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Course focus: tissue engineering

BY LIA UNRAU
Rice News Staff

With cardiovascular disease the leading cause of death in the United States and demand for human vital organs growing at 15 percent each year, research in tissue engineering continues to gain momentum. The latest developments in the field were the focus of an annual short course at Rice University.

“Advances in Tissue Engineering,” held Aug. 13-18, allowed scientists and clinicians to update their knowledge in this field and focused on the latest science and technology for growing human tissues and replacing damaged or diseased organs or bones. In addition to Tony Mikos, course director and the J.W. Cox Professor of Bioengineering and Chemical Engineering, and numerous other Rice faculty presenters, several guest presenters were on hand to discuss their research.

During the course, Michael Sefton of the University of Toronto presented The LIFE Initiative, “Living Implants from Engineering,” an international collaboration of researchers working together to create an unlimited supply of organs, such as hearts, livers and kidneys, for transplantation. Mikos serves on the initiative’s interim steering committee.

Charles Vacanti of the University of Massachusetts Medical Center discussed methods for combining living cells to grow new tissue. In addition to experiments with cartilage and bone, he has explored the use of immature cells found in the central nervous system, such as the brain and spinal cord. Whereas other cells die about five minutes after losing oxygen, he found that, in the right conditions, small, undifferentiated brain and spinal cord cells begin to multiply and to form branches. These “stem” cells have the ability to mature into the different cellular elements of central nervous system tissue. Animal studies are now under way to combine neural stem cells with polymer components and growth factors to try to repair spinal cord injury or stroke damage.

The urinary system is another target for tissue engineering research. Anthony Atala of Harvard Medical School explained that further studies need to be conducted in order to apply tissue engineering techniques to humans, but studies in animals involving replacement bladders, ureters and urethras have been promising. Clinical trials using injectable cell-based tissue engineering in humans for the correction of urinary incontinence in adults are currently ongoing.

Research in information science will allow researchers in tissue engineering rapid access to information, both in a visual format and text format. Peter Johnson of TissueInformatics Inc., described a system that would assist in diagnosis and research insights.

Attendees included national and international research scientists from industry and academia and plastic surgeons and biomedical engineers from medical centers.

The eighth annual course was sponsored by Rice’s Cox Laboratory for Biomedical Engineering, the Institute of Biosciences and Bioengineering and the Department of Bioengineering.

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