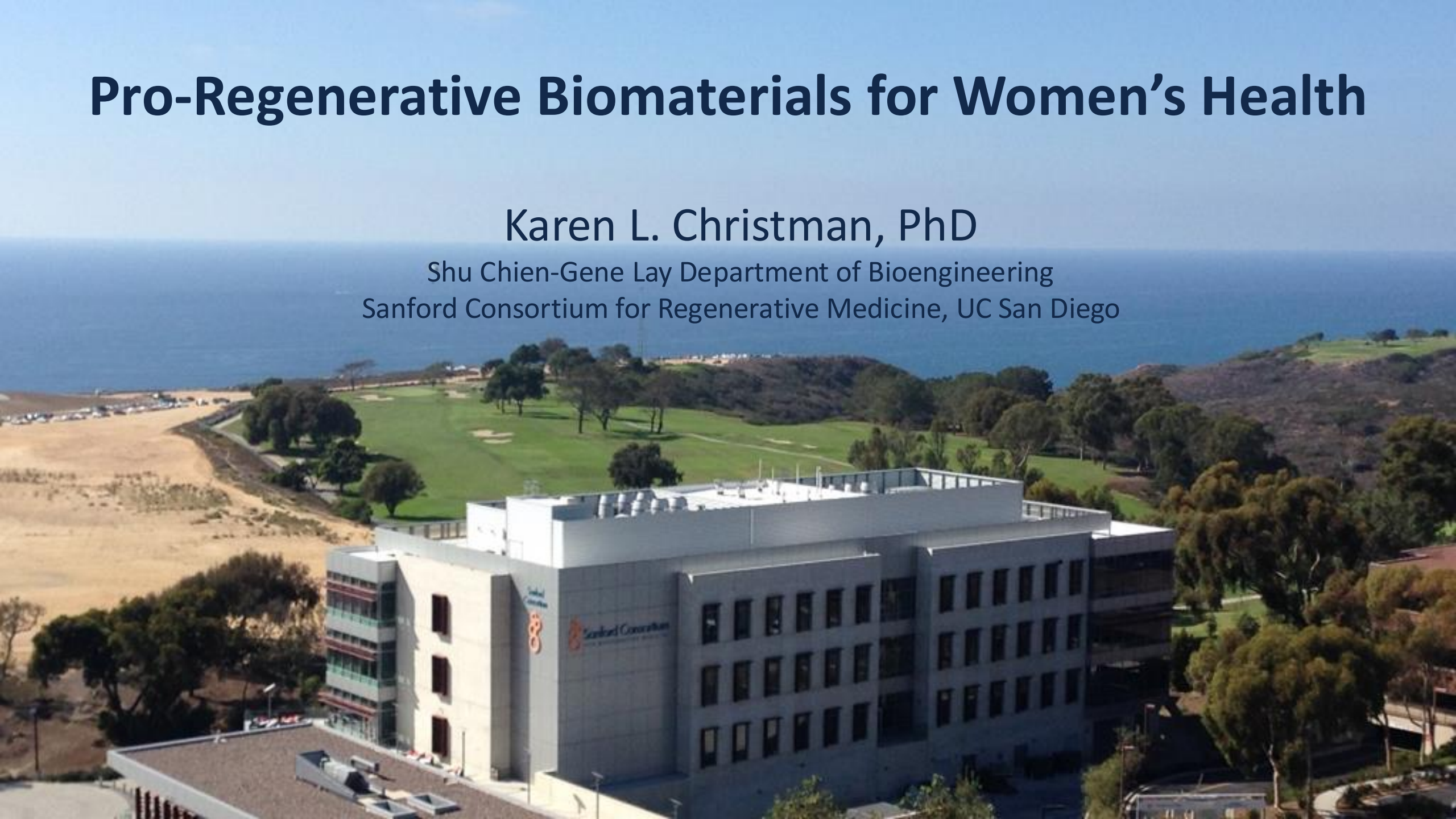


# Pro-Regenerative Biomaterials for Women's Health

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# Disclosures

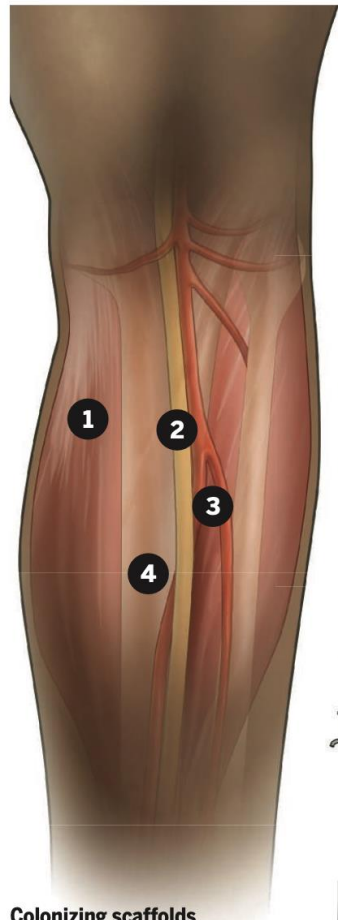
ventrix**bio**

- Co-founder
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- Hold Equity

KARIOS 

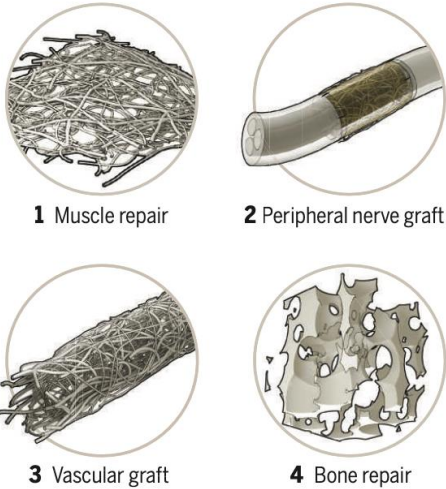
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# Pro-Regenerative Biomaterial Scaffolds



## Regenerative medicine using acellular biomaterial scaffolds

Biomaterials, either synthetic or naturally derived, including decellularized tissues, recreate the ECM and microenvironment and influence immune responses for tissue remodeling and repair. They can either be implanted or injected at the site of disease or injury to facilitate endogenous cell infiltration and regeneration.



