas to Supplement Student Learning During Pandemic Restrictions

John Wall, Gurvinder Kaur Ph.D., Keith Bishop Ph.D., Brandt Schneider, Ph.D.

Introduction: Understanding three-dimensional (3D) relationships between different structures in human anatomy can be challenging for first year medical students. The head and neck are spatially complex regions of the human body. Complete Anatomy (CA) is a cloud-based anatomy platform where 3D anatomical models can be built and manipulated to allow students to understand 3D relationships. This study evaluated student participation and satisfaction with CA learning modules in first year medical students taking Clinically Orientated Anatomy at TTUHSC under pandemic imposed in-person dissection restrictions. Our goal was to determine if use of these modules impacted student performance on the head and neck practical exam.

Methods: CA learning modules were constructed based upon a list of anatomical structures students needed to identify for each of the eight labs in the head and neck unit. Modules consisted of lectures with varying viewpoints of models and quiz questions from the structures list. After a summative unit practical exam, students were surveyed on their participation and satisfaction with the modules. Student performance on the exam was compared between those who did and did not use the modules.

Results: Ninety-three percent of survey respondents (n=72) reported using the modules as a study aid and 72% reported using the modules for each lab. Additionally, 78% rated the modules as very useful or higher, and 58% reported using both the lectures and quizzes. A positive correlation was observed between student performance on module quiz questions and practical exam performance (r=0.33, p=0.0005). Eighty-one percent of students reported the CA modules helped supplement their learning during pandemic restrictions.

Conclusion: Students found CA modules to be a useful tool to supplement their learning of anatomy, specifically with in-person restrictions in place. Further, utilization of CA modules positively impacted performance on practical examination.

School: Graduate School of Biomedical Sciences

WARD, HAVEN

Post-intervention Effects of Tai Chi and Qi Gong on Anxiety Scores: A Systematic Review and Meta-Analysis

1^Haven Ward, 1^Kevin, Chin, 2^Chathurika Dhanasekara, 3^Dale Dunn, 3,4,5^Chwan-Li Shen, 4,5,6,7Chanaka Kahathuduwa

1^Department of Medical Education, SOM, TTUHSC; 2^Department of Surgery, SOM, TTUHSC; 3^Department of Pathology, SOM, TTUHSC; 4^Center of Excellence for Integrative Health, TTUHSC; 5^Center of Excellence for Translational Neuroscience and Therapeutics; TTUHSC; 6^Department of Laboratory Science and Primary Care, SHP, TTUHSC; 7^Department of Psychiatry, SOM, TTUHSC.

Background: The practice of Tai-Chi and Qi Gong as mindfulness meditation exercises has been shown to have beneficial effects on psychological well-being. We aimed to systemically analyze the beneficial effects of exposure to at least 3-weeks of Tai Chi or Qi Gong on anxiety scores.

Methods: Peer-reviewed records examining the effects of Tai-Chi or Qi Gong on depressive or anxiety symptoms were searched using PudMed, Scopus, ProQuest, and Web-of-Science databases. Outcomes of the search were independently screened by two researchers for pre-determined eligibility criteria. Full-text articles of prospective controlled clinical trials examining the effects of exposure to >3 weeks of Tai Chi or Qi Gong on anxiety symptoms were identified. Studies were evaluated for the risk of bias using the methods in the Cochrane handbook. Pre- and post-intervention anxiety symptoms of the intervention and control groups were extracted. DerSimonian Liard random-effects meta-analyses were performed on the data using the meta package in R statistical software (version 4.0.2).

Results: Out of 1,306 studies that emerged on initial database search, 33 studies were deemed eligible for the meta-analysis. Mean exposure to Tai-Chi or Qi Gong during interventions ranged from 5-312 hours (mean 41.11±67.35 hours). Tai-Chi interventions were observed to significantly decrease standardized anxiety scores vs. controls (Cohen`s d=-0.52, [-0.82; -0.22]). Similarly, Qi Gong interventions significantly decreased standardized anxiety scores vs. controls (Cohen`s d=-0.49 [-0.77; -0.20]).

Discussion: Mind body interventions such as Tai-Chi and Qi Gong seems to have a moderate effect in alleviating anxiety. Our findings should inform the clinicians to encourage the use of these mind-body interventions to reduce clinical as well as subclinical anxiety. Future meta-regression analyses should examine the differential effects of mind-body interventions based on socioeconomic factors and symptom severity.

School: School of Medicine

WOOD, DANIEL

The Value Of An Interprofessional Clinical Laboratory Science Experiential Activty In A Pass-Fail Medical School During The Covid-19 Pandemic

Daniel Wood, Daniel R. Webster, Tammy Carter, Koy Kubala, Jessica Brashear, Corey Swackhammer

During the COVID-19 crisis, medical education has adapted to include distance learning through virtual lectures and reliance on independent study. We hypothesized that a small-group active-learning activity would provide benefits to medical student wellness while still providing a meaningful learning experience.

A hypothetical clinical scenario was developed. MS1 volunteers were divided into two learning groups (Experiential or Self-Directed). Students in each group were presented with the same clinical case and then asked to develop a preliminary diagnosis. The Self-Directed students were then given pertinent test results for their patient and unfettered access to online resources in order to refine their diagnosis. Experiential students spent time in a clinical lab where different lab tests were explained by Clinical Laboratory Sciences (CLS) students. The Experiential students then participated in small-group discussions with aid from the CLS students. Both groups were required to submit a final diagnosis plus recommended lab tests at the end of the activity. All were quizzed periodically on the scenario to test retention of concepts developed during the exercise.

The Experiential and Self-Directed learning groups performed similarly on all of the quizzes. Compared to the Self-Directed students, those in the Experiential group felt the instruction offered by the activity was more effective (94% vs 59%), that they were better prepared for the remainder of medical school (87% vs 59%) and were more likely to strongly recommend this activity to future medical students (69% vs 47%).

Learning approach did not affect student performance. However, enjoyment and satisfaction were greater in the Experiential group. In the midst of a global pandemic that is affecting all aspects of medical students' lives, safe and effective methods of maintaining experiential learning in the pre-clinical years may have great benefit in keeping students engaged and fulfilled.

School: Graduate School of Biomedical Sciences

WYNN, ADAM

Effects of Consumption of Coconut Oil or Coconut on Glycemic Control and Insulin Sensitivity: A Systematic Review and Meta-Analysis of Interventional Trials

Adam Wynn, Amber Nelson, Megan Spradley, Chathurika Dhanasekara, Christina Robohm-Leavitt, Chwan-Li Shen, Chanaka Kahathuduwa

Background: While the often-purported claim that coconut fat is beneficial for cardiovascular health was disputed in a recent comprehensive meta-analysis, evidence on the effects of coconut fat consumption on glycemic control remains equivocal. We conducted a systematic review and meta-analysis to determine the effects of dietary coconut fats on markers of glycemic control.

Methods: Specific, predefined keyword combinations were used to search PubMed, Scopus, ProQuest, and Web-of-Science studies examining coconut derivatives' effects on glycemic control. Records were screened by three independent reviewers using pre-determined eligibility criteria. Data from randomized controlled trials (RCTs) examining acute and long-term (i.e. >10 days) effects of coconut fat consumption on markers of glycemic control were extracted. DerSimonian Liard random effects meta-analyses were conducted using meta package in R (4.0.2).

Results: 14 RCTs on acute effects and 4 RCTs on long-term effects of coconut oil were included. Meals containing coconut fat significantly increased incremental AUC of glucose (Δ = 162.48 mg x min/dL [2.74, 322.22], p = 0.046) and significantly decreased incremental AUC of insulin vs. control meals (Δ = -459.13 mIU x min/L [-889.98, -28.27], p = 0.037). Furthermore, coconut fat-containing meals resulted in a small yet significant increase in fasting blood glucose vs. control meals (Δ = 2.73 mg/dL [95% CI: 0.50, 4.95], p = 0.0162). Meta-analyses of studies examining long-term effects of coconut fat consumption did not show significant differences in fasting insulin, HOMA-β, or HOMA-IR between coconut fat vs. control groups.

Conclusions: Dietary coconut fat seems to be associated with a decreased post-prandial insulin response, possibly causing a minimal, yet increased post-prandial glycemic response. Coconut oil does not seem to have long-term benefits for glycemic control. These results disprove the popular claims that coconut fat improves glycemic control.

School: School of Medicine

XU, TIFFANY

Insufflation via a PD Catheter is a Safe Way to Achieve Pneumoperitoneum

Neil Jain, B.S, Tiffany Xu, B.A, Hisham Ali, B.S, Anas Hamdi, MD

In this report, we present a case where a patient with a hostile abdomen safely underwent robotic-assisted partial nephrectomy (RAPN) for a renal mass after insufflation was alternatively achieved using a peritoneal dialysis (PD) catheter.

A 66 year old morbidly obese female with BMI 44.2 and past medical history of T2DM, HTN, gastric ulcer disease, ESRD on peritoneal dialysis and past surgical history of open cholecystectomy, umbilical hernia repair, and laparoscopic peritoneal dialysis catheter placement was found to have an incidental 1.5 cm enhancing right renal mass suspicious for renal cell carcinoma. Preoperatively, a tunneled central venous dialysis catheter was placed by interventional radiology and nephrology was consulted for tem-

porary hemodialysis. Insufflation tubing was connected to the PD catheter and four quadrant pneumoperitoneum was achieved with normal opening pressure. RAPN was completed without complication. Patient's post-operative course was unremarkable except for high arterial pressures during hemodialysis requiring replacement of her tunneled hemodialysis catheter and labetalol. Pathology revealed pT1a RCC. Patient was doing well on follow-up and was cleared to restart peritoneal dialysis. PD was restated without issue.

Intraperitoneal access for laparoscopy surgery is done via closed Veress Needle method or open Hasson technique. Patient's morbid obesity and past surgical history makes access via those techniques challenging. In this case, the decision was made to insufflate from the peritoneal dialysis catheter to avoid those risks.

We demonstrated that pneumoperitoneum for laparoscopic surgery can be safely achieved via a preplaced peritoneal dialysis catheter. Literature review on the PubMed database regarding PD catheter insufflation found that this specific technique is novel. To our knowledge, no prior cases have used this method for surgical management in patients with a hostile abdomen.

School: School of Medicine

YOUNG, MADELINE

Knowledge of Antibiotic Use and Antibiotic Resistance on the Texas Tech University Campus

Madeline Young, Kirby Mateja, Grant Hansen, Craig Hannon, Robert Saldana

Antibiotic resistance is the ability of bacteria to mutate in response to the use of antibiotics and evade the bactericidal or bacteriostatic effect. This is a growing threat to healthcare systems worldwide due to patient noncompliance and physician over-prescription. In our research project, we aimed to assess the knowledge of proper antibiotic use, compliance with the prescribed course, and understanding antibiotic resistance on the Texas Tech University Campus. The sample consisted of 287 students, all of which completed an online survey. While the vast majority of students (86.4%) recognized that antibiotics kill bacteria, 39.9% answered that antibiotics treat viral infections as well. Of the 85.71% that answered yes to being prescribed antibiotics, 68.57% took the full course as prescribed, 30.61% took antibiotics until they felt better, and 0.82% did not take them. Of those that did not take the full course, 44.16% answered that they saved the antibiotics for future use. These numbers depict inappropriate and improper use of antibiotics and highlight the insufficient knowledge of antibiotics amongst our sample population. Our research group opted to provide educational visuals, using social media as a tool, on proper antibiotic usage and the risk of antibiotic resistance. Due to COVID-19, our population was expanded to the general public. The 143 participants were instructed to review the visuals and take a follow-up survey. There was a significant increase in those that responded correctly, 93% correctly identified the use of antibiotics and 92.3% correctly identified the factors associated with antibiotic misuse. We acknowledge that both the difference in population and delivery of survey could explain these results. This may suggest a lack of knowledge regarding antibiotic use in undergraduate and graduate populations relative to the general population. However, more analysis is needed to confirm these findings.

School: School of Medicine

ZAPATA, ALEX

From Telephones to Telemedicine: A Case Study for Increasing Patient Volume With The Free Clinic

Alex Zapata, Roald Credo MS, Samuel B. Jackson, Vianne Nanez, Abby Ellington, Ayushi Chintakayala, Zoe Davis, Steph Bui, Brianna Marschke, John Rafael, Aaron Thomas, Bryan Bashrum, Riya Koshy, Dr. Fiona Prabhu, Dr. Kelly Bennett

The COVID-19 pandemic disproportionately affected underserved populations medically. At the Free Clinic in Lubbock, TX (FC) our patient volume decreased from an average of 23 patients per week in the year prior to the pandemic, to a mean of 13 since March 2020. We formulated an outreach method, through the means of phone calls, to reach established patients. The aims of outreach included promotion of our telemedicine services, to conduct a survey to gain novel insights on pandemic-related questions, and research future strategies to minimize barriers to care.

A survey-based descriptive study of FC patients, under a IRB reviewed protocol (L21-004), was conducted. The 35 question survey consisted mostly of categorical questions regarding the pandemic, access to care, and general well-being. We reached out to 1,586 patients via phone call, ages 18-65, Saturdays from 9/12/2020-11/14/2020, to promote services being offered and ask them to participate in our voluntary survey. For every person we were able to reach, regardless of their willingness to participate in our survey, we first let them know what services (telemedicine, social work, and mental health) were available from FC.

The month prior to our study, FC was seeing 6 returning patients and 0 new patients, on average. In the weeks after obtaining IRB approval and implementing outreach, FC began serving an average of 11 returning patients with 1 - 2 new patients each week, an 85% increase. The first full month after the survey was completed 10 patients on average were served each week.

Patient outreach can be used as a method to sustainably increase patient volume and be utilized in the future to address barriers to care. Continuous outreach to improve outcomes and volume is the next step in engagement with our population recommended, and the current plan is to begin following-up with patients via phone 6 weeks after their last appointment starting this spring.

School: School of Medicine

ZHU, CHRISTINA

Small Bowel Diverticulitis Resulting in Small Bowel Obstruction

Linda Luong DO, Erin Burton MD, Christina Zhu

Intro: Diverticulosis, and diverticulitis, is one of the most common problems in general surgery. Although sigmoid diverticulitis (SD) is common, small bowel diverticulitis (SBD) is not. The management of SBD is more difficult since it is rare. In this case, we will discuss SBD resulting in a small bowel obstruction (SBO) requiring surgical intervention.

Case Presentation: An 81 yo female was transferred from an outside facility with a three-day history of dull, abdominal pain in the RUQ. She was passing flatus and having bowel movements. Surgery was consulted for symptomatic cholelithiasis and partial SBO. On exam, she was tender in the RUQ and CT showed gallstones with no bowel obstruction. She underwent a laparoscopic cholecystectomy. Post-op, she developed a SBO. On CT scan, there was evidence of obstruction secondary to inflamed SBD. Surgery attempted nonoperative management, but she continued to have obstructive symptoms and was taken to the OR for exploration. She was found to have a small bowel segment, with multiple diverticula with surrounding inflammation that tethered the segment down to the LLQ. Of note, the small bowel diverticula were on the mesenteric side. She underwent a small bowel segment resection and side to side stapled anastomosis. Post-op, her bowel function returned.

Discussion: Small bowel diverticulosis can present with symptomatic complications such as diverticulitis, perforation or SBO. Duodenal diverticula are more common than jejunal or ileal diverticula. Jejunoileal diverticula are 3-4 times more likely to develop complications than duodenal diverticula. Small bowel diverticula are much less common than large bowel diverticula and sigmoid diverticula. Compared to SD, presentation with sigmoid diverticulitis is classified into four stages using the Hinchey classification. However, there is a lack of clear guidelines on how to treat small bowel diverticulitis due to its rarity and therefore is more difficult to diagnose and treat.

School: School of Medicine

ALI, ZAIN

Evaluating urine pH and specific gravity: A single-center experience comparing different urine testing methods in children receiving high-dose methotrexate.

Zain Ali, MBA (HOM) 1; Joanna Chyu 2; Mhd Hasan Almekdash, MA, MS, PhD 3; Mohamad M. Al-Rahawan, MD 4,5

1 MS4, School of Medicine, Texas Tech University Health Sciences Center, 2 MS1, School of Medicine, University of Texas Medical Branch, 3 Clinical Research Institute, Texas Tech University Health Sciences Center, 4 Department of Pediatrics, Texas Tech University Health Sciences Center, 5 Center of Excellence for Integrative Health, TTUHSC School of Medicine

High-dose methotrexate (HDMTX) is commonly used in patients with acute lymphoblastic processes and osteosarcoma. Maintaining precise ranges of urine pH and specific gravity (SG) are essential to avoid methotrexate toxicity. These values can be monitored through 3 methods: manually read urine dipsticks (DpH/DSG), point of care automated urine dipsticks (ApH/ASG), and lab testing using a urinalysis machine (UpH/USG). Our institution uses Urisys 1100 Analyzer for ApH/ASG and Velocity iChem for chemistry analysis for UpH/USG. We conducted a retrospective chart review comparing the reliability and accuracy of the three methods in patients who received HDMTX at our hospital, from January 2017 to June 2020. Correlations amongst the methods of testing urine pH and SG were determined using the Pearson product-moment correlation and paired sample t-tests. There were 17 patients (59% female, average age 9.2 years) that met inclusion criteria but only 11 of them (81% female, average age 9.7 years) had sufficient data. Each of them had multiple courses of HDMTX. We found a correlation between each pair of all 3 pH methods (r = 0.38-0.65). Additionally, the pairs DSG-ASG and ASG-USG showed some correlation (r = 0.45-0.83). The paired sample t-test revealed no significant mean difference between pH pairs but showed a significantly higher mean for ASG than USG. We aimed to compare the reliability of dipstick and point of care automated testing to urinalysis. We found that they are as reliable when it comes to pH but the point of care automated testing revealed a higher SG. Despite the statistically significant difference in the latter, this difference was small enough to be questionably helpful in the clinical arena. Our small sample is a significant limitation. Further study using a larger sample size and prospective approach is needed to assess cost-effective alternatives to standard urinalysis.

