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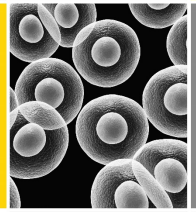
School of Medical Sciences

# RESEARCH INFORMATION NIGHT

25th August 2017
5 - 7 pm



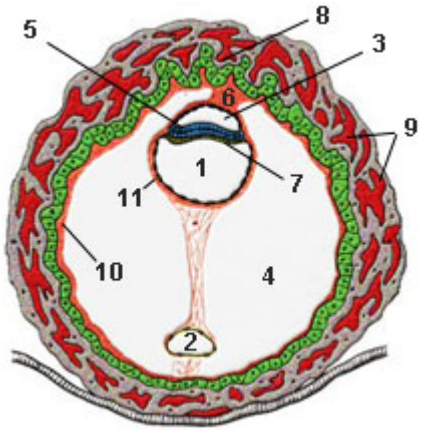
Wallace Wurth Atrium

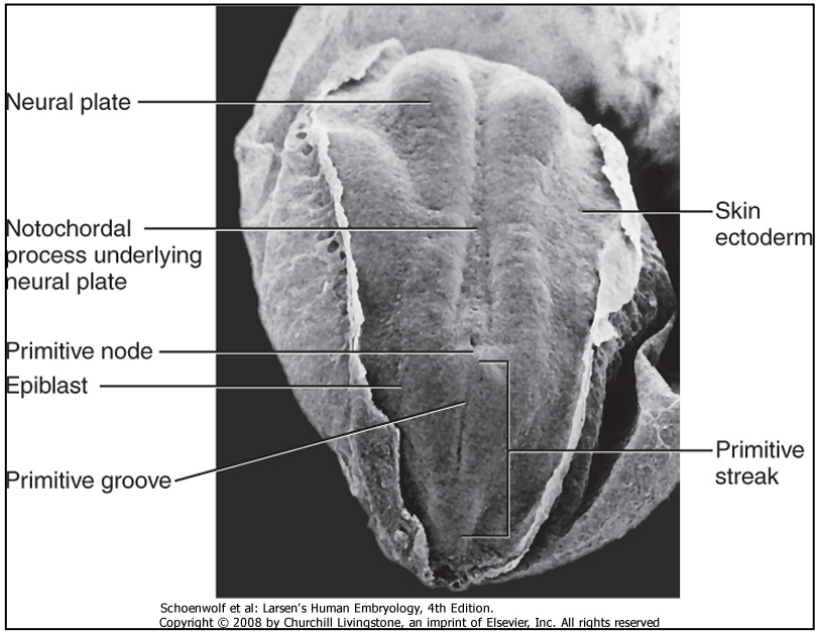
Enrol for study in the School of Medical Sciences and other Schools, Centres, Institutes in the Faculty of Medicine

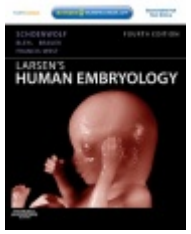
**Quiz rules:**

Spread out across available tables
No phones, text books, or (lecture) notes on your desks
No consultation with your colleagues
No websites open other than the Quiz page
No screen snap shots or copying of quiz questions
Penalties will apply

# Mesoderm Development




Resources:
http://php.med.unsw.edu.au/embryology/
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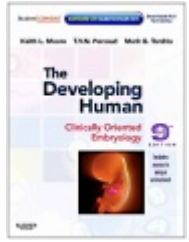
The Developing Human: Clinically Oriented Embryology




Dr Annemiek Beverdam – School of Medical Sciences, UNSW
Wallace Wurth Building Room 234 – A.Beverdam@unsw.edu.au

# Week 3 Lecture overview

Gastrulation

Early Mesoderm Development

Notochord

Paraxial Mesoderm

Intermediate Mesoderm

Lateral Plate Mesoderm

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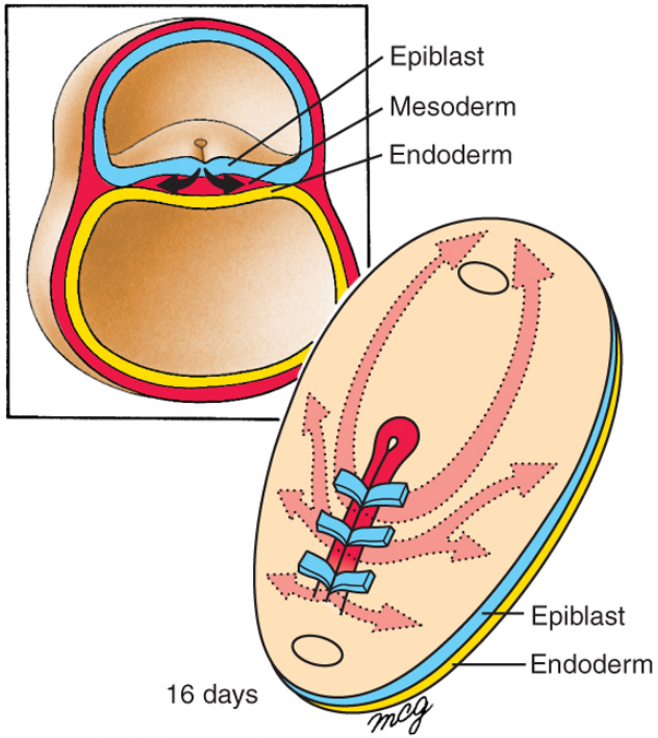
# Gastrulation

Week 3

Ingression of epiblast cells: EMT transition
Generation of definitive endoderm
Generation of intra-embryonic mesoderm
Oropharyngeal and cloacal membrane
Embryonic ectoderm






http://php.med.unsw.edu.au/embryology/images/5/55/Mesoderm_001.mp4

# End product gastrulation:

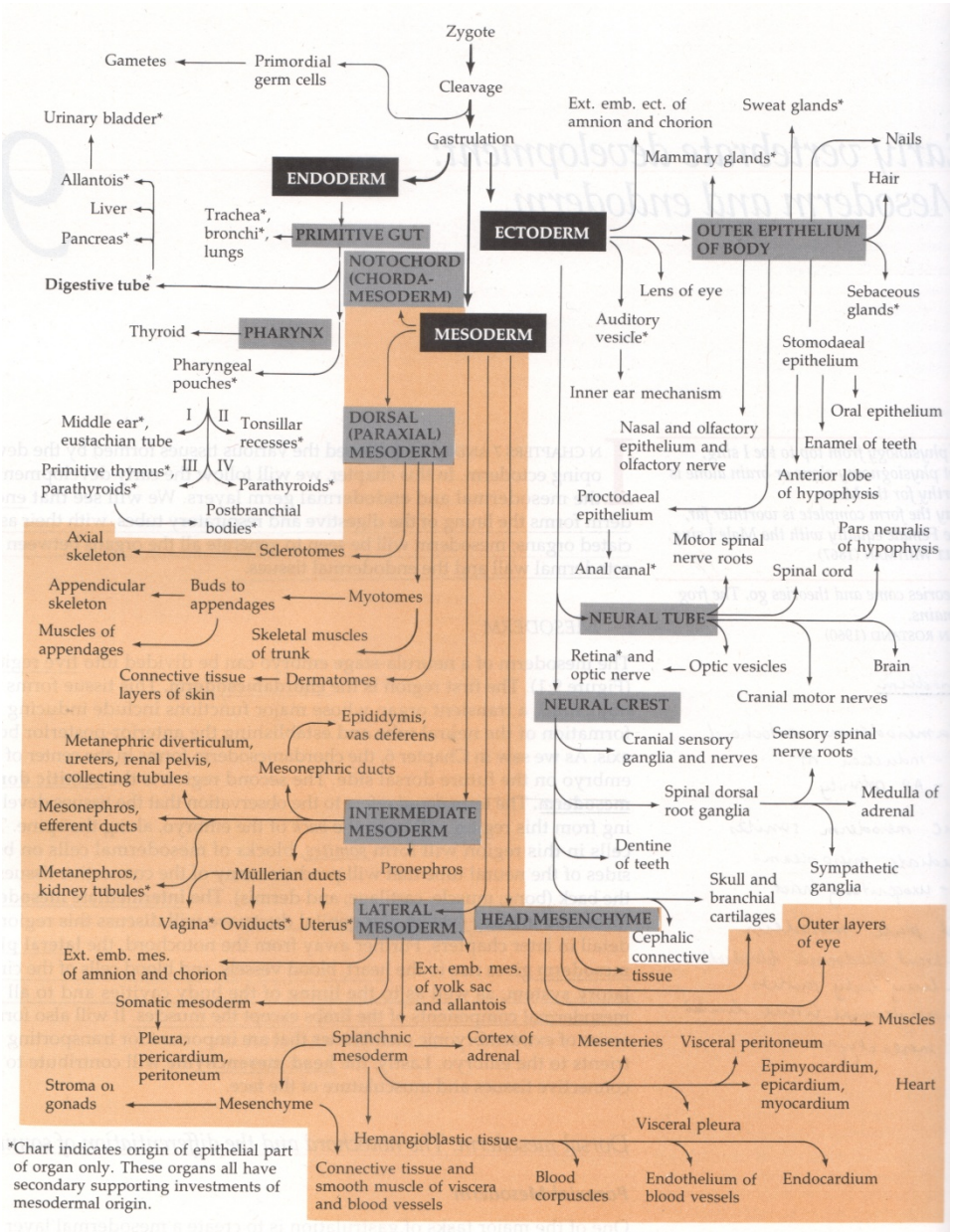
Trilaminar embryo

Ectoderm *(Neural crest)*
brain, spinal cord, eyes, *peripheral nervous system*
epidermis of skin and associated structures,
*melanocytes, cranial connective tissues (dermis)*

Mesoderm
musculo-skeletal system
limbs
connective tissue of skin and organs
urogenital system, heart, blood cells

