MedicalXpress

# Researchers find dying cells essential to muscle development and repair

May 30 2013, by Josh Barney

Dying cells play an unexpected and vital role in the creation of muscle fibers, researchers at the University of Virginia School of Medicine have determined. The finding could lead to new ways to battle conditions such as muscular dystrophy, facilitate healing after surgery and benefit athletes in their efforts to recover more quickly.

"These dead cells aren't just a nuisance, which we've always considered them to be," U.Va.'s Kodi S. Ravichandran said. "They have other, important roles before they leave this world."

Dying cells have long been considered debris that must be removed from the body to avoid causing tissue inflammation. However, the U.Va. research shows that a small number of myoblasts – precursor cells that develop into muscle tissue – must die to allow muscle formation.

The finding suggests that programmed cell death, known as apoptosis, can also influence differentiation of other healthy cells within a tissue. The dying cells express a marker on their surface that signals their death and spurs the body to remove them; that same marker on these dying cells, the U.Va. researchers discovered, cues surrounding cells to develop into muscle fibers. The U.Va. researchers have identified both the membrane marker on the dying cells (a lipid normally hidden on live cells) and a corresponding receptor in the healthy myoblasts that are induced to fuse, said Ravichandran, chairman of the School of Medicine's Department of Microbiology, Immunology and Cancer Biology.

"It's been known for a while that there are a few muscle cells that die during exercise, and that building muscle mass depends on a few of those cells dying," Ravichandran said. "This work puts an interesting spin on that."

The discovery opens up many intriguing avenues for researchers to explore, including the possibility of producing muscle growth either through the direct application of apoptotic cells or by otherwise stimulating the cellular signaling pathways on the healthy cells. The genes encoding the receptor protein (called BAI1) and some of the components of the signaling pathway are found to be altered in patients with muscular dystrophy and other forms of muscle disorders.

"Because this pathway seems to be involved in muscle repair after injury, this could be relevant for recovery after surgeries, combat injuries in soldiers or any condition that could lead to muscle injury or muscle atrophy," Ravichandran said. "Take Duchenne muscular dystrophy, for example. One in 3,500 boys that are born have this disease. If we can help alleviate the distress of even a few of these individuals, we would have made significant progress."

The findings have been published online by the journal *Nature* and will appear in a forthcoming print edition (along with a News and Views highlighting the impact of the work).

Provided by University of Virginia