

Development of Somitic Lineages

Skin

Dermis of the back, neural crest derivatives melanocytes and peripheral neurons

- Movement of cells through the primitive streak during gastrulation generates mesoderm
- Presomitic mesoderm becomes segmented into individual somites by a mechanism involving Notch signaling
- Wnt signals from the surface ectoderm and dorsal neural tube induce the dorso-lateral half of each somite to form the dermomyotome
- Cells of the central dermomyotome undergo an epithelial to mesenchymal conversion and form the dermis of the back
- Neural crest forms from epithelium at the junction of the neural plate and non-neural ectoderm
- The first wave of migrating neural crest cells travel between somites and the neural tube, then through the anterior half of each sclerotome, and eventually become sensory neurons and glia of the PNS
- The second wave of migrating neural crest cells go between the dermomyotome and the surface ectoderm, and are fated to become melanocytes

Muscle

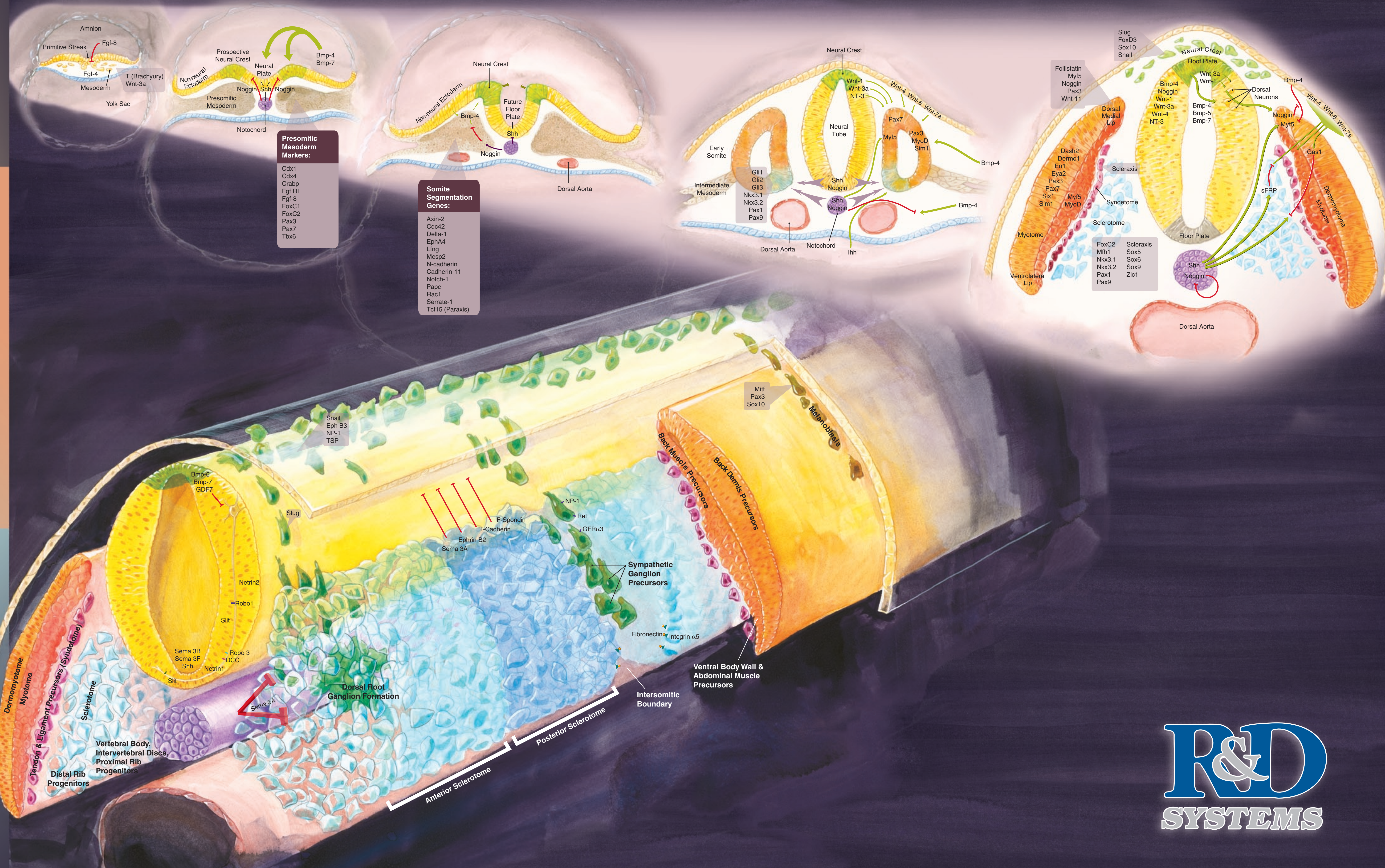
Skeletal muscles of the trunk and limbs

- Sonic hedgehog and Wnt signals induce expression of Myf5 and MyoD in muscle progenitor lineages of the dermomyotome
- Migration of cells from the dorso-medial and ventro-lateral lips of the dermomyotome gives rise to the myotome
- The medial myotome gives rise to epaxial deep back muscles
- The lateral myotome gives rise to hypaxial intercostal, body wall, and limb muscles
- Myogenin and MRF4 function in differentiation and fiber type specialization

Bone and cartilage

Vertebral bodies and intervertebral discs, proximal and distal ribs

- As dorsaling Wnt signals induce the dermomyotome, Sonic hedgehog and Noggin from the notochord and floor plate induce the ventral half of each somite to form the sclerotome
- Newly induced sclerotome cells undergo an epithelial to mesenchymal conversion and migrate around the neural tube and notochord, as well as laterally
- The ventro-medial sclerotome forms vertebral bodies, intervertebral discs, and proximal ribs
- The ventro-lateral sclerotome forms distal ribs
- Cartilage differentiation from sclerotome is mediated by Bmp signaling
- The syndetome is located between the myotome and sclerotome and gives rise to tendons and ligaments



Presomitic Mesoderm Markers:

- Cdx1
- Cdx4
- Crabp
- Fgf R1
- Fgf-8
- FoxC1
- FoxC2
- Pax3
- Pax7
- Tbx6

Somite Segmentation Genes:

- Axin-2
- Cdo42
- Delta-1
- EphA4
- Lfng
- Mesp2
- N-cadherin
- Cadherin-11
- Notch-1
- Papc
- Rac1
- Serrate-1
- Tcf15 (Paraxis)