

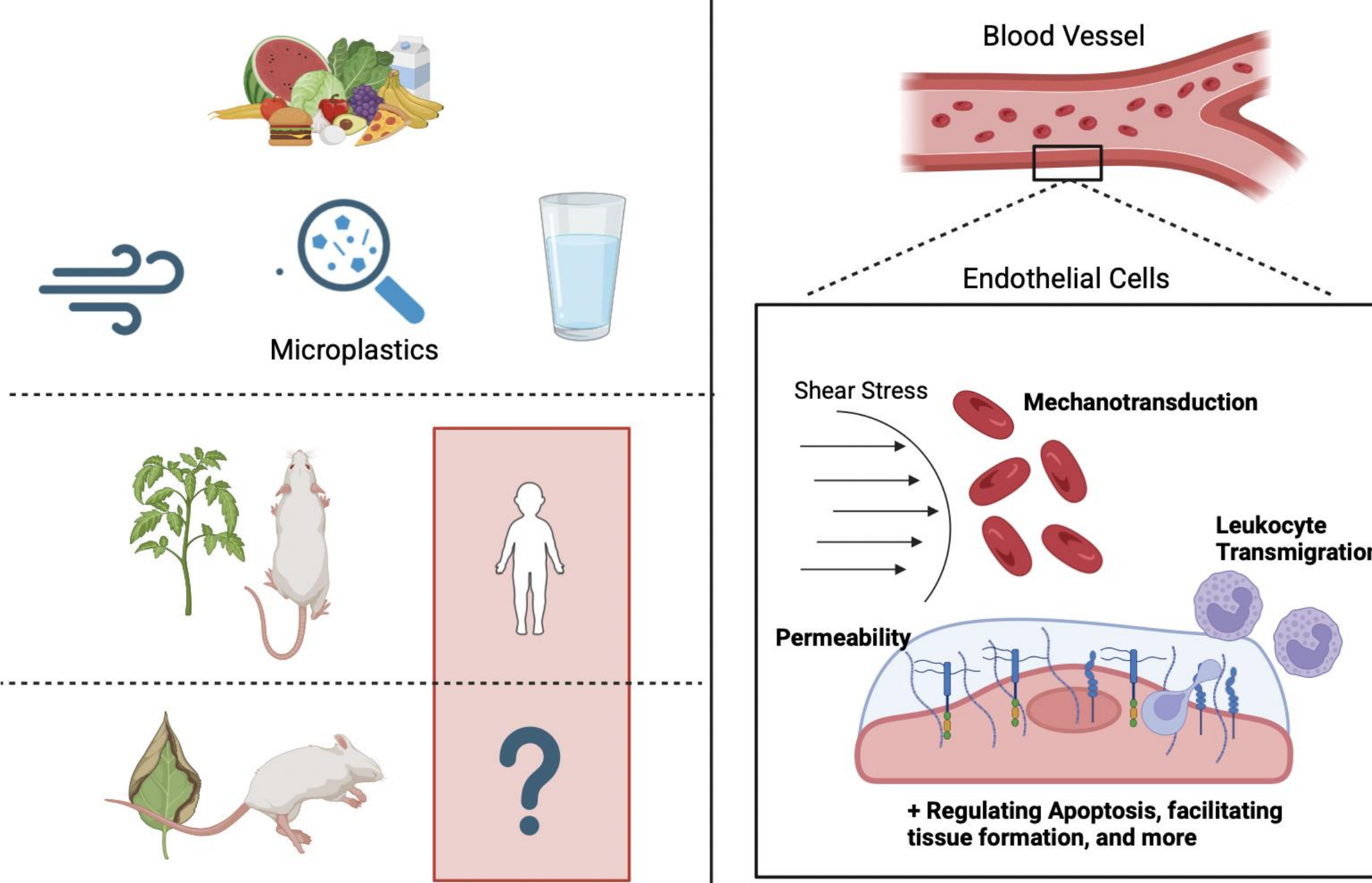
RESEARCH QUESTION

How do microplastics of various types affect cell viability and morphology of endothelial cells?

