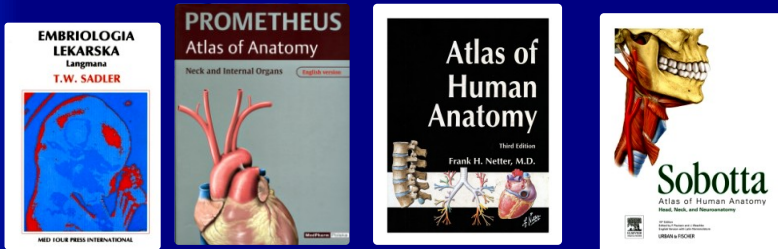


Rozwój serca



Układ sercowo naczyniowy rozwija się jako pierwszy spośród dużych układów już około połowy trzeciego tygodnia rozwoju.

Samo serce funkcjonuje od początku czwartego tygodnia.

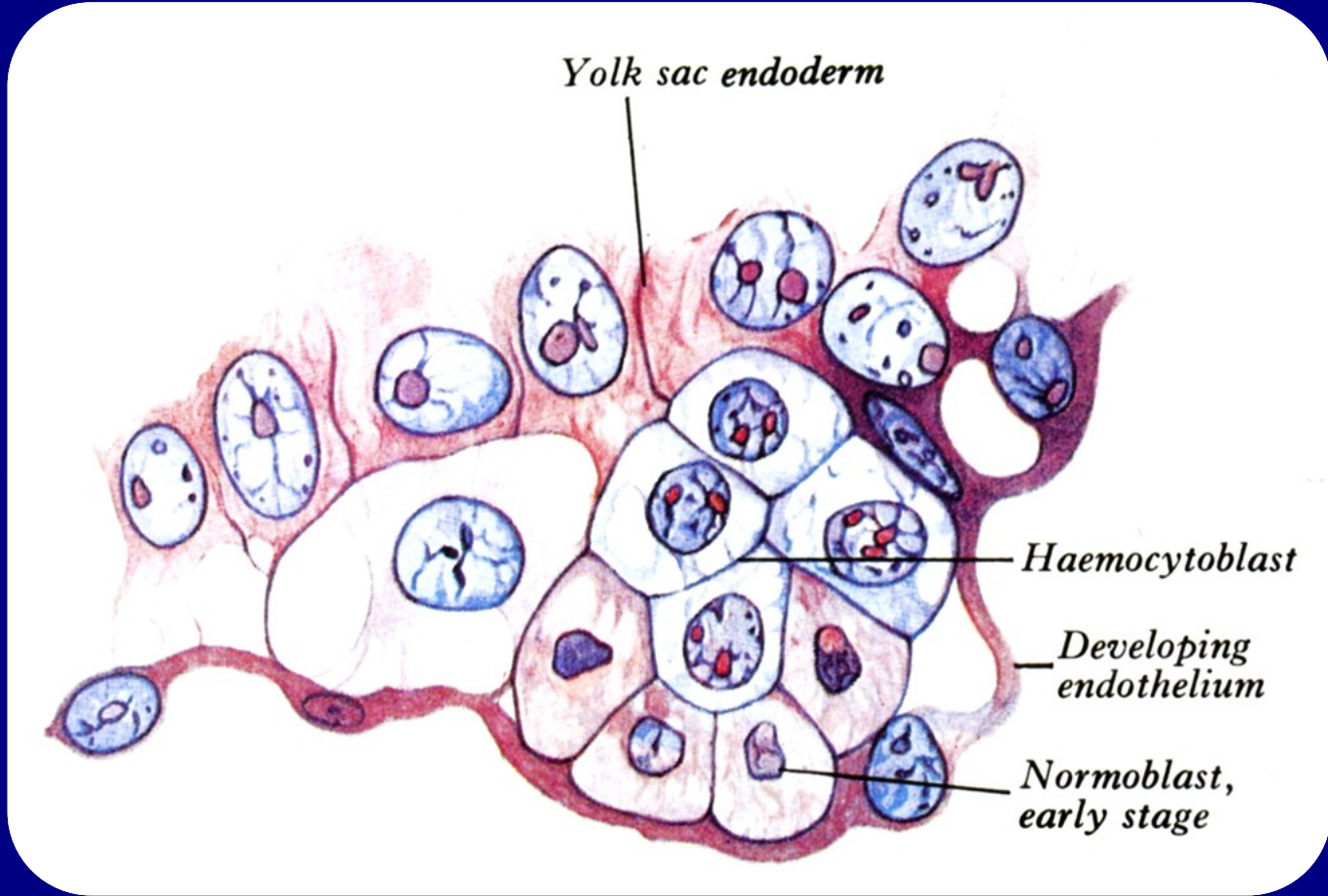
Jakie są powody tak wczesnego rozwoju
układu sercowo-naczyniowego?

Rozwijający się zarodek nie jest w stanie pozyskiwać materiałów odżywczych na drodze prostej dyfuzji.

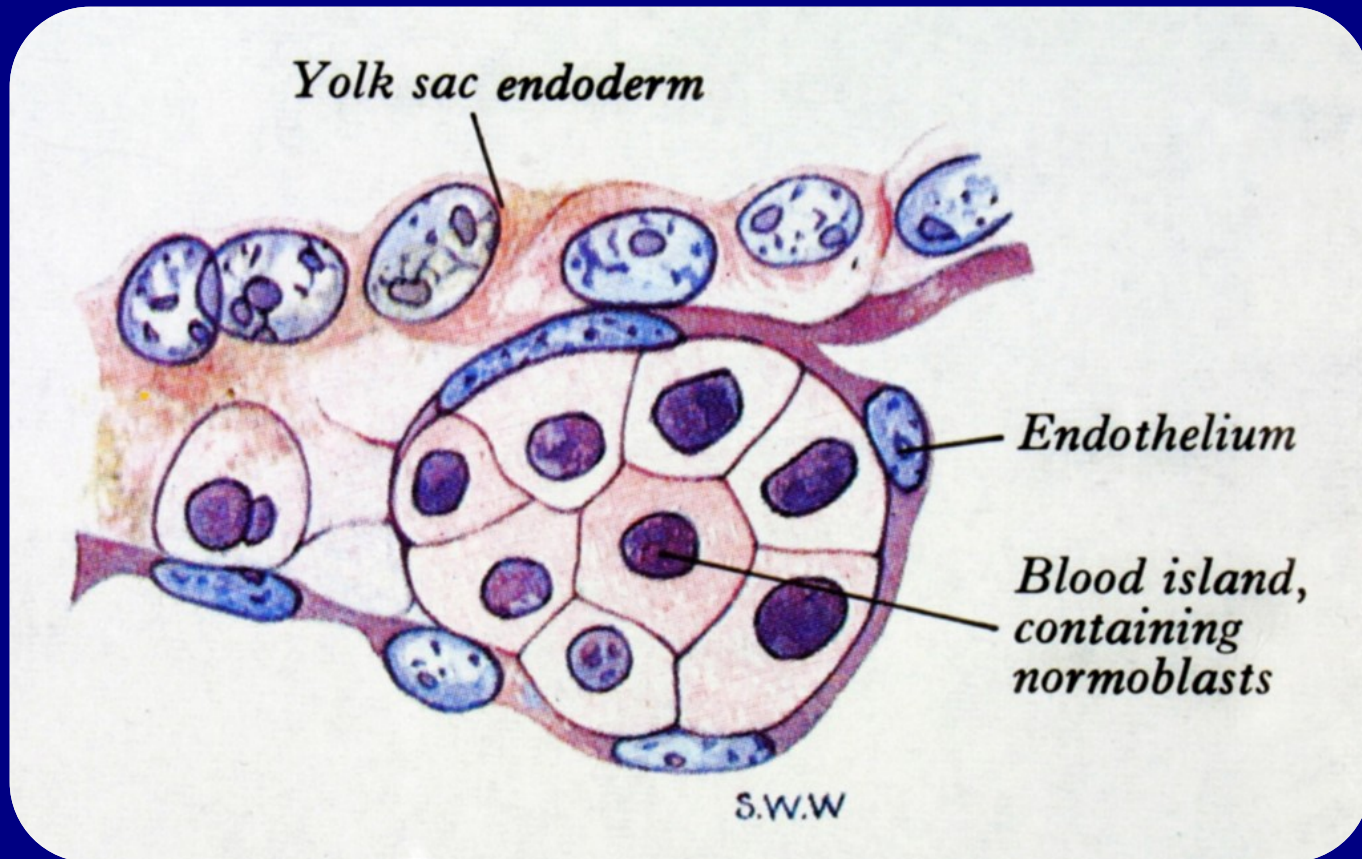
W konsekwencji wzrasta zapotrzebowanie na efektywniejsze sposoby uzyskiwania tlenu i materiałów odżywczych z krwi matki, a także wydalanie dwutlenku węgla i produktów przemiany materii.

Układ sercowo-naczyniowy rozwija się z:

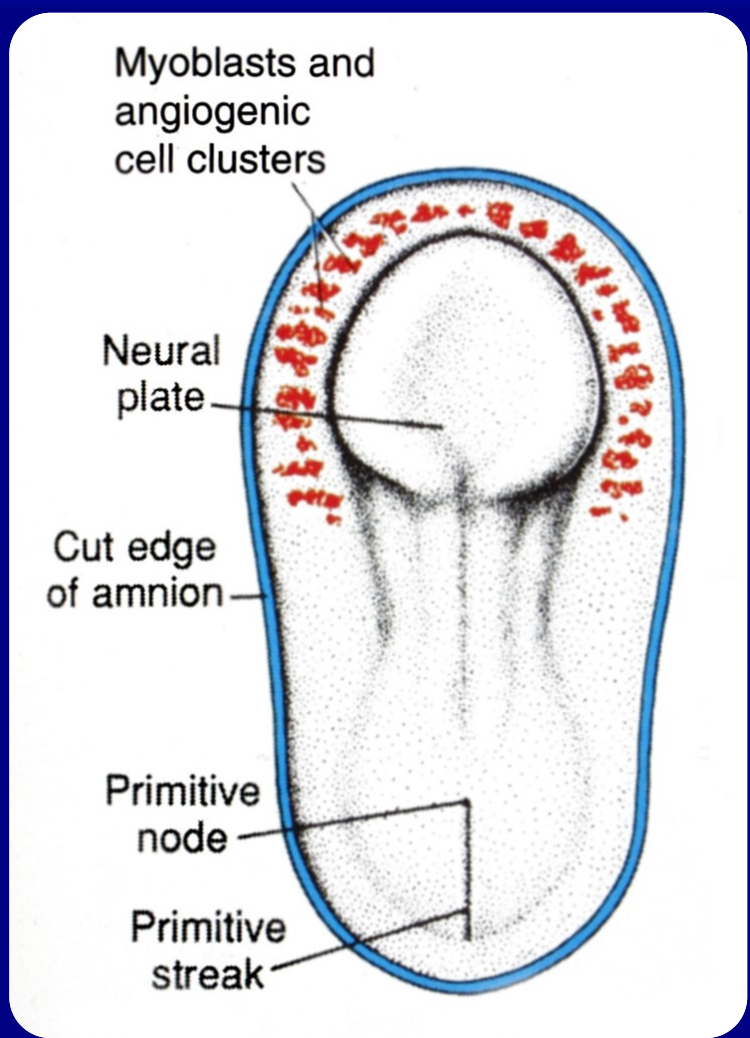
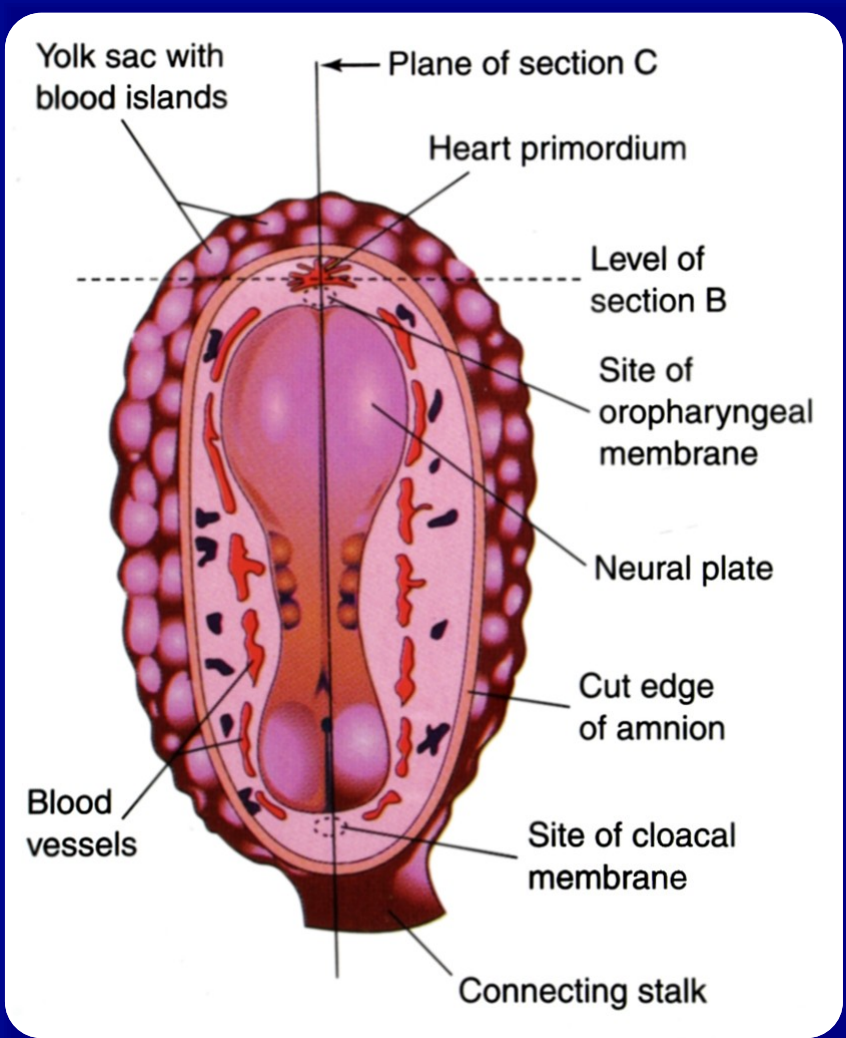
1. mezodermy trzewnej (tworzącej zawiązek serca)
2. przyosiowej i bocznej mezodermy
3. komórek grzebieni nerwowych



Part of the section through the wall of the yolk sac of an early human embryo, to show an early stage in the differentiation of angioblastic tissue.



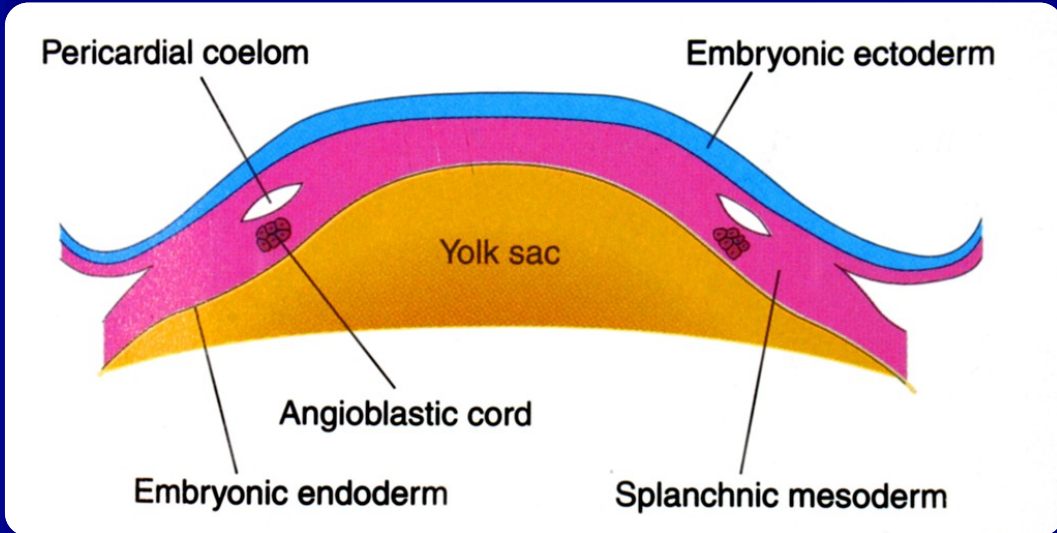
Part of the section through the wall of the yolk sac of an early human embryo, to show a developing blood vessel including a blood island.



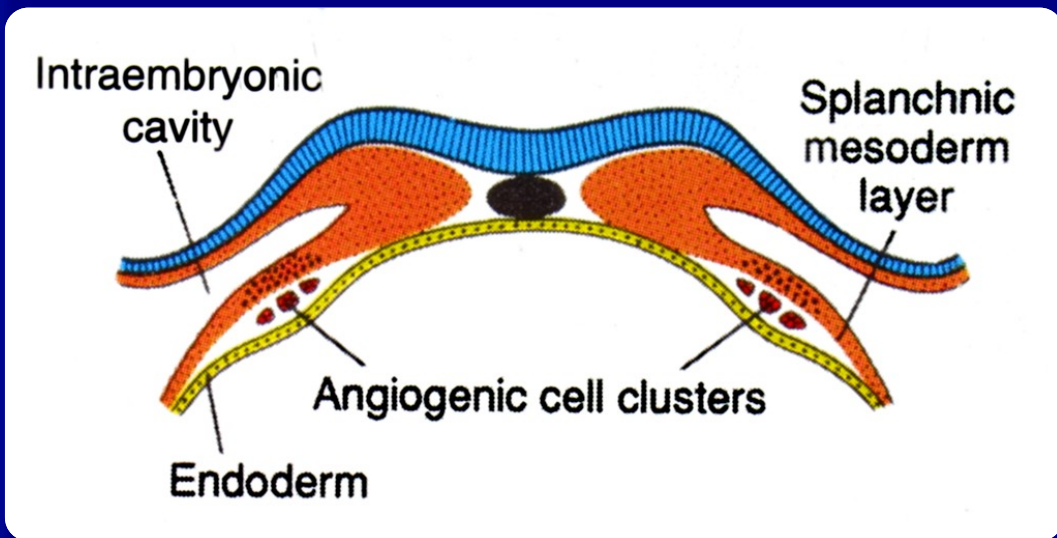
Dorsal view of a late presomite embryo (approximately 18 days) after removal of the amnion.

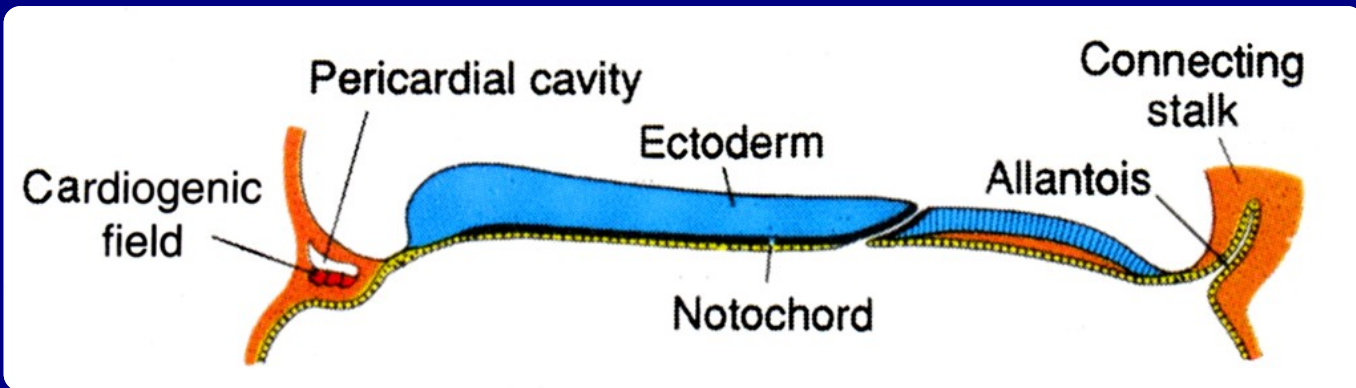
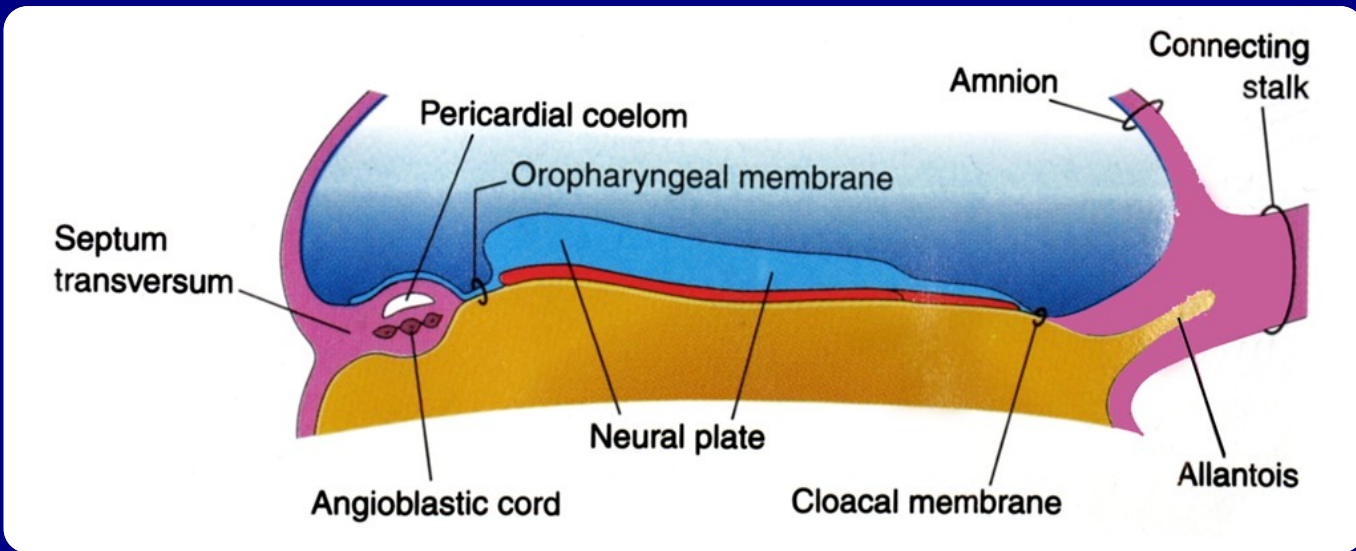
Waskulogeneza – proces powstawania naczyń krwionośnych z prekursorów (np. wysepek krwiotwórczych);

Angiogeneza – powstawanie sieci naczyń z już istniejących naczyń prekursorowych.

