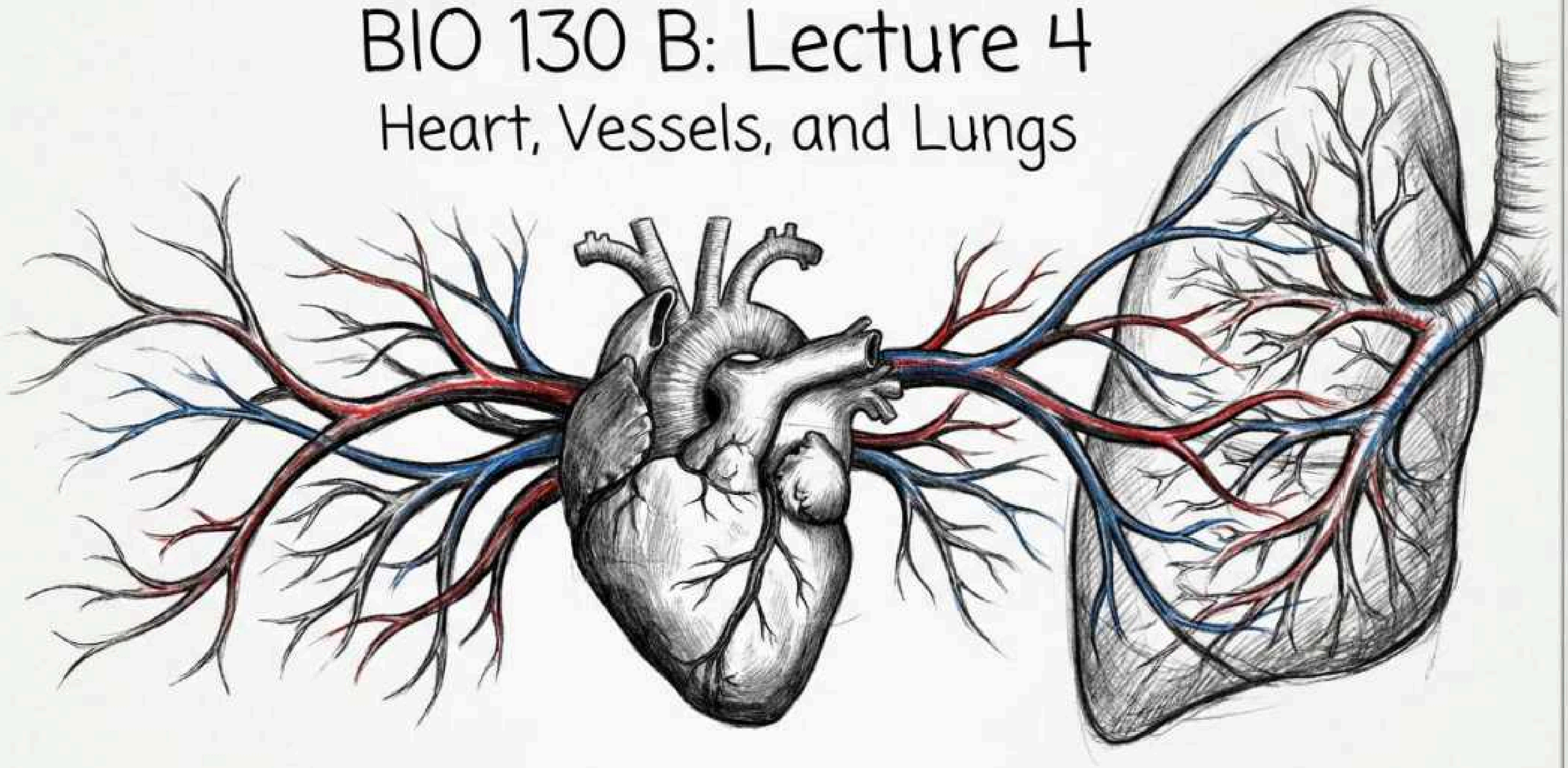
