

In vitro Differentiation of Bone Marrow-derived Mesenchymal Stem Cells to Functional Endothelial-like Cells

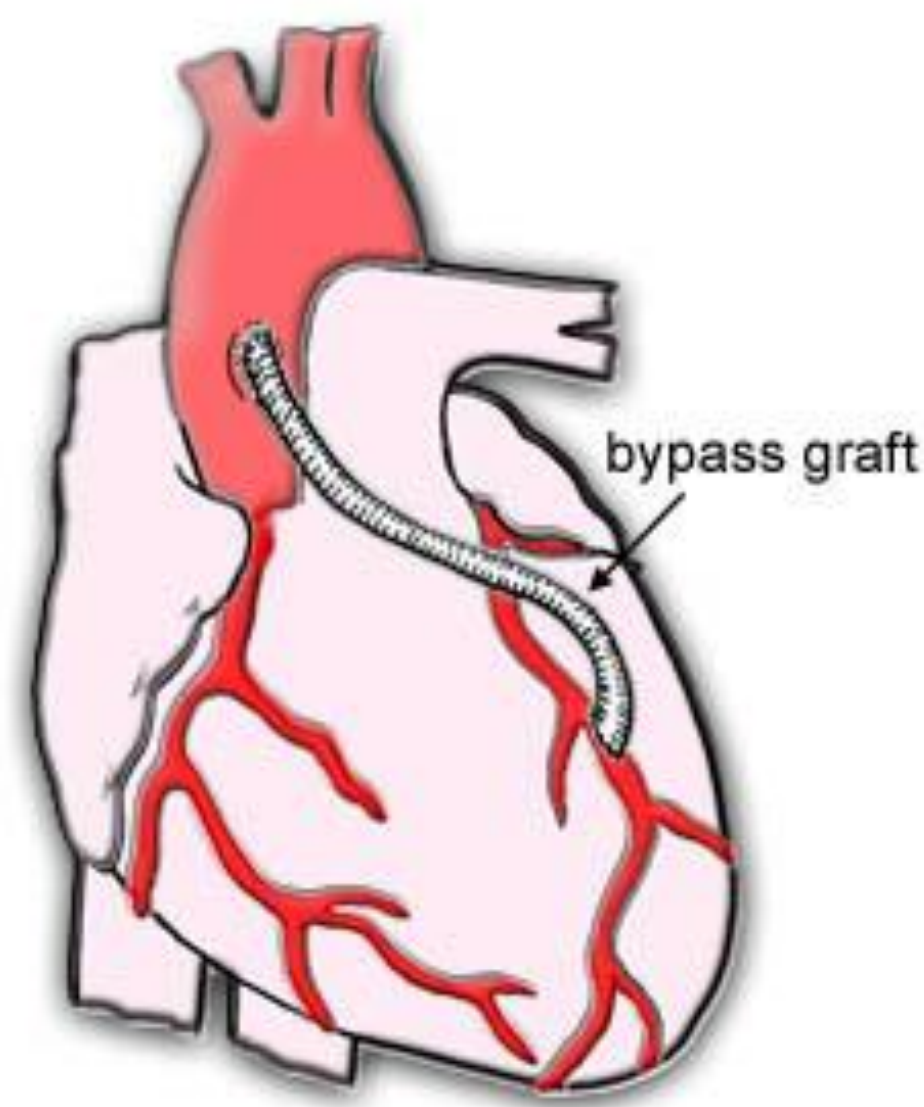
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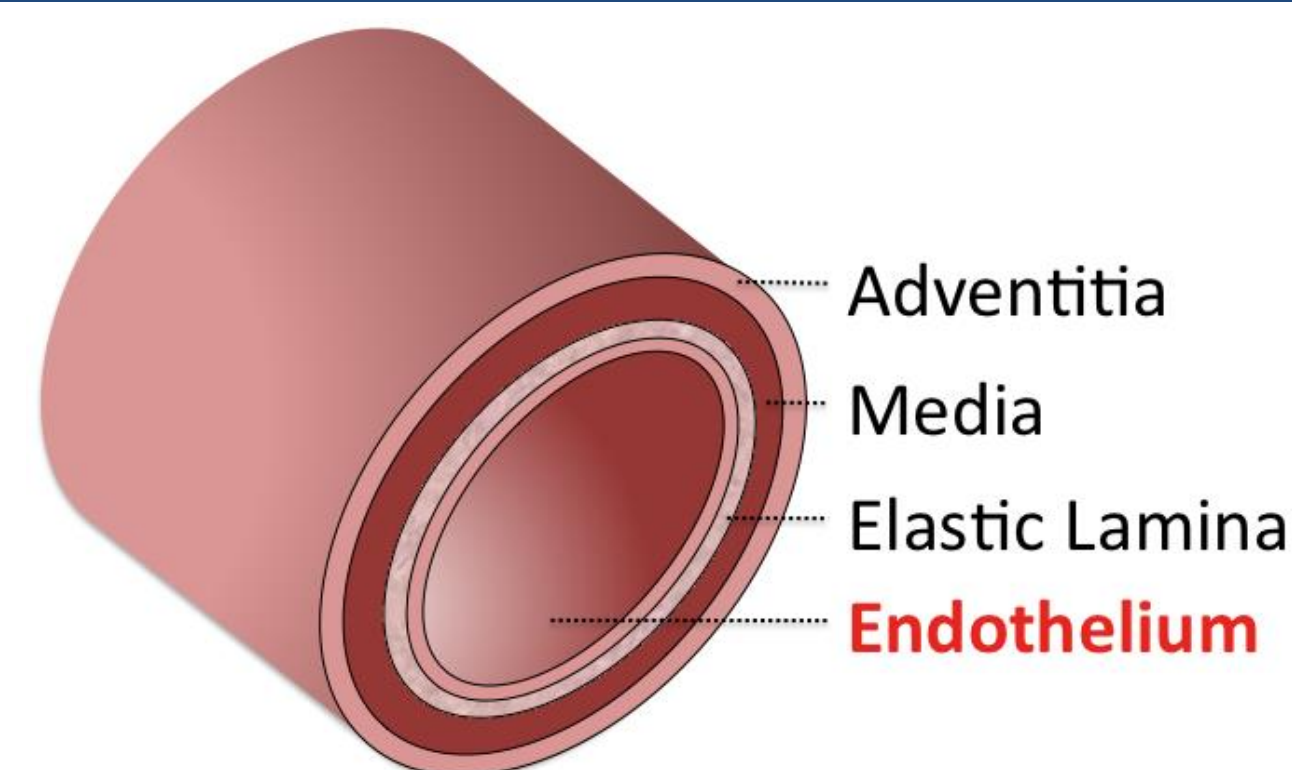
Background

