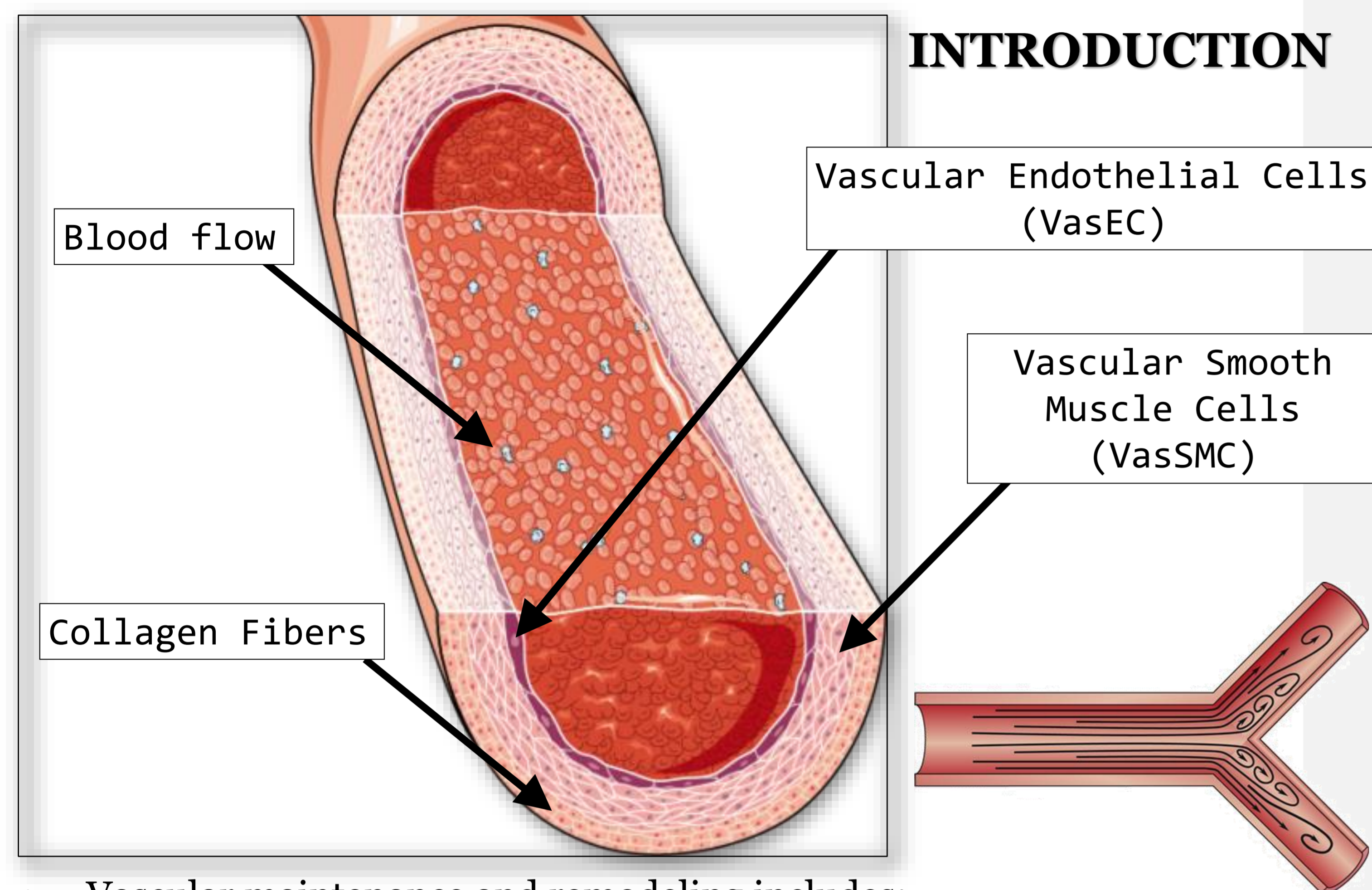


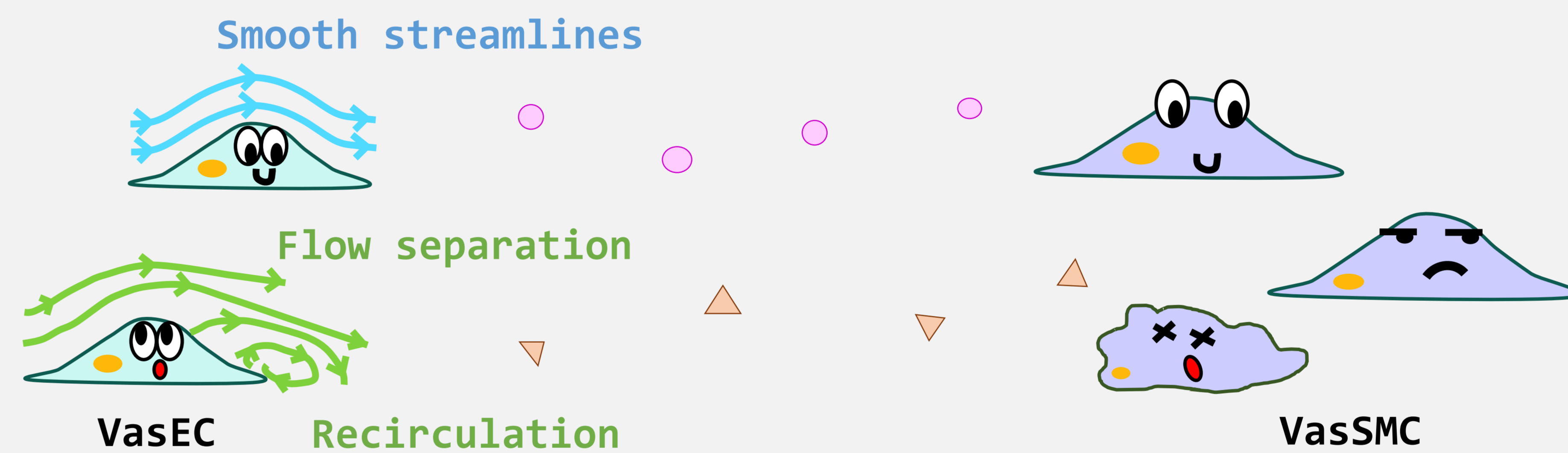
THE EFFECTS OF OSCILLATORY SHEAR REGULATION ON PARACRINE SIGNALING BETWEEN VASCULAR ENDOTHELIAL CELLS AND VASCULAR SMOOTH MUSCLE CELLS

Denise Hsu¹, Alexandra Tchir¹, Joshua Hutcheson^{*1}, & Sharan Ramaswamy^{*1}
¹Department of Biomedical Engineering, Florida International University, Miami, FL, *Co-Advised Principal Investigators