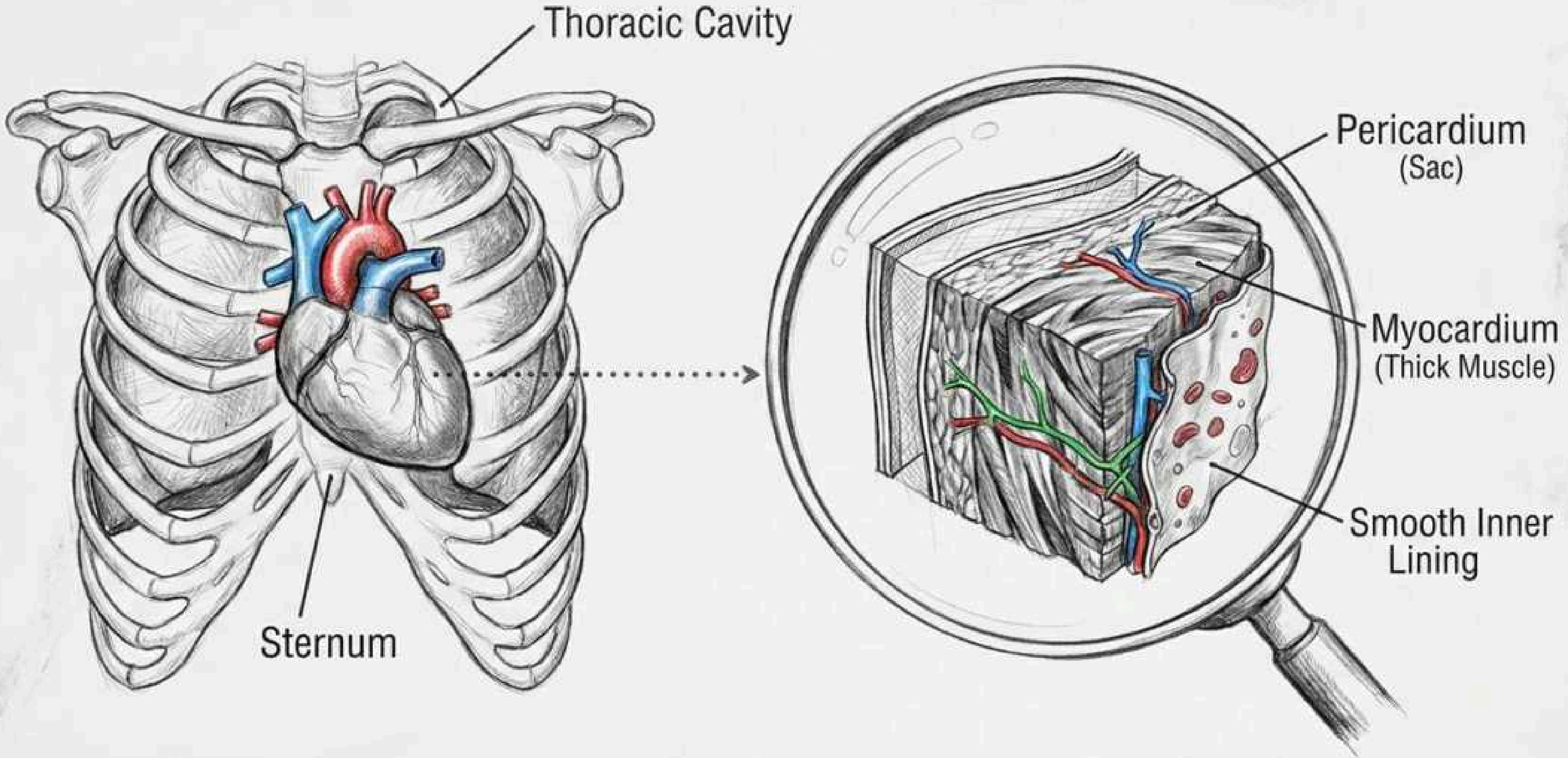
BIO 130 B: Lecture 4

