

"First Week of Development"

I. Cleavage (Cell Division After Fertilization)

- Begins ~30 hours after fertilization
- Type of division: mitotic
- Resulting cells = blastomeres (smaller with each division)

Timeline of Cleavage

Stage	Time after fertilization	Feature
2-cell	30 hours	First mitotic division
4-cell	40 hours	Second division

8-cell	3rd day	Loosely arranged clump → compaction begins
16-cell	3 days	Morula formation

Compaction (3rd Cleavage)

- Inner cells segregate from outer cells
 - Inner cells: Tight junctions (communication + adhesion)
 - Inner + outer cells: Gap junctions (nutrient & signal exchange)
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2. Morula

- Structure: 16-32 cells
- Differentiation:

Component	Origin	Future Structure
Inner cell mass (ICM)	Inner cells	Embryo proper
Outer cell mass	Outer cells	Trophoblast → Placenta

3. Blastocoele & Blastocyst Formation

- Morula enters uterine cavity
 - Fluid penetration → Intercellular spaces of ICM →
Formation of blastocoele (cavity)
 - Embryo now called blastocyst
 - Outer layer = trophoblast (future placenta)
 - Inner cell mass = embryo proper
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4. Implantation

- Zona pellucida disappears → allows implantation
 - Adhesion molecules:
 - L-selectins: trophoblast → uterine epithelium
 - Extracellular matrix molecules: Laminin +
Fibronectin
 - Attachment site: Functional layer of endometrium
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5. Uterine Structure at Implantation

Layer	Description
Perimetrium	Outer serosal layer
Myometrium	Thick muscular layer

Endometrium	Inner glandular layer → implantation site
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- Endometrium subdivision:
 - Functional layer → Spongy + Compact layers
 - Basal layer → Regenerative layer
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6. Uterine Cycle (Correlated with Implantation)

A. Follicular / Proliferative Phase

- Cause: Estrogen (from Theca interna + Granulosa cells)
 - Changes:
 - Endometrial growth
 - Glandular proliferation
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B. Secretory / Progestational Phase

- Cause: Progesterone (from corpus luteum)
 - Changes:
 - Glands become large and tortuous
 - Vascularity increases
 - Glycogen + mucus secretion
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C. Menstrual Phase

- Cause: No fertilization → Corpus luteum degenerates → Corpus albicans forms
 - Effect: ↓ Progesterone → functional layer shed → menstruation
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7. Integrated Timeline: First Week of Development

- A. Fertilization → Zygote formation (Ampulla)
- B. Cleavage → 2-cell → 4-cell → 8-cell → 16-cell
(morula)
- C. Compaction → segregation of inner and outer cells
- D. Blastocyst formation → fluid-filled blastocoele
- E. Zona pellucida disappears → implantation begins
- F. Endometrium:
- Proliferative phase → growth
 - Secretory phase → support implantation
 - Menstrual phase → if no fertilization
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8. Exam Points

- Blastomeres: cells produced during cleavage
- Compaction: 8-cell stage, tight + gap junctions
- Morula: ICM → embryo, trophoblast → placenta

- Blastocoele: cavity inside blastocyst
 - Implantation:
 - L-selectins, laminin, fibronectin
 - Occurs in functional layer of endometrium
 - Endometrial phases: Proliferative, Secretory, Menstrual
 - Menstruation: occurs if no fertilization
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-> The End <-