School: School of Medicine

ALKUL, MAHMUD

A Tale of Three Nipples: A Review of Unilateral Nipple Diseases

Mahmud Alkul, BS,^1 Christine P. Lin, BA,^1 Jay Truitt, MD, PhD, PharmD, MPH,^2 Michelle B. Tarbox, MD^2

1. Texas Tech University Health Sciences Center, School of Medicine, Lubbock, TX; 2. Texas Tech University Health Sciences Center, Department of Dermatology, Lubbock, TX

We present a case of Paget's disease of the nipple in a 73-year-old female with a brief review of other common unilateral nipple diseases. Paget's disease of the nipple is a rare type of breast carcinoma of the nipple-areola complex, most commonly in postmenopausal women. It is often associated with an underlying in situ or invasive carcinoma. Clinically, Paget's disease typically presents as a thickened, eczematous, erythematous weeping or crusted lesion with irregular

borders. Advanced lesions may present with erosion, scaling, and bleeding. Paget's cells invading the epidermis are the hallmark histopathologic feature of Paget's disease and expresses cytokeratin 7 in nearly all cases. The diagnosis of Paget's disease may be delayed or missed as benign nipple processes such as nipple eczema and nipple adenoma may clinically mimic Paget's disease. Nipple adenomas can present as eroded or ulcerative papules and are histologically

characterized by adenomatous proliferation in the stroma of medium and small caliber ducts, coated by a double layer of cells. Nipple eczema may present as erythematous papules and plaques with oozing, crusting, or erosions and characterized histologically by parakeratosis and scale crust overlying an acanthotic and spongiotic epidermis. Treatment for Paget's disease of

the nipple is typically mastectomy with or without axillary lymph node dissection. Nipple adenomas and eczema are treated with elective resection and topical steroids respectively. Careful review of clinical findings and histopathology is required to avoid missing the diagnosis of Paget's disease of the nipple.

School: School of Medicine

AL-SUKHNI, LAYAN

Margarita Burn: Recognition and Treatment of Phytophotodermatitis

Layan Al-Sukhni, BS; Ganesh Maniam, BA, MBA; Katelyn MacLeay, MD; Dr. Joana Wilson, DO

Phytophotodermatitis is a cutaneous reaction caused by direct contact with phototoxic agents and subsequent sunlight exposure. Due to the etiology of these rashes relating closely to the outdoor consumption of margaritas, patients may know the rash as "margarita burn". The diagnosis of phytophotodermatitis is often made clinically, but can be complicated due to its similarity in appearance to many other common cutaneous reactions. Careful history taking is essential in not only narrowing down the differential diagnosis, but also in avoiding unnecessary tests or ineffective treatments. The classically described clinical triad in these patients is a sequence of rash progression: first as erythematous macules or patches, which later become vesicles similar to second-degree burns, before finally becoming an asymptomatic hyperpigmentation. However, the wide variety of presentations may cause a difficult diagnosis due to confusion with other similar skin conditions, such as: solar erythema, contact dermatitis, polymorphic light eruption, and drug-related photosensitivity. This case presents a 26-year-old female diagnosed with phytophotodermatitis following utilization of citrus fruits for margaritas while outdoors in direct sunlight, and a discussion of this case as well as its atypical features that may assist in the recognition and treatment of similar cases.

School: School of Medicine

ANAND, ROHAN

Use of ABRA DTS and ACell MatriStem for Successful Closure of Traumatic Complex Extremity and Trunk Soft Tissue Wounds

Rohan Anand, Jasmin Rahesh, Jayne McCauley MD, Babak Abbassi MD, Shirley McReynolds MD, Steven E. Brooks MD FACS, Catherine Ronaghan MD FACS

Traumatic soft tissue injury with substantial tissue loss is a frequent and challenging problem, requiring operations that have long-term functional and cosmetic consequences. This, combined with painful dressing changes, prolonged wound healing, and increased resource utilization, prompted exploration of more effective solutions. The ABRA Dynamic Tissue System (DTS) closure device has been successfully used to facilitate open abdomen closure, but may be appropriated for soft tissue extremity wounds as well. There are both invasive and non-invasive variations of the device for closing soft tissue extremity and trunk defects. ACell MatriStem is a porcine urinary bladder matrix (PUBM) which accelerates wound healing through constructive remodeling.

We identified 14 patients with large complex traumatic wounds and used ABRA DTS and PUBM to definitively heal these wounds. In most cases we used both DTS and PUBM; in select patients we used only PUBM. Detailed photographic documentation was performed of each wound. Among our patients, there was 100% healing of each wound without the need for skin grafting or tissue flaps. There were no surgical site infections (SSI) even in the most contaminated of wounds. In each case, wound healing was accelerated with excellent cosmetic and functional outcomes.

Complex traumatic wounds of the trunk and extremities are a challenging problem. The ABRA DTS closure device uses elastomers anchored at the wound edges to create dynamic tension across the soft tissue defect, allowing for serial contraction of the retracted wound edges. This results in decreased wound volume dimensions that are more amenable to primary closure. The extracellular matrix is a substrate that serves as the site for cell attachment, migration, proliferation, and differentiation. Combined use of ABRA DTS and PUBM can be used to successfully heal large soft tissue defects in the extremities or abdomen with minimal SSI and positive cosmetic and functional outcomes.

School: School of Medicine

ARMIN, SABIHA

Could I Pick Your Brain? Recognition and Management of Delusional Parasitosis Before It Is Too Late

Sabiha Armin BS, Roy Jacob MD

Delusional parasitosis, also known as monosymptomatic hypochondriacal psychosis, is a psychiatric condition characterized by an individual's persistent belief that she or he is infested with pathogens such as parasites, microbes, or insects, when no such infestation is medically present. Patients with this disorder can present to the clinic or ER setting by bringing providers with items such as photographs, containers (like plastic bags, jars, or even matchboxes) with pieces of skin or clothing as "evidence" of their infection. Generally, patients with DP are resistant to psychiatric treatment due to referral or mediation noncompliance and the stigma surrounding this mental health issue. Family education on safety and minimizing risk of self-injury should be done before discharge. It is imperative that these patients be treated as soon as possible due to the high risk of self-mutilation and injury associated when patients try to rid themselves of the parasite.

We present the case of a woman who presented twice with self-inflicted non-missile penetrating injury to the head to get rid of supposed tapeworms in her brain; she declined antipsychotic medication and psychiatric referral after the first ER visit only to come back with a more serious injury less than 10 days later. The second ER visit with the foreign body required a bifrontoparietal craniectomy; after the procedure, the neurosurgeon showed her images that were negative for parasitic organisms.

In all cases of DP, a psychiatric assessment is important, especially in view of patients' own risk to themselves. It is important to decide whether the patient has decision-making capacity. An emergency physician should remain vigilant in his/her assessment of patients with seemingly psychiatric symptoms, in particular elderly patients with no known psychiatric illnesses. Neuroimaging should be amongst studies considered in the evaluation of elderly patients presenting with new onset psychiatric complaints.

School: School of Medicine

BOWMAN, ANNA

Use of carmustine wafers in treatment of glioblasoma multiforme patients, a case series.

Anna Bowman, PhD, Jeannie Lee, MD, Benedicto Baronia, MD

Glioblastoma multiforme (GBM) is the most common type of brain cancer and has a high mortality rate. The standard therapy used in treatment of GBM currently involves resection of the cancer via surgery, followed by chemotherapy. As surgery needed for tumor resection is very invasive and requires a healing period, chemotherapy is delayed by an average of 2 months. A novel therapeutic intervention involves implantation of carmustine wafers within the cavity of the excised tumor as a chemotherapy bridge between surgery and formal chemotherapy. We evaluated the impact of carmustine wafer implantation during resection surgery on the GBM patient's overall survival, rate of complications, need for repeated resection and overall quality of life.

School: School of Medicine

BROWN, ELLEN

Demographics and Predictors of Recidivism and Graduation from Lubbock Drug Courts

Ellen Brown, Kyla Petrie, Zach Sneed PhD, Regina Baronia MD

Drug courts help break the cycle of addiction for offenders that commit drug-related crimes. They are linked to lower rates of drug use and recidivism. The Lubbock County Drug Court was established in 2005 to help address drug-related crimes and a lack of substance use treatment. This project seeks to determine differences between participants in the court that may predict recidivism and graduation.

Data on 864 participants from 2009-2017 were analyzed using T-tests, Chi-squared tests, and ANOVAs on SPSS-26 to determine the differences between graduates/terminates, sex, and race in relation to time in the program, age, total number of arrests, and recidivism. A regression analysis was used to determine which variables predicted recidivism.

Between graduates and terminates, there was a significant difference in time spent in program (492 vs 210 days), age (33.9 vs 30.4), and total number of arrests (.33 vs 1.02). Sex and graduation were associated ($\chi 2(1)=4.476$); 61.6% of women and 54% of men graduated. Women spent significantly more time in the program (406 vs 352 days), with fewer arrests (.48 vs .70). There was a significant difference in age, time in program, and total number of arrests between races. Graduation was associated with lower likelihood of recidivism. The regression was significant, with graduating and White and Latinx race associated with lower rates of recidivism.

The association of female sex with graduation and fewer arrests, Latinx race with lower rates of recidivism, and graduates with fewer arrests is likely linked with increased time in the program and older age seen in these groups. Graduation associated with lower rates of recidivism establishes the continued success of the program.

The Lubbock Drug Court has helped many offenders break out of substance use leading to offenses and prison time, and continues to do so, despite significant increases in program size and court type.

School: School of Medicine

CASTRO, LUIS

Antiallodynic and Antihyperalgesic Effects of Ginger, Capsaicin, Naringin, Soy, Resveratrol and Molecular Mechanism in the Treatment of Neuropathic Pain: A Review of the Literature

^1 Luis F Castro, ^1 Maribel Castro, ^2,3,4,5Volker Neugebauer, ^4,5,6Chwan-Li Shen

^1Department of Medical Education, ^2Department of Pharmacology and Neuroscience, ^3Garrison Institute on Aging, ^4Center of Excellence for Translational Neuroscience and Therapeutics, ^5Center of Excellence for Integrative Health, ^6 Department of Pathology, Texas Tech University Health Sciences Center, Lubbock, TX 7943

Neuropathic pain (NP) is a debilitating chronic pain condition that is very common around the world. Recent epidemiological studies have estimated it to be anywhere between 3% to 17% of the global population. The etiology of the condition is diverse. Commonly, it can be a result of metabolic disorders (e.g. peripheral diabetic neuropathy), traumatic injuries (e.g. nerve or spinal cord injury), viral infections (e.g. post-herpetic neuralgia), and autoimmune disorders (e.g. multiple sclerosis) among others. Nerve injury in NP often leads to neuroinflammation and other neuroplastic changes causing neuronal sensitization and hyperexcitability in the peripheral and central nervous system. People that suffer from this condition often report allodynia, hyperalgesia, and spontaneous pain.

Despite the high prevalence of this condition, current treatment options are often ineffective and have debilitating side effects, including a high risk for addiction. The goal of neuropathic pain treatment is to provide effective long-term relief while minimizing side effects and risk for addiction. Studies have found that the bioactive compounds ginger, capsaicin, naringin, soy, and resveratrol have beneficial effects on neuropathic pain possibly without serious side effects.

After a thorough review of the literature, these natural compounds were found to exert their effect on peripheral sensory neurons, spinal dorsal horn neurons, and microglia. Like some anticonvulsant drugs, ginger and capsaicin decreased neuronal hyperexcitability by increasing outward potassium current and desensitizing TRPV1 channels, respectively. Ginger, naringin and soy decrease secretion of inflammatory cytokine release including IL-6, TNF-α, IL-1β via NF-κB pathway. Resveratrol can inhibit inflammation by reducing activity of nuclear SIRT1 protein. The results show that these bioactive compounds may be effective in managing neuropathic pain, but more research on mechanisms and effects in humans is needed.

School: School of Medicine

CHOI, SARAH

Cytokine profiles and Lactobacillus species presence in pre-menopausal subjects with genital Mycoplasma genitalium or Ureaplasma urealyticum colonization

Sarah Choi, John Garza, Kushal Gandhi, Asley Sanchez, and Gary Ventolini

Background and Purpose: Lactobacilli play a vital role in protecting the vagina against pathogens. Cytokines are vital components of defense against infections in women. The genital mycoplasmas, Mycoplasmas genitalium and Ureaplasma urealyticum, are associated with various infectious diseases in adults and infants. The objective of our study is to delineate the relationship between genital Mycoplasma genitalium and Ureaplasma urealyticum colonization in pre-menopausal women and variances in cytokine profile and Lactobacillus species predominance.

Methods: A real-time polymerase chain reaction was performed to measure

Lactobacillus species in vaginal swab samples. Cytokine analysis was performed

using multiplex immunoassays techniques. Analysis of variance confirmed a significant difference in cytokine profiles between patient groups with t-tests identifying the most significantly different cytokines. Categorical data analysis identified significant patterns of relative Lactobacillus species dominance in the study groups.

Results: Lactobacillus species profile was significantly different between control and Mycoplasma or Ureaplasma study groups. The cytokine levels were different based on Mycoplasma genitalium or Ureaplasma urealyticum colonization in study group. Using Spearman correlation, the associations between most cytokines in control group were negative whereas they were mostly positive in Mycoplasma or Ureaplasma group.

Conclusion: Lactobacillus iners was the predominant Lactobacillus species in control group. There was no dominant Lactobacillus species in Mycoplasma or Ureaplasma study group. There was a statistically significant difference in cytokines levels between control and Mycoplasma-Ureaplasma study groups. IL-1β, IL-8, and VEGF-A were expressed significantly higher in Mycoplasma or Ureaplasma study group whereas IL10, IL-12, and IL-1RA were expressed higher in control group.

School: School of Medicine

CHOW, NATHAN

Argyria In a Patient with Severe Anemia

Nathan Chow, BS,1 Kristen Fain, BS,1 Jay Truitt MD, PhD, PharmD, MPH,2 Cloyce Stetson MD2

1 Texas Tech University Health Science Center, School of Medicine, Lubbock, TX; 2 Texas Tech University Health Sciences Center, Department of Dermatology, Lubbock, TX

A 68-year-old female with a 10-year history of chronic anemia of unknown etiology was admitted for progressive generalized weakness, dyspnea, and a widespread slate gray tint to her skin with a hemoglobin of 2.4 g/dL. Patient was tachycardic, but otherwise hemodynamically stable with O2 saturation in the high 90's on room air. Patient received 5 units of blood and was evaluated by hematology, GI, and dermatology. Additional labs showed a microcytic anemia with low ferritin and normal copper, zinc and ceruloplasmin. An EGD revealed a hiatal hernia and duodenal erosions without any bleeding. A skin biopsy demonstrated prominent granular silver deposits around the eccrine ducts and vessels of the dermis, consistent with the pathological diagnosis of argyria. Further history discovered the patient was taking 1 tablespoon of colloidal silver orally daily for seven years to boost her immune system and to prevent viral infections, but discontinued use 1 year prior because of the worsening skin discoloration. Patient was diagnosed with chronic anemia due to iron deficiency, given an iron sucrose infusion, and discharged with oral iron supplementation. Follow up was recommended with GI as an outpatient for colonoscopy and dermatology to treat skin depigmentation. Argyria is a rare disease caused by the chronic usage of products with a high silver content leading to silver granules being deposited in the skin, nails, mucosa, eyes, and internal organs. This results in a permanent blue-gray coloring of the skin that is worse in sun exposed areas where the silver deposits also stimulate the production of melanin. Treatments for dyspigmentation include ceasing silver intake, sun protection, lightening creams, and lasers. Patient's coexisting argyria complicated the diagnosis since argyria can cause pseudocyanosis from silver deposition and microcytic anemia secondary to copper and zinc deficiency caused by colloidal silver.

School: School of Medicine

CHU, VICTORIA

Management of Constipation in Patients with Schizophrenia - A Case Study and Review of Literature

Sabiha Armin BS, Aurelio Vargas BS, Victoria Chu MS, Kristen Fain BS, Ashish Sarangi MD, Jessica Nelson MD

Schizophrenia is a complex disease that has extensive impact not only on patients' health and well-being, but also on their risk of developing comorbidities from medication treatment. While literature on the side effect profile of antipsychotics for schizophrenia is abundant, there are few studies on early diagnosis of anticholinergic effects on gut motility and prophylaxis development. The aim of this review is to consider the prevalence and severity of antipsychotic associated constipation in patients with schizophrenia, and to discuss potential management of antipsychotic induced constipation.

We conducted a literature review assessing the prevalence of antipsychotic-induced constipation on Embase, Medline, Cochrane Library, and PubMed databases. Key word searches included constipation with concurrent antipsychotic use, antipsychotics and anticholinergic effects, factors causing constipation in schizophrenia, social disparities involved with constipation and colorectal cancer screenings.

Main findings included high complication rates that may be explained by negative health habits, comorbid metabolic disorders, and delay in diagnosis and treatment. Co-existing negative symptoms could also be associated with more indifference toward health outcomes and was found to have adverse consequence on the course of schizophrenia progression. Comorbidities of diabetes and cardiovascular complications contributed to gut hypomotility. Finally, caregiver burden was found to factor in delay in recognizing constipation as a side effect.

Overall, there is insufficient trial-based evidence to compare the effectiveness and safety of common pharmacological interventions for constipation, or of novel treatments such as linaclotide in the setting of antipsychotic caused constipation. Prescribing antipsychotics should be accompanied by regular physical monitoring, appropriate use of laxatives, and early referral of constipated patients, before pathologic processes develop.

School: School of Medicine

DOMINGO-JOHNSON, E.L.

The Curious Case of the Concerning Colorful Collision

E.L. Domingo-Johnson, BSN, MS4, Landon Hope, MBA, MS4, Jeannie Nguyen, M.D., Michelle Tarbox, M.D., Ashley Sturgeon, M.D.

