Musculoskeletal: Bone, Cartilage and Muscle

Bone, cartilage, muscle, fat, and connective tissue cells together represent a large fraction of the body's tissues. They derive from a common progenitor cell type, the mesenchymal stem cells. Mesenchymal stem cells are able to differentiate into either one of these cell types, and their differentiation processes are mutually exclusive.

Insight into the differentiation processes that give rise to these tissues, and the roles of progenitor cells in muscle and skeletal repair, leads to an understanding of how genetic and molecular deficiencies give rise to developmental and degenerative diseases of muscle, bone and cartilage. This knowledge now allows researchers to regulate and maybe even redirect at will the pathways of mesenchymal cell differentiation. Cell-based therapeutic approaches, such as autologous cell re-implantation, are being explored for the generation and regeneration of muscle, cartilage and bone in degenerative musculoskeletal diseases and toward musculoskeletal repair.

The Craniofacial and Mesenchymal Biology Program combines cell and developmental biologists as well as translational researchers and clinicians with an interest in muscle, bone, cartilage and connective tissue development, and the overall aim to translate research findings into cell-based, therapeutic approaches.

The Bone, Cartilage and Muscle pipeline is directed by Drs. Rik Derynck and Ted Miclau.

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