Researchers develop new method for creating tissue engineering scaffolds

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Researchers at Northwestern University have developed a new method for creating scaffolds for tissue engineering applications, providing an alternative that is more flexible and less time-intensive than current technology.

A paper describing the results, "Low-Pressure Foaming: A Novel Method for the Fabrication of Porous Scaffolds for Tissue Engineering," was featured in the February issue of the journal *Tissue Engineering*.

Through tissue engineering, researchers seek to regenerate human tissue, such as bone and cartilage, that has been damaged by injury or disease. Scaffolds - artificial, lattice-like structures capable of supporting tissue formation - are necessary in this process to provide a template to support the growing cells. Over time, the scaffold resorbs into the body, leaving behind the natural tissue.

Scaffolds are typically engineered with pores that allow the cells to migrate throughout the material. The pores are often created with the use of salt, sugar, or carbon dioxide gas, but these additives have various drawbacks; They create an imperfect pore structures and, in the case of salt, require a lengthy process to remove the salt after the pores are created, said Guillermo Ameer, professor of biomedical engineering at the McCormick School of Engineering and professor of surgery at the Feinberg School of Medicine.

The new scaffolds, created from a combination of ceramic nanoparticles and elastic polymers, were formed in a vacuum through a process termed "low-pressure foaming" that requires high heat, Ameer said. The result was a series of pores that were highly interconnected and not dependent on the use of salt.

The new process creates scaffolds that are highly flexible and can be tailored to degrade at varying speeds depending on the recovery time expected for the patient. The scaffolds can also incorporate nano-sized fibers, providing a new range of mechanical and biological properties, Ameer said.

"The technology could prove very useful in repairing ACL (anterior cruciate ligament) tears and in bone void fillers," Ameer said.

Provided by Northwestern University