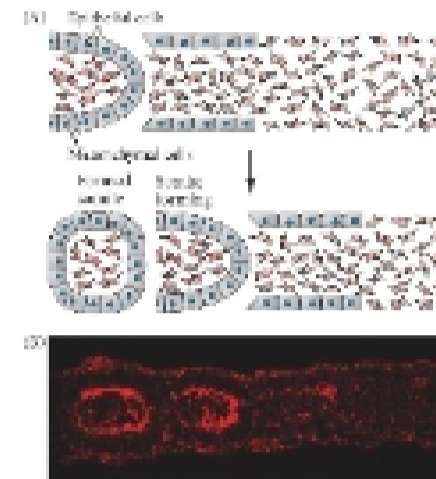


CHAPTER 14-2, INTERMEDIATE MESODERM: UROGENITAL SYSTEM

ZOO3603C

Epithelialization and de-epithelialization in somites of a chick embryo



- A formed somite is surrounded by epithelial cells.
- Epithelialization occurs first at the posterior edge of the somite.
- F-actin accumulation in somites after the separation.

N-cadherin vs E-cadherin

- Cadherin: Calcium-dependent cell adhesion molecules.
- N-cadherin was first described in the CNS of the mouse and chicken
- N-cadherin is grouped with E-, P- and R-cadherins into a subfamily.
- N-cadherin is strongly expressed in the neural ectoderm, where the expression of E-cadherin in the epidermal ectoderm.
- N-Cadherin tends to be expressed in mesenchymal cell types, whereas E-cadherin is expressed in epithelial cell types.
- In the progression of many cancers, for very often E-cadherin expression is lost in metastatic cells, while the expression of N-cadherin is elevated.

Epithelialization in somite

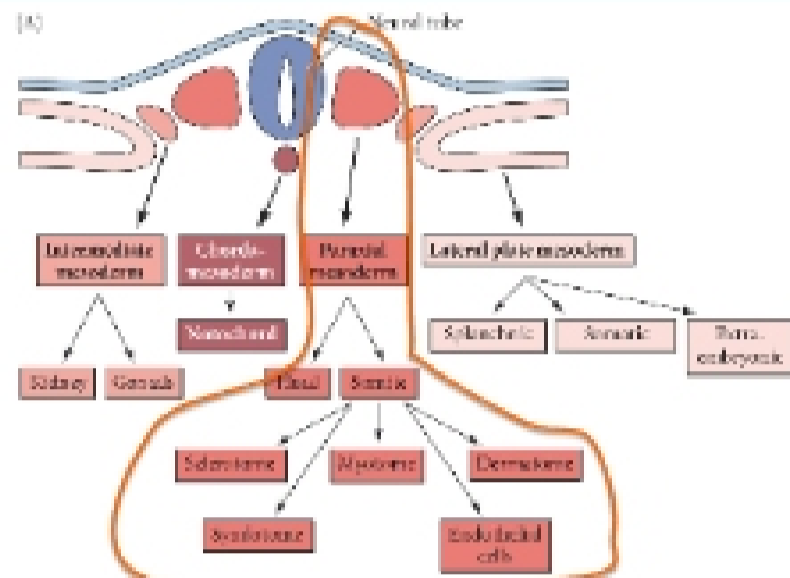
- Epithelialization \neq become epithelial cell.
- Somite = mesodermal cells = mesenchymal cells
- Packing somite cells needs the adhesion molecules.
- Adhesion molecule in mesenchymal cell is N-cadherin.
- Epithelialization of the somites need N-cadherin, not E-cadherin

Derivatives of the somites

Characteristics of somite cells

- The commitment of the cells within a somite occurs relatively late.
- Any of early somite cells can become any of the somite-derived structures.

The major lineages of the amniote mesoderm



Four regions of the trunk mesoderm at neurulation

1. **Chordamesoderm:** Notochord inducing neurulation and establishing the anterior-posterior body axis.
2. **Paraxial mesoderm (or somitic mesoderm):** Somites producing bone, muscle, cartilage and dermis in the back.
3. **Intermediate mesoderm:** Urogenital system consisting kidneys, gonads and their associated ducts.
4. **Lateral plate mesoderm:** Circulatory system consisting heart, blood vessel and blood cells.

