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Future Skin, Cartilage, Bone Products Focus of 'Advances in Tissue Engineering'

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Course Tissue engineering research, including skin products that may be available by the end of this year, and future products such as cartilage and bone, were the focus of an annual short course at Rice's Institute of Biosciences and Bioengineering.

"Advances in Tissue Engineering," held Aug. 5-9, allowed scientists and clinicians to update their knowledge in this rapidly growing, interdisciplinary field. The course focused on the latest science and technology for growing human tissues and replacing damaged or diseased organs or skeletal structures.

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Advances discussed at the course include two skin products that will be the first tissue-engineered products on the market, possibly available later this year. One of the products works as a temporary covering for burns prior to skin grafting. The other serves as a skin replacement for diabetic ulcers. Another area that is rapidly advancing toward the market is cartilage for reconstruction of facial defects and knees. Tissue engineered cartilage integrates smoothly into animals' joints, and clinical trials in humans are expected to begin early next year.

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Future products include heart valves and blood vessels that grow along with the patient. They have been implanted in animals, and are expected to be in clinical trials in two to three years.

Bone grown upon biodegradable polymer scaffolds can be custom-shaped for each patient. The new bone eventually replaces the biodegradable polymer, and maintains the anatomically desired shape and mechanical properties. Bone has been grown in sheep by Antonios Mikos, associate professor of chemical engineering, and preliminary results hold promise for future clinical trials.

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Important research areas include development of biomaterial scaffolds for promoting simultaneous growth of different types of cells, necessary for re-creating complex organs such as the liver, pancreas and kidneys, which require different types of cells to interact to perform various functions. Researchers are also studying how these highly metabolic organs, once developed, might be integrated smoothly into a human, so there is no interruption in nutrient and blood supply.

Research is also focused on methods for combining gene therapy with tissue engineering to replace cells deficient in one or more gene product, and engineering cells to deliver proteins and other therapeutic drugs.

Attendees included national and international research scientists from industry and academia, and plastic surgeons and biomedical engineers from medical centers. The fourth annual course was cosponsored by the Institute of Biosciences and Bioengineering and the School of Continuing Studies.

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