The University Of Jordan
Faculty Of Medicine

Derivatives of the three germ layers

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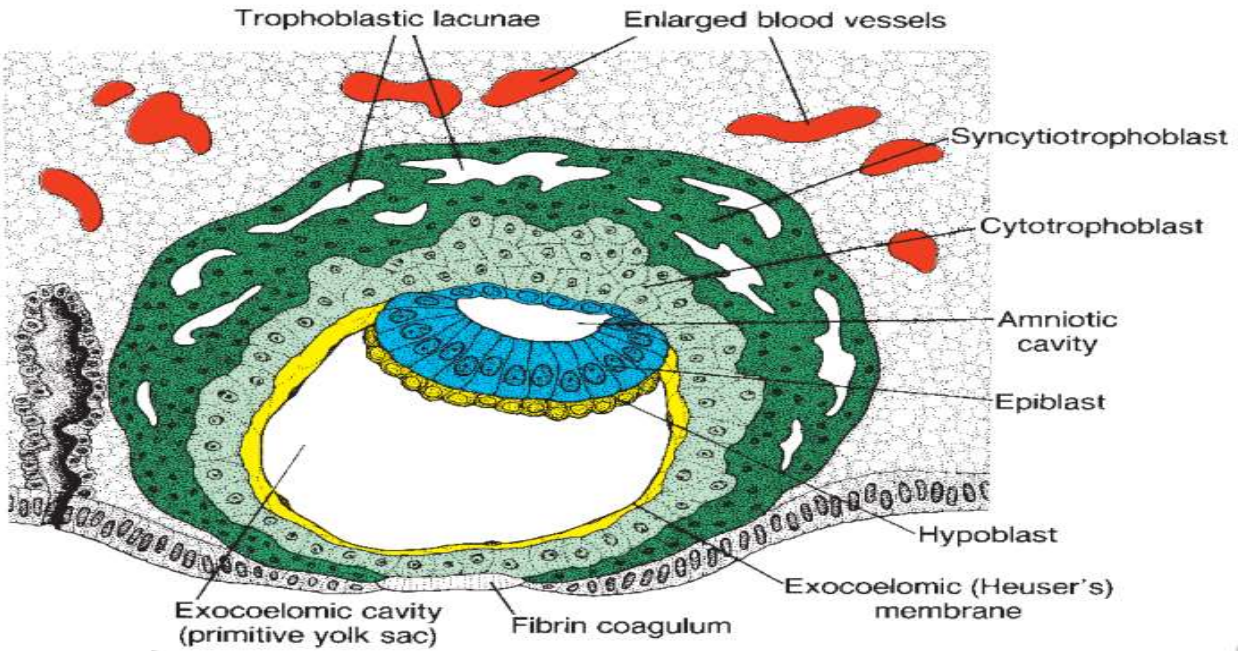
a) Development of the ectoderm

- **Early ,** the ectoderm forms the **dorsal** layer of the germ disc and forms the **floor** of the amniotic cavity .
- **After folding ,** the ectoderm becomes the outer layer of the embryo.



The ectoderm germ layer differentiates into the following structures :

1- The epidermis of the skin including skin glands ,hair & nails

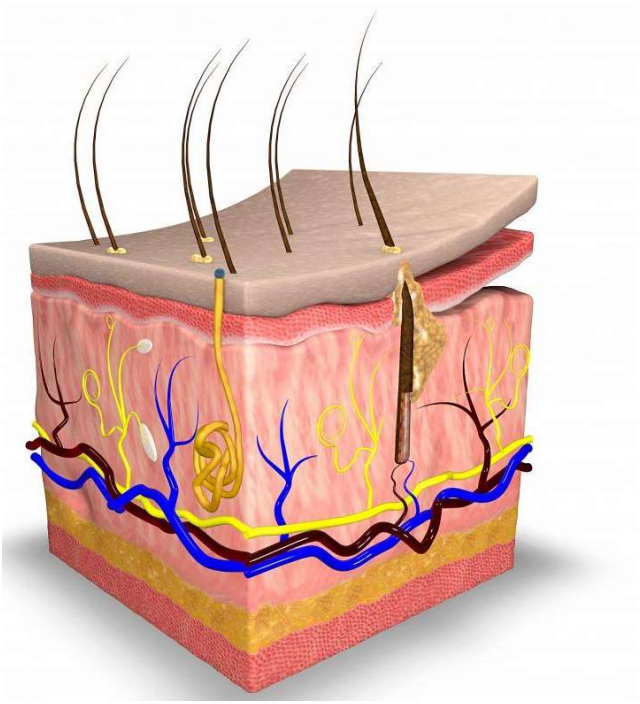
2. Nervous system :

- ***The neural tube*** gives brain , spinal cord , Peripheral nerves.
- ***Sensory*** epithelium of sensory organs eg. Olfactory epithelium and taste buds .

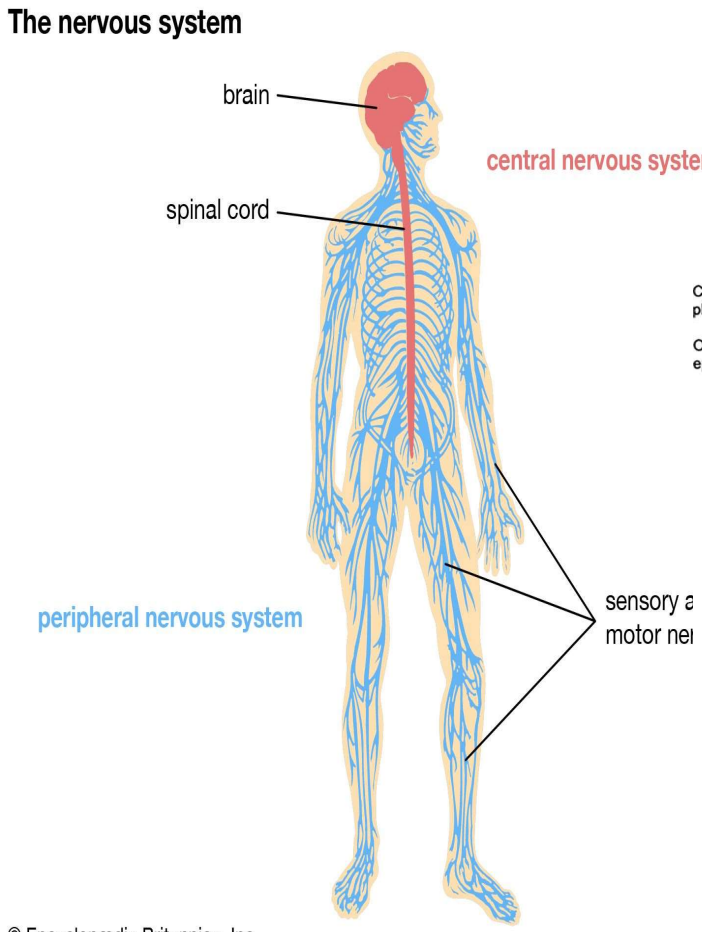
3. Ear : external auditory meatus & outer layer of ear drum .

4. Respiratory system : nasal epithelium

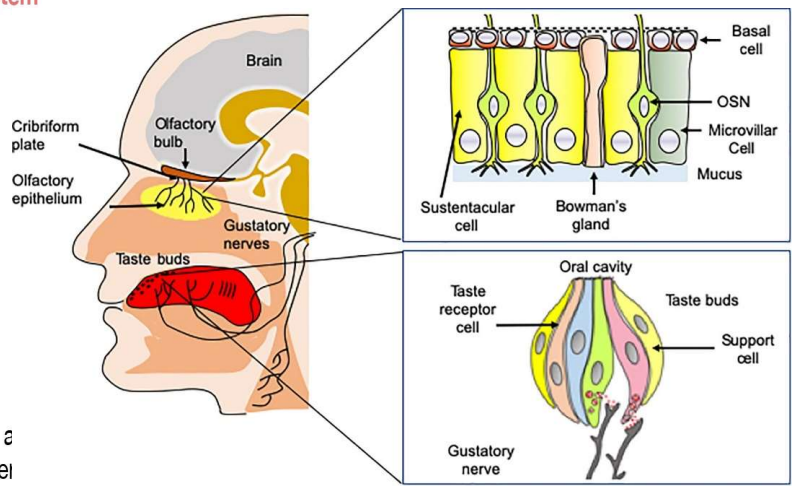
5. Gastrointestinal tract : anterior part of oral cavity and lower ½ of anal canal .