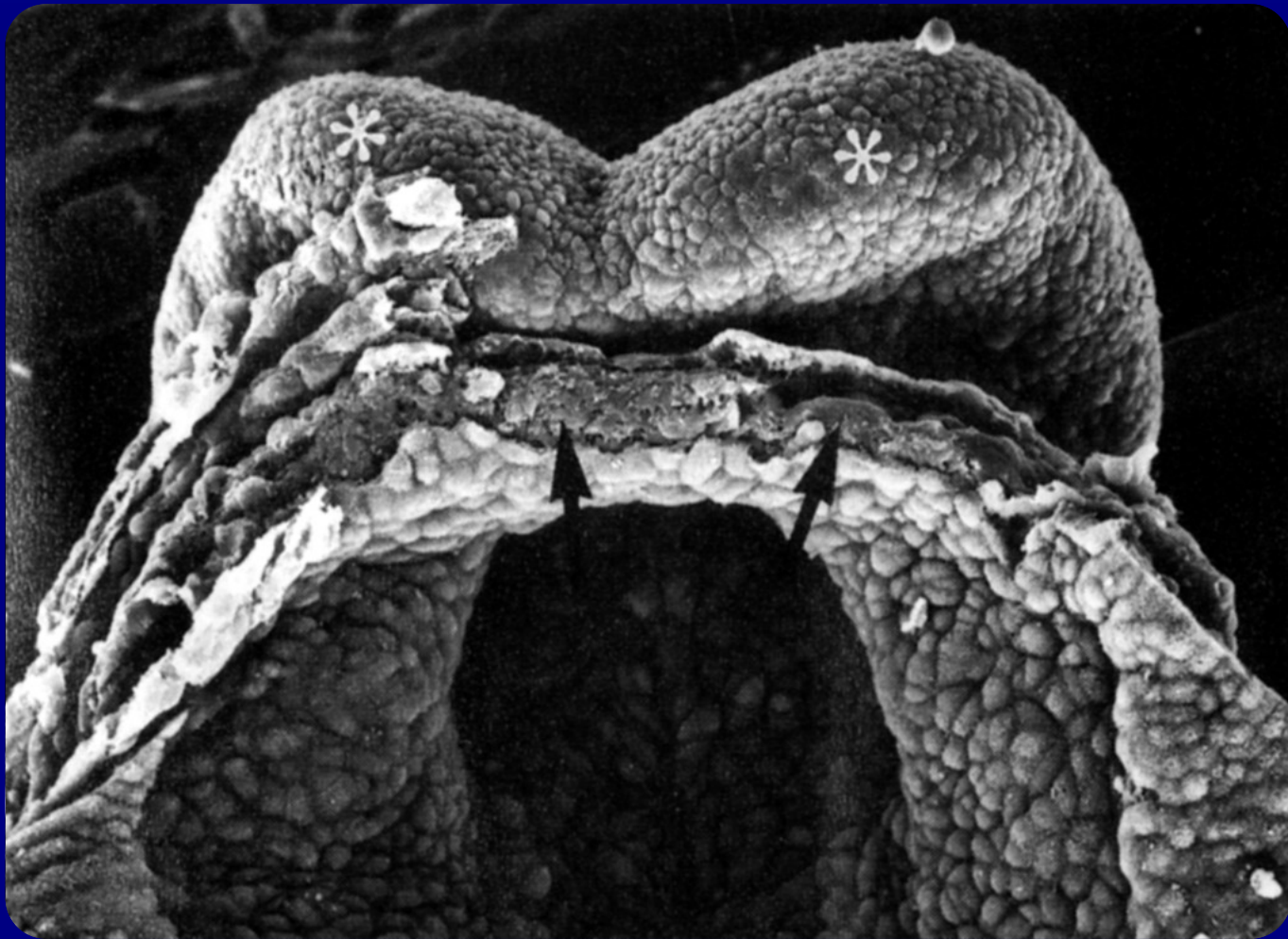


Transverse section through a similar-staged embryo to show the position of the angiogenic cell clusters in the splanchnic mesoderm layer.





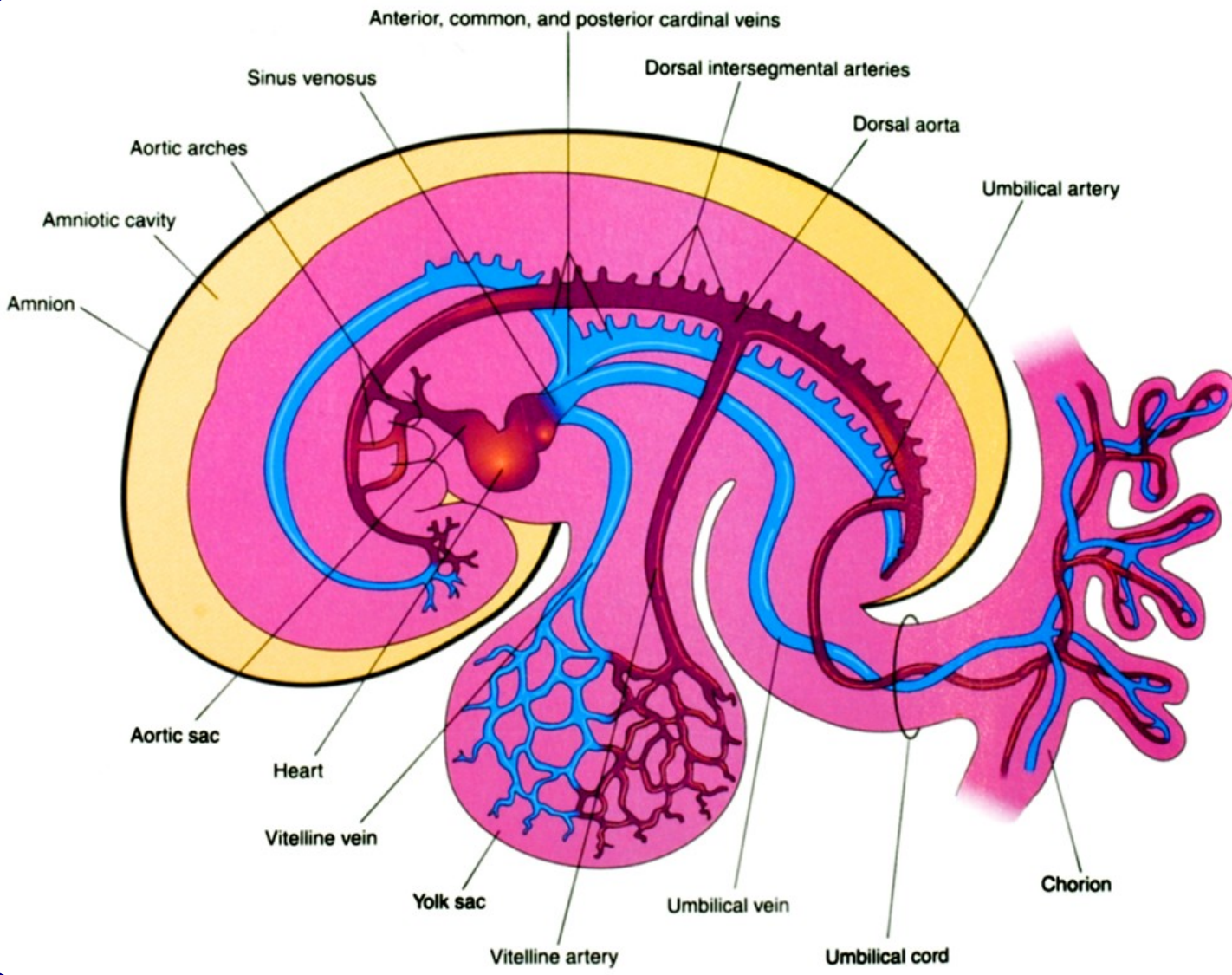
Cephalocaudal section through a similar-staged embryo to showing the position of the pericardial cavity and cardiogenic field.



Scanning electron micrograph of a mouse embryo equivalent to 19 days in the human, showing coalescence of the angiogenic cells into a horseshoe shaped heart tube (arrows) lying in the primitive pericardial cavity under the cranial neural folds (asterisks).

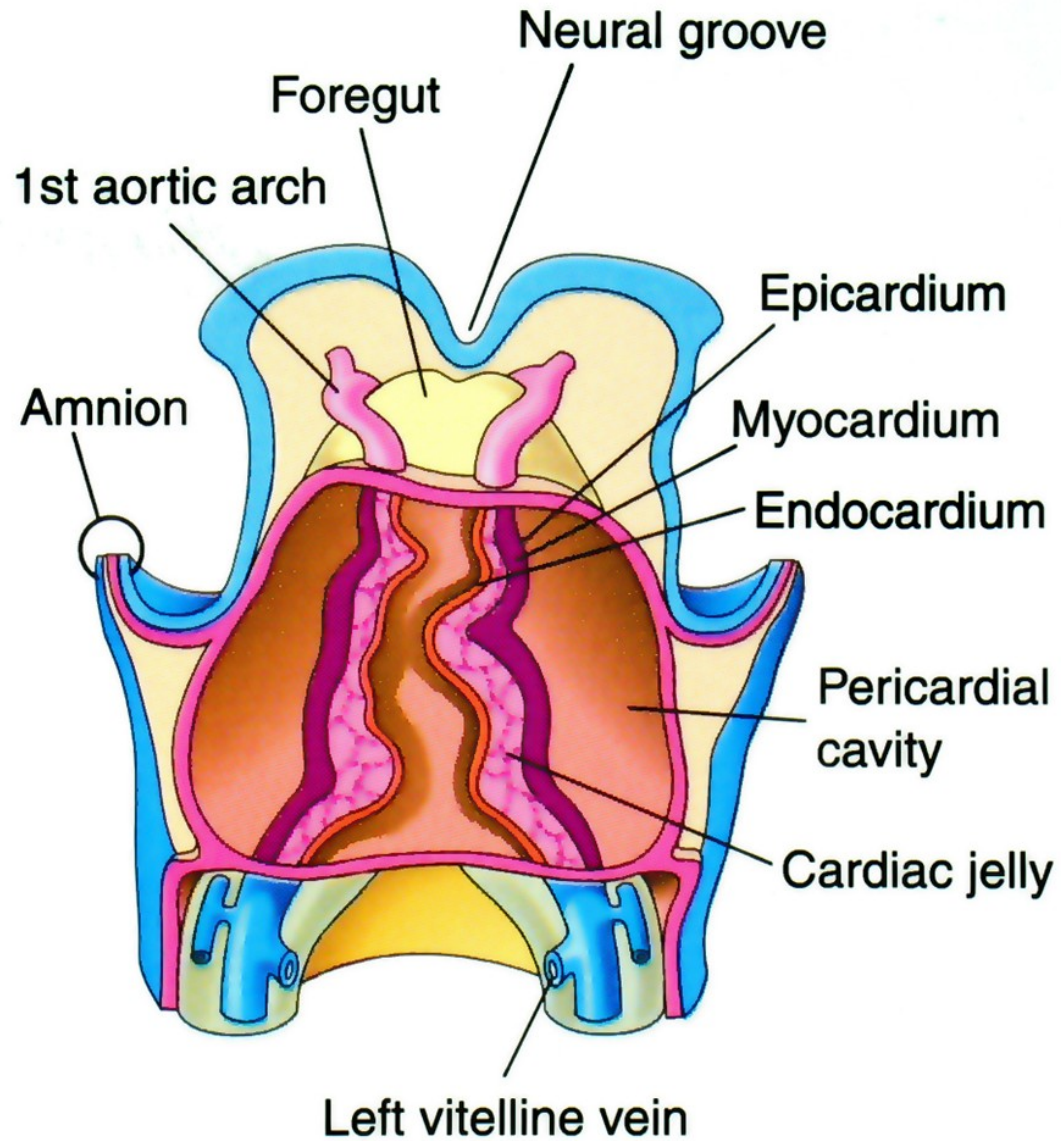
Trzy pary żył uchodzą do zawiązka serca:

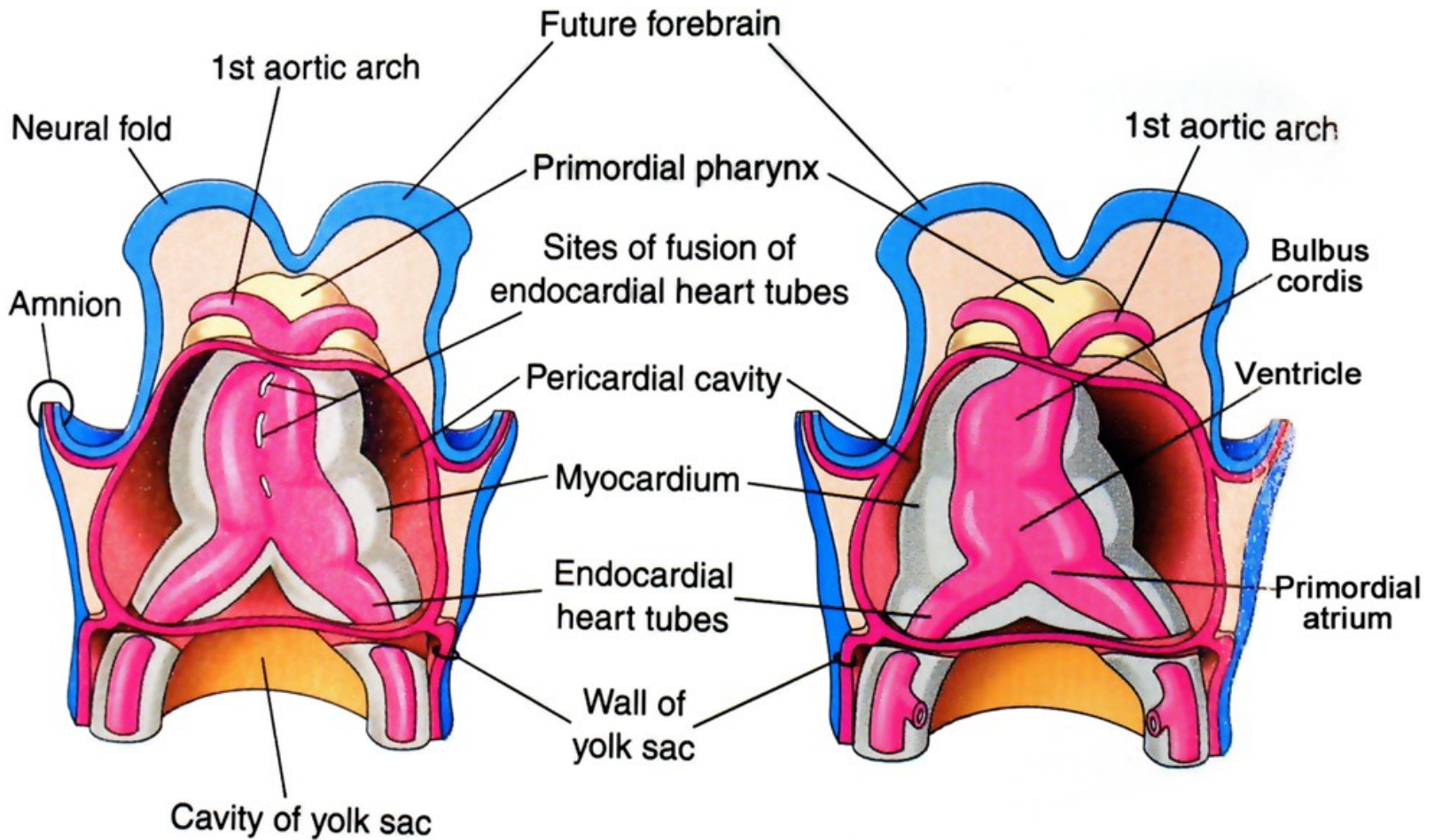
- żyły żółtkowe
- żyły pępkowe
- żyły zasadnicze wspólne

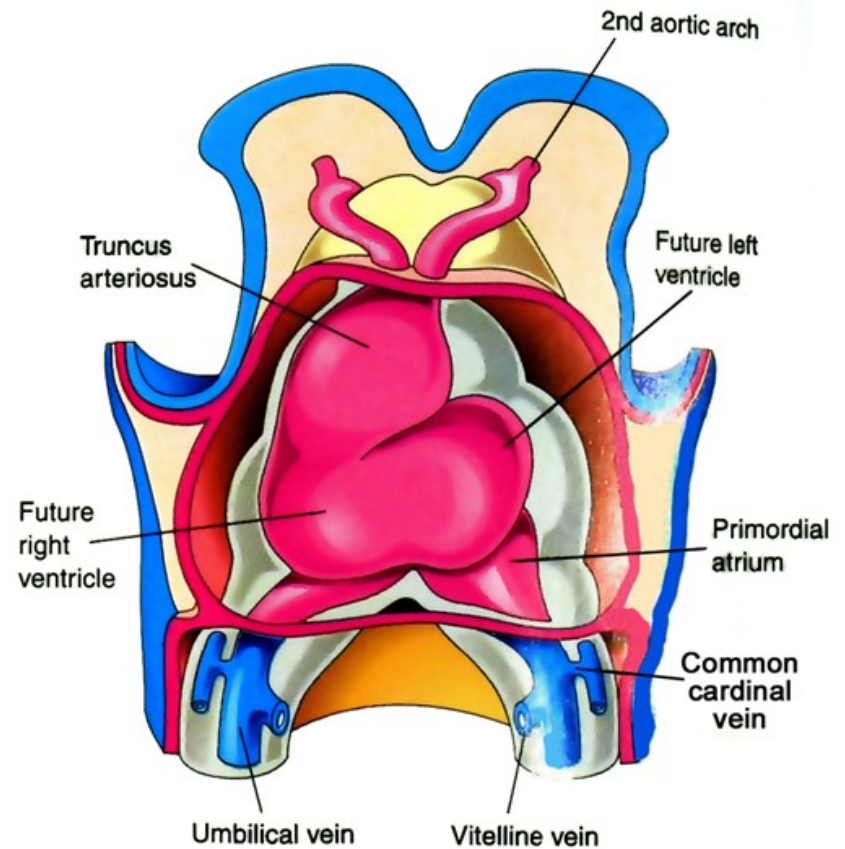
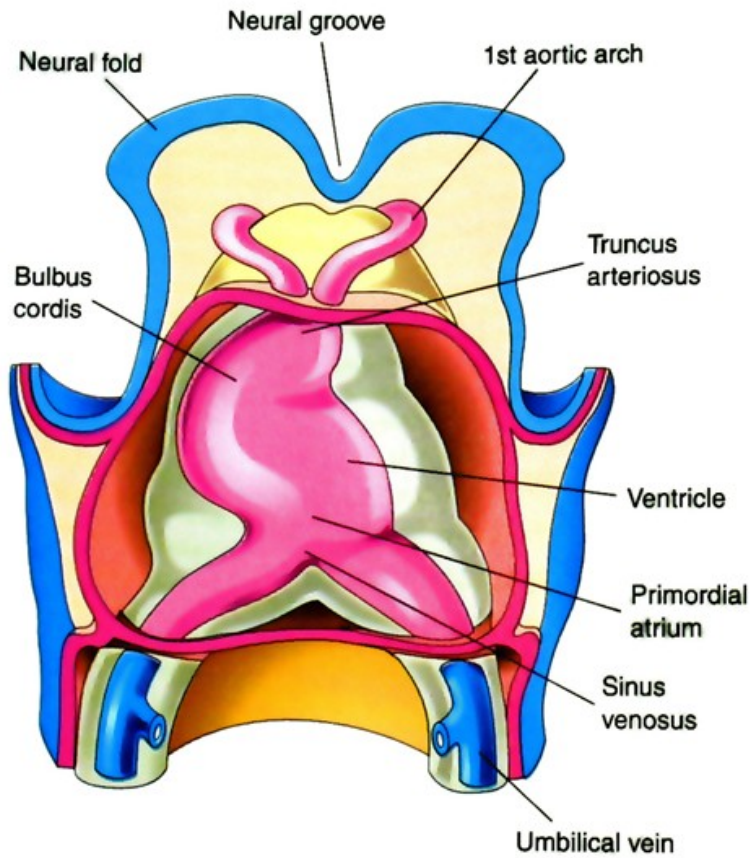


Sketch of the embryonic cardiovascular system (about 26 days) showing vessels on the left side only.