Endoderm
epithelial linings of gastrointestinal and respiratory tracts

# Embryonic development:

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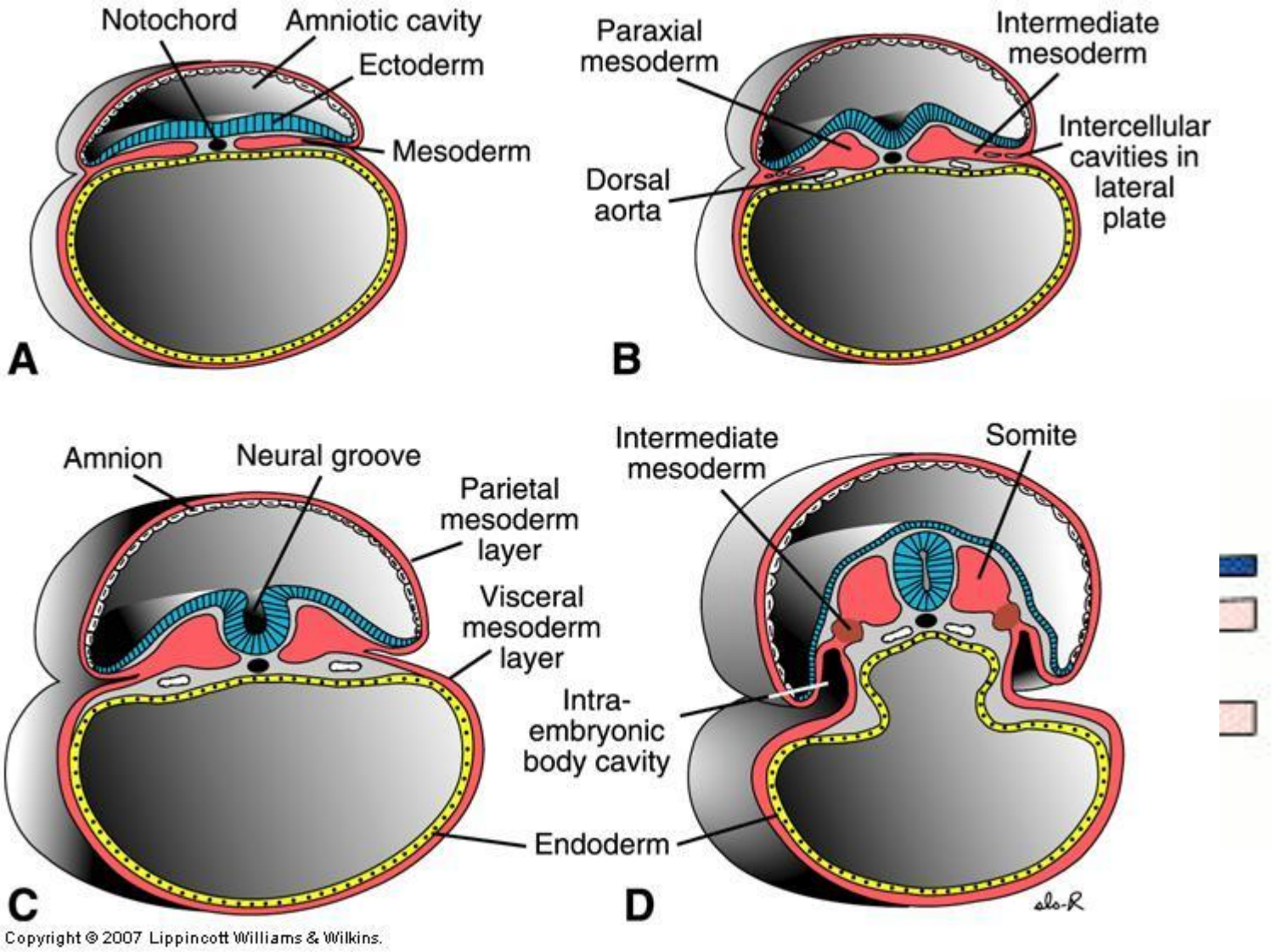
# Early Mesoderm Development



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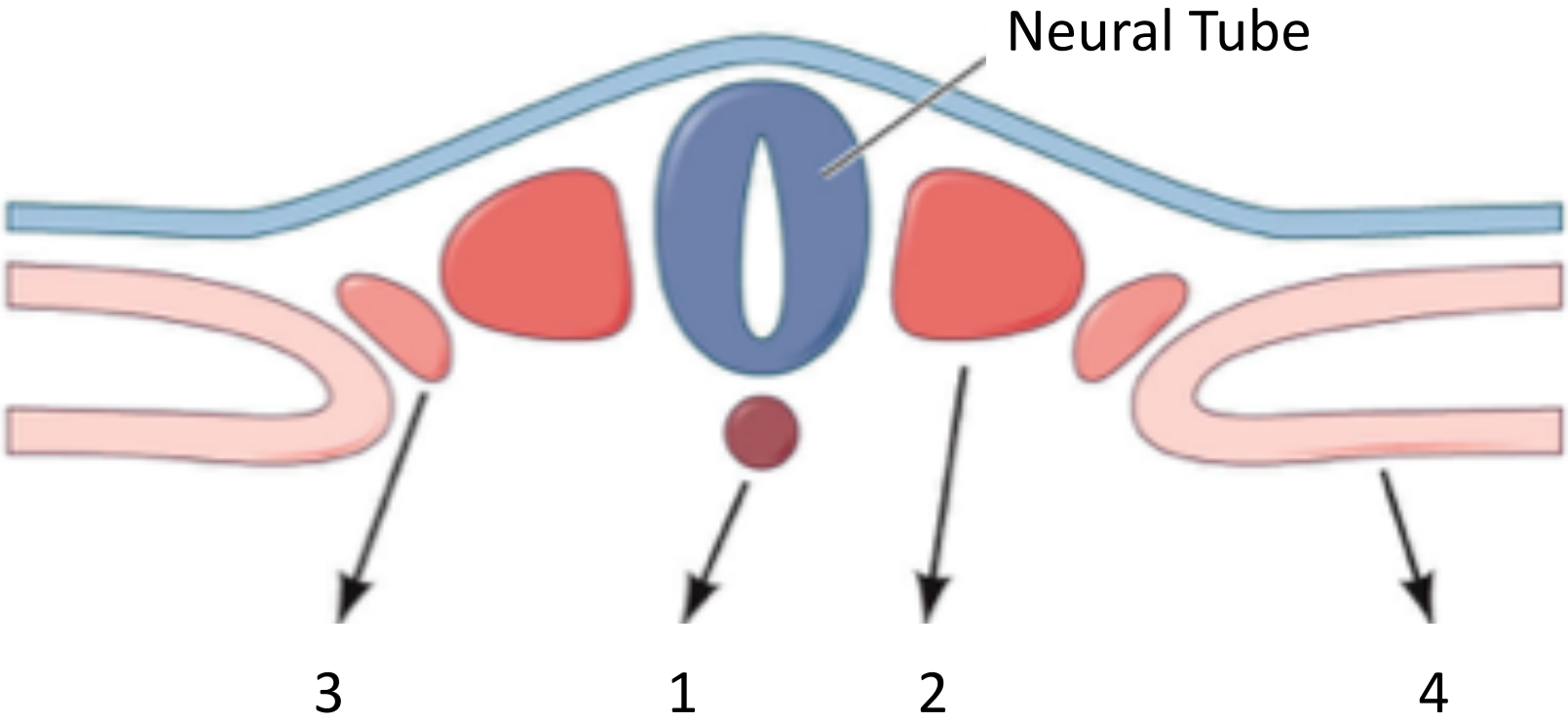
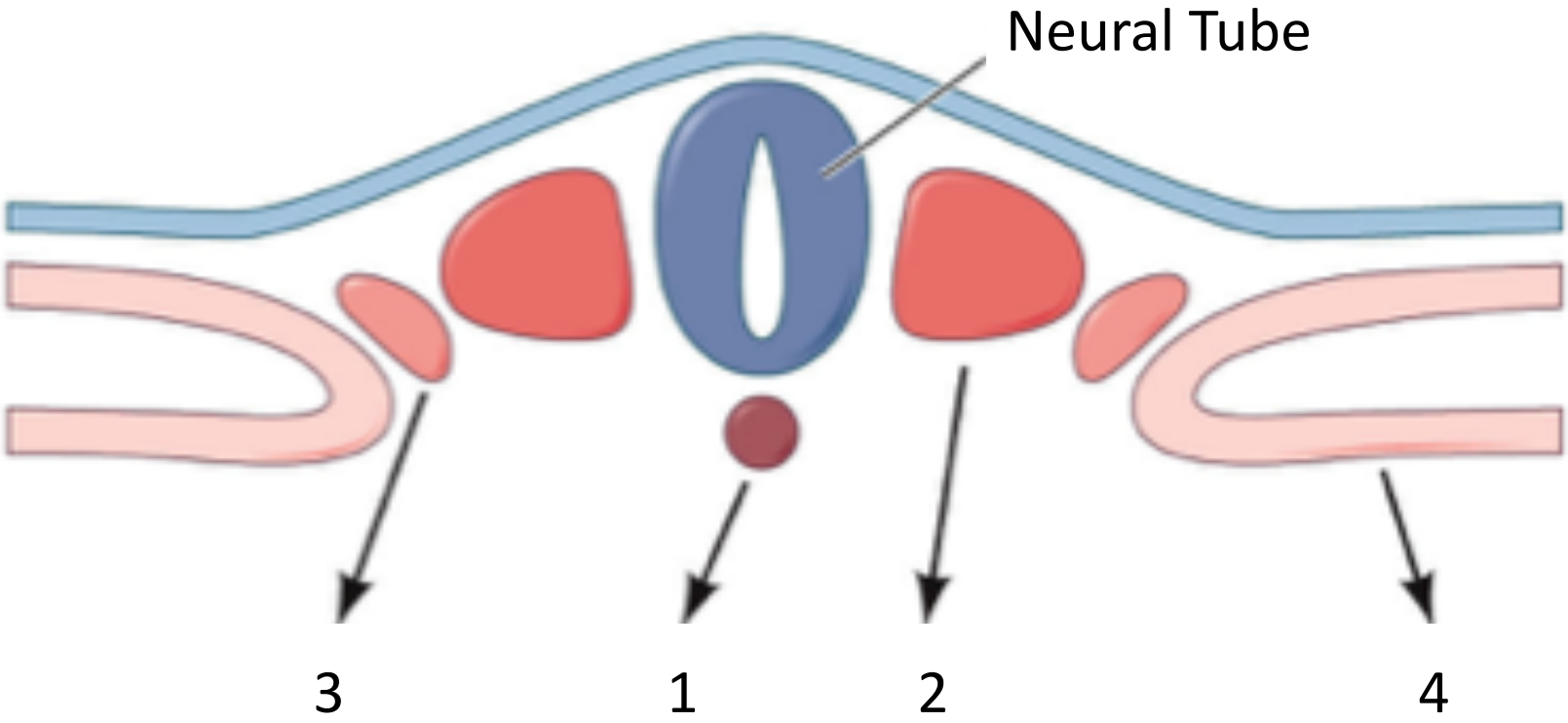



1: notochord
2: paraxial mesoderm
3: intermediate mesoderm
4: lateral plate mesoderm

