Introduction to the Human Cardiovascular System
INTRODUCTION

- The cardiovascular system is transport system of body
- It comprises blood, heart and blood vessels.
- The system supplies nutrients to and remove waste products from various tissue of body.
- The conveying media is liquid in form of blood which flows in close tubular system.
FUNCTION OF CARDIOVASCULAR SYSTEM

- Transport nutrients, hormones
- Remove waste products
- Gaseous exchange
- Immunity
- Blood vessels transport blood
  - Carries oxygen and carbon dioxide
  - Also carries nutrients and wastes
- Heart pumps blood through blood vessels
COMPONENTS OF CARDIOVASCULAR SYSTEM

• BLOOD

• HEART

• BLOOD VESSELS
BLOOD

• The Blood: Blood cells & Plasma
• Blood cells

1- Erythrocytes - Red Blood Cells
2- Leucocytes
3- Thrombocytes

• Plasma is fluid portion
HEART

• Heart is a four chambered, hollow muscular organ approximately the size of your fist

• Location:
  – Superior surface of diaphragm
  – Left of the midline
  – Anterior to the vertebral column, posterior to the sternum
FUNCTIONS OF THE HEART

• Generating blood pressure
• Routing blood
  Heart separates pulmonary and systemic circulations
• Ensuring one-way blood flow
  Heart valves ensure one-way flow
• Regulating blood supply
  Changes in contraction rate and force match blood delivery to changing metabolic needs
BLOOD VESSELS

• Blood Vessels - A closed network of tubes

• These includes:
  ➢ Arteries
  ➢ Capillaries
  ➢ Veins
BLOOD VESSELS

-Arteries (Distributing channel)
  • Thick walled tubes
  • Elastic Fibers
  • Circular Smooth Muscle

—Capillaries (microscopic vessels)
  • One cell thick
  • Serves the Respiratory System

—Veins (draining channel)
Blood vessels that carry blood away from the heart are called arteries.

They are the thickest blood vessels and they carry blood high in oxygen known as oxygenated blood (oxygen rich blood).
ARTERIES

- Accompanied by vein and nerves
- Lumen is small
- No valves
- Repeated branching
CLASSIFICATION OF ARTERIES

• Elastic - e.g. (Aorta & its Major branches)
• Muscular - e.g. (Renal, Testicular, Radial, Tibial etc.)
• Arterioles -
  Terminal arterioles
  Meta-arterioles
CAPILLARIES (5-8 micron)

• The smallest blood vessels are capillaries and they connect the arteries and veins.
• This is where the exchange of nutrients and gases occurs.
BODY CONTAINS TWO KINDS OF CAPILLARIES

• CONTINUOUS-SKIN, LUNG, SMOOTH MUSCLE, CONNECTIVE TISSUES

• FENESTRATED- PANCREAS, ENDOCRINE GLANDS, SMALL INTESTINE, CHOROID PLEXUS, CILIARY PROCESS etc.
SINUSOIDS

• SINUSOIDS- Large irregular vascular space eg. Liver, Spleen, Bone marrow, suprarenal, Parathyroid etc.
VEINS

• Blood vessels that carry blood back to the heart are called veins.
• They have one-way valves which prevent blood from flowing backwards.
• They carry blood that is high in carbon dioxide known as deoxygenated blood (oxygen poor blood).
VEINS

• Thin Walled
• Large irregular lumen
• Have valves
• Dead space around
• Types:
  Large
  Medium
  Small
VEINS

• Veins without valves:
  ➢ SVC & IVC
  ➢ Hepatic, Renal
  ➢ Uterine, Ovarian not Testicular
  ➢ Facial
  ➢ Pulmonary
  ➢ Umbilical
  ➢ Emissary
  ➢ Portal Veins
VEINS

- Veins without Muscular tissue:
  - Dural venous sinuses
  - Pial Veins
  - Retinal
  - Veins of erectile tissue of sex organs
  - Veins of spongy bones
VEINS

- Factors responsible for venous return:
  1. Muscle contraction
  2. Negative intrathoracic pressure
  3. Pulsation of arteries
  4. Gravity
  5. Valves
ANASTOMOSIS

• Communication between vessels
• ARTERIAL:
  Actual (end to end)- Palmar, plantar, Circle of Willis, Labial Intestinal arcade, etc.
  Potential- Coronary, around joints etc.
ANASTOMOSIS

• ARTERIOVENOUS ANASTOMOSIS:
1. Skin of nose
2. Lips
3. External Ear
4. Mucus membrane of GI & nose
5. Erectile tissue of sex organ
6. Thyroid
7. Tongue
END ARTERIES

• END ARTERIES:
  1. Central artery of retina
  2. Arteries of spleen, liver, kidneys, metaphyses of long bones
  3. Central branches of cerebral cortex
CIRCULATION

– Coronary circulation – the circulation of blood within the heart.
– Pulmonary circulation – the flow of blood between the heart and lungs.
– Systemic circulation – the flow of blood between the heart and the cells of the body.
– Fetal Circulation
Pulmonary circulation
The flow of blood between the heart and lungs.

Systemic circulation
The flow of blood between the heart and the cells of the body.

Figure 18.5
CORONARY CIRCULATION: ARTERIAL SUPPLY
Portal circulation - the flow of blood between two sets of capillaries before draining in systemic veins.
Fetal Circulation

- Aorta
- Ductus arteriosus
- Superior vena cava
- Pulmonary trunk
- Inferior vena cava
- Descending aorta
- Ductus venosus
- Umbilical vein
- Umbilical arteries
APPLIED

• Problems with the cardiovascular system are common, but they don’t just affect older people.

• Many heart problems affect children and teenagers.
THANK YOU
QUESTIONS

1-All of the following are the example of elastic arteries except:
   a) Aorta
   b) Common carotid artery
   c) Subclavian artery
   d) Radial artery
2-All of the following are the example of end arteries except:

a) Central branches of cerebral arteries
b) Central artery of retina

c) Facial artery
d) Splenic artery
QUESTIONS

3-Arteriovenous anastomosis are found at all of the following sites except:

a) Skin of lips
b) Erectile tissue of penis
c) Thyroid gland
d) Liver
QUESTIONS

4-All of the following are the example of portal circulation except:

a) Hepatic circulation
b) Renal circulation
c) Circulation of hypophysis cerebri
d) Pulmonary circulation
QUESTIONS

5-All of the following are features of veins except:
a) Thin walls
b) Thin tunica media
c) Thin tunica adventia
d) Wide lumen
REFERENCES

1- General Anatomy by Vishram Singh
2- Clinical Anatomy by R. Snell
3- Gray’s Anatomy