## Colonizing scaffolds

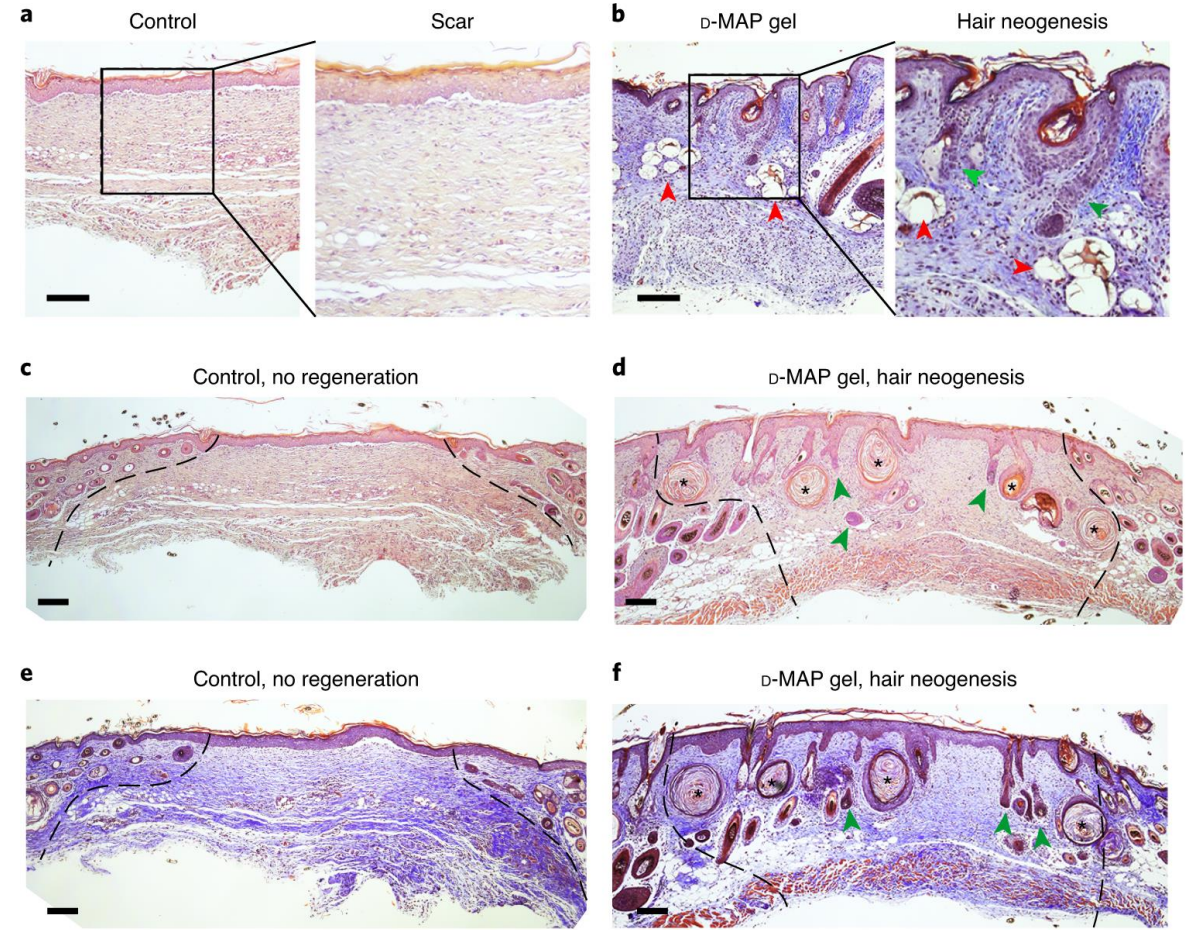
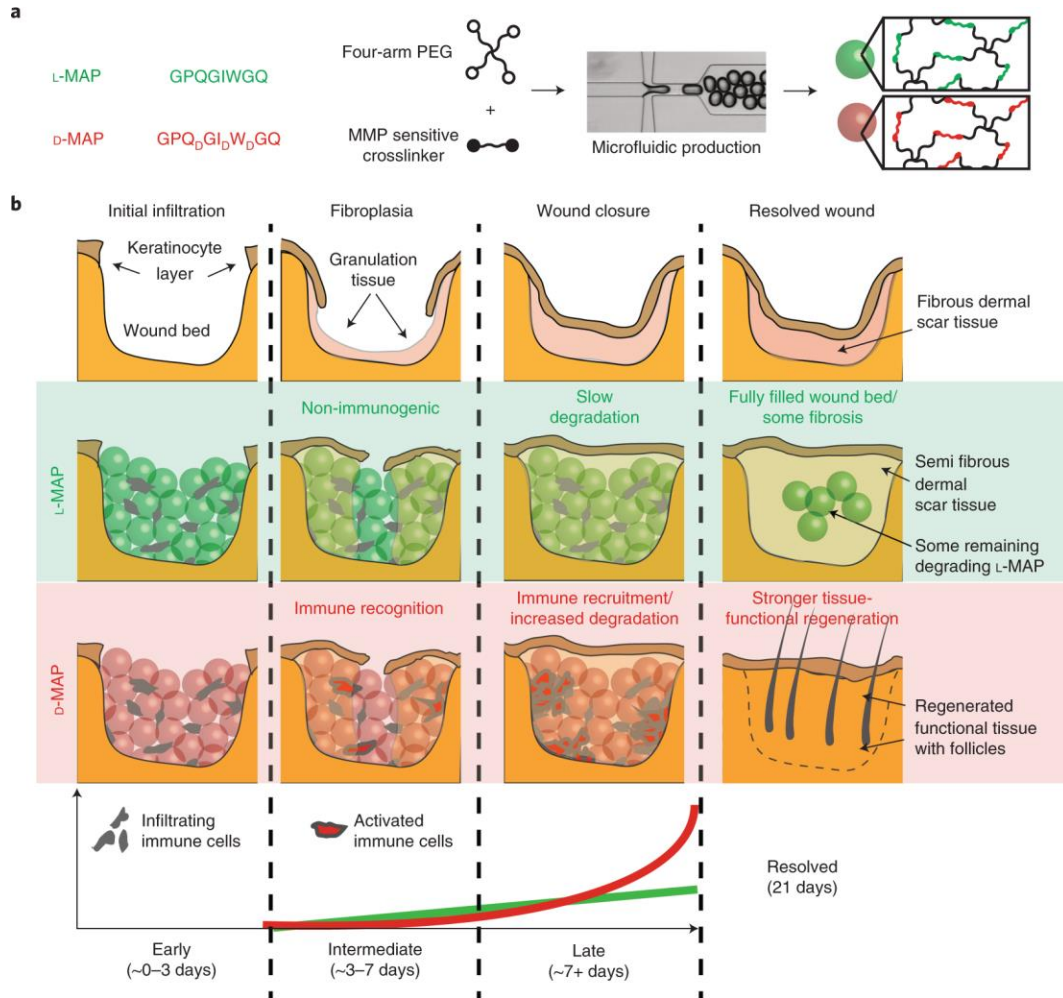
Implanted acellular scaffolds can recruit endogenous immune, progenitor, and other cells to facilitate regeneration.