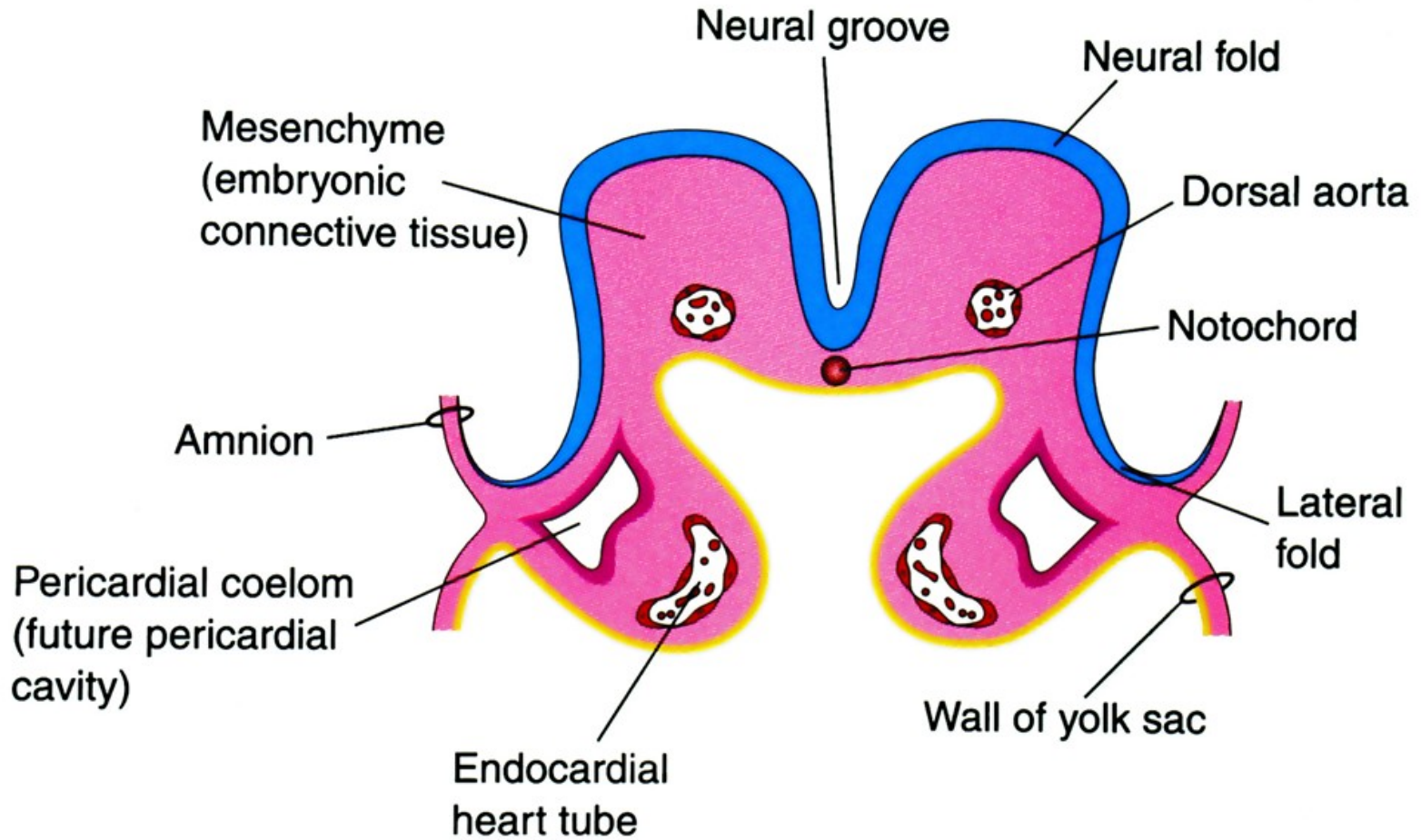
Po raz pierwszy zawiązek serca pojawia się
ok. 18. dnia rozwoju.

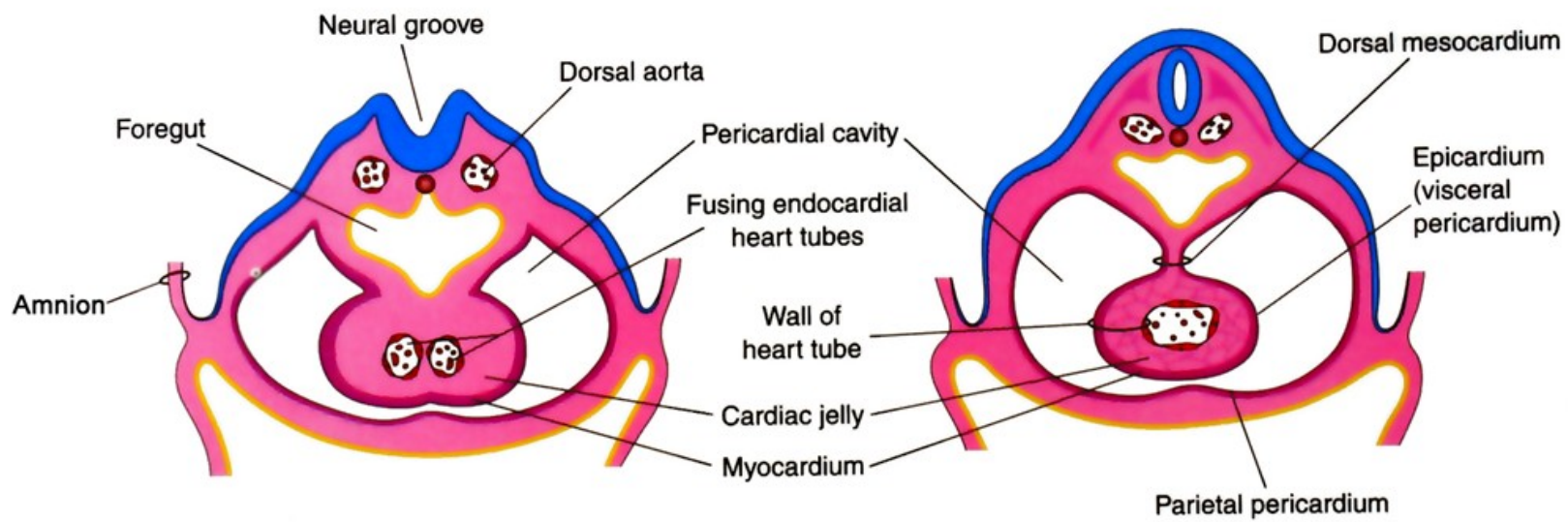






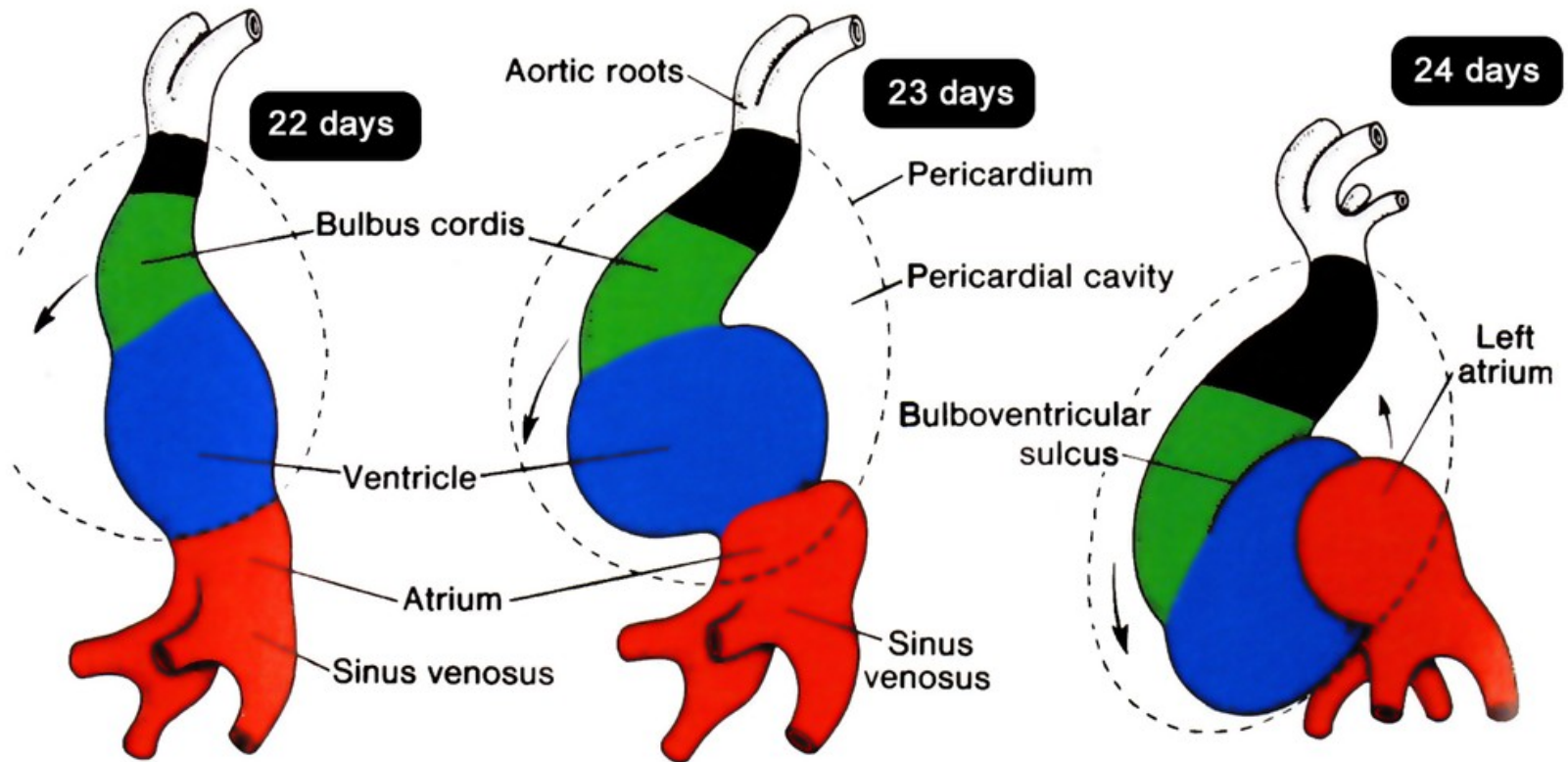
As the heart elongates, it bends upon itself, forming an S-shaped heart.





Cewa sercowa składa się początkowo z pięciu poszerzeń:

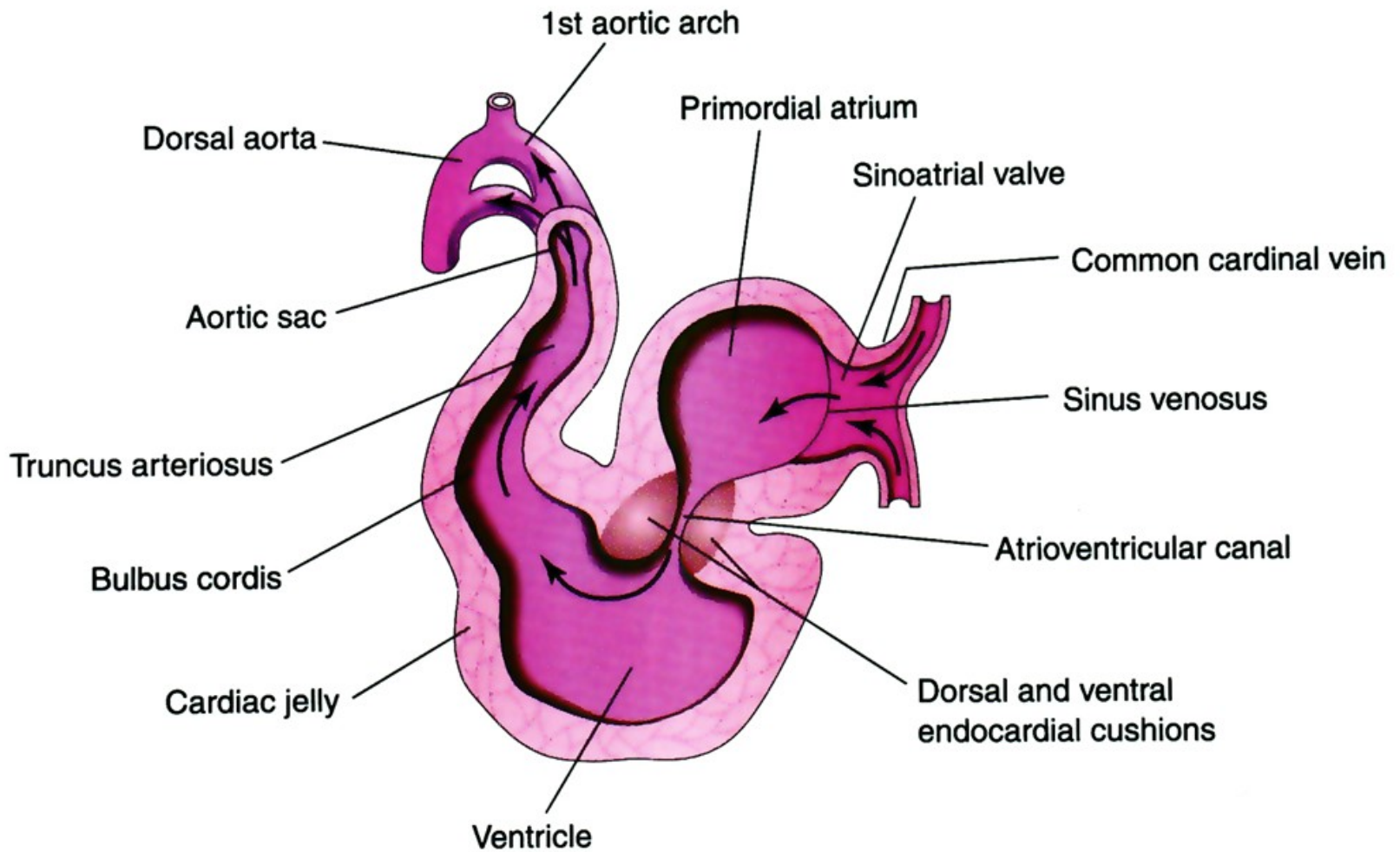
- zatoki żyłnej
- wspólnego przedsionka
- wspólnej komory
- opuszki serca
- wspólnego pnia tętniczego

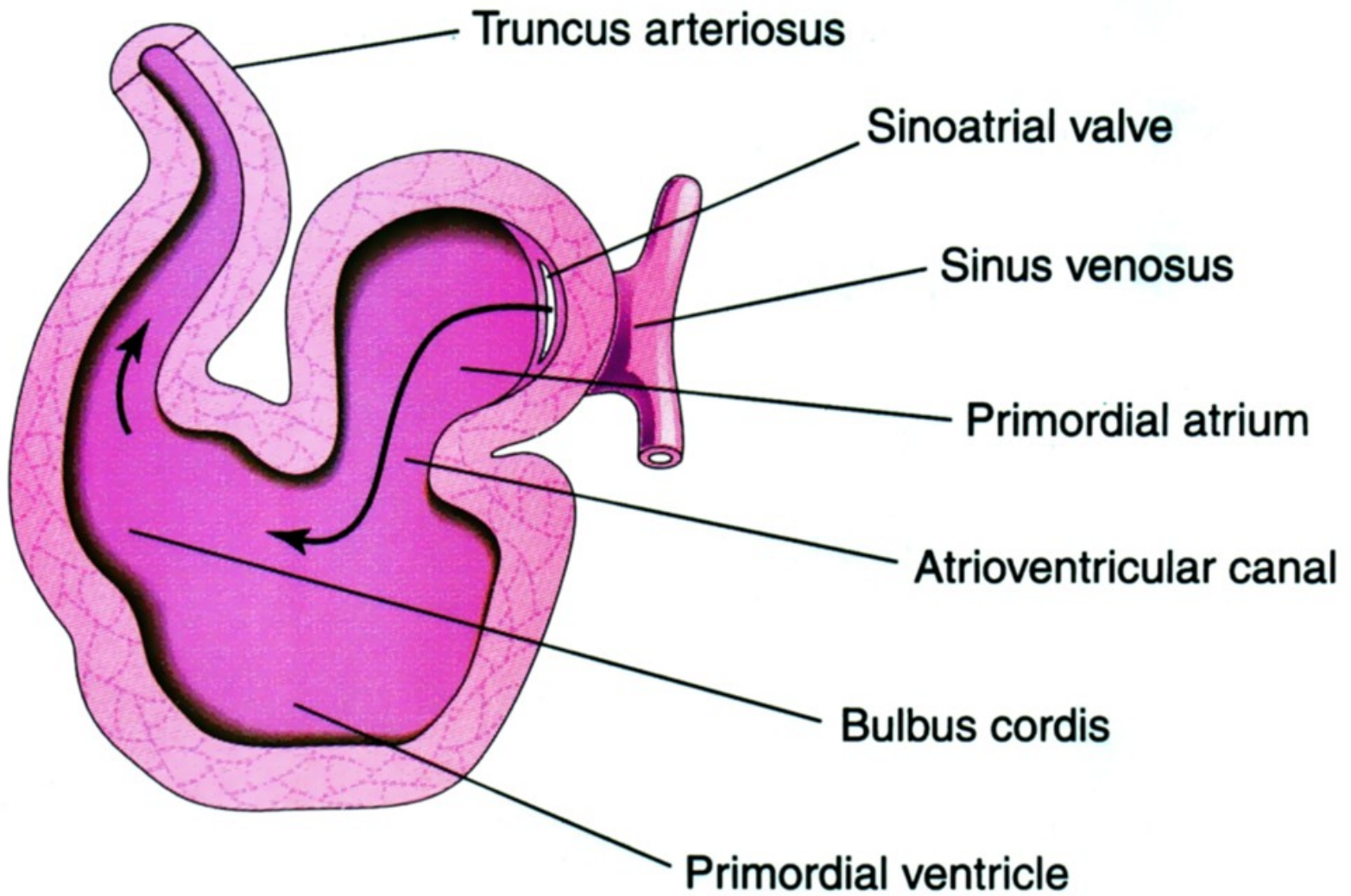


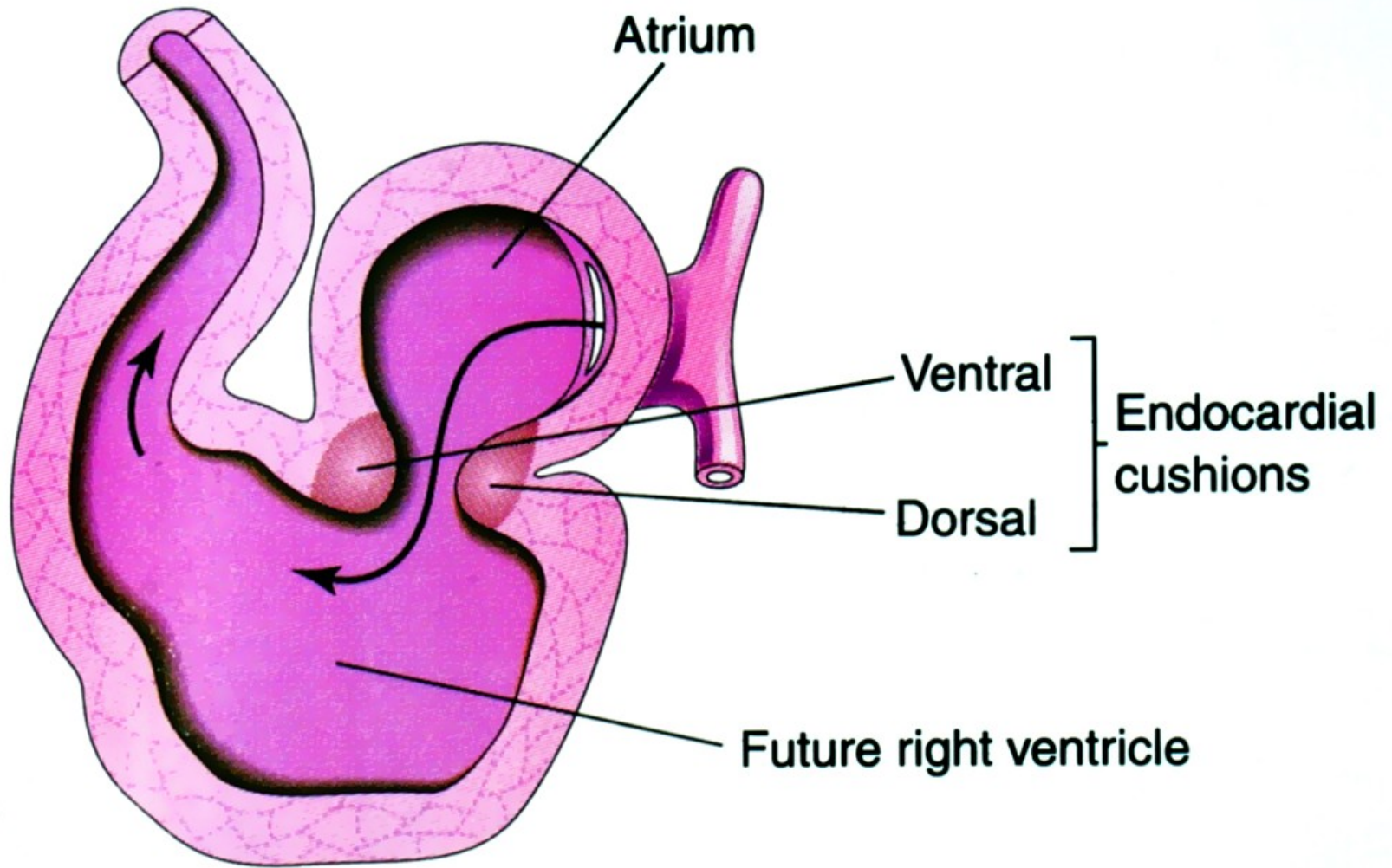
Formation of the cardiac loop.

