

HD4 – Development of the Cardiovascular System II

LEARNING OBJECTIVES:

1. Describe the aortic arches and their major derivatives.

Ascending aorta, Aortic arch, Brachiocephalic artery.
Carotid arteries, Subclavian arteries.
Pulmonary arteries, Ductus arteriosus.
General idea of the derivation of the other arteries of the body.

2. Describe the cardinal, umbilical and vitelline venous systems.

Superior and Inferior Venae Cavae, Portal Vein, Ductus Venosus.
Pulmonary venous development.
Sinus Venosus derivatives.
General idea of the derivation of the other veins of the body.

3. Fetal circulation, and changes that occur after birth.

4. General idea of lymphatic system development.

5. Origin and significance of anomalies, specifically:

Right aortic arch.
Double aortic arch.
Aberrant subclavian artery.
Coarctation of the aorta.
Patent ductus arteriosus.

Persistent left superior vena cava.
Interrupted or duplicated inferior vena cava.
Anomalous pulmonary venous return.

6. General concepts of molecular pathways involved in cardiac development and underlying congenital heart disease.

RECOMMENDED READING:

A) Larsen's Human Embryology Textbook:

Chapter 8, especially parts dealing with learning objectives.

B) You may also find it useful to consult the book by Keith Moore and Persaud

“The Developing Human. Clinically Oriented Embryology. 7th Edition.”

Or the book by the same authors titled:

“Before we are born. Essentials of Embryology and Birth Defects, 6th Edition”.

C) It is highly recommended that you “look over” the review article by Deepak Srivastava that is posted on the website. Srivastava is one of the leaders in the field of molecular mechanisms of cardiac development.

The article is a bit dense and dry because it summarizes a large amount of data that has accumulated in the field over the last 10 years or so. **YOU ARE NOT EXPECTED TO MEMORIZE THE NAMES OF ALL THE GENES MENTIONED IN THE ARTICLE**, but it will not hurt you to be aware of the major molecular pathways currently implicated in heart development.

You should be aware that some of these genes are already important for the molecular diagnosis of congenital heart disease. Our understanding of normal and abnormal cardiac development is rapidly getting more refined and these genetic pathways are likely to become more and more relevant to the practice of cardiology over the next 10 years.