HYPOTHESIS

- Hyp 1:** Microplastics will affect both cell viability and morphology
- Hyp 2:** The higher the concentration of microplastics, the lower the cell viability and the greater the morphological changes
- Hyp 3:** Polyethylene microplastics will yield more significant results

BACKGROUND



Microplastics

Microplastics are small plastic particles that were first found in humans in 2022. They are known to be toxic, inducing DNA and oxidative damage. However, little research has been done on their effects on humans.

Endothelial Cells

Endothelial Cells are vital cells found in blood vessels and are responsible for blood transport. They also produce the glycocalyx, a vital substance that plays many key roles in the human body and human health.

MAIN TAKEAWAYS

Microplastics are toxic to endothelial cells and alter both cell viability and morphology significantly. This has serious implications for the health of all living organisms. This creates the need to further investigate the effects of microplastics and create a system to eliminate these microplastics.

RESULTS

Trypan Blue Exclusion Assay

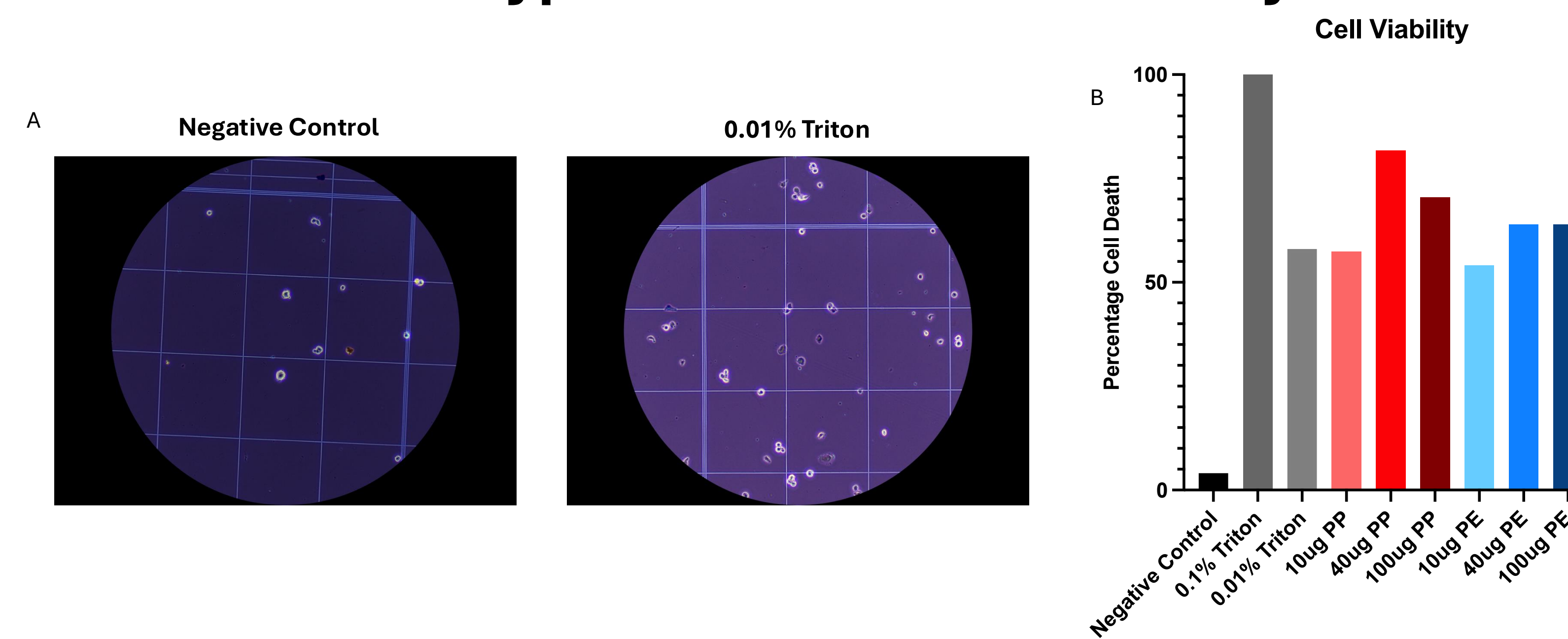


Figure 1. Trypan Blue Exclusion Assay used to measure cell viability. (A) Cells glowing are considered live and stained cells are considered dead. Using this metric, (B) cell viability, represented as percentage of dead cells was collected.

Cell Morphology

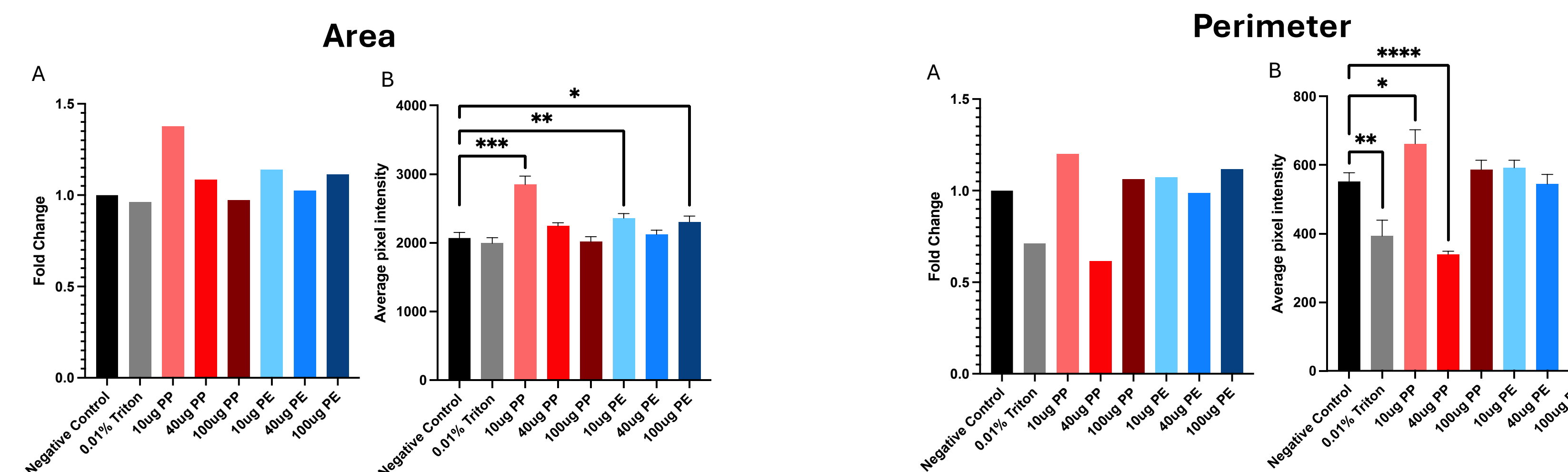


Figure 2. CellProfiler determined area of cell represented through (A) fold change and (B) average pixel intensity.

Figure 3. CellProfiler determined perimeter of cell represented through (A) fold change and (B) average pixel intensity.