Podział

kanału przedsionkowo-komorowego







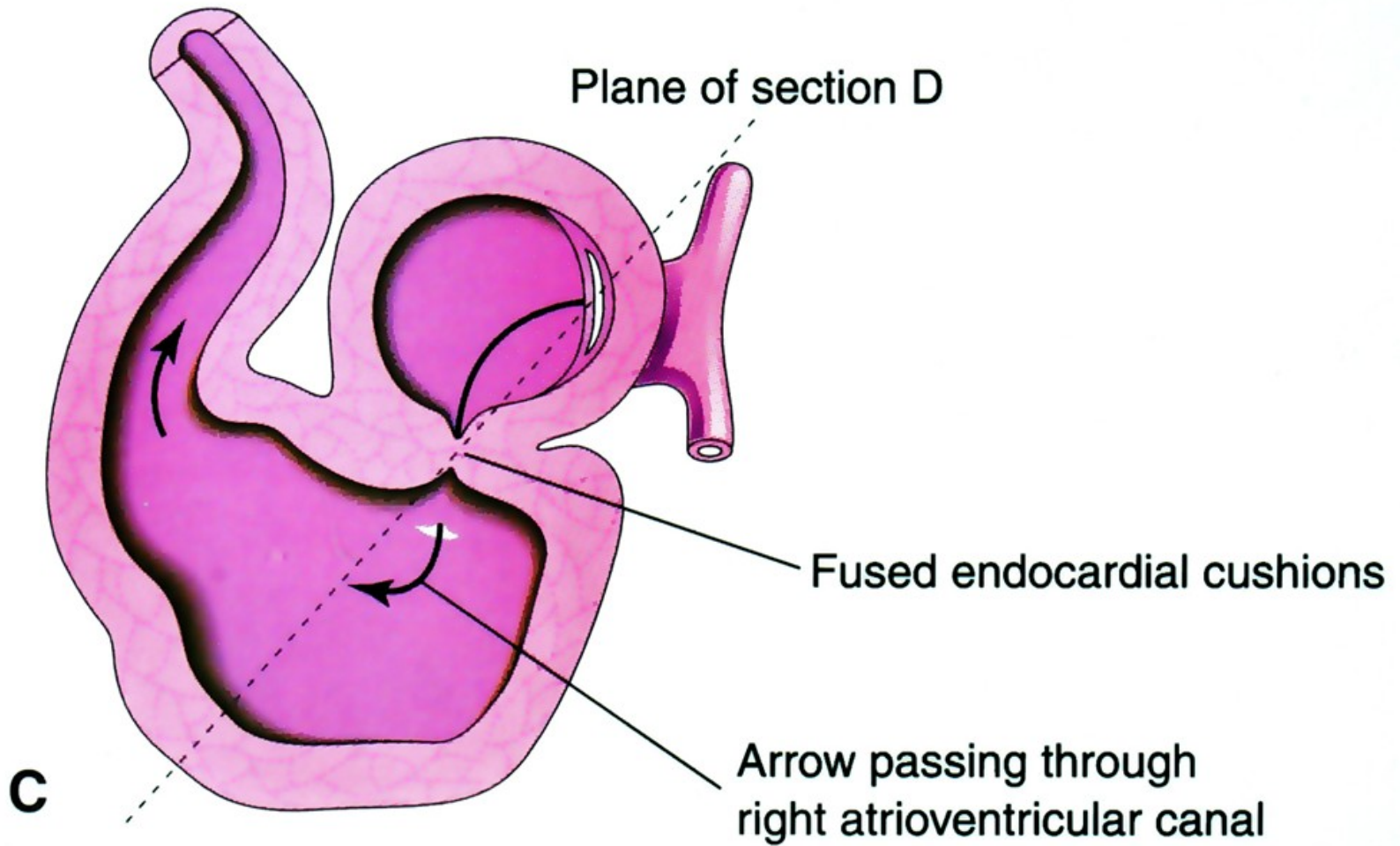
Atrium

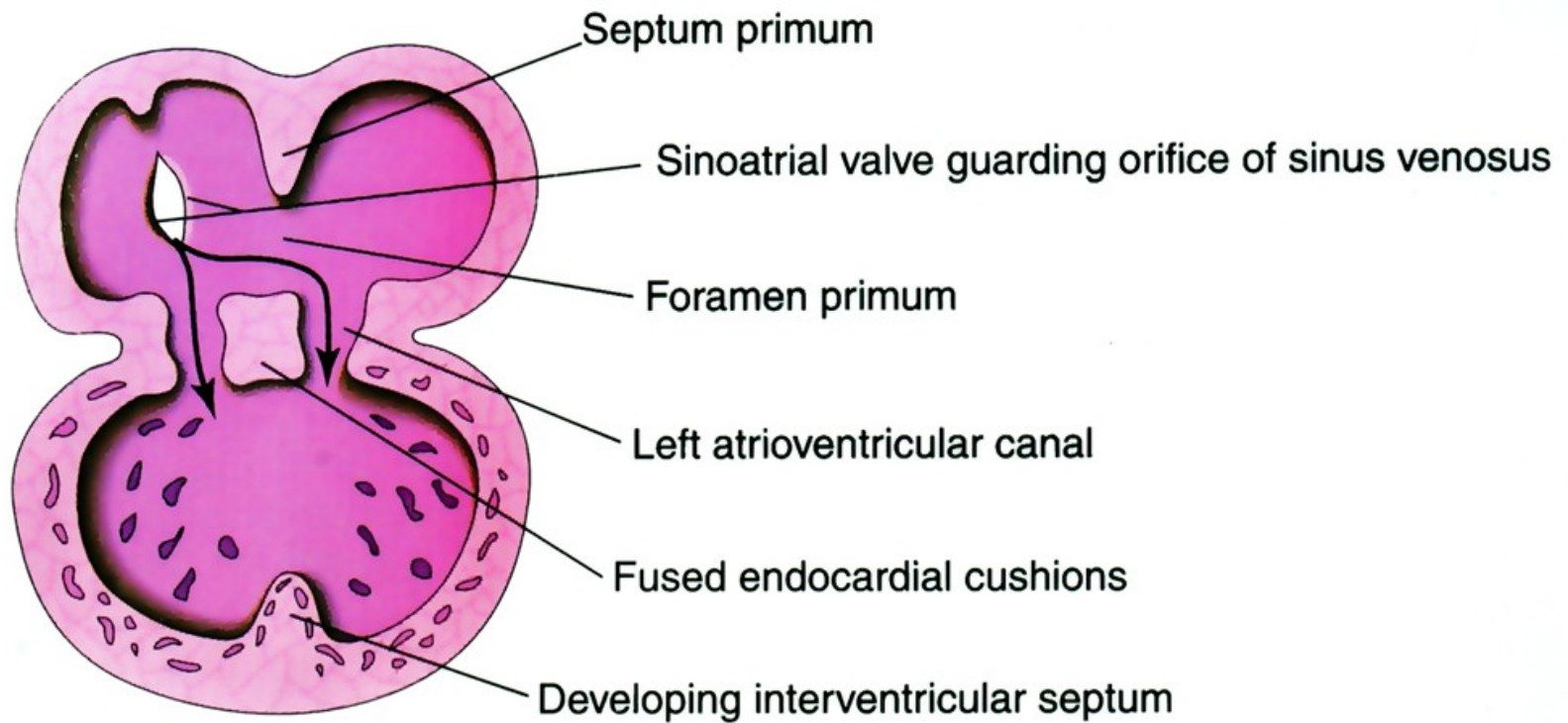
Ventral

Endocardial
cushions

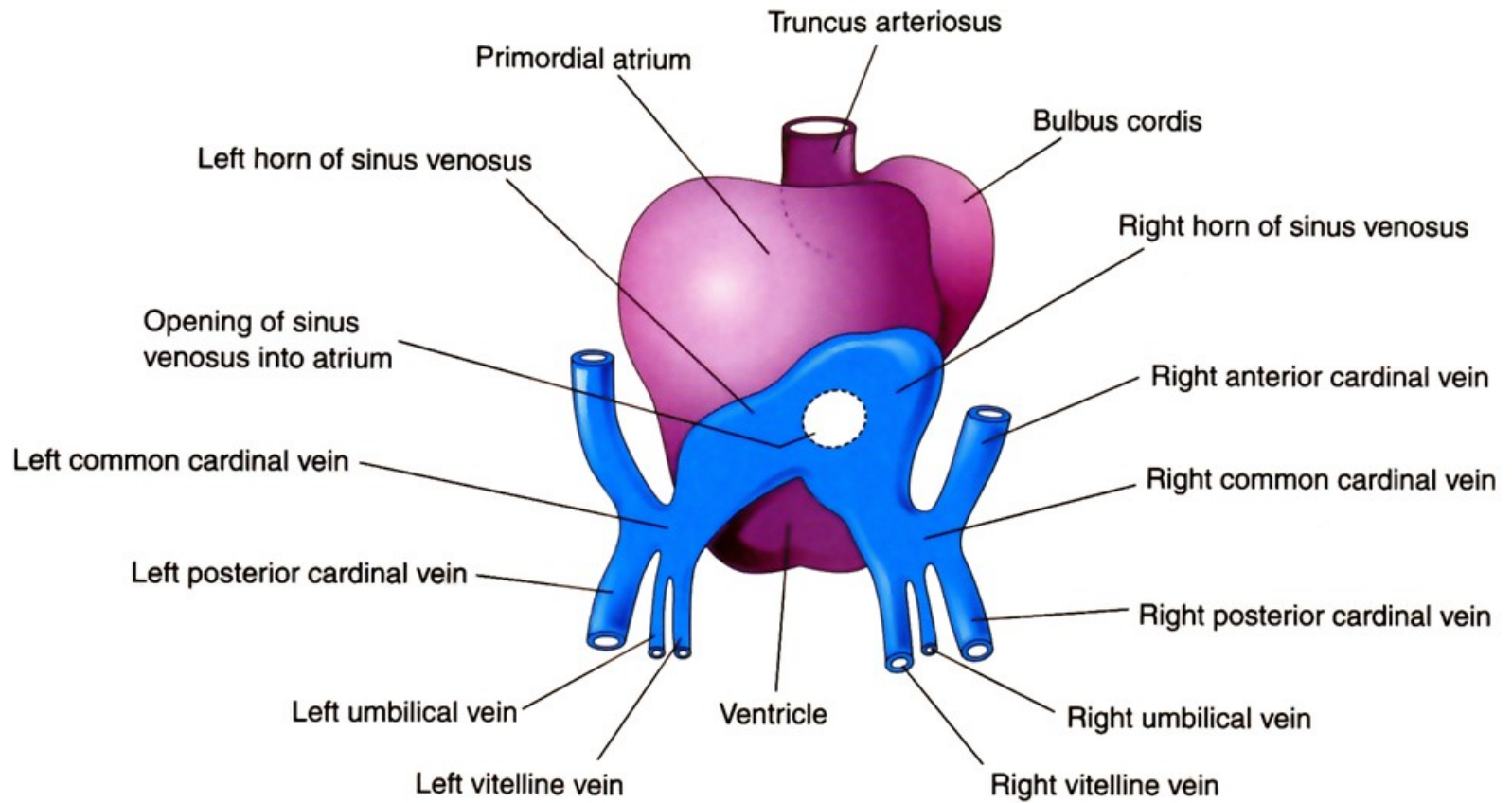
Dorsal

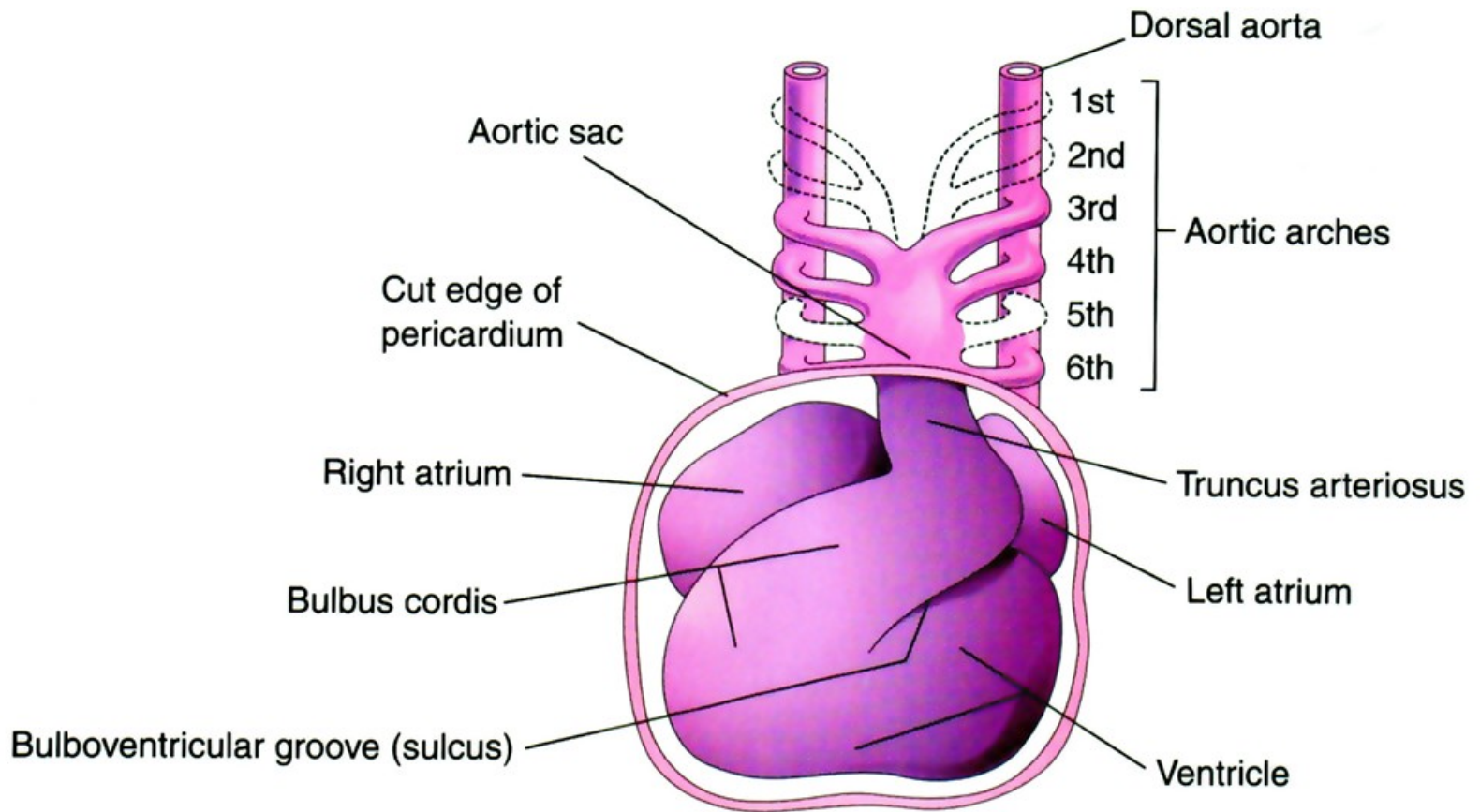
Future right ventricle

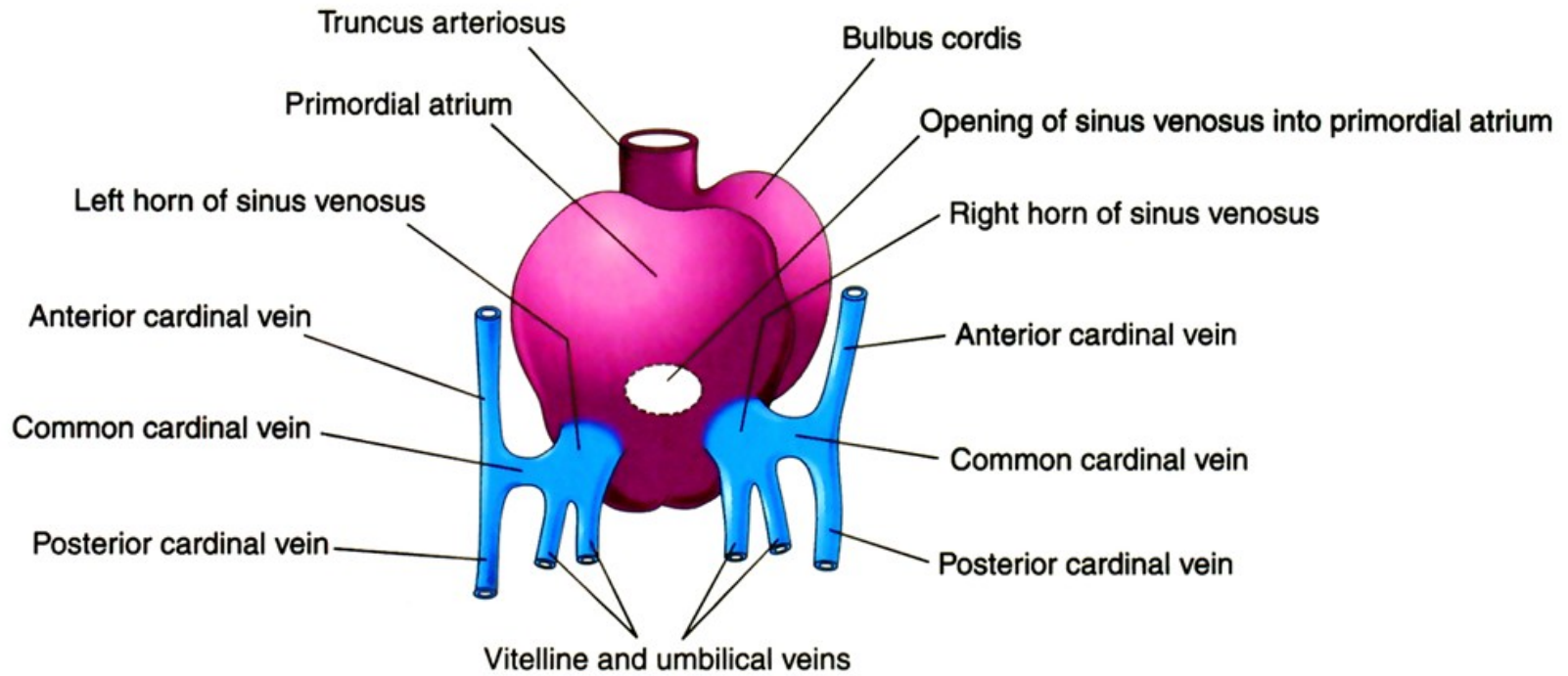


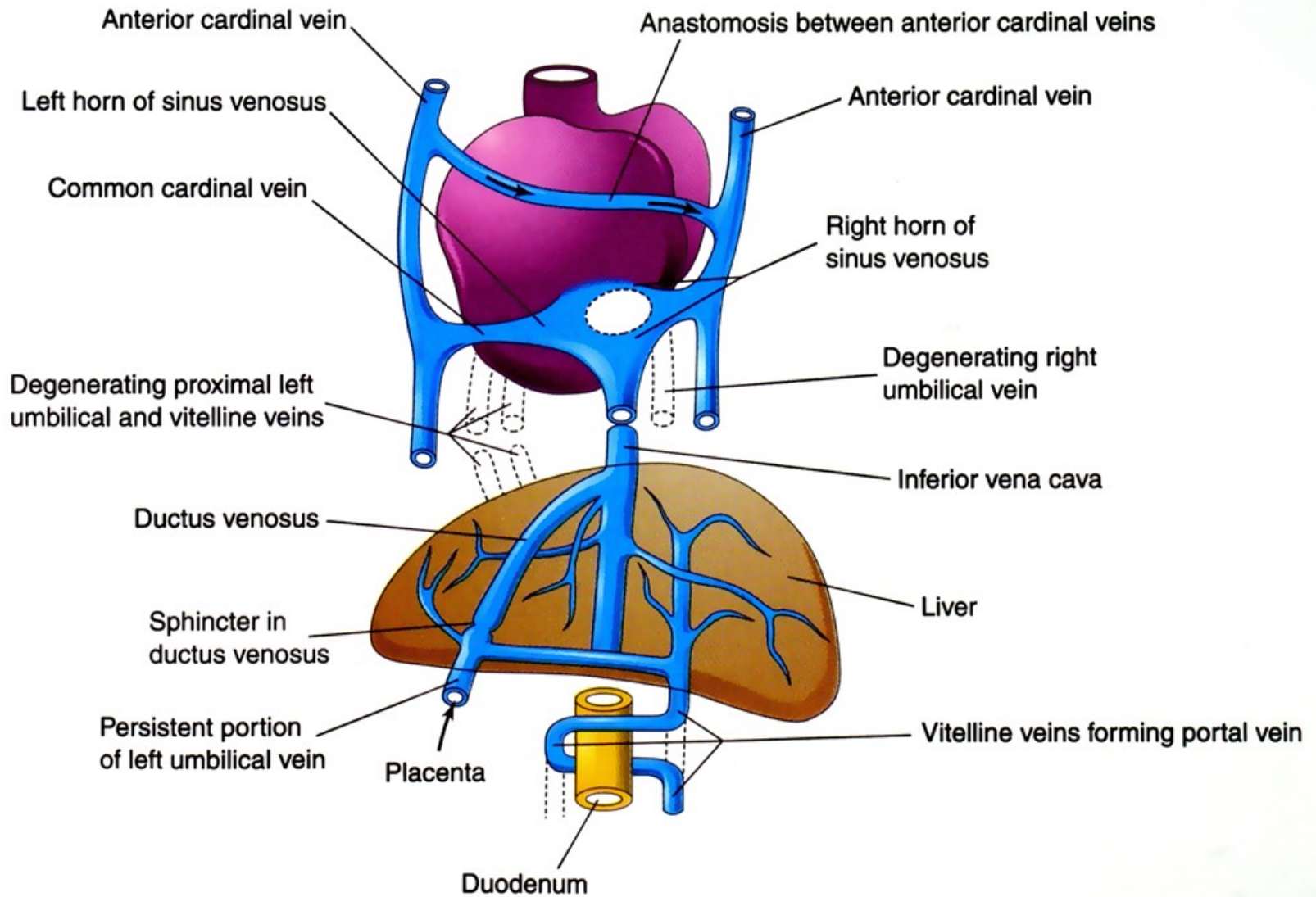


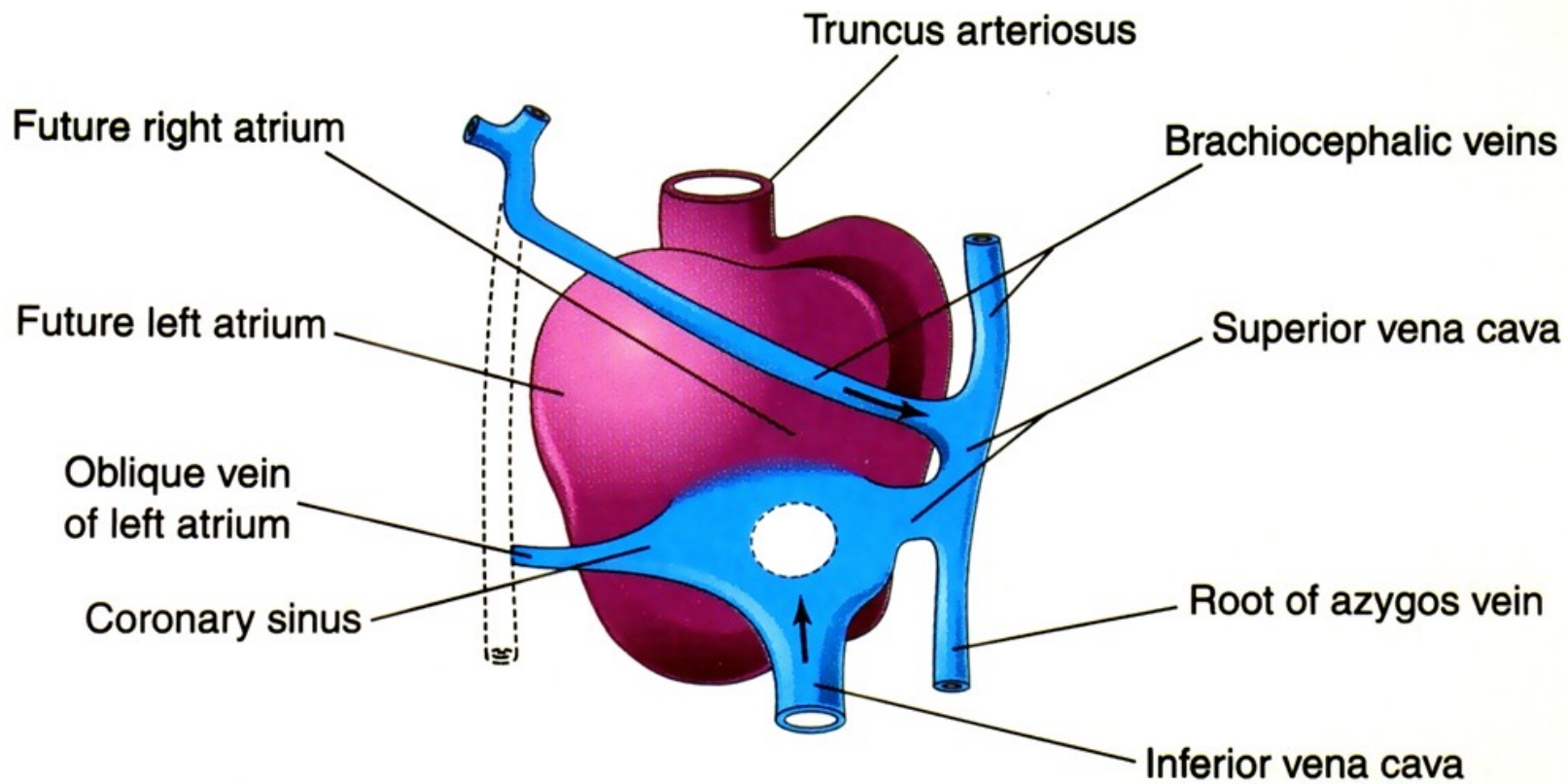
Losy rozwojowe zatoki żyłnej
i wspólnego pnia tętniczego

