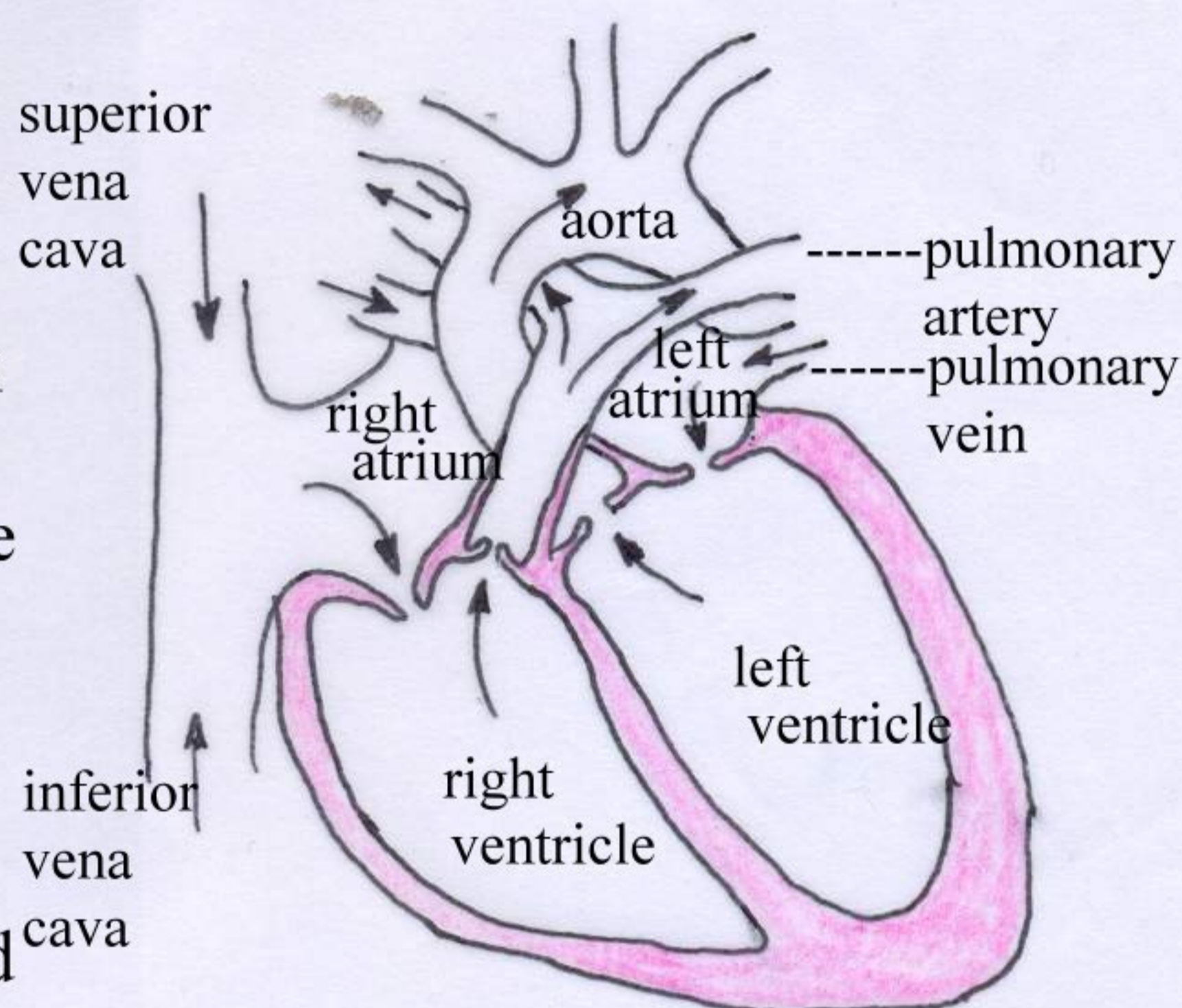


Cardiovascular System

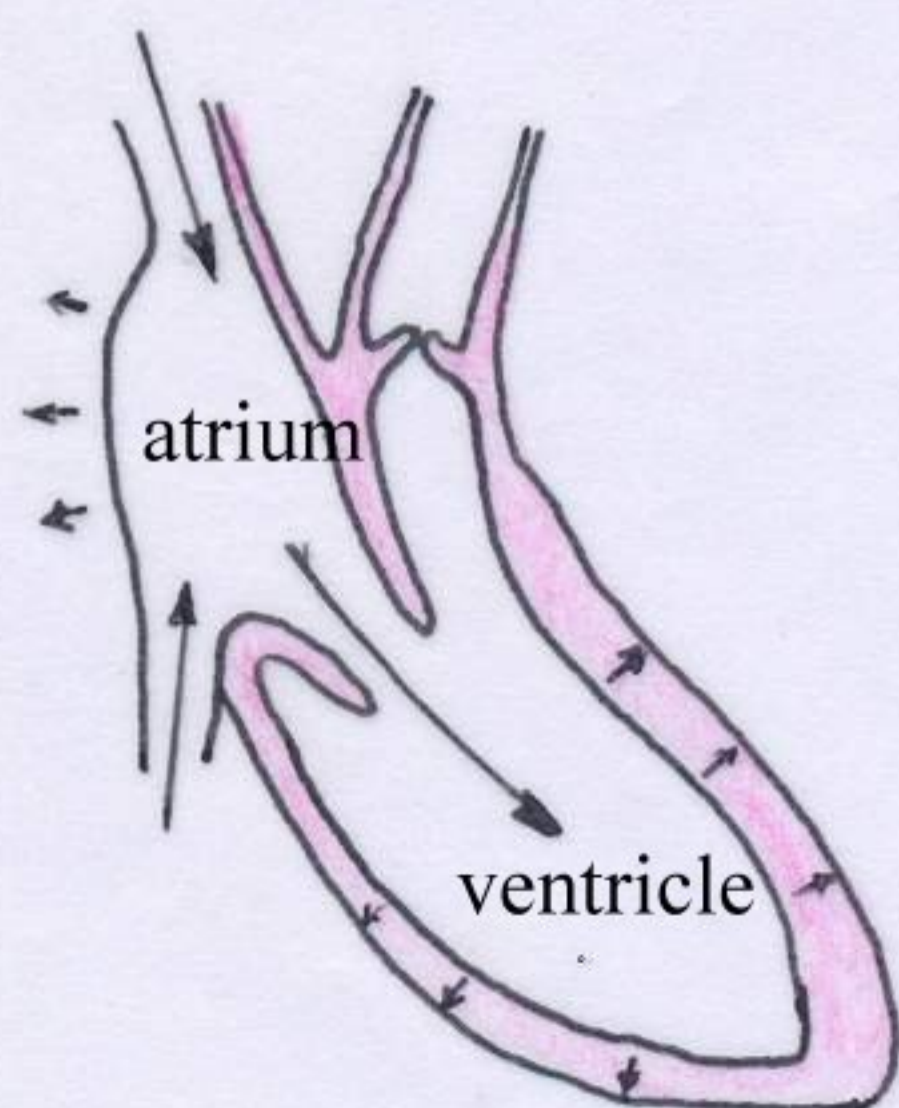
Andrew Ying-Siu Lee, MD, PhD.

(1) Structure of heart:

- heart has left and right atria and ventricles (4 chamber)
- atrioventricular valves (mitral valve, left and tricuspid valve, right) between atria and ventricles
- aortic valve (left) and pulmonary valve (right) between ventricles and great arteries (aorta and pulmonary artery)
- atria and ventricles : pumping action of heart
- heart valves: control direction of blood flow