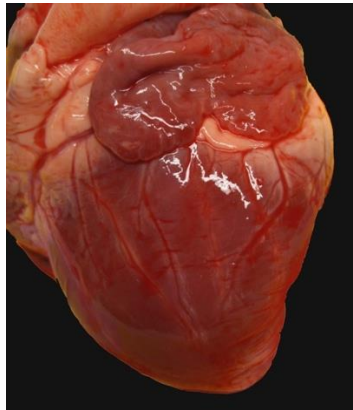
- Synthetic or naturally derived biomaterials
- Promote pro-remodeling immune response (M2, Th2) to drive regeneration
- More cost effective than cells
- No living product (less storage, shipping, and preparation concerns)
- Potential for sterilization
- More reproducible
- Some applications/materials can be regulated as devices



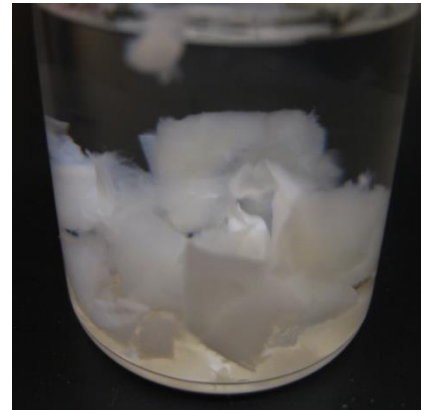
# MAP Scaffolds: Microporous Annealed Particles



