

Exercise walk-through

4.6

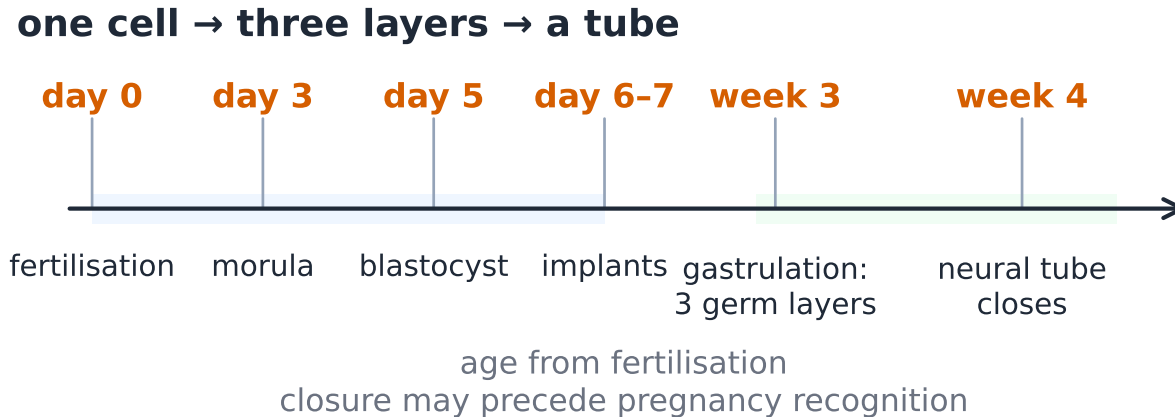
Early development: fertilisation to gastrulation

University Medicine

Fertilisation to gastrulation: early development

- 1 Timeline** Day 0 **fertilisation** → day 5 **blastocyst** → day 6–7 implants → week 3 **gastrulation** → day 26–28 neural tube closes.
- 2 Layers** Ectoderm (nervous + epidermis); mesoderm (muscle, bone, blood, heart, kidney); endoderm (gut lining, liver, pancreas).
- 3 Timing** The tube closes about two weeks after the first missed period, often before the pregnancy is known: folate must start before conception.

Early development - one cell to three layers.



From one cell to three layers in three weeks.

Exercises 2.1-2.3

2.1 Which germ layer makes the nervous system? [3]

2.2 When does the blastocyst implant? [3]

2.3 How do clinical pregnancy weeks differ from conception age? [3]

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2.1 Which germ layer makes the nervous system? [3]

2.1

- Ectoderm.
-

2.2 When does the blastocyst implant? [3]

2.2

- Day 6–7.
-

2.3 How do clinical pregnancy weeks differ from conception age? [3]

2.3

- Clinical weeks count from the last menstrual period: ~2 weeks ahead of conception.

Exercise 3.1

3.1 Map the three germ layers.

For each layer, list three derivative structures ✓. Explain why a week-3 insult can produce a multi-organ syndrome.

[7]

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3.1

- Ectoderm: nervous system, epidermis, enamel.
- Mesoderm: muscle, bone, heart, kidney, blood.
- Endoderm: gut lining, liver, pancreas, airway lining.
- The layers are adjacent fields: one disruption hits neighbours that will become different organs.

Exercise 3.2

3.2 Elevated maternal AFP with an open spine on ultrasound (fictional).

Identify the developmental defect and its timing. Map defect level to deficit (lumbar vs cervical). Explain the AFP finding (fetal protein leaking through the open defect). [7]

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3.2

- Neural-tube closure failure at day 26–28.
- A lumbar lesion can affect leg movement and bladder function; a higher cervical lesion can affect all four limbs. Deficits depend on the level and extent of the lesion.
- AFP leaks from fetal exposure through the open defect into maternal blood/amniotic fluid.