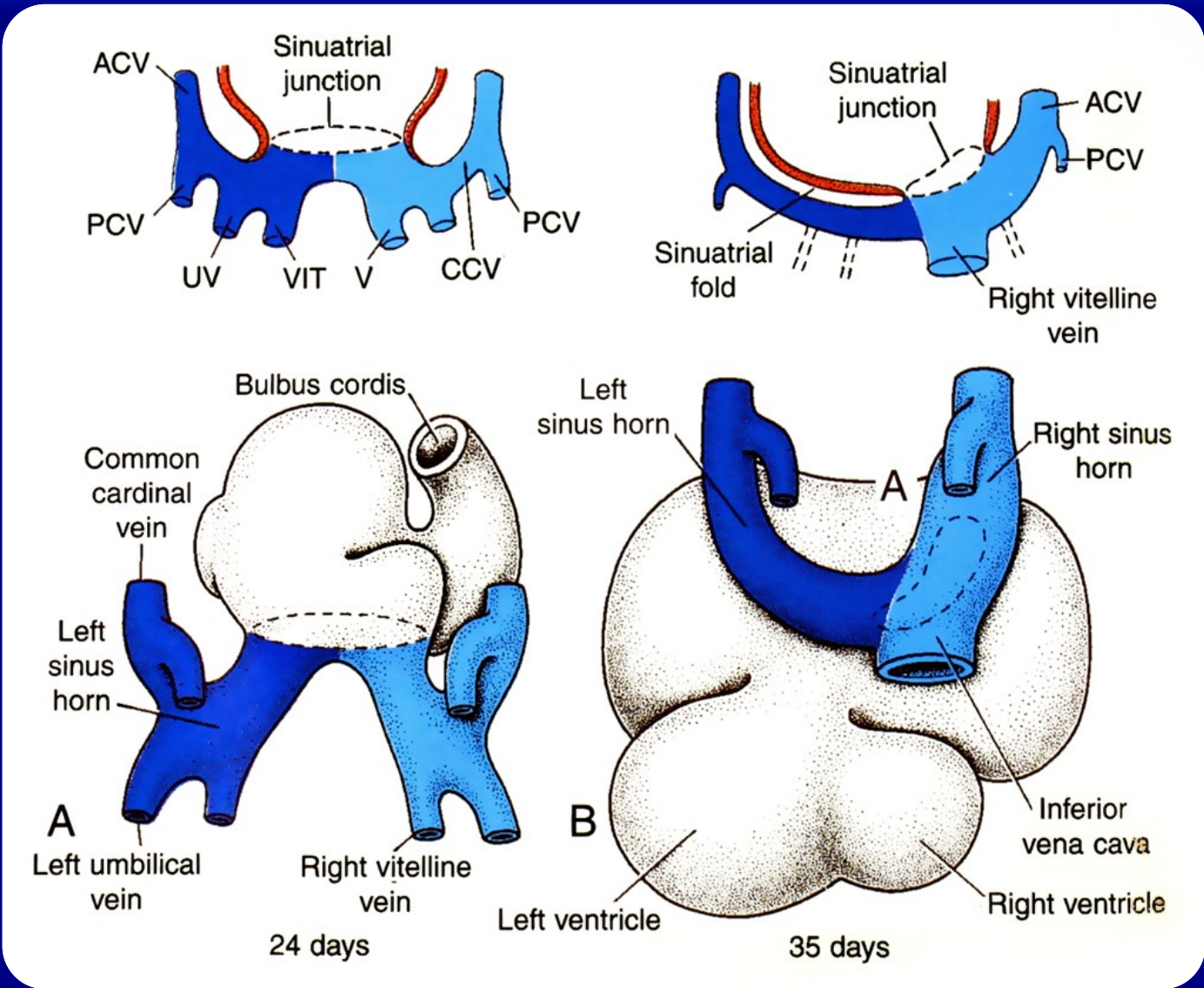




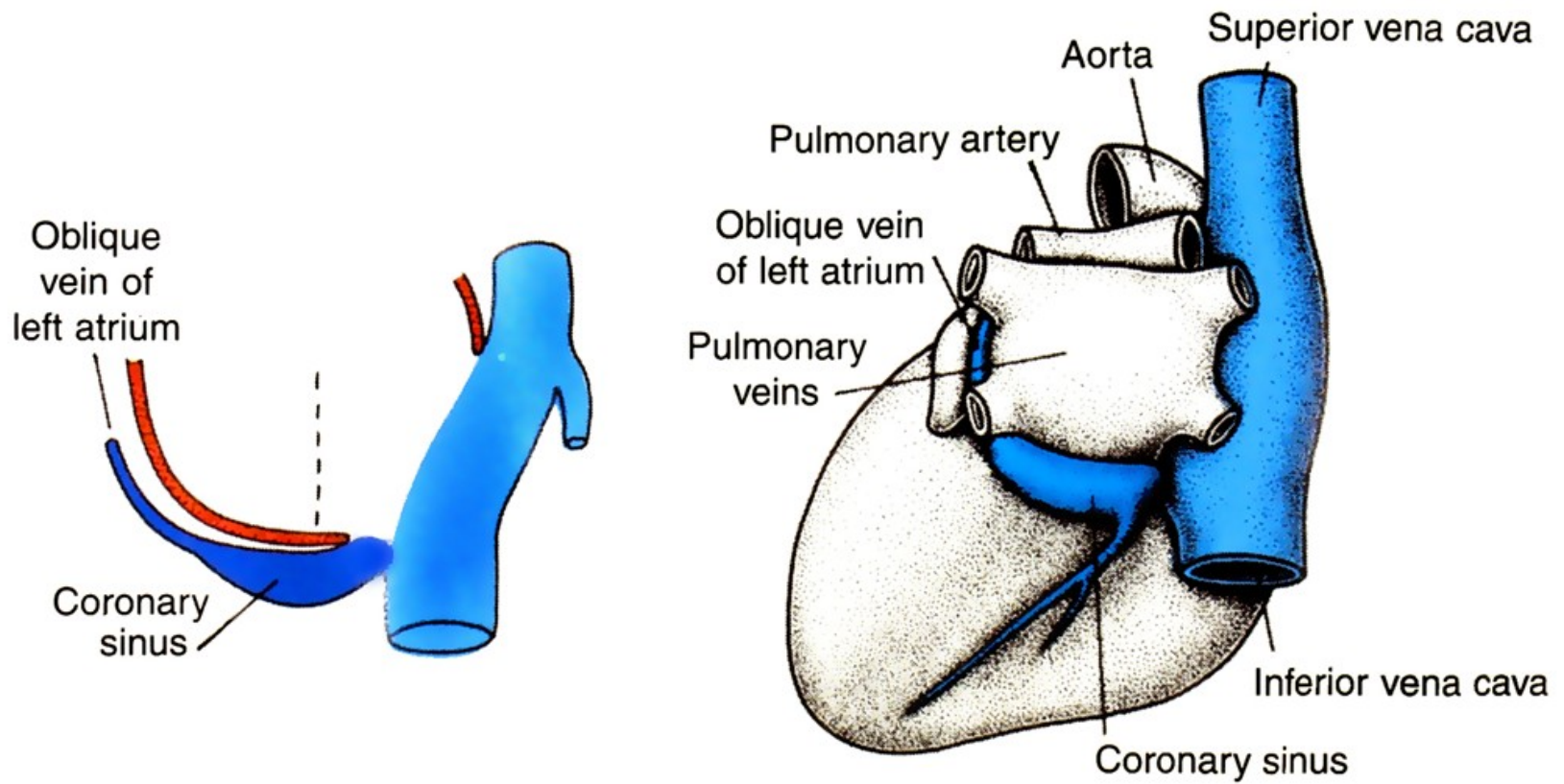




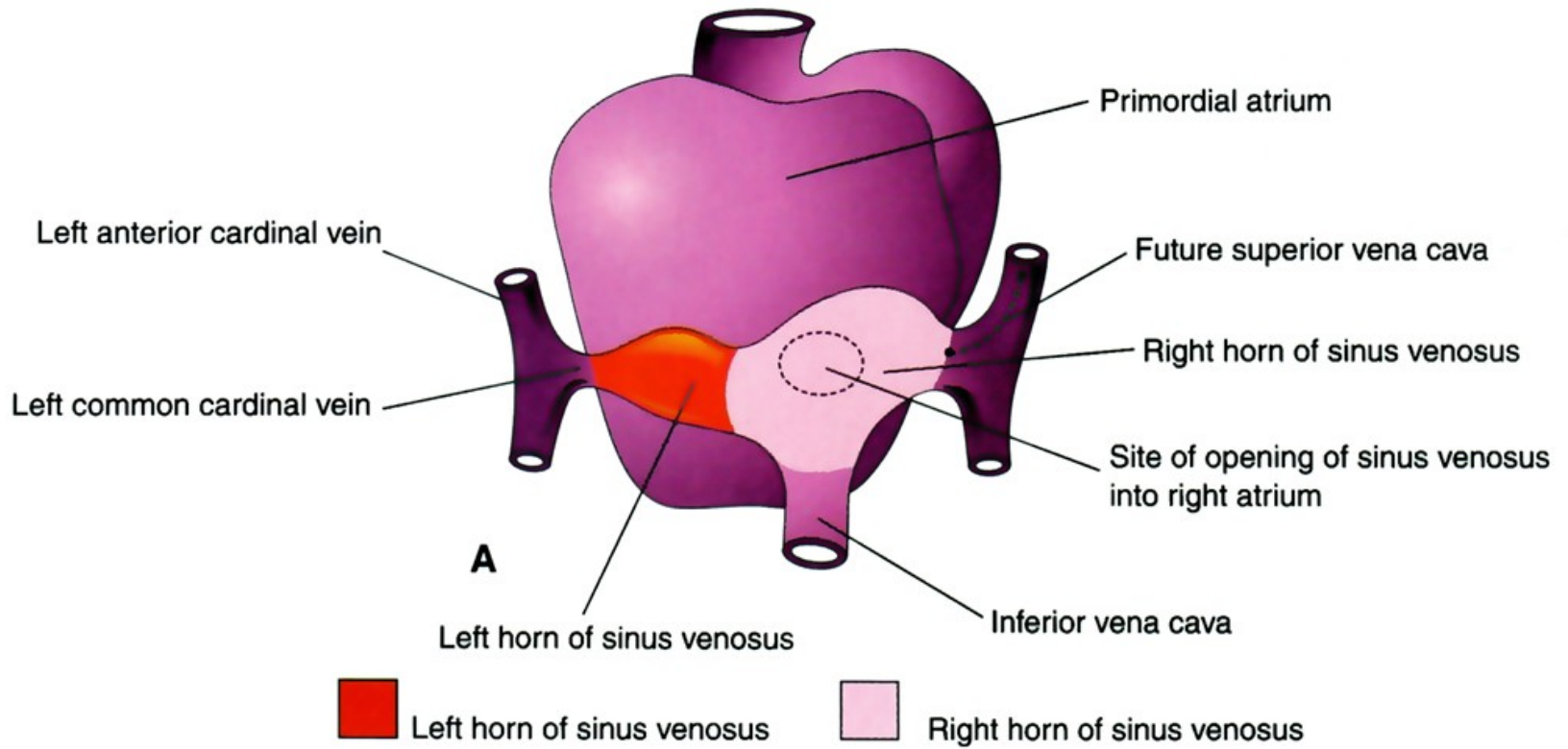


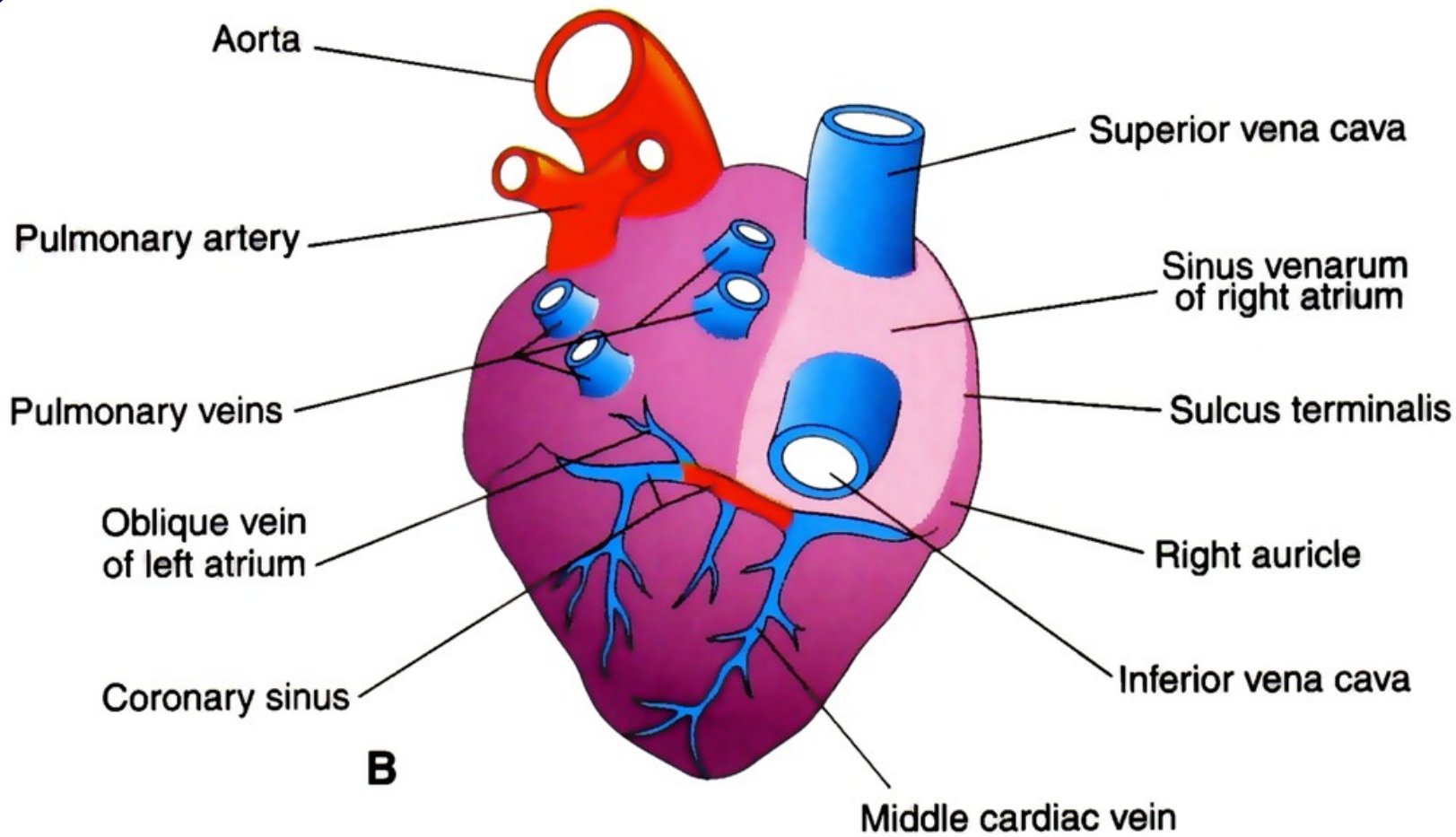



Development of the sinus venosus at approximately 24 days (A) and 35 days (B).



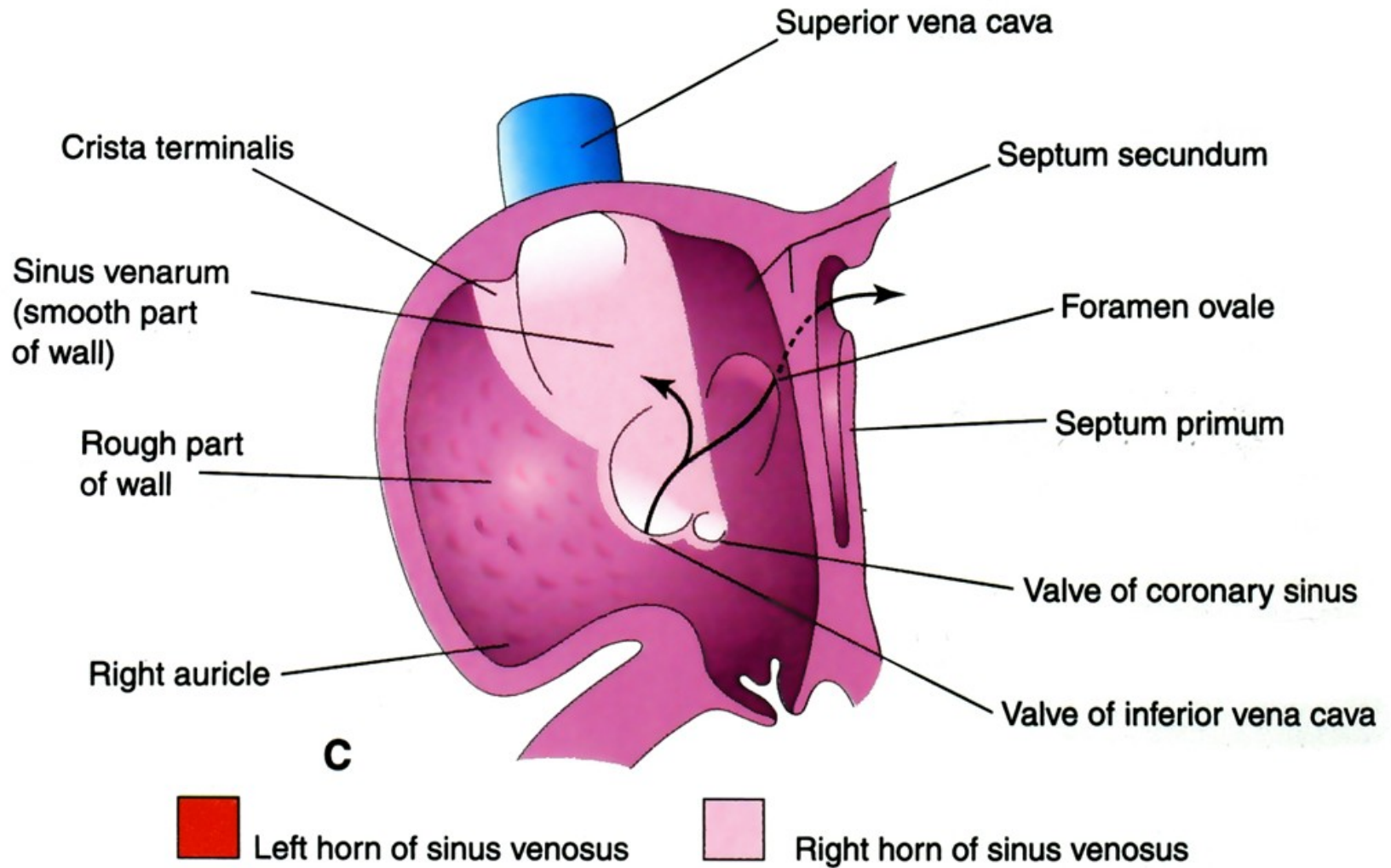
Final stage in development of the sinus venosus and great veins.



