



REGENERATIVE BIOLOGY AND TISSUE ENGINEERING

PROBLEM



How can genomic information lead to treatments for chronic health problems? Diseases such as diabetes, osteo- and rheumatoid arthritis, and osteoporosis present daunting challenges to current clinical practices. Research in the Regenerative Biology and Tissue Engineering Research Theme will focus on creating both custom devices based on the patient's unique genome and therapies that enhance the body's regenerative powers.

RESEARCH



The theme brings together scientists in nanotechnology, bioengineering, cell biology, genomics, biomaterials, and computer sciences, and links with clinical programs at Carle Hospital and the University of Illinois College of Medicine.

The theme will focus on understanding the specific genes involved in normal tissue formation and regeneration, as well as the pathogenic changes in the same tissues that underlie most chronic diseases. Theme researchers will isolate and manipulate bone marrow, bone and soft tissue, and gastrointestinal stem cells, and will seek a better understanding of bone and cartilage regeneration. Specific research questions include:

- How can micro- and nano-environments be created to optimize tissue development and engineering?
- How can new therapies for chronic conditions or tissue and organ replacement be developed from understanding healthy tissue regeneration?
- How can design rules for simple cell-based systems and devices be applied to more complex biological systems and devices?
- How can cost-effective clinical treatments be derived from the manipulation of stem cells to treat chronic conditions?

BENEFITS

Theme research will lead to the design of drugs and devices that restore the body's own mechanisms of natural regeneration. Initial work with maxillofacial surgeons at Carle Hospital may yield devices that will replace bone, cartilage, and soft tissue for use in reconstruction of the head and face after traumatic injury. Ultimately, the theme will seek to develop novel biomaterials, micro- and nano-devices, and drugs for tissue and organ replacement.

THEME LEADER

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