# ECM Hydrogels



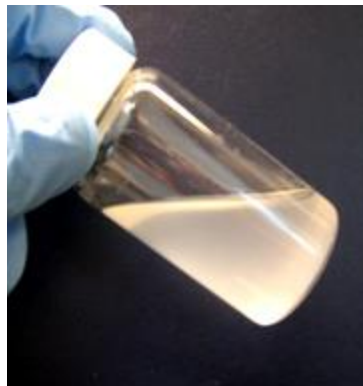
Porcine Tissue



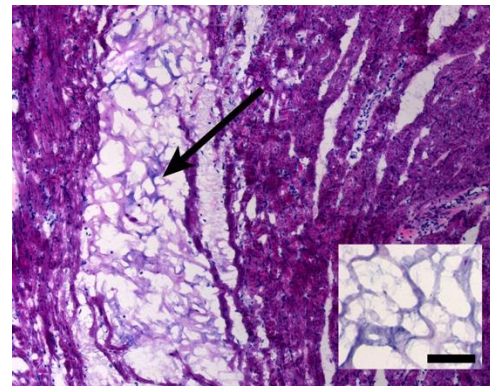
Decellularized ECM



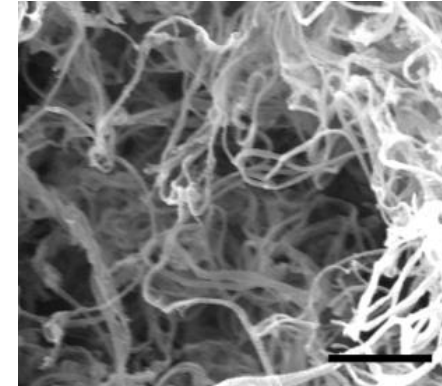
Lyophilized,  
milled ECM



Liquid matrix



In vivo self-assembly

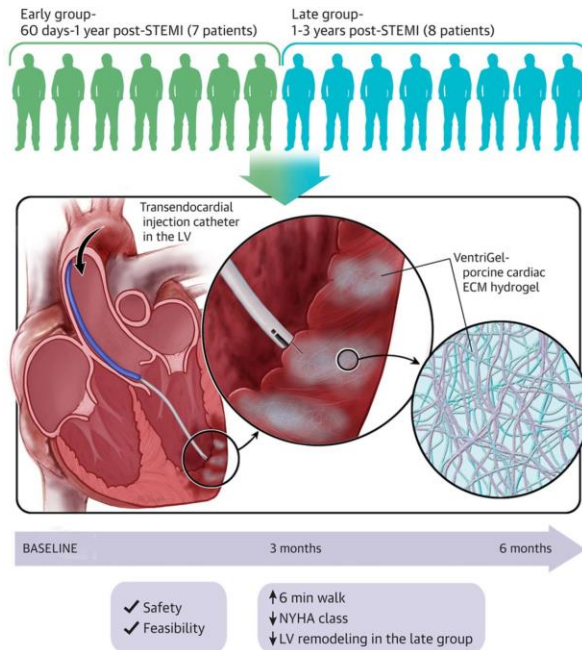


1 μm



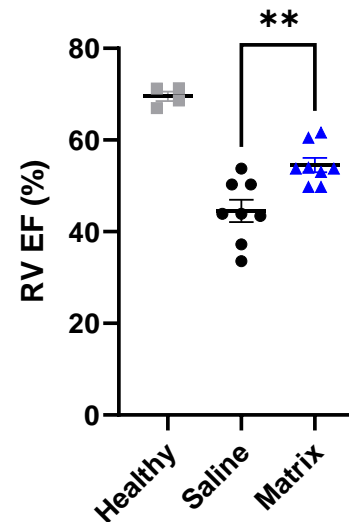
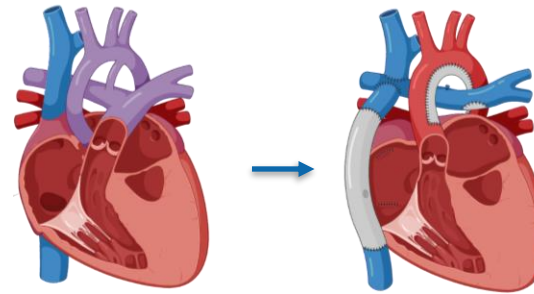
# ECM Hydrogels for Cardiovascular Disease