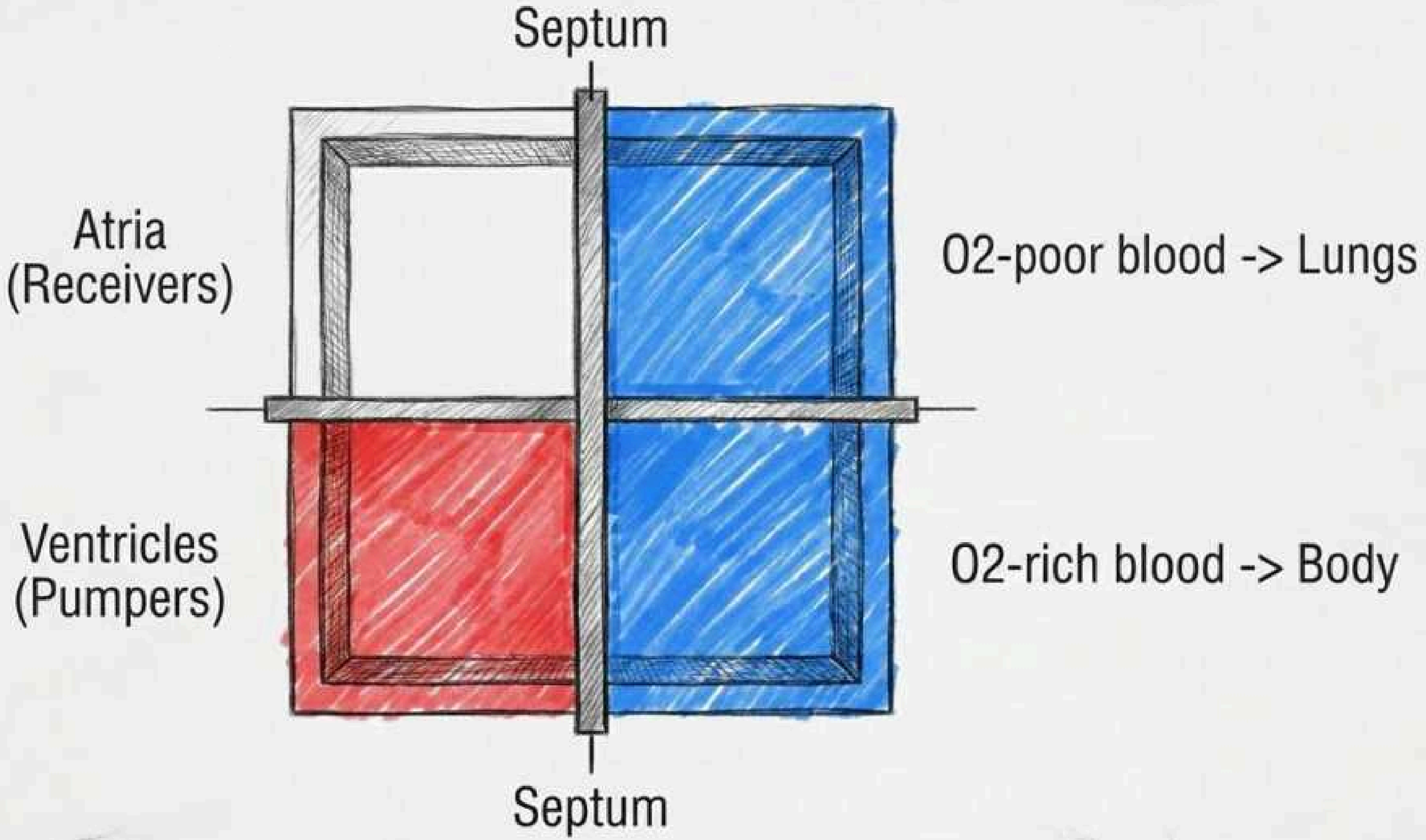
Heart, Vessels, and Lungs



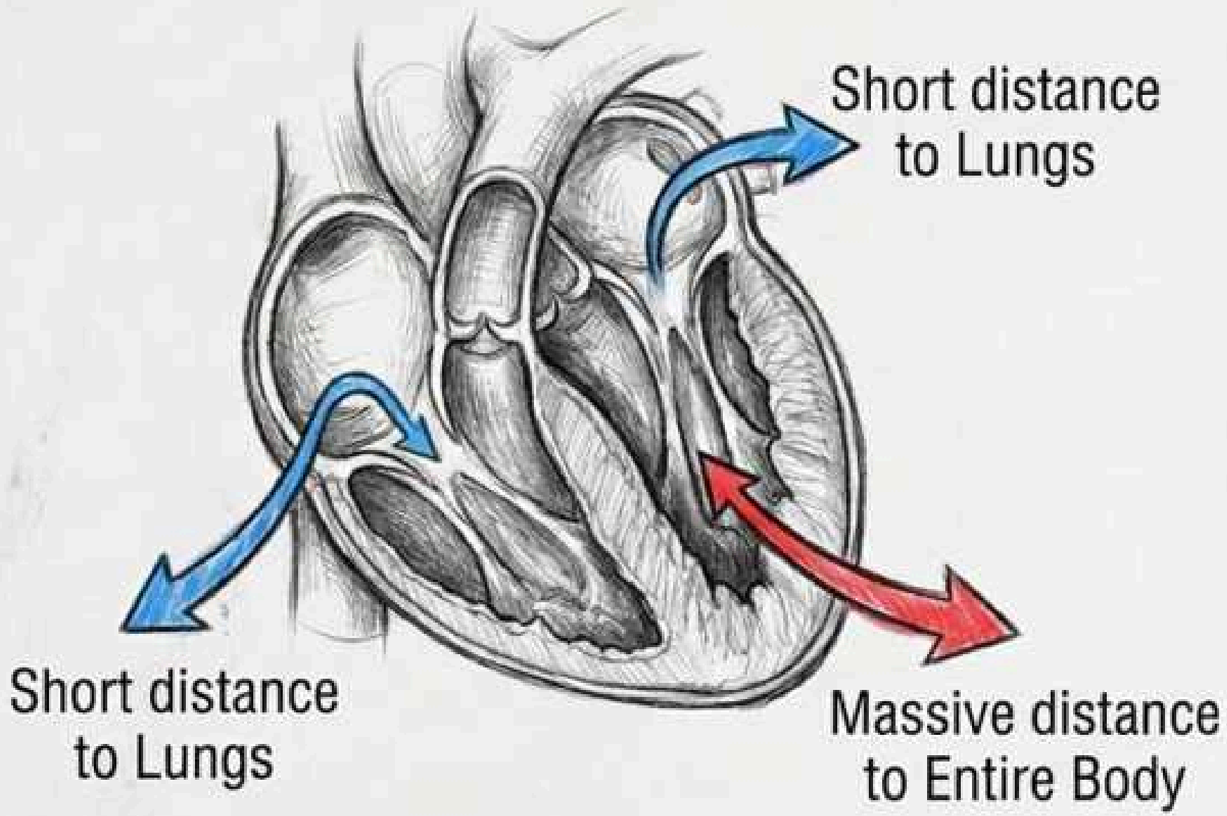
An anatomical study of position, flow, network, and exchange.


Thoracic Cavity
Sternum
Pericardium