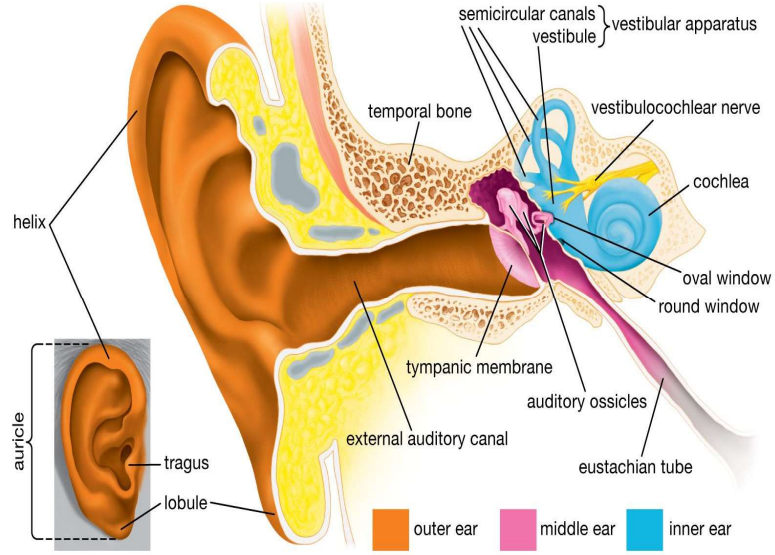
Skin

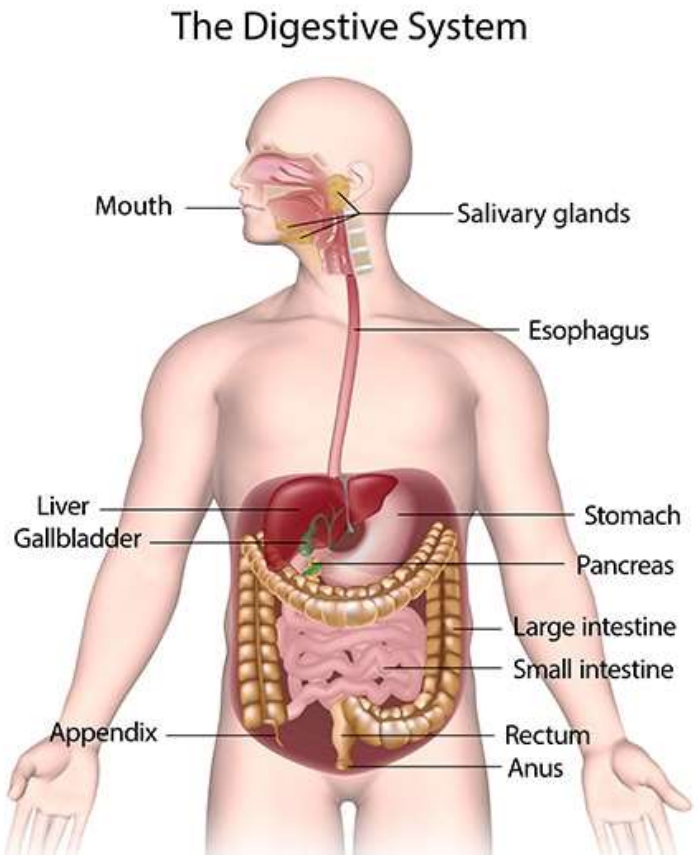


Nervous system



Olfactory epithelium and taste buds





External auditory meatus
Outer layer of Ear drum

Neural crests:

They are: 2 strips of ectodermal cells present on both sides of neural plate

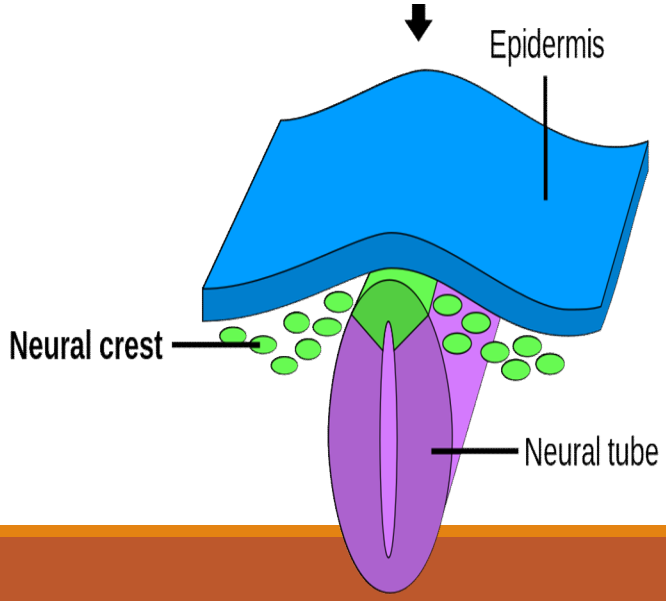
Derivatives

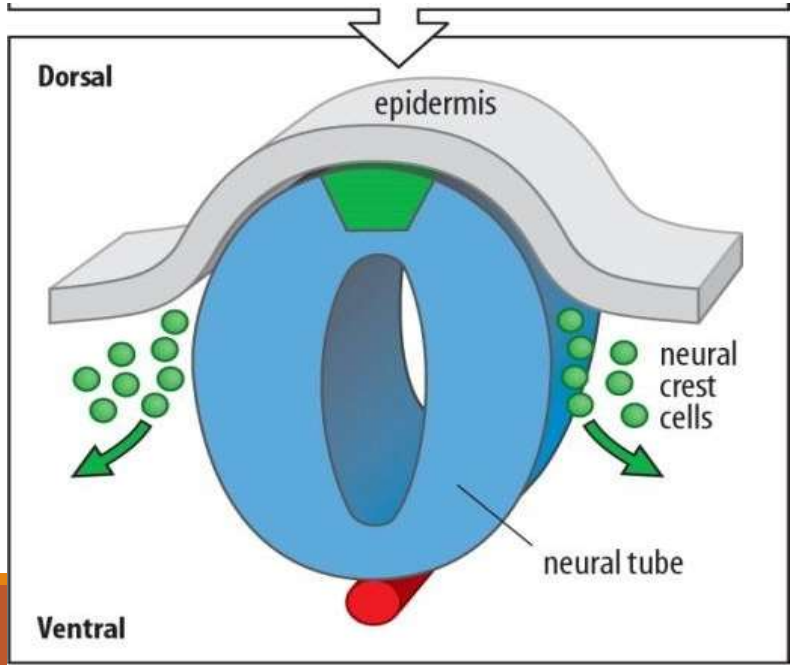
1.Ganglia: sensory, sympathetic & parasympathetic.

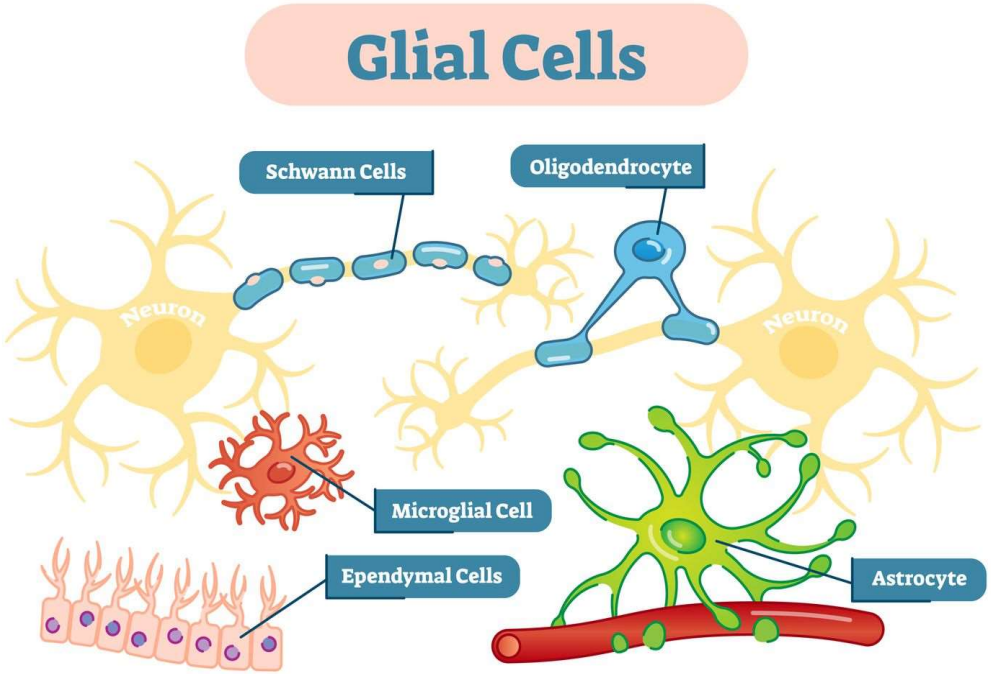
2.Cells : Glial and melanocyte cells

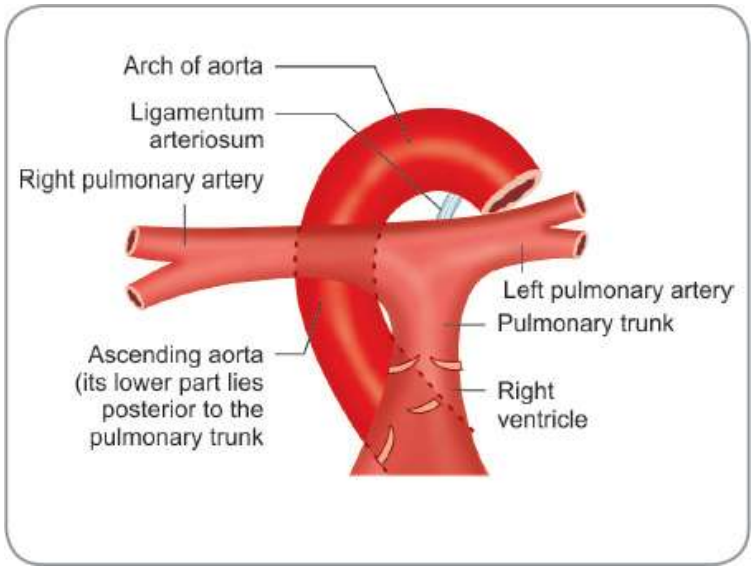
3.Adrenal medulla

4.Septum between ascending aorta & pulmonary trunk

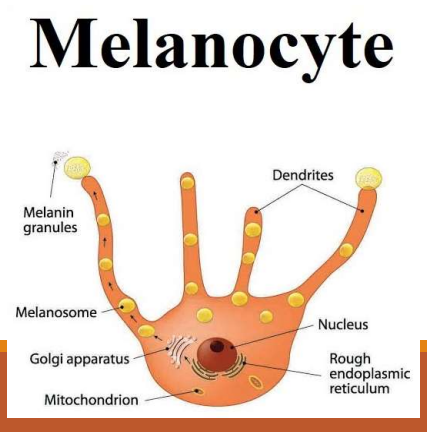


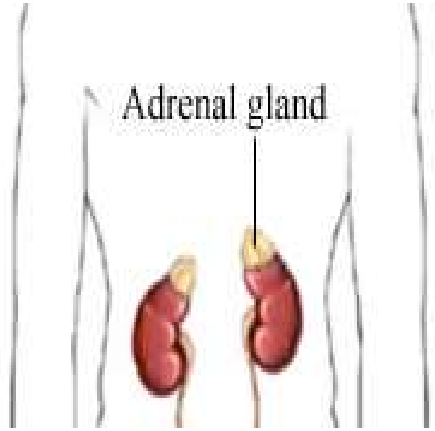



Glial Cells
Schwann Cells
Oligodendrocyte
Neuron
Neuron
Microglial Cell
Ependymal Cells
Astrocyte