The major lineages of somite

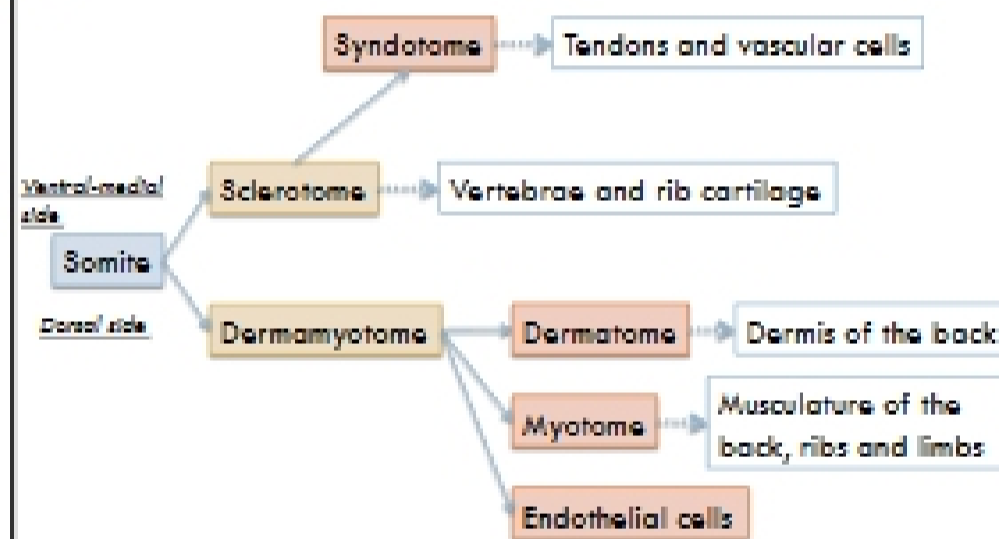


Diagram of a transverse section through the trunk of a chick embryo on days 2-4

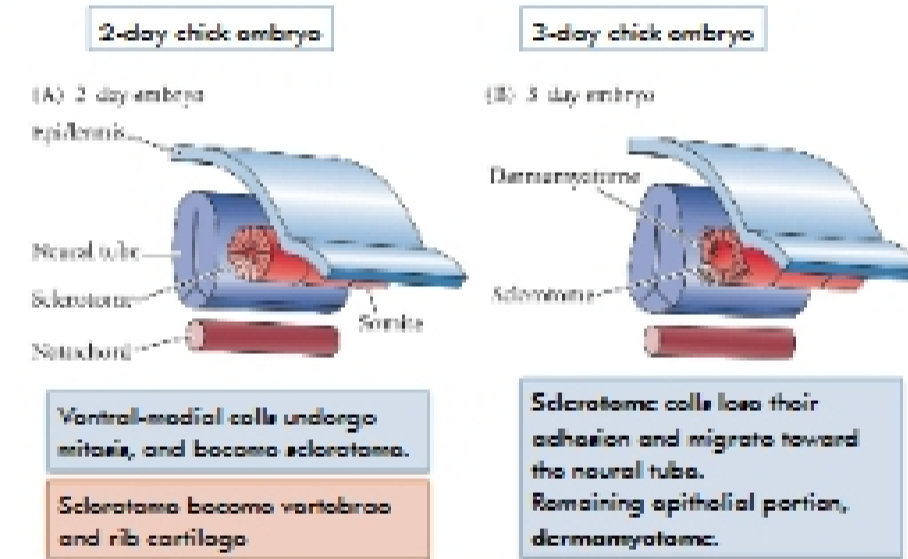


Diagram of a transverse section through the trunk of a chick embryo on days 2-4

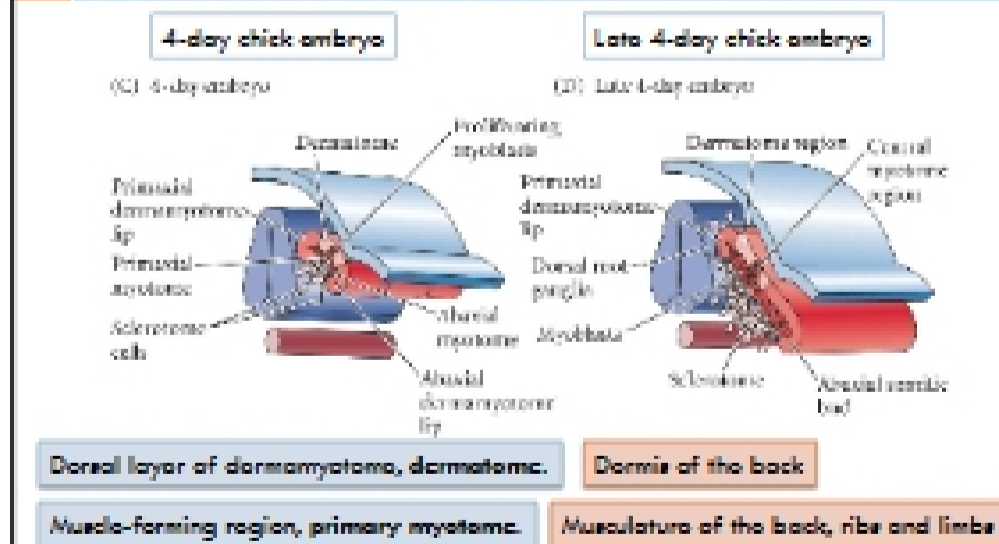
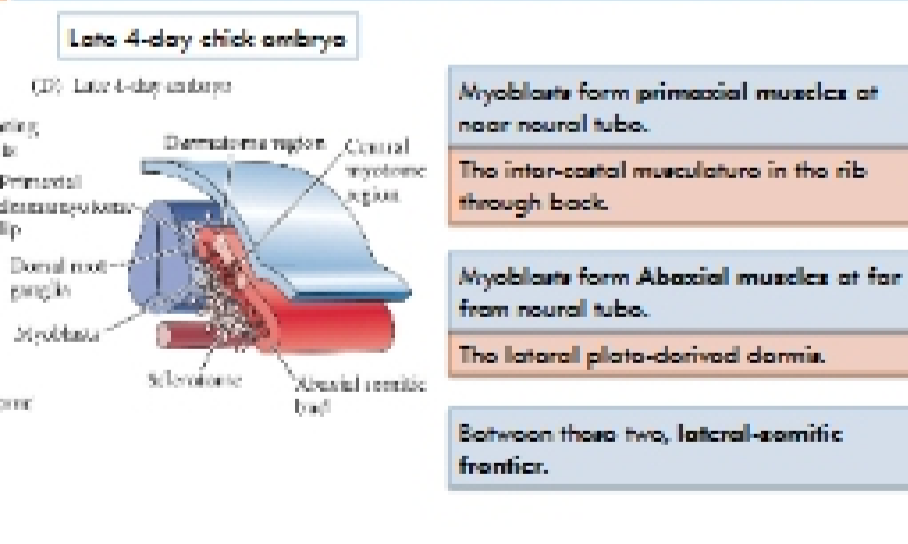


