PIPADOR REVISION

MRCOG Part 1 Revision Notes

The Second Week — Bilaminar Disc

EMBRYOLOGY • LECTURE 45

VISUAL EXAMINATION REVISION NOTES

2026 Edition

MRCOG Part 1 Revision Notes

Lecture 45: The Second Week — Bilaminar Disc

Embryology • Visual revision edition

COLOUR CODE USED THROUGHOUT THESE NOTES

TROPHOBLAST	EPIBLAST / AMNION	HYPOBLAST / YOLK SAC	EXTRA-EMBRYONIC MESODERM	CLINICAL

LEARNING OBJECTIVES — tick off as you go

- ☐ Explain why week 2 is the 'week of twos'.
- ☐ Describe the completion of implantation and the lacunar stage.
- ☐ Describe the bilaminar disc, amniotic cavity and the two yolk sacs.
- ☐ Describe extra-embryonic mesoderm, the chorionic cavity, chorion and connecting stalk.
- ☐ Know when primary villi and the prochordal plate appear.
- ☐ Apply to the all-or-none period, the yolk sac on ultrasound and twinning.

1 The 'Week of Twos'

IN ONE LINE: *Implantation finishes and the embryo becomes a flat two-layered disc sitting between two cavities.*

Pair	Members
Two trophoblast layers	Cytotrophoblast (inner, dividing) • syncytiotrophoblast (outer, invasive, hCG)
Two layers of the disc	Epiblast (dorsal, columnar) • hypoblast (ventral, cuboidal)
Two cavities	Amniotic cavity • yolk sac
(Bonus) two mesoderm layers	Extra-embryonic somatic and splanchnic mesoderm

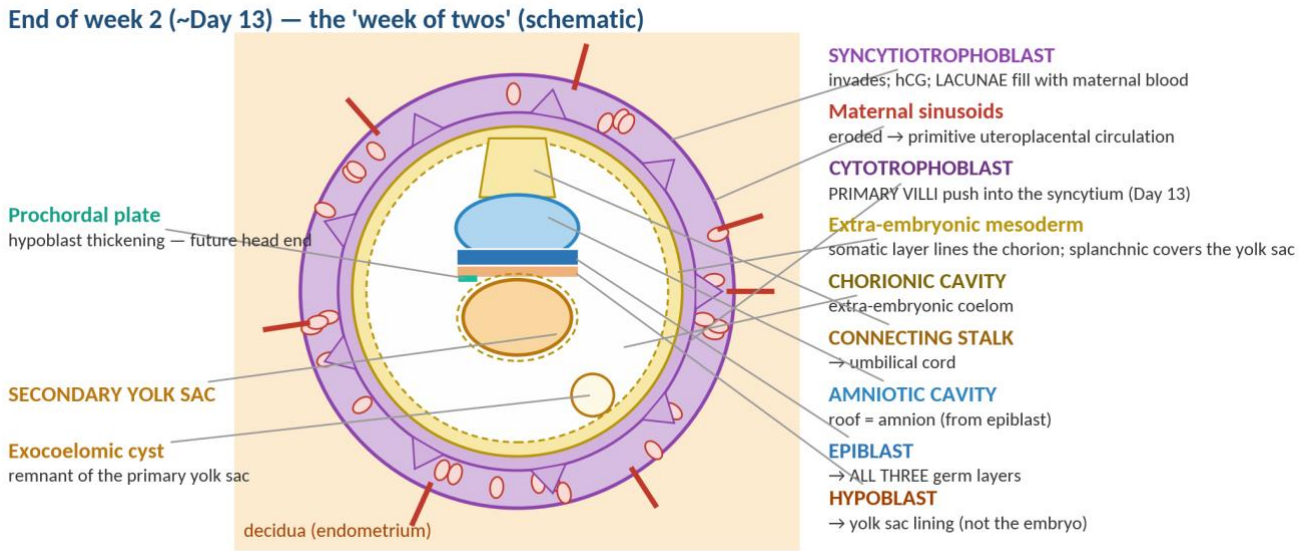


Figure 1. The conceptus at the end of week 2.