# Early Mesoderm Development

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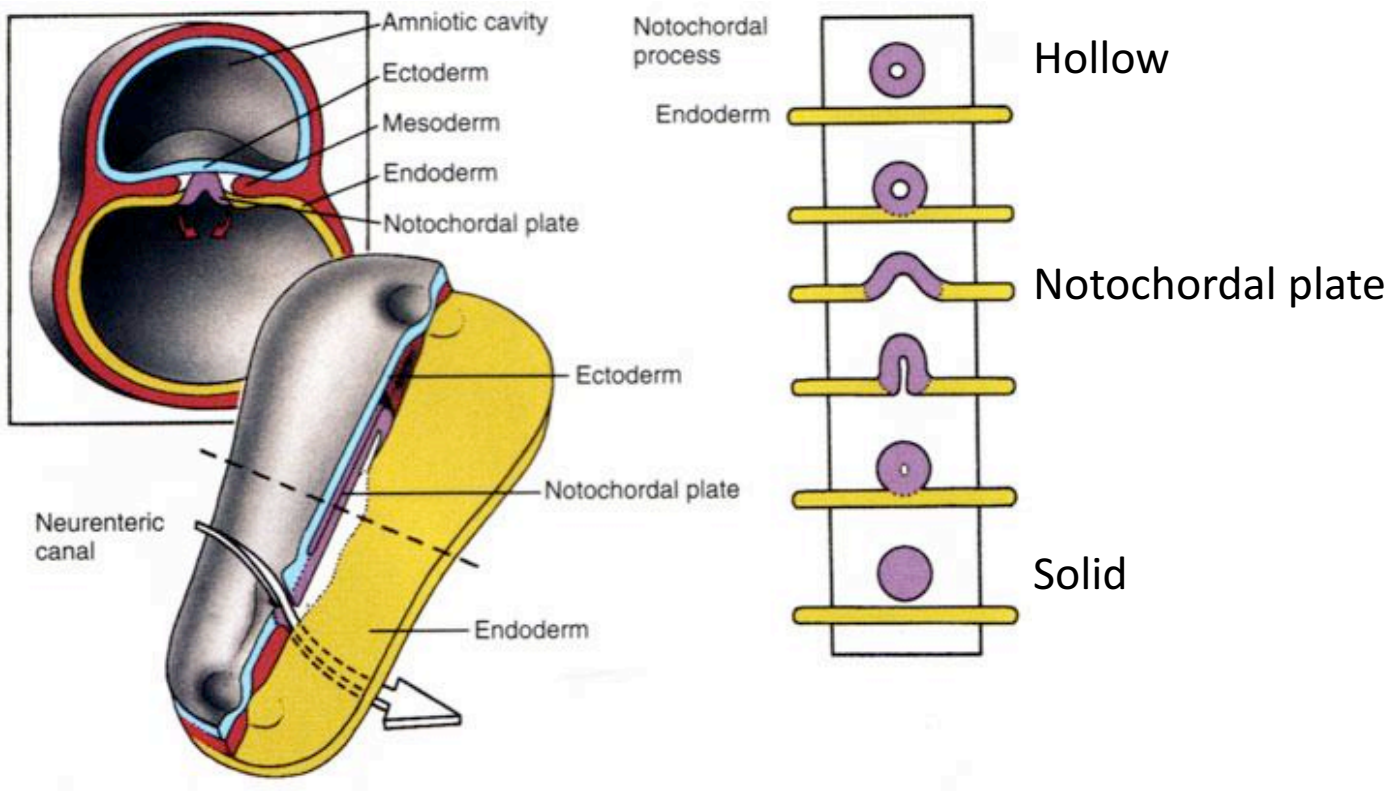
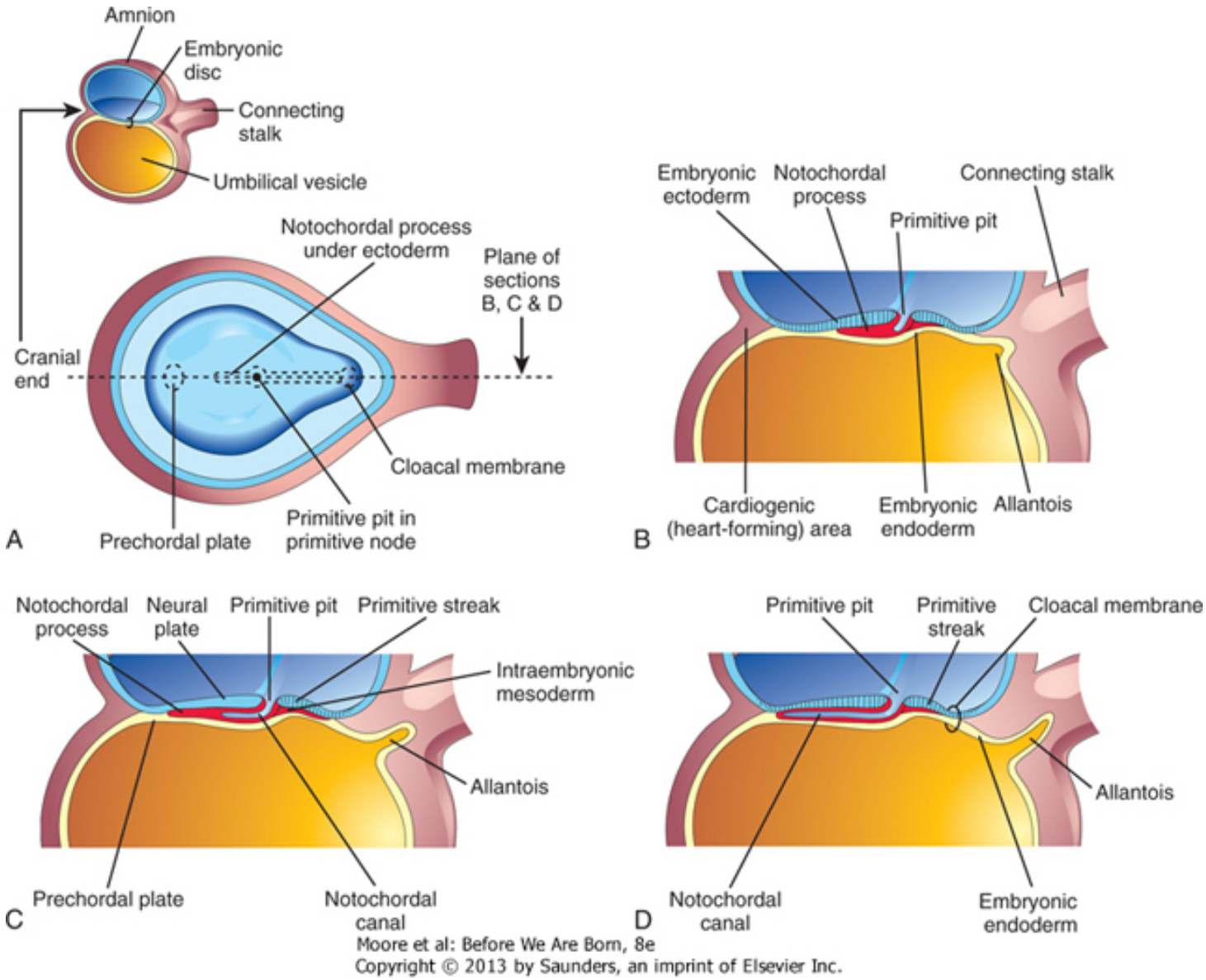
# 1: Notochord




Axial mesoderm
Transient
Development
Neurenteric canal
Crucial signalling centre
Mechanical role in embryonic folding

# 1: Notochord



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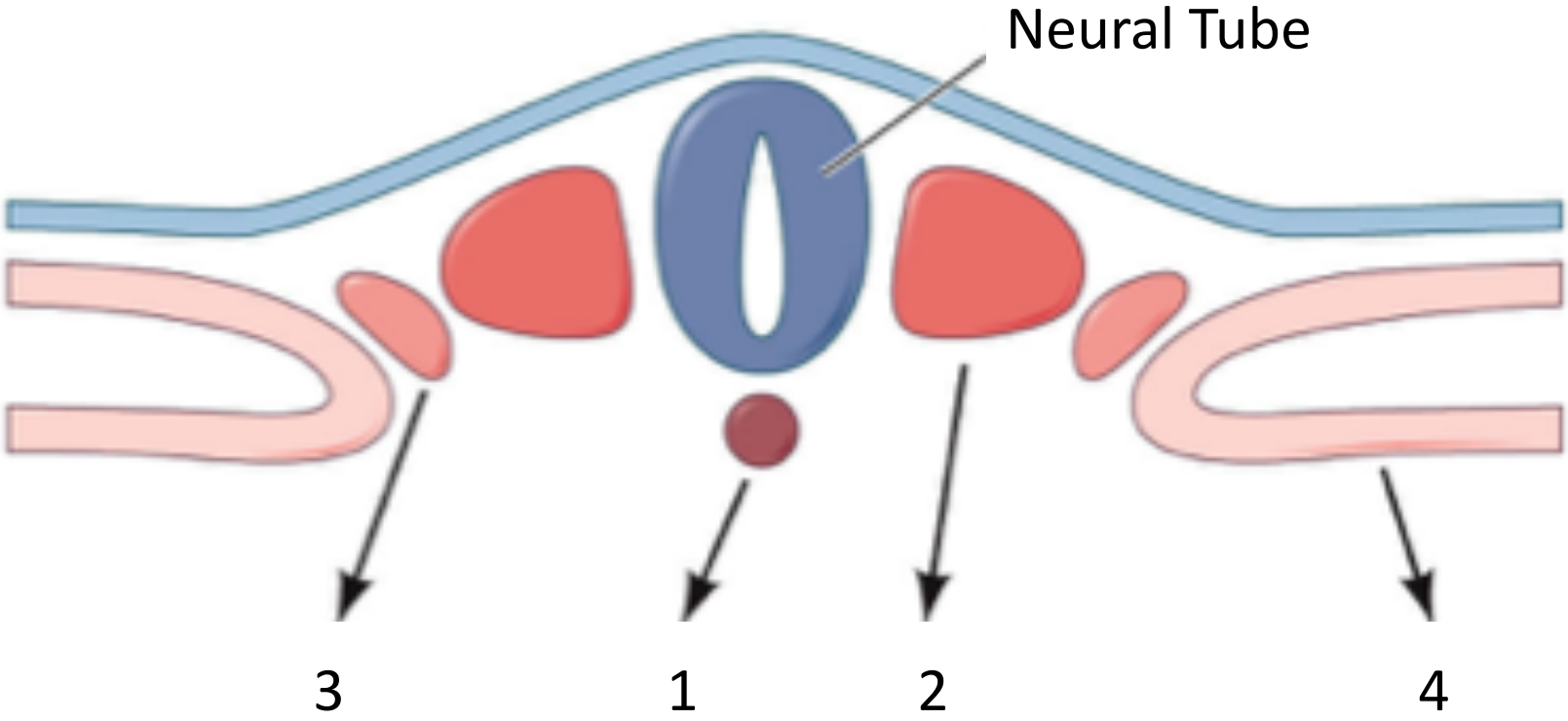


