

HD18 – LIMB

RECOMMENDED READING:

Larsen's Human Embryology, 3rd Edition pages 315-328, 335-342

GLOSSARY:

Apical ectodermal ridge (AER) - most distal rim of epithelium of the limb bud. It is a major signaling center in regulating patterning of the limb and apoptosis in underlying mesoderm (see lecture on Apoptosis).

BMP-2: inhibitor of FGF secretion

Fibroblast growth factor (FGF) - FGF-4, a secreted protein from the AER overlying the ZPA, regulates the expression of SHH.

Induction: the change in a cell or tissues fate due to a signal from another tissue or cell.

Limb field: Area on body wall committed to form limb mesenchyme even before limb bud appears,

Morphogen: A secreted molecule that regulates induction. A concentration gradient of the molecule is frequently established.

Patched: Shh receptor

Progress Zone (PZ) - mesoderm below AER where cellular proliferation takes place.

Sonic hedgehog (SHH) a member of the "hedgehog family" of secreted signaling proteins. SHH is made by the ZPA (below) and regulates anterior/posterior patterning.

Tout-Velou: sharpens concentration gradient of Shh.

Zone of Polarizing Activity (ZPA) - mesenchyme, just below the AER, on the posterior boundary of the limb bud. Major signaling center for the regulation of anterior/posterior patterning.

LEARNING OBJECTIVES:

1. Understand the contribution made by lateral plate (somatopleure) mesoderm and somitic (paraxial) mesoderm to the formation of the limb.
2. Understand the origin of the complex innervation pattern of the adult limbs.
3. Understand the signaling mechanisms between the zone of polarizing activity and the apical ectodermal ridge in the anterior-posterior patterning of hand. As a sub-category understand the novel way in which sonic hedgehog establishes a concentration gradient in the limb.
4. Understand the concept of overlapping HOX gene expression in limb patterning proximal to distal.