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Title: 3D Biofabrication Processes & Engineered Tissues

Research emphasis:

Dr. Shirwaiker's group focuses on design and scalable manufacturing technologies for engineered tissues. They study the fundamental interrelationships between biofabrication processes, biomaterials, and their effects on critical-to-quality attributes of 3D scaffolds and cellular constructs. This knowledge is further utilized to develop new manufacturing strategies and medical products in collaboration with other engineers and clinicians. These can be used for therapeutic and diagnostic applications including pharmacology/toxicology screening and disease modeling.

Application :

- Bioprinting
- 3D tissue constructs
- Orthopaedic tissues
- *In vitro* therapeutic and diagnostic models

Collaboration potential:

- Engineered tissue models for diagnostic, therapeutic, and fundamental research applications

Selected publications:

Mehendale SV, Mellor LF, Taylor MA, Loba EG, Shirwaiker RA (2017) Characterizing Effects of 3D-Bioplotting Polycaprolactone (PCL) Scaffold Geometry on Human Adipose-Derived Stem Cell Viability and Proliferation. *Rapid Prototyping Journal*. 23(3): DOI: 10.1108/RPJ-03-2016-0035

Warren P, Huebner P, Spang J, Shirwaiker RA, Fisher M (2017) Engineering 3D-Bioplotting Scaffolds to Induce Aligned Extracellular Matrix Deposition for Musculoskeletal Soft Tissue Replacement. *Connective Tissue Research*. Online first. DOI: 10.1080/03008207.2016.1276177

Narayanan LK, Huebner P, Fisher M, Spang J, Starly B, Shirwaiker RA (2016) 3D-Bioprinting of Polylactic Acid (PLA) Nanofiber-Alginate Hydrogel Bioink Containing Human Adipose-Derived Stem Cells. *ACS Biomaterials Science & Engineering*. 2(10): 1732-1742. DOI: 10.1021/acsbiomaterials.6b00196

Hunsberger J, Harrysson O, Shirwaiker RA, Starly B, Wysk R, Cohen P, Allickson J, Yoo J, Atala A (2017) Manufacturing Roadmap for Tissue Engineering and Regenerative Medicine Technologies. *Stem Cells Translational Medicine*. 4:1-6. DOI: 10.5966/sctm.2014-0254