Diagram of a transverse section through the trunk of a chick embryo on days 2-4

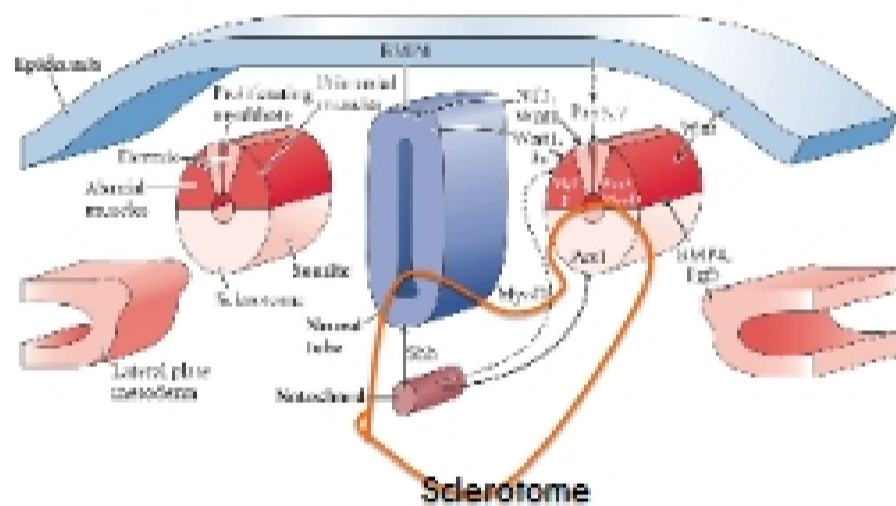


Determination of the sclerotome, dermatome & myotome

Determination of the sclerotome

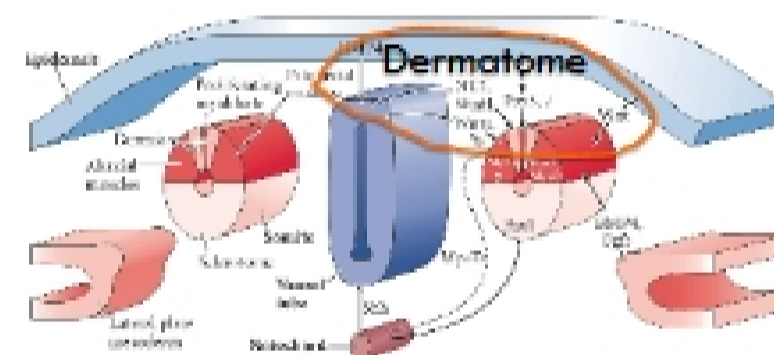
- The destiny of a somitic region depends on **LOCATION**.
- Sclerotome specification by paracrine factor, **Sonic hedgehog** secreted from the notochord and the neural tube floor plate.
- Sclerotome differentiation by **Pax1**, a transcription factor.
- Sclerotome cells express I-mf, an inhibitor of the myogenesis.

Model of major postulated interactions in the patterning of the somite



Determination of the dermatome

- Specification by paracrine factor, **neurotrophin-3 (NT3)** and **Wnt1**, secreted from the notochord and the neural roof.



Determination of the primaxial myotome

- Primaxial myotomes are induced by paracrine factor, **Wnt1 & Wnt3a**, secreted from the neural roof.
- And, low level of **Shh** from the notochord and the neural tube floor plate.
- Noggin in primaxial myotomes prevents BMP signals from lateral plate mesoderm.

Determination of the abaxial myotome

- Abaxial myotomes are induced by paracrine factor, **Wnt1 & BMP4**, secreted from the epidermis and lateral plate mesoderm, respectively.