

A Human Skeletal Muscle Atlas Identifies the Trajectories of Stem and Progenitor Cells across Development and from Human Pluripotent Stem Cells.

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Public Summary:

Development of a human atlas of skeletal muscle development and from human pluripotent stem cells.

Scientific Abstract:

The developmental trajectory of human skeletal myogenesis and the transition between progenitor and stem cell states are unclear. We used single-cell RNA sequencing to profile human skeletal muscle tissues from embryonic, fetal, and postnatal stages. In silico, we identified myogenic as well as other cell types and constructed a "roadmap" of human skeletal muscle ontogeny across development. In a similar fashion, we also profiled the heterogeneous cell cultures generated from multiple human pluripotent stem cell (hPSC) myogenic differentiation protocols and mapped hPSC-derived myogenic progenitors to an embryonic-to-fetal transition period. We found differentially enriched biological processes and discovered co-regulated gene networks and transcription factors present at distinct myogenic stages. This work serves as a resource for advancing our knowledge of human myogenesis. It also provides a tool for a better understanding of hPSC-derived myogenic progenitors for translational applications in skeletal muscle-based regenerative medicine.

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