1: notochord
**2: paraxial mesoderm**
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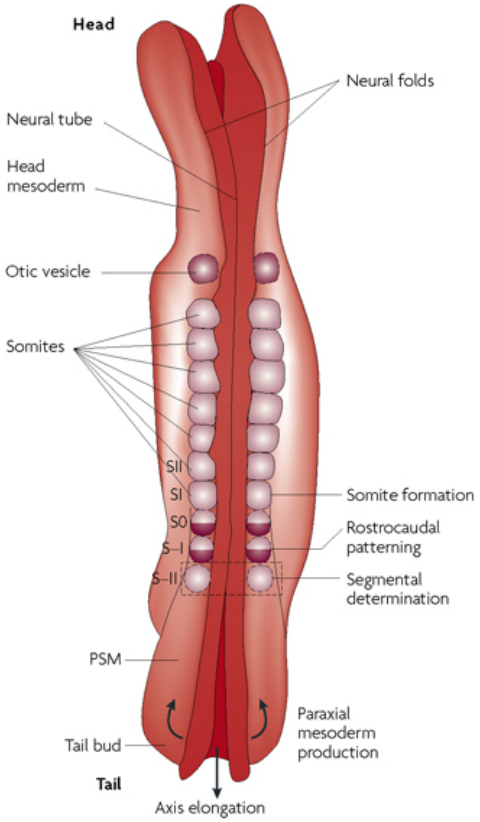
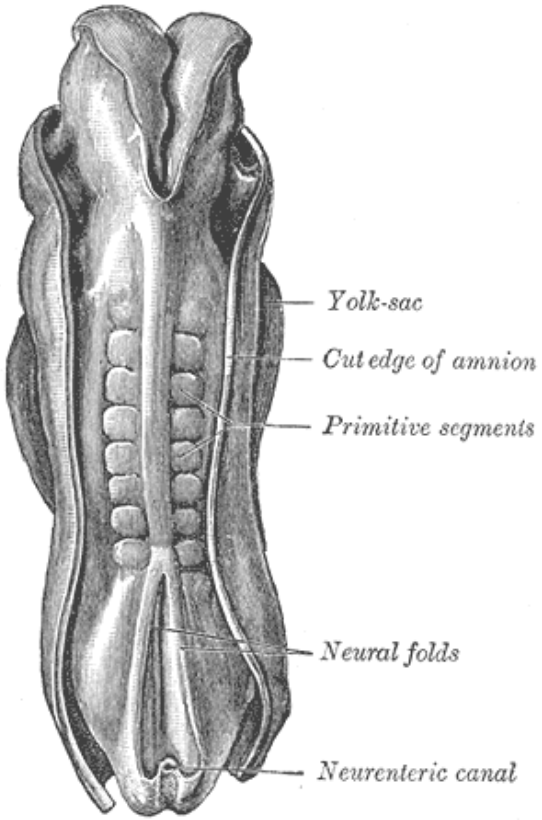
# 2: Paraxial Mesoderm

Cranial: Unsegmented paraxial mesoderm: head mesenchyme

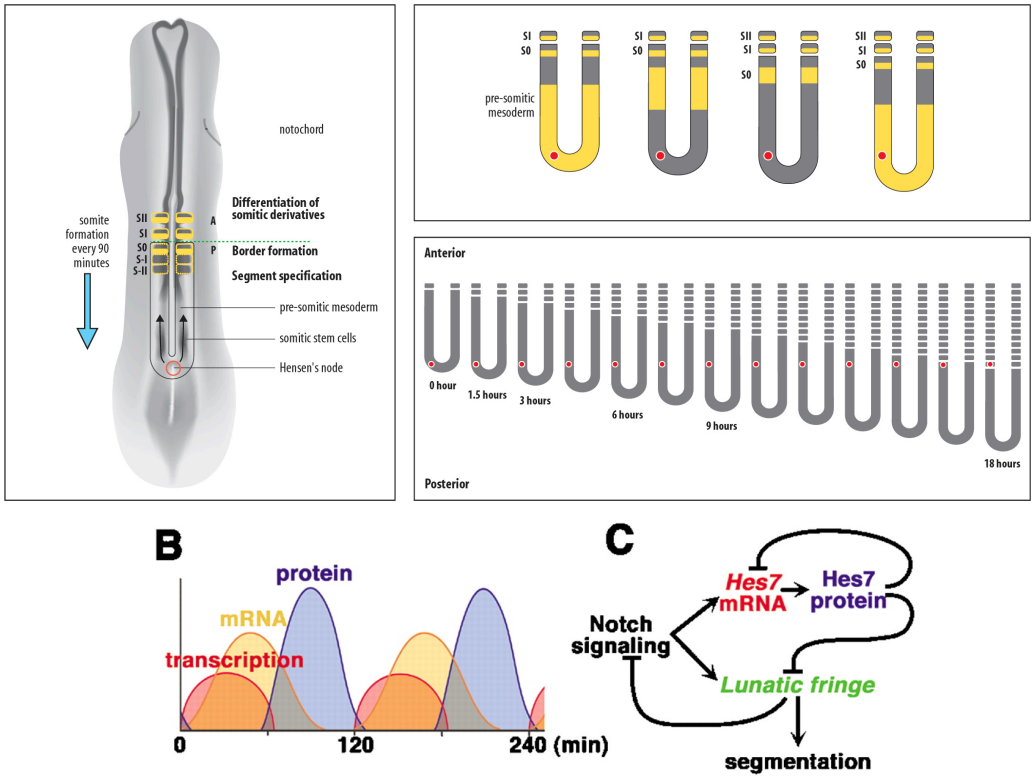
Trunk: Segmented paraxial mesoderm: somites



# 2: Paraxial Mesoderm

## Somitogenesis




Block-like bilateral condensations of the paraxial mesoderm

Form every 90 minuts in a cranial to caudal direction (day 20 to day 30)

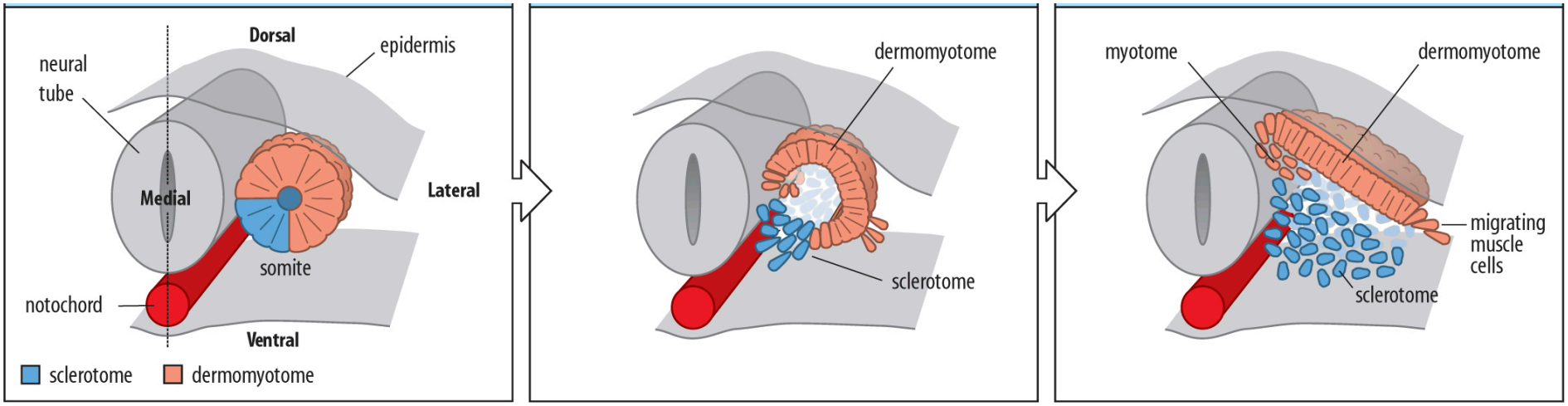
'Segmentation clock' depends on *Hes7* transcription/translation

44 max are formed, 33 remain

Give rise to axial skeleton and musculature, dermis of the trunk

# 2: Paraxial Mesoderm

## Somite Development




Somites develop into:

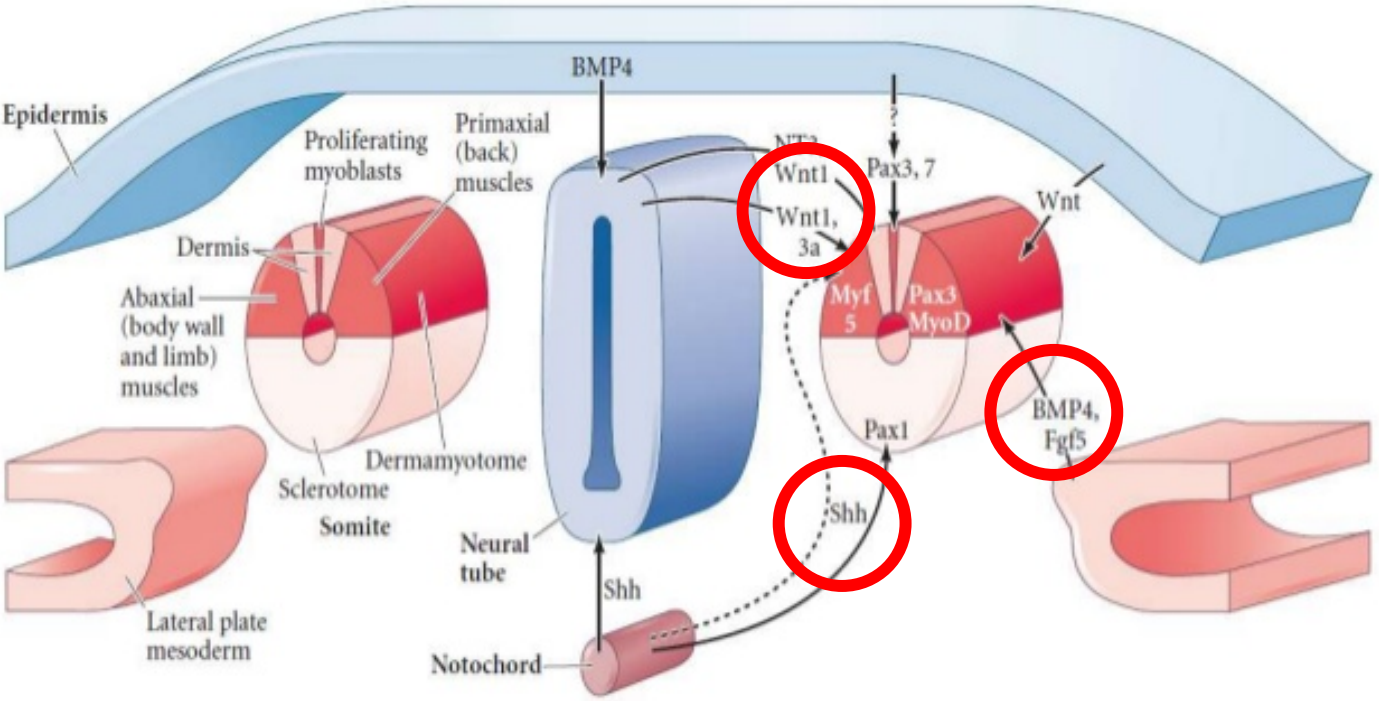
- Sclerotome: mesenchymal cells (vertebral body and intervertebral disk)
- Dermomyotome: columnar epithelium

Dermomyotome develops into:

- Dermatome: dermis of the trunk
- Myotome: trunk musculature

# 2: Paraxial Mesoderm

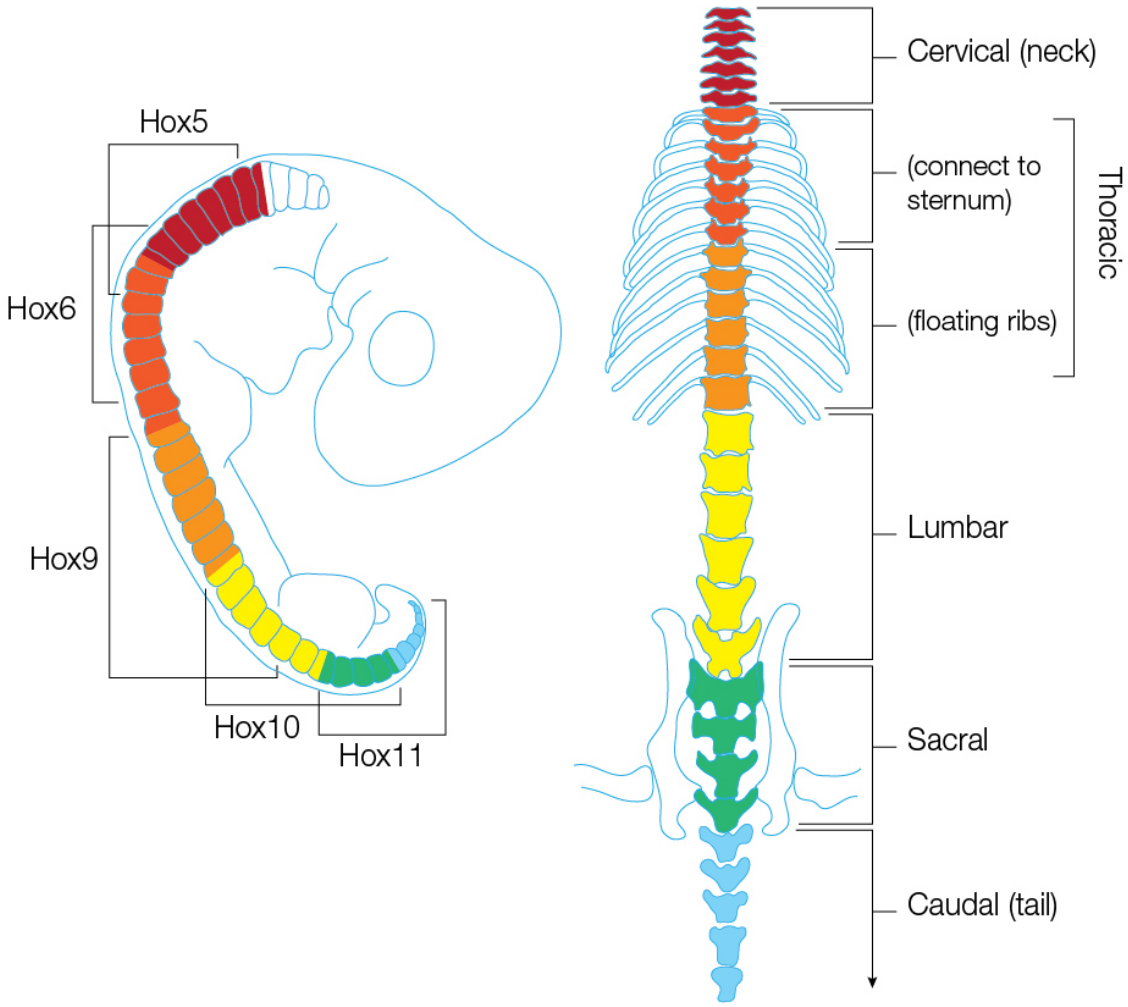
## Somite Development




Sonic hedgehog (Shh) (notochord and floor plate): ventral somites.
BMP-4: lateral somites.
Wnt family proteins (roof plate): dorsal somites.

# 2: Paraxial Mesoderm

## Somite Derivative Specification depends on AP level/*Hox* code




7: cervical region

12: thoracic region

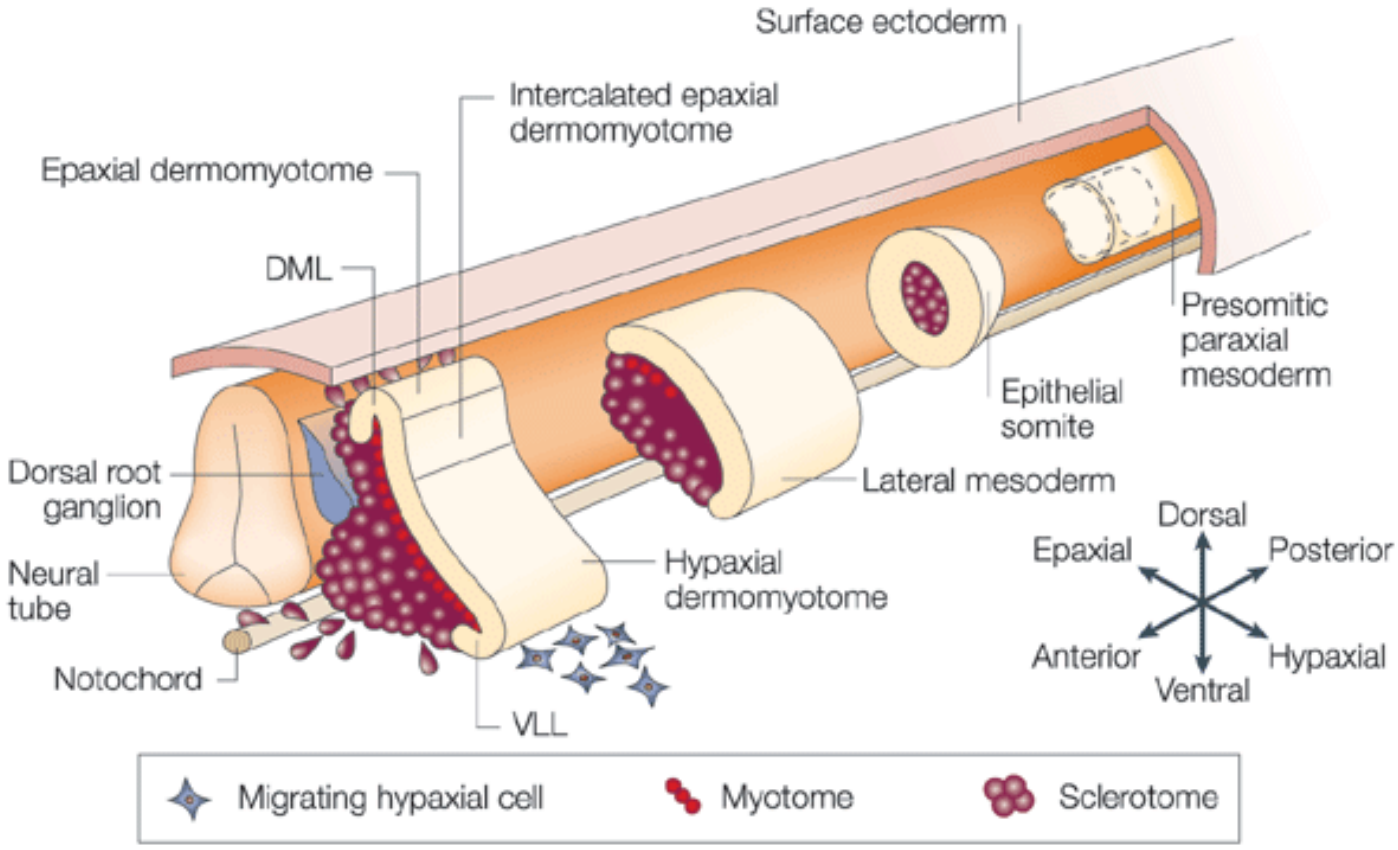
5: lumbar region

5: sacral region

4: caudal region (tail)

