

Fetal Circulation

3. During fetal development, are the heart and lungs functional organs? If so, when do they become functional?
4. Three fetal structures are used to shunt blood and bypass unnecessary delivery of blood to certain organs: the foramen ovale, the ductus arteriosus, and the ductus venosus. All three of these structures become nonfunctional shortly after birth. Using Chapter 28, Figure 28.14 on page 1086 to complete the following chart:

Fetal Structure	Location	Function	Organ Bypassed	Adult Structure
Foramen ovale				
Ductus arteriosus				
Ductus venosus				

Cardiac Output

When Nate was home visiting his parents one weekend, his mother confided in him that his dad had just been placed on high blood pressure medication. Nate was very concerned for his father and began to think about the implications of hypertension (high blood pressure) on his father's heart.

5. How does hypertension alter Nate's father's afterload?
6. In order for Nate's father to keep his CO adequate for his tissue needs, what will the heart need to do to deal with the increased afterload?

Nate was relieved to find out that his father was given Lisinopril, which is an ACE inhibitor, to treat his high blood pressure. ACE inhibitors prevent Angiotensin I from being converted into Angiotensin II, which is a vasoconstrictor.

7. How would you expect this medication to affect the $CO = SV \times HR$ equation?
8. How will this affect delivery of blood to body tissues?