## Myocardial Infarction/ Ischemic Heart Failure



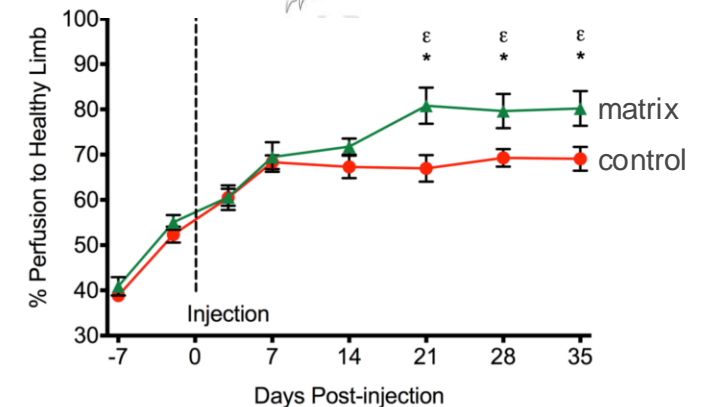
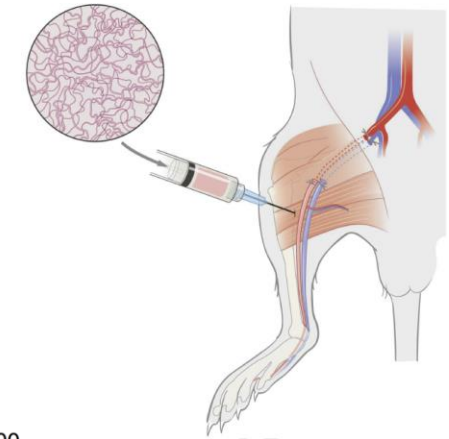
Singelyn et al., *JACC*, 2012; Seif-Naraghi et al., *Science Translational Medicine*, 2013; Wassenaar et al., *JACC*, 2016; Wang et al., *Acta Biomaterialia*, 2022; Traverse et al., *JACC:BTS*, 2019

## Hypoplastic Left Heart Syndrome



Hunter, et al., *JACC BTS*, 2024

## Peripheral Artery Disease



Ungerleider, Johnson et al, *JACC: BTS*, 2016

# Pelvic Floor Disorders



Pelvic Organ Prolapse



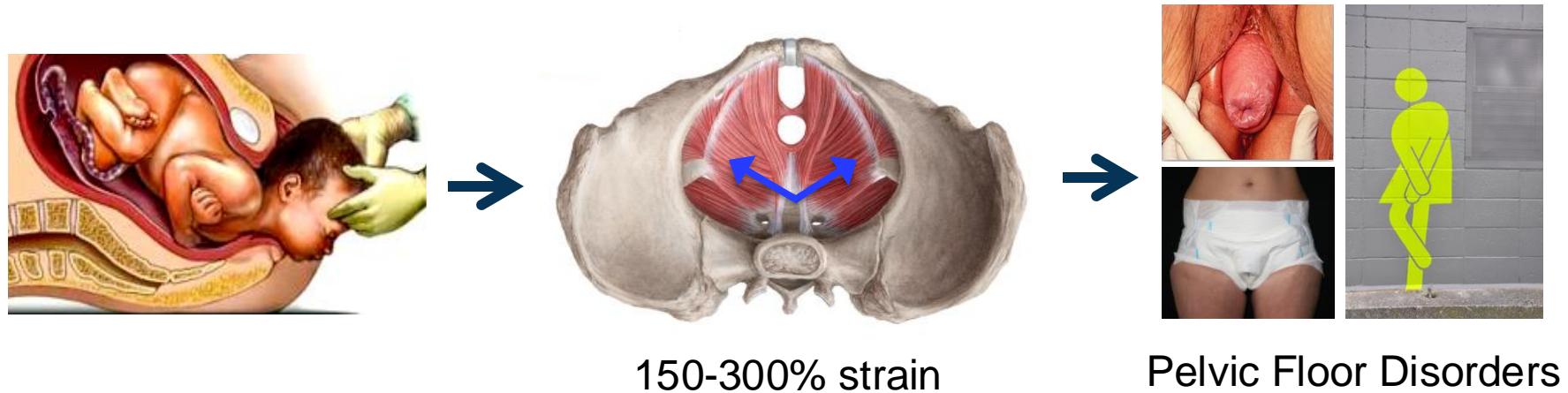
Urinary Incontinence



Fecal Incontinence

- Presently  
**~25% of U.S. Women**
- Negative Impact on Quality of Life
- Large Associated Costs
- Increasing Demand for Care