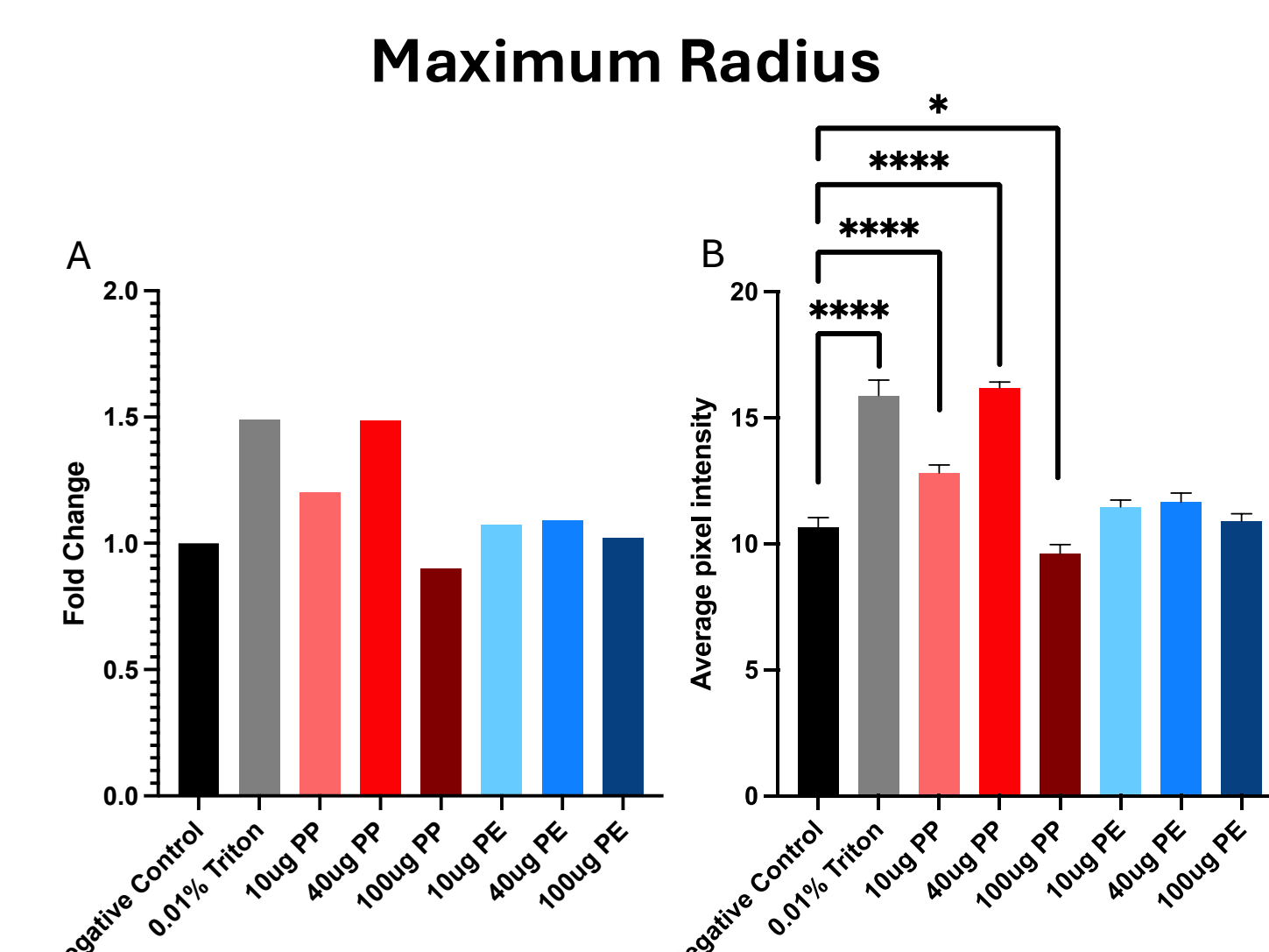


Figure 4. CellProfiler determined maximum radius of cell represented through (A) fold change and (B) average pixel intensity.

