

INCREASED FRACTION OF CARDIAC OUTPUT TOWARD UTERINE ARTERY IN MATERNAL COMPROMISE IN *PAPIO SPP.*

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INTRODUCTION

Maternal vascular remodeling plays a central role in pregnancy development. Local (spiral artery) and central (maternal cardiovascular system) vascular beds undergo physiological changes that start in early gestation. Maternal cardiac output (CO) has been suggested as an index of fetal growth and maternal vascular resistance – as a screening tool for pre-eclampsia. Non-human primates – baboons (*Papio spp.*) have a type of placentation that is relatively similar to humans, however these species do not develop pre-eclampsia. The aim of this study was to evaluate pregnancy-driven blood flow distribution toward uterine artery (UtA) as a fraction of maternal CO in *Papio spp.*

METHODS

Five non-pregnant baboons near term underwent ultrasound examination as previously described (Ultrasound Obstet Gynecol. 2005 Sep;26(3): 252-7). The absolute blood flow was calculated using GE algorithm: $QA (ml/min) = V (cm/s) \times \pi r^2 \times 60 s/min$; where QA is the arterial flow, V is the time-averaged mean velocity, and r is the radius of the vessel. Data were analyzed using the Mann-Whitney U-test.

RESULTS

The absolute and weight-adjusted UtA blood flow was increased in pregnant, compared to the non-pregnant animals, the ratio UtA/CO was higher in two animals with advanced reproductive age and cardiac pathology (higher number of pregnancies and vegetation on the aortic valve).