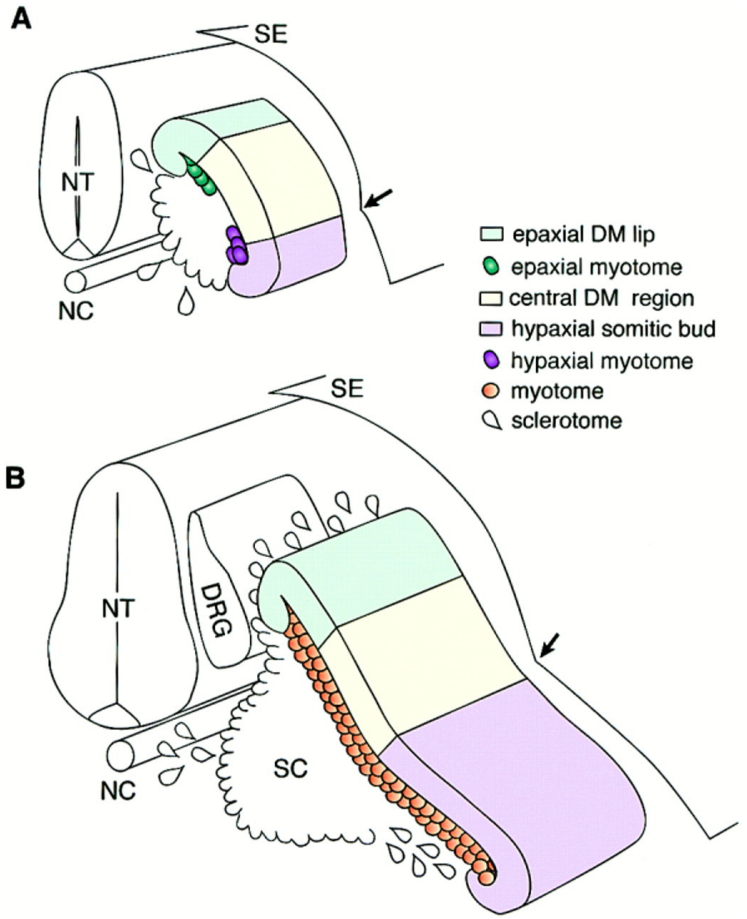
# 2: Paraxial Mesoderm

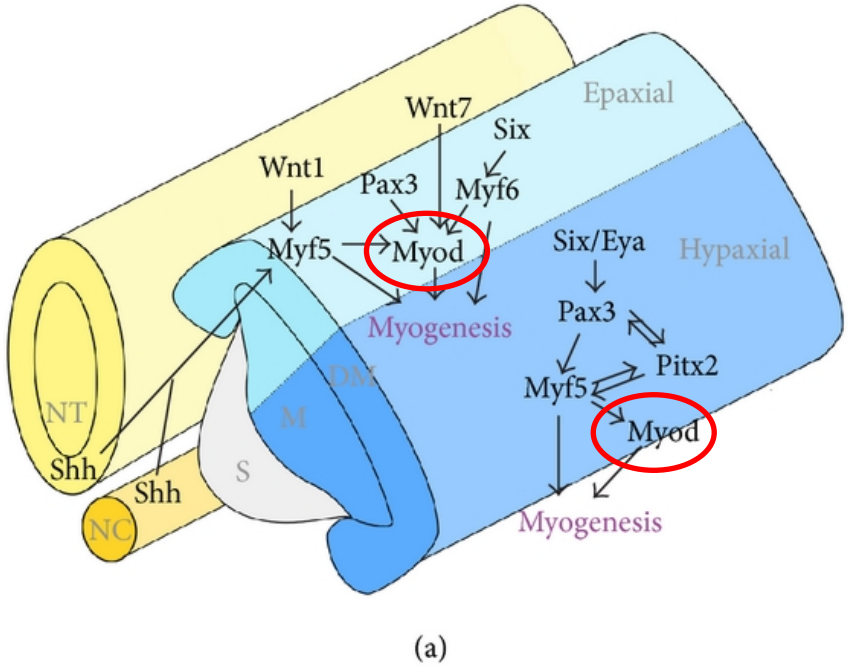
## Somite Development



# 2: Paraxial Mesoderm

## Myotome Development



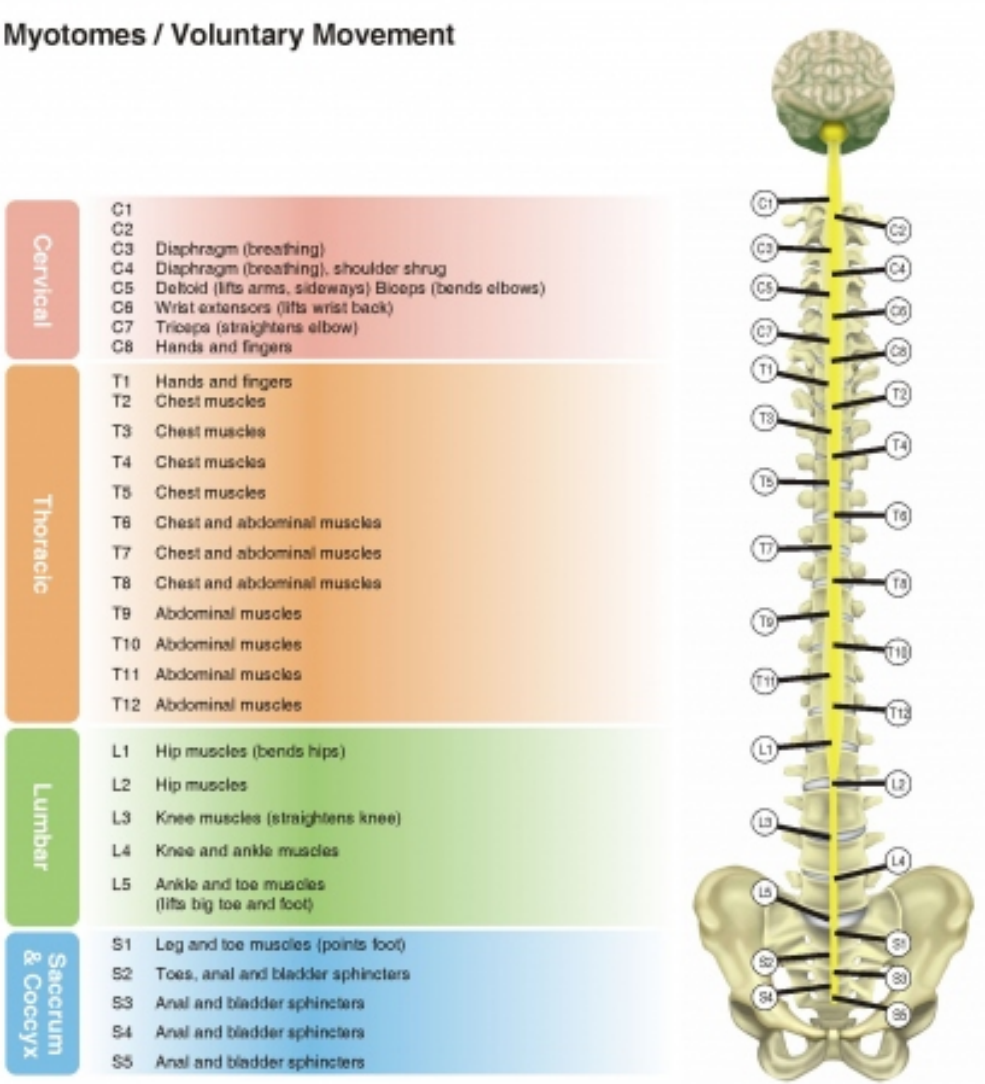

Epaxial myotome: epimere: erector spinae

Hypoaxial myotome: hypomere: 3 primary muscle layers

MyoD initiates myogenesis

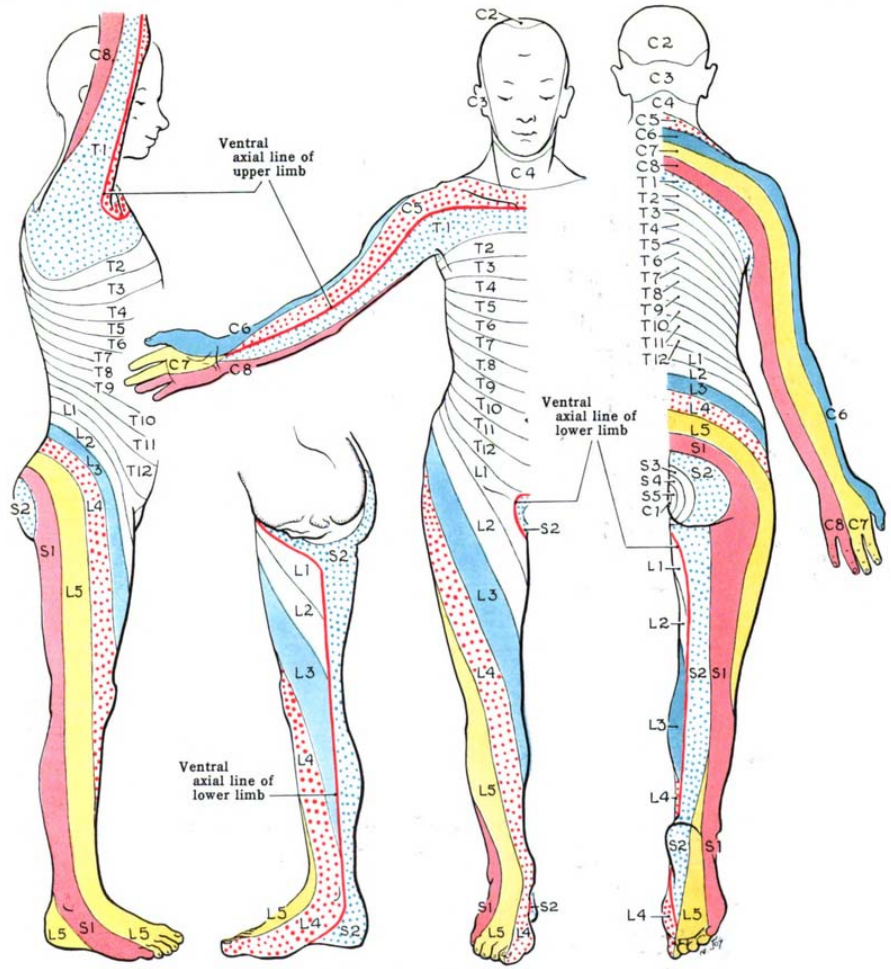
# 2: Paraxial Mesoderm

## Myotome Development



# 2: Paraxial Mesoderm

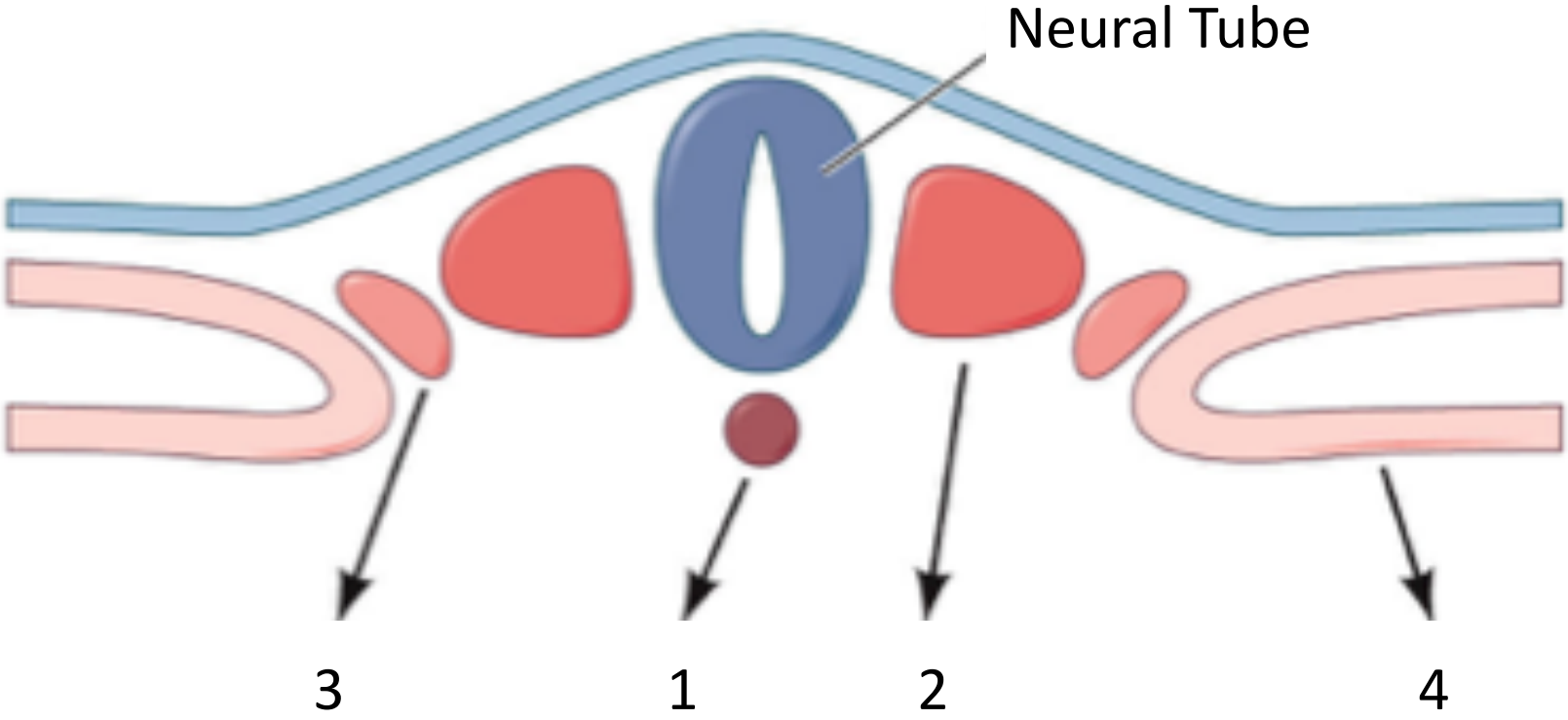
## Dermatome Development




Embryonic dermatomes will form the dermis

Postnatal dermatome is a strip of skin innervated by a single spinal nerve