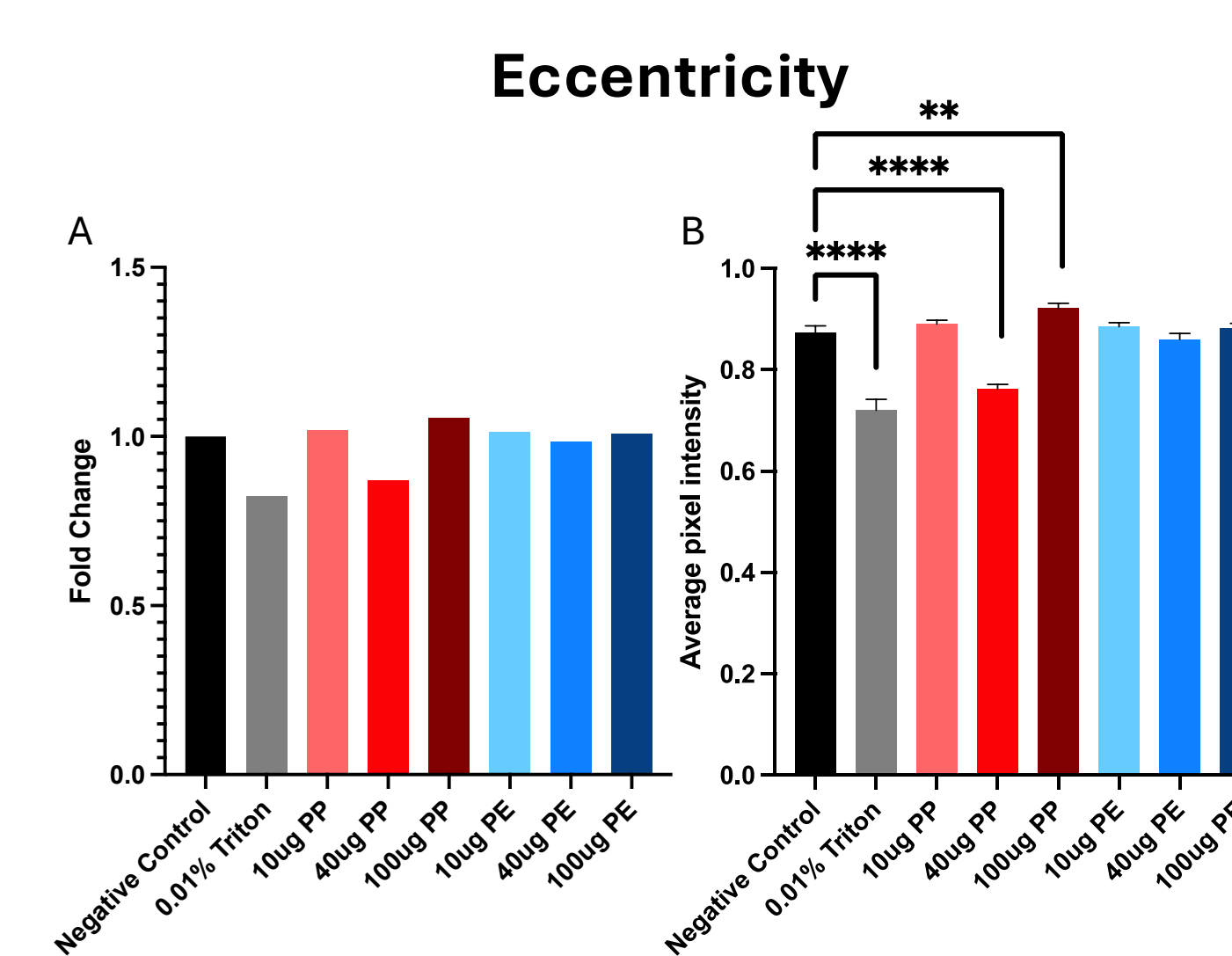
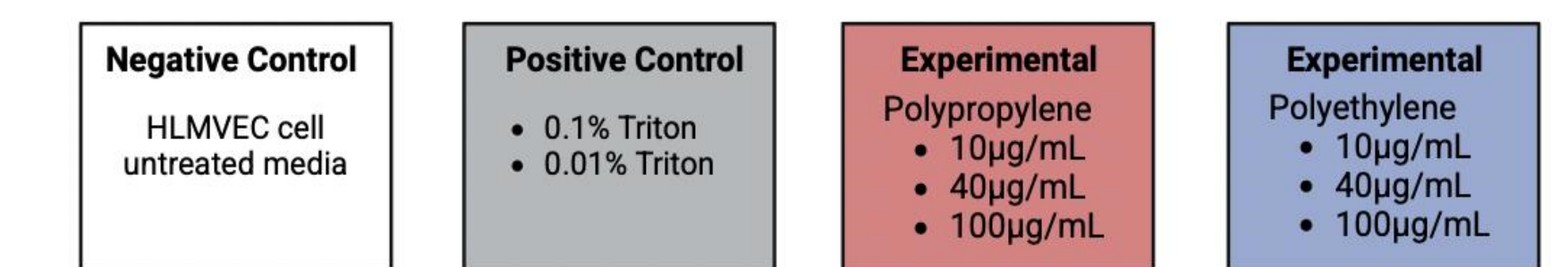