We present a 41-year-old female who presented to the dermatology clinic for a changing lesion on her leg. The patient has a history of several dysplastic nevi being removed as well as a family history of melanoma in her father. The current lesion in question had appeared innocuous upon previous exam but grew in size and color over the intervening year, causing issues with shaving and prompting her to bring it to our attention. Due to its unusual appearance and behavior, the lesion could not be definitively diagnosed clinically, and a shave biopsy was obtained. Upon initial review of the histology, the lesion appeared somewhat concerning for a melanocytic malignancy; however, utilizing immunohistochemical studies and deeper sectioning along with clinicopathologic correlation, the dermatopathologist was able to determine that there were actually two separate but overlapping pathologies within the specimen, a dermatofibroma and a dysplastic nevus. The simple phenomenon of two separate lesions colliding into what appears to be a singular lesion has been recorded many times in the literature; however, this particular collision has been recorded only a handful of times. This case serves to highlight this potential pitfall which due to the unusual features and potentially concerning clinical presentation of such a collision may lead to overdiagnosis and unnecessary treatment without meticulous histopathologic interpretation.

School: School of Medicine

FAIN, KRISTEN

Management of Phenibut Withdrawal in a Patient with Substance Use Disorder

Victoria Chu, Kristen Fain, Grace Wooten MD

Phenibut is a neuropsychotropic drug used clinically in Russia that acts as a GABA-mimetic, similar to baclofen. Due to ease of mail-in-pharmacy, we are seeing greater potential for phenibut abuse in the US. We present a case report of a patient with phenibut dependency after self-medicating for anxiety symptoms.

The patient with HTN, hypothyroidism, PTSD, MDD with anxiety, alcohol use disorder, cannabis use disorder showed symptoms of withdrawal after using 5g daily of phenibut obtained from a mail in pharmacy in Canada. Symptoms included agitation, paranoia, and auditory hallucinations. Medications at initial presentation included levothyroxine, buproprion, hydroxyzine, amitriptyline, and gabapentin. Patient remained sober for 11 months but relapsed. The decision to use gabapentin over baclofen for phenibut cessation was due to concern of potential abuse. A slow phenibut taper was started to avoid the withdrawal symptoms. With higher doses of gabapentin, 1200mg 3x daily, he decreased phenibut use to 150mg, but was unable to discontinue fully.

The decision was made to cross taper gabapentin to baclofen to aid with phenibut discontinuation. At follow-up visits, patient reported maintained sobriety from phenibut, with minimal return of anxiety and denial of phenibut withdrawal. Throughout cross taper and discontinuation of phenibut, he remained on initial PTSD and MDD regimen. Patient denied misuse of his baclofen prescription and was amenable to a slow taper to discontinue baclofen.

This case highlights the efficacy of baclofen as a pharmacological agent to mitigate withdrawal symptoms from phenibut. The year-long attempt to taper and discontinue phenibut use while on higher doses of gabapentin was ineffective for this patient. In patients with concern for potential substance abuse, baclofen can be used to eliminate phenibut withdrawal symptoms. The occurrence of patients abusing mail in orders of novel drugs not utilized in the US will likely continue to increase.

School: School of Medicine

FORT, CALLIE

Systematic Review: Effects of Essential Oils on Scars and Wound Healing

Bailey D. Harvey, BS, Callie L. Fort, MS, MBA, Joshua C. Demke, MD, James C. Wang, MD, PhD

Introduction: Essential oils (EOs) have been considered as an alternative therapy for wound healing and minimization of scar tissue. The efficacy of EOs and their wound healing properties should be evaluated for their potential role in reducing scar tissue following reconstructive surgery. The purpose of this study is to provide a comprehensive review of clinical studies that examine the wound healing effects of EOs and evaluate their ability to reduce scar tissue formation.

Methods: Pubmed, Cochrane, Ovid and Embase computerized searches were performed through June 2020. Two independent reviewers conducted data extraction following a predetermined protocol identifying articles that examined the healing effects of EOs on 47 wounds/scars. Search results were additionally reviewed by the senior author.

Results: Three articles testing 3 different EO preparations were included in the final analysis. The outcomes that were tested include: healing rate, erythema, pain, pruritus, patient discomfort, physician satisfaction, percent wound reduction, wound/scar surface perimeter area, and qualitative dermatological evaluation. All articles concluded that the EOs used resulted in either superior or non-inferior outcomes in comparison to the control. Hypericum-Calendula preparation obtained lower wound surface perimeter area in comparison to the control. Pain (p<.001) and erythema (p<.001) were significantly decreased by the peppermint oil preparation in comparison to the control (petroleum jelly). Physicians reported greater satisfaction (p<.001) in wound appearance with use of the peppermint essential oil preparation.

Conclusion: A paucity of studies have examined essential oil use for wound healing and scar reduction. Essential oil treatment resulted in decreased erythema and pain, while showing increased physician satisfaction of wound appearance. Future studies should assess the effects of essential oils for facial plastic and reconstructive surgery patients.

School: School of Medicine

FROST, JOSHUA

The Ideal Donor Site Dressing: A Comparison of a Chitosan Based Gelling Dressing to Traditional Dressings

Nkemjika Uke, BS, Simran Singh, MBA, Grant E. Sorensen, PhD, Joshua Frost, BS, Amanda Venable, MSN, Bailey Burge, MSN, Ilina Terziyski, BS, Ebrahim Payberah, BS, John Griswold, MD,

Introduction: Donor site wound management is critical in split-thickness skin graft surgeries. These sites typically recover in 7-14 days due to the dermal-imbedded keratinocytes that promote skin regeneration. An ideal donor site dressing can help to mitigate pain, reduce infection risk, promote hemostasis, and accelerate healing times. Additionally, this dressing would be easy to apply in the operating room, easily managed, and cost-effective. Chitosan-based gelling dressings (CBGD) possess many of these qualities that make an ideal donor site dressing.

Methods: We conducted a retrospective chart review of patients who received CBGD as part of their post-operative wound care plan. We collected data on infections, hemostasis, dressing failure, and hospital course over a 14-month period where CBGD was used as the donor site dressing.

Results: One hundred and fourteen patients were evaluated. We found an infection rate of 7%, a bleed-through rate of 1.8%, and a re-application rate of 9.6%. The average CBGD cost per patient was $75.15.

Conclusions: CBGD has similar healing times, infection rates, and pain scores as traditional donor site dressings. However, it possesses several qualities of an ideal donor site dressing notably quicker healing rates, impressive hemostatic property, low infection rate, adequate pain control, and low cost. Our study supports the idea that CBGD is an ideal donor site dressing for split-thickness skin graft surgeries.

School: School of Medicine

GUERRERO CRIADO, ANDRES E

Immediate Sequential Bilateral Cataract Surgery: Opinions among Refractive Surgeons in the United States and a Comparative Analysis with European Consultants.

Andres Eduardo Guerrero Criado MSIV, Sloan W. Rush M.D.

Purpose: Perspectives analysis of refractive surgeons regarding Immediate Sequential Bilateral Cataract Surgery (ISBCS) implementation in the United States (US) when compared to their European (EU) colleagues.

Methods: An electronic survey regarding provider impressions on ISBCS was sent to practicing U.S. Refractive Surgery Alliance (RSA) members. Responses were examined and compared to a similar survey among EU surgeons.

Results: Across 107 subjects, 25.2% reported performing ISBCS, 70.1% do not perform ISBCS and 4.7% have discontinued performing ISBCS. 22.5% of subjects felt that ISBCS should be the standard of care for routine cataract surgery. Among non-financial concerns, 70.7% listed medico-legal liability, 44.4% expressed a need for improved safety/efficacy data, 41.4% indicated a desire for specialist society/Academy approval, 35.4% listed the need for prepacked left/right eye surgical instrument packs, and 32.3% listed the need for approved intra-cameral antibiotics. Financial concerns of decreased reimbursement for same-day surgery were listed by 84.6%, where overall 78.8% cite lack of patient insurance coverage or full reimbursement as the limiting factor to ISBCS adoption. Ultimately, EU refractive surgeons are 2.5 times more likely to perform ISBCS when compared to US refractive surgeons (p<0.0001).

Conclusion: While US surgeons often perform bilateral corneal and intraocular procedures; many barriers, especially to reimbursement, exist for ISBCS. Concerns by US surgeons mirror their EU counterparts. One contrast is the use of ISBCS among EU surgeons. 25.2% of US surgeons currently perform ISBCS, 70.1% do not perform ISBCS, and 4.7% have discontinued performing ISBCS. When compared to the EU: 67.2% perform ISBCS, 28.7% do not perform ISBCS, and 4.0% have discontinued performing ISBCS. The majority of US refractive surgeons in this survey indicate that ISBCS should not be the routine standard of care, primarily due to decreased reimbursement.

School: School of Medicine

HECOX, EMILY

A retrospective comparison of primary outcomes for low-risk primigravida mothers delivered by board-certified family medicine versus obstetrics and gynecologist physicians

Emily Hecox, MS3, Kerri Spontarelli, MS2, Jessica Spontarelli, MS2, Esther Robbins, MD, MPH

It has become increasingly difficult for family medicine (FM) physicians to gain obstetric privileges in American hospitals which has been attributed to the lack of studies comparing delivery outcomes of FM physicians to obstetrician-gynecologist (OBGYN) physicians. The necessity of obstetric privileges for FM physicians is highlighted in rural healthcare with many barriers to obstetrical care in remote areas. However, these FM physicians experience difficulties in gaining hospital privileges, despite their training. Given these circumstances, there is a need for additional evaluation of FM outcomes compared to those of OBGYNs in a rural environment, with UMC-Lubbock serving as a unique setting in which to conduct this research. This project aims to compare the primary outcomes of low-risk primigravida deliveries at UMC-Lubbock between FM-Obstetrics and OBGYN specialties. The study consists of a chart review of two delivery outcomes: spontaneous vaginal deliveries versus other deliveries (vacuum-assisted, forceps-assisted, c-section) in the patient population. Furthermore, differences in prenatal care will be explored to see if they impacted delivery outcomes. Descriptive statistics will be summarized as n (%), mean (standard deviation), or median (inter-quartile range). Chi-square or Fisher's exact test will be used to test the group differences for categorical outcomes. Independent samples t-test or its non-parametric alternative will be used depending on the Gaussian assumption to test the group differences for continuous outcomes. Appropriate correlation analysis will be done and correlation coefficients will be reported. A P-value of less than 0.05 will be set as statistically significant. We hope this study will provide justification to allow FM doctors obstetric privileges, especially in underserved areas where there is a shortage of obstetricians.

School: School of Medicine

HOPE, BRIANNA

The COVID rash that puts the U in GROUCH

Brianna Hope, MS4 | Landon Hope, MBA, MS4 | Richard Hope, M.D. | Michelle Tarbox, M.D.

Our patient is a 44-year-old female who presented to the outpatient dermatology clinic with complaints of a new onset rash on her lower back and inner thighs, as shown in the image. The patient underwent a punch biopsy to both locations to confirm the diagnosis of urticarial vasculitis. Dermatopathology reported that sections displayed a normal appearing epidermis. A superficial and deep perivascular mixed inflammatory infiltrate was present within the dermis which was comprised of eosinophils, neutrophils and neutrophil fragments, lymphocytes, and extravasated red blood cells. Overt fibrinoid necrosis of vessel walls is not identified in the tissue. These features were present in both biopsy locations, coming to the pathological diagnosis of either severe urticaria or early urticarial vasculitis.

The patient was treated with a combination of oral steroids and high dose antihistamines. She has recovered well from the urticarial lesions. Interestingly, our patient tested positive for SARS-Cov-2 two days after the biopsy was completed. This leads us to the likely possibility that the urticarial vasculitic reaction seen in our patient was secondary to infection from COVID-19 and was likely the initial presentation of the disease. The eruptions associated with COVID-19 infection have recently been grouped into the mnemonic GROUCH which stands for Generalized maculo-papular (20.7%), Grover's disease and other papulo-vesicular eruptions (13.8%), livedo Reticularis (6.9%), Other eruptions (22.4%), Urticarial (6.9%), and CHilblain-like (29.3%). Urticarial eruptions are a less common, but important presenting or associated sign of COVID-19 and this case serves to highlight this less common presentation.

School: School of Medicine

HOPE, LANDON

Dermatology Detects the Derivation of Disseminated Disease:A Vesiculopustular Eruption of Disseminated Staph in an Immunocompromised Patient

Landon Hope, MS4, MBA | Brett Austin, M.D. | Michelle Tarbox, M.D.

A 63-year-old male renal transplant patient currently being treated for stage 3 B Cell Lymphoma presented to the emergency department with a three-day history of a fever and a worsening vesiculopustular eruption. Upon examination a disseminated vesiculopustular eruption was present on the chest, axilla, shoulders, left and right arms, hands, bilateral lower extremities, face, abdomen, back, and feet. The patient complained of pain and moderate pruritus with the lesions. Treatment with cefepime, vancomycin and 2 doses of filgrastim had been initiated, and by the next day his fever improved but the vesicular eruptions persisted. A punch biopsy was taken from lesions on the chest and left arm. Bacterial culture of the lesion from the left arm grew MSSA and the chest lesion pathology displayed an attenuated epidermis overlying a vesiculopustule with large colonies of bacterial cocci within the superficial dermis. This combination of findings was concerning for septic emboli, but blood cultures returned negative for microorganisms and echocardiography did not demonstrate any valvular anomalies. Nevertheless, the histopathology pointed unequivocally to a hematogenous origin for the organisms and cultures from the venous access port returned positive for pan-sensitive MSSA and the patient subsequently had the device removed. After beginning the patient on nafcillin the vesicular lesions began to regress. The patient was sent home in good condition on treatment with four weeks with ceftriaxone. This case serves to highlight the importance of clinicopathologic correlation in the management of complex hospitalized patients, particularly in the setting of immunosuppression and infection, and also describes a rare cutaneous presentation of disseminated staphylococcal infection.

School: School of Medicine

KALAYILPARAMPIL, BELLA

Hickam's Dictum vs. Occam's Razor in Diagnosing Subacute Bacterial Infective Endocarditis

Bella Kalayilparampil, MS4, Stacy Philip, MS4, Sara Alhaj, MS4, Ahmad Halka, MD, Tarek Naguib, MD

Introduction: Early detection of infective endocarditis (IE) is imperative for improving morbidity and mortality. IE, originating from bacterial infection of prosthetic heart valves, intravenous drug use, or immunosuppression, can prove fatal, with the production of septic emboli and end-organ damage. This case report elucidates the severe, yet subtle, presentation of subacute bacterial IE.

Case: A 56-year-old male presented with acute cerebrovascular accident; labs revealed vitamin B12 deficiency and pancytopenia. The patient was discharged, but returned with progressive dysphagia and significant weight loss. Labs indicated a worsening pancytopenia, acute kidney injury, and hypocomplementemia. Upon discharge after this encounter, he was readmitted for respiratory symptoms and tested positive for influenza A. He met sepsis criteria and blood cultures grew Enterococcus faecalis. Physical exam revealed a new diastolic murmur and widened pulse pressure. Transesophageal echocardiogram revealed IE with aortic valve perforation.

Discussion: This patient presented with several systemic signs and symptoms of IE including ischemic stroke, acute kidney injury, dysphagia, weight loss, vitamin deficiencies, and cutaneous lesions. Each diagnosis was managed separately with every hospitalization, without consideration for one etiology. Using Hickam's dictum to separately explain this patient's presentation, rather than utilizing Occam's razor to identify one encompassing diagnosis, led to delays in proper management.

Conclusion: IE can be difficult to diagnose due to various subtleties in the clinical picture that are patient-specific. Blood cultures should be part of pancytopenia workup without identifiable cause. In diagnostic uncertainty, clinicians should use an Occam's Razor approach to connect all clinical manifestations under a single encompassing diagnosis.

School: School of Medicine

KANKAM, ALFRED

Physis Injuries: Using Velocity of Growth to Guide Management

Alfred Kankam

Physeal injuries complicate 18–30% of pediatric fractures. Growth arrest occurs in 5–10% of cases in those with physeal fractures. Growth arrest incidence is quite variable depending on physeal location, type of injury, and treatment received.1 In 1963, Robert B. Salter (1924–2010) and W. Robert Harris (1922–2005) created a physeal fracture classification system based on anatomy, fracture pattern, and prognosis.1 The purpose of the classification system is to identify the mechanism of injury and predict the likelihood of complications.2 However, some authors state that the Salter-Harris (SH) classification is an unreliable predictor of the outcome. This may be the case because it does not consider bone age and the amount of growth left at the time of injury. A physeal bar can be a complication of a physis fracture and is managed currently with bone age in mind. Resection of the physeal bar is indicated if its bar size is 25-40%, the patient has more than two years of growth remaining as evidenced by the left hand on X-ray, and the patient is free of drainage for more than one year if the bar is a result of drainage.3,4 This study aims to use the physis growth velocities at different locations to guide the management of physis fractures and physeal bar resections.

A literature search was conducted using PubMed/Medline, ScienceDirect, OVID, and Cochrane Library to search for articles between 2000 to 2020. The search was done using “Salter-Harris Fractures”, “Bone Development”, “Growth Disorders” “Radius”, “Growth and Development”, “Wounds and Injuries”, “Growth Plate”, and “Follow-Up Studies” as the MeSH terms AND English, with clinical trial, meta-analysis, randomized control trial, review, systematic review, and multi-center study as the subtypes. The “last 20 years” was used as the publication date. The relevant articles were then chosen that fit the criteria.

School: School of Medicine

KASHYAP, CIMRON

A Rare Case of Left Ventricular Thrombus Formation Despite Preserved Ejection Fraction

Cimron Kashyap, MBA, Dhruv Patel, MBA, Pooja Sethi, M.D.