Arch of aorta
Ligamentum arteriosum
Right pulmonary artery
Left pulmonary artery
Pulmonary trunk
Ascending aorta (its lower part lies posterior to the pulmonary trunk
Right ventricle

Glial cells


Melanocyte
Dendrites
Melanin granules
Melanosome
Nucleus
Golgi apparatus
Rough endoplasmic reticulum
Mitochondrion


Adrenal gland

b) Development of the endoderm :

- **Early ,** the endoderm forms the **ventral** layer of the germ disc and forms the **roof** of the yolk sac .
- **After folding ,** the upper part of yolk sac becomes incorporated into the embryo , forming the **primitive gut**

Derivatives of Endoderm :

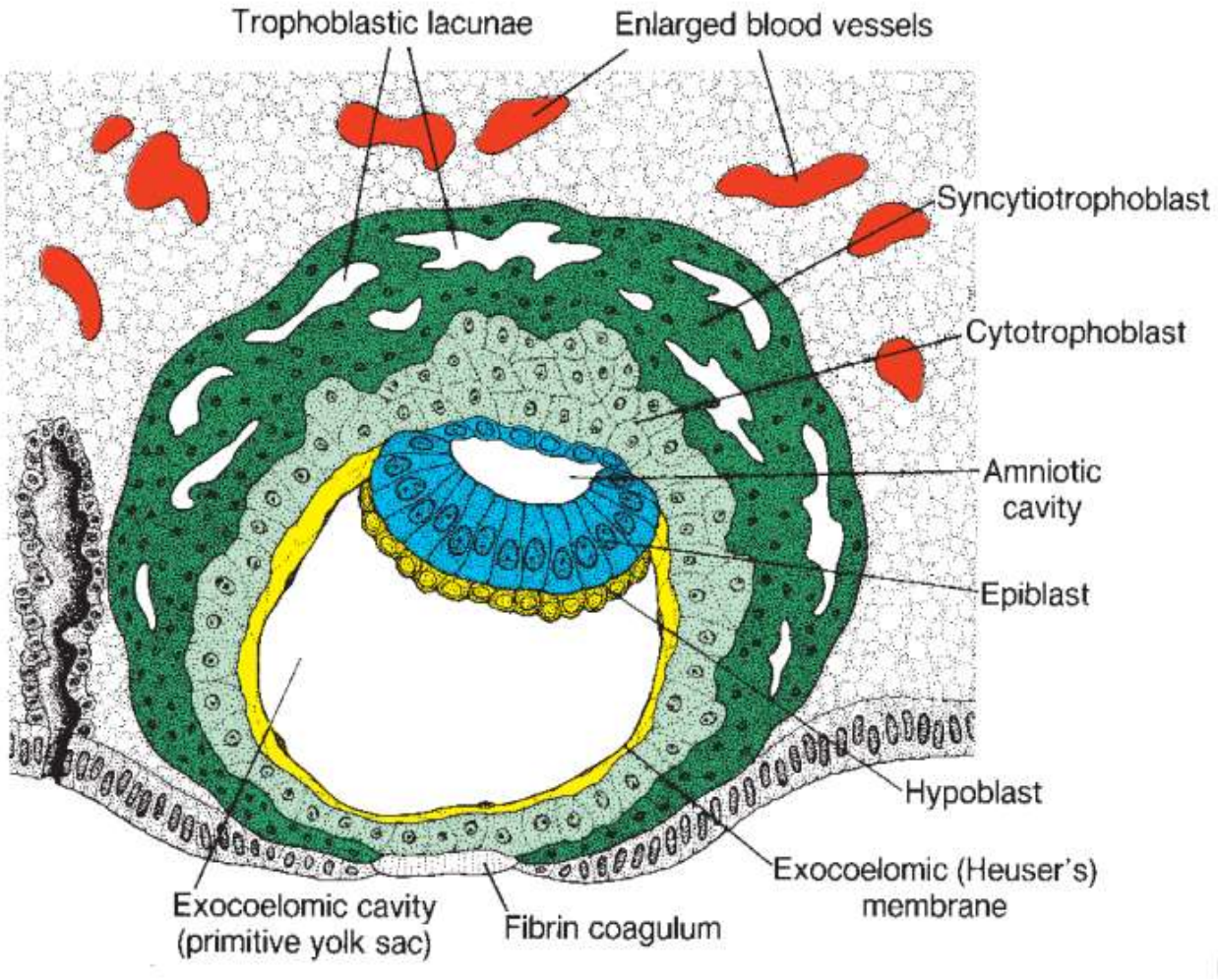
1- Epithelium lining of

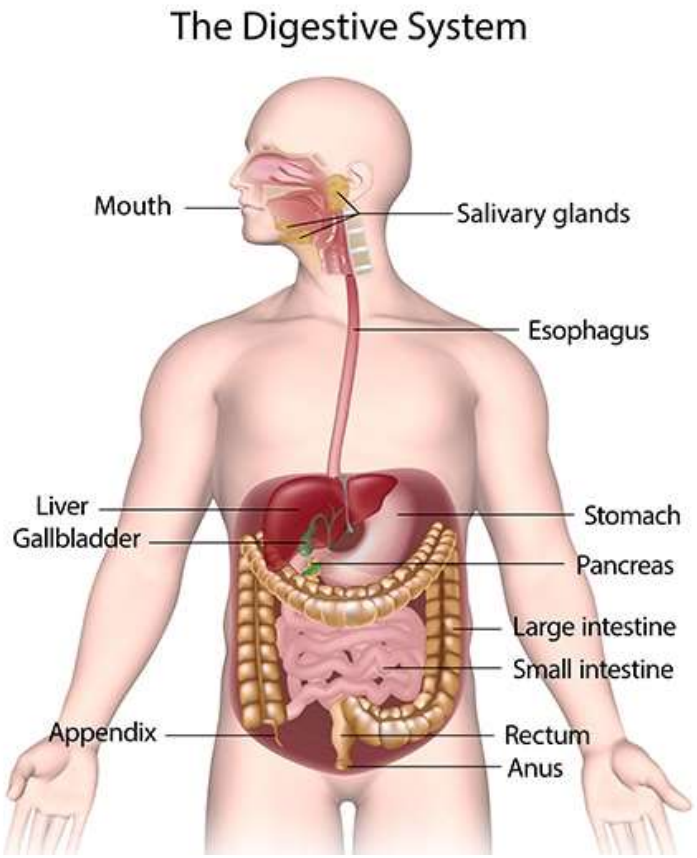
A. Gastrointestinal tract **Except** anterior part of oral cavity and lower ½ of anal canal

