



Effect of Acellular Dermal Matrix Orientation on Cellular Infiltration in a Unidirectional Model

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Background

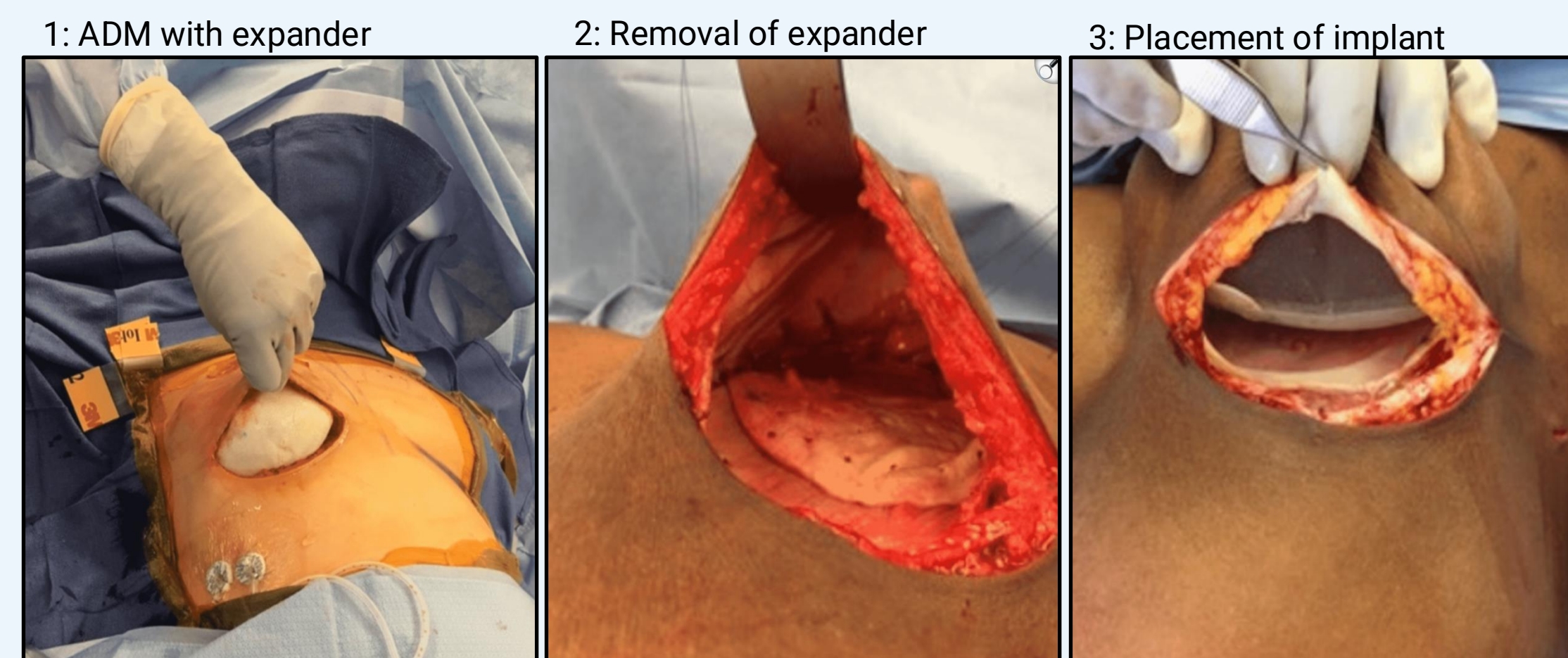
Acellular Dermal Matrix

An **acellular dermal matrix (ADM)** is a biologic scaffold derived from cadaveric human skin that has been processed to remove cells while preserving the structural proteins. It provides soft tissue support, promotes vascular ingrowth, and integrates with host tissue.

ADM is widely used in breast reconstruction to reinforce the implant pocket, provide soft tissue coverage, and improve cosmetic outcomes by reducing implant visibility, palpability, and complications like rippling or malposition.



Current ADM Use ADM in Two-Stage Breast Reconstruction



Why Acellular Dermal Matrix (ADM) is Used

- Provides structural support in soft tissue reconstruction
- Reinforces implant coverage and improves contour
- Promotes cellular infiltration and neovascularization
- Reduces tension across reconstructive sites
- Improves implant stability and positioning
- May decrease complications such as rippling and malposition

