circulation and circulatory changes at birth

circulation and circulatory changes at birth

- By 12 weeks of fetal life the primitive vascular tube is fully developed. Fetal circulation di ff ers from that of the adult in that the right and left ventricles pump blood in parallel rather than in series. This arrangement allows the heart and head to receive more highly oxygenated blood. This is possible because - of the presence of three structural shunts: the ductus venosus, foramen ovale and ductus arteriosus (Figure 59.21). Soon after birth, pulmonary vascular resistance falls because of the action of breathing and resulting pulmonary vasodilatation. Within 30 minutes of delivery , the ductus arte - riosus constricts in r esponse to increasing blood oxygen levels. The result is a reversal of the pulmonary–systemic pressure - gradient and termination of blood flow from the pulmonary - artery into the aorta. After birth, cutting and tying of the umbilical cord stops venous blood flow from the placenta. This lowers inferior vena ca va pressure and, with falling pulmonary vascular resistance, right atrial pressure falls. The result is closure of the foramen ovale. The abolition of venous return from the placenta also - causes the ductus venosus to close. Closure of the fetal circulatory shunts in the few hours following birth is functional, with complete structural closure typically taking several months. In 20% of adults the structural - closure of the f oramen ovale remains incomplete, but is of no cardiovascular significance. Abnormalities of cardiac structure may arise from the per - sistence of normal fetal channels (PDA, patent foramen ovale), failure of septation (atrial septal defect [ASD], VSD, tetral - ogy of Fallot), stenosis (intracardiac, supravalvular, valvular, infra valvular or extracardiac coarctation of the aorta), atresia or abnormal connections (transposition of the g reat vessels (TGV), total anomalous venous drainage). Fetal echocardiog raphy is now su ffi ciently sensitive to detect intracardiac lesions in the second trimester.

Ductus arteriosus Foramen ovale Ductus venosus Figure 59.21 Fetal circulation.

Revision #1
Created 2025-12-31 15:22:20 UTC by Omar Ayman
Updated 2025-12-31 15:22:20 UTC by Omar Ayman