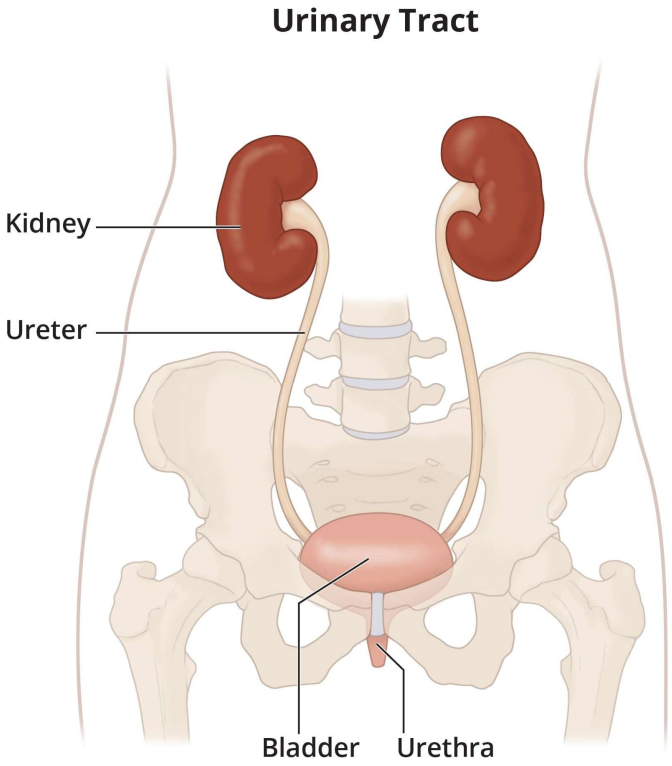
B. Most of urinary bladder and urethra

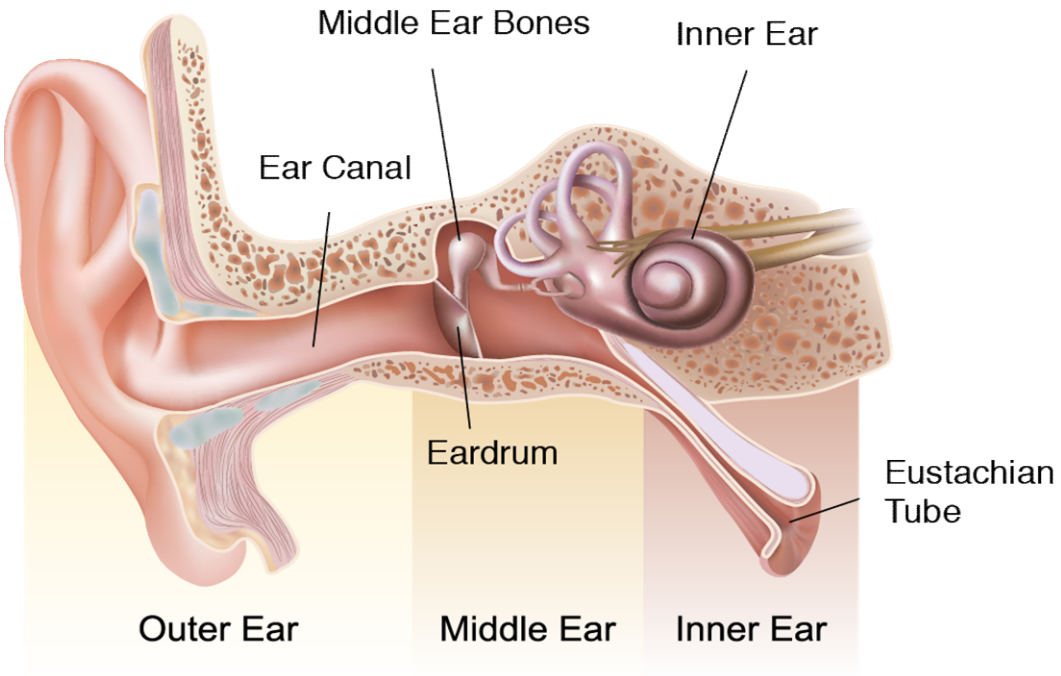
C. Middle ear and Eustachian tube

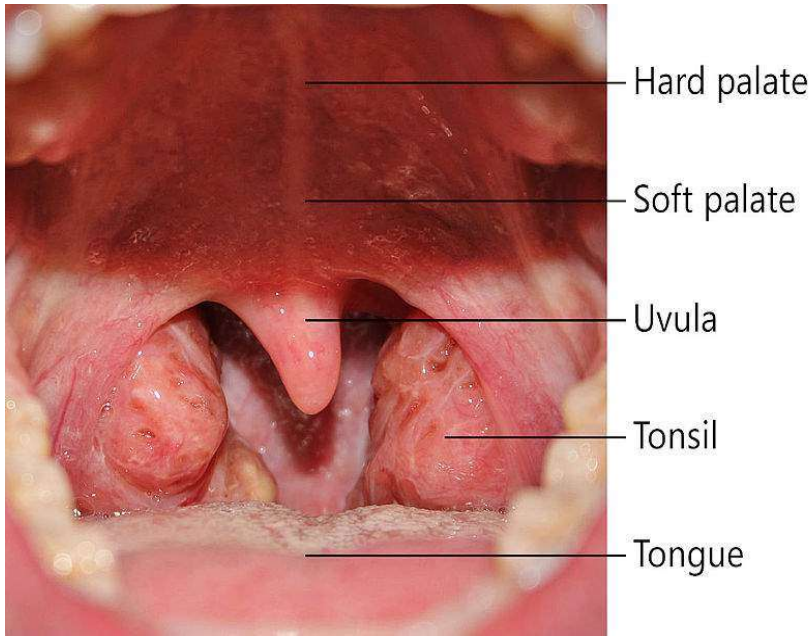
2-Parenchyma of Palatine tonsils, thyroid, Liver & pancreas

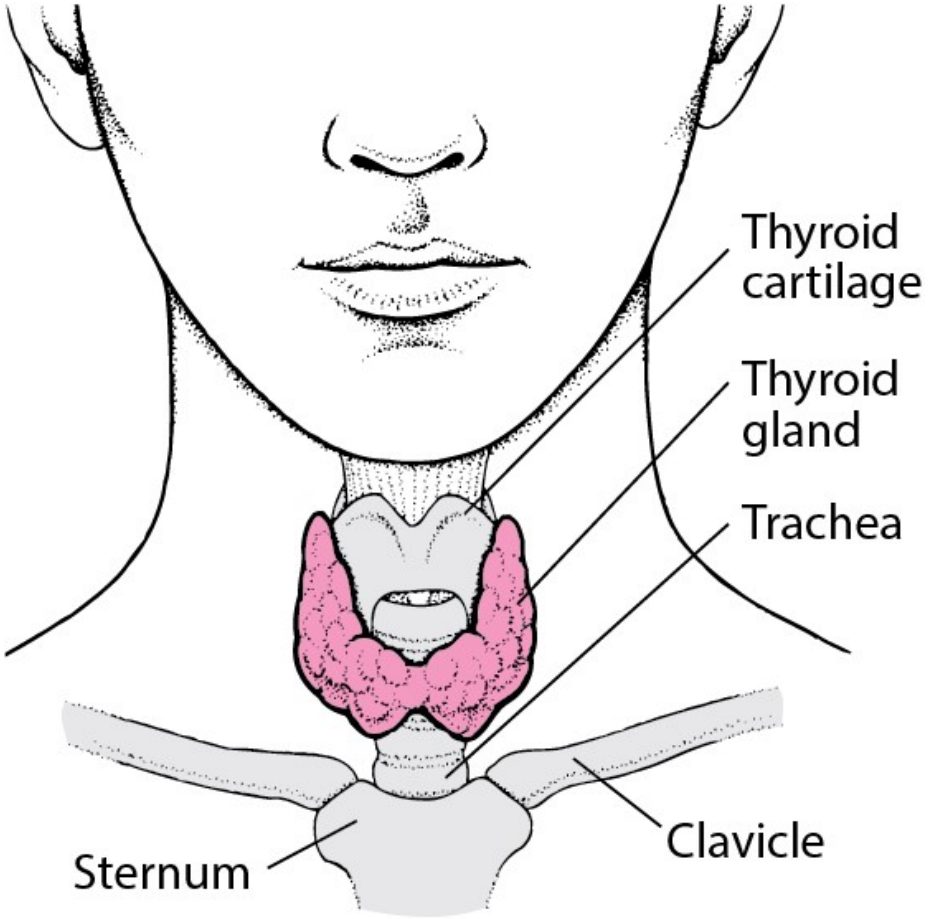

Trophoblastic lacunae
Enlarged blood vessels
Syncytiotrophoblast
Cytotrophoblast
Amniotic cavity
Epiblast
Hypoblast
Exocoelomic (Heuser's) membrane
Exocoelomic cavity (primitive yolk sac)
Fibrin coagulum

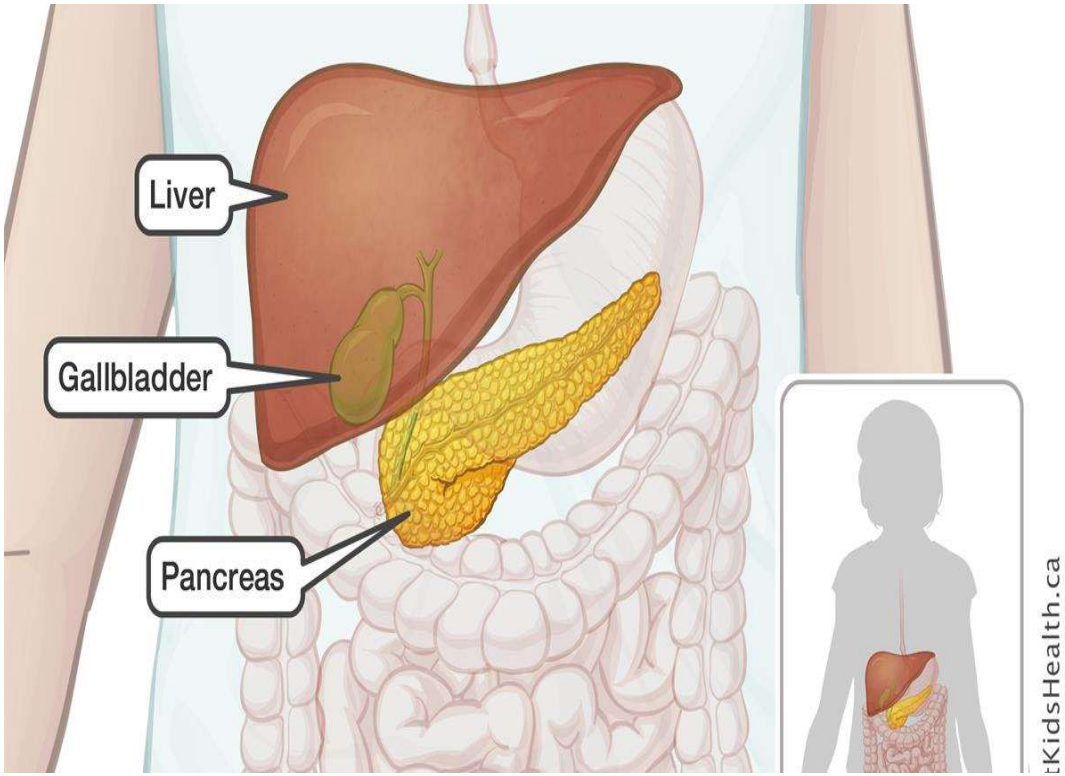

The Digestive System
Mouth
Salivary glands
Esophagus
Liver
Gallbladder
Stomach
Pancreas
Large intestine
Small intestine
Appendix
Rectum
Anus


