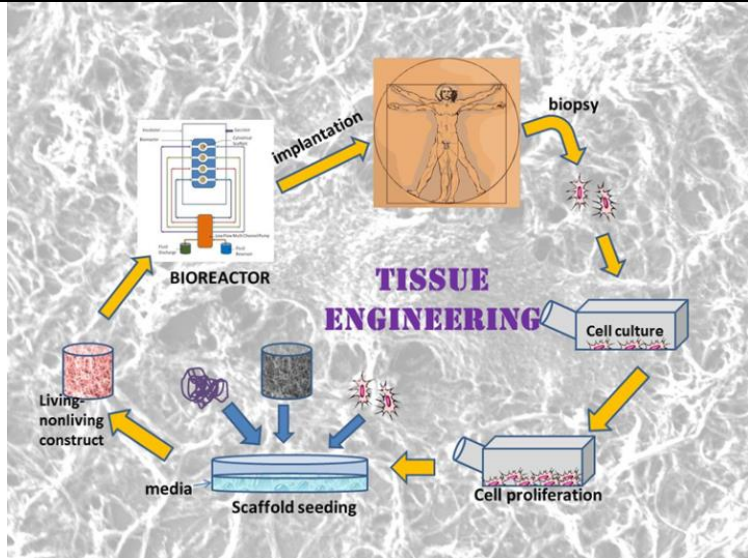


NDSU Engineering Grand Challenge Project Examples

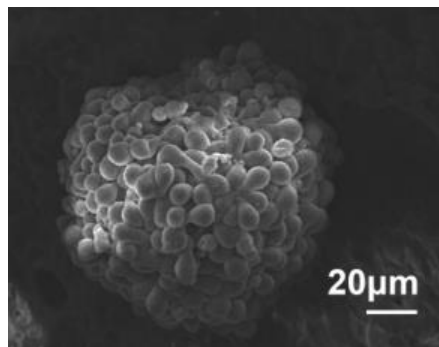
Engineering new Bones

Over one million Americans require joint replacement surgery each year and over half million patients receive bone defect repairs. Also, many of such surgeries need to be revisited. The materials used for replacing bone such as ceramics, metals, and polymers replace function and not form. What if we could enable our bodies to make bone to treat these conditions. This is the field of Tissue Engineering, a challenging interface of Engineering and Medicine. It involves making meshes called scaffolds of degradable materials seeded with patients own stem cells. Cells grow and make bone inside scaffold and scaffold degrades! The most creative, innovative minds can be put to work on this interdisciplinary project.



In the Katti research group, we work with nanoclays (clays that are crushed into nanometer-sized particles) and use them with degradable polymers to make scaffolds seeded with mesenchymal stem cells (adult stem cells).

Highly interdisciplinary in nature, the project involves engineering, advanced materials design and fabrication and use of advanced characterization techniques (big toys!!!) to design structures and materials to make bones.



A prostate cancer tumor made on engineered bone

Make an Engineering Cancer Test-Bed

Cancer patients go through the agony of being tried for various combinations of drugs. Here, you can design an engineered test-bed that is made up of the Tissue Engineered Bone (see project above) and seeded with patients own cancer cells. A cancer tumor is made and studied outside of the body and can be tested for drugs efficacy!

You can be part of an exciting team of researchers who take a new engineering approach to treating and understanding this offensive malady.

GC Mentor:

Dr. Kalpana Katti

University Distinguished Professor
Civil and Environmental Engineering



Phone: 701-231-9504

Email: kalpana.katti@ndsu.edu

Web:

https://www.ndsu.edu/ce/faculty/Kalpana_Katti/index.html