Apr 12th, 9:05 AM - 9:17 AM

The Use of Biomimetic Hydrogels to Direct Stem Cell Differentiation for Tissue Engineering Applications

India Pursell
Louisiana Tech University

Haley Barnett
Louisiana Tech University

Anna Whitehead
Louisiana Tech University

Mary Caldorera-Moore
Louisiana Tech University

Jamie Newman
Louisiana Tech University

The Use of Biomimetic Hydrogels to Direct Stem Cell Differentiation for Tissue Engineering Applications

India Pursell[1*], Haley Barnett[2*], Anna Whitehead[2*], Mary Caldorera-Moore[3, 4*], and Jamie Newman[1*]

[1]*School of Biological Sciences, Louisiana Tech University*

[2]*Molecular Sciences & Nanotechnology, Louisiana Tech University*

[3]*Biomedical Engineering, Louisiana Tech University*

[4]*Nanosystems Engineering; Louisiana Tech University*

Human mesenchymal stem cells (hMSCs) are a multipotent stem cell used in cell based regenerative therapies with over 600 clinical trials being conducted for the treatment of conditions like leukemia, autoimmune disease, cardiovascular disease, and orthopedic injury. hMSCs have the ability to self-renew and the potential to differentiate into many cell types, including those that make up bone, fat, and cartilage. In order to harness the potential of stem cells for regenerative medicine applications, there is a growing interest in the generation of biomimetic scaffolds to facilitate the growth and differentiation of specified tissue types. However, despite the research in the area of biomaterials for regenerative tissue scaffolds, there remain many questions about how cells interact with these scaffolds and how the properties of the materials influence cell behavior. We have analyzed the response of hMSCs seeded on Poly (ethylene glycol) dimethacrylate (PEGDMA) hydrogels to determine how the cells behave on materials of different elasticities. Attachment studies, immunofluorescence staining, and qRT-PCR were used to quantify and verify adipogenesis of hMSCs. Hydrogel biocompatibility was confirmed in mouse embryonic stem cells (mESCs) and hMSCs as they adhered to and survived on hydrogels of different elasticities. In addition, IF and qRT-PCR confirmed an influence of hydrogel elasticity on cell state, that will continue to make contributions to the field striving to characterize and optimize biomaterial-cell interactions for tissue engineering applications.