Urinary Tract
Kidney
Ureter
Bladder
Urethra


Middle Ear Bones
Inner Ear
Ear Canal
Eardrum
Eustachian Tube
Outer Ear
Middle Ear
Inner Ear


Hard palate
Soft palate
Uvula
Tonsil
Tongue


Thyroid cartilage
Thyroid gland
Trachea
Sternum
Clavicle


Liver
Gallbladder
Pancreas
tKidsHealth.ca

c) Development of the intraembryonic mesoderm :

It is the layer that separate endoderm and ectoderm

Origin : from epiblast that invaginate the primitive streak and pit

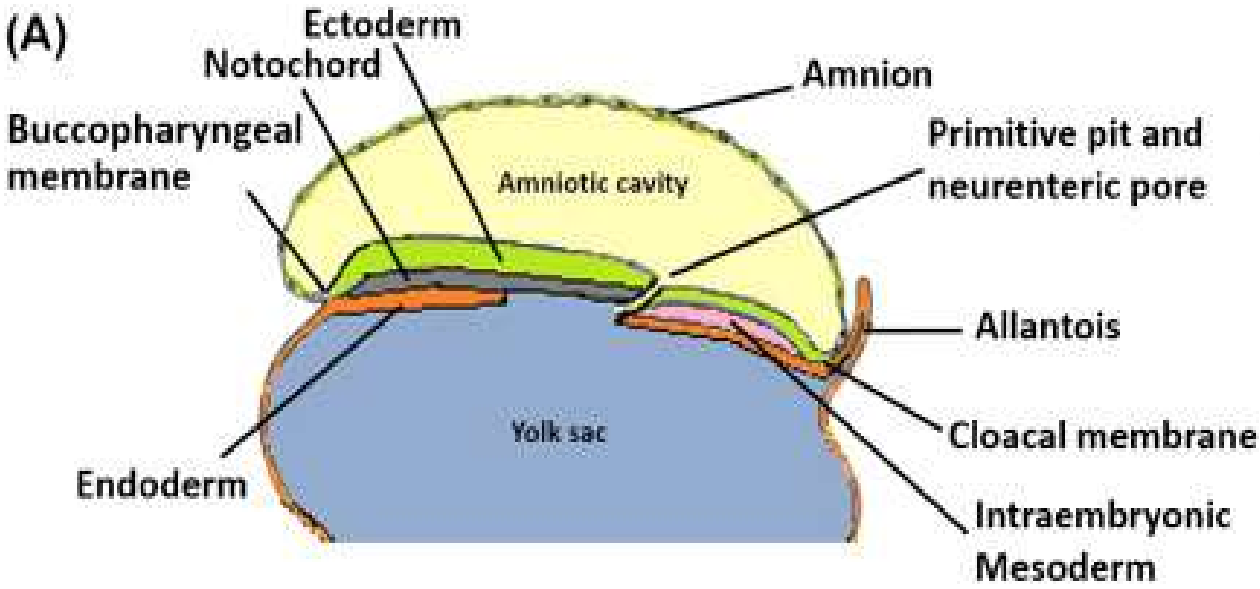
Site: It is not present at the following sites:

1- Buccopharyngeal membrane, cranially

2- Cloacal membrane, caudally

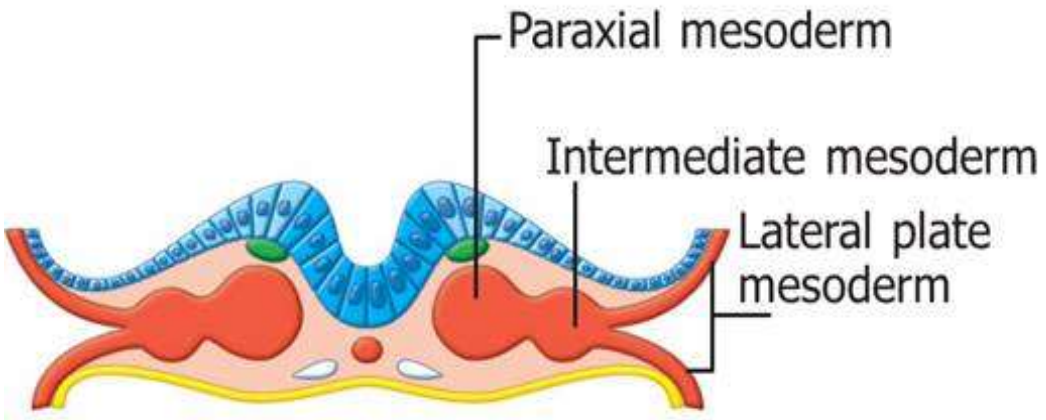
3- Site of the notochord.

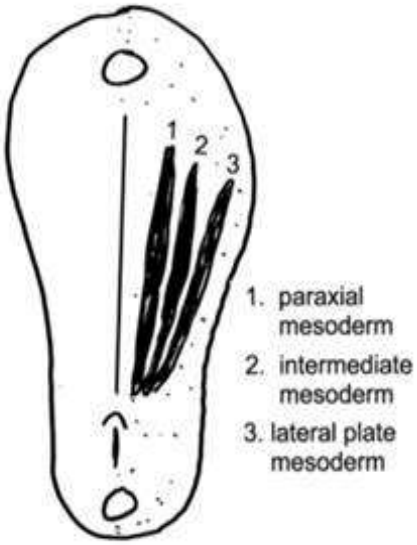
4- Site of neural tube.



Differentiation : At 17th Day it differentiates into

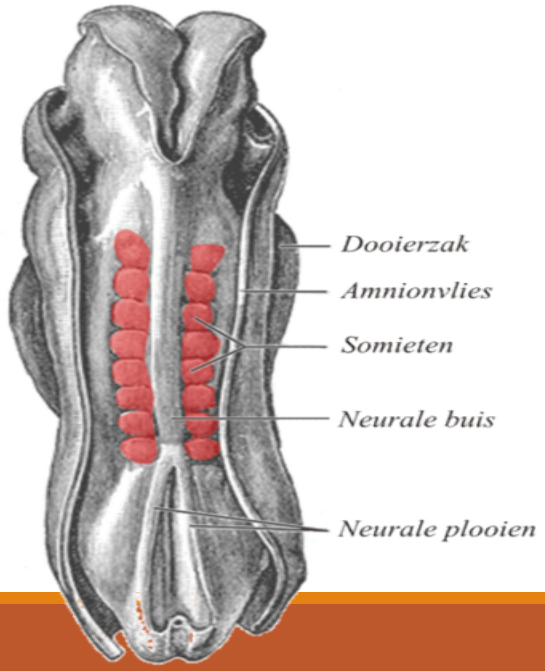
a) Paraxial mesoderm: It is the part on both sides of notochord and neural tube
b) Intermediate mesoderm: it is present between paraxial & lateral plate mesoderm.
c) Lateral plate mesoderm: it is the most lateral part

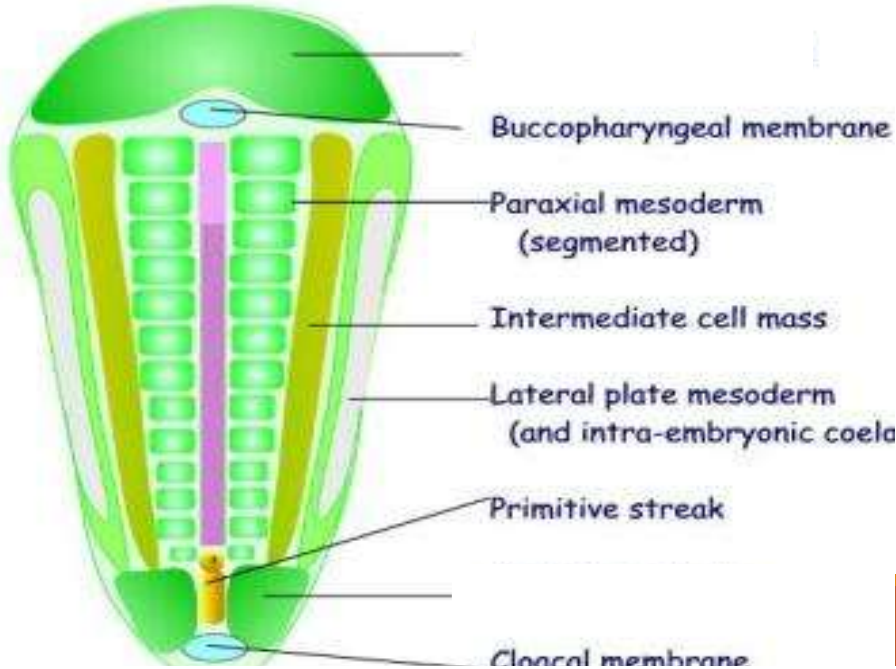




1- Paraxial mesoderm:

