

Researchers Use Adult Stem Cells to Create Soft Tissue

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A Columbia University research team aims to create soft tissue from patients' own bone marrow to perform facial or breast reconstruction.

With a \$2.5 million grant from the National Institute of Biomedical Imaging and Bioengineering, the goal of the Columbia University Medical Center team, led by Jeremy Mao, associate professor of dental medicine, is to create long-lasting soft tissue implants from stem cells harvested from the patient. These stem cells can differentiate into bone, fat, cartilage and other types of cells for facial reconstruction following disfiguring injuries from war, cancer surgery or accidents.

“Our research has shown that mesenchymal stem cells can create tissue that is biocompatible with the host and that the continuous generation of these cells can replenish the implant to reduce shrinkage,” Mao says.

Currently, surgeons often graft from the patient's own tissue, which creates additional wounds. Grafted cells also fail to stay alive, causing implants to shrink up to 70 percent and lose their shape and volume. Attempts have also been made to use fat cells left over after liposuction, but those cells also have a limited lifespan.

The Columbia team of biologists, biomedical engineers, biomaterial scientists, imaging experts and surgeons has shown that human adult stem cells can create long-lasting implants in mice. The implant is created by placing the stem cells into an FDA-approved scaffold that mimics the conditions needed to turn stem cells into fat cells.

Because stem cells have the ability to replicate and differentiate, they can regenerate the soft tissue, keeping the implant from shrinking. In mice, these cells have successfully created fat cells that could be implanted and retained their size and shape for at least a month. Because the implants can be molded into any size or shape, they could also be used for breast reconstruction.

Source: Columbia University

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