Muscle Development

Muscle types – Skeletal, Cardiac, Smooth

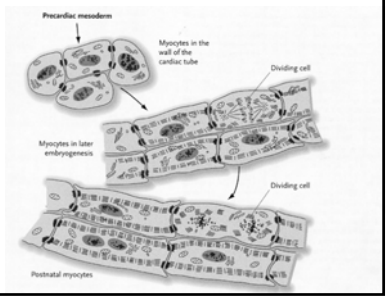
Smooth muscle : Derived from splanchnic mesoderm surrounding gut. Cellular elongation without cell fusion

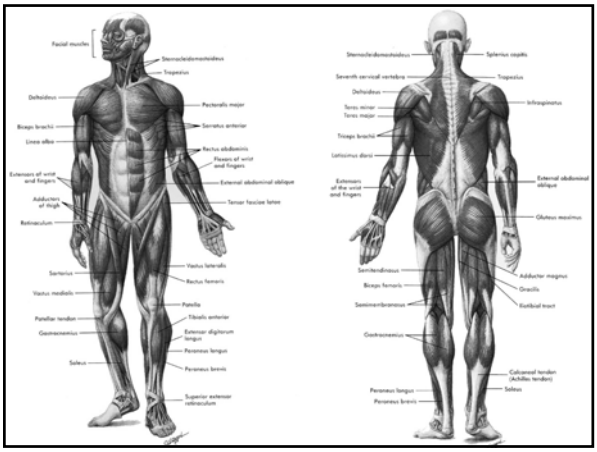
Cardiac muscle

Derived - splanchnic mesoderm

Myoblasts adhere but do not fuse

Form intercalated discs





Skeletal Muscle

Head region skeletal musculature
- Derived from head mesenchyme
- Migration from the cranial somitomeres

Trunk region skeletal musculature
- Myoblasts derived from somites
- Migration - FGF controlled
- Spindle shaped cells - line up and fuse
- Multinucleated syncitium
- Myofibrils with cross-striations - actin-myosin

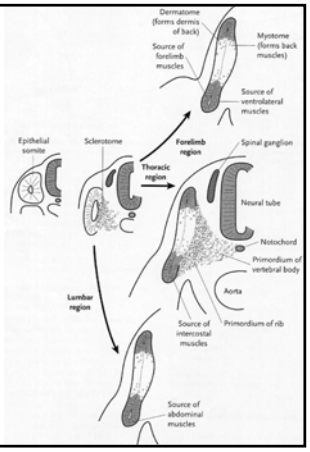
Region-Specific myoblast behavior

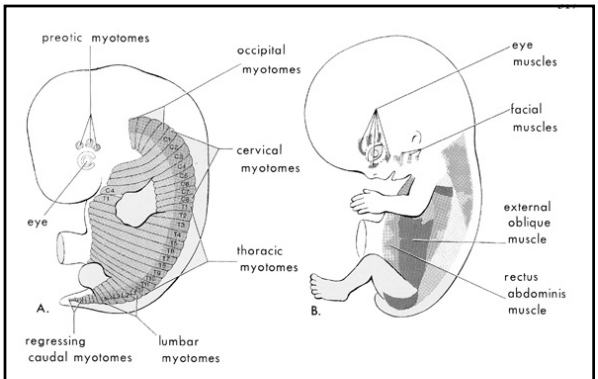
Limb Region – myoblast migration into limb primordia, Differentiation is delayed

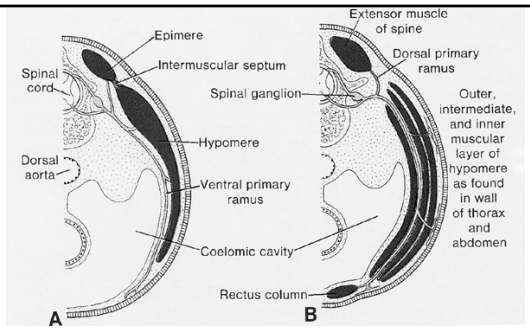
Thoracic Region – myotubes form at the somite – then invade the body wall to form the intercostal muscles

Lumbar Region – myoblast migrate to form the abdominal muscles

Myoblast behavior is controlled by their environment



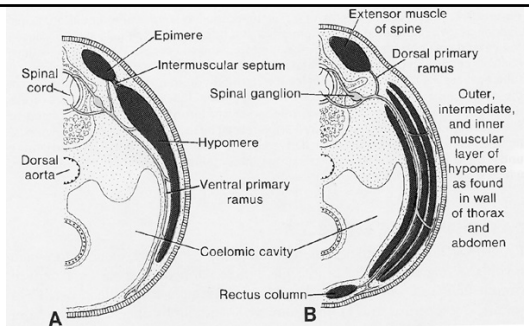




Myotome: two parts

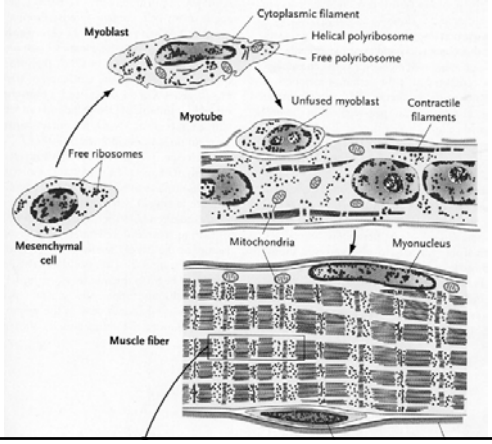
Epimere→Dorsomedial → Extensors of Vertebral column
Hypomere→Ventrolateral → limb/body wall

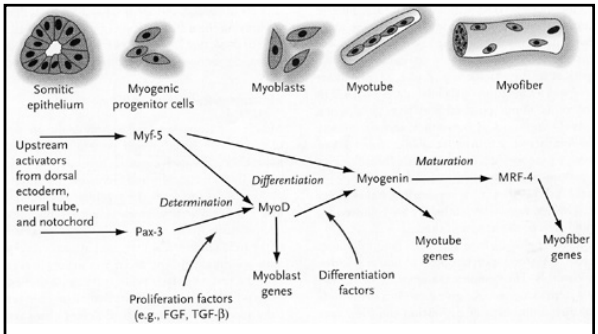
Innervating nerves – Dorsal ramus; Ventral ramus



Thoracic level – 3 myogenic layers – external intercostal, internal intercostal, transversus abdominis muscles

Ribs maintain segmented musculature, elsewhere fusion → large muscle sheets





Determination of myoblast occurs very early
Key regulators – Myf-5, Pax3, MyoD