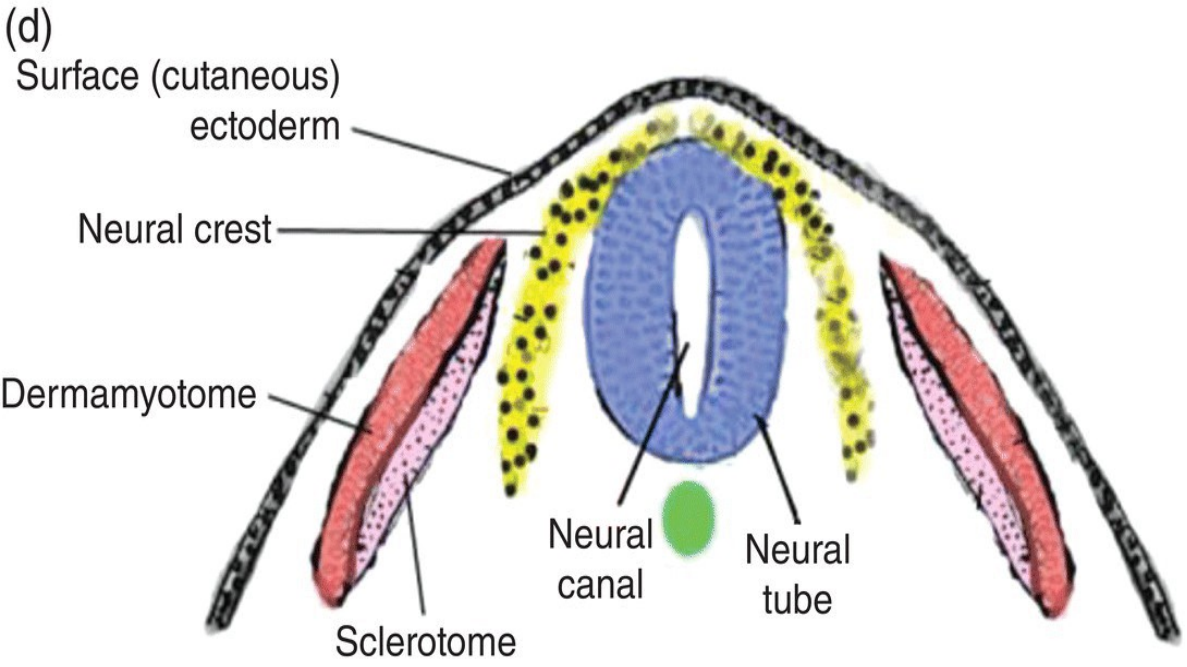
- It is segmented in the head region to form 7 ***somitomeres*** which gives skeletal muscles of face , jaws and throat .
- It is segmented from the occipital region caudally to form the ***somites***.
- Total number of somites formed are 42 – 44 classified as follows :
- 4 occipital, 8 cervical, 12 thoracic, 5 lumbar, 5 sacral & 8 – 10 coccygeal.

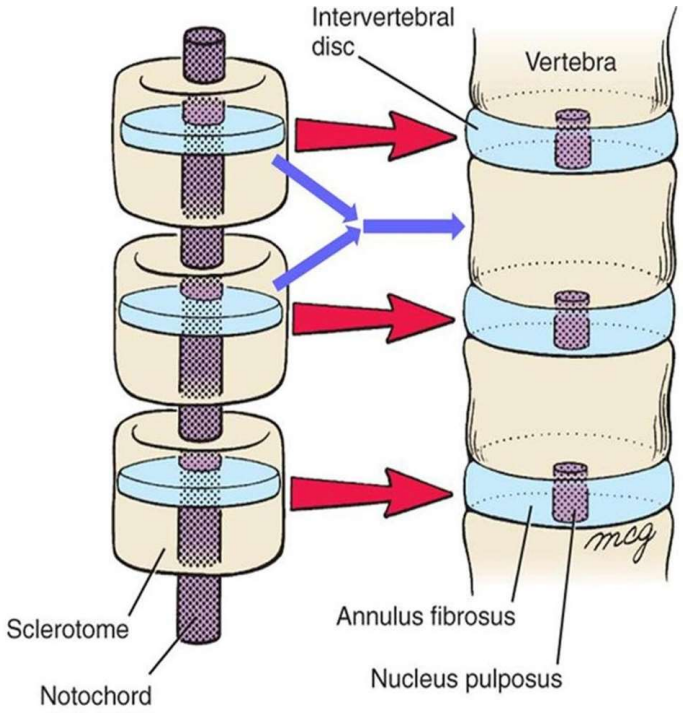




Derivatives of somites : Each somite **divides** into :

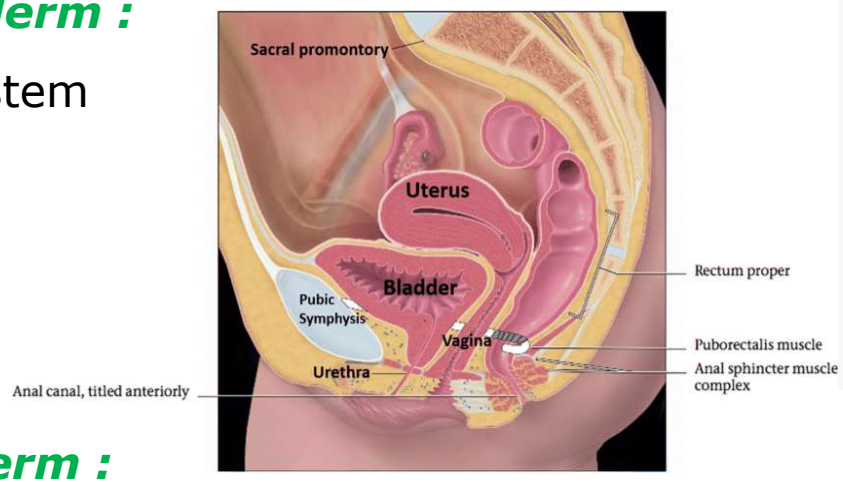
- **A ventro-medial part** called the ***sclerotome*** which surround the neural tube & notochord to form the **vertebral column**.
- **A dorso-lateral part** called the ***dermo-myotome*** which divides into ***dermatome*** which form the dermis of skin and ***myotome*** which form the striated muscles .

