



FETAL CIRCULATION



Fetal circulation is characterized by unique adaptations tailored to meet the physiologic demands of the developing fetus within the intrauterine environment.

Fetal blood vessels

The fetal umbilical cord is composed of 1 umbilical vein and 2 umbilical arteries.

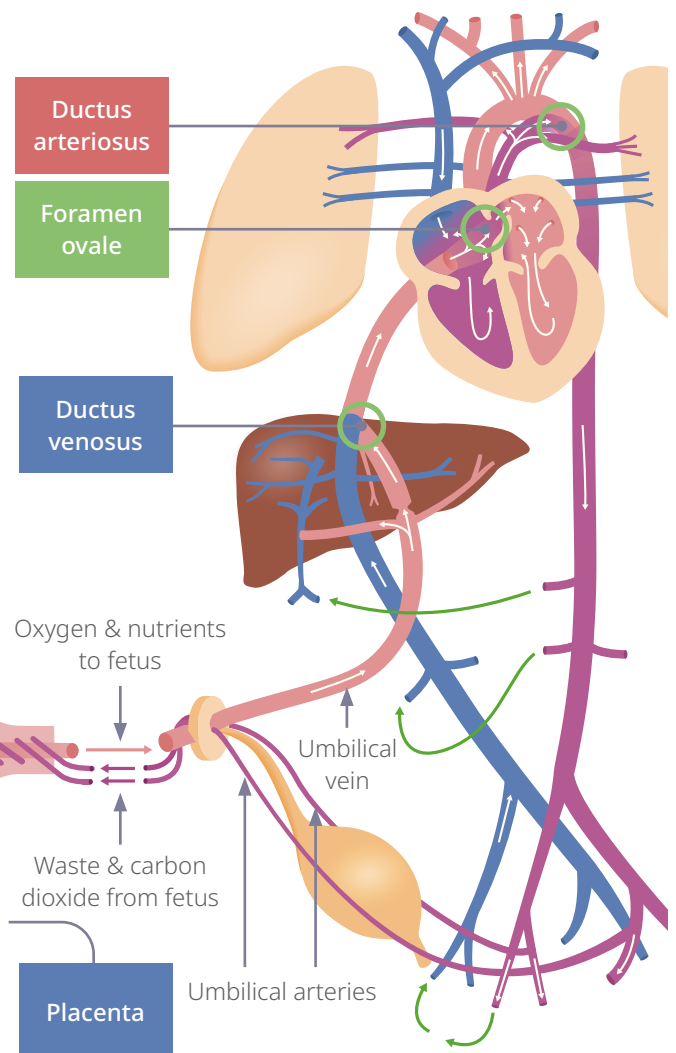
- Adult circulation: Arteries carry oxygenated blood; veins carry deoxygenated blood.
- Fetal circulation: Umbilical vein carries oxygenated blood coming from the placenta; umbilical arteries carry deoxygenated blood pumped back to the placenta by the fetal heart.

Role of the placenta

The fetal blood supply remains separate from the maternal blood supply. The placenta facilitates exchange of oxygen, nutrients, and waste products between the two. By oxygenating fetal blood and removing waste, the placenta fulfills the functions of the lungs and liver for the fetus.

Three unique fetal structures allow blood flow to bypass the developing liver and lungs, which are not yet functional in the fetus.

Ductus venosus	Foramen ovale	Ductus arteriosus
Directs oxygenated blood from umbilical vein into inferior vena cava, bypassing liver.	An opening in the atrial septum. Shunts blood from right to left atrium, bypassing the lungs.	Shunts blood from pulmonary artery into aorta, bypassing lungs.



Neonatal transition

- As lungs expand with each neonatal breath, pulmonary pressure drops → shift in pressure gradient establishes pulmonary circulation and closes the foramen ovale and ductus arteriosus shunts.
- Cessation of placental blood flow and clamping of the umbilical cord cause the ductus venosus to collapse.
- Oxygen levels increase and mature circulatory pattern is established.