Background: Left ventricular thrombi are commonly seen in the setting of decreased systolic function and regional wall abnormalities, often occurring due to myocardial infarction, heart failure, or dilated cardiomyopathy. Although most cases of left ventricular thrombi present with an ejection fraction of less than 40%, in rare instances, thrombus formation can develop despite a normal EF.

Case: A 61-year-old male with prior history of coronary artery disease, chronic kidney disease, and peripheral artery disease was initially admitted to the hospital for a lower leg burn injury surgery. An elective echocardiogram showed an LV clot and a transthoracic echocardiogram revealed an ejection fraction of 65-69% as well as apical hypokinesis. He was started on appropriate treatment prior to discharge.

Decision-Making: Patients with normal ejection fraction can develop LV thrombi. Contrast echocardiography can aid in diagnosis and treatment of such patients and is recommended whenever the LV apex in not well visualized with 2D images. A high degree of suspicion is necessary from clinicians to prevent complications like stroke and embolic phenomenon.

Conclusion: Due to advancements in acute anticoagulation medications and diagnostic techniques, the reported incidences of LV thrombi have decreased within the past couple decades. Although LV thrombi frequently present with reduced ejection fraction, our case highlights that LV thrombi can also present with a normal ejection fraction. Early detection and proper treatment can greatly reduce adverse outcomes and better obviate potential risk of embolization. Thus, it is important to monitor both patients with high risk factors for LVT as well as older patients with seemingly normal heart function to prevent severe deterioration and potentially fatal complications.

School: School of Medicine

KECK, RYAN

The Use Of Surfactant-Based Debridement Topical In A Single Burn Center: A Retrospective Review On The Use Of Collagenase Debridement Topicals.

Ryan Keck, Joshua Frost, Simran Singh, Nkemjika Uke, John Griswold

One of the persistent challenges in burn care is the management of indeterminate depth, second-degree burns. The determination of the size, depth, and subsequent treatment of first- and third-degree burns is relatively straightforward, yet second-degree burn injuries are less straightforward. Second-degree burns are classified by superficial-partial or deep-partial thickness, which can change rapidly as the damaged cells either remain viable or undergo apoptosis. Visual assessment of the wound is essential to determine the depth of injury and a treatment plan, but cell viability of indeterminate-depth burns can take several days to determine. Traditionally, enzymatic debridement topical ointments play a key role in debriding and promoting healing of the wound to provide an accurate assessment of the healing potential. Surfactants are another class of debridement topical ointments that circumvent the harsh side effects of enzymatic debridement, yet, few burn centers currently use it as a part of burn management. In this paper, we describe our experience with using a surfactant-based topical as an adjunct to standard burn treatment in 109 patients admitted to a burn center in West Texas over a twenty-month period. During this time, the surfactant topical was cost-effective, had higher levels of patient comfort, and aided in rapidly determining the need for surgical intervention by providing improved visual assessment of the wound.

School: School of Medicine

LIN, CHRISTINE

COVID-19 Myocarditis

Maniam G, Kusko R, Lovelace J, Naguib MT

Rare complications of COVID-19 continue to be recognized as the disease is further studied around the world. COVID-19 myocarditis is a newly recognized entity where troponin increases in absence of EKG and clinical criteria of acute infarction, presumably due to direct viral invasion of the myocardium, with hypoxia likely an added factor contributing to cardiac stress. We present the case of a 57-year-old male with diabetes and hypertension who was transferred from prison with shortness of breath, fever, vomiting, and diarrhea. On presentation, the patient had tachycardia, hypertension, and severe hypoxia with bilateral rhonchi that required prompt intubation. Despite uneventful EKG, troponin I was elevated, as were lactic acid and white blood cells with lymphopenia. Chest X-ray (CXR) showed enlarged cardiac silhouette and bibasilar airspace opacities. COVID-19 PCR came back positive, troponin I levels further increased, and ventilator settings had to be maximized. By hospital day 4 (HOD4), troponin dropped, but respiratory and kidney failure followed by severe hypertension on HOD5 necessitated continued care in the ICU. Care was further complicated by elevated lipase level that evoked the suspicion of propofol-induced acute pancreatitis; propofol was replaced by dexmedetomidine. By HOD13, the patient was extubated and transferred to the floor. He remained hemodynamically stable with good BP on carvedilol and amlodipine. After several days, he was discharged to prison with no oxygen supplementation. In this case, troponin elevation paralleled the respiratory failure early on and resolved spontaneously with supportive measures despite protracted respiratory and kidney failure, making hypoxia a likely factor in the pathogenesis. While type II myocardial infarction secondary to hypoxia must remain on the differential, the overall clinical picture is consistent with myocarditis, helping to establish it as a possible complication of COVID-19.

School: School of Medicine

LOWE, RACHEL

A Case of Hypokalemic Periodic Paralysis in a Pediatric Patient

Rachel Lowe MS3, Jennifer Wilson MD

Hypokalemic Periodic Paralysis (HPP) is a rare neuromuscular disorder with a prevalence of approximately 1 in 100,000. Almost all instances of HPP are transmitted in an autosomal-dominant mode of inheritance, although incomplete penetrance is common. This inherited defect affects muscle ion channels and results in episodes of severe hypokalemia, cardiac dysrhythmias, painless muscle weakness and paralysis. Attacks can be precipitated by heavy exercise, fasting, or high-carbohydrate meals. We report the case of a 13-year-old previously healthy Hispanic female who was transferred to our facility after requiring admission at an outside hospital for severe hypokalemia, shoulder weakness, and bilateral lower extremity paralysis resistant to PO potassium replacement. Upon arrival, patient was clinically stable with persistent shoulder weakness and intermittent lower extremity cramping. Laboratory evaluation revealed moderate hypokalemia, low urine osmolality and potassium, in addition to hypophosphatemia, neutrophilia, and thrombocytopenia. EKG was normal for age. Physical exam revealed improving muscle weakness. Based on her presentation and laboratory evaluation, differential diagnosis included Myasthenia Gravis, Thyrotoxic Periodic Paralysis, enema or laxative abuse, anorexia, malnutrition, and HPP. Initial treatment consisted of intravenous electrolyte replacement and a high potassium diet. Patient was transitioned to oral potassium replacement and remained hospitalized until serum potassium normalized. Although rare, Hypokalemic periodic paralysis is a potentially deadly neuromuscular disorder. It is important to consider in the differential for patients experiencing unexplained episodic muscle weakness. We present this case to highlight the presentation and management of Hypokalemic Periodic Paralysis with the hopes of shedding light on a rare form of paralysis.

School: School of Medicine

LUDWIG, CAMERON

Atypical Cutaneous and Musculoskeletal Manifestation of SARS-CoV-2: "Covid Toes" and Spasticity in a 48-Year Old Female

Cameron Ludwig, BS, Avery Kopacz, BS, Michelle Tarbox, MD

With most of the world affected by the COVID-19 pandemic, much attention has been turned to studying the features of its source: Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). Although primarily the cause of a respiratory illness, this strain of the single-stranded RNA virus has been shown to affect nearly every organ system without reliable predictability. The wide variety of associated symptoms makes categorization of this illness difficult. One of the more curious features of Coronavirus Disease 2019 (COVID-19) includes the cutaneous manifestations known colloquially as "Covid Toes". These chilblain-like lesions appear primarily on the feet and are generally described as painful violaceous papules on the dorsal surface of the toes, although there can be some variation in color and location. The true mechanism for this pathology has yet to be fully explained. Colmenero et. al. studied these lesions in pediatric patients, finding both viral particles and histological evidence of vascular damage. They postulated that the mechanism could be direct endothelial damage inflicted by the virus. Vinayagam et. al. also linked this endothelial dysfunction to the increased number of thrombotic events in COVID patients due to increased thrombin generation that halts fibrinolysis, leading to hypercoagulopathy. The current literature reports that this symptom of COVID-19 occurs predominantly in children and young adults later in their disease course. We present a case of "Covid Toes" in a 48-year-old female with underlying coagulopathic syndrome.

School: School of Medicine

MIKKELSON, MEGAN

Disability Centered Education in MedEd - Integrating a New Course at TTUHSC

Megan Mikkelson, MS3, Mary Girgis, MS3, Boo Wright, MS3, Angela Abraham, MS3, Summre Blakely, MS3

All at Texas Tech University Health Science Center School of Medicine, Lubbock

Inadequate knowledge and skills of health providers may adversely affect outcomes and attitudes of disabled populations. Education regarding appropriate communication and facets of care is critical to lessen the health disparities of disabled patients. A multi-part survey gauged attitudes, overall comfort level, preparedness, and perceptions towards patients with disabilities and interest in inclusive training at TTUHSC School of Medicine. A clinical simulation was designed to introduce first-year medical students to appropriate language, physical exam skills and social activism for disabled patients. Participants evaluated their attitudes prior to and after completing the simulation and its effectiveness. A post-encounter session explored other disability topics. Prior to the simulation, survey responses showed a significant lack of preparedness towards treating disabled patients. 26 first-year medical students participated. Prior to the activity, 42.3% stated they did not feel prepared to treat a patient with ANY disability, while the remaining 57.7% stated they felt prepared to treat a patient with some disabilities such as blindness, deafness and motor impairment. Post-simulation, 75% of respondents stated that they now felt prepared to treat a patient with certain disabilities and 20.8% stated that they felt confident treating most patients with a variety of disabilities. All respondents stated some level of preparedness following the activity. Medical education is lacking in disability focused education. Our goal was to introduce an understanding of different disabilities and their individual needs, improved disability sensitive interviewing skills, exposure to various forms of accessibility, awareness of medical discrimination, and communication skills regarding disability. Increased perceived preparedness indicates potential for a more universal application of this curriculum to improve future patient-physician relationships for disabled patients.

School: School of Medicine

MITTAL, NITISH

Novel Percutaneous Device to aid in treatment of Tricuspid Endocarditis

Nitish Mittal, MS3; Joseph Greene, MS1; Ronnie Orozco, CCRP; Mohammad M Ansari, MD

Background: The AngioVac System is utilized for the removal of thrombus. We present a case report where we utilized the device for the removal of vegetations on the tricuspid valve.

Statement of the Problem: High risk surgical patients who present with severe valve disease secondary to endocarditis, having no other options, can be treated with the AngioVac system.

Aims/Methods: Male, African American, age 56 with past medical history of DM, HTN, HFrEF and CKD initially presented to the hospital due to infected pacemaker lead. He tested positive for Clostridium difficile colitis and blood culture grew Pseudomonas. Thus, he underwent the lead extraction procedure during which residual vegetations of 3 x 1.5 cm on the atrial aspect of the tricuspid valve and 1.5 x 1.2 cm on the ventricular aspect were identified. Decision was taken to approach with the AngioVac system, since patient was deemed high risk for surgery, to decrease the vegetation burden to decrease septic emboli risk and greater penetration of antibiotic therapy. For this purpose, the accesses were obtained followed by placement of cannula and dry sheath. Angiovac circuit was connected, and Angiovac Catheter was advanced into the right atrium. The circuit was started and debulking of the vegetations was successfully performed under Trans-Esophageal Echocardiography (TTE) and Fluoroscopy guidance of the tricuspid valve. TEE demonstrated a significant reduction (>80%) in the size of the vegetations. Post-operatively, no complications were noted and patient left the OR in stable condition.

Conclusions and Implications: This case illustrated the use of innovative medical technology, the AngioVac System, to remove the large vegetations with bacteremia on tricuspid valve. Utilizing the approach helped in treating this patient having no other options, as he was deemed high risk for surgery. This is a glaring example of how innovation of new technologies are integral in the development of medical treatment.

School: School of Medicine

NEVELS, ANNA

Case of Struma Ovarii Occurring with Breast Cancer

Anna Nevels; Louis Brandi, M.D.

Struma ovarii is a type of monodermal teratoma composed of over 50% thyroid tissue and represents approximately 5% of ovarian teratomas. Because of the rarity, there are very few case reports and case series dedicated to this topic. Even fewer are reports of struma ovarii occurring simultaneously to breast cancer. Here we describe a case of struma ovarii found incidentally on imaging in a patient undergoing neo-adjuvant chemotherapy for breast cancer. A 44-year-old female was diagnosed in 2016 with stage 1A left breast cancer at an outside institution. She began neo-adjuvant therapy, and while receiving treatment in 2017, an incidental left adnexal mass was discovered on CT. The patient received a left partial mastectomy with axillary lymphadenectomy in 2018, but the adnexal mass was not removed at this time. The patient was referred to our institution in 2019 where a repeat ultrasound and CT confirmed a complex left adnexal cyst measuring 7.7 cm in diameter, enlarged from previous imaging. CA-125, CEA and thyroid hormone levels were all within normal limits. In June of 2019, the patient received a total laparoscopic hysterectomy with bilateral salpingo-oophorectomy (TLH/BSO) with cystoscopy. The preliminary diagnosis of ovarian teratoma was made at this time via frozen section and was later confirmed to be benign struma ovarii with an area of remote infarct and metaplastic ossification. Peritoneal fluid was found to be negative for malignancy and cystoscopy results were normal. Post-operative recovery was uneventful and was scheduled for regular follow up with her OB/GYN. In this case, the patient received a TLH/BSO due to concerns for ovarian cancer given her history of breast cancer. Although the struma ovarii had special features on pathology, previous reports indicate benign struma ovarii are treated well with excision.

School: School of Medicine

ONYEJEGBU, DUBEM

Identification of the bupropion binding site in GLIC using site-directed mutagenesis

Dubem Onyejegbu, Jessica Shepherd, Elham Pirayesh, Akash Pandhare, Zackary Gallardo, Michaela Jansen.

The aminoketone bupropion is clinically used as an antidepressant and smoking cessation drug. The mechanism of action involves binding to dopamine and norepinephrine transporters to inhibit reuptake in the brain. More recently, it was shown that bupropion also inhibits pentameric ligand-gated ion channels (pLGICs) also called Cys-loop receptors in eukaryotes, in particular nicotinic acetylcholine receptors (nAChR) and serotonin receptors (5-HT3AR). A prokaryotic homologue that has been extensively used to investigate structure, function, and pharmacology of pLGICs is the Gloeobacter violaceus ligand-gated ion channel (GLIC). GLIC is a proton-gated cation-selective channel that exists that structurally contains an extracellular and transmembrane domain. We used docking studies and site-directed mutagenesis to analyze potential binding site residues for bupropion. We engineered amino acids within the α-helical transmembrane domain with the goal to interfere with bupropion's ability to bind and inhibit channel function. Two-electrode voltage-clamp recordings in Xenopus oocytes were used to examine the effect of mutations on the proton concentration that yields half- maximal GLIC activation and then the bupropion inhibition of these engineered GLIC constructs was tested. We further used Cys scanning of key residues in the identified binding site to substantiate our results. Further studies are needed to probe whether bupropion uses a similar binding site in eukaryotic pLGICs. A more detailed understanding of bupropion's molecular mechanism of action will enable us to better understand its clinical effects. This may include both desired as well as undesired clinical effects

School: School of Medicine

PATEL, DHRUV

A Rare Case Of Takotsubo Cardiomyopathy Mimicking An Acute Myocardial Infarction

Dhruv Patel, MBA, Cimron Kashyap, MBA; Jinesh Lachmansingh, MD

Background: Takotsubo cardiomyopathy (also known as broken heart syndrome or apical ballooning) is a rare but serious stress-induced left ventricular systolic dysfunction that resembles a myocardial infarction (MI). However, Takotsubo is not associated with obstructive coronary artery disease or plaques.

Case: A 52yo male with past medical history of IV drug use, necrotizing soft tissue infection, and MRSA bacteremia presented with multifocal osteomyelitis and vertebral collapses. Therefore, he was scheduled for two spine surgeries. On post-op day three after the first surgery, the patient went into cardiac arrest. The patient was in cardiogenic shock due to low blood pressure and thus was given epinephrine and intubated. TTE showed apical ballooning and akinetic midventricular segments with severely depressed LVEF <30% and a cardiac index of 1.5-2. Due to these results, the second spine surgery was postponed. Initial ECG after cardiac arrest revealed new T-wave inversion in the anterolateral leads. Troponins and brain natriuretic peptide were critically elevated at 212 and 2321, respectively. The patient was managed with aspirin, heparin gtt, and dopamine gtt. Follow up ECG showed resolution of the anterolateral T wave inversion. Over the next few days, troponins began to downtrend significantly and the cardiac index increased up to normal limits. The patient was weaned off of dopamine and cardiac activity stabilized. Ultimately, the patient was diagnosed with Takotsubo cardiomyopathy and was able to undergo the second spinal surgery upon resolution of his cardiac symptoms.

Conclusion: This case is unique due to the acuity of managing Takotsubo cardiomyopathy, which mimics an MI, while the patient is awaiting the second spine surgery. Furthermore, this case highlights the importance of distinguishing Takotsubo cardiomyopathy from other cardiac pathologies in a timely manner to ensure proper treatment and prevent unnecessary medical or surgical intervention.

School: School of Medicine

PETERSON, JOSHUA

Generalized lichen nitidus in a 6-year-old girl with Down Syndrome

Joshua A. Peterson MSIII, William “David” Boothe MD, Brett Austin MD, Cloyce Stetson MD

Lichen nitidus is a rare inflammatory skin condition characterized by typically asymptomatic flesh-colored papules 1-2mm in diameter. Lesions are usually localized to the trunk, upper limbs, and genitalia. Here, we describe a generalized presentation of lichen nitidus in a 6-year-old female patient with Down syndrome. The patient presented complaining of a widespread, pruritic rash for one year. Aside from these symptoms, the patient reported feeling well. Prior use of CeraVe lotion and hydrocortisone ointment to control the lesions had not been successful. On physical exam, hundreds of coalescing, monomorphic papules were found on the face, trunk, extremities and intertriginous areas. Lesions varied between scaly and shiny, while some linear papules due to koebnerization were found on the right arm. A biopsy was not performed because of the patient’s age. Based upon clinical presentation, the patient was diagnosed with lichen nitidus. The patient was prescribed treatment with daily moisturization with Vaseline or CeraVe lotion and a nightly humidifier. Topical hydrocortisone 2.5% ointment and topical triamcinolone 0.1% ointment were prescribed for when her symptoms worsen. As she is still under treatment, it is unknown if her symptoms have improved or resolved. Lichen nitidus shares a known association with Down syndrome and several case studies report patients with Down syndrome developing generalized lichen nitidus. The extensive nature of our patient’s lichen nitidus, as well as the uncommon distribution (particularly on the face), demonstrates another case of generalized lichen nitidus in a patient with Down syndrome. While a possible association between generalized lichen nitidus and Down syndrome could exist, further exploration and study would be required to determine if these reports document a true relationship or if they are coincidental.

