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# At the right place at the right time—new insights into muscle stem cells

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Muscles have a pool of stem cells which provides a source for muscle growth and for regeneration of injured muscles. The stem cells must reside in special niches of the muscle for efficient growth and repair.

The developmental biologists Dr. Dominique Bröhl and Prof. Carmen Birchmeier of the Max Delbrück Center for Molecular Medicine (MDC) Berlin-Buch have elucidated how these stem cells colonize these niches. At the same time, they show that the stem cells weaken when, due to a mutation, they locate outside of the muscle fibers instead of in their stem cell niches.

Muscle stem cells, also called satellite cells, colonize a niche that is located between the plasma membrane of the muscle cell and the surrounding basal lamina. Already in newborns these niches contain satellite cells from which both muscle cells and new stem cells can be generated.

## Weakened stem cells

In the present study Dr. Bröhl and Professor Birchmeier showed that mouse muscle progenitor cells lacking components of the Notch signaling pathway cannot colonize their niche. Instead the muscle progenitor cells locate in tissue between the muscle fibers. The developmental biologists view this as the cause for the weakening of the muscles. The stem cells that are "in the wrong place" are no longer as

potent as they originally were and hardly contribute to muscle growth.

In addition, the Notch signaling pathway has a second function in muscle development. It prevents the differentiation of stem cells into muscle cells through suppression of the muscle developmental factor MyoD and thus ensures that there will always be a pool of stem cells for muscle repair and regeneration. In the future this work could gain in importance for research on muscle regeneration and muscle weakness.

**More information:** Colonization of the Satellite Cell Niche by Skeletal Muscle Progenitor Cells Depends on Notch Signals, *Developmental Cell*, http://dx.doi.org/10.1016/j.devcel.2012.07.014

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