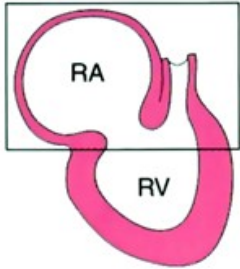


 Left horn of sinus venosus

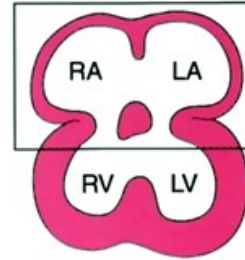
 Right horn of sinus venosus



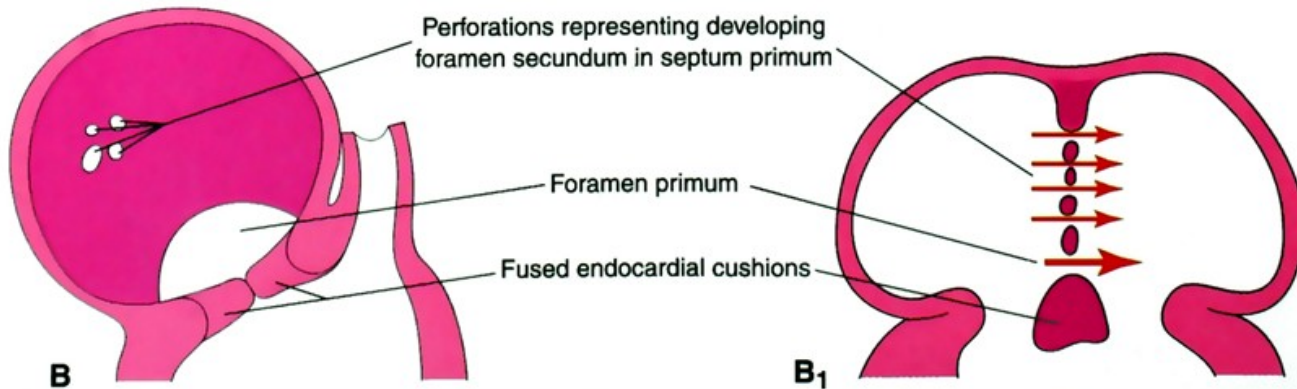
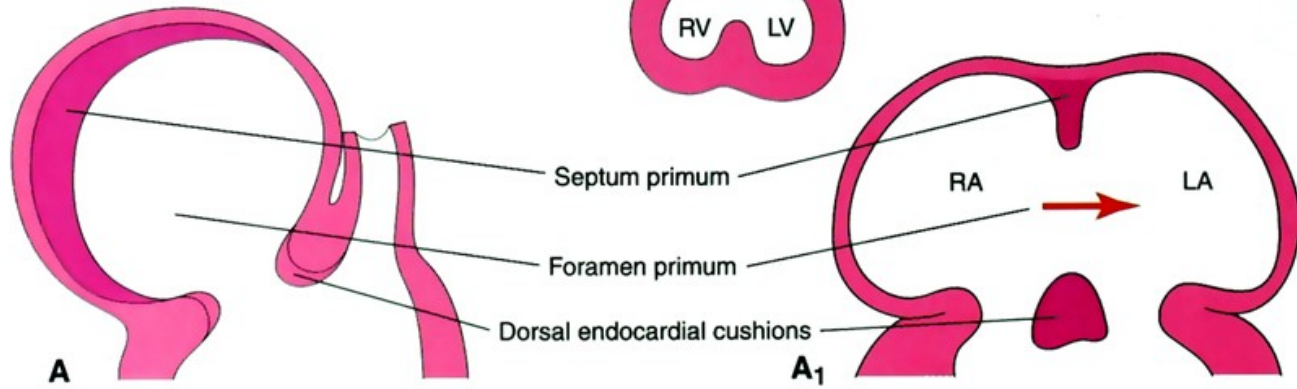
Podział wspólnego przedsiönka



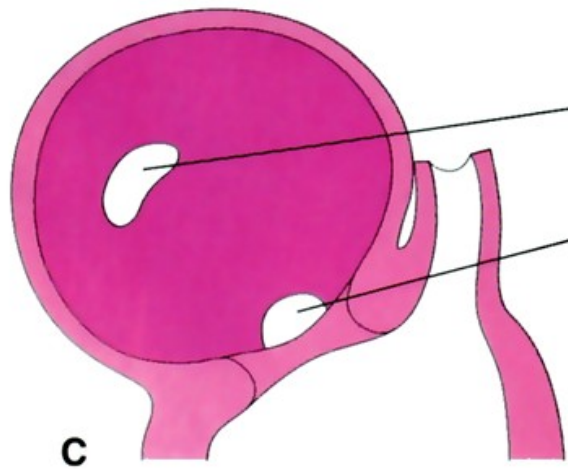
RA, right atrium
RV, right ventricle



LA, left atrium
LV, left ventricle



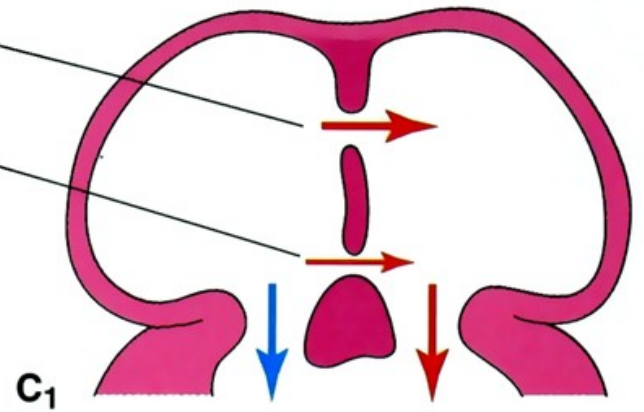
Red arrows—well oxygenated blood Blue arrows—poorly oxygenated blood



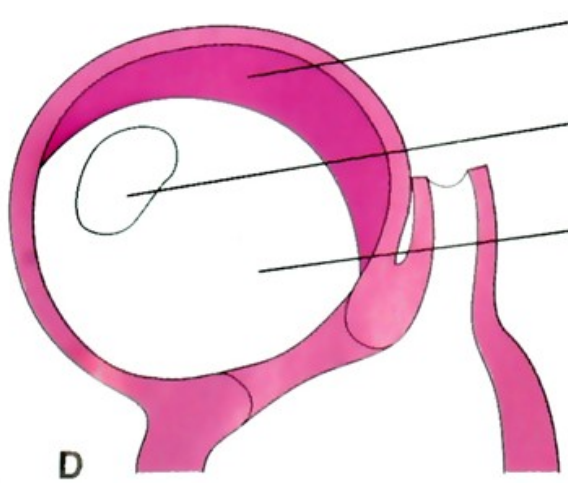
C

Foramen secundum

Foramen primum



C₁



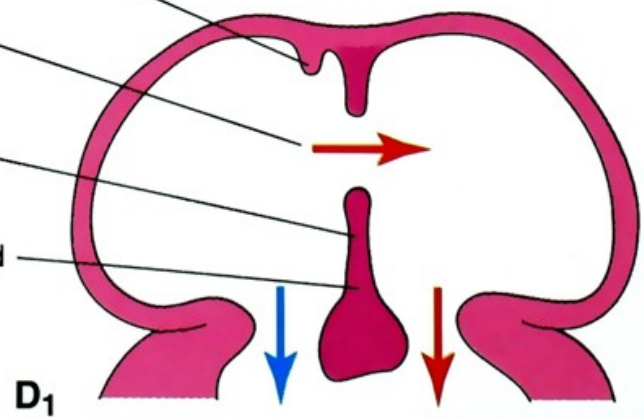
D

Developing septum secundum

Foramen secundum

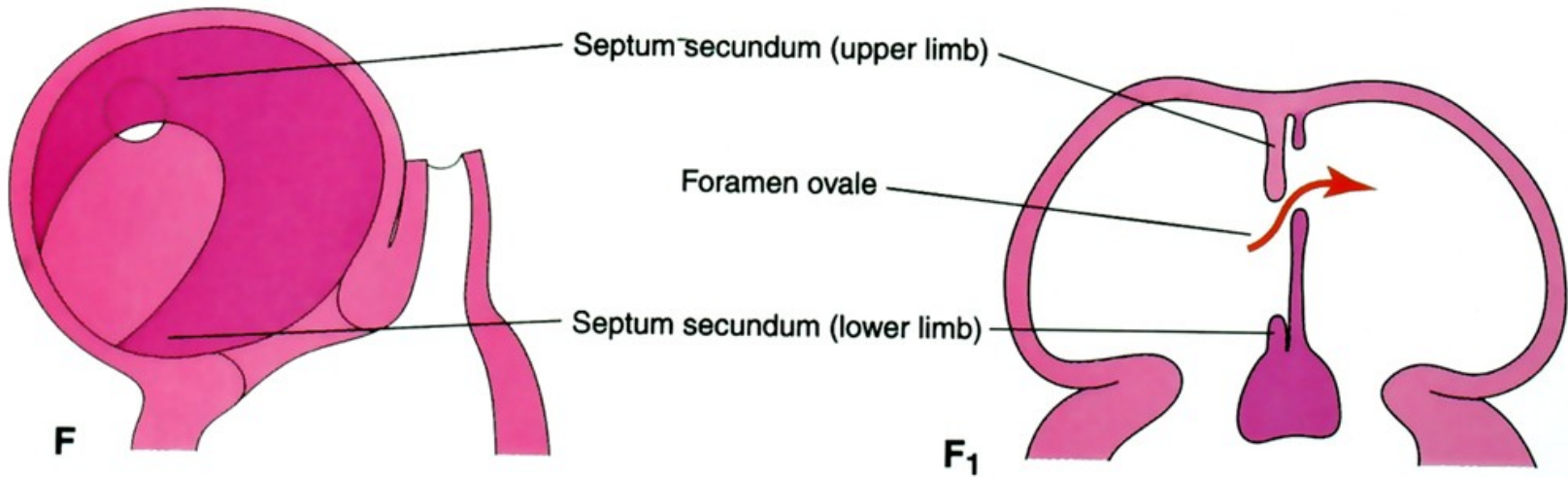
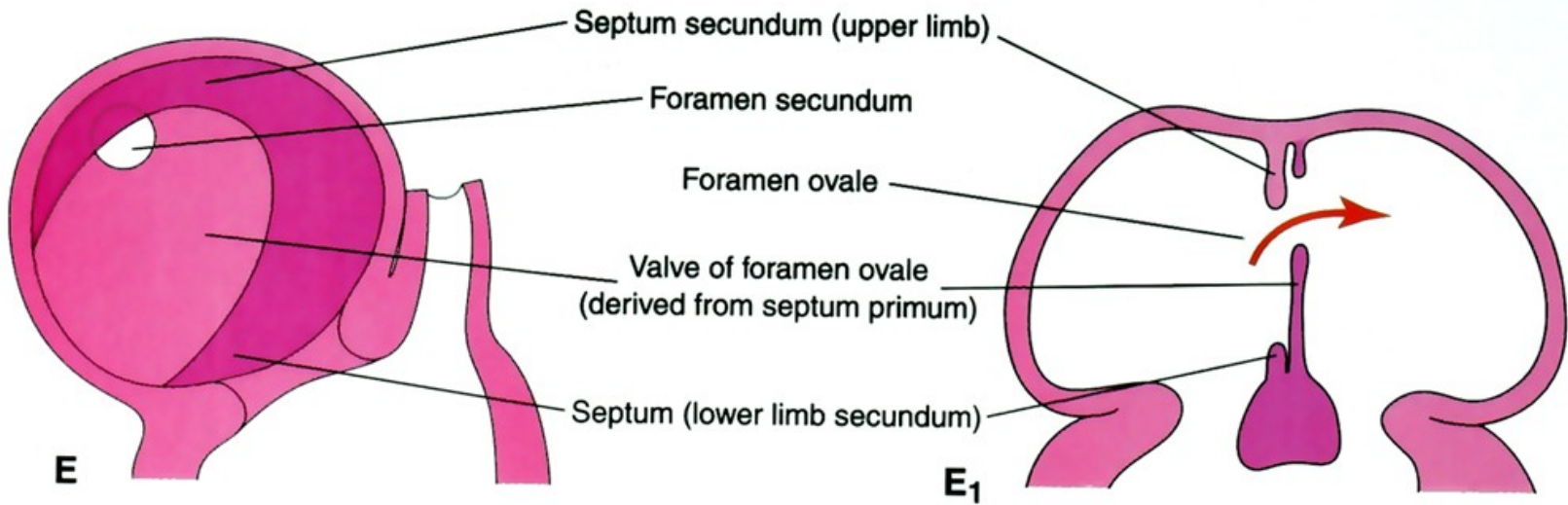
Septum primum

Foramen primum closed

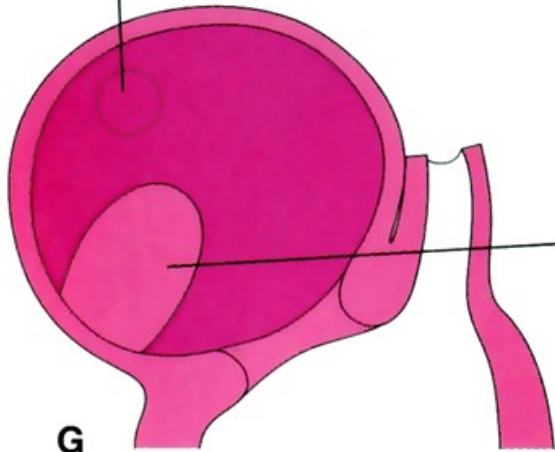


D₁

Red arrows—well oxygenated blood Blue arrows—poorly oxygenated blood



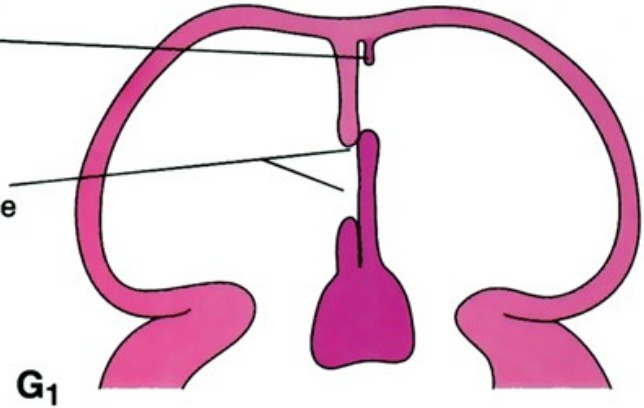
Remnant of foramen secundum



G

Degenerating part of septum primum

Foramen ovale closed by valve of foramen ovale



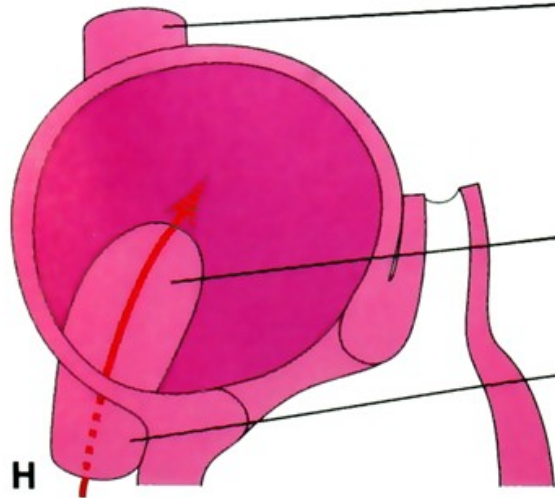
G₁

Superior vena cava

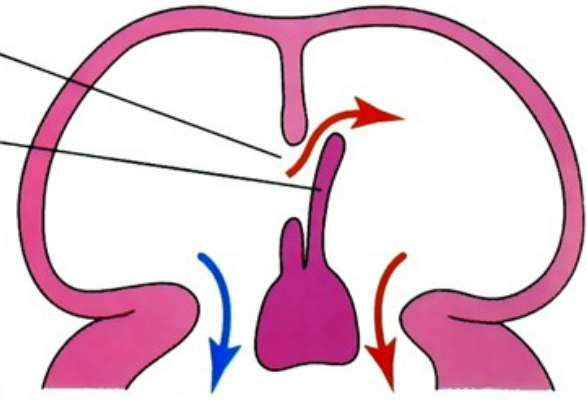
Foramen ovale open

Valve of foramen ovale

Inferior vena cava
(carrying well-oxygenated blood)