School: School of Medicine

PETERSON, CHRISTOPHER

Academic Journal Retractions and the COVID-19 Pandemic

Christopher Peterson, Caleb Anderson, Dr. Kenneth Nugent

The 2020 COVID-19 pandemic has produced an unprecedented amount of scientific research, with over 100,000 articles on the SARS-COV2 virus or the associated pandemic published within the first year. To effectively disseminate such a large volume of research, many academic journal publishers altered their review criteria, with some publishers foregoing the traditional peer review process altogether. It was argued that expediting the publication process would allow much-needed information about the pandemic to be communicated quickly. Curated online repositories, such as BioRX, have also served as platforms for so-called "pre-prints", or articles made available online before and without a review process by a publisher. Unfortunately, with this rapid influx of information, there have been a number of COVID-19 articles that have been retracted or withdrawn. Some researchers have expressed concern that these retractions call into question the validity of an expedited review process, as well as the quality of the larger body of COVID-19 research. However, few studies have examined the nature of these retracted papers and their implications on COVID-19 research in general. Here we examine 70 such retracted papers, providing a comprehensive description of the articles as well as the reasons for their retraction.

School: School of Medicine

PETRIE, KYLA

Throughout the Courts: Participants in Different Types of Lubbock County Drug Courts, Their Demographics, and Possible Predictors of Recidivism and Graduation

Ellen Brown, Kyla Petrie, Zach Sneed PhD, Regina Baronia MD

Intro: The Lubbock County Drug Court gives offenders with drug-related charges a chance at rehabilitation and a clean record. The program has grown significantly since its start in 2005, adding three courts in addition to the original drug (DCT) and DWI (DWICT) courts, to serve more and higher risk participants. Two re-entry courts from the County Residential Treatment Center (CRTC) and Substance-Abuse Felony Punishment Facility (SAFPF), in-patient rehabilitation programs, and a problem-solving court (PSC) have been added. This project seeks to determine participant demographics and differences between courts that may predict recidivism and graduation.

Methods: Data on 864 participants from 2009-2017 were analyzed using T-tests, Chi-squared tests, and ANOVAs on SPSS-26 to determine the differences between court type and graduation, sex, race, time in the program, age, total number of arrests, and recidivism.

Results: Court type and graduation were associated; 43.2% of CRTC, 47.8% of SAFPF, 77.7% of DWICT, and 69.7% of DCT graduated. There were significant differences in age, time in program, total number of arrests, and number of modifications between court types. Court type and recidivism were associated; 33% in CRTC, 28.3% in SAFPF, 16.2% in DWICT, and 23.6% in DCT.

Discussion: Participants in re-entry courts often struggle with abuse of more addictive substances and for a longer time than other participants. This, along with less time spent in program and younger age in CRTC, helps explain the low graduation and high recidivism rates seen in SAFPF and CRTC. The lowest recidivism and highest graduation rates in DWICT are likely associated with having the oldest age and longest time spent in program. Alcohol use disorder has a longer treatment history and better outcomes than drug use treatment across the nation. The low recidivism and high graduation rates of DCT show a successful baseline for serving drug-related offender populations and program management.

School: School of Medicine

RAHESH, JASMIN

Sutureless Closure of CSF Fistula and Thoracolumbar Surgical Wound

Jasmin Rahesh MS MBA, Rohan Anand MBA, Yana Puckett MD, Robyn Richmond MD, FACS, Catherine Ronaghan MD, FACS

Neurosurgical Thoracolumbar Wound Complicated by CSF Fistula Open for 29 Days, Achieved Definitive Sutureless Closure Within 12 Days After Implantation of Porcine Urinary Bladder Matrix

School: School of Medicine

RIVERA, ELSY

Perception of Quality of Care in Obstetrics and Gynecology Outpatients' Clinic During COVID-19 Pandemic

Annu Dixit, MD, Sarah Kennedy, DO, Rivera Elsy, MS4, Tina Thai, MD, Chanaka N. Kahathuduwa, M.B.B.S., M.Phil., Ph.D., Sabeena Rahman, DO, Christopher Maguire, DO, Kathryn Hutton, MD, Christopher Enakpene, MD, Daniela Pino, MD, Michael Galloway, DO and Natalia Schlabritz-Lutsevich MD, Ph.D.

As waves of COVID-19 cases rose, modifications were made on a city and statewide level. Places providing an essential service continued to run. Outpatient clinics modified their services by mandating masks, incorporating telemedicine, and decreasing the patient load to 25% capacity.Our study was created to get an overview of how patients perceive their care.We also looked at whether the pandemic affected patient access to resources.

Quality of care was assessed through the use of a survey with fourteen questions. A total of 115 patients were given a survey and 107 of those patients completed the study. Patients were provided with an information sheet detailing the study and how their answers would be used. The mean and standard deviations were calculated for each question.

Patients' mean response was neutral for the use of telemedicine in visits (Q.A,5,6,7,8,9).Patients reported above the mean for felt safe during their doctor's appointment and felt satisfied with their care during the COVID pandemic (Q.4, Q.10).Patients reported less than the mean for preferring telemedicine over face-to-face visits(Q.11). Other questions did not have a statistical significance in terms of difference.

After analyzing the results, the majority of patients responded neutrally with their experience with telemedicine. Less than the majority of patients felt negatively impacted by the pandemic. Between the Spanish-speaking and English-speaking patients, Spanish-speaking patients felt more negatively impacted than English-speaking patients. Telemedicine was considered less favorable over face-to-face visits, but patients reported that their care was not negatively impacted. It is interpreted that patients considered telemedicine an inconvenience to their care, while still perceiving a good quality of care.It is possible that the results were taken too early before a significant loss in economic stability was apparent.

School: School of Medicine

ROJAS, ALEXSANDRA

Malignant Dopamine Secreting Paraganglioma in 41-year-old Male

Alexsandra P. Rojas, BA1, Shane Holloway, M.D.2, Eva M Bashover, M.D.3, Stephen J. Usala, M.D., Ph.D1

1Department of Internal Medicine, Texas Tech University Health Sciences Center, Amarillo, TX 79106, USA; 2Amarillo Surgical Group, Amarillo, TX; 3Amarillo Pathology Group, Amarillo, TX

Paragangliomas are a relatively rare subset of neuroendocrine tumors, making up only about 15 to 20% of diagnosed chromaffin cell tumors. Unlike pheochromocytomas, which originate from the adrenal medulla, paragangliomas arise from extra-adrenal chromaffin cells. Most paragangliomas that are hormonally active secrete epinephrine and norepinephrine, causing the classical presentation of headache, palpitations, diaphoresis, and hypertension. However, a rare subset of these tumors produces predominantly or exclusively dopamine and therefore lack these hallmark symptoms. Due to the lack of hyperadrenergic symptoms, diagnosis is more difficult and often delayed until the mass is large enough to cause symptoms of mass effect. Dopamine-secreting paragangliomas also tend to have a higher malignancy potential, further complicating treatment. We present the case of a malignant dopamine secreting paraganglioma in a 41-year-old male. On first presentation to endocrine clinic, the patient complained of lack of appetite and lower back pain. Three months previously, CT of abdomen and pelvis revealed an incidental 7.7 X 5.5 cm retroperitoneal/periaortic mass suspicious for neoplasm. Biopsy at the time indicated markers suspicious for a neuroendocrine tumor. Subsequent evaluations revealed consistently elevated blood dopamine levels, suggesting a dopamine-secreting neuroendocrine tumor. The patient underwent resection of the mass without complication, after which pathology confirmed diagnosis of a grade 3 malignant neuroendocrine tumor with immunohistochemistry suggestive of malignant paraganglioma. Due to the dopamine-secreting attribute of the tumor, alpha-adrenergic blockade with phenozybenzamine or doxazosin was not done pre-operatively in order to avoid possible life-threatening hypotension. By presenting this case, we hope it will serve as an example of how to identify and treat malignant dopamine-secreting paragangliomas, therefore improving outcomes in affected patients.

School: School of Medicine

SINGHAL, ESHA

Role Of Critical Access Hospitals In Trauma

PI - Sharmila Dissanaike, MD; Co-Investigators - Esha Singhal, BS; Tiffany Xu, BS; Hasan Almekdash PhD; Destiny Anamege, BS; Adel Alhaj Saleh, MD; Jenny Lazarus, MD; Amber Tucker, MSN, RN, CEN

While it is well established that a robust trauma system improves outcomes for injured patients by ensuring they are transferred to a higher level of care when needed, it is unclear which interventions undertaken at the primary critical access hospital may be most valuable in improving ultimate outcome. The aim of this retrospective study is to compare the outcomes of trauma patients directly transported to a level I trauma center versus those who are first stabilized at nontertiary hospitals and then transferred.

This retrospective study was performed using the trauma registry of the University Medical Center in Lubbock, TX. UMC is a state designated Level 1 trauma center that admits between 3000- 4000 trauma patients a year. Patient details included mechanism of injury, basic demographics, and whether the patient was transported directly from the scene, or after first being stabilized at critical access hospital. For patients who were transferred in after stabilization at a critical access hospital, we explored what interventions were performed. Interventions performed at the critical access hospital were grouped into 5 categories: (1=CT/MRI, 2=X-rays/ultrasound/inspection, 3=transfusion/infusion, 4=procedures, 5=operations). Length of stay at the critical access was measured. TRISS and ISS were utilized to assess trauma severity. Outcomes measured included the ICU length of stay, hospital length of stay, and discharge status.

Those patients who received CT/MRIs and stabilized at a CAH were more likely to survive as compared with any other procedure. Therefore, based on survivability predictors, there was neither a significant disadvantage or advantage for survivability in transferring patients indirectly or directly to UMC. Critical access hospitals prove useful for initial stabilization through procedures such as imaging and can help reduce ICU length of stay, but ultimately, do not provide a statistically significant survival benefit.

School: School of Medicine

SWINNEY, SETH

COVID-19 and Acute Encephalopathy in a Patient with Dementia: A Case Report

Seth Swinney; Tate Leatherwood; Gabriel Neves, MD; Jeannie Lee, MD; Parunyou Julayanont, MD

A novel coronavirus known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was detected in Wuhan, China in December 2019. Since then, SARS-CoV-2 has been identified as the COVID-19 pandemic. It has challenged the health care system, disrupted the norms of society, and, most importantly, placed individuals with Alzheimer's disease or related dementias in vulnerability. The risk of contracting COVID-19 targets the population with dementia in different ways. Individuals with severe dementia are often unable to follow recommendations, such as maintaining hand hygiene or physical distance from others. Many of those with milder forms of dementia have depression or apathy and, thereby, unwilling to follow the general guidelines that the public health authorities recommend.

The typical presentation of a respiratory virus, such as SARS-CoV-2, involves fever, cough, and shortness of breath. Morbidity and mortality rates are highly associated with the patient's age and comorbid medical conditions. In the dementia patient population, age is one of the factors that is most highly associated with dementia. On top of the age factor, morbidity and mortality is increased in this population as comorbidities are also associated with older age. Large-scale studies have demonstrated that the mortality rate from COVID-19 pneumonia has been reported to be twice as high in individuals with dementia compared to that of those without dementia.

While flu-like symptoms are the most classical presentation of upper respiratory viral infections, prior studies have demonstrated extensively that the initial presentation of COVID-19 infection is variable. We present a case report of a patient with Alzheimer's dementia who presented with acute decline in functional and mental status.

School: School of Medicine

TERZIYSKI, ILINA

A Retrospective Analysis of Systemic Norepinephrine Impact on Tangential Excision and Split Thickness Skin Graft Outcomes in Burn Shock Patients

Ilina Terziyski; Annie Snitman; Albin John; Grant Sorensen, PhD; Callie Adams; Matteo Novello, MD; John Griswold, MD

Background: Severely burned patients can present with burn shock, which often occurs within 24 hours following burn injury. Initial resuscitation often involves administering IV crystalloids to effectively treat the hypovolemia. In patients non-responsive to fluid challenges and correction, vasopressors, like norepinephrine, represent the last therapeutic resource. However, systemic vasopressors may reduce blood flow to the dermis and subcutaneous tissue, which can theoretically impede skin graft take and result in reoperations.

Objective: This study aims to highlight the role of systemic vasopressor use in patients with burn shock and its impacts on surgical split-thickness skin graft healing.

Methods: Our study retrospectively identified patients, of all genders, ages 0-89, who presented to Timothy J. Harnar Burn Center at University Medical Center in Lubbock, TX from January 2014 –June 2019 with burn shock, were treated with vasopressors within the first 48 hours of admission, and received at least one tangential excision and split-thickness skin graft (STSG) procedure as part of their treatment. We used graft take percentage at graft takedown as our main dependent variable and measure of STSG healing.

Results: 19 patients met our inclusion criteria. Within our patient sample, we also analyzed variables such as patient sex, TBSA, vasopressor timing, and vasopressor dose but found no correlation between these variables and skin graft take percentage. The mean percent graft uptake for the 19 burn patients was 76.63%.

Conclusion: We hypothesized that patients who received systemic norepinephrine to treat burn shock in the first 48 hours of their hospital stay would have poor graft take. Our results reject our hypothesis. Based on our findings, administering systemic norepinephrine does not have enough of a detrimental effect on skin graft healing to warrant withholding its use in patients who require burn shock resuscitation.

School: School of Medicine

THOMPSON, CAROLINE

Restorative Yoga Therapy for Third Year Medical Students in Pediatrics Rotation: Working to Improve Medical Student Well-being

Caroline Thompson, Ellen Brown

Medical education can be a very demanding training program. The resulting stress can negatively affect students' well-being: research has shown a high prevalence of anxiety among medical students and increases in stress as students proceed through training. One solution is the implementation of a yoga practice. Reviews of yoga practices suggest that they can reduce the impact of stress, anxiety, and depression. The goal of this project is to design and evaluate a restorative yoga program to help students cope with stress, anxiety, and depression and benefit their overall well-being.

Medical students on their Pediatrics rotation voluntarily completed 6 weekly 45-minute yoga sessions. Students completed the Warwick-Edinburgh Mental Well-being Scale (WEMWBS) before and after the 6-week period, as well as a satisfaction questionnaire. The classes were in-person, then moved online March 2020 due to COVID-19.

Every statement except one from the WEMWBS showed a positive increase in the average rating. Four statements showed the most improvement: "I've been feeling relaxed" increased by 39.19%, "I've been able to make up my own mind about things" by 20.12%, "I've been thinking clearly" by 15.27%, and "I've been feeling optimistic about the future" by 13.89%. 70% of participants endorsed recommending participation in a program like this to a friend and 60% felt the program benefited their overall wellbeing and would participate again.

These data indicate that restorative yoga could improve the well-being of medical students, specifically increasing relaxation and reducing stress around decision making. Positive ratings for recommending the program to a friend and participating again signal long-term usefulness of the program with potentially enduring benefits on well-being. Unfortunately, participation declined when classes moved online due to COVID-19. In the future, we hope to return to in-person sessions as precautions allow.

School: School of Medicine

VARGAS, AURELIO

Successful Pregnancy with Left Ventricular Assist Device Failure in the Setting of Peripartum Cardiomyopathy

Sabiha Armin, BS; Aurelio Vargas, BS; Edward Yeomans, MD

Peripartum cardiomyopathy (PPCM) is a rare condition defined as systolic heart failure in the last month of pregnancy or during the first five postpartum months. Pregnancy is contraindicated for women with left ventricular dysfunction due to high maternal and fetal mortality. Risks regarding heart failure exacerbations arise from the physiological changes during pregnancy. A 31-year-old woman, gravida 4, with heart failure due to PPCM from her previous pregnancy, presented to the clinic after a positive pregnancy test. The patient had a Left Ventricular Assist Device (LVAD) implant due to decreased left ventricular ejection fraction (LVEF) and was on warfarin due to recurrent thrombotic complications associated with her device. She also had type II diabetes treated with insulin and hypertension treated with amlodipine. Throughout her pregnancy, management focused on signs of cardiac decompensation, placental insufficiency, and obstetric complications. Medical regimen was modified to exclude drugs with teratogenic potential. She remained on metoprolol, furosemide, and hydralazine for her PPCM and insulin and metformin for her glucose control. Obstetric visits were scheduled every two weeks in which the patient had multiple cardiac complications, including necessitation of LVAD deactivation. At 32 weeks, a successful cesarean section was performed. Post-surgery, the patient's transthoracic echocardiographic examination revealed LVEF of 30-34%, dilated LV, with moderate global hypokinesis. Her heart failure medication regimen was optimized. Because her LVAD was placed by cardiologists in a facility in another city, she was transferred for further care. This case highlights the need for coordinated care from specialists, such as cardiologists and maternal-fetal mortality obstetricians, to improve hemodynamic status, minimize symptoms, and obtain the best fetal outcome. The patient delivered an infant and avoided worsening cardiac function despite her deactivated LVAD.

School: School of Medicine

VO, DIANA

Deadliest Catch

Diana Vo, MS3, Ronald Cook, D.O., Jessica Gray, M.D.