2 Finishing Implantation

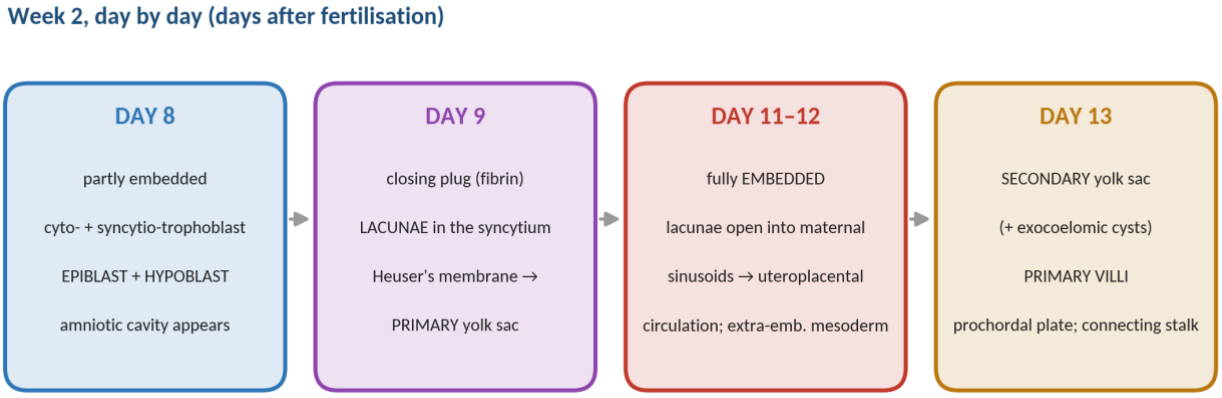


Figure 2. Week 2, day by day.

- **Day 9**: a **fibrin closing plug** seals the endometrial defect; **lacunae** form in the syncytiotrophoblast.
- **Days 11–13**: embryo fully embedded; syncytium erodes **maternal sinusoids** → blood enters the lacunae → **primitive uteroplacental circulation** (forerunner of the intervillous space).
- **Day 13**: cytotrophoblast columns push into the syncytium → **primary chorionic villi**.

3 Bilaminar Disc, Amnion and Yolk Sacs

EPIBLAST

- Tall columnar cells facing the **amniotic cavity**
- **Gives rise to the whole embryo** — all three germ layers at gastrulation (week 3)
- Its dorsal cells form the **amnion** (roof of the amniotic cavity)

HYPOBLAST

- Small cuboidal cells facing the blastocyst cavity
- Lines the **yolk sacs** — does **not** form the embryo
- Anterior hypoblast (**prochordal plate**, AVE-like signalling) sets the **head end**

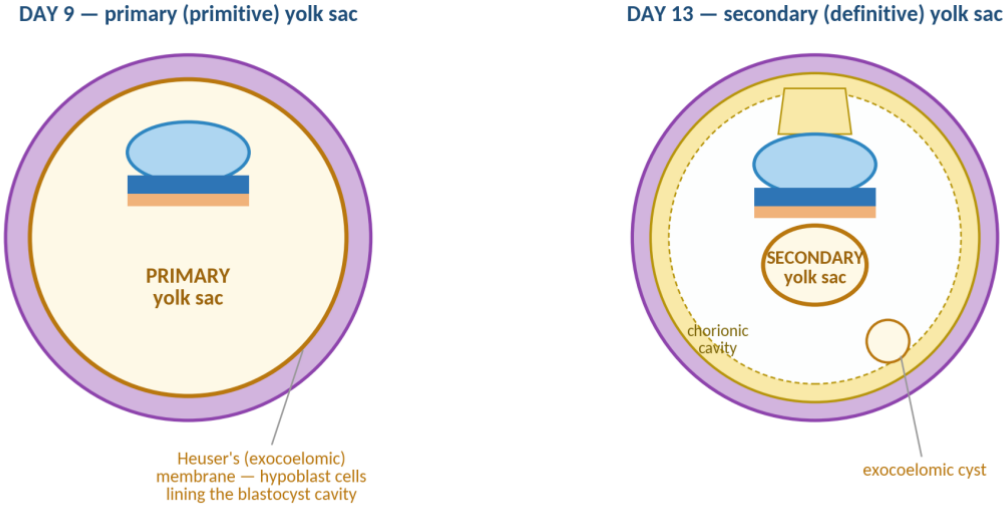


Figure 3. Primary to secondary yolk sac.

	Primary yolk sac	Secondary yolk sac
When	Day 9	Day 13

	Primary yolk sac	Secondary yolk sac
Lining	Heuser's (exocoelomic) membrane — hypoblast cells lining the old blastocyst cavity	Hypoblast + extra-embryonic splanchnic mesoderm
Fate	Pinched off; remnants = exocoelomic cysts	Early haematopoiesis (weeks 3–6); PGCs gather in its wall; allantois buds from it; the yolk sac seen on scan

- The **amniotic cavity** keeps expanding and fills the chorionic cavity, the amnion meeting the chorion by around the **end of the third month**.

4 Extra-embryonic Mesoderm and the Chorion

- **Days 11–13**: loose **extra-embryonic mesoderm** fills the space between the trophoblast and the amnion/yolk sac. Its origin is debated — from yolk sac/hypoblast cells (Langman) or early epiblast.
- Spaces in it merge → **extra-embryonic coelom (chorionic cavity)**, splitting it into **somatic** (lining the trophoblast, over the amnion) and **splanchnic** (over the yolk sac) layers.
- **Chorion** = extra-embryonic somatic mesoderm + cytotrophoblast + syncytiotrophoblast. The **connecting stalk** (persisting mesoderm) → **umbilical cord** once vessels enter in week 3.