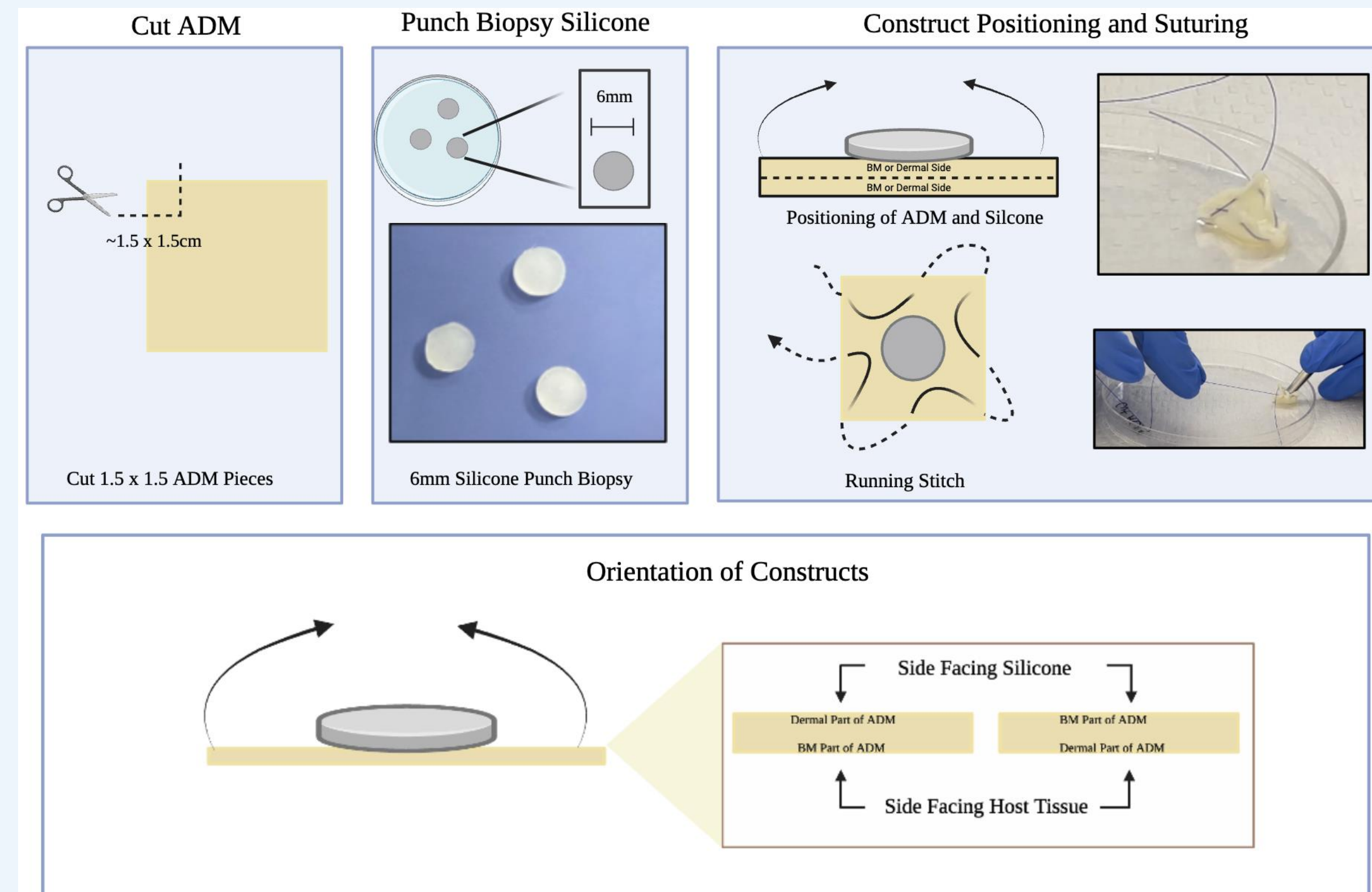
Objective

Prior studies have demonstrated successful incorporation of single-layer acellular dermal matrix (ADM) in models permitting bidirectional cellular infiltration. However, these models do not isolate the effect of directional ingrowth.

