MedicalXpress

Discovery of a 'conductor' in muscle development

February 25 2014

A team led by Jean-François Côté, researcher at the IRCM, identified a "conductor" in the development of muscle tissue. The discovery, published online yesterday by the scientific journal *Proceedings of the National Academy of Sciences* could have an important impact on the treatment of muscular diseases such as myopathies and muscular dystrophies.

"For several years, we have been studying myogenesis, a process by which muscles are formed during embryonic development," says Jean-François Côté, PhD, Director of the Cytoskeletal Organization and Cell Migration research unit at the IRCM. "During the last step of this process, muscle cells called myoblasts align and fuse together to form muscle fibers."

The fusion of myoblasts is a critical step in the formation of embryonic muscle fibers as it determines muscle size, among other things. This process is also important in adult life because muscle stem cells fuse with existing fibers to achieve muscle growth and help regenerate damaged muscles. However, until now, fusion remained a poorly understood step within the scientific community.

"We were able to identify the receptor BAI3, a protein at the surface of myoblasts, as one of the crucial missing links in the fusion of muscle cells," adds Dr. Côté. "In fact, this receptor acts much like an orchestra conductor by activating a signalling pathway required for this important process."

In 2008, Dr. Côté's team explained the role of the DOCK1 and DOCK5 genes in the development of muscle tissue by showing that these two genes were critical regulators of the fusion process in mice. In their most recent study, the researchers confirmed receptor BAI3's essential role by blocking its interaction with the DOCK signalling pathway. They discovered that, as a result, myoblast fusion was also blocked.

"Our scientific breakthrough will undoubtedly have a translational research application on the regeneration of tissue from stem cells, given that a better understanding of the molecular mechanisms of fusion are required for the development of such therapies," concludes Dr. Côté. "This could therefore have an impact on the treatment of muscular diseases, including myopathies and muscular dystrophies."

More information: *PNAS* DOI: 10.1073/pnas.1313886111

Provided by Institut de recherches cliniques de Montreal