The Road to Regeneration

Center for Tissue Regeneration and Engineering at Dayton

• Learn from the classical models
• Coax stem cells to differentiate at will
• Use scaffolds to create tissues or organs
• A combination of all fields will provide solutions

1) Key expertise (Areas of Expertise and Center Leaders)
   - Tissue Regeneration, biomaterials, scaffolding for tissue engineering (bone and lens) (Tsonis, Lafdi, Singh, Kango-Singh)
   - Growth Regulation during Organogenesis (Singh, Kango-Singh)
   - Fruit fly Model for genome wide and chemical screens for regeneration (Singh, Kango-Singh)
   - Nanotoxicology (Rowe),
   - Vertebrate Fluid Homeostasis and surgical device development (Krane)
   - Tendon Repair, Wound healing (Joseph)
   - Stem Cells (Tsonis, Hong)
   - Biomimetic materials development for implant coatings (Hansen)
   - Biocompatibility of metallic biomedical implants (Hansen)

2. Vivarium, various other model systems are housed in individual laboratories (fruit flies, salamander, axolotl, oysters).

3. Set up for Molecular biology, tissue culture, materials research, and nano-material research.

Collaborations:

1. Rice University (lens project); Miami University Vision Center (Regeneration).
2. Ethicon Harmonic R Surgical System.
3. Collaborations with the OSU, Wright State University, Industrial Research partners in Ohio.
4. Okayama University, Japan, Centre for Human Genetics, Belgium, University of Florida at Gainesville, Florida
5. M D Anderson Cancer Center, Houston
3) Key Technology

Material synthesis unique experimental models for regeneration

Tissue Engineering

Prototypic Blood Vessel Tensioning Device for Surgical Instrument R&D

Transgenic animals

Load Cell

Surgical Device

IV Tubing

Blood Vessel

HOMOPHILA
Human Disease to Drosophila Gene Database
4) Unique processes:
   • Unique blend of research team members comprising of undergraduates, graduates, postdocs and research investigators.
   
   Researchers at TREND are representatives from Engineering, Biology, Clinical research, and sports medicine field which provides unique perspective to our discussions and interactions in the field of tissue regeneration and engineering that encompass basic biology (developmental, cellular and molecular) and advanced material engineering.
   
   • Interdisciplinary research with collaborators from UD Departments of Biology, Math, Engineering.

   **Strong interaction with the**
   • Local community (Tissue Center; Center for Neuroscience at WSU),
   
   • Regional (Vision Center, University of Miami)
   
   • National and international collaborators.
   
   • Our strength is in the diversity of specializations of researchers in our group.