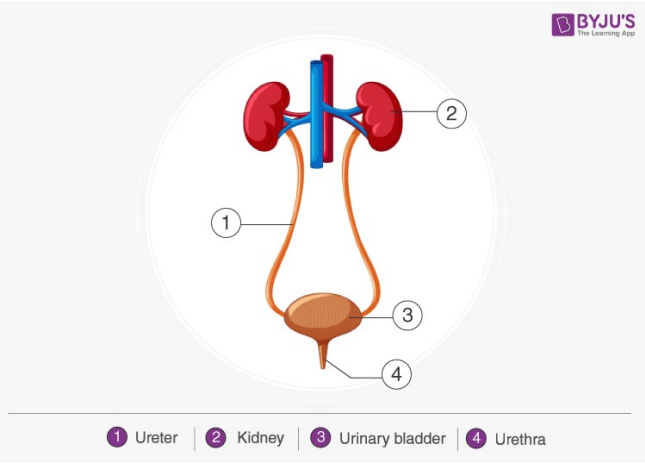




2. Intermediate mesoderm :

Most of the urogenital system



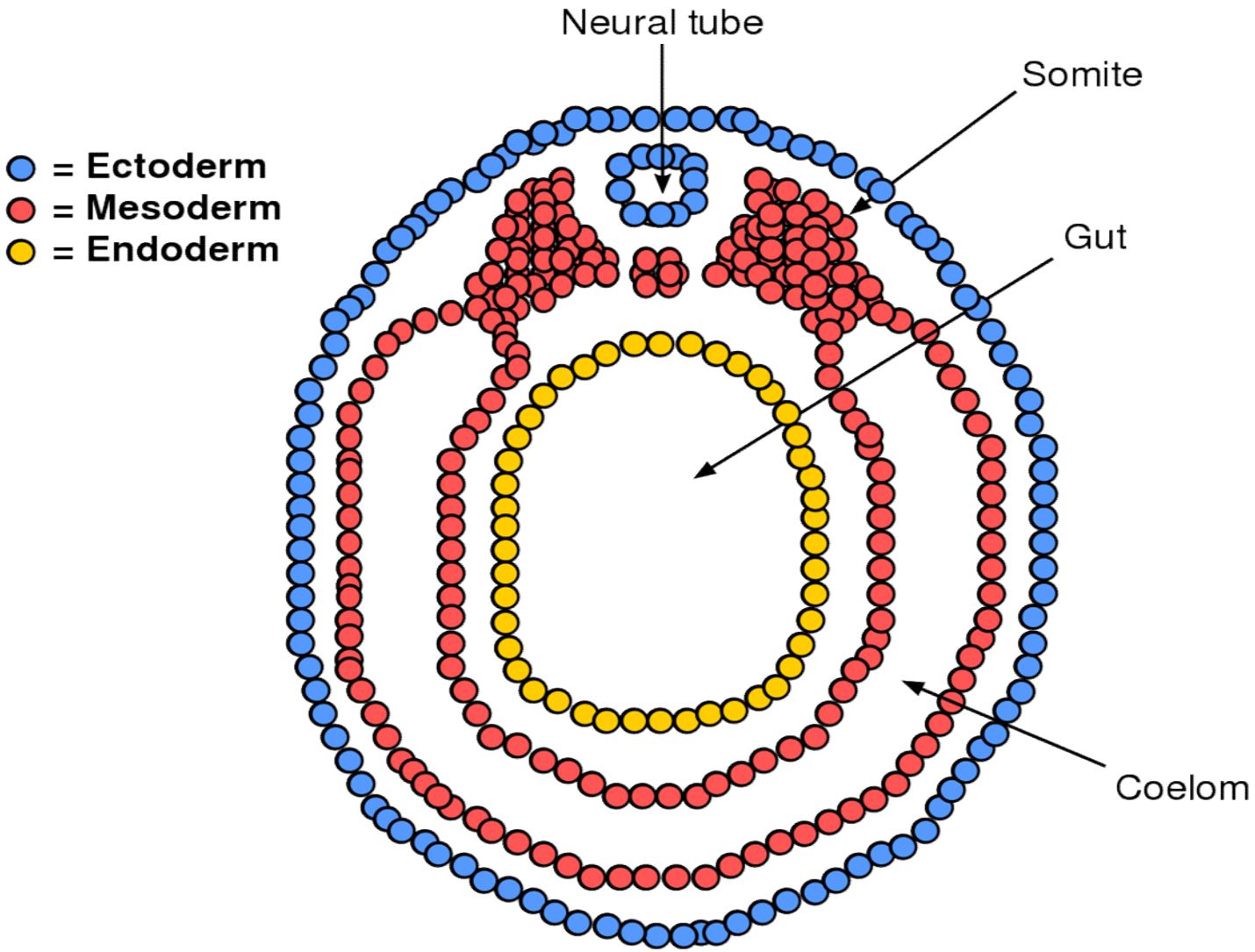


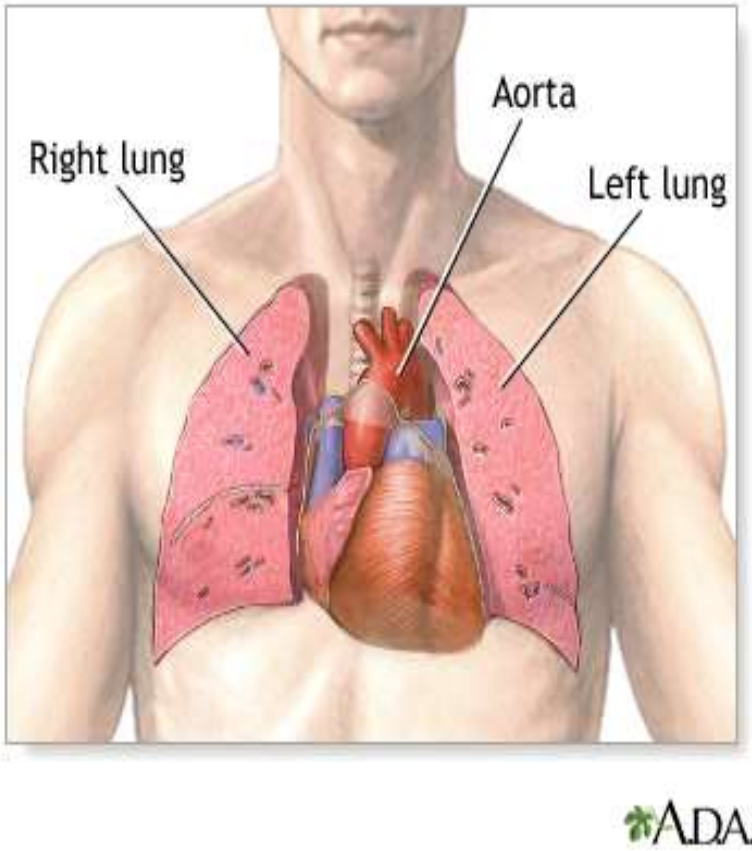
3. Lateral plate mesoderm :

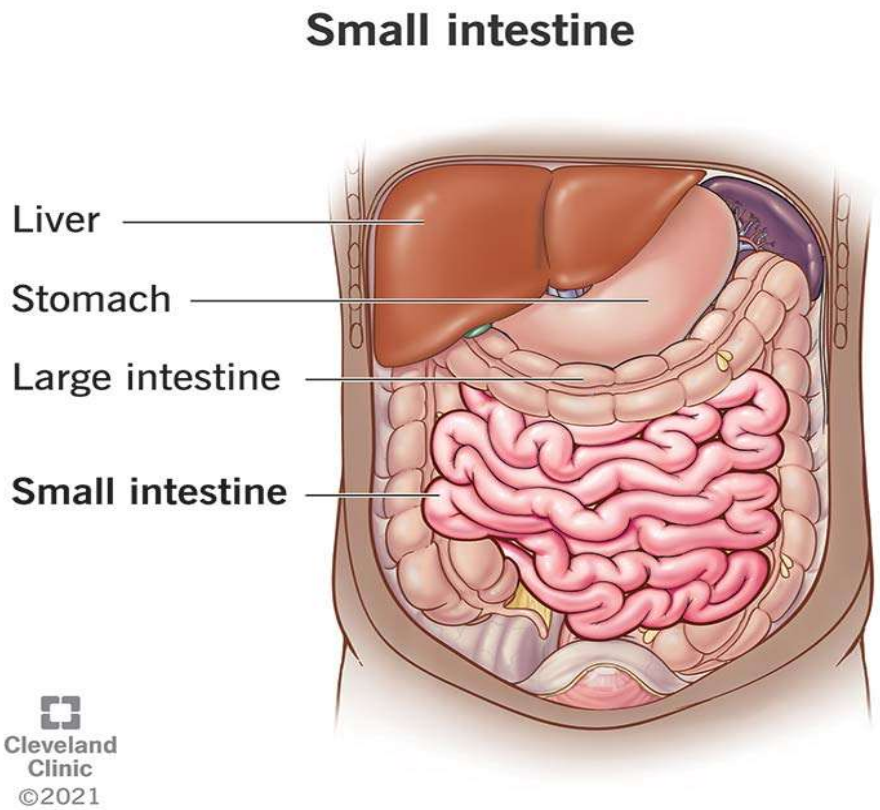
Small spaces , appear in the lateral plate of mesoderm , which form a cavity in this plate called the intraembryonic coelomic cavity

It is in the form of an inverted U with a central part and 2 limbs on the sides of embryo.

- The central part will form the pericardial cavity.
- The cranial part of the 2 limbs will form the 2 pleural cavity.
- The caudal part of the 2 limbs will form the peritoneal cavity .


= Ectoderm
= Mesoderm
= Endoderm
Neural tube
Somite
Gut
Coelom


Aorta
Right lung
Left lung
A.D.A.M.


Small intestine
Liver
Stomach
Large intestine
Small intestine
Cleveland Clinic
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The intraembryonic coelomic cavity **divides the lateral plate mesoderm** into:

The somatic mesoderm:

1-It becomes adherent to ectoderm to forms the striated muscles and connective tissue of the **lateral & ventral aspect of body wall** .

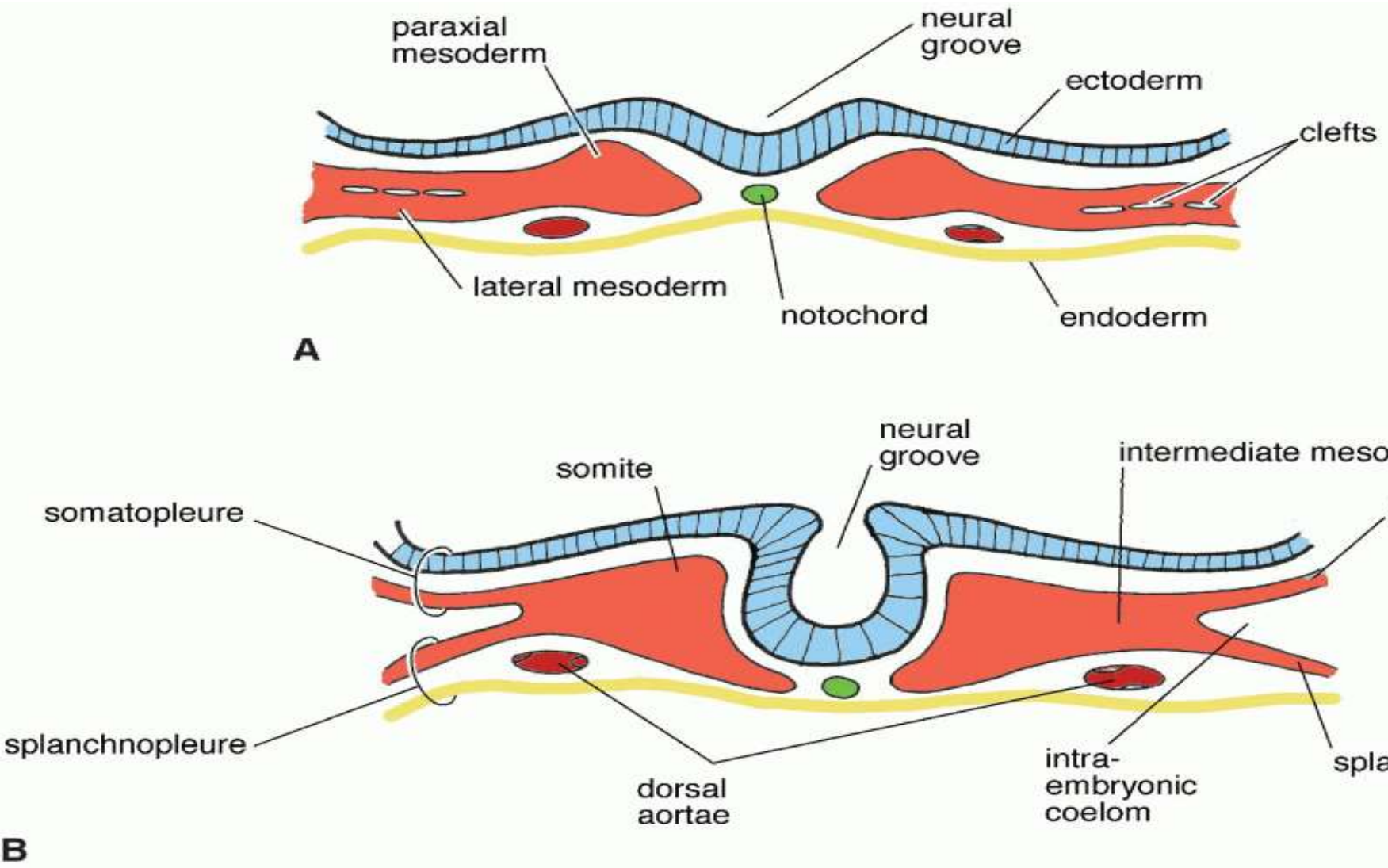
2-Parietal layers of **serous membranes** (pericardial ,pleural and peritoneum)