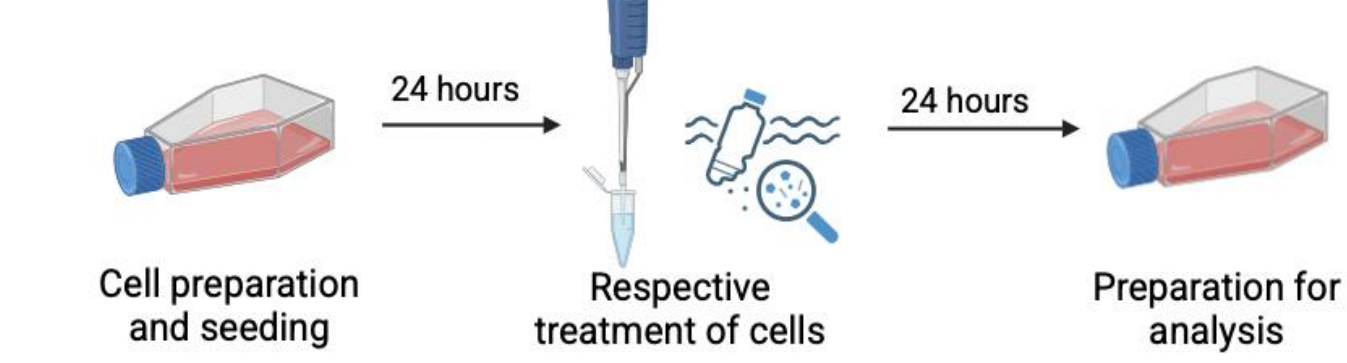
Figure 5. CellProfiler determined eccentricity of cell represented through (A) fold change and (B) average pixel intensity.