# Early Mesoderm Development

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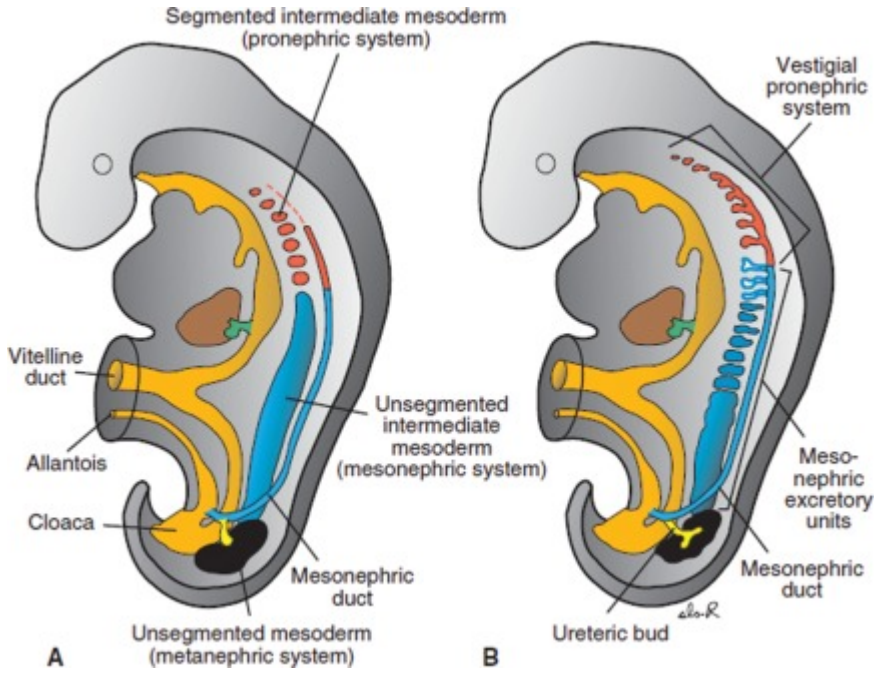
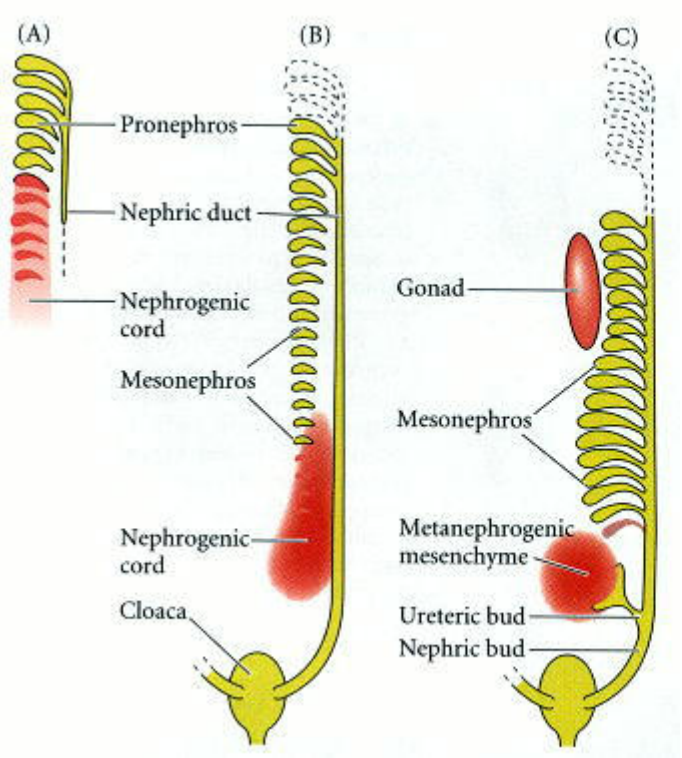
# 3: Intermediate Mesoderm

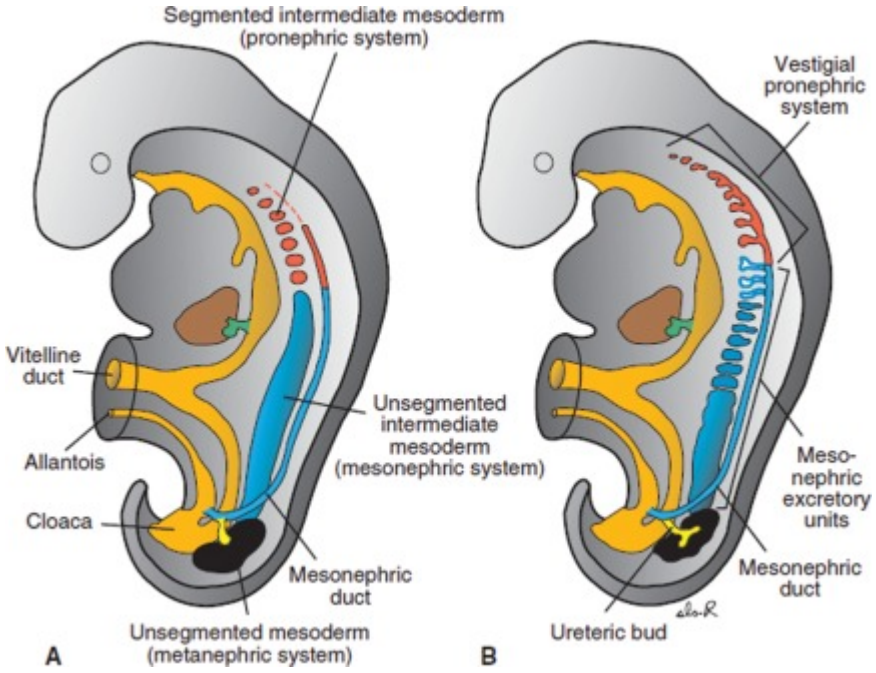
Segmented and unsegmented intermediate mesoderm
Mesonephric duct
Urogenital sinus
Mesonephric tubules
Ureteric buds

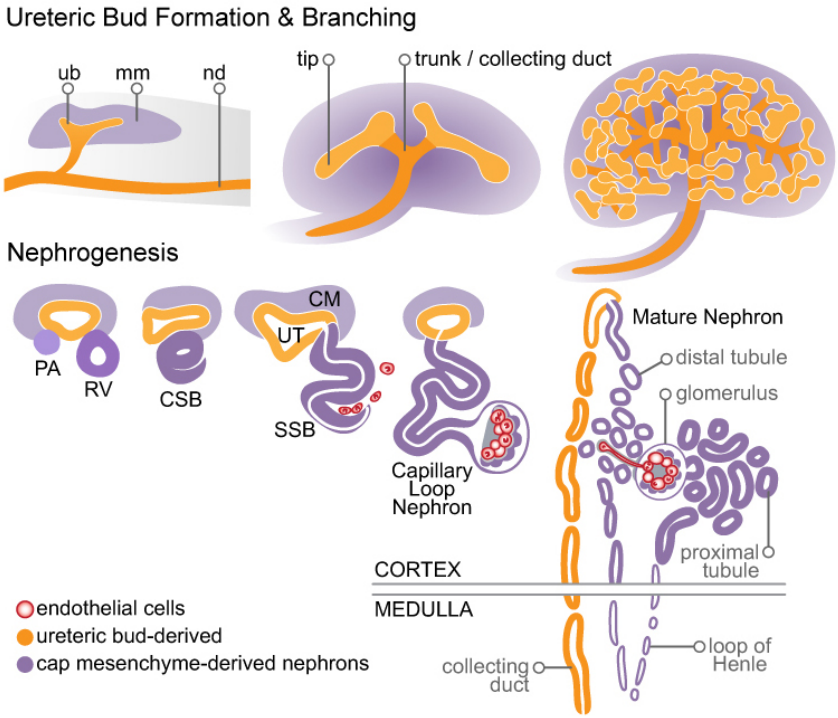


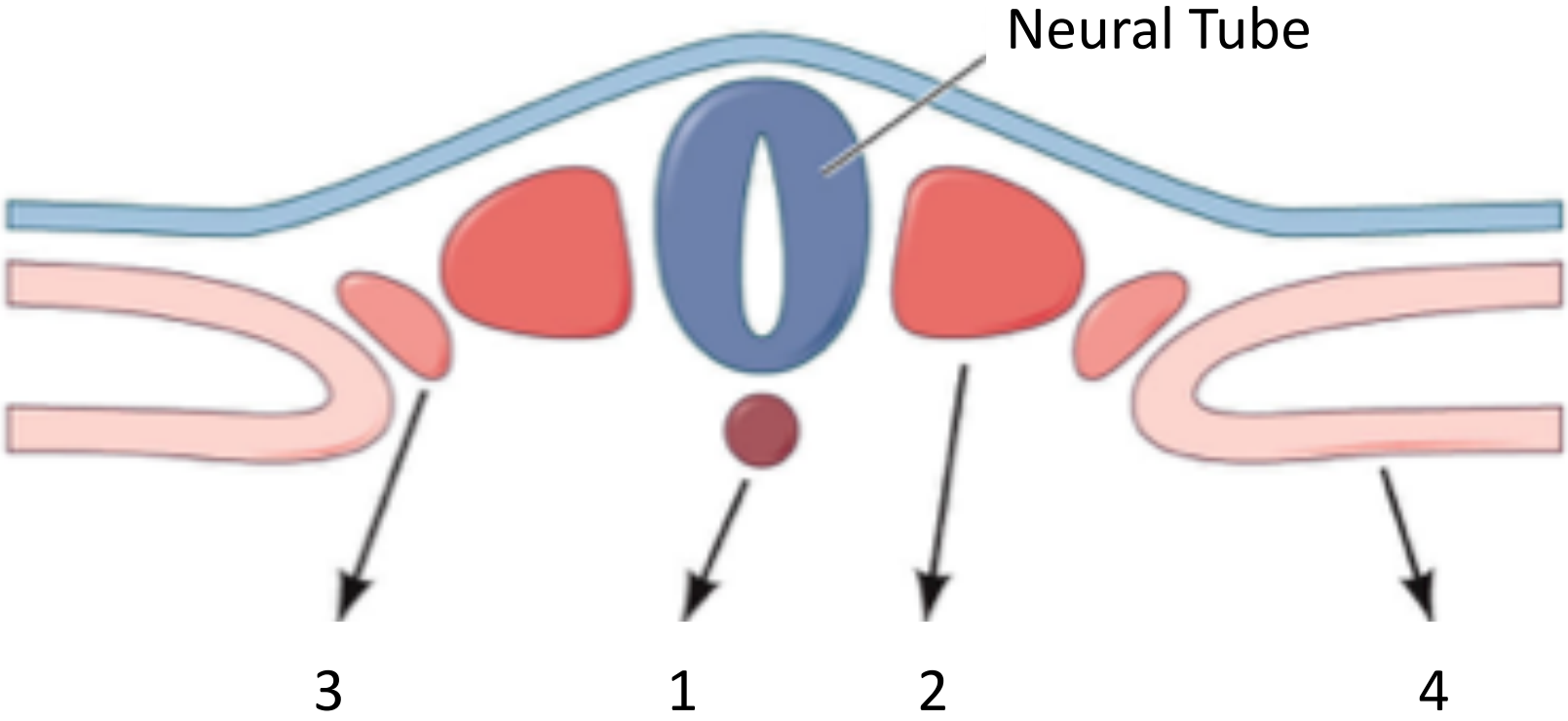
# 3: Intermediate Mesoderm

3 nephric systems:
- Pronephros: regress
- Mesonephros: reproductive system, and collecting duct and tubules of the kidney
- Metanephros: nephrons of the kidney