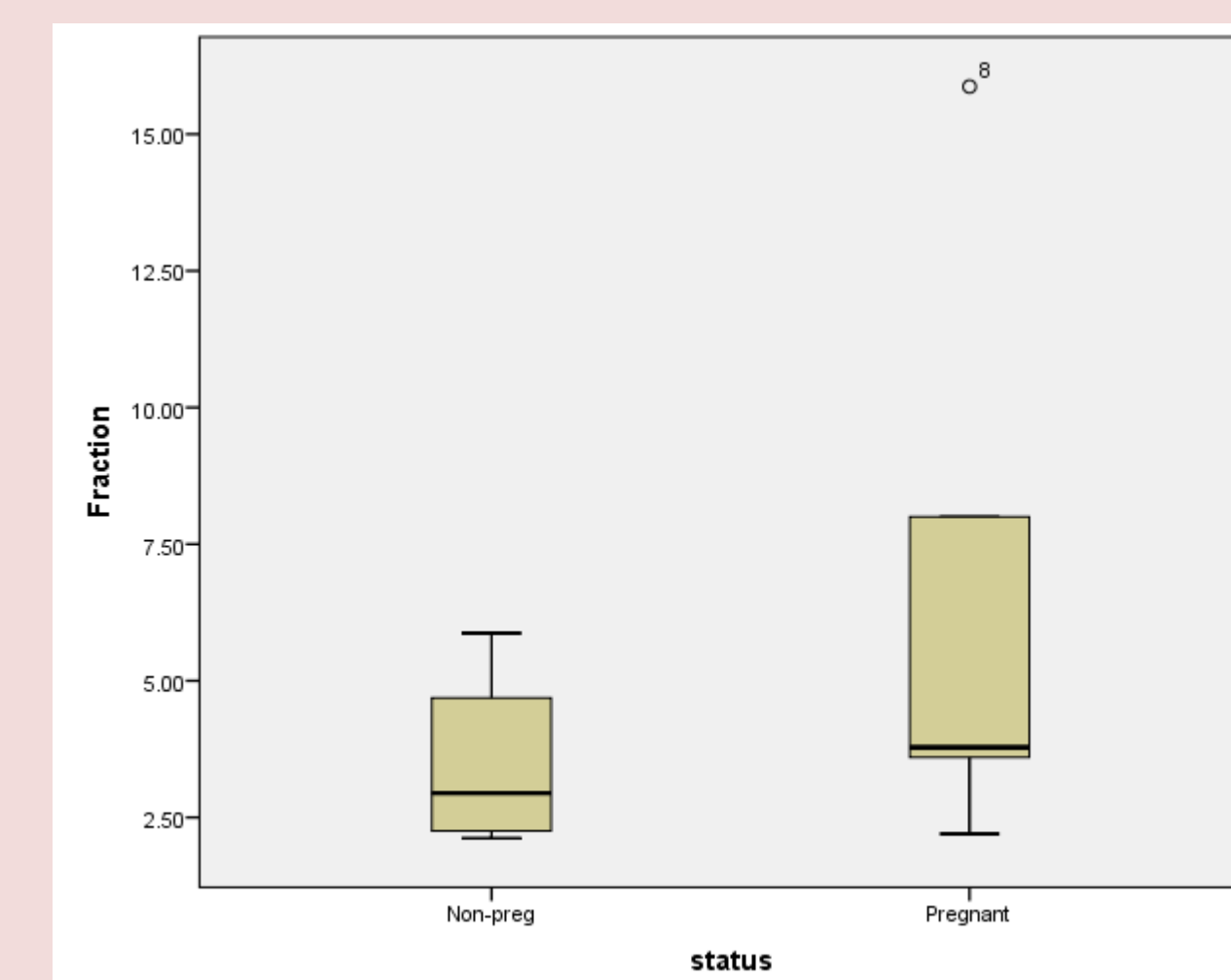
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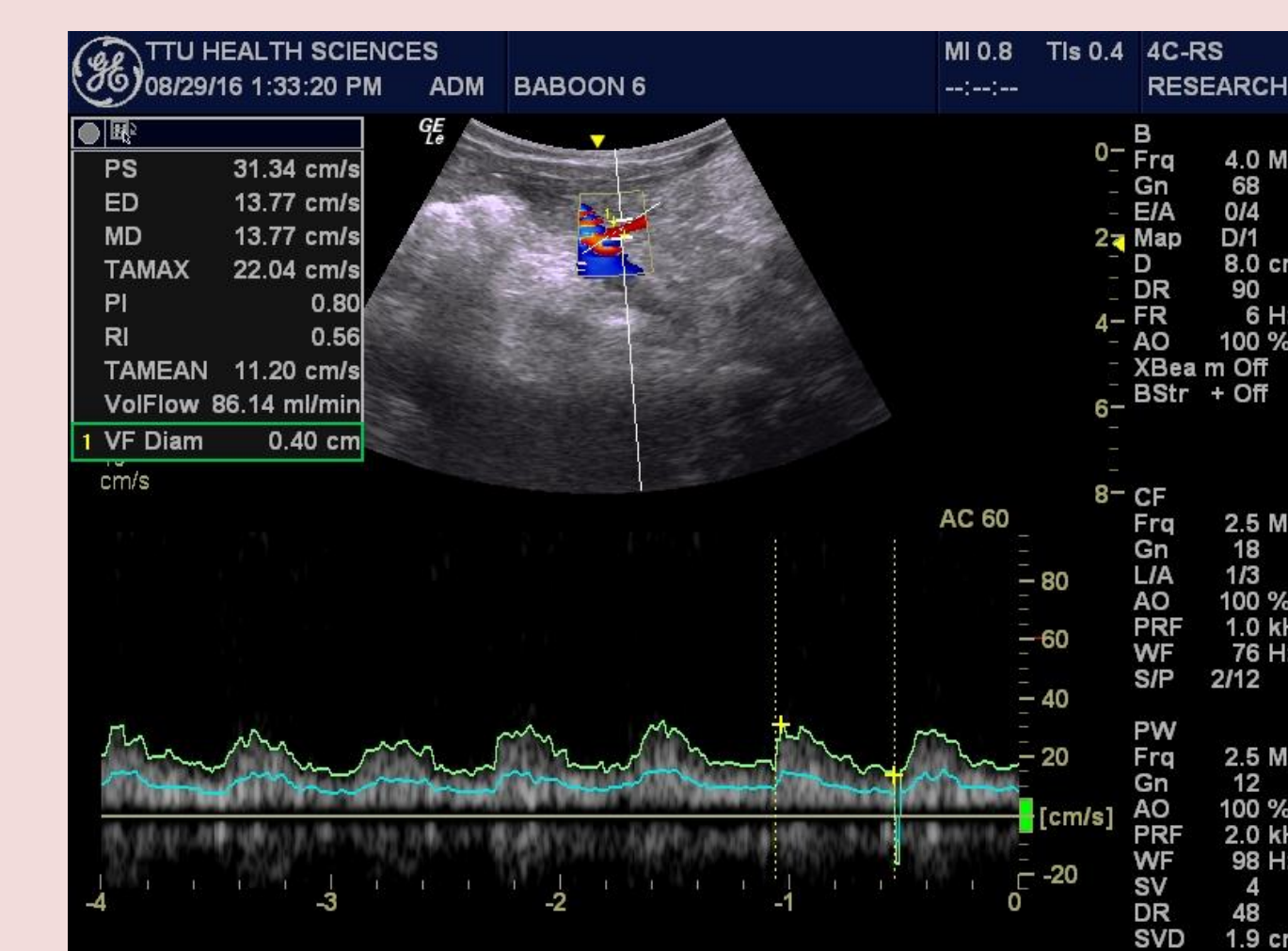
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ID	Pregnancy status	Weight (kg)	UtA, blood flow		Aorta, blood flow		Fraction %
			ml/min	ml/min/kg	ml/min	ml/min/kg	
1	N	13.8	53.94	3.91	NA	NA	NA
2	N	18.15	100.81	5.55	1718	94.65	5.87
3	N	23.7	83.92	3.54	2360	99.57	3.5
4	N	29.9	31.99	1.07	1338	44.75	2.39
5	N	22.3	52.92	2.37	2492	111.75	2.12
6	Y	15	86.14	5.74	2281	152.07	3.78
7	Y	15.7	149.72	9.54	4635	295.22	2.2
8	Y	16.6	164.22	9.89	1035	62.35	15.87
9	Y	18.9	175.25	9.27	4824	255.24	3.6
10	Y	23.1	148.4	6.42	1855	80.30	8



