**Introduction**

Healthy pregnancy is associated with remodeling of the maternal uterine vasculature to meet the metabolic demands of the developing fetus. In spite of the progress we have made in maternal-fetal health, there remains conflicting evidence as to the effect of late-pregnancy (LP) and the immediate postpartum period (PP) on resistance-sized (≤200μm) radial uterine arteries (RUA) structure and myogenic tone (MT).

Alterations in arterial MT and mechanical properties may contribute to pregnancy-associated pathologies like preeclampsia, and leave lasting effects on maternal and fetal health following delivery. Further understanding of healthy physiological adaptations during and after pregnancy are needed.

It has previously been shown by Eckman et al. that myogenic tone in endothelial intact vessels is increased in human pregnancy. Other models have shown conflicting results. One group found RUA myogenic tone to increase in pregnant rats, while various other models have shown the opposite trend.

Early literature suggests that total collagen and elastin content has been shown to increase in pregnancy, but the functional contribution has never been looked at.

Distsensibility has been previously shown to increase during pregnancy, preclampsia, and leave lasting effects on maternal and fetal health.

Hypothesis

We hypothesize RUA structure/function will be altered during LP and PP periods compared with non-pregnant (NP) RUAs.

**Methods**

RUAs from NP (n=4), LP (gestational age: 20±1 days, n=7), and 3 days postpartum (PP; n=5) Sprague-Dawley rats were isolated, cleaned of connective tissue, cannulated, and mounted in an arteriograph chamber. RUA MT and mechanical characteristics (lumen diameter, OD; distensibility, D; and arterial wall thickness, WT) were assessed at physiological salt solution with 0mM Ca²⁺ and absence/presence of elastase (0.5mg/ml) and collagenase (0.5mg/ml). Values: all thickness measurements were calculated by measuring the outside diameter (OD) and inside diameters (ID) simultaneously and dividing by two.

Wall thickness was calculated by measuring the outside diameter (OD) and inside diameters (ID) simultaneously and dividing by two.

**Results**

**Non-Pregnant vs Late-Pregnant**

- **Figure 1:** Late-Pregnancy Increases RUA Myogenic Tone And Increases Wall Thickness
- **Figure 2:** Late-Pregnancy Increases Vessel Size And Decreases Distsensibility
- **Figure 3:** Elastase Treatment Demonstrates Greater Elastin Contribution in Non-pregnant Arteries
- **Figure 4:** Collagenase Treatment Reveals A Lower Contribution Of Collagen Than Elastin In Non-pregnant And Pregnant Arteries

**Non-Pregnant vs 3 Days Postpartum**

- **Figure 5:** 3 Days Postpartum Myogenic Tone And Wall Thickness Remains Augmented
- **Figure 6:** 3 Days Postpartum Mechanical Properties Remain Augmented
- **Figure 7:** Postpartum Elastase Treatment Demonstrates A Maintained Decrease In Elastin
- **Figure 8:** Postpartum Collagenase Treatment Demonstrates Lower Contribution Of Collagen Postpartum

**Summary**

**Myogenic Tone**

- Our preliminary observations suggest that myogenic tone is attenuated during pregnancy and postpartum, with a concurrent increase in wall thickness and lumen diameter.
- Distsensibility
  - Despite increases in wall thickness and lumen diameter, the distensibility is decreased in pregnancy, and this decrease in distensibility is maintained postpartum.

**Enzyme Treatment**

- Elastase appears to have a greater contribution than collagenase on arterial distensibility in pregnancy and postpartum. This suggests that collagen contributes less to arterial distensibility.
- The attenuation of MT in pregnancy is reflective of the remodeling induced changes seen on elastin and collagen content in both pregnancy and postpartum. The greater contribution of elastin suggests that elastin may have a greater role in the maintenance of MT.

**Conclusion**

- We have shown that pregnancy associated remodeling of the RUA persists at 3 days PP. These studies will serve as the foundation for future investigations on the changes in RUA structure and function in rodent models of complicated pregnancy.

**References**