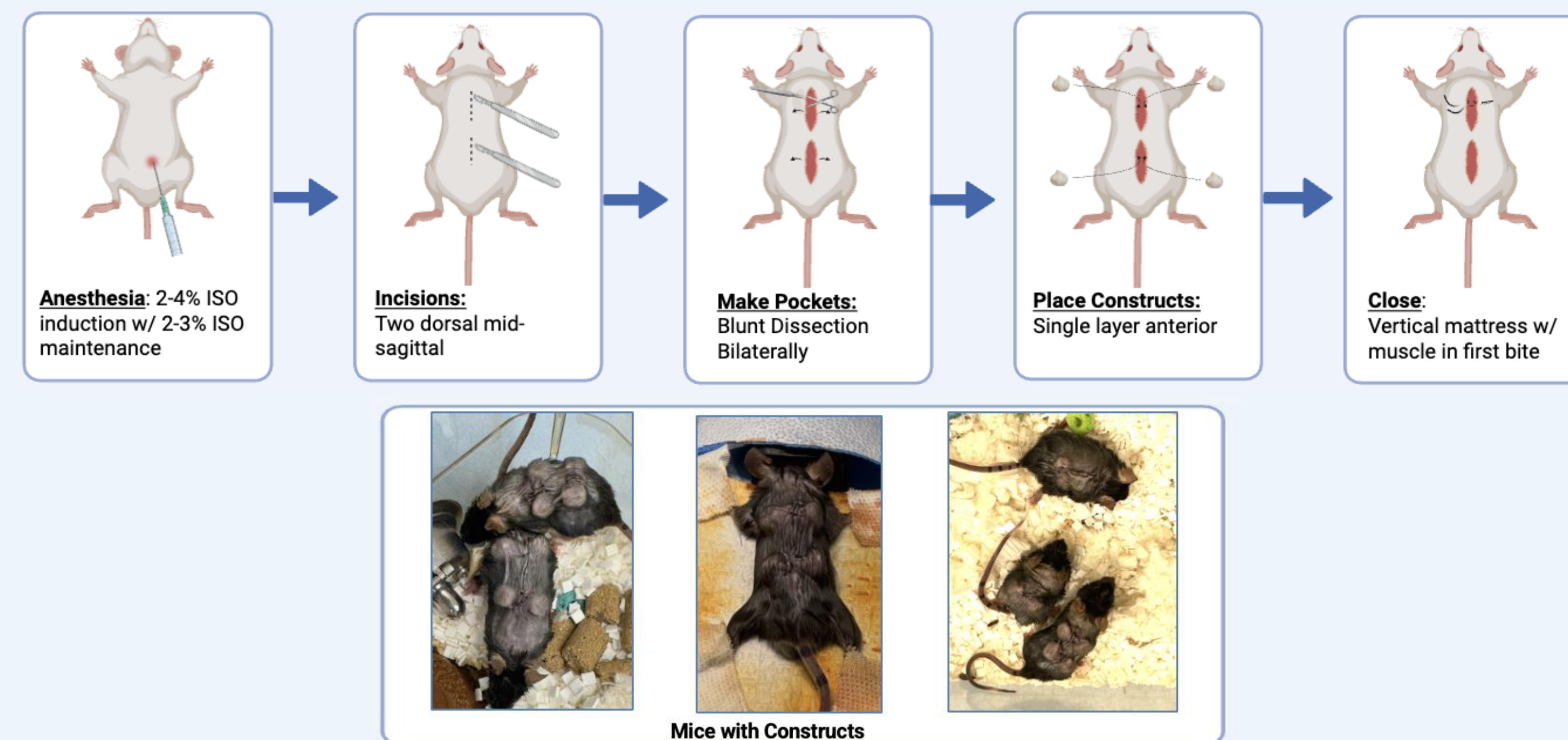
The objective of this study was to evaluate cellular infiltration in ADM using a unidirectional model that isolates the effects of directional ingrowth under controlled, one-sided conditions