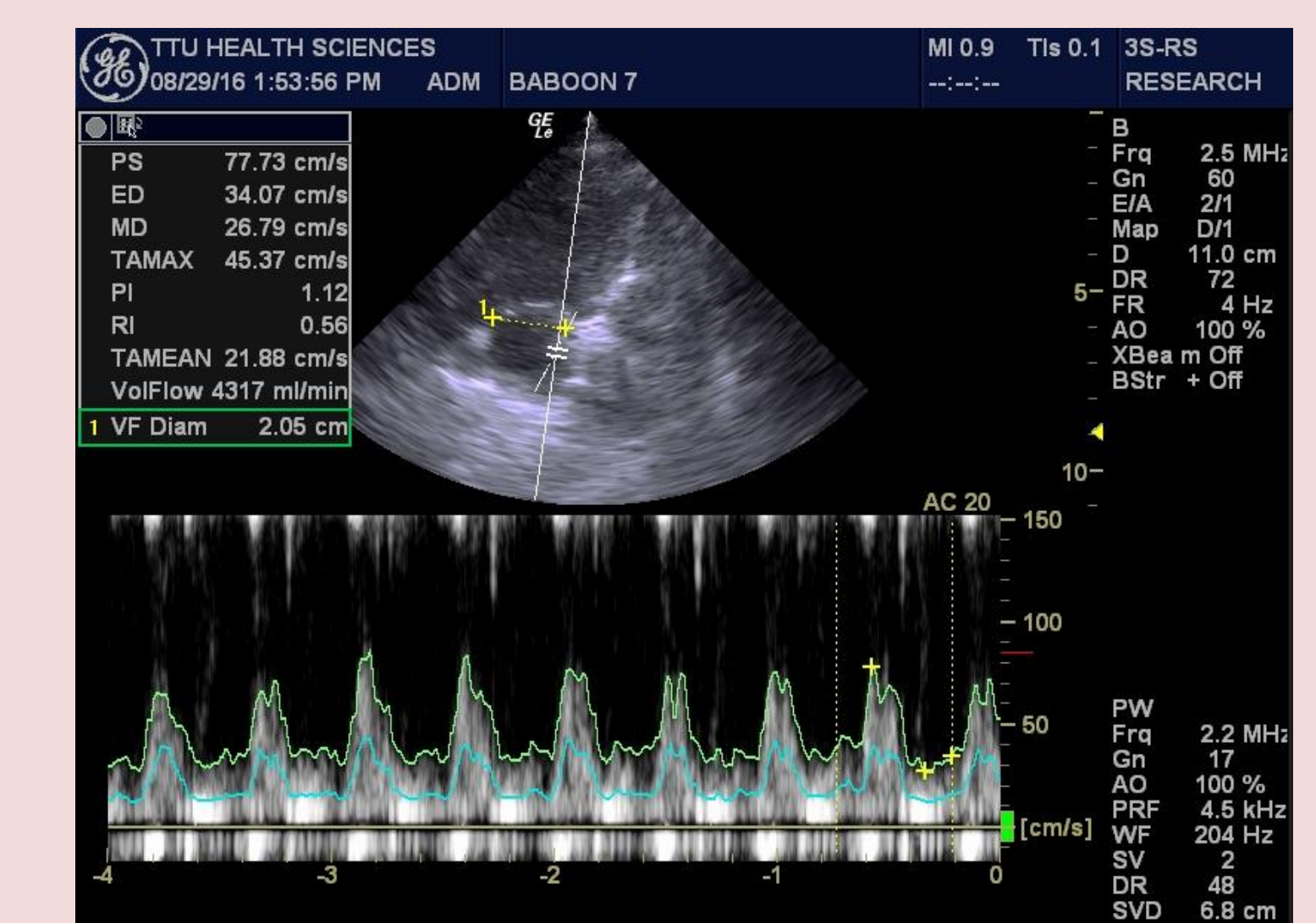
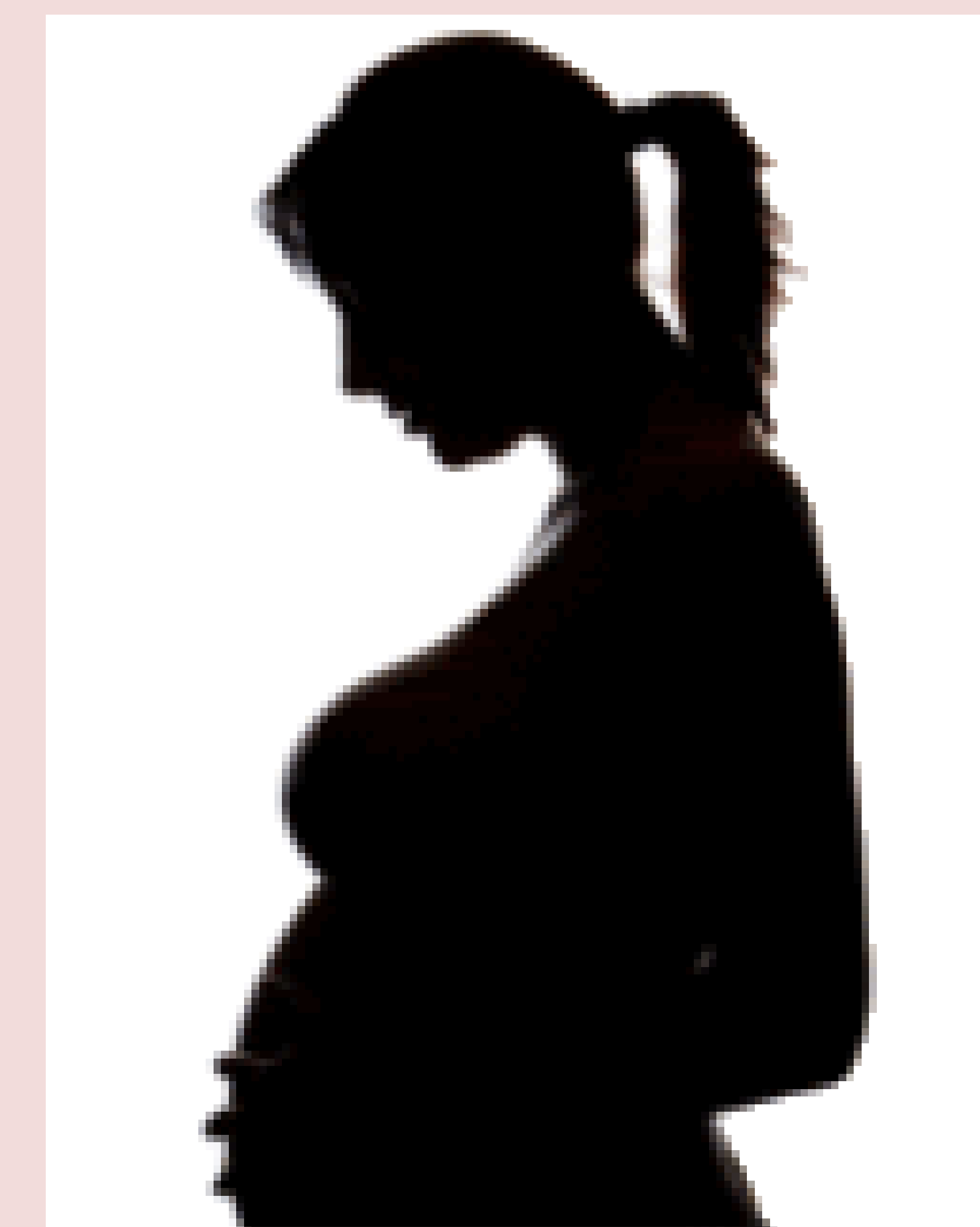
Blood flow to the uterine artery as a fraction of the cardiac output in non-pregnant (n=4) and pregnant (n=5) baboons near term (165 dGA)



Representative image of uterine artery blood flow in pregnant baboon at the end of gestation

Decreased flow is associated with stillbirth (McBride et al., 2016, SRI)

Increased fraction is associated with maternal compromise



Representative image of aortic flow in pregnant baboon at the end of gestation

CONCLUSION

The increase in the UA/ CO ratio could be a compensatory mechanism ensuring fetal nutrient supply. However this mechanism could be accompanied by decreased proportion of oxygenated blood, delivered to the maternal body, which might lead to the maternal pregnancy complications.