Determination of canine placental blood flow using pulsed wave Doppler ultrasonography
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Introduction
Ultrasonography is an important non-invasive tool used to monitor the fetal health during canine pregnancy.\(^1\) However, reports on gestational changes in umbilical artery blood flow during normal pregnancies are contradictory.\(^2,3\) In addition, blood flow within the canine placenta has not been reported. The aim of this study was to describe changes in placental, umbilical, and uterine artery blood flow during the last third of gestation in normal canine pregnancies. Our hypothesis was that blood flow would increase in all of these vascular beds with increasing gestation.

Materials and methods
Time-averaged maximum velocity (TAMAX) and resistance index (RI) were determined from placental, umbilical and uterine arteries from pregnant beagles (n=4) using pulsed wave Doppler ultrasonography (Mindray M5, Shenzhen Mindray Bio-Medical Electronics C., LTD., Nanshan, Shenzhen, China) with a 5-8 MHz micro-convex transducer twice weekly from 41-60 days past the LH surge (term=65 days). Data were compared using a one-way ANOVA (GraphPad Prism®, GraphPad Software, Inc., La Jolla, CA) and \(P<0.05\) was considered significant.

Results
Uterine blood flow (TAMAX) and RI did not significantly change during late gestation (Figure). However, both umbilical and placental blood flow increased, although umbilical blood flow was greater than placental blood flow. In addition, vascular resistance within both the umbilical and placental arteries decreased with gestation, with lower resistance in placental arteries compared to umbilical.

Conclusion
The results from this study are similar to previous research that concluded that umbilical TAMAX increases during gestation.\(^4\) However, other investigators had found that uterine artery vascular resistance decreases while uterine artery blood flow increases with gestational age,\(^2,4\) which differs from our results. It is important to note that this is the first report to describe changes in blood flow through canine placental arteries during late gestation. These data may be useful for clinicians following high risk pregnancies as it has been shown in humans that placental vascular resistance is higher in cases of placental insufficiency.\(^5\)

Keywords: Canine, Doppler ultrasound, placental artery, umbilical artery, uterine artery

References