



Morphogenesis and Differentiation

Wednesday, February 02, 2011

ZOO 401- Embryology-Dr. Salah A. Martin

Morphogenesis

- Specific changes involves
 - Cell shape
 - Cell position &
 - Cell adhesion
- Changes involves migrations
- Amoeboid movements due to cell extension and contractions
- Cell crawling is involved in convergence extension

Wednesday, February 02, 2011 Morphogenesis 2

ZOO 401- Embryology-Dr. Salah A. Martin

Morphogenic Movements

- Guided by extracellular matrix
- Matrix consists of adhesive substances and fibers
- **Laminin and fibronectin**
- Migrating cells receive direction **cues**
- Others substances in extracellular matrix prevent migration along specific paths

Wednesday, February 02, 2011 Morphogenic Movements 3

ZOO 401- Embryology-Dr. Salah A. Martin

Cell Adhesion

- Effected by Cell Adhesion Molecules (CAMs)
- CAMs contribute to selective association
- CAMs vary in amount and chemical identity
- **Cadherins** are CAMs that require presence of calcium
- Cadherins genes express in tissue specific manner

Wednesday, February 02, 2011 Cell Adhesion 4

ZOO 401- Embryology-Dr. Salah A. Martin

Embryonic Induction

- Fate of the cells depend on cytoplasmic determinants
- Two general principles integrate the genetic and cellular and cellular mechanisms
 - Heterogenous distribution of cytoplasmic determinants in fertilized egg and gene expression
 - Induction and interaction among embryonic cells

Wednesday, February 02, 2011 Embryonic Induction 5

ZOO 401- Embryology-Dr. Salah A. Martin

Fate Mapping

- Reveals cell geneologies in chordate embryos
- Fate map show origin and fate of cells
- W. Vogt in 1920 in amphibian blastula
- Cell Lineage
- E.g. in nematode ***Caenorhabditis elegans***
- Two conclusions
 - Founder cells generate specific tissues
 - Development potentials becomes limited as development proceeds

Wednesday, February 02, 2011 Fate Mapping 6

ZOO 401 - Embryology - Dr. Salah A. Martin

Cytoplasmic Determinants

- This depends on
 - Polarity of basic body plan &
 - Restriction of cellular potency

Wednesday, February 02, 2011

Cytoplasmic Determinants

7

ZOO 401 - Embryology - Dr. Salah A. Martin

Pattern Formation

- The Spemann and Mangold Organizer
- Transplantation indicated the dorsal lip of the blastopore act as a primary organizer
- It sets up interaction between **chordamesoderm** and the overlying ectoderm
- The rudimentary notochord induces the dorsal ectoderm of a gastrula to the neural plate

Wednesday, February 02, 2011

Pattern Formation

8