A 34 y/o male, with no significant PMHx, presented to the emergency room with the complaint of severe shortness of breath, wheezing, and anxiety. His symptoms developed 9 hrs prior to arrival while he was cleaning his salt-water fish tank containing his zoanthid coral when he agitated the coral by moving it in the tank. It released a substance from its polyps bubbling to the surface of the tank. His face was less than two feet from the surface of the water at the time of the chemical release. Within minutes, he began to have dyspnea, subjective fever, chills, nausea, vomiting, and a sore throat. The patient attempted to shower and take an OTC antihistamine without relief and drove himself to the ED.

Upon physical exam, the patient was alert and in moderate distress. His blood pressure was 160's/100's, heart rates was in the 130's, temperature was 98.7, respiratory rate was 28, and O2 saturation was 95% on 3L nasal cannula. His mucous membranes were dry, with no oropharyngeal erythema. There was decreased air movement throughout and diffuse wheezing in all lung fields and labored breathing. He was tachycardic, with a regular rhythm, and mild edema of cheeks and hands. No rashes, cyanosis, wounds, or petechiae was seen. No focal deficits. DTR were 2+. Oriented x4 and appeared anxious.

12-lead ECG showed sinus tachycardia. CXR was negative for pathology. The patient's lab work was mostly unremarkable except for a WBC of 15,200.

Diagnosis: Zoanthid coral palytoxin chemical pneumonitis.

The Palythoa spp. corals are often sold at local pet stores and have modest life requirements and are easy to breed, making them a popular candidate for home aquariums. However, the polyps of these seemingly benign coral species contain palytoxin (PTX), a deadly marine toxin. It causes cell swelling and cell death. There is no antidote for PTX exposure and treatment is supportive care.

School: School of Medicine

WAKIL, ANISA

COVID-19 Vaccination: The Race for a Cure and Possibility of Herd Immunity

Sabiha Armin BS, Anisa Wakil BS, James Tarbox MD, Kenneth Iwuji, MD.

Since the Severe Acute Respiratory Syndrome Coronavirus-2 2 (SARS-CoV-2 also known as COVID-19) was discovered in December 2019, there have been tireless efforts by the medical and scientific communities to understand the pathophysiology, treatment, and prevention of this respiratory illness. In the last few months, several therapeutic treatments including steroid, antivirus, convalescent plasma, and many others have been tried for the treatment of SARS-CoV-2 with varying results. Pfizer and Moderna COVID-19 vaccines recently got approved for Emergency Use Authorization by the FDA. Although COVID-19 vaccine development is the first hurdle in the race for a cure, the following challenges remain: adequate vaccine doses, issues with mass distribution, global access, proper storage, and sufficient vaccine compliance.

COVID-19 is an enveloped, positive-stranded RNA virus containing spike-like projections of glycoproteins on its surface. Studies of SARS-CoV-2 genomic sequences indicate that the receptor binding domain of the S glycoprotein is highly conserved, providing hope for a successful vaccine directed at a stable target. Most vaccine trials are targeting the S protein, which contains 2 subunits - S1 and S2, with a receptor binding site found on S1.

There is still a question about how long immunity to COVID lasts after natural infection, but experiments showed that these antibodies to SARS-CoV-2 could block the virus from infecting cells, and so developing a vaccine has been a priority. However, if the virus mutates frequently then herd immunity may never be reached. Therefore, pandemic strategies cannot use natural infection to achieve herd immunity, as this will lead to uncontrolled transmission and overwhelm healthcare facilities and the workforce.

School: School of Medicine

WALTERSCHEID, BROOKE

Assessing skin of color representation in pre-clinical medical coursework

Brooke Walterscheid, MS4, Michelle Tarbox, MD

The underrepresentation of skin of color (SoC) in dermatology and the greater field of medical education is not of novel realization. For decades, it has been known that SoC is severely lacking in medical literature, but it is overrepresented in portraying venereal disease. In fact, clinical images depicting SoC, defined as Fitzpatrick types IV-VI, encompass 4.5 to 25% of the clinical images displayed in major dermatology and other influential medical textbooks, including the predominant USMLE licensing exam preparatory materials. Thus, medical students must turn to other resources to receive this necessary education. As pre-clinical lectures are the root of early medical education, the use of clinical images during these formative years should be analyzed to ensure proper representation of diverse skin types. Implicit biases unbeknownst to the educators themselves may be negatively impacting the representation of SoC, thus evaluating clinical imagery can provide a quantifiable assessment for the cumulative representation of SoC. In an institutional analysis of medical student lecture materials, all images from pre-clinical lectures representing a clinical diagnosis from 2017-2019 were isolated and compiled into a singular bank. Each image was then correlated with its approximate Fitzpatrick type. Preliminary reports showed that Fitzpatrick types IV-VI represented approximately 16% of all clinical images used during the MS1 curriculum from 2017-2018 (43 of 267), and SoC was predominately utilized to represent venereal disease at 60% (9 of 15). These findings are consistent with the aforementioned data on SoC representation in major textbooks and board preparatory materials. Better representation of diverse skin types will contribute to a more comprehensive medical education and positively impact patient care via diagnostic accuracy and cultural competency, and such data permits educators to correct this gap in education.

School: School of Medicine

WILSON, ELLEN

The Bougie Went Easy, but Oops!

Jasmin Rahesh MS MBA, Ellen Wilson BS, Muhammad Nazim MD, Hassan Ahmed MD

Background: A 76 year old woman with symptomatic paraesophageal hernia repair (PEH).

Objective: This case report describes a rare complication and effective management of esophageal mucosal rupture after Bougie insertion.

Methods: After favorable preoperative workup, the patient underwent Robotic PEH repair with Nissen-Hill hybrid repair. A 58-French bougie was used intraoperatively to configure fundoplication. Upper-endoscopy revealed a longitudinal 7-8 cm esophageal mucosal tear, which was repaired successfully with endoscopic clips. As a precaution, bilateral chest tubes, venting gastrostomy and feeding jejunostomy tubes were placed.

Results: Upper GI-fluroscopy revealed no leaks. Uneventful postoperative course discharged on full liquid diet. Tubes were removed in clinic 8 weeks later.

Conclusions and Implications: Mucosal tears secondary to Bougie insertion are a rare complication, but can be effectively managed with endoscopic intervention.

School: School of Medicine

YAMASHIRO, JUSTINE

Risk of chronic kidney disease in patients with retained ureteral stents

Justine R Yamashiro MS3, Cornelia S deRiese, MD, PhD, Werner T deRiese, MD, PhD

Objective: Numerous publications describe the management of stent encrustations, but few address long-term risks. The purpose of this study is to analyze the incidence of new chronic kidney disease (CKD) attributed to retained ureteral stents in a large multi-institutional patient population.

Materials and Methods: A retrospective chart review of stone disease patients with ureteral stent placement was done in the nationwide Cerner Health Facts database between July 10, 2009 and June 7, 2018. Estimated glomerular filtration rate (eGFR) was calculated using serum creatinine and the Modification of Diet in Renal Disease Study equation. The study focused on patients with stent duration longer than 6 months and an eGFR above 60 ml/minute/1.73m2 before stent placement.

Results: A total of 1,234 stent placements were documented in the Cerner database, 108 patients had a normal eGFR prior to the retained stent. The median duration of retained stents was 12.1 months (range 6.1 to 77.7 months), and 33 (30.6%) patients developed new onset CKD compared to 8.3% in patients with non-retained stents.

Conclusion: New onset of CKD was observed in 30.6% of patients with retained ureteral stent, emphasizing the importance of patient counseling and preventative measures to ensure patient compliance and follow up.

Keywords: Obstructive Urolithiasis, Ureter, Retained Stents, Chronic Kidney Disease

School: School of Medicine

ZADOO, SAN

Improving Care of Psychiatry Patients in Crisis: Alternatives to the Emergency Department

San Zadoo, MSIV & Alexander Danaj, MD

The deinstitutionalization of Psychiatry in the 1960s left a vacuum of care for patients suffering from severe mental illnesses. Beds within Psychiatric hospitals have decreased 32% from 2000 to 2016 due to defunding within the field. This reduction in resources, combined with the shortage of skilled mental health workers, has created a severe dearth of options when patients in the United States experience a mental health crisis. Patients are forced to visit the Emergency Department which is oftentimes a location that can exacerbate their condition. This literary review will discuss barriers to providing optimal care to psychiatric patients in this setting and suggest three systemic, alternative interventions to help alleviate suffering for such patients. One of the most meaningful interventions has been to create dedicated, free-standing Psychiatric Emergency Departments or Crisis Walk-In Clinics capable to accepting patients who do not have insurance. Most patients seen at such facilities are effectively stabilized within 24 hours by professionals trained to handle their disease process. Patients acquire care more quickly than the 11-hour average found in EDs. Another intervention solves the problem of "boarding" where patients are held involuntarily in the ED, waiting for a dedicated inpatient bed to become available. This solution involves creating an online database for providers to find available psychiatric inpatient beds within the state and allows them to quickly transfer patients. The last intervention is a co-management model where patient care is shared between an attending-level psych consultation-liaison service and Emergency Department providers. Using a multidisciplinary team and creating a standardized procedure scoring tool allowed time to first medication to improve from 43 minutes on average to less than 5 minutes.

School: School of Medicine

SCHOOL OF NURSING

KRISTINE ANDERSON, LUCIUS LOMAX, & SUZANA ZUKANOVIC

Traumatic Brain Injury and Reducing ICP Spikes

School: School of Nursing

KIM BARNETT BSN, RN & SHANNON BELLA BSN, RN, RNC

E-Cigarette (EC) Use in Tobacco Cigarette Cessation

School: School of Nursing

CORINNE BERG

Self-Management Practices of University Students with a Mental Health Disorder; A Novice Research Assistant Perspective

School: School of Nursing

YVONNE CASTRO & LAUREN SHADDOX

Complementary Medicine Versus Epidural Analgesia for Pain Relief in Labor

School: School of Nursing

NICHOLE CHISUM BSN, RN

Treating Depression in Adult Patients

School: School of Nursing

MARISSA HILL BSN, RN & DARLYN SUSTAITA BSN, RN

Depression Management in Major Depressive Disorder

School: School of Nursing

SHELBY JONES BSN, RN & ANGELA HARLESS BSN, RN

Prophylatic Hypothermia in Brain Injury

School: School of Nursing

SHELBY MOTT BSN, RN

Helmets: Their Efficacy in Contact Sports

School: School of Nursing

JENNIFER REEB RN, BSN, JULIE MARTINEZ RN, BSN & RAEANNA JUDD RN, BSN

Beyond skin: Organ Dysfunction in DRESS Syndrome

School: School of Nursing

JOSETTE REEB & LEXIE BAILEY

Type II Diabetes Mellitus Management

School: School of Nursing

PHILIP SARTIN BSN, RN & SARAH STEVESON BSN, RN

Biofeedback Therapy for Depression

School: School of Nursing

ANGELA WILLIAMS & CHRISTA CRUMRINE

Weight Loss and Quality of Sleep

School: School of Nursing

RESIDENTS & CLINICAL FELLOWS

ADAMS, KAKA

Pott's Puffy Tumor in a 5-year-old Female

Dr. KaKa Adams M.D. and Dr. Eudys Briceno-Brito M.D.

Pott's Puffy Tumor is a rare complication of frontal sinusitis in young children that results in acute osteomyelitis of the frontal bone with associated subperiosteal abscess causing swelling over the forehead, with the possibility for intracranially spread. This particular pathology is more commonly seen in adolescents and young adults; therefore, can easily be excluded from the differential diagnosis in younger children due to the delayed onset and natural development of the frontal sinuses. Our patient is a previously healthy 5 year old female who presented with one week of severe frontal headaches, forehead swelling, and left orbital swelling/pain that was controlled by OTC analgesics. No prior medical history of chronic headaches, seasonal allergies, or recurrent ear infections were noted. Further investigation with CT & MRI were consistent with Pott's Puffy Tumor, intracranial extension with epidural empyema and left frontal cerebritis. Due to the worsening of symptoms, the patient underwent a FESS procedure and prompt antibiotic coverage via PICC line. Patient continued to be stable and had improvement in her symptoms. The frontal sinuses in children start to develop around the age of six to eight years, but do not complete their development for another 8 to 10 years. This case highlights the need to properly diagnose Pott's Puffy Tumor clinically in a younger child. Early diagnosis and treatment is imperative due to the potential propagation of intracranial infection.

School: Texas Tech University Health Sciences Center

GAGNON, DOMINIQUE

Postpartum Psychosis Secondary To Thyrotoxicosis

Brenda Chavez, MD, Dominique G. Gagnon, MD. PhD., Dhruv Patel, MBA, Jeohassin Cordero, MD, Sarah Wakefield, MD., Franklyn C. Babb MD FAAFP, Jaime Haynes MD.

Thyrotoxicosis is a rare complication of untreated hyperthyroidism. It can be triggered by infection, trauma, surgery, parturition etc. Signs and symptoms of thyrotoxicosis include weight loss, tremor, anxiety, palpitations, shortness of breath, hypertension, tachycardia and tachypnea. Unfortunately, little is known about postpartum thyrotoxicosis-induced psychosis.

A 20 yo G2P2 female presented to the ED on postpartum day 10 with complaints of anxiety and insomnia. Her hyperthyroidism had been uncontrolled during her pregnancy despite methimazole treatment. She was showing new onset paranoia and delusions. Vital signs showed tachycardia but no hypertension. Lab showed TSH<0.01 (0.27-4.20), free T4 3.83 (0.93-1.70), free T3 12.90 (2.30-4.20), and antithyroid peroxidase 110 (<34). She was admitted for thyrotoxicosis and unspecified psychiatric disorder. She was started on propylthiouracil (PTU) and propranolol. She became distrustful, combative, aggressive, and displayed visual and auditory hallucinations. Psychiatry concluded that she was unable to make medical decisions and subsequently restrained in the ICU. Her medication regimen was switched to methimazole, propranolol, hydrocortisone, and potassium iodide resulting in progresive, but slow return to euthyroidism. Nursing staff reported frequent episodes of hallucinations and inappropriate behavior (eg. disrobing, refusal of medications and analysis). ENT performed a total thyroidectomy, unfortunately, her psychosis persisted. Psychiatric differential diagnosis included psychotic disorder due to postpartum thyroiditis or bipolar spectrum disorder with peripartum onset. She was subsequently started on Zyprexa. After several days of monitoring, her delusions, hallucinations, and orientation improved and she was discharged home with social support and clinic follow-up. This is a unique case of thyrotoxicosis-induced severe psychosis postpartum, despite total thyroidectomy and return to euthyroidism.

School: Texas Tech University Health Sciences Center

HUGGETT, AMANDA

Transrectal Migration of Distal Ventriculoperitoneal Shunt Catheter Tubing

Amanda Huggett, DO PGY1; Reagan Collins, BA MS1; Laslo Nagy, MD

Transrectal migration of ventriculoperitoneal (VP) shunt is a rare complication documented in the literature to occur in only 0.1-2.5 % of cases. We describe a case of a 2-year-old female presenting with transrectal extrusion of her ventriculoperitoneal (VP) shunt tubing and subsequent management. Multiple causes of this complication are proposed in the literature, however the pathogenesis of shunt tube migration is still unclear. Varying presentations and subsequent sequelae make timely diagnosis and intervention essential for improving outcomes in these patients.

School: Texas Tech University Health Sciences Center

IWUJI, KENNETH

Macrophage Activation Syndrome in Adults

Taylor Warmoth, MD, Malvika Ramesh BS, Kenneth Iwuji, MD and John S. Pixley MD

Macrophage activation syndrome (MAS) is a form of hemophagocytic lymphohistocytosis that occurs in patients with a variety of inflammatory rheumatologic conditions. It is often misdiagnosed in adults who have a prior rheumatic diagnosis. Traditionally, it is noted in pediatric patients with systemic juvenile idiopathic arthritis and systemic lupus erythematous. MAS is characterized by excess immune activation and can lead to multiorgan failure if left untreated with an estimated mortality rate of 40% in children. It has become clear recently that MAS occurs in adult patients with underlying rheumatic inflammatory diseases. Herein we describe 6 adult patients with likely underlying MAS. This case series will outline factors related to diagnosis, pathophysiology and review present therapeutic strategies.

School: Texas Tech University Health Sciences Center

LAYHER, HEATHER

A Case of an Adnexal Iceberg; Danger Lurks Beneath the Surface

Heather Layher MD, Landon Hope BS, Dylan Maldonaldo MD, Michelle Tarbox MD

Introduction: Keratinocytic carcinomas may at times demonstrate adnexal differentiation. We present a case of basal cell carcinoma with features of aberrant, follicular and apocrine, differentiation along with a brief review of the literature.

Methods: A 68-year-old male patient presented initially to our clinic with generalized pruritus. Upon physical exam, a 7mm papule with telangiectasia overlying a 3 centimeter nodule was found on his left mid back. The lesion was asymptomatic and related that he had been told previously that it was a cyst. A shave biopsy of the 7 mm papule was performed which revealed nodular aggregates of basaloid cells invading the dermis and focally reaching the deep edge of the relatively superficial biopsy specimen. The patient returned for excision of the lesion with the underlying nodule. At the time of excision, keratinaceous debris was expressed as the specimen was removed to be placed in the specimen cup. The entire specimen was sent for histopathologic review.

Results: The working diagnosis at this time was re-excision of basal cell carcinoma with underlying epidermal inclusion cyst. The histopathology of the excision specimen demonstrated a complex epithelial neoplasm comprised of varying elements with basaloid, apocrine, epithelioid, and sebaceous differentiation along with a large complex cystic structure with variable types of epithelial lining. Immunohistochemical staining and expert review at the Cleveland Clinic confirmed a diagnosis of basal cell carcinoma with features of aberrant, follicular and apocrine, differentiation.

Conclusion: BCC with aberrant differentiation is a distinct pathologic entity and a rare subtype of BCC featuring varying elements of follicular adnexal structures. This case serves to highlight this unusual variant of basal cell carcinoma, methods for evaluation, and potential pitfalls in diagnosis.

