

"Formation of Notochord"

1. Prechordal Plate

- Origin: Epiblastic cells
- Location: Between tip of notochord and oropharyngeal membrane
- Future role: Contributes to forebrain formation

Flowchart:

Epiblast cells → Migrate cranially → Form prechordal plate → Forebrain precursor

2. Prenotochordal Cells → Notochord Formation

- Definition: Precursor cells of the notochord

- Migration:
 - Invaginate at primitive node
 - Move downward, forward, and cranially in the midline
 - Temporarily intercalated in hypoblast → form notochordal plate
- Transformation:
 - Epiblast cells displace hypoblast → form endoderm
 - Prenotochordal cells become a solid rod → definitive notochord
- Location:
 - Cranially: Prechordal plate
 - Caudally: Primitive pit
- Note: No mesoderm at notochordal region

Flowchart:

Prenotochordal cells → Intercalate hypoblast →
Notochordal plate → Epiblast displaces hypoblast →
Definitive notochord

3. Functions of Notochord

1. Neurulation → induces neural plate formation
 2. Axial skeleton → contributes to nucleus pulposus of intervertebral discs
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4. Neuroenteric Canal

- Definition: Temporary connection between amniotic cavity and yolk sac via primitive pit
- Function: Fluid exchange between amniotic cavity and yolk sac

5. Oropharyngeal (Buccopharyngeal) Membrane

- Definition: Thin region where ectoderm and endoderm directly contact each other
- Mesoderm: Absent
- Future role: Forms mouth opening

6. Cloacal Membrane

- Definition: Posterior region of germ disc where ectoderm and endoderm contact
- Allantois (Allantoenteric diverticulum):
 - Appears ~day 16
 - Posterior wall of yolk sac

- In humans, may contribute to urinary bladder anomalies
 - Mesoderm: Absent
 - Note: In lower vertebrates → stores nitrogenous waste
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7. Fate Map of Mesoderm

Source of cells	Differentiation / Fate
Cranial region of primitive node	Prechordal plate + Notochord
Lateral edges of node + cranial streak	Paraxial mesoderm (somites, muscles, dermis)
Mid-streak cells	Intermediate mesoderm (urogenital system)

Caudal streak cells	Lateral plate mesoderm (body wall, limb buds, heart)
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Flowchart:

Primitive streak → Cell migration →

- Cranial → Prechordal plate + Notochord
 - Lateral → Paraxial mesoderm
 - Mid-streak → Intermediate mesoderm
 - Caudal → Lateral plate mesoderm
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8. Key Clinical Correlations

- Persistent primitive streak → sacrococcygeal teratoma
- Allantois anomalies → bladder exstrophy, urachal cysts

- Notochord defects → chordomas (rare tumors)
 - Oropharyngeal / cloacal membrane defects → congenital mouth or anal malformations
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Summary Flow of Notochord Formation

1. Epiblast → Cranial migration → Prechordal plate
 2. Prenotochordal cells → Intercalate hypoblast → Notochordal plate
 3. Definitive notochord forms → Dorsal midline beneath epiblast
 4. Functions:
 - Induces neurulation
 - Contributes to nucleus pulposus
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-> The End <-