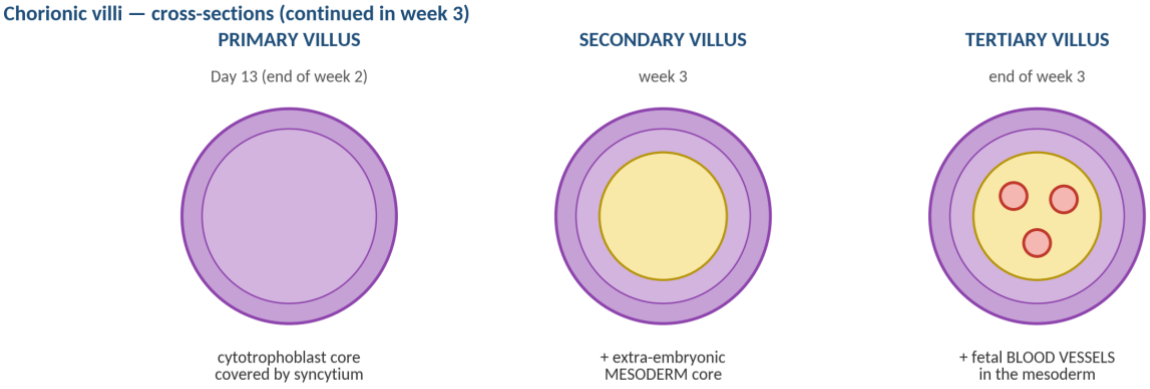


Figure 4. Villus stages.

5 Clinical Correlates

ALL-OR-NONE PERIOD

- Weeks 1–2 after conception: a harmful exposure usually either ends the pregnancy (often unnoticed) or has **no effect**
- Cells are still interchangeable, so survivors are usually normal
- Main teratogenic risk begins with organogenesis (weeks 3–8)

YOLK SAC ON ULTRASOUND

- The **gestational sac** appears first; the **yolk sac** is the first structure inside it (~5–5.5 weeks from LMP) — first definite sign of an intrauterine pregnancy
- Normally round, ~3–5 mm; **large (> ~5–6 mm), irregular or absent** → higher miscarriage risk

IMPLANTATION + INVASION

- Abnormal site or depth → **praevia, accreta spectrum, caesarean scar pregnancy, ectopic**
- Poor later trophoblast invasion of spiral arteries → **pre-eclampsia, FGR**

TWINNING RECAP

- Split at the **blastocyst / inner cell mass** stage (days 4–8, before the amnion) → **MCDA**
- Split at the **bilaminar disc** stage, **after** the amnion forms (days 8–13) → **MCMA**

★ PEARL

Epiblast makes the embryo; hypoblast makes yolk sac lining. All three germ layers come from the **epiblast** in week 3.

The **prochordal plate** (hypoblast thickening) marks the head end and the future **oropharyngeal membrane**.

6 MRCOG Exam Pearls — Last-Minute Page

Numbers to know

Day 8 Epiblast + hypoblast	**Day 9** Lacunae; primary yolk sac	**Day 11–12** Fully embedded	**Day 13** Secondary yolk sac; primary villi
3 Pairs of 'twos'	**~5.5 wk** Yolk sac on TVS (LMP)	**> 5–6 mm** Large yolk sac — worse outlook	**~3 months** Amnion meets chorion

HIGH-YIELD CHECKLIST

- ☐ Week of twos: cyto/syncytio; epiblast/hypoblast; amniotic cavity/yolk sac.
- ☐ Closing plug Day 9; fully embedded Day 11–12.
- ☐ Lacunae + maternal sinusoids → uteroplacental circulation (Days 11–13).
- ☐ Epiblast → embryo (all germ layers); hypoblast → yolk sac lining.
- ☐ Amnion from epiblast; Heuser's membrane → primary yolk sac.
- ☐ Secondary yolk sac Day 13; exocoelomic cysts are primary yolk sac remnants.
- ☐ Chorion = somatic extra-embryonic mesoderm + both trophoblast layers.
- ☐ Connecting stalk → umbilical cord.
- ☐ Primary villi Day 13; prochordal plate = head end.
- ☐ All-or-none period: weeks 1–2.

Self-assessment — cover the right-hand column

Question	Answer
Which layer of the bilaminar disc forms the embryo?	Epiblast
What lines the primary yolk sac?	Heuser's (exocoelomic) membrane — hypoblast-derived
Remnants of the primary yolk sac?	Exocoelomic cysts
Components of the chorion?	Extra-embryonic somatic mesoderm + cyto- + syncytiotrophoblast
How does the uteroplacental circulation begin?	Lacunae in the syncytium open into maternal sinusoids
What marks the future head end?	Prochordal plate
Why 'all or none' in weeks 1–2?	Cells are still interchangeable — loss or full recovery
First structure inside the gestational sac on TVS?	Yolk sac (~5–5.5 weeks)

Question	Answer
Structure that becomes the umbilical cord?	Connecting stalk
Twin type if splitting happens at the bilaminar disc stage?	MCMA

7 References

- Sadler TW. Langman's Medical Embryology. 14th ed. 2019.
- Moore KL, Persaud TVN, Torchia MG. The Developing Human. 11th ed. 2020.