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Activity: Abstract
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Bio-scaffold Versus Synthetic Scaffold Interactions With Seeded Stem Cells In Dynamic Flow Culture Environments

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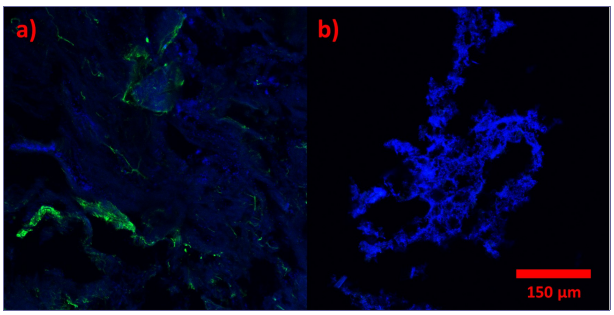
Abstract:
OBJECTIVE: Elastin is an important component for extracellular matrix and cardiac tissue regeneration (1). The objective of this study is to determine whether porcine small intestinal submucosa (PSIS) bio-scaffolds can better promote cardiac tissue regeneration from bone marrow stem cells compared to poly glycolic acid-poly L-lactic acid (PGA-PLLA) synthetic scaffolds under physiologically-relevant flow environments.
METHODS: Human bone marrow stem cells (RoosterBio, Frederick, MD) were seeded at 2,000,000 cells per 2.5cm^2 in 1.5cm x 1cm PSIS bio-scaffolds and PGA-PLLA synthetic scaffolds using Dulbecco's Modified Eagle Medium (DMEM) at 10% fetal bovine serum (FBS), 1% penicillin-streptomycin (P/S), 82ug/mL L-ascorbic acid 2-phosphate (AA2P), and 2ng/mL basic fibroblast growth factor (bFGF). The seeded PSIS strips were placed in rotisserie for 8 days followed by conditioning in a bioreactor under physiologically-relevant flow environment with surface shear stress of 3dyne/cm^2 for an additional 14 days. Conditioned samples were then fixed in 10% formalin at 4degC overnight, embedded in optimal cutting temperature (OCT) compound, and sectioned at 16 um using a cryostat. Sectioned samples were subsequently stained with elastin mouse monoclonal primary antibody (Novus Biologicals, Littleton, CO), followed by goat anti-mouse polyclonal secondary antibody (Thermo Fisher, Waltham, MA) and 4',6-diamidino-2phenylindole (DAPI). Stained samples were imaged using a confocal microscope.
RESULTS: Image results show presence of elastin protein (green) in the PSIS strip (a) and none in the PGA-PLLA (b) samples.
CONCLUSIONS: Cells seeded in PSIS bio-scaffold extracellular matrices facilitate higher production of elastin under flow mechanical conditions compared to PGA-PLLA synthetic scaffolds. Bio-scaffolds extracellular components allow bone marrow stem cells to communicate and secrete engineered matrix component, such as elastin that will be useful for enhancing cardiovascular regeneration.
REFERENCE(S): (1) Gonzalez de Torre, I. *et al*: Frontiers in Bioengineering and Biotechnology 2020-Jun-30; Vol. 8.



Author Disclosure Information:

C. Hsu, None..
B. A. Gonzalez, None..
S. Ramaswamy, None.
Topic (Complete): Aortic Valve
ACCME Practice Gaps Requirement (Complete):
1. What professional practice gap does this abstract address?
(A practice gap is the difference between actual and ideal performance and may include the difference between actual and ideal patient outcomes.)
: Extracellular matrices from bio-scaffolds promote higher elastin production compared to synthetic scaffolds. Elastin is an important component for for heart valve tissue regeneration.

2. How will this abstract influence change in competence, performance or patient outcomes?
: Valve replacement options should include extracellular matrices that allow elastin regeneration.

Additional Information (Complete):
My abstract is a new submission, not previously accepted to the HVS 2021 Annual Meeting. : True

Presentation Preference (Complete): Oral Presentation
Status: Complete

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