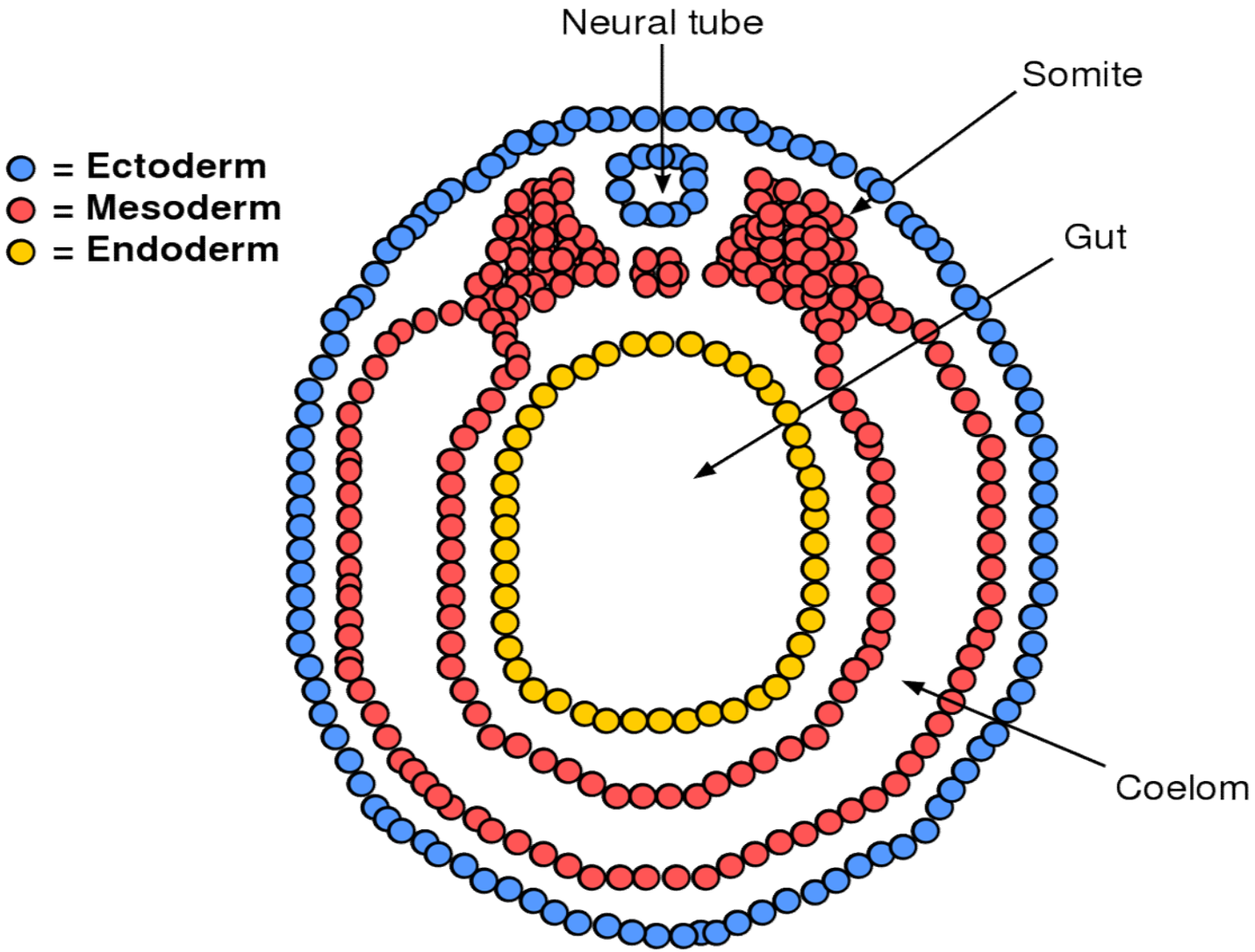
The splanchnic mesoderm:

1-It becomes adherent to endoderm to forms the smooth muscles and connective tissue of the **gut & respiratory system .**

2-Cardiac muscles .

3-Visceral layer of **serous membranes** (pericardial ,pleural and peritoneum)


paraxial mesoderm
neural groove
ectoderm
clefts
lateral mesoderm
notochord
endoderm
A
somite
neural groove
intermediate mesoderm
somatopleure
somatic mesoderm
splanchnopleure
dorsal aortae
intra-embryonic coelom
splanchnic mesoderm
B


= Ectoderm
= Mesoderm
= Endoderm
Neural tube
Somite
Gut
Coelom

Three Germ Layers

Ectoderm

1-The epidermis of the skin

2. Nervous system :

- ***The neural tube*** gives brain , spinal cord Peripheral nerves.
- ***Sensory*** epithelium of sensory organs

3. External auditory meatus & outer layer of ear drum .
4. Nasal epithelium
5. Anterior part of oral cavity and lower ½ of anal canal .

Neural crest

1.Ganglia

2.Cells : Glial and melanocyte cells

3.Adrenal medulla

4.Septum between ascending aorta & pulmonary trunk

Endoderm

1- Epithelium lining of

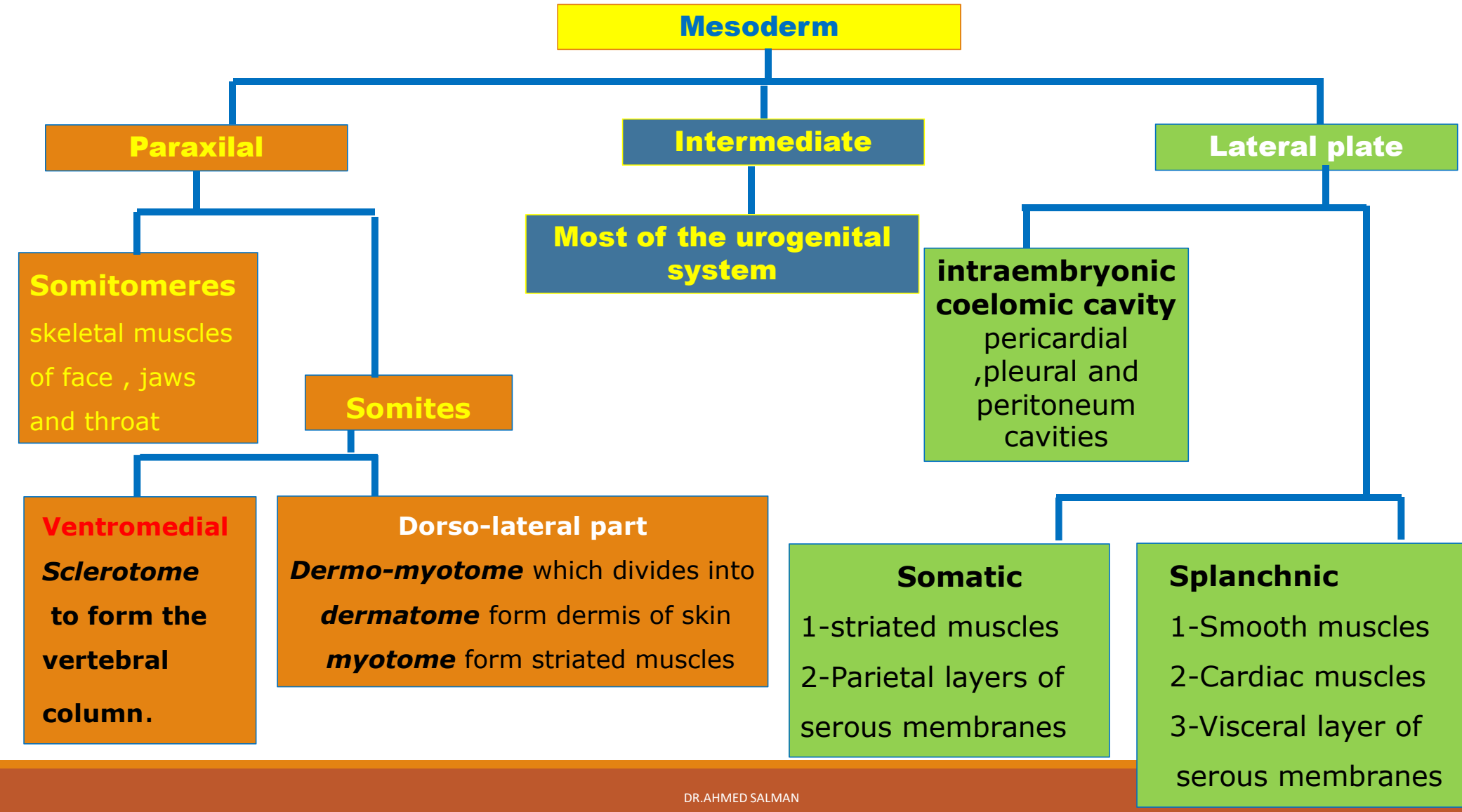
A. Most of GIT

B. Most of urinary bladder and urethra

C. Middle ear and Eustachian tube

2-Parenchyma of

Palatine tonsils, thyroid, Liver & pancreas


Mesoderm
Paraxilal
Intermediate
Lateral plate
Somitomeres
skeletal muscles of face , jaws and throat
Somites
Most of the urogenital system
intraembryonic coelomic cavity
pericardial ,pleural and peritoneum cavities
Ventromedial
Sclerotome
to form the vertebral column.
Dorso-lateral part
Dermo-myotome which divides into
dermatome form dermis of skin
myotome form striated muscles
Somatic
1-striated muscles
2-Parietal layers of serous membranes
Splanchnic
1-Smooth muscles
2-Cardiac muscles
3-Visceral layer of serous membranes


THANK YOU