School: Texas Tech University Health Sciences Center

LURTSEMA, RYAN

Chicken or the Egg?

Ryan D. Lurtsema MD; Frank Perez, CAFS, LAT, ATC, MAT; Colbert Perez, MD; Roy Jacob, MD; Jennifer Mitchell, MD, FAAFP, FAMSSM

Case History: A 19yo male D-1 Cross Country athlete was seen for return to play (RTP) clearance following COVID-19 infection. Patient diagnosed via routine team screening and reported only one day of sore throat during his 10-day isolation. At clinic visit, patient denied fever, chills, CP, SOB, peripheral edema, or syncope. Patient disclosed running 3 miles daily during isolation, including the morning of evaluation.

PMHx: Uncomplicated; PSHx: None; Meds: None

Physical Exam: Vitals: T 97.7oF; BP 114/58; HR 63; RR 12; Pox 97%; Gen: AOx4, no acute distress; CV: RRR, no m/g/r. 2+ peripheral pulses with no edema; Resp: CTAB, no w/r/r; Abd: Soft, non-distended, non-tender to palpation

Tests and Results: ECG: No changes from baseline (Aug 2019); TTE: Normal; no changes from baseline (Aug 2019); High-Sensitivity Troponin T (hsTnT): 22.3 (NL: <19.0); repeat 3 days later: 9.1; Cardiac MRI (cMR): LV EF 52% (NL: 59-74%); RV EF 38% (NL: 43-65%) with RV dilation; regional wall dyskinesia involving the LV apex; Interpretation: Non-ischemic cardiomyopathy; Repeat cMR 3mo Later: LV EF 52%; RV EF 28% with RV dilation; global hypokinesia

Working Diagnosis: Post-COVID-19 Non-Ischemic Cardiomyopathy

Discussion: Exercise during COVID-19 myocardial injury may precipitate malignant ventricular arrhythmia, mandating cardiopulmonary clearance before RTP. Evaluation includes: H&P, ECG, TTE, and hsTnT. If abnormal, cMR can identify cardiac sequelae, such as: cardiomyopathy, myocarditis, or silent cardiac inflammation. In this case, cMR identified ventricular dysfunction not seen on TTE. Data such as this are crucial in further refining RTP criteria after COVID-19 infection.

Outcome: Given persistence of reduced cardiac function on cMR, the patient remains held from physical activity. He is currently scheduled for genetic labs to further evaluate post-COVID cardiac changes vs. an underlying cardiomyopathy and will be seen at a cardiomyopathy referral center.

School: Texas Tech University Health Sciences Center

MALDONADO, DYLAN

Stellate Eschars in a Patient with Renal Failure

Dylan Maldonado, MD,1 Nathan Chow, BS,2 Jeannie Nguyen, MD,1 Michelle Tarbox, MD,1,2 Cloyce Stetson, MD1,2.

1 Texas Tech University Health Sciences Center, Department of Dermatology, Lubbock, TX; 2 Texas Tech University Health Sciences Center, School of Medicine, Lubbock, TX

We present a case of a 51-year-old female with a history of CKD stage 5 who presented with a one-month history of painful progressive black necrotic lesions on her bilateral thighs and left lower leg. Calciphylaxis is a disease process that develops due to calcification of arteriole walls and subcutaneous capillaries, leading to thrombotic occlusion of vessels.1,2 It occurs most commonly in the setting of renal disease, with an estimated prevalence of 4% among patients with end-stage renal disease (ESRD) undergoing hemodialysis.3 Other risk factors include obesity, diabetes mellitus, and female gender13. Early manifestations of the disease include painful patches of erythema or retiform purpura, particularly in sites with ample adipose tissue or trauma. A dusky gray color may develop and progress into ulcerations with black, leathery eschars with surrounding induration. The differential diagnosis for calciphylaxis based on the presentation of retiform purpura includes thrombotic sources, embolic sources, and vasculitides. Skin biopsy remains the gold standard for diagnosis of calciphylaxis; histopathology must show calcified small vessels within the subcutaneous fat on histopathology. Radiologic imaging can aid in the diagnosis if skin biopsy is not available or is inconclusive.4-8 The one-year mortality is reported to be 45-80%, with sepsis being the leading cause of death. Treatment includes meticulous wound care, intravenous sodium thiosulfate, management of mineral bone disease (normalization of serum calcium, phosphorus, parathyroid hormone), and avoiding protein-energy malnutrition9. Our patient was discharged to inpatient rehabilitation for wound care assistance, a high protein diet as tolerated, and intravenous sodium thiosulfate three times per week.

School: Texas Tech University Health Sciences Center

MOTES, ARUNEE

Impact of Angiotensin-Converting Enzyme Inhibitors/Angiotensin Receptor Blockers on Renal Function in Chronic Kidney Disease Patients undergoing Coronary Angiography

Arunee Motes, Praveen Ratanasrimetha, Sariya Wongsaengsak, Yuttiwat Vorakunthada, Thammasak Mingbunjerdsuk, Camillo Pena, Kenneth Nugent

Background: Cardiac catheterizations and coronary angiography are minimally invasive methods for studying the heart and the coronary arteries, using iodinated-radiocontrast agents which can cause acute kidney injury (AKI). Angiotensin-converting enzyme (ACE) inhibitors and angiotensin receptor blockers (ARB) have been widely used due to their well-established benefit in coronary artery disease and renal protection in diabetes mellitus. Renin angiotensin-aldosterone system inhibitors can induce AKI in some patients.

Method: This study analyzed the effect of radiocontrast media used for coronary angiography on renal function in patients with chronic kidney disease (CKD) stages 2–5 who also took ACE inhibitors/ARB medications. Information was collected from the electronic medical records of 116 cases to determine changes in creatinine following angiography.

Result: The average age of patients was 65.2 ± 12.3 years. There were 89 men (76.7%) and 27 women (23.3%). Six patients had documented ACE inhibitor discontinuation, and one patient had documented ARB discontinuation prior to their procedures. Based on the criteria of an increase in serum creatinine (SCr) by ≥ 0.3 mg/dl within 48 hours, 19 cases (16.4%) had AKI. Based on the criteria of increasing in SCr to ≥ 1.5 times baseline, AKI developed in 2 cases (1.7%) on day 1, 4 cases (3.5%) on day 2, and 7 cases (6.0%) on day 3 after coronary angiography.

Conclusion: The study indicates that coronary angiography with contrast does not cause clinically important changes in creatinine in patients with CKD stages 2-5 who also take ACE inhibitors/ARB medications.

School: Texas Tech University Health Sciences Center

PURSER, JEREMY

Axillary granular parakeratosis in a patient following cutaneous bacterial infection

Chelsea Gerlicki, MS2, Jeremy Purser, MD, Michelle Tarbox, MD

Granular Parakeratosis is a rare, idiopathic, benign skin condition that results in brown-red papules that can coalesce into plaques typically located on intertriginous surfaces. [1,2]. The etiology is thought to be due to an acquired keratotic dermatosis proposed to be secondary to a defect in the processing of profilaggrin to filaggrin [3]. Granular parakaratosis is diagnosed based on distinct histologic characteristics of a thickened and compact stratum corneum with parakeratosis and retention of kertohylain granules [1]. We present a case of a 59-year-old female who presented with a pruritic erythematous velvety plaque to the left axilla with clinical evidence of impetigo, and later histologic evidence of granular parakeratosis. This case presents a unique presentation of axillary granular parakeratosis, along with noteworthy dermatoscopic findings.

School: Texas Tech University Health Sciences Center

ROSALEZ, RAFAEL

Not Par For The Course: Pathologic Fracture in Ollier's Disease

Rafael Rosalez, MD; David S. Edwards, MD; Frank Perez, CAFS, LAT, ATC, MAT; Kevin Crawford, MD; Jennifer Mitchell, MD, FAAFP, FAMSSM

History: 18 yo male College Track & Field athlete, acute onset of right hand pain after hitting golf shot

Impact with the ball was normal; club did not hit the ground. He was unable to continue playing and contacted athletic trainer who splinted the #4 digit at site of pain/swelling. Saw team physician the next day. Patient's concern was how this would impact his ability to compete in his throwing events. PMHx: Ollier's disease (OD) PSHx: Surgical revision metacarpal lesion at 13 yo

Physical Exam: Vitals: WNL; Right Hand: swelling and ecchymosis over distal #4MC and #4 middle phalanx; swelling over dorsal ulnar hand. Fingers with FROM other than #4 limited by swelling and pain; unable to bend finger to make a fist; able to palpate mass at base of #4 proximal phalanx and MC; significant ttp over #4 middle phalanx and palpable mass

Differential: 1: Fracture of #4 Phalanx and/or Metacarpal; 2: Contusion hand/finger; 3: Ollier's disease, pathologic fracture; 4: Osteofibrous Displasia; 5: Osteosarcoma

Outcome: 3 View XR Left Hand, #4 Digit: Non-displaced, pathologic fracture just distal to an enchondroma at the middle phalanx; enchondromas at #4 proximal phalanx and midshaft #4 metacarpal. 10 days later: no significant change in healing, no displacement. 5 weeks later: fracture mostly healed. Enchondromas unchanged.

Healing fracture reassuring; awaiting input from sarcoma specialist if surgical stabilization may be required for return to play. Weighted throws (discus, hammer) transmit enough stress to the bone to risk repeat fracture.

Discussion: Ollier's disease is a rare disorder of bone with enchondromas formed in the appendicular skeleton. Incidence is about 1/100000. Tumors are typically benign but may cause fragility of the cortical bone near the enchondromas, leading to fractures. OD is often diagnosed in adolescence after pathologic fracture. Potential for malignant transformation of enchondromas to chondrosarcoma is 5%-50% typically after 45 yo

School: Texas Tech University Health Sciences Center

SARANGI, ASHISH

Staff perspective on challenges of psychiatric care delivery in a nursing home during the COVID-19 pandemic.

Ashish Sarangi MD, Chief Resident in Psychiatry, Department of Psychiatry, Texas Tech University Health Sciences Center- Lubbock

COVID-19 has significantly impacted delivery of psychiatric care in the nursing home setting across the United States. Various healthcare systems have scrambled to develop and implement testing measures across psychiatric nursing homes. Lack of bed availability, stigma associated with a COVID-19 diagnosis and neuropsychiatric presentation of the illness has posed multiple challenges to clinicians. Challenges faced include refusal of acutely psychotic or manic patients to weak face coverings and dealing with patients who spit and cough deliberately at healthcare providers. This qualitative study sought to gauge some of these challenges and innovative ways utilized by staff during the current COVID-19 pandemic to maintain optimal psychiatric care delivery.

Staff at a local geriatric nursing home were surveyed via an anonymous link to determine challenges they faced during the COVID-19 pandemic when dealing with psychiatric patients who tested positive for the illness. Staff members included nursing staff and physicians. Responses to surveys were collected and stored and de-identified.

Majority of staff members reported significant challenges faced when dealing with COVID-19 positive patients presenting with psychiatric issues especially those who presented involuntarily. Challenges included refusal of patients to wear masks, spitting and coughing deliberately on healthcare providers, hesitancy of ancillary staff and security to hold down an agitated patient if he or she tested positive for COVID-19 and refusal of inpatient psychiatric units to accept positive patients.

Significant number of staff members reported feeling fearful of contracting COVID-19 themselves and transmitting it to their own family members. Nursing and social work staff began cancelling shifts, as did part-time physicians who contracted services with our department.

COVID-19 has significantly impacted the day to day functioning of nursing homes.

School: Texas Tech University Health Sciences Center

SAUGH, KERALA

Positive psychological factors and the development of depressive symptoms in medical students

Kerala Saugh, Shannon Pan, Kiran Ali

Medical students have been shown to have higher rates of depression due to isolation, and the stress of maintaining a balanced life in the context of academic pressure, financial constraints, relationships and self-care. This study aims to examine the association between psychological factors such as resilience, spirituality, loneliness, engaged living and depression in medical students.

School: Texas Tech University Health Sciences Center

SHOJI, ERI

Child and Adolescent Psychiatry Experience During Residency: A Comparison of Current Training in Japan and the United States of America

Eri Shoji MD, Micah Park MD, Mai Yamakawa MD, Jessica Nelson MD

Objectives: Postgraduate training in psychiatry largely varies between countries and times. In Japan, from the introduction of the one-year internship system in 1946, postgraduate education has evolved into the "two-year junior residency training system," designated by federal law in 2004, and the "new medical board certification system implemented in 2018. This poster explores current psychiatry postgraduate education by comparing Japan and the United States (US), with specific focus on Child and Adolescent Psychiatry.

Methods: A literature review was conducted in both Japanese and English. Calculations were based on selected data on publicly available resources.

Results: Japan has 1/3 the number of total US postgraduate trainees at PGY-1 level, 1/4 to 1/5 the number of psychiatry residents per year. The percentage of trainees who enter psychiatry residency is similar. Length of total training is longer in Japan by 1 year, however length of psychiatry training alone is longer in the US by 4 months. Board pass rate was 68.6% in Japan (2018), and 76% (2019) in the US.

Conclusion: Major differences include more training in general medicine with written case reports in Japan, and stricter structure in residency programs in the US, as in child psychiatry training. It is notable Japanese psychiatrists must obtain an additional national license for unrestricted psychiatry practice in regards to involuntary commitment. Board pass rate is lower in Japan. Both countries require strict standards and rigorous training for board certification.

School: Texas Tech University Health Sciences Center

WEBER, TYSEN

3D Printing Offering Efficacious and Cost Effective Access to Medical Devices

Tysen Weber, MD

The author lived for two years in a third world country where specialty medical care and medical devices were largely out of financial reach to the average citizen. The author set out to see if 3D printing would offer an efficacious and cost effective way to allow access to that care, specifically in the way of orthotic or prosethic devices. In an online collaboration with a father of a child with cerebral palsy, open source files have been produced and continue to be adapted for an effective upper extremity orthotic device. The author 3D printed the device, with the tracked costs of the materials sourced locally in Lubbock, TX summing to $12.74 which is over 300x cheaper than the commercially available brace. This father has been utilizing this device for his daughter over the last two years with success. Others have joined the online discussion and have helped adapt the open source files and have shared their experiences utilizing the device (or their own adaptation) in pediatric and adult patients. The author details the process of creating files that can be printed with most commercially available 3D printers, a detailed cost breakdown, a discussion of the efficacy of the device and other implications and limitations of the technology in the poster.

School: Texas Tech University Health Sciences Center

ATKINS, GEORGIA RAE

The Epididymal Matrix Displays Key Properties of Bacterial Biofilms

Georgia Rae Atkins, Caitlyn Myers, Gail A. Cornwall

The epididymal lumen contains a nonpathological amyloid matrix with likely roles in sperm maturation and protection. This matrix contains the amyloid structures of four members of the CRES subgroup (CRES, CRES2, CRES3, and cystatin E2), a reproductive subgroup within the family 2 cystatins of cysteine protease inhibitors, implying CRES subgroup amyloids have biological functions. Indeed, our studies show that CRES amyloid and the endogenous epididymal amyloid matrix have antimicrobial activity in vitro, suggesting roles in host defense. Several host defense structures, such as bacterial biofilms, have common components including an amyloid infrastructure, extracellular DNA (eDNA), and a proteoglycan-carbohydrate rich extracellular matrix (ECM). We hypothesize the epididymal amyloid matrix shares structural features with biofilms and contains eDNA and ECM. Epididymal amyloid matrix isolated from the caput and cauda epididymis were stained with Thioflavin S (ThS), an amyloid specific dye, and DNA stains Hoechst, Sytox Green, and TOTO-3 before and after exposure to denaturants (SDS, urea, and formic acid) or DNAse I. All three DNA stains showed that eDNA was present in the amyloid matrix from both the caput and cauda. Partially disassembling the matrix with denaturants further exposed the eDNA and the amyloid core, suggesting eDNA was part of the amyloid matrix infrastructure. Exposure to DNase I also caused the matrix to come apart, indicating eDNA is important for maintaining amyloid matrix infrastructure. Immunoblot analysis showed that neurocan, a chondroitin sulfate proteoglycan enriched in specialized ECM that surrounds some neurons, and amyloid precursor protein (APP), an amyloidogenic precursor, were also in the epididymal amyloid matrix. Our findings suggest the epididymal amyloid matrix is a unique host defense structure that structurally, and perhaps functionally, resembles bacterial biofilms.

School: Texas Tech University

BILTZ, CAROLINE

Development of a Pre-Health Professions Student Volunteering/Mentorship Program Provide Positive Exposure, and Address the Economic Challenge of the Caregiver-Patient Ratio in Geriatric Memory Units

Biltz C_b, Willms J_c,Young K_b, Chavez A_b, Zon A_b, Patel R_b, Perez A_b, Thomas G_b, Gassman T_b, Wolpert J_c, Culberson J_a aGarrison Institute on Aging, Texas Tech University Health Sciences Center, 3601 4th Street, MS 9424, Lubbock, TX 79430, United States

bTexas Tech University, 2500 Broadway, Lubbock, TX 79409; cTexas Tech University Health Sciences Center 3601 4th St, Lubbock, TX 79430

The Garrison Geriatric Care and Education Center was established in 2005 as a teaching nursing home at Texas Tech University, (TTU), focused on memory care. TTU pre-health students run a volunteer group and have created a progressive learning platform to perform dementia caregiving tasks, including emotional support, managing behavioral symptoms, feeding, and structured activities. Our objectives were to provide experiential learning for pre-health students in a memory care unit, and to provide supportive care for dementia patients without increasing financial burden. Students are given opportunities for innovation, interprofessional collaboration, and leadership experience. Experiential learning of future health care professionals in this setting may produce healthcare teams that are more empathetic, anticipatory of patient needs, and who value an integrated health care system. Also, students receive volunteer hours in a healthcare setting which improve their professional school applications. Unpaid caregivers provided 18.6 billion hours of care to patients with age-related dementias in 2019.1 Despite this, the lifetime cost for care to a patient diagnosed with dementia is $357,297.1 From 2016 through spring 2020, TTU volunteers contributed ~1700 hours of unpaid care. We estimated the value of this care to be ~$5,355 per year. The COVID-19 Pandemic has provided an opportunity to implement and evaluate innovative and collaborative education models in long-term care. The TTU Clinical Council has recently developed a work group, reporting to the Office of the President, based upon the success and passions of our student-run group. TTU pre-health students are an untapped resource that could decrease the financial burden on families and the healthcare system, and serve as a powerful driver for change in the care of memory patients.

