The Roles of Pax7 in Regulating Adult Muscle Satellite Cells

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Adult MuSCs characteristically express the transcription factor Pax7. Although Pax7 has been extensively studied in the context of MuSCs, the exact roles played by this transcription factor remain less clear. Using a tamoxifen-inducible and MuSC-specific Pax7 knockout mouse model (Lepper, et al., Nature, 2009), we investigated the behaviour of Pax7-null MuSCs both in vivo and in culture. We found that Pax7-null MuSCs displayed delayed S phase re-entry during their initial transition from the quiescent state to the proliferating state. However, the mutant cells eventually were able to complete the cell cycle and continued to divide several rounds, albeit at a reduced rate. Pax7-null MuSCs were also able to undergo differentiation. Consistently, Pax7-null MuSCs could fully regenerate injured muscles in vivo. By RNA-seq analysis, we have identified a set of Pax7-regulated genes that are involved in cell cycle re-entry. We will present our new findings regarding how Pax7 regulates adult MuSCs in vivo.