A. location

- in thorax, in inferior mediastinum
- posterior to sternum
- medial to lungs
- superior to diaphragm
- anterior to vertebrae
- orientation - oblique
- apex points down and to the left
- 2/3 of mass on left side of body

B. overall function - creates a pressure gradient that moves blood through the vascular system

perfusion = blood flow through tissues and organs

1. left heart = systemic pump
   supplies body tissues and returns blood to heart

2. right heart = pulmonary pump
   takes blood to lungs to pick up oxygen and get rid of carbon dioxide
C. pericardium -

1. parietal pericardium - double membrane surrounding heart, attached only at base of vessels on superior margin of heart, also called the pericardial sac
   a. outer layer = fibrous c.t.
   b. inner layer = serous membrane (simple squamous e. + areolar c.t.)

2. visceral pericardium = attached to surface of heart
   serous membrane (simple squamous e. + areolar c.t.)

D. heart wall

1. epicardium = visceral pericardium

2. myocardium = cardiac m.; bundles of cells arranged in spiral pattern

3. endocardium = simple squamous e. + areolar c.t.
E. chambers and vessels

1. atria (right and left)
   - superior
   - separated from each other by interatrial septum
   - atrioventricular groove / coronary sulcus separates atria from ventricles

   a. right atrium forms right border of heart
      - auricle = outer wall of atrium
      - fossa ovalis in interatrial septum
      - superior and inferior vena cavae return blood from body to heart
      - coronary sinus returns blood from coronary circulation to heart

   b. left atrium forms most of posterior surface
      - auricle
      - pulmonary veins return blood from lungs to heart

2. ventricles (right and left)
   - inferior
   - interventricular septum separates ventricles from each other
   - interventricular sulci = grooves on outside of heart over interventricular septum; anterior and posterior
   - trabeculae carnae = ridges of muscle tissue seen on internal surface of ventricles

   a. right ventricle (thinner wall)
      - right border of heart
      - pulmonary trunk carries blood from heart to lungs

   b. left ventricle (thicker wall)
      - apex and inferior surface of heart
      - aorta carries blood from heart to body
F. valves - control direction of blood flow; prevent backflow
valves are opened and closed by pressure gradients

1. atrioventricular (AV) valves
   - have cusps attached to ventricular wall by chordae tendineae at papillary muscles
     a. right = tricuspid
     b. left = bicuspid or mitral

2. semilunar (SL) valves
   - have 3 cusps attached to wall at junction of ventricle and artery
     a. right = pulmonary
     b. left = aortic
G. fibrous skeleton

made of dense fibrous c.t.
separates atria and ventricles
surrounds and anchors valves; prevents overdilation
serves as insertion for cardiac muscle bundles
blocks electrical impulses

H. conducting system

1. autorhythmic cells vs contractile cells

   a. contractile cells (99%) are specialized for contraction
   b. autorhythmic cells (1%) are specialized for generating and conducting electrical signals
      • smaller diameter, less actin and myosin than contractile cells
      • automatically generate action potentials and conduct cardiac impulse through heart

2. conducting system

   sinoatrial (SA) node = normal pacemaker of heart located in superior, lateral right atrium

   internodal pathways = cells in right and left atria

   atrial myocardium

   atrioventricular (AV) node - located in medial, inferior right atrium

   atrioventricular bundle (bundle of His) pass from AV node into superior interventricular septum

   left and right bundle branches run down interventricular septum then upwards into outer ventricule walls

   conduction myofibers (Purkinje fibers) - large cells, few myofilaments

   ventricular myocardium
I. innervation

1. sensory – visceral afferent neurons

2. motor
   a. sympathetic (cardiac nerves)
      • originate in cervical and thoracic ganglia and pass through the cardiac plexus
      • innervate myocardium, nodes, coronary vessels
   b. parasympathetic (branches of vagus nerve)
      • branches of vagus nerve pass through the cardiac plexus
      • innervate SA node and AV node, some cells in atrial myocardium

J. coronary circulation

left and right coronary arteries leave aorta just above aortic semilunar valve

1. left coronary artery runs posterior to pulmonary trunk and branches just lateral of the pulmonary trunk into:
   a. anterior interventricular a.
      • located in anterior interventricular sulcus
      • supplies interventricular septum and anterior walls of both ventricles
   b. circumflex a.
      • located in atrioventricular sulcus
      • supplies left atrium and posterior left ventricle

2. right coronary artery in AV sulcus
   a. marginal a.
      • runs along right margin of heart
      • supplies right ventricle
   b. posterior interventricular a.
      • located in posterior interventricular sulcus
      • supplies interventricular septum and posterior walls of both ventricles

3. capillaries

4. cardiac veins

5. coronary sinus