What is Embryonic Development?

Worksheet

Embryonic development is the process by which a zygote divides (cleavage), forms three germ layers - ectoderm, mesoderm, endoderm - through gastrulation, and then builds organs (organogenesis) from those layers.

Questions

1. How many primary germ layers are formed during gastrulation?

A) One
B) Two
C) Three
D) Four

2. Which germ layer forms the nervous system?

A) Endoderm
B) Mesoderm
C) Ectoderm
D) Trophoblast

3. What is the embryonic period in humans?

A) Weeks 1-2
B) Weeks 3-8
C) Weeks 9-40
D) The first trimester only

4. Failure of the neural tube to close properly can cause

A) Down syndrome
B) Spina bifida
C) Cleft palate
D) Color blindness

5. Which germ layer gives rise to the nervous system and skin, and which gives rise to muscle and blood?

6. Compare the timing of the embryonic period and fetal period in human development.

7. Neurulation begins around day 18-19 after fertilization and the neural tube closes by about day 28. Why does this 10-day window matter clinically?

8. Define: What is gastrulation?

9. Define: What does the ectoderm become?

10. Define: What does the mesoderm become?

Answer Key

1. C) Three - Gastrulation forms three germ layers: ectoderm, mesoderm and endoderm.

2. C) Ectoderm - The ectoderm folds during neurulation to form the neural tube, which becomes the brain and spinal cord.

3. B) Weeks 3-8 - Weeks 3-8 is when gastrulation, neurulation and organogenesis build all major organ systems.

4. B) Spina bifida - Incomplete neural tube closure by about day 28 can cause defects like spina bifida or anencephaly.

5. Gastrulation forms three germ layers: ectoderm, mesoderm, endoderm Ectoderm develops into the nervous system (via neurulation) and the epidermis of the skin Mesoderm develops into muscle, bone, blood and the circulatory system Endoderm develops into the lining of the digestive and respiratory tracts

6. Weeks 1-2: fertilization and implantation Weeks 3-8: embryonic period - gastrulation, neurulation and organogenesis form all major organ systems Week 9 onward: fetal period - existing organs grow and mature By the end of week 8 the embryo is about 3 cm long with recognizable human features

7. Day 18-19: the neural plate begins folding upward from the ectoderm Days 20-27: the folds progressively close from the middle outward, forming the neural tube Day ~28: the neural tube should be fully closed If closure fails by day 28 (e.g., low folate levels), neural tube defects such as spina bifida or anencephaly can result

8. The process during which a blastula reorganizes into three germ layers - ectoderm, mesoderm and endoderm.

9. The nervous system and the epidermis (outer layer) of the skin.

10. Muscle, bone, blood, the circulatory system and other connective tissues.