(Sac)
Myocardium
(Thick Muscle)
Smooth Inner
Lining

¶ 4.2

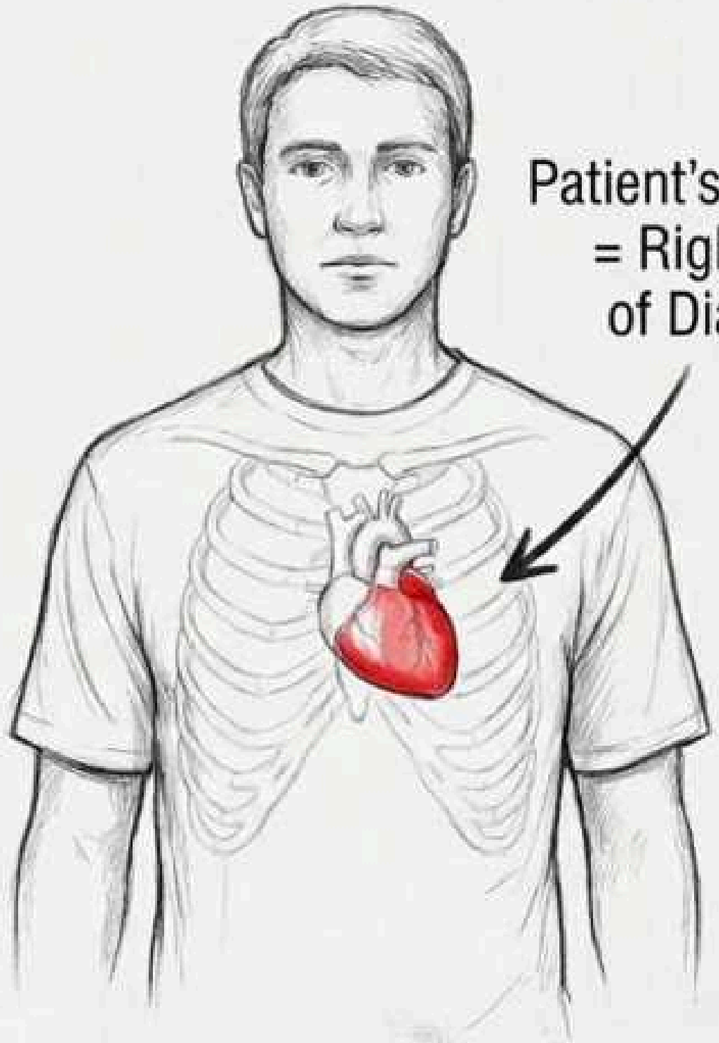

Septum
Atria
(Receivers)
O2-poor blood -> Lungs
Ventricles
(Pumpers)
O2-rich blood -> Body
Septum