1. Alzheimer's Association. "2020 Alzheimer's Disease Facts and Figures." Alzheimer's & Dementia (2020);16(3):391+.

School: Texas Tech University

BINGI, SAI PRANATHI

Determining Whether Bacteria Can Mount Resistance to Anti-biofilm Agents

Sai Pranathi Bingi, Whitni K. Redman, Kendra P. Rumbaugh, Ph.D.

Department of Surgery and the Burn Center of Research Excellence, Texas Tech Health Sciences Center, Lubbock, TX; Texas Tech University, Lubbock, TX

Chronic wounds are a critical healthcare concern and significant economic burden. Frequently these chronic wound infections are biofilm-associated. Biofilms are a community of microorganisms protected by an extracellular polymeric substance (EPS). The EPS acts as a shield against antimicrobial agents while additionally providing other benefits including mechanical stability. Previous studies have shown that glycoside hydrolases (GHs) can be used to breakdown the complex polysaccharides structures in the EPS. Through hydrolysis of the α-1,4 linkages of EPS polysaccharides, the GH known as α-amylase has been shown to induce bacterial dispersal both in vitro and in vivo as well as improve antibiotic potency. However, it is not known if bacteria can develop resistance to GHs or alter their EPS production after repeated exposure to GHs and therefore decrease dispersal efficacy over time. This study utilized a dual-species biofilm of Pseudomonas aeruginosa and Staphylococcus aureus established in an in vitro well-plate. The established biofilms were treated with either 5% α-amylase or PBS as a vehicle control for 2 hours. After treatment, the supernatant and biofilms were collected and colony forming units (CFUs) were enumerated to determine percent dispersal. The bacteria remaining in the biofilm were used to establish the next set of biofilms, mimicking repeated exposure in a patient. Thus far, the composition of the dual-species biofilms has remained unchanged, while the efficacy of biofilm dispersal has increased after both the vehicle control and α-amylase treatments. We hypothesize that either a lack of bacterial persister cells, which are important for continued infection, and/or a potential skew of polysaccharide production by the 'evolved' biofilm cells may explain these results. In conclusion, our results indicate that bacteria do not mount resistance to repeated GH treatment over time.

School: Texas Tech University

CHAVEZ, ALONDRA

Deciphering the Molecular Mechanisms of Human Diseases Associated with Mutations in the Signal Recognition Particle

Alondra Chavez, Morgana K. Kellogg, Erin Choi, Elena B. Tikhonova, Andrey L. Karamyshev

Protein misfolding and aggregation underlies many human diseases including amyotrophic lateral sclerosis (ALS), Alzheimer's, Parkinson's, and Huntington's diseases. Proper cell function requires proteins to be transported to their correct intracellular destinations such as the nucleus, endoplasmic reticulum, cytoplasm, and others for minimizing protein misfolding and aggregation. If this process is disrupted, the proteins may aggregate causing a disease. Because correct translocation is vital to the function of the cell, several mechanisms have evolved to correctly target proteins. The SRP-dependent pathway is the major mechanism of secretory proteins which is essential to every organism. The universally conserved signal recognition particle (SRP) is responsible for the targeted delivery of □30% of the newly synthesized proteome to the eukaryotic endoplasmic reticulum (ER). SRP binds to the signal sequences of the nascent chains of pre-secretory proteins when they emerge from the ribosome and brings the complex to the ER for translocation. Recently, studies have shown that mutations in SRP causes Schwachmann-Diamond-like syndrome, which is a type of severe primary neutropenia. The goal of this project is to understand the molecular mechanism of the diseases associated with mutations in SRP. To achieve this goal, we will introduce specific mutations in SRP and study how they change protein targeting. Earlier studies from our lab demonstrated that SRP depletion induces the RAPP (Regulation of Aberrant Protein Production) protein quality control and consequently mRNA degradation of the SRP substrates. We will test if disease-causing mutations in SRP pathologically activate the RAPP pathway. Results for this research will determine both the mechanism of pathogenesis for SRP dominant mutations and their association with involvement of RAPP in molecular mechanisms of many human diseases.

School: Texas Tech University

DAUM, MIKAELA

Testing the Therapeutic Efficacy of Glycoside Hydrolases to Disperse ESKAPE Pathogens Found in Biofilm-Associated Chronic Wounds

Mikaela Daum^1, Whitni Redman^2, & Dr. Kendra Rumbaugh^2,3

Texas Tech University^1, Lubbock, TX; Department of Surgery^2 and Burn Center of Research Excellence^3, Texas Tech University Health Sciences Center, Lubbock, TX

Biofilms formed by ESKAPE pathogens pose considerable challenges in nosocomial environments and chronic wound infections. Biofilms are communities of bacteria surrounded by a protective extracellular polymeric substance (EPS) that augments antibiotic resistance and impedes host clearance. Glycoside hydrolases (GHs) are enzymes that target glycosidic linkages within the polysaccharide structures of the EPS to promote bacterial dispersal and antibiotic susceptibility. GHs have previously shown significant therapeutic efficacy against Pseudomonas aeruginosa and Staphylococcus aureus biofilms but have yet to be tested on biofilms formed by other ESKAPE pathogens. We hypothesize that GHs previously shown to be effective in dispersing P. aeruginosa and S. aureus will also be effective in dispersing other bacterial species commonly found in chronic wounds since glycosidic linkages are highly conserved and potentially present in the polysaccharide structures of other bacterial species. This study examined the ability of five GHs to disperse three ESKAPE pathogens (Acinetobacter baumannii, Enterococcus faecalis, and Klebsiella pneumoniae) plus Escherichia coli. Biofilms were established by inoculating a polystyrene 24-well plate with 10^5 CFU/mL of the bacteria of interest. After 48 hr the established biofilms were treated by GHs of interest or a vehicle control for 2 hr. Enzyme efficacy was quantified by enumerating the colony forming units (CFU) in the supernatant and biofilm and calculating percent dispersal. Results suggest A. baumannii does not adhere well to polystyrene plates as the vehicle control displayed the highest percent dispersal compared to the enzymes. However, the GHs did exhibit dispersal efficacy against the other bacterial species tested, suggesting promising results for complex, poly-microbial infections. In conclusion, GHs exhibit significant bacterial dispersal in a variety of bacterial species commonly found in biofilm-associated chronic wounds.

School: Texas Tech University

GAO, MARK

Determining an Efficacious Dose and Delivery Method for the Application of Xylanase to Treat Biofilm-Associated Infections

Mark R. Gao, Whitni K. Redman & Kendra P. Rumbaugh, Ph.D.

Department of Surgery and the Burn Center of Research Excellence, Texas Tech University Health Science Center, Lubbock, TX, USA; Texas Tech University, Lubbock, TX, USA

Chronic wounds are frequently associated with the formation of a biofilm that impedes wound closure and reduces antibiotic potency. Biofilms are communities of microbial cells surrounded by an extracellular polymeric substance (EPS), which can impede antibiotics. Glycoside hydrolases (GHs) are enzymes that target the glycosidic linkages in the EPS, and thus induce bacterial dispersal and improve antibiotic potency. The GH, xylanase, has previously been shown to effectively induce dispersal in various bacterial species, but also exhibits toxicity to the host after repeated treatments. This study focused on optimizing a vehicle to deliver xylanase effectively and safely. First, several concentrations of xylanase were tested for their efficacy to disperse Pseudomonas aeruginosa (PAO1) biofilms in vitro. Biofilms were established for 48 hr in a polystyrene plate and then treated for 2 hr with 500 U/mL, 250 U/mL, 125 U/mL, 62.5 U/mL or a PBS vehicle control. Efficacy was determined by enumerating the colony forming units (CFU) in the supernatant and biofilm followed by calculating percent dispersal (CFU in supernatant/CFU total). 125 U/mL was the lowest concentration of xylanase tested that consistently exhibited significant dispersal compared to PBS. Next, xylanase (500 U/mL and 125 U/mL) and PBS were used to disperse PAO1 and Staphylococcus aureus (SA31) in a dual-species wound like microcosm model. Biofilms were grown for 48 hr and treated for 90 min. 125 U/mL xylanase also caused significant biofilm dispersal in this model. Next, biofilms established in the wound microcosm model were treated with either 125 U/mL xylanase or PBS in different application vehicles that are commonly used in wound care (washes, gauze, cream, hydrogel). The wash application exhibited the highest dispersal efficacy. Future studies include testing these vehicles in our in vivo murine chronic wound model.

School: Texas Tech University

GEORGE, ISAIAH

Evidence-Based Treatment and Clinical Management of Biofilm-Associated Chronic Wound Infections

Cuello, Luis and Ostermaier, Emily

Voltage-gated sodium and potassium channel dysregulation and overexpression have been found to be the leading cause of many channel-related diseases, including epilepsy, Alzheimer's disease, schizophrenia, and most recently, several cancer types. In relation to cancer, potassium channels can become dysregulated, allowing an increased efflux of positively charged potassium ions out of the cell, overriding many checkpoints within the cell cycle, and permitting the cell the ability to divide uncontrollably as a result. It has also been found that overexpression of potassium channels also promotes cell mobility of cancer cells, often leading to metastasis. KcsA (a prokaryotic K+channel) is the archetypal potassium channel that would be used in the study of finding therapeutic drugs that could act as a "gatekeeper" (in the case of an inhibitor) to regulate the flow of water molecules as a consequence of positively charged ions (K+-ions) moving out of the cell. We attempt to do this by employing a liposome fluorescence assay in which the fluorescent signal decay indicates channel activity. The presence of an inhibitor can therefore "block" (or inhibit) the K+ channel activity, halting the decay in the fluorescent signal, and potentially identifying a putative therapeutic novel blocker. Finally, electrophysiology will be utilized to track the movement of K+-ions across the cell membrane, as well as the blocking properties of putative new therapeutic drugs. The development of this novel high-throughput functional assay will provide a robust and reliable first drug screening approach to identify ion channels blockers in general.

School: Texas Tech University

IBRAHIM, ANDREW

Thioredoxin Protects Against Hyperglycemia Induced Mitochondrial Hyperfission in Human Endocardial Endothelial Cells

Andrew Ibrahim

Cardiovascular complications are highly prevalent in diabetic patients. Hyperglycemia has been linked to mitochondrial dysfunction and cell injury, with the formation of harmful reactive oxygen species (ROS), such as superoxide. However, how hyperglycemia affects cardiac endothelial cells and their mitochondrial metabolism is not clear. Within mammalian hearts, endothelial cells are the most numerous, constituting up to 64% by number, and undergo apoptosis prior to cardiomyocytes. As such, they are the focus of our study.

The thioredoxin class of proteins, however, has been found to play a role in protecting against harmful ROS such as superoxide. In this study, we investigated the role of thioredoxin in protecting against glucose induced DRP1-faciliated mitochondrial fission. This experiment was four-pronged – human endocardial endothelial cells (HECECs) were exposed to hyperglycemic conditions (25 mM glucose) and treated with thioredoxin vs. without. We (1) measured mitofission in the form of visible mitochondrial breakage under microscopy, (2) measured apoptosis rates among cells through flow cytometry, (3) measured the amount of superoxide produced using electron paramagnetic resonance, and (4) measured activation of the DRP1-protein, a protein that mediates mitofission through Western blotting.

We found that mitochondria were shorter and fragmented in cells when exposed to hyperglycemia; however, cells not treated with thioredoxin were more fragmented compared to those with thioredoxin. Thioredoxin treated cells also showed less apoptotic rates and less superoxide formation in HECECs under EPR.

These findings indicate that the (1) fission-mediated fragmentation of mitochondria, along with the (2) production of harmful superoxide and the (3) death of endocardial endothelial cells, is lowered in HECECs treated with thioredoxin as compared to without. This points to possible protective effects of human thioredoxin against cardiac damage in diabetic patients.

School: Texas Tech University

PEREZ, ANDREA

Specialized ribosomes as a mechanism to remodel translation in protozoa parasites

Andrea Perez, Sneider Alexander Gutierrez Guarnizo, Elena B. Tikhonova, Kai Zhang, Andrey L. Karamyshev, Zemfira N. Karamysheva

Leishmania species cause leishmaniases that affect around 12 million people worldwide. Visceral leishmaniasis is the most severe form of the disease, which is lethal in the absence of treatment. To develop better treatments, it is necessary to uncover the molecular mechanism of parasite adaptation during the host change from sand flies to vertebrates. When parasite switches from the insects to mammals it is exposed to dramatic stresses including host immune response, temperature rise, change in pH and nutrition. Exposure to the stresses is essential for the parasite transformation from promastigote to amastigote in mammalian host. However, the molecular mechanism that support adaptation and survival of parasite during this transition is poorly understood. We have found that ribosomes lost 30 proteins at 37□C that are typically present at 27□C and gain additional 6 proteins including ribosomal protein L36 during heat shock. Our data suggest that specialized ribosomes support translation of heat induced transcripts when general translation is repressed due to stress. In order to elucidate the role of identified proteins in parasite survival we established CRISPR-Cas9 technology to edit its genome. This technique allows to knock-out or tag genes. L36 gene knock-out and N-terminal tagging were successfully achieved using the technique. Both wild type and L36 KO grew at the same rate at optimal temperature (26□C), however, L36 KO cells were very sensitive to the heat stress (37□C) in comparison with wt cells supporting that this specialized ribosome component plays an important role in parasite survival during the heat stress. Currently, the role of L36 protein in parasite differentiation and survival in mammalian host is being investigated. Our data support the hypothesis that ribosomes undergo a change in the composition to support selective translation during the heat shock and transmission to mammalian host.

School: Texas Tech University

SCHNEIDER, REBECCA

Characterizing Pseudomonas aeruginosa in the Intensive Care Units at UMC

Rebecca Schneider, Rebecca Gabrilska, and Kendra Rumbaugh

The opportunistic bacterial pathogen Pseudomonas aeruginosa is one of the leading causes of nosocomial, or hospital-acquired, infections, especially in populations of highly susceptible patients within intensive care units (ICUs). Numerous infection control procedures have been implemented to protect these vulnerable patients, including routine testing for bacterial contamination. In conjunction with UMC Infection Control, our lab found P. aeruginosa to be prevalent in water sources throughout the ICUs; we isolated P. aeruginosa from sink drains in the Burn ICU (BICU), Surgical ICU (SICU), Medical ICU (MICU), and the Labor & Delivery unit, including the Neonatal ICU (NICU). Concurrently, we collected isolates from patients that contracted P. aeruginosa infections in the ICUs. We investigated whether cross-transmission was occurring between the P. aeruginosa in the hospital environment and ICU patients by examining the relatedness of our isolates. We hypothesized that patient and environmental isolates from the same ICU would share the same genetic elements coding for pathogenicity, indicating close relatedness and possible cross-transmission. To evaluate relatedness between isolates, we conducted PCR on patient and environmental isolates from the BICU, SICU, MICU, and East Tower (including L&D and NICU) at UMC. We also compared the phenotypic traits exhibited by these isolates by performing virulence assays, including measuring biofilm production, protease activity, and pyocyanin production. Our results suggest that P. aeruginosa isolates from patient infections display more virulent phenotypes compared to environmental isolates. Since P. aeruginosa nosocomial infections have high rates of morbidity and mortality, we ultimately hope to identify microbial factors that contribute to transmission in the ICUs at UMC. Results from this type of research could help hospitals refine their infection control procedures and prevent future devastating outbreaks.

School: Texas Tech University

XUE, DANIEL

Staphylococcal Burden in First Responders

Daniel Xue^1, Hailey Burden, MS2^2, Shane Parker, NRP, EMT-LP^3, and Cassie Kruczek, PhD^4

1:Texas Tech University Honors College, Lubbock TX; 2: Texas Tech University Health Sciences Center (TTUHSC) School of Medicine, Lubbock TX; 3: Lubbock Fire and Rescue, Lubbock TX; 4: TTUHSC Department of Medical Education School of Medicine, Lubbock TX

Staphylococcus aureus is a Gram-positive bacterial pathogen that causes a wide range of infections, including superficial skin and soft tissue infections (SSTIs), bloodstream infections, and sepsis. Approximately 120,000 Staphylococcal bloodstream infections, including those caused by methicillin-resistant Staphylococcus aureus (MRSA) strains, occur in the United States each year. Of these, an average of 20,000 result in patient mortality. Due to the increasing prevalence of antibiotic resistant strains such as MRSA, these infections are becoming more challenging and costly to treat. Once mainly considered a nosocomial (hospital-acquired) pathogen, community-acquired MRSA infections are becoming commonplace. While approximately one-third of the population carries S. aureus in their nasal cavity, several studies have noted that first responders, including police, EMS personnel, and firefighters, carry S. aureus at a higher rate when compared to the rest of the population. This is not surprising since first responders often bridge the hospital and general community environments to provide care for those who are likely to be S. aureus carriers, such as those residing in long term care facilities and incarcerated populations. In addition to nasal cavity carriage, various surfaces and equipment at EMS and fire stations have been shown to harbor S. aureus and MRSA, providing yet another potential source of contamination/infection. This poses an infection risk to not only first responders but also to the populations for whom they provide care. This review seeks to summarize the burden of Staphylococcal and MRSA colonization amongst first responders and provide strategies to reduce the bacterial burden in this population and their work environment.

School: Texas Tech University

COMMUNITY SPONSOR

A big thank you to H-E-B for their generous donation for Student Research Week!

H-E-B Helping Here®

VENDORS

Thank you to our sponsors.

PHCBI