H

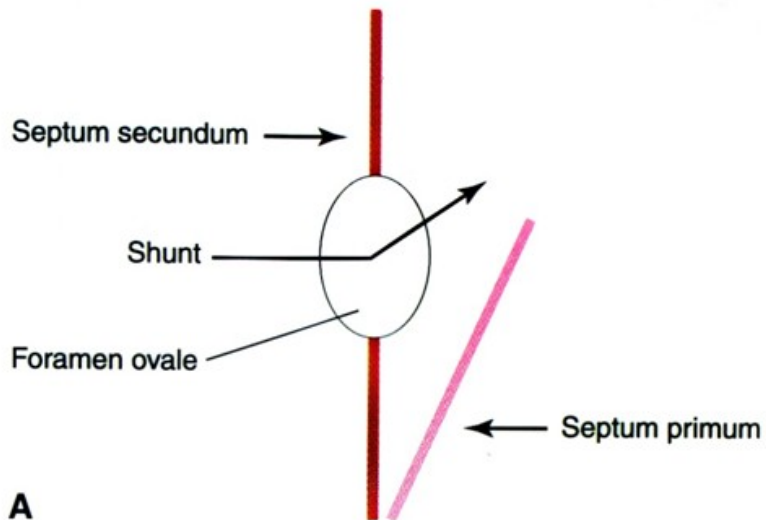


H₁

BEFORE BIRTH

RIGHT ATRIUM
HIGHER PRESSURE

LEFT ATRIUM
LOWER PRESSURE

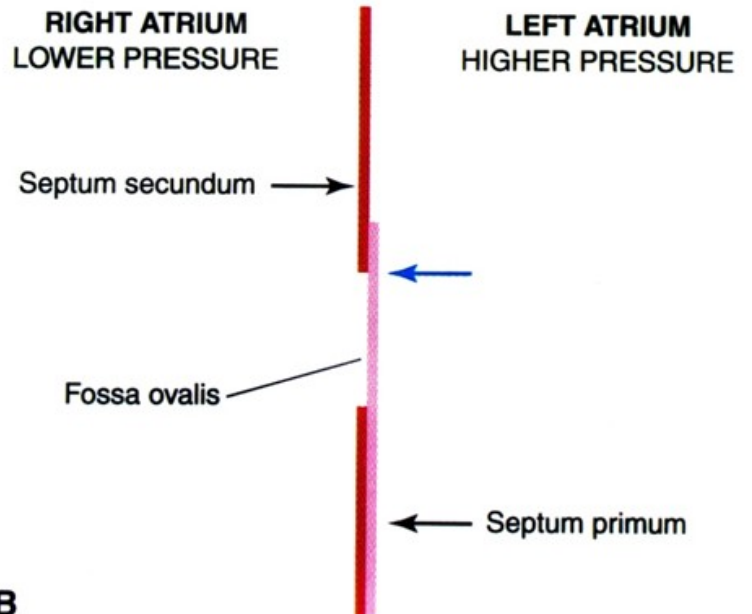


A

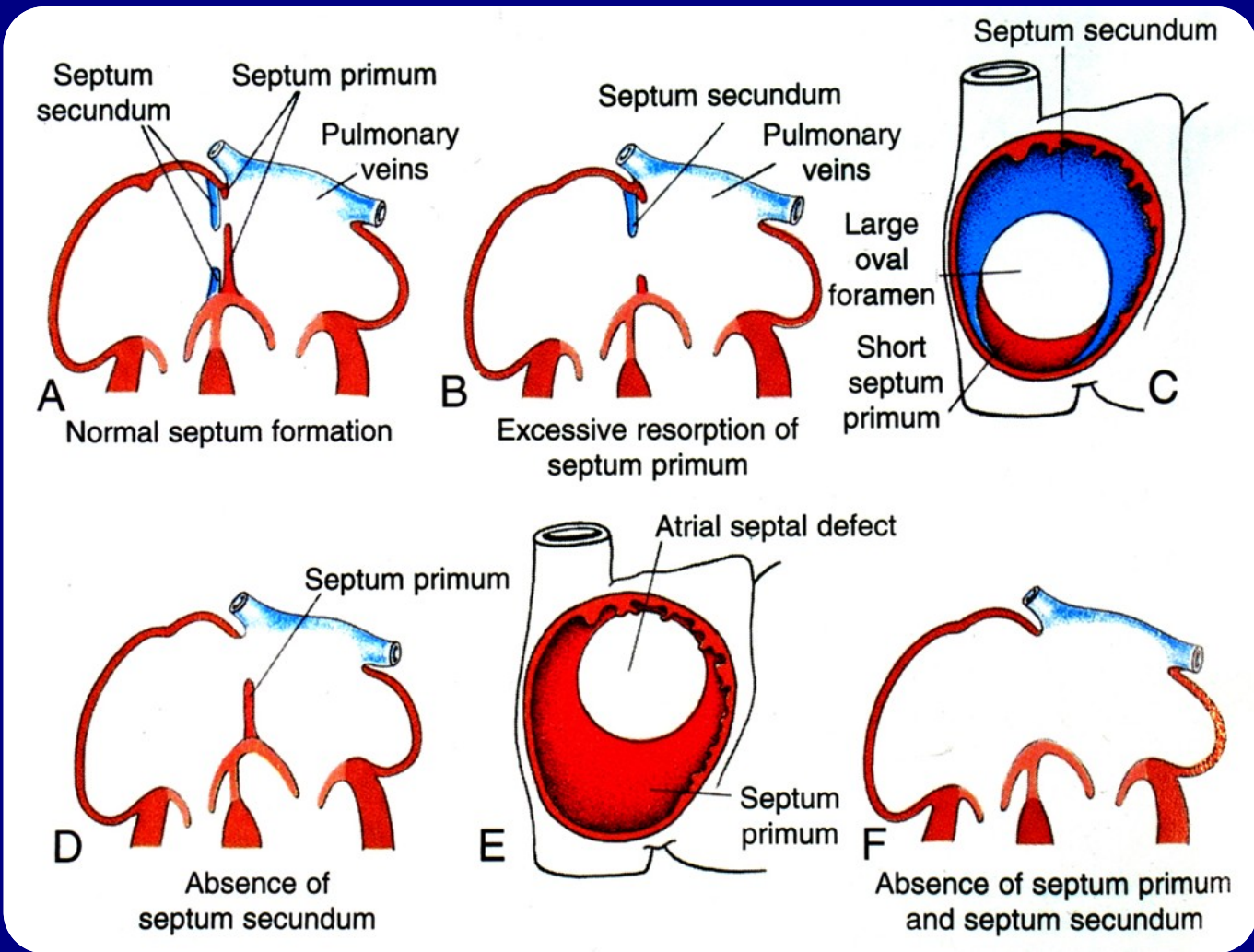
AFTER BIRTH

RIGHT ATRIUM
LOWER PRESSURE

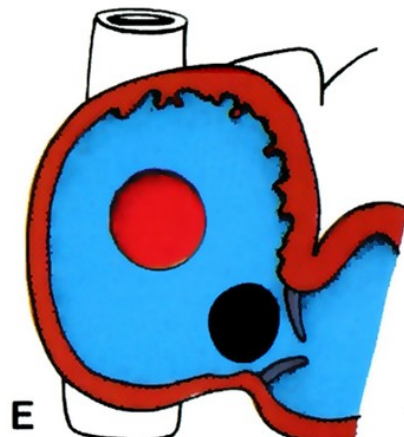
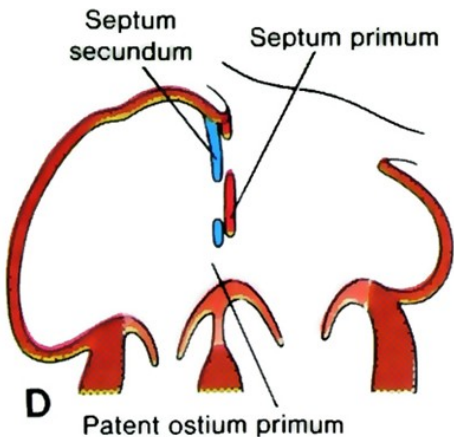
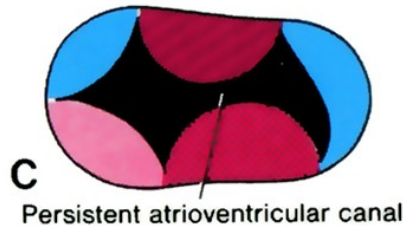
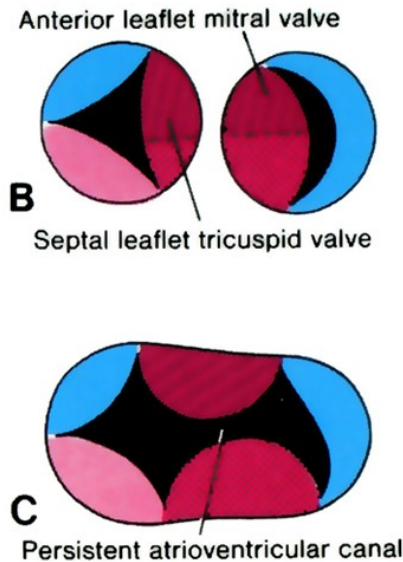
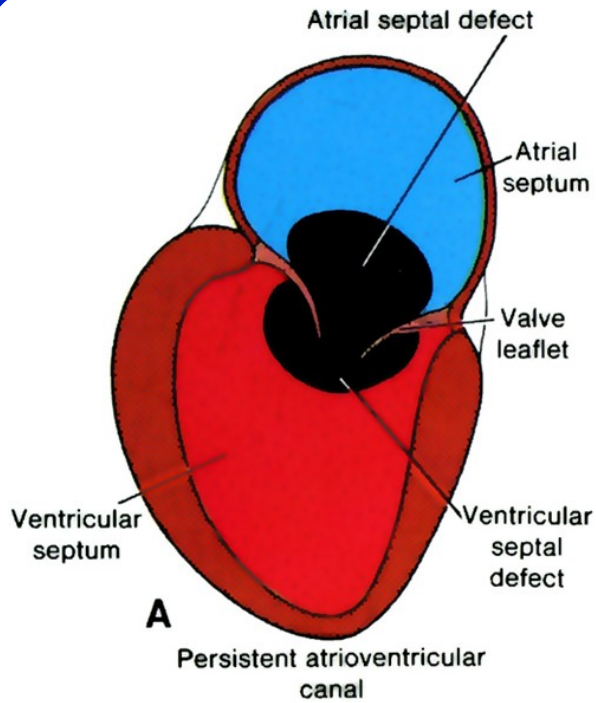
LEFT ATRIUM
HIGHER PRESSURE



B



A - Normal atrial septum formation. B and C - Ostium secundum defect caused by excessive resorption of the septum primum. D and E - Similar defect caused by failure of development of the septum secundum. F - Common atrium, or cor triloculare biventriculare, resulting from complete failure of the septum primum and septum secundum to form.



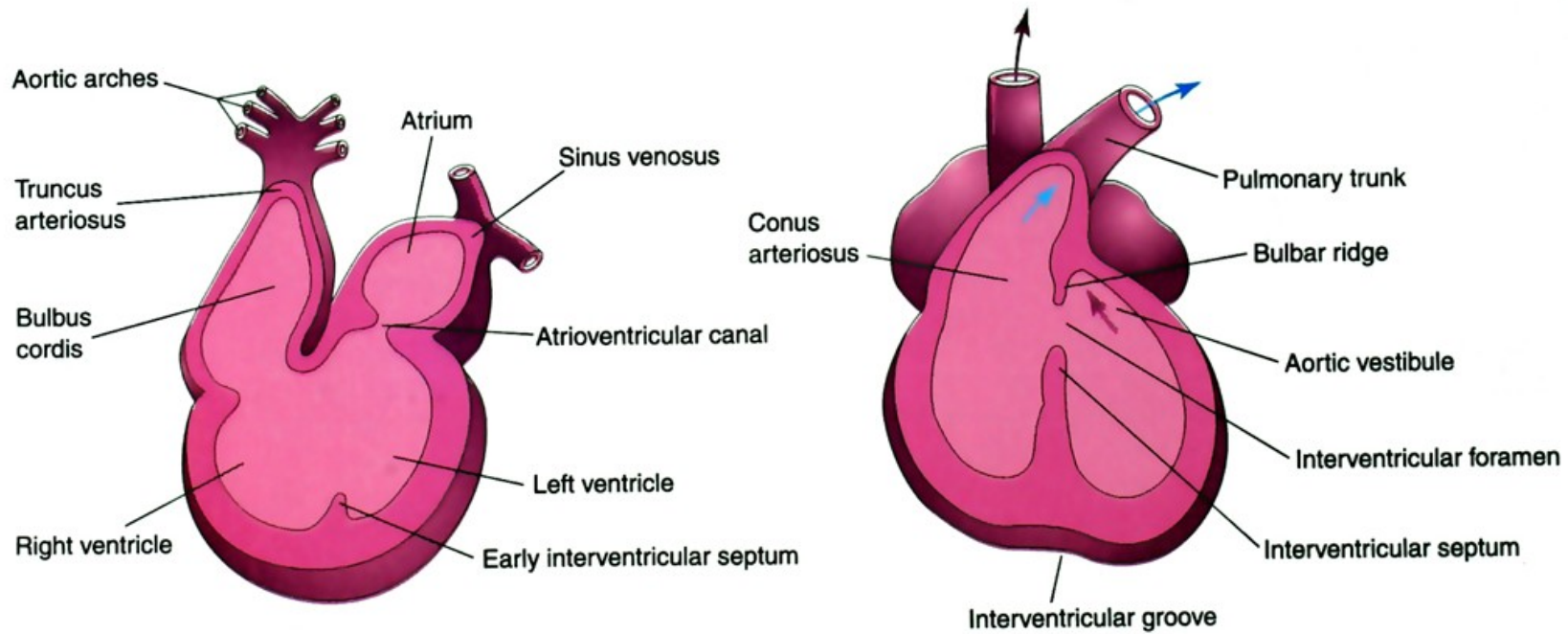
A – Persistent common atrioventricular canal. This abnormality is always accompanied by septum defect in the atrial as well as in the ventricular portion of the cardiac partitions.

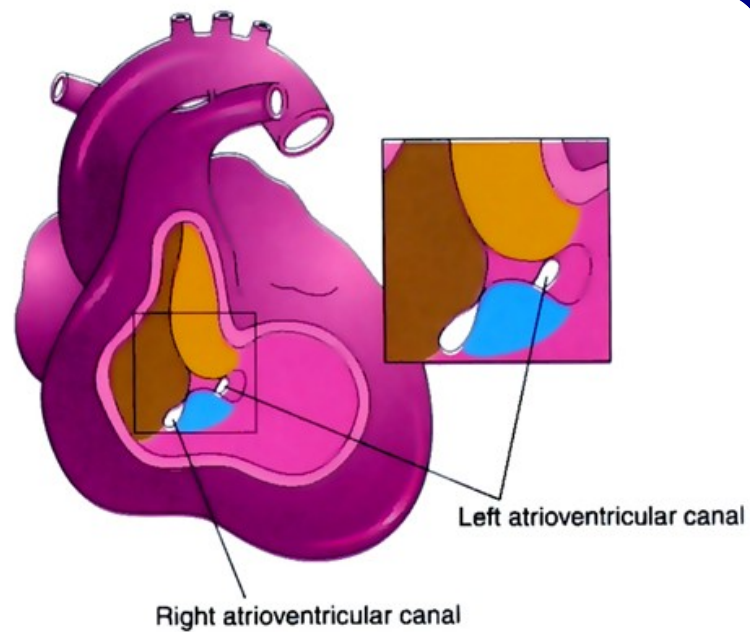
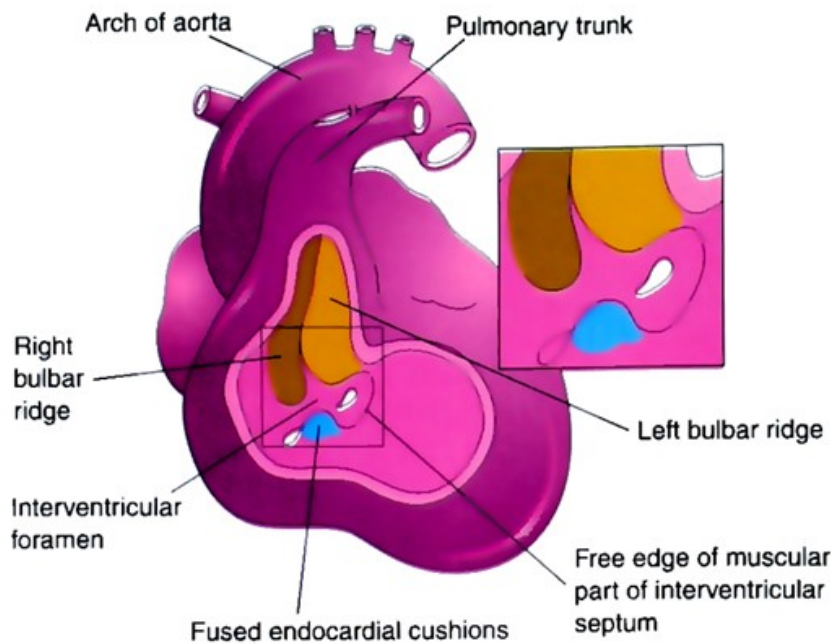
B – Valves in the atrioventricular orifices under normal conditions.

C – Split valves in a persistent atrioventricular canal.

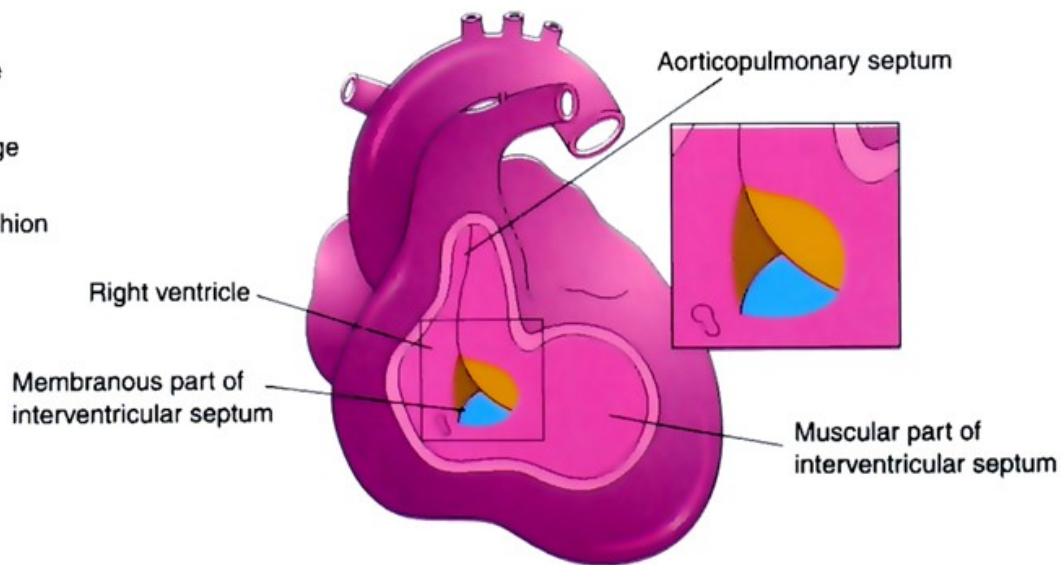
D and E – Ostium primum defect caused by incomplete fusion of the atrioventricular endocardial cushions.

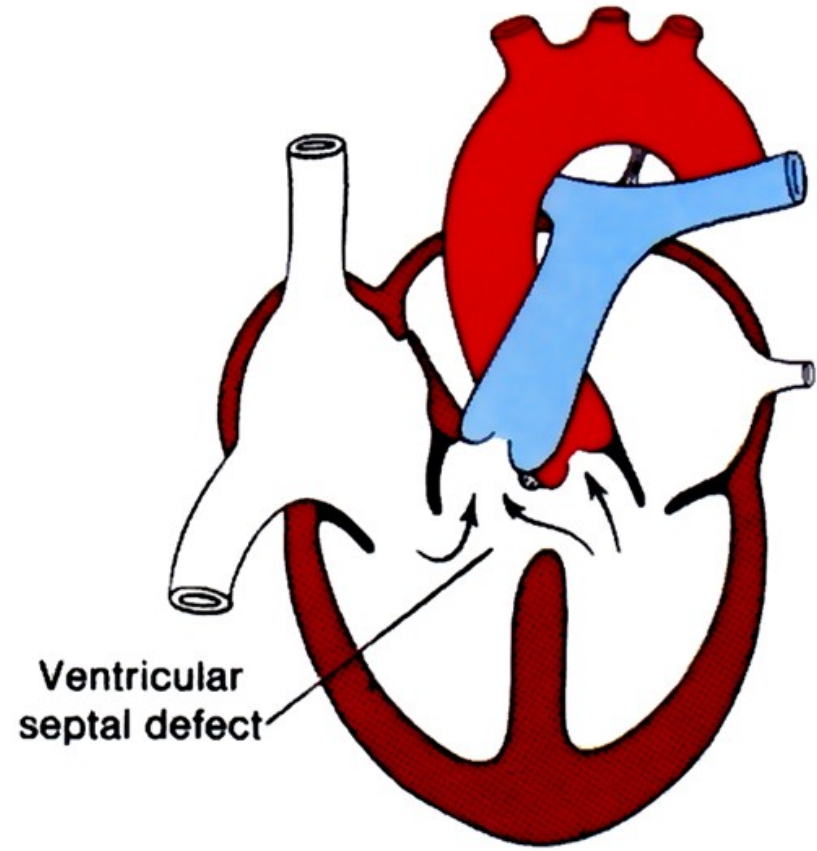
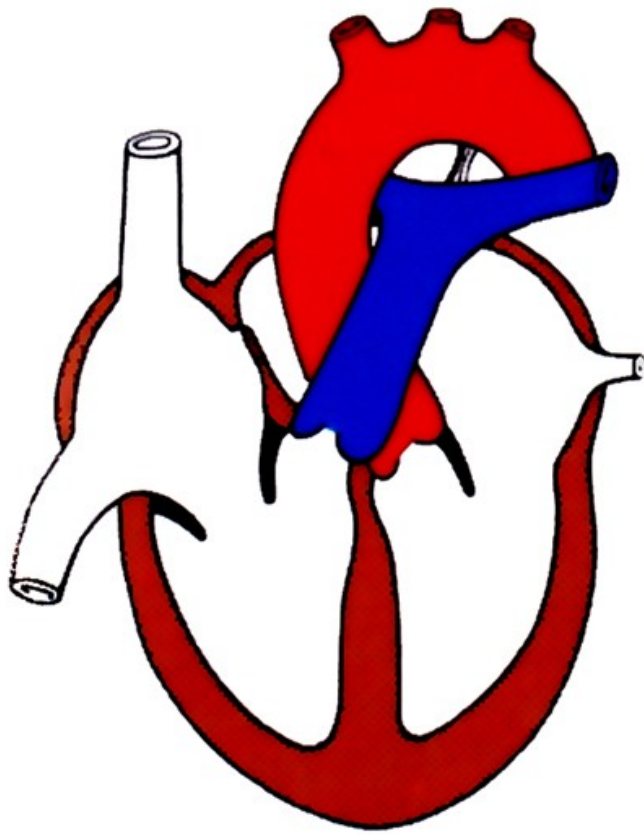
Podział wspólnej komory





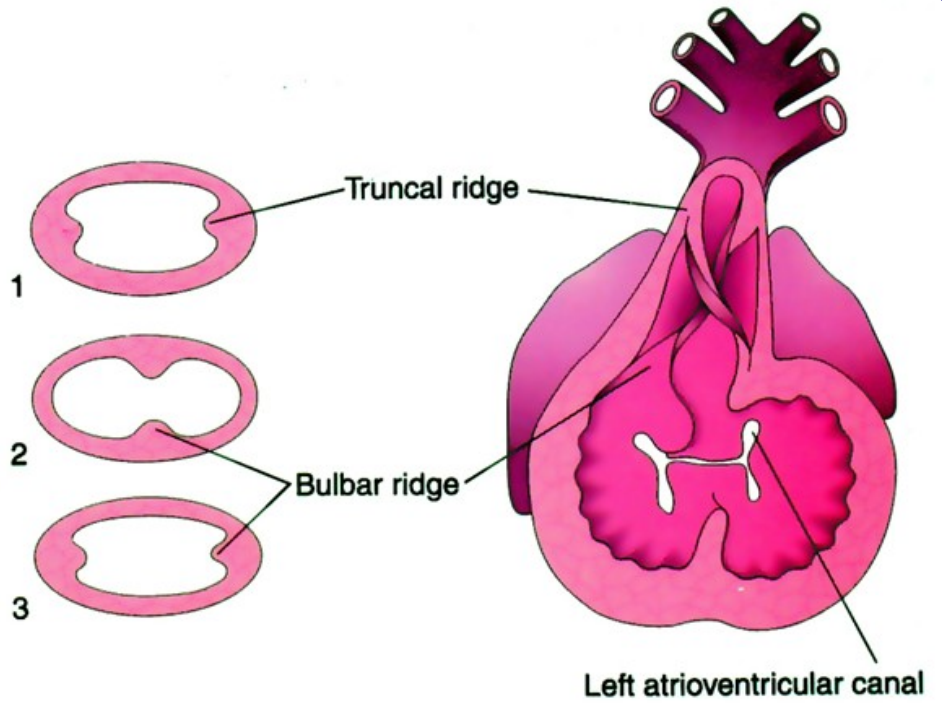
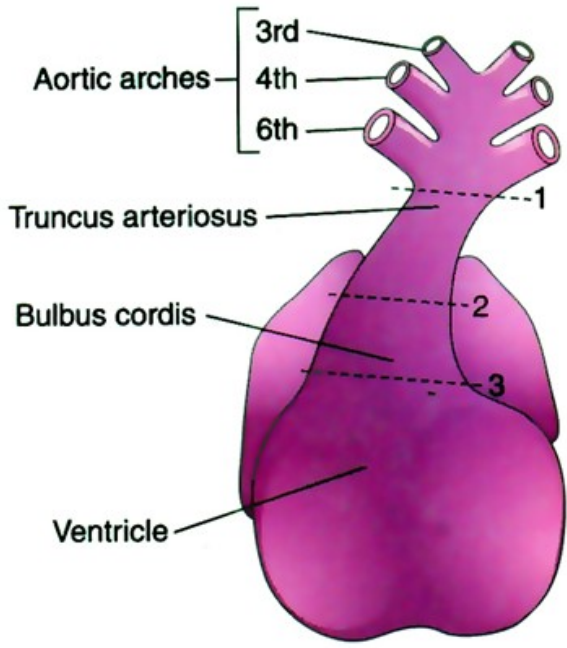
-  Left bulbar ridge
-  Right bulbar ridge
-  Endocardial cushion

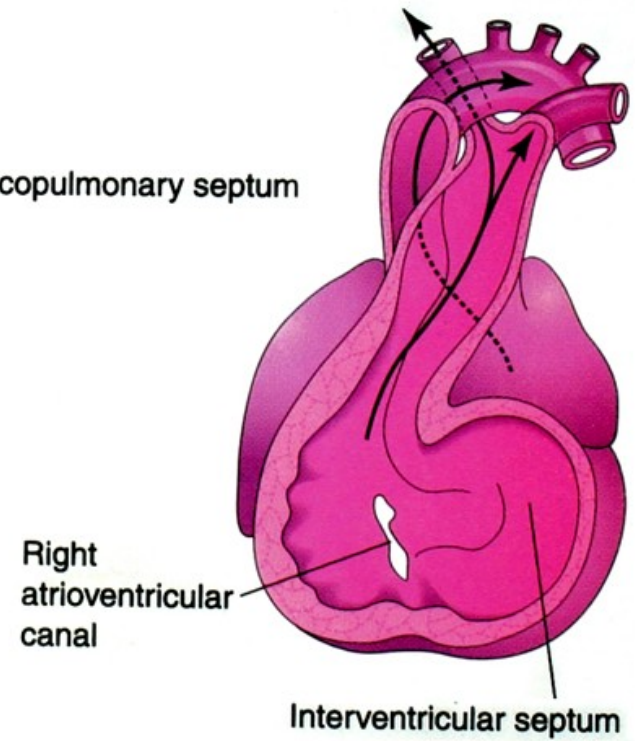
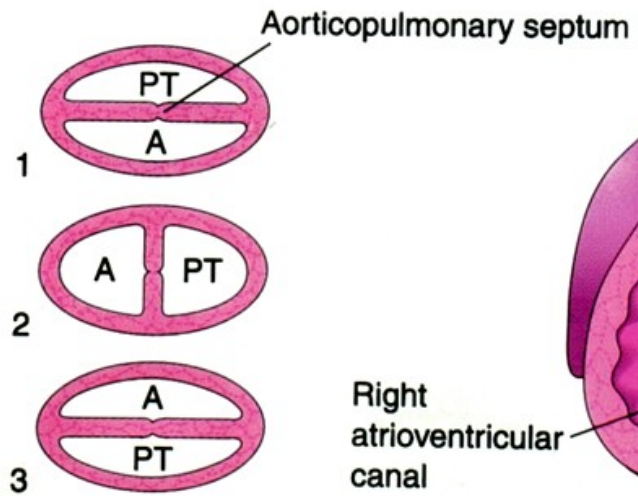
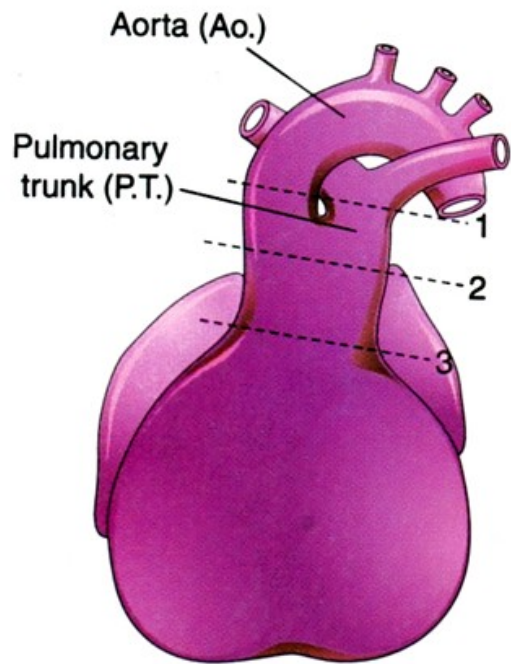