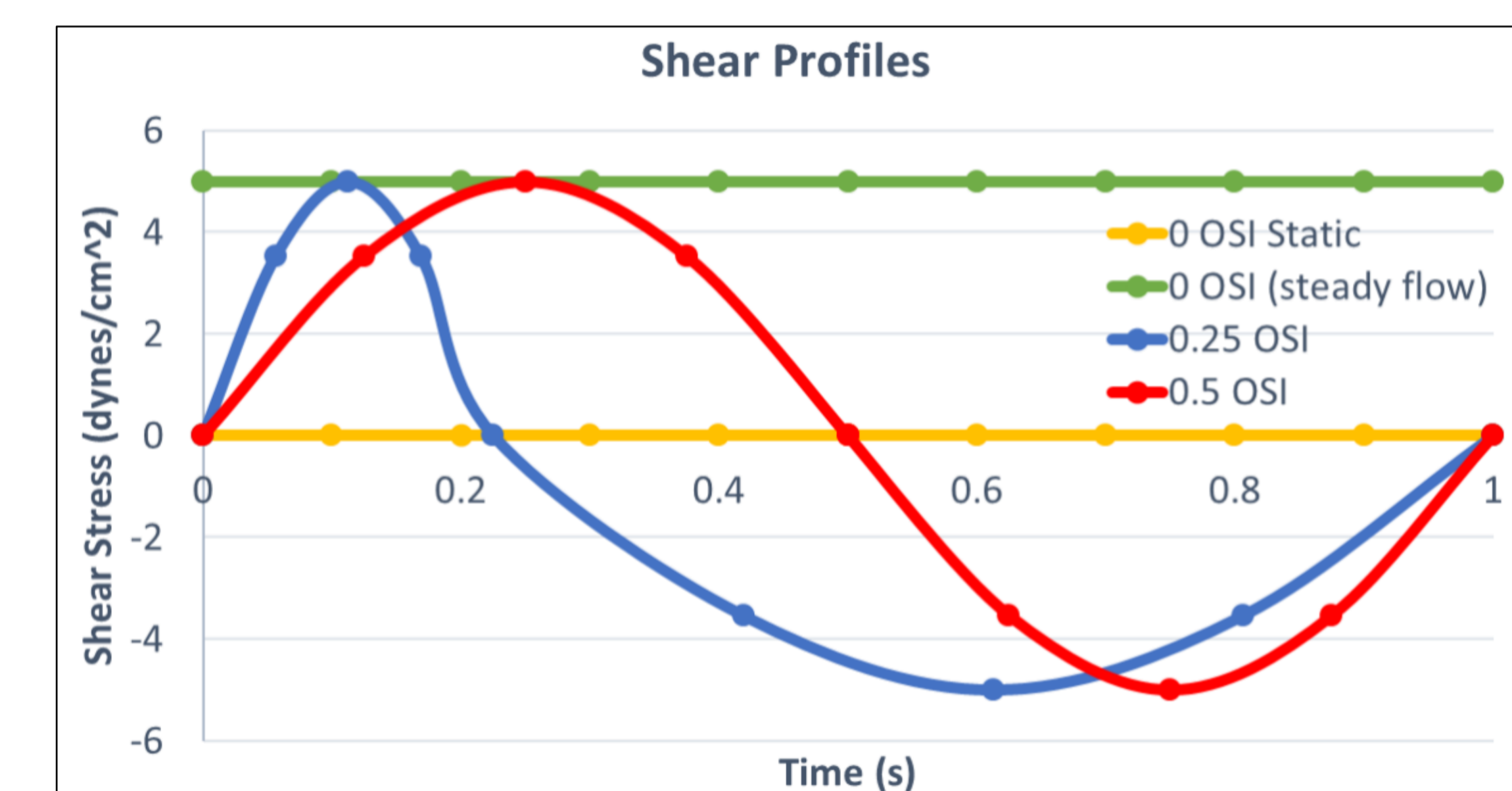
Flow oscillations can regulate vascular cell communication and phenotype



- Vascular maintenance and remodeling includes:
 - autocrine signaling within the VasECs and VasSMCs
 - paracrine signaling between the VasECs and VasSMCs
- Pulsatile flow subjects blood vessels to oscillatory shear, especially at bifurcation sites.
- We investigated the effects of different oscillatory shear stress magnitudes on VasEC.
- To examine the effects of paracrine signaling, we assessed the VasSMC phenotype after exposure to biochemical end-products from conditioned media from VasECs.



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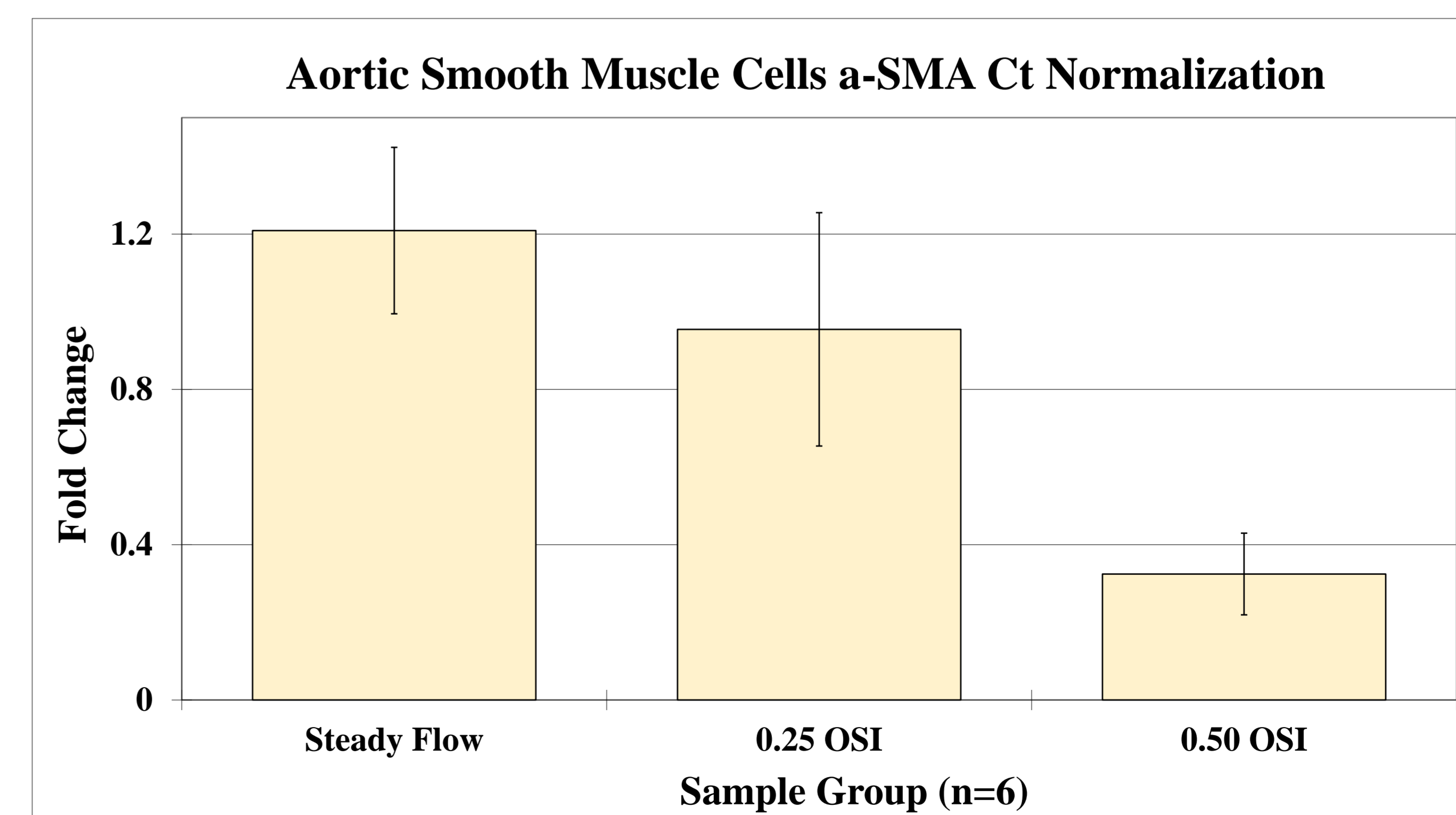


- Oscillatory shear index (OSI): A parameter that quantifies the change in direction and magnitude of wall shear stresses
- $0 \leq OSI \leq 0.5$
- $OSI = \frac{1}{2} \left(1 - \frac{\int_0^T \tau_w dt}{\int_0^T |\tau_w| dt} \right)$
 where τ_w = wall shear stress, T = cycle duration, t = time
- Four OSI magnitudes are to be applied to endothelial cells:
 - No flow (static)
 - Steady flow (OSI = 0)
 - 0.25 OSI
 - 0.50 OSI
- Data analysis consists of RT-PCR gene expression followed by Livak method, or $\Delta\Delta C_T$, to compute fold change using static (no flow) as control

METHODS

ITEM	DESCRIPTION
Porcine Vascular Cell Type	Vascular Endothelial Cells (VasEC) Vascular Smooth Muscle Cells (VasSMC)
Conditioning Media	100% Fresh media 50% Spent media from VasEC 50% Fresh media
Seeding Method Conditioning time: 48 hrs	Bioflux 24-well Plate Air pressure Pressure interface Input well Output well Cover glass bottom Viewing port Cell layer 6-cm Culture Dish

RESULTS & CONCLUSION



- Statistical analysis showed a significantly higher expression ($p < 0.05$) of α SMA in the steady flow group (OSI=0) compared to OSI=0.50.
- Expression of α SMA between flow groups OSI=0 vs. OSI=0.25 and OSI=0.25 vs OSI=0.50 were not significant ($p > 0.05$).
- VasECs exposed to moderate levels of flow oscillation will maintain VasSMC contractility via paracrine signaling in a similar manner to VasECs exposed to steady flow.
- Downregulation of α SMA by VasSMCs suggests loss of contractile and non-proliferative phenotype.
- RNAseq analysis for more comprehensive assessment of gene expression.