(2) Pumping action of heart



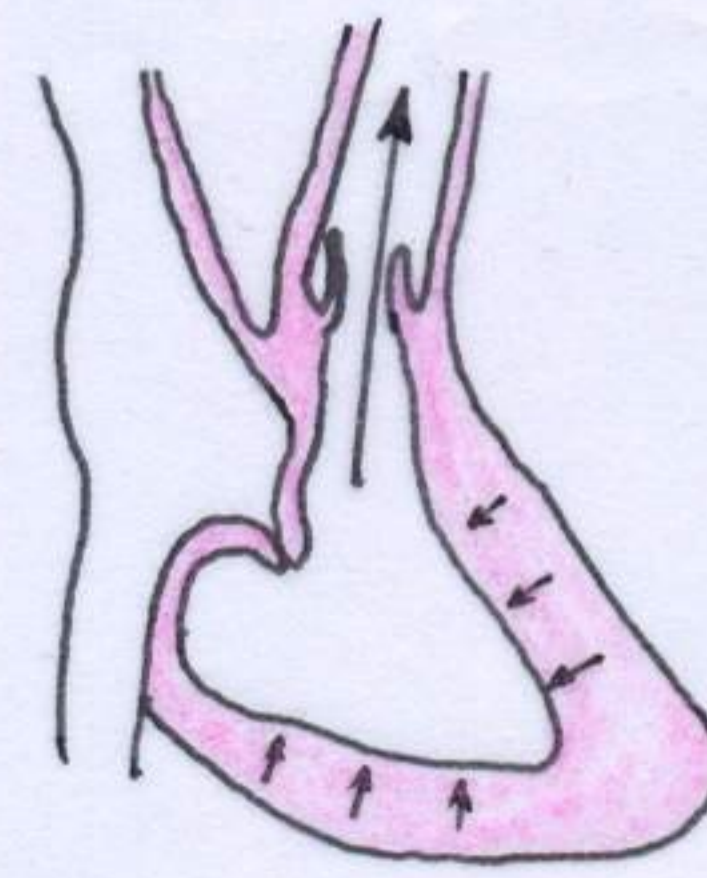
Relaxation of atria and ventricles

--> atrioventricular valves open and aortic or pulmonary valves close --> pooling of blood from venous system to heart



Atrial contraction

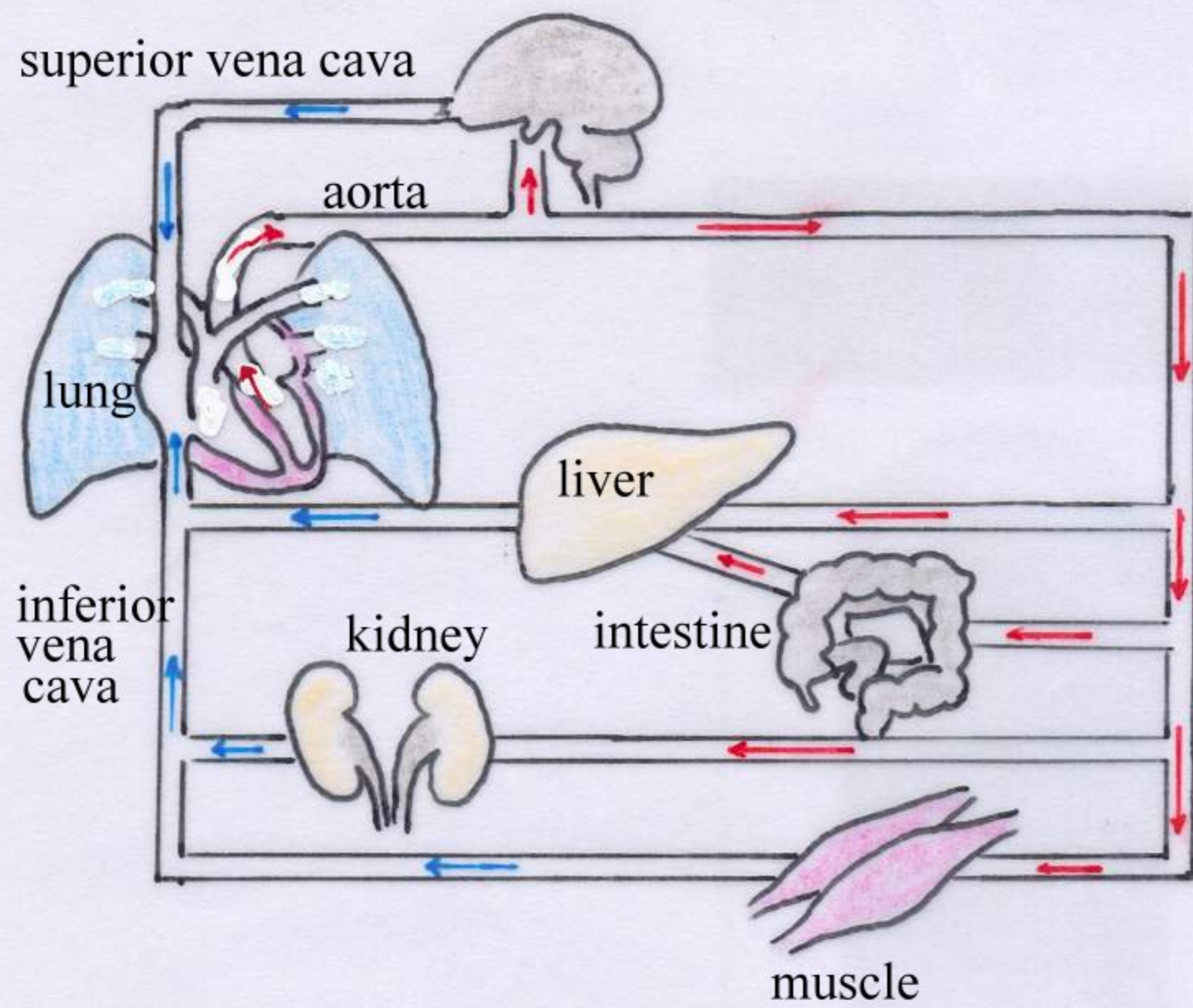
--> atrioventricular valves open and aortic or pulmonary valves close --> blood flow from atria to ventricles