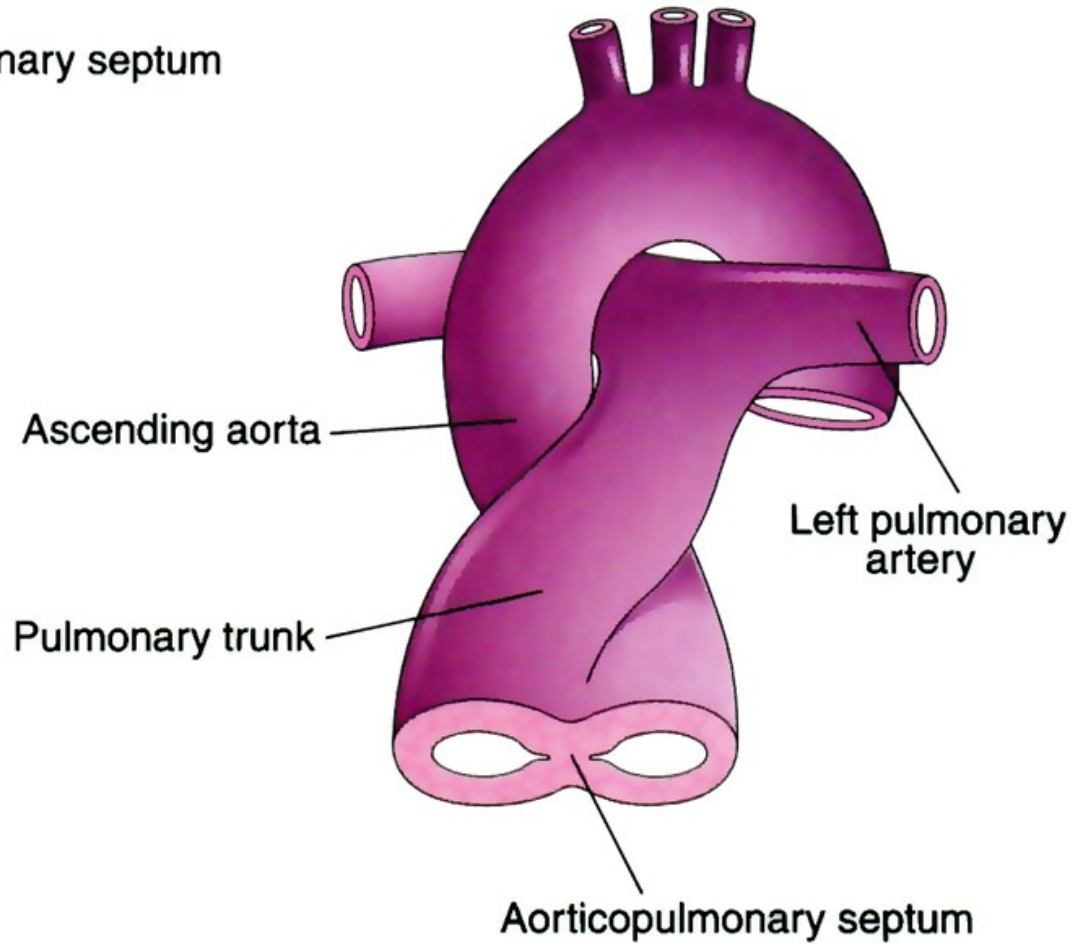
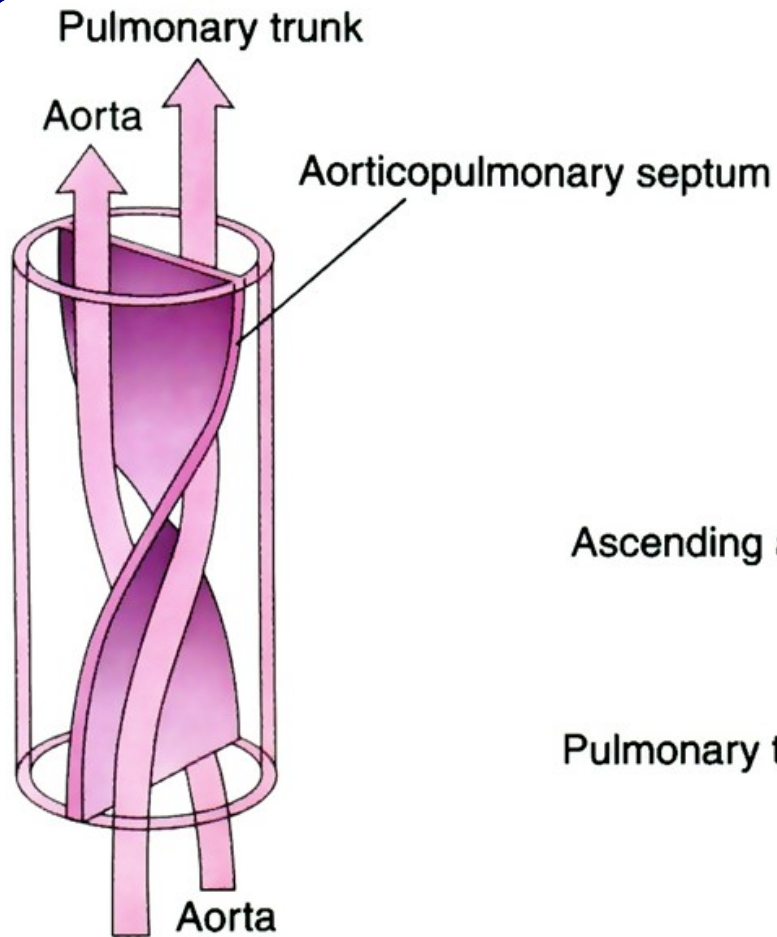


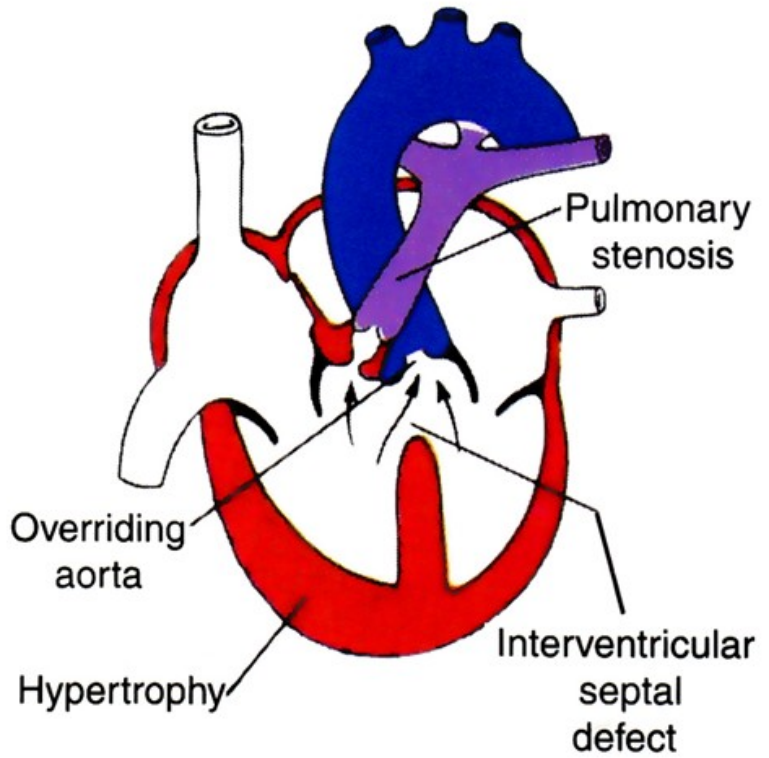
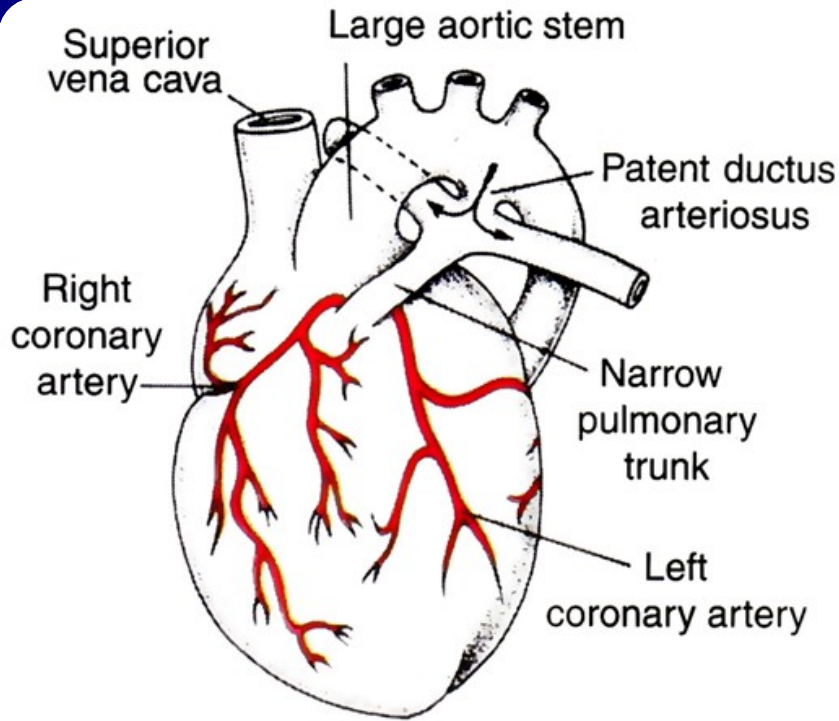
A - Normal heart. B – Isolated defect in the membranous portion of the interventricular septum. Blood from the left ventricle flows to the right through the interventricular foramen.

Podział opuszki
i wspólnego pnia tętniczego

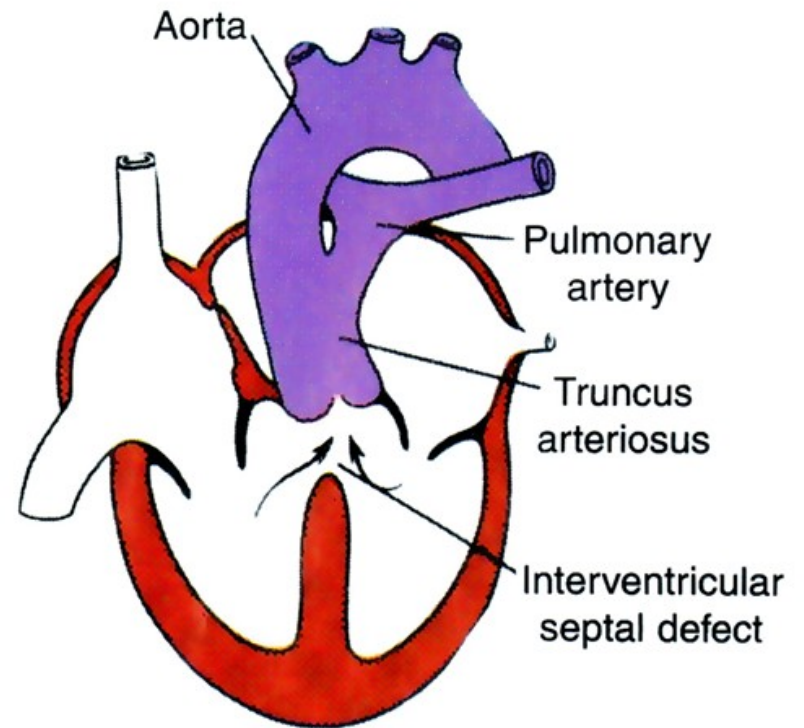
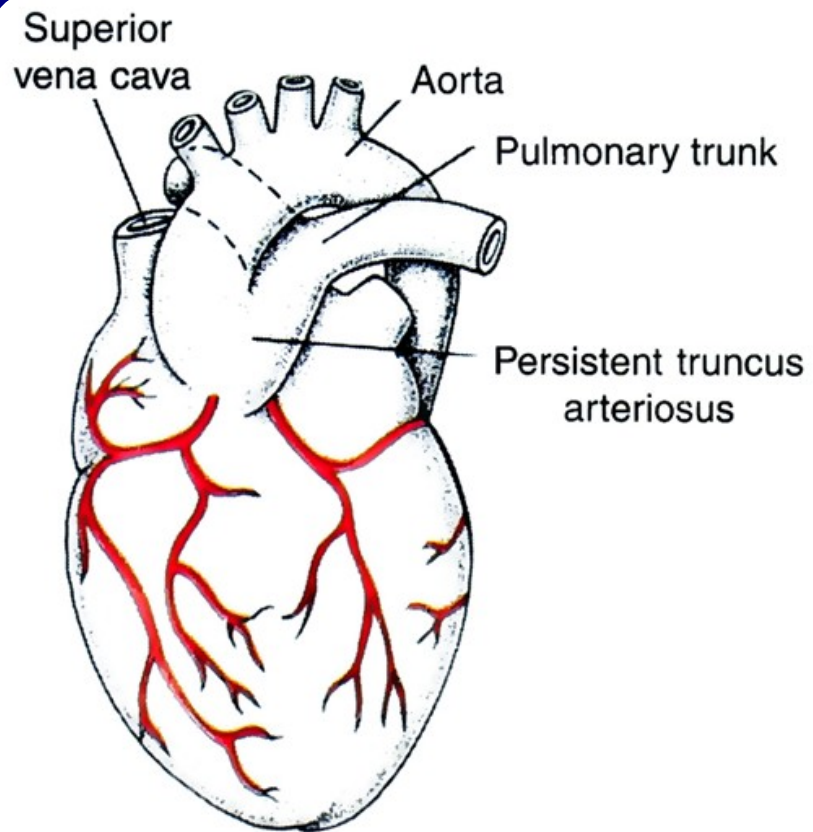




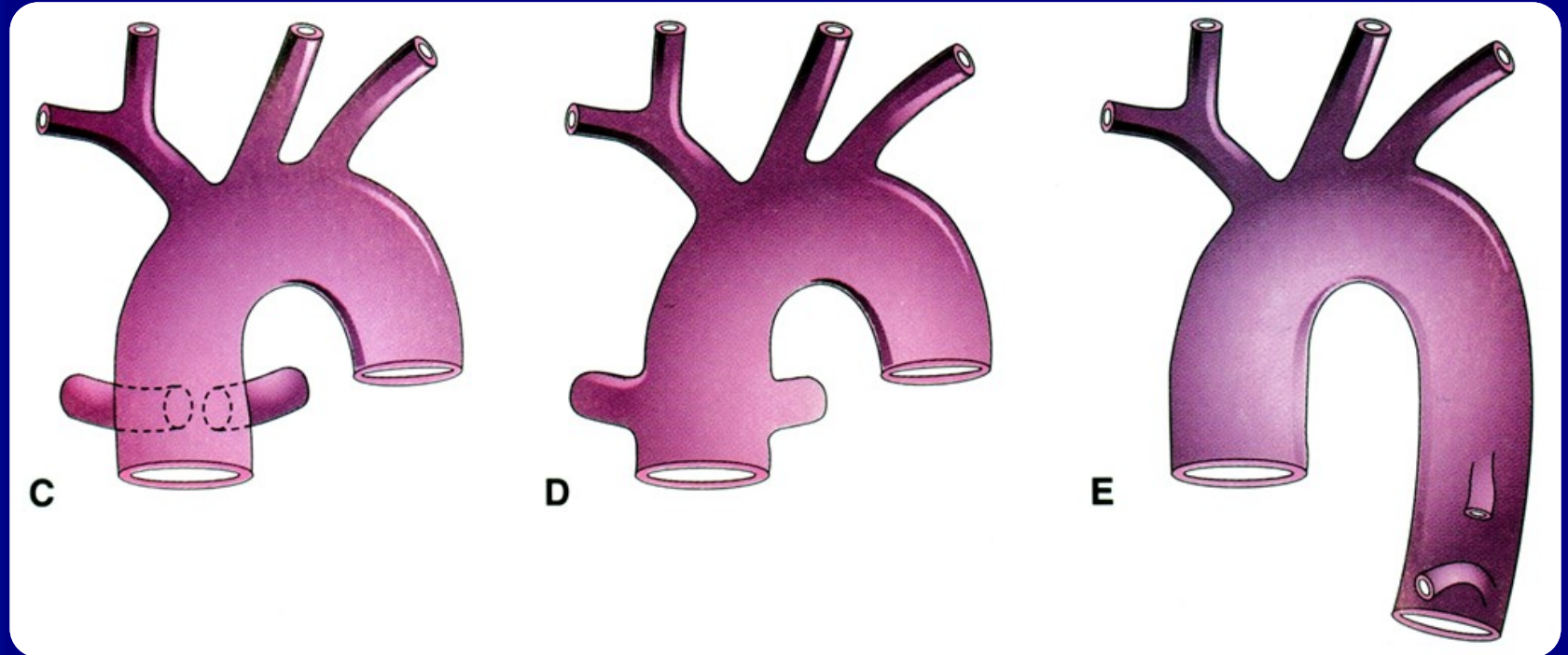




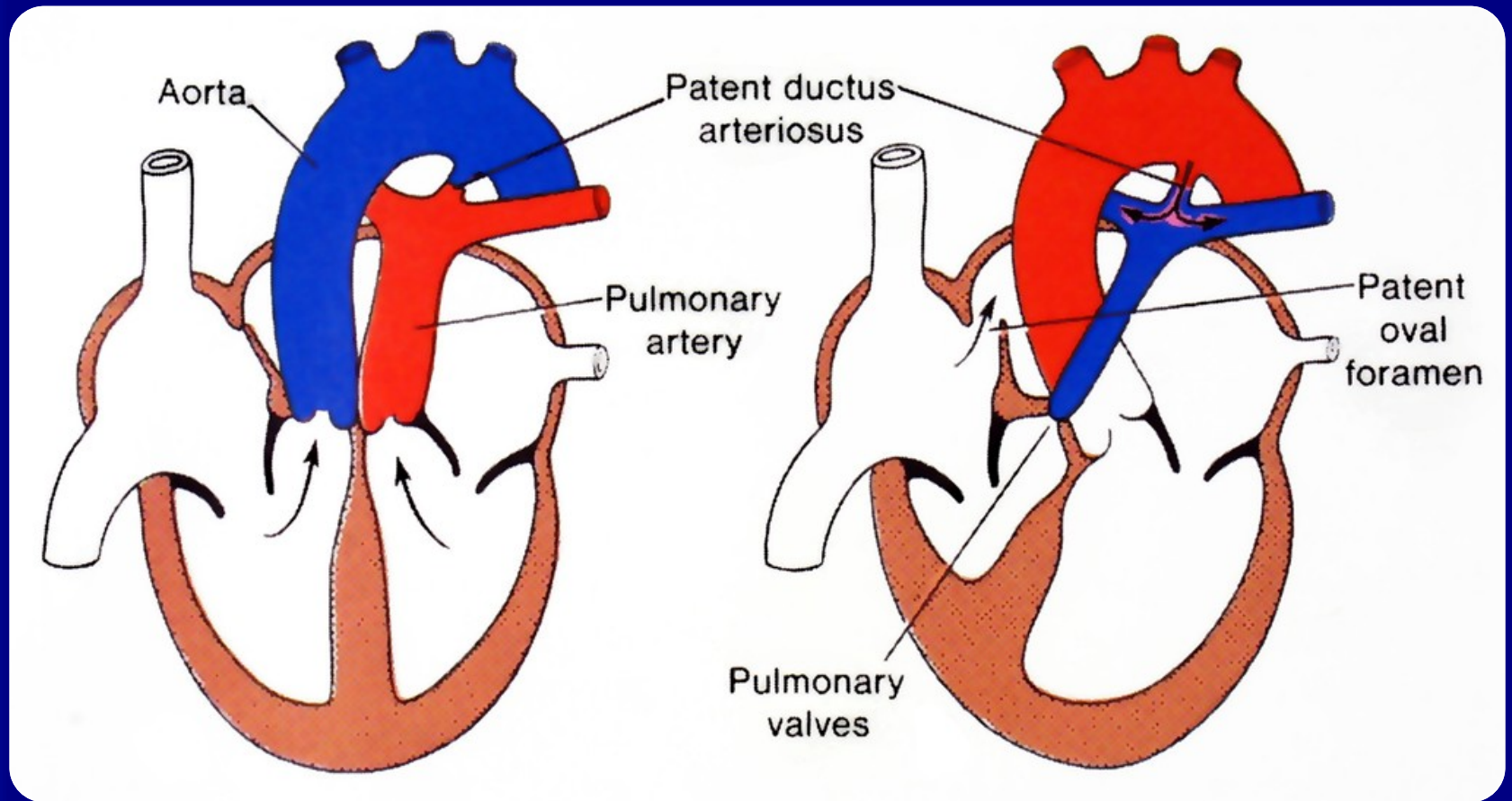
Tetralogy of Fallot



Persistent truncus arteriosus



- C – The right and left pulmonary arteries arise close together from the truncus arteriosus.
- D – The pulmonary arteries arise independently from the sides of the truncus arteriosus.
- E – No pulmonary arteries are present; the lungs are supplied by the bronchial arteries.



Transposition of the great vessels