- Hundreds of thousands of coronary artery bypass graft surgeries are performed each year
- Using a tissue engineered artery instead of a native graft could
 - 1) Reduce the number of surgery sites
 - 2) Enhance the lifetime of the graft



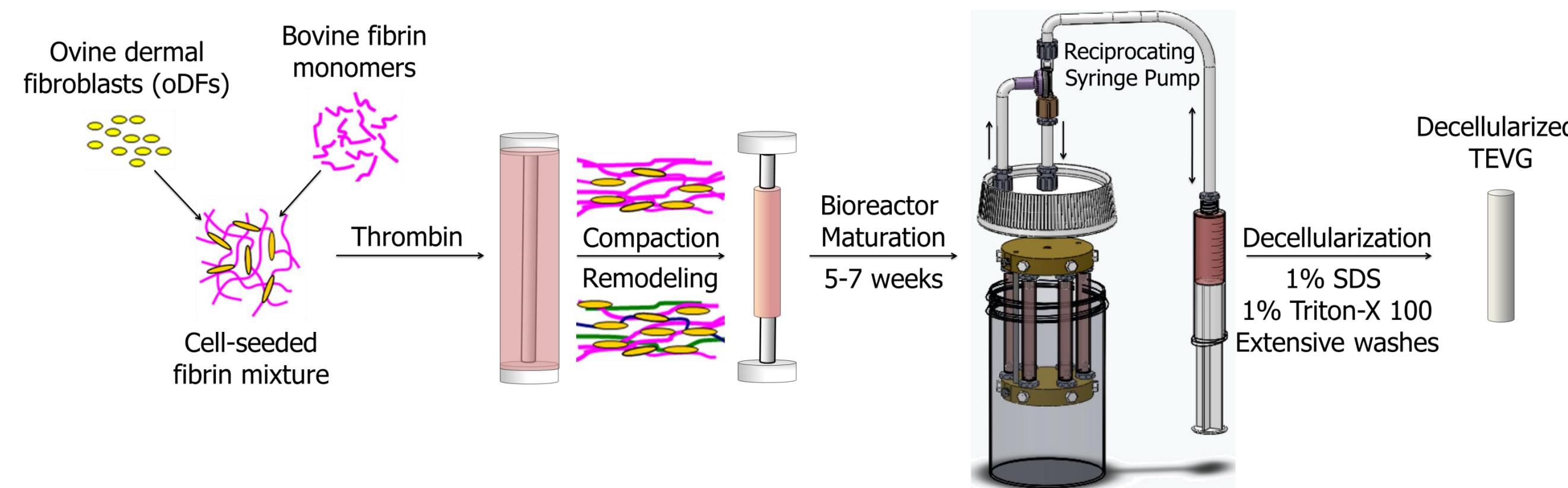
www.texasheartinstitute.org

Artery Structure

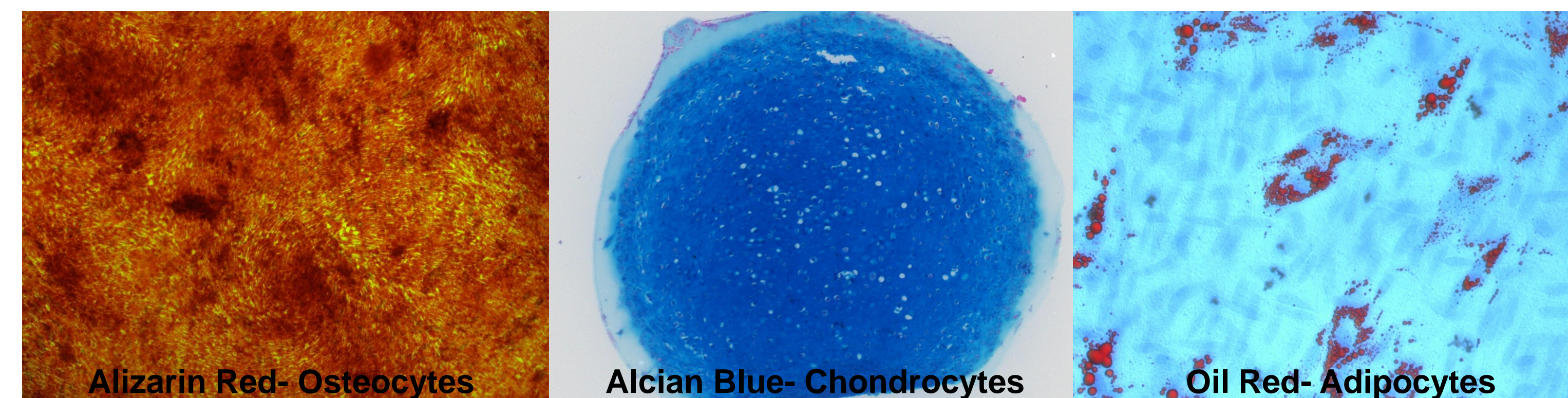


- Inner surface lined with *endothelial cells*
 - Prevents blood from clotting
 - Reduces turbulence
- *Mesenchymal stem cells* are a favorable alternative for tissue engineering
 - Derived from bone marrow
 - Multilineage differentiation potential
 - Possible allogeneic cell sourcing