Structure Follows Function



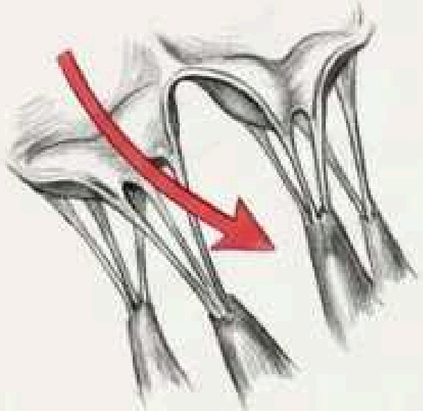
$$W_{left_wall} \approx 3 \times W_{right_wall}$$

Orientation

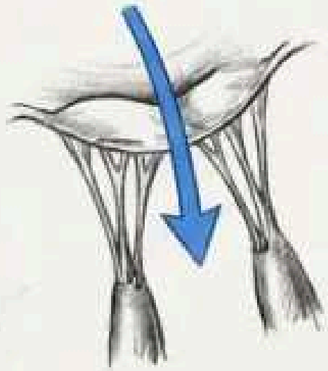


Atrioventricular (AV) Valves

Tricuspid (Right)

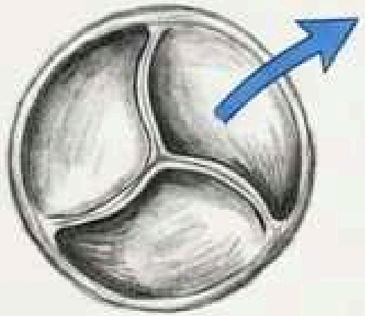


Mitral / Bicuspid (Left)