METHODOLOGY

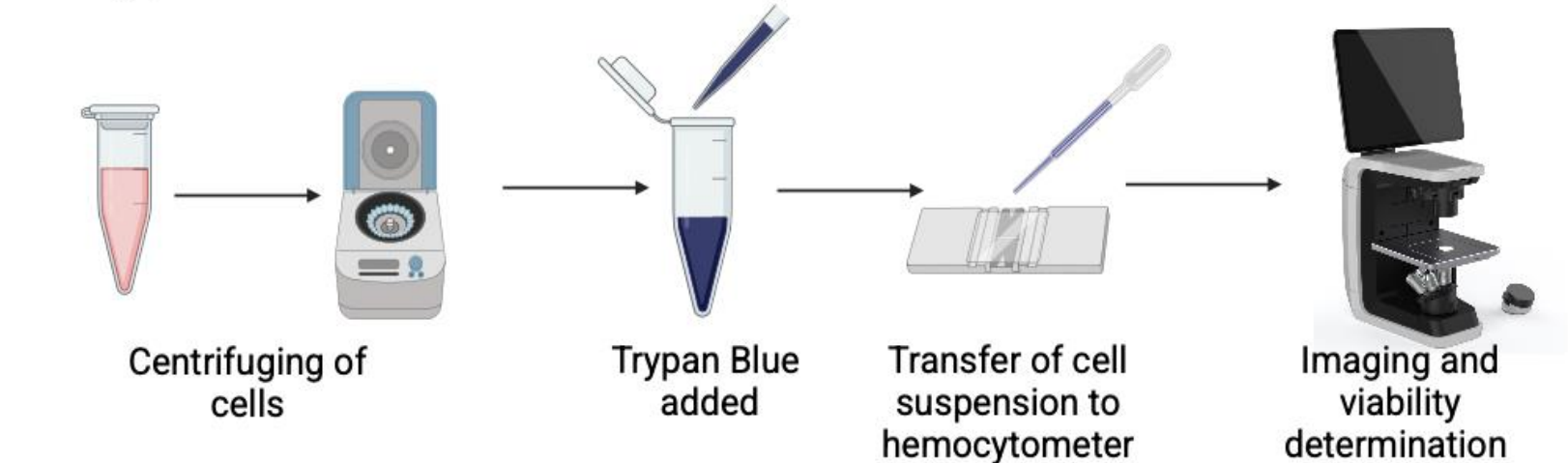
Experimental Groups



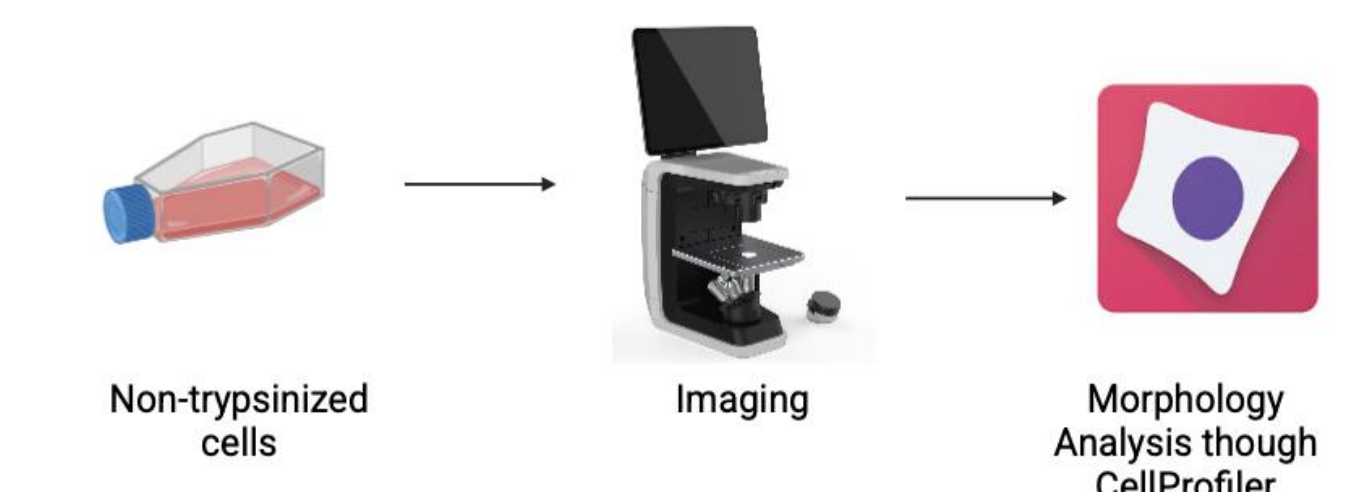
Treatment



Trypan Blue Exclusion Assay



Cell Morphology Analysis



CONCLUSION

- Microplastics affect both viability and morphology
- As concentrations increase, cell viability decreases
- As concentrations decrease, changes to morphology become more significant
- Polypropylene has a more significant impact
- There is a further need to study microplastics as this study finds that they have critical implications for health

FUTURE STEPS

- Further trials
- Raman spectroscopy to determine microplastic intake
- Determine further effects on glycocalyx
 - Shear stress exposure with measurement of mechanotransduction
 - Expression of glycosaminoglycan Heparan Sulfate
- Immunogenicity Assessment