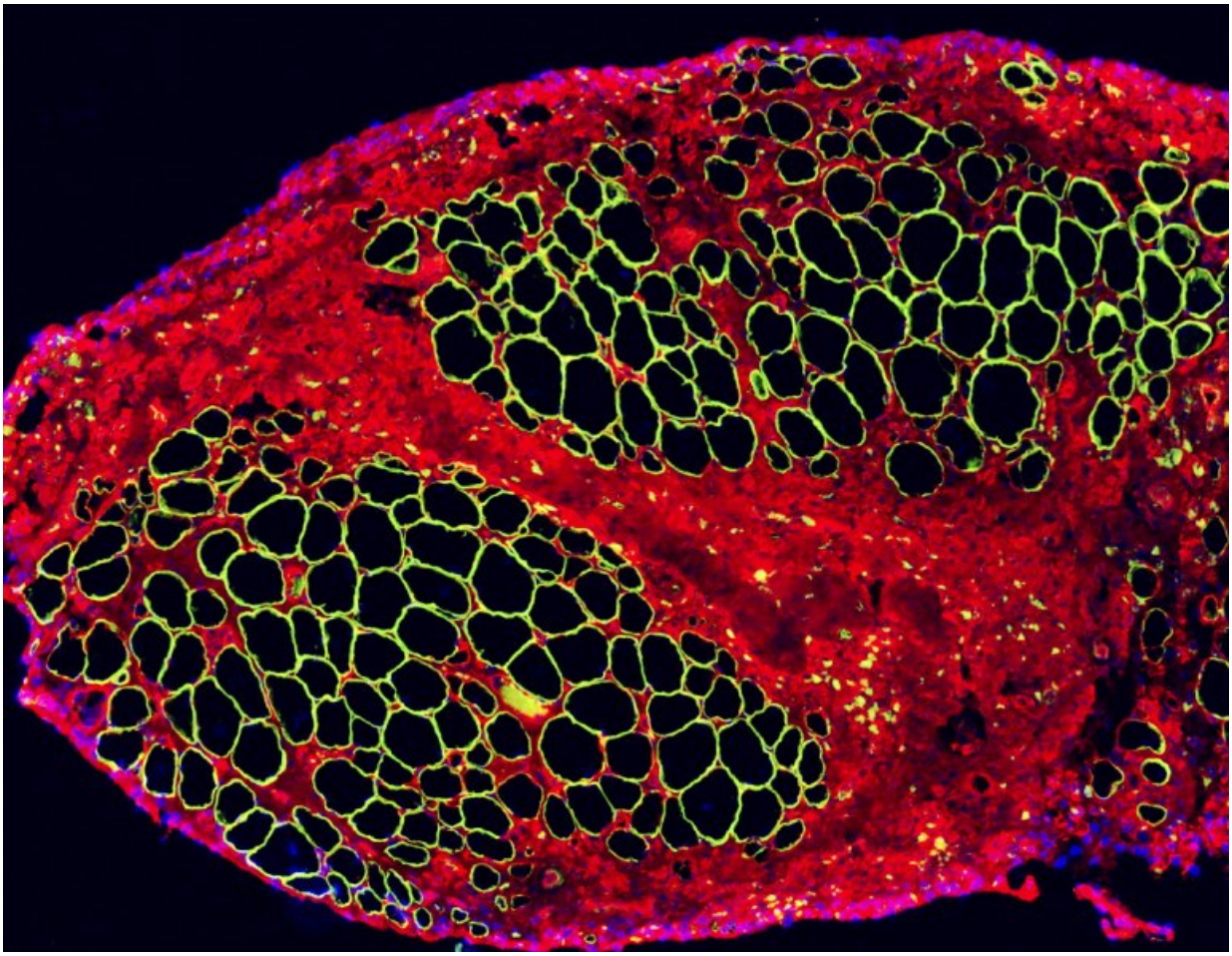
Medical Xpress

Regenerating muscle from stem cells

October 28 2016, by Christina Hueschen



Cross-sectioned muscle fibers are shown as black shapes outlined in green. Credit: Xiaoti Xu and Hua Tian

A microscopic image of a mouse leg that has been reconstructed with a

stem cell transplant shows what may one day help patients regrow new muscle after a major surgery.

The image shows cross-sectioned muscle fibers as black shapes outlined in green. The catch: these are human muscle fibers, grown from human stem cells.

Xiaoti Xu, MD, a resident physician in UC San Francisco's Division of Plastic and Reconstructive Surgery, studies a type of stem cell called satellite cells, or muscle stem cells. Xu became interested in muscle stem cells because of his experiences as a clinician.

"Our inability to generate healthy, living muscle is a huge shortcoming," Xu said. To reconstruct a cancer patient's shoulder after surgical removal of a tumor, for example, Xu and his colleagues transfer a large amount of muscle from the patient's abdomen or leg. These living muscle transfers take eight to 12 hours, followed by a long and painful recovery process for the patient.

"Imagine losing a whole piece of muscle the length of your thigh – how much pain you would have to go through," Xu said.

Xu wondered if instead, healthy muscle could be grown ahead of time from muscle stem cells. Thanks to the support of his residency program, Xu worked with Jason Pomerantz, MD, to take a problem from the operating room into the lab. Xu successfully isolated human muscle stem cells and tested their ability to grow new muscle by transplanting them into injured mice.

His remarkable finding: human muscle stem cells transplanted into a new environment are capable of regenerating lost muscle tissue.

"This research has so many applications to the clinical issues that we

see," Xu said. "That's why we did it."

Xu dreams big about the applications of his discovery, though he knows more work is needed to develop those treatments. "But it's what gets us motivated," Xu said.

Provided by University of California, San Francisco