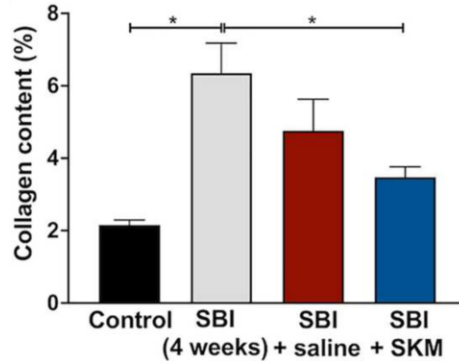
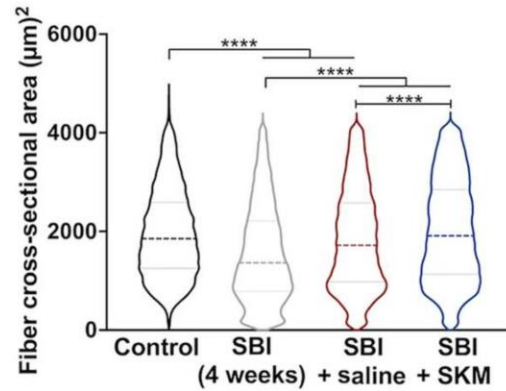
# Vaginal Delivery: Leading Risk Factor for Pelvic Floor Injury





# ECM Hydrogels for Women's Health

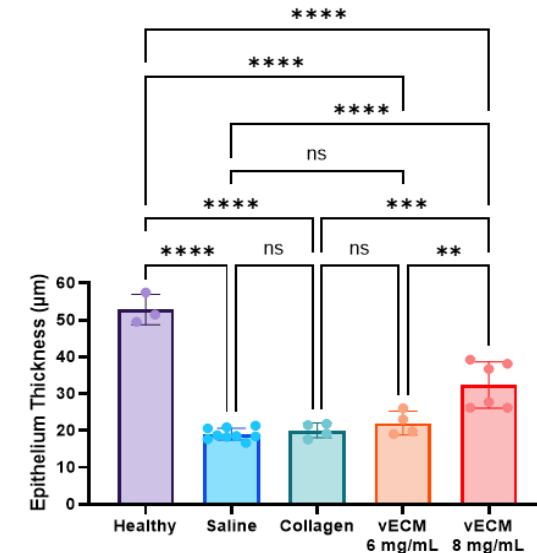
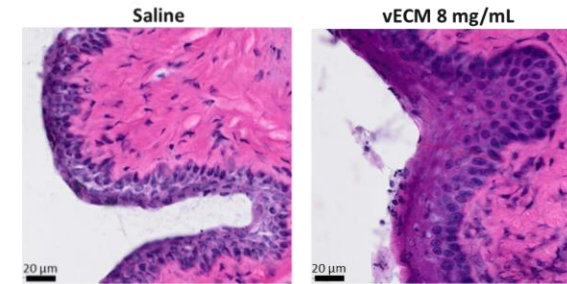
## Pelvic Floor Muscle Injury



- Modulation of immune response
- Upregulation of myogenesis pathway
- Downregulation of genes related with ECM remodeling

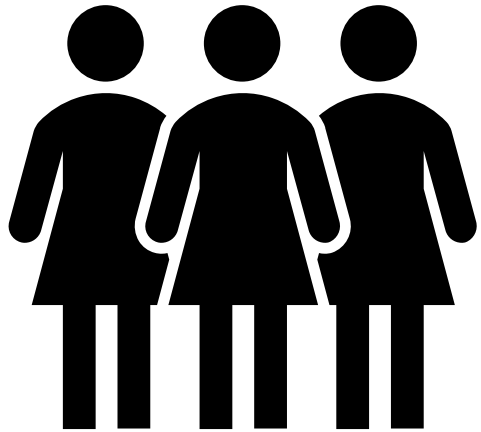
Duran, et al., *SciTM*, 2023

## Genitourinary Syndrome of Menopause



Zelus, et al., *in prep*

# Challenges for Translating Pro-Regenerative Biomaterials for Women's Health



- Don't know the exact pathology and disease progression at the molecular, cellular, and tissue level in women
- Don't know the optimal time to deliver a regenerative therapy
- Lack of precedent
  - Unclear preclinical path for IND for many indications (what animal models will be required?)
  - Best outcome measures for trials not defined
  - Which patients will benefit most?
- Raising funds with new/different technologies can be challenging

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