# Early Mesoderm Development

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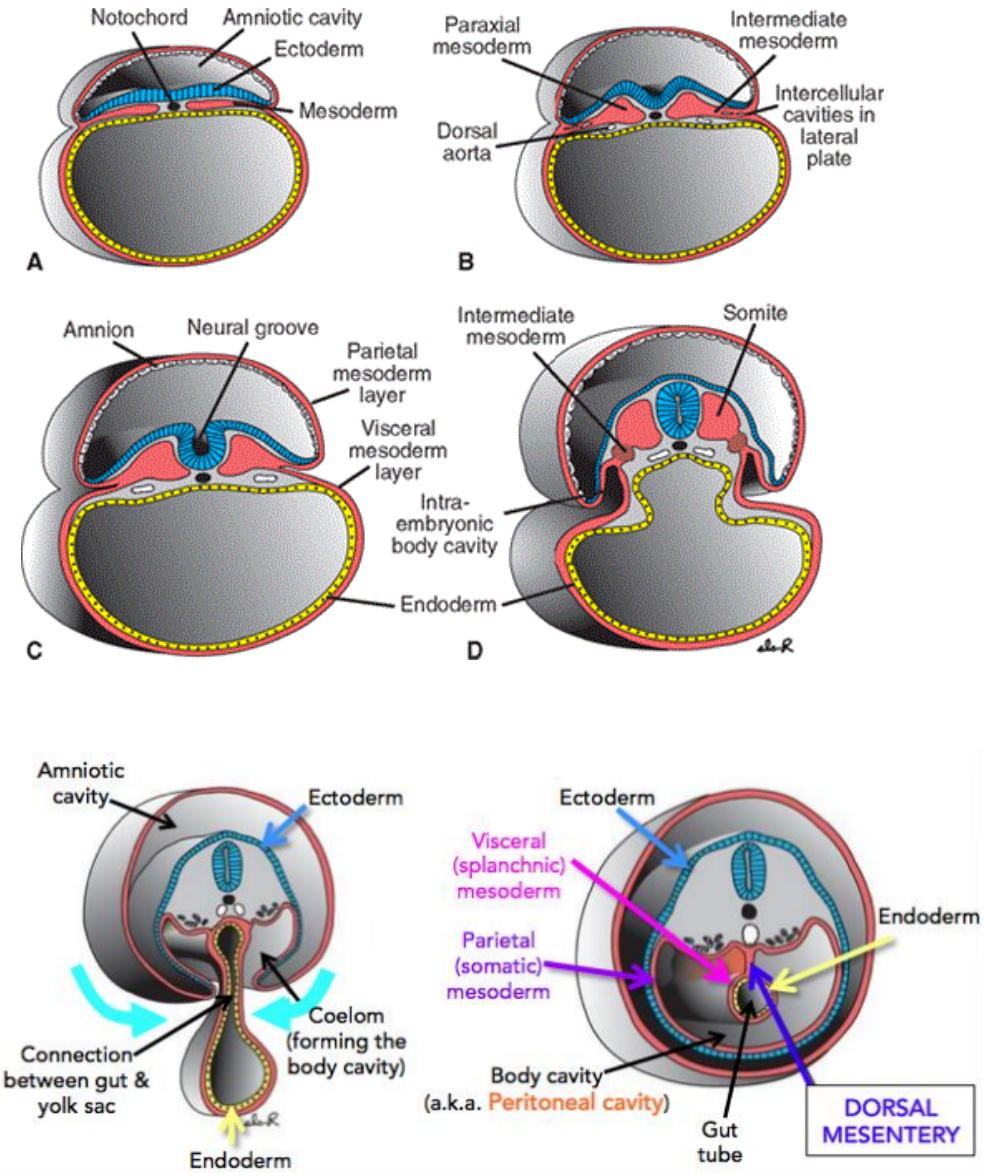
# 4: Lateral Plate Mesoderm




Lateral plate mesoderm develops into:

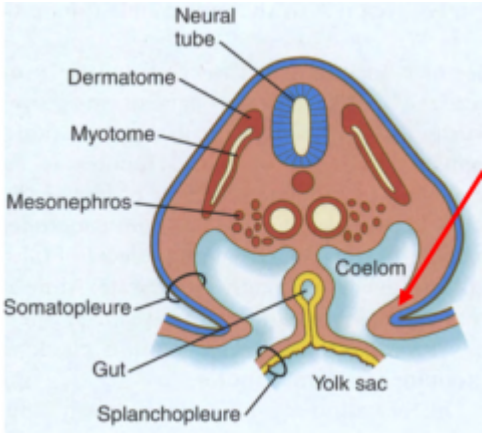
- Splanchnic/visceral mesoderm
- Somatic/parietal mesoderm

Intraembryonic coelom: 3 cavities:

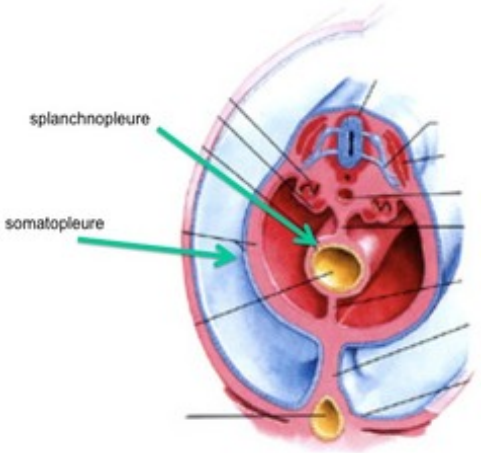
- Pericard
- Pleural
- Peritoneal

# 4: Lateral Plate Mesoderm

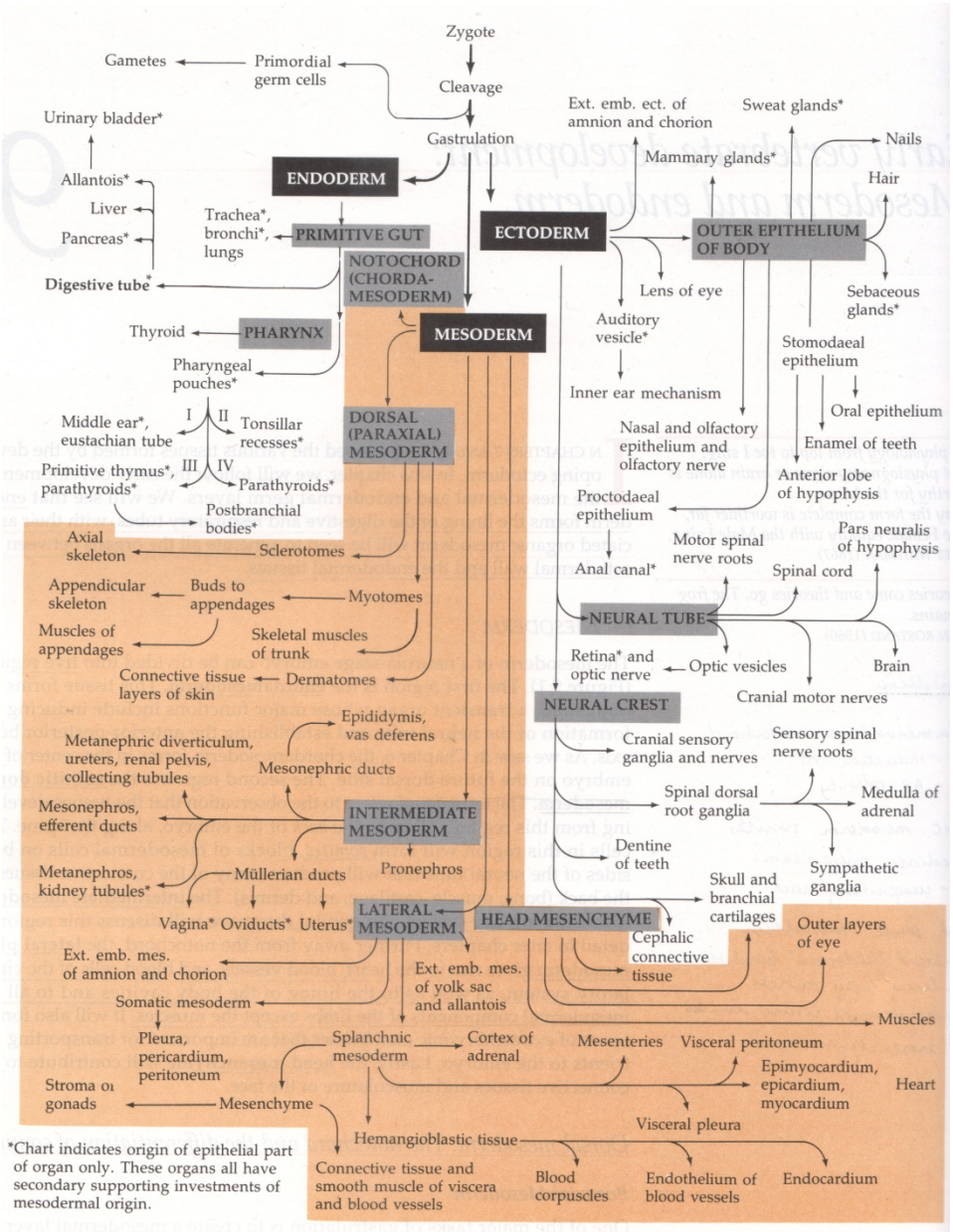
Somatic/parietal mesoderm: **somatopleure**
- Closest to ectoderm
- Gives rise to:
  - Connective tissue and lining of the body wall
  - Bones, ligaments and dermis of the limbs




Splanchnic/visceral mesoderm: **splanchnopleure**
- Closest to endoderm
- Gives rise to:
  - Cardiac mesoderm (prechordal splanchnic mesoderm)
  - Blood vessels
  - Smooth muscles of the gut



# Embryonic development:

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5th edition

# Week 3 Lecture overview

Placentation

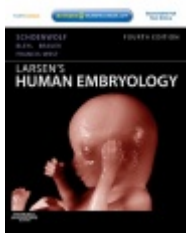
Body axes

Gastrulation

Axis formation

Embryo folding

Lecture contents relevant to Labs 3 and 7

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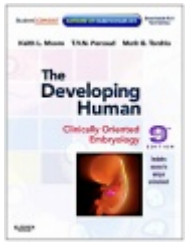


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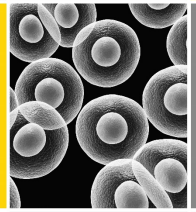

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