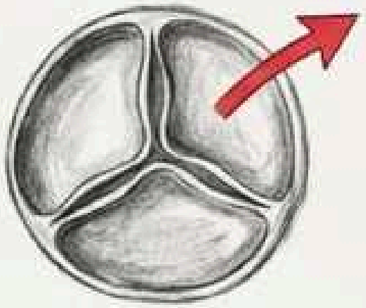


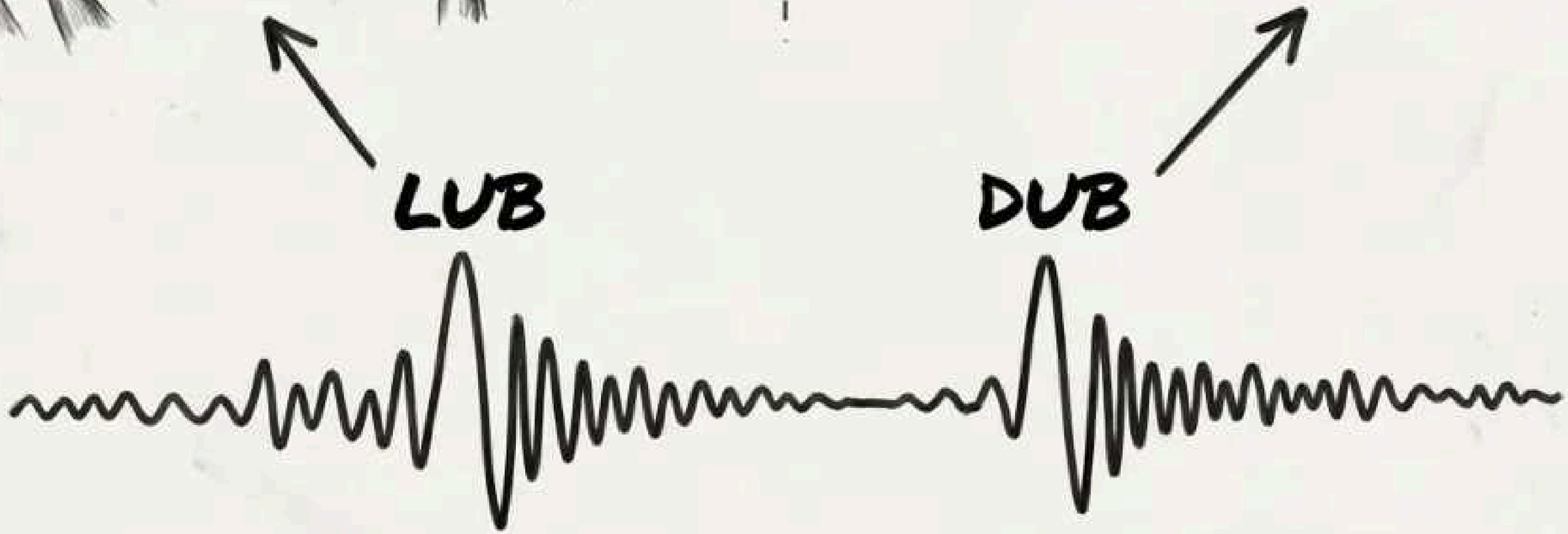
Semilunar Valves

Pulmonary

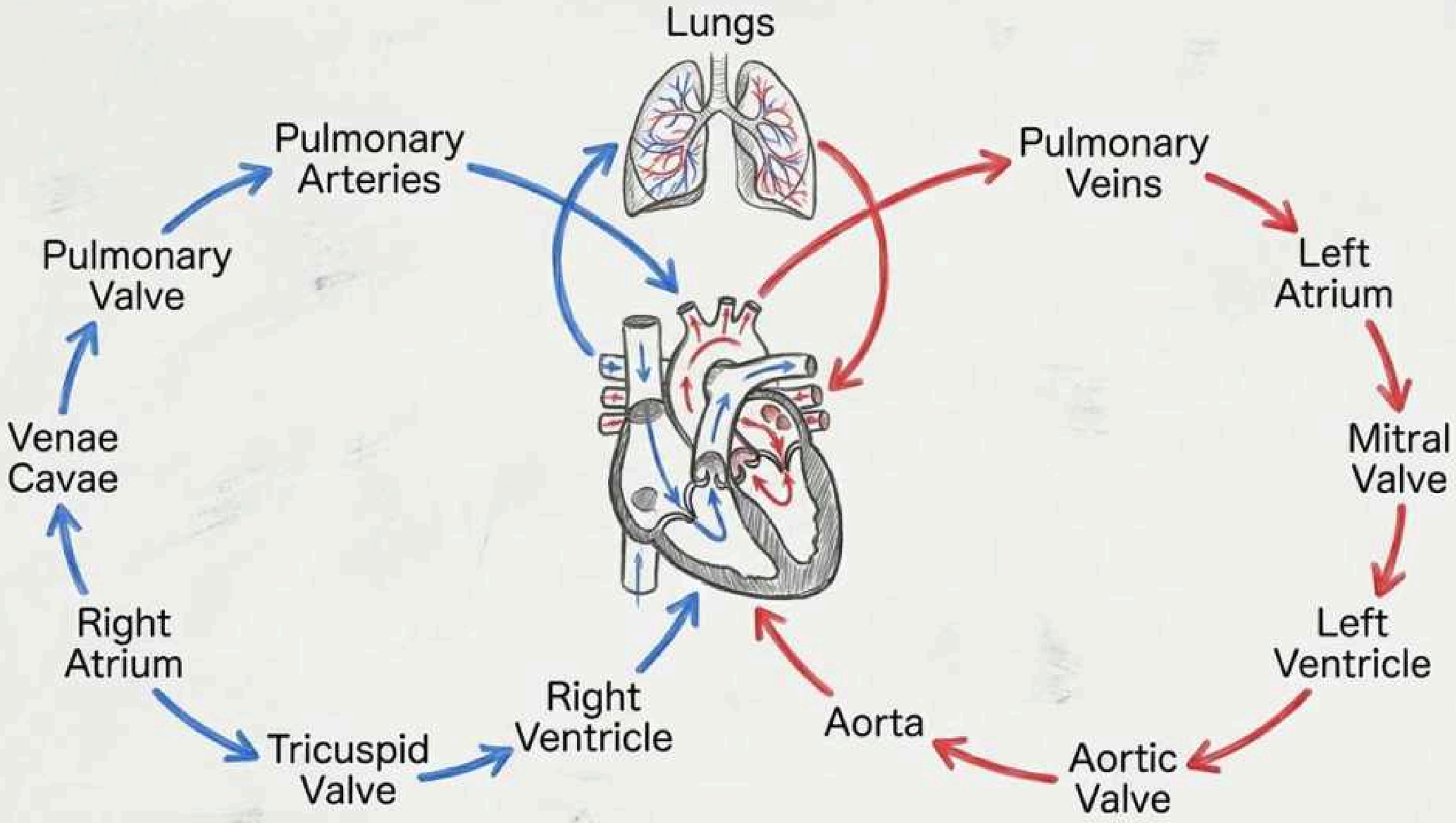


