MedicalXpress

Researchers describe a key mechanism in muscle regeneration

December 19 2012

Researchers at the Bellvitge Biomedical Research Institute (IDIBELL) have described a new selective target in muscle regeneration. This is the association of alpha-enolase protein and plasmin. The finding could be used to develop new treatments to regenerate muscular injuries or dystrophies. The study has been published in *PLOS ONE* journal.

Skeletal muscle has a great regeneration capacity after injury or genetic diseases such as Duchenne muscular dystrophy, the most common neuromuscular disorder in children. This condition is due to a defect in the gene of dystrophin, which absence causes instability of the membrane and leads to degeneration of muscle fibres.

Regeneration involves the restructuration of the muscular tissue and it requires the participation of extracellular enzymes such as plasmin. The alpha-enolase, an enzyme found in the cytoplasm of cells, enables the activity of plasmin on the cell membrane giving the cell the ability to degrade the surrounding tissue.

In this study, IDIBELL researchers show that the association of alpha-enolase and plasmin regulates two connected processes in the injured muscle or dystrophy: first, the attraction (recruitment) of immune cells to remove damaged tissue and, on the other hand, the formation of new muscle tissue from the stem cells. The researchers observed in the laboratory that these stem cells lost the ability to activate and merge to form skeletal muscle fibers when specific inhibitors of the alfa-enolasa/plasmina union were applied.

The researchers also performed experiments in mice with Duchenne muscular injury. When the animals were treated with the same inhibitors, mice showed a significant defect in muscle regeneration.

"These results demonstrate that the interaction of alpha-enolase and plasmin is necessary for the restoration of damaged muscle tissue", explained Roser López-Alemany, IDIBELL researcher and study coordinator.

Recently, an extensive proteomic meta-analysis identified the alpha-enolase as the first differentially expressed protein in both human pathologies and mouse models, suggesting that "it may be considered a marker of a pathological stress in a large number of diseases", said Lopez-Alemany.

More information: Díaz-Ramos À, Roig-Borrellas A, García-Melero A, Llorens A, López-Alemany R. Requirement of Plasminogen Binding to Its Cell-Surface Receptor α-Enolase for Efficient Regeneration of Normal and Dystrophic Skeletal Muscle. *PLoS ONE* 7(12): e50477.

Provided by IDIBELL-Bellvitge Biomedical Research Institute

Citation: Researchers describe a key mechanism in muscle regeneration (2012, December 19) retrieved 23 April 2024 from https://medicalxpress.com/news/2012-12-key-mechanism-muscle-regeneration.html

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