Methods

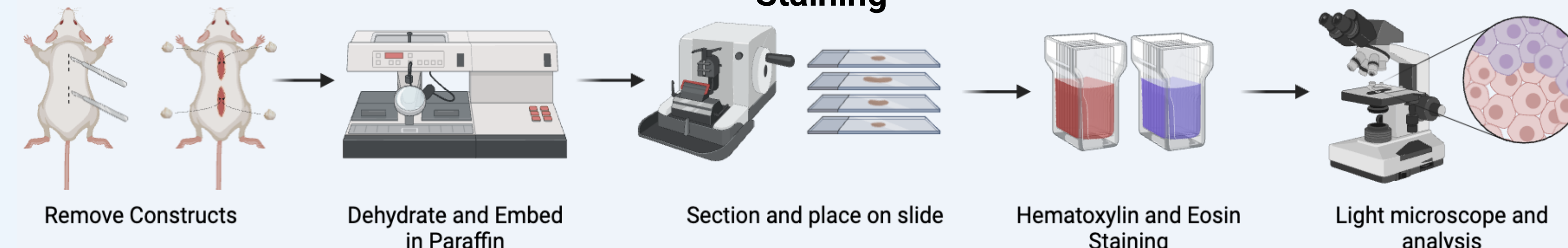
Construct Creation



Surgery

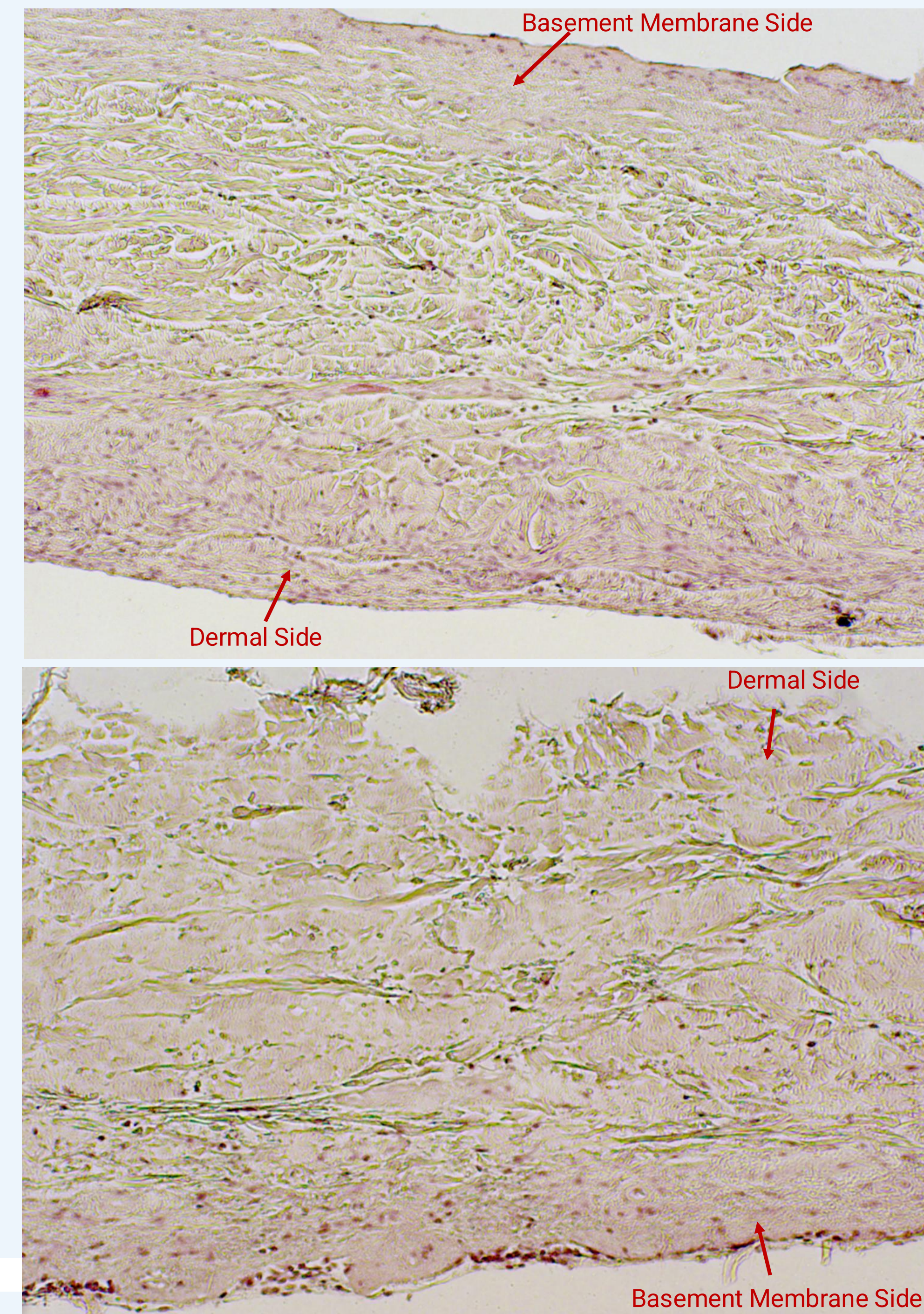


Staining



Results

The Affect of ADM Orientation on Unidirectional Cellular Infiltration in Single Layer ADM Constructs



Single Layer Construct at 28 days with the dermal (D) side facing the subcutaneous tissue

Cells Traveled throughout the entire length of the ADM with an even distribution

Single Layer Construct at 28 days with the basement membrane (BM) side facing subcutaneous tissue

Cells accumulated at the basement membrane side of the ADM with some cells able to penetrate the basement membrane layer and migrate into the ADM

Conclusion and Future Direction

Conclusion:

ADM orientation significantly influences cellular infiltration in a unidirectional model. Constructs with the BM facing the subcutaneous tissue demonstrated superficial integration by week 4, although to a lesser extent compared to the constructs with the dermal layer facing the subcutaneous tissue.

These findings suggest that the basement membrane is not completely impermeable, as previously thought, and that orientation plays a critical role in directing host cell infiltration.

Future Direction

1) Perform Immunohistochemistry

- iNOS: M1 Macrophage
- CD163: M2 Macrophage
- FSP-1 : Fibroblast
- CD31 (PECAM): Endothelial cells
- α -SMA : myofibroblasts

2) Quantify Cellular infiltration on HE and IHC