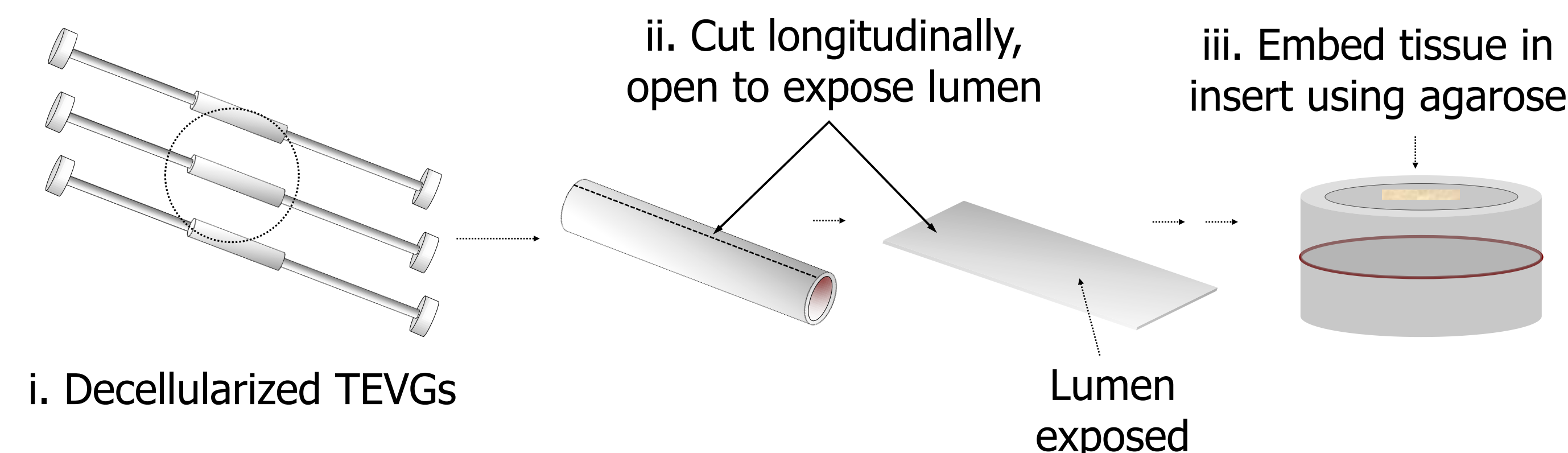
Graft Fabrication



MSC Characterization

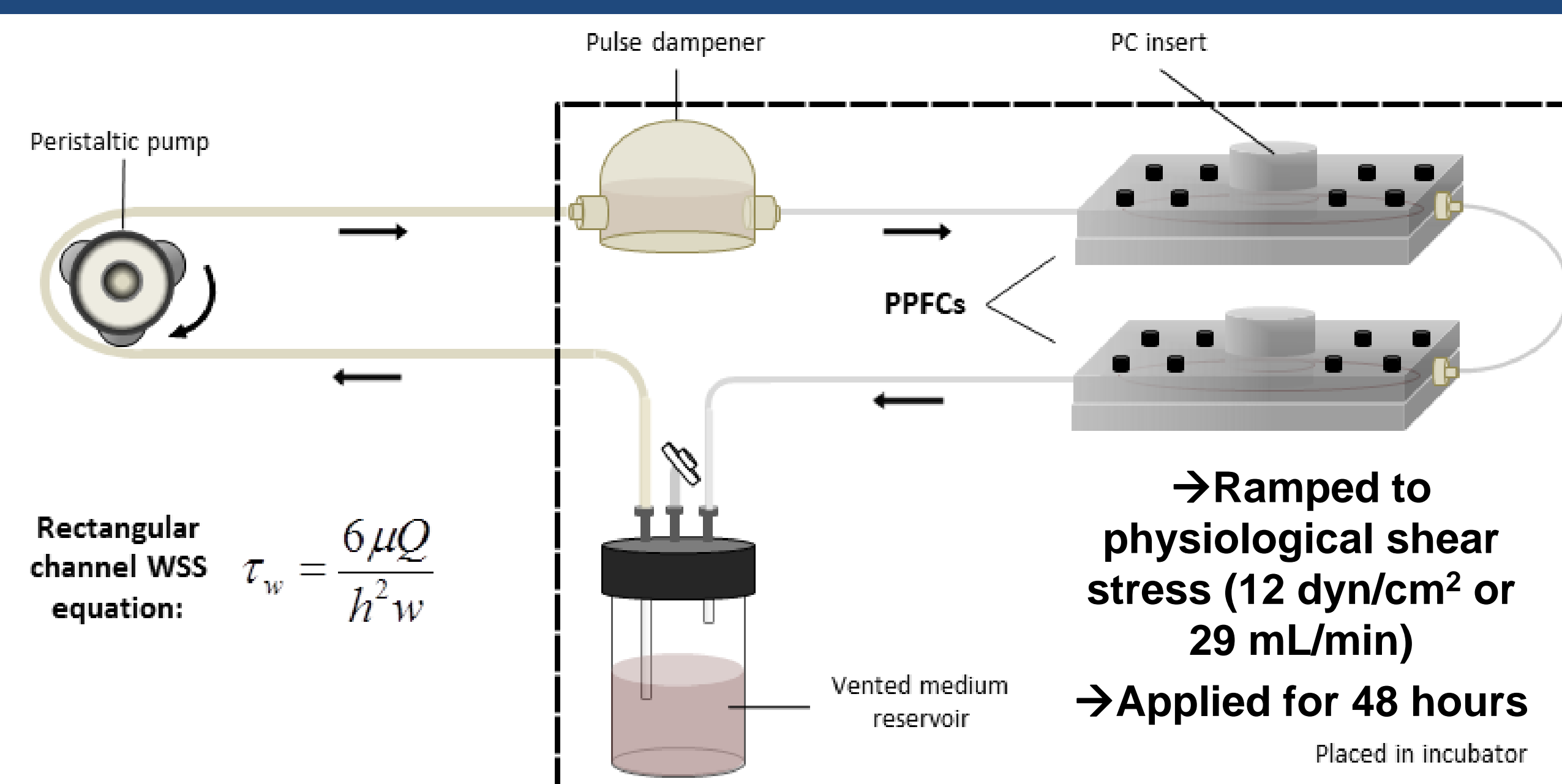


Cell Seeding

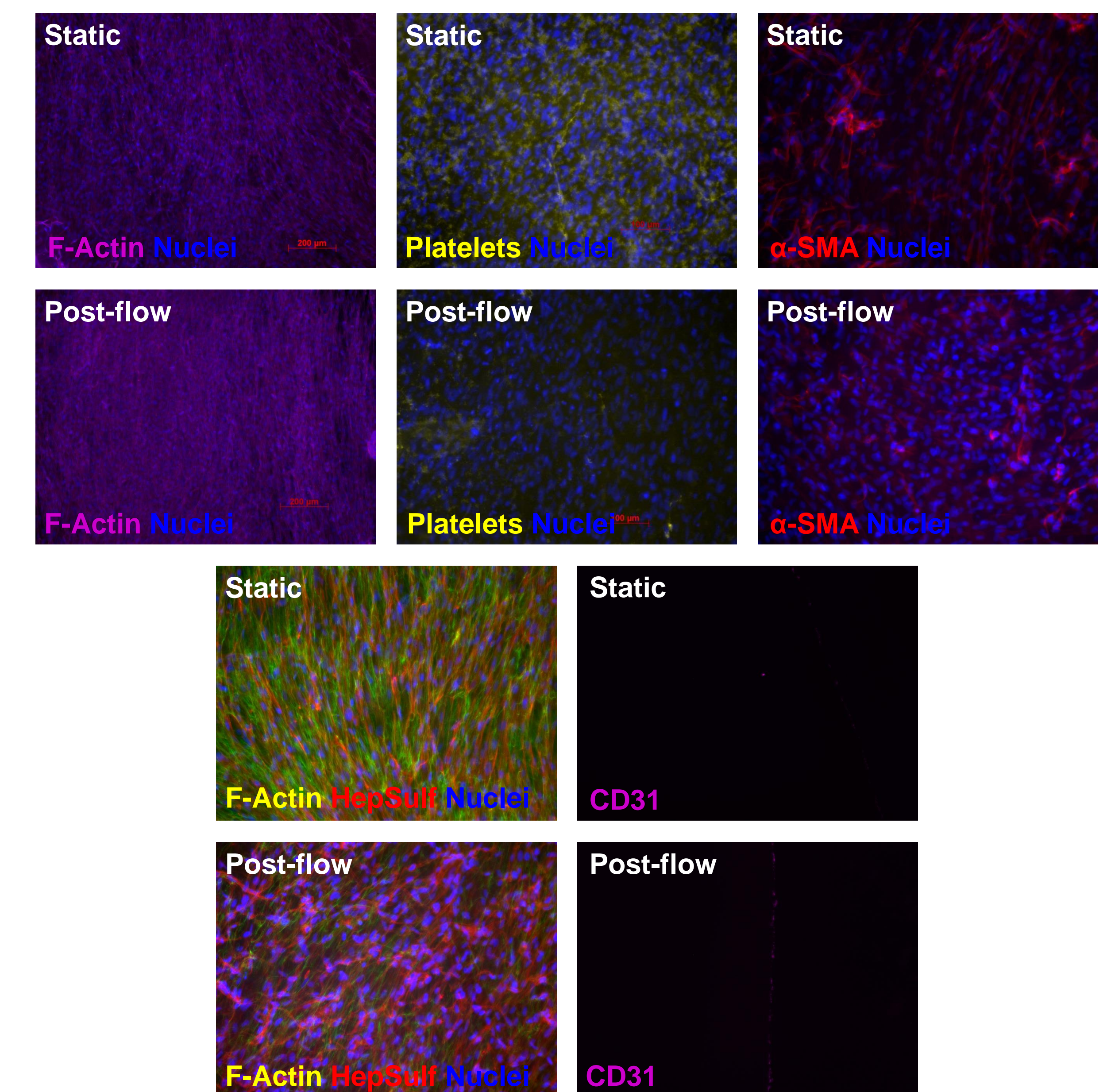


- Coat tissue with fibronectin for 4 hours at 37°C
- Ovine mesenchymal stem cells seeded at 2.5 million cells/mL (0.5 mL per embedded sample)

Fluid Shear Stress



Results



Conclusions

- oMSCs are retained and qualitatively show decreased platelet adhesion after applied fluid shear stress
- Effect of shear stress on α-SMA, heparan sulfate, and CD31 expression is unclear
- Future work will continue to focus on confirming an endothelial phenotype

Acknowledgements

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