Ventricular contraction

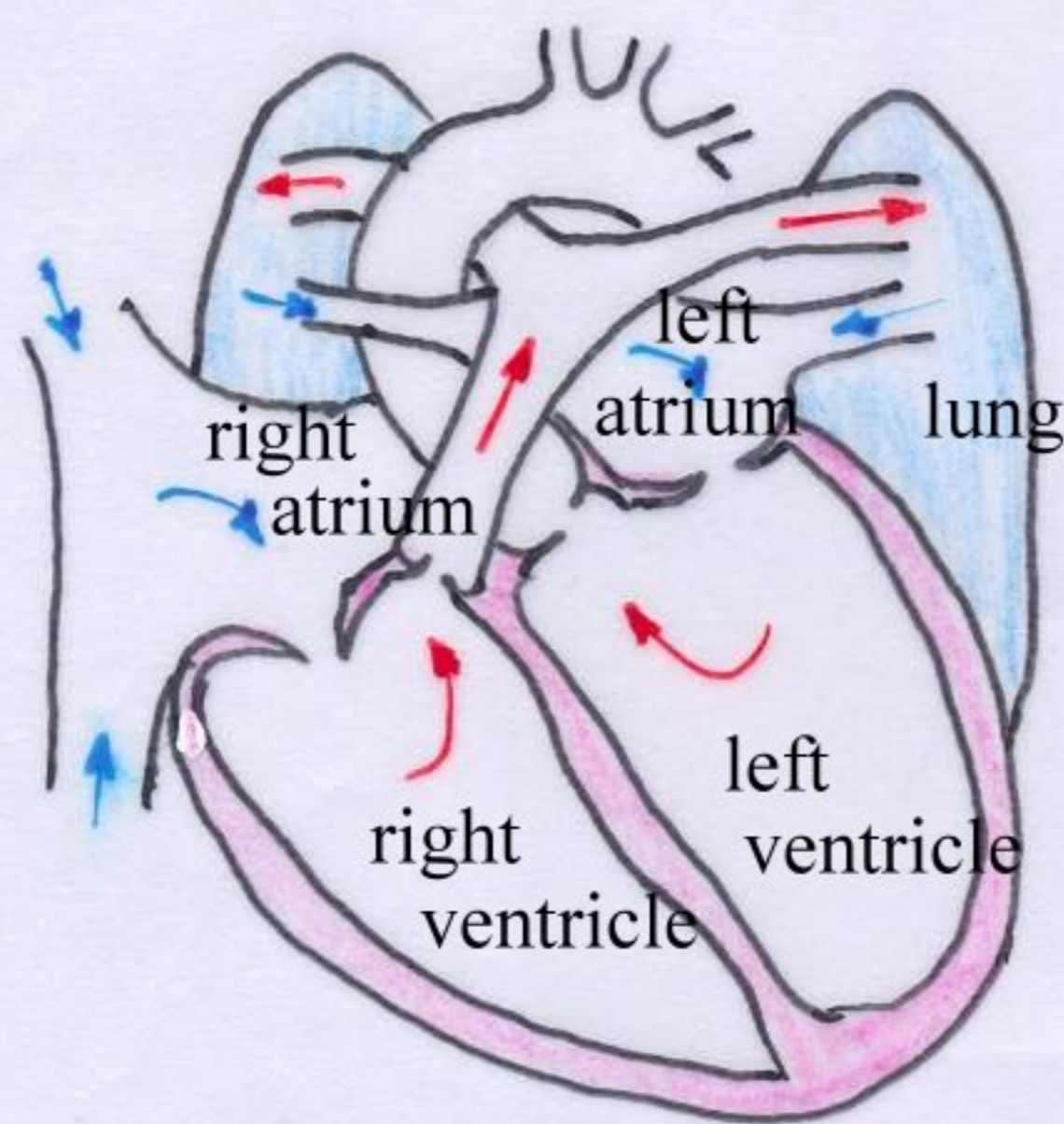
--> atrioventricular valves close and aortic or pulmonary valves open --> blood flow from ventricle to pulmonary artery or aorta

(3) Blood circulation consists of:



Systemic circulation:

left ventricle --> aorta --> arteries --> capillary system (for exchange of oxygen, nutrients and wastes) --> veins --> superior and inferior vena cava --> right atrium

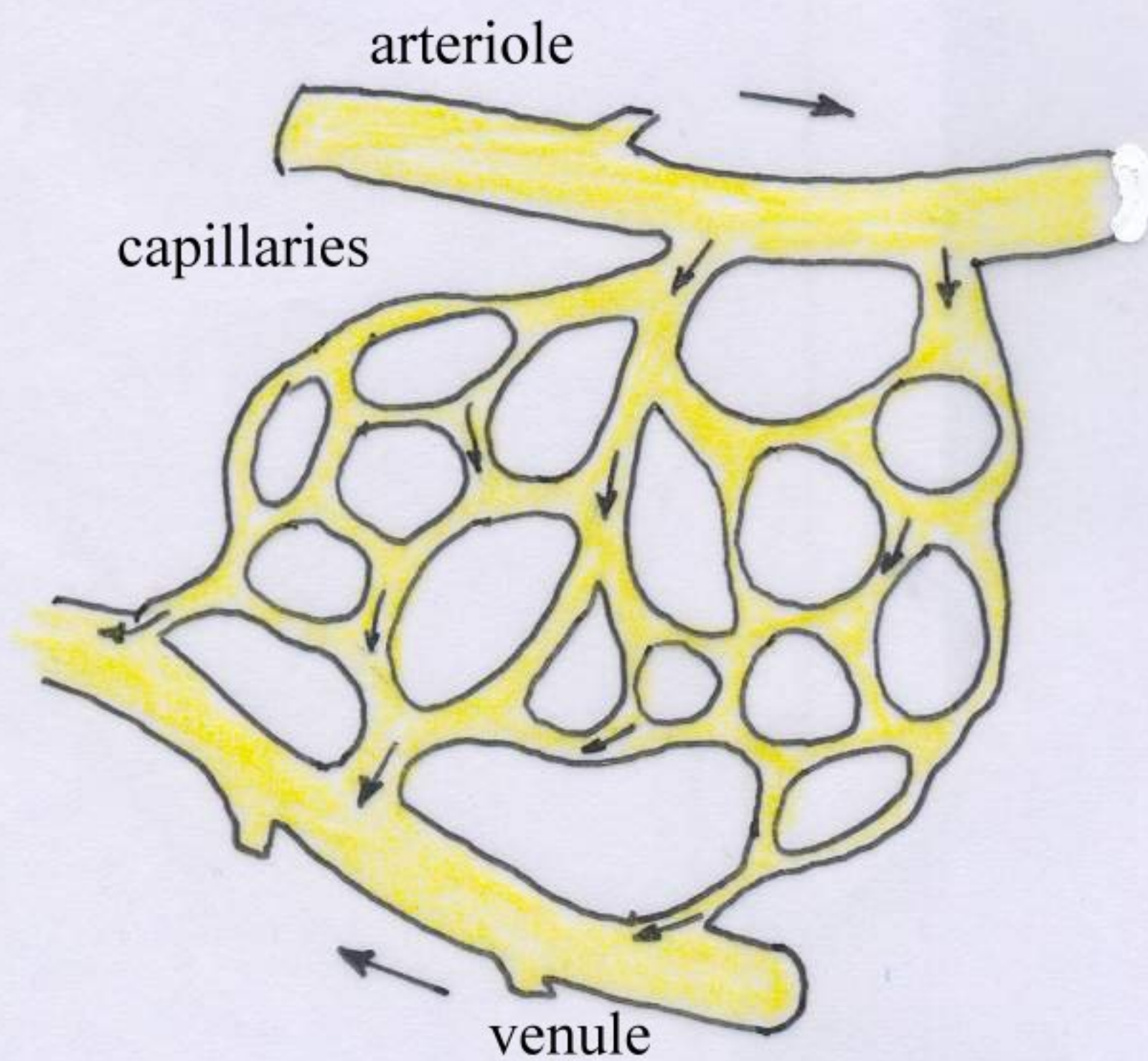
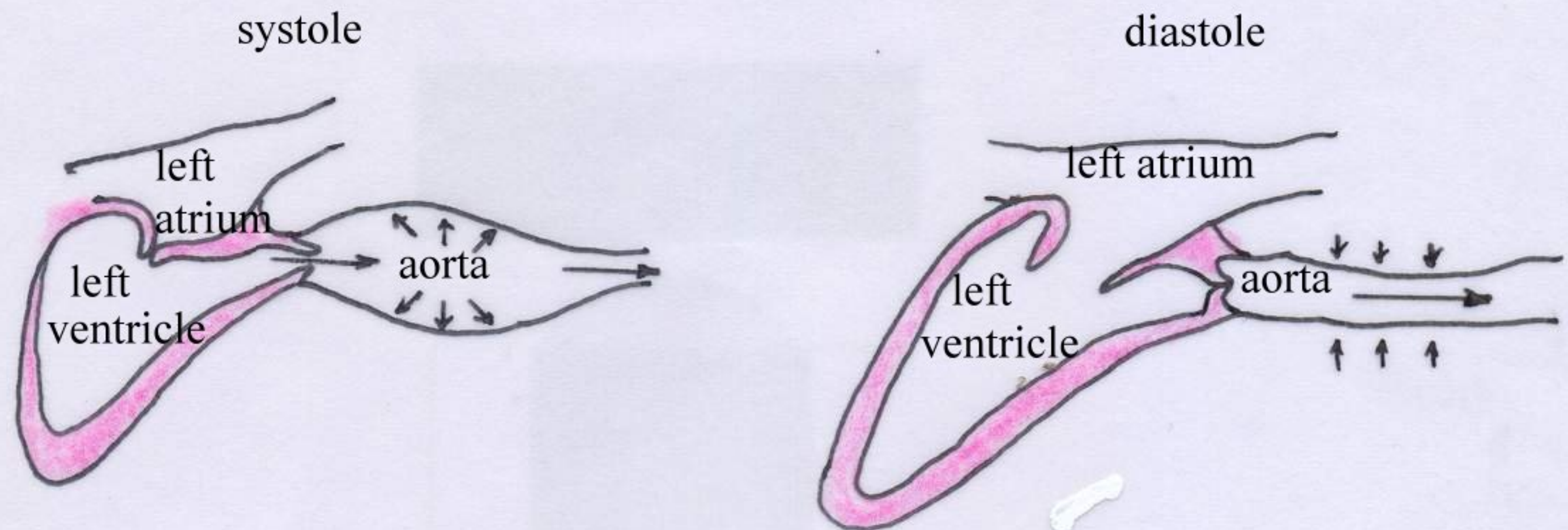


Pulmonary circulation:

right ventricle --> pulmonary artery --> pulmonary capillary system (for gas exchange. pulmonary venous blood release carbon dioxide and obtain oxygen from lung) --> pulmonary vein --> left atrium

(4) Arterial system:

- intima of arteries have elastic fiber. During ventricular contraction, intima can expand so as to lessen blood pressure. During ventricular relaxation, intima rebound so as to propel blood flow forward (accessory pumping action)
- baroreceptors and chemoreceptors present in arterial system, so as to control blood flow and pressure under different situations.



(5) Capillary system:

aorta --> arteries --> arterioles --> capillaries (for exchange of gases, nutrients and wastes) --> venules --> veins --> superior and inferior vena cava --> right atrium

(6) Venous system:

Skeletal muscle pump aids in forwarding venous blood towards the heart. Valves in veins open (forward flow) and close (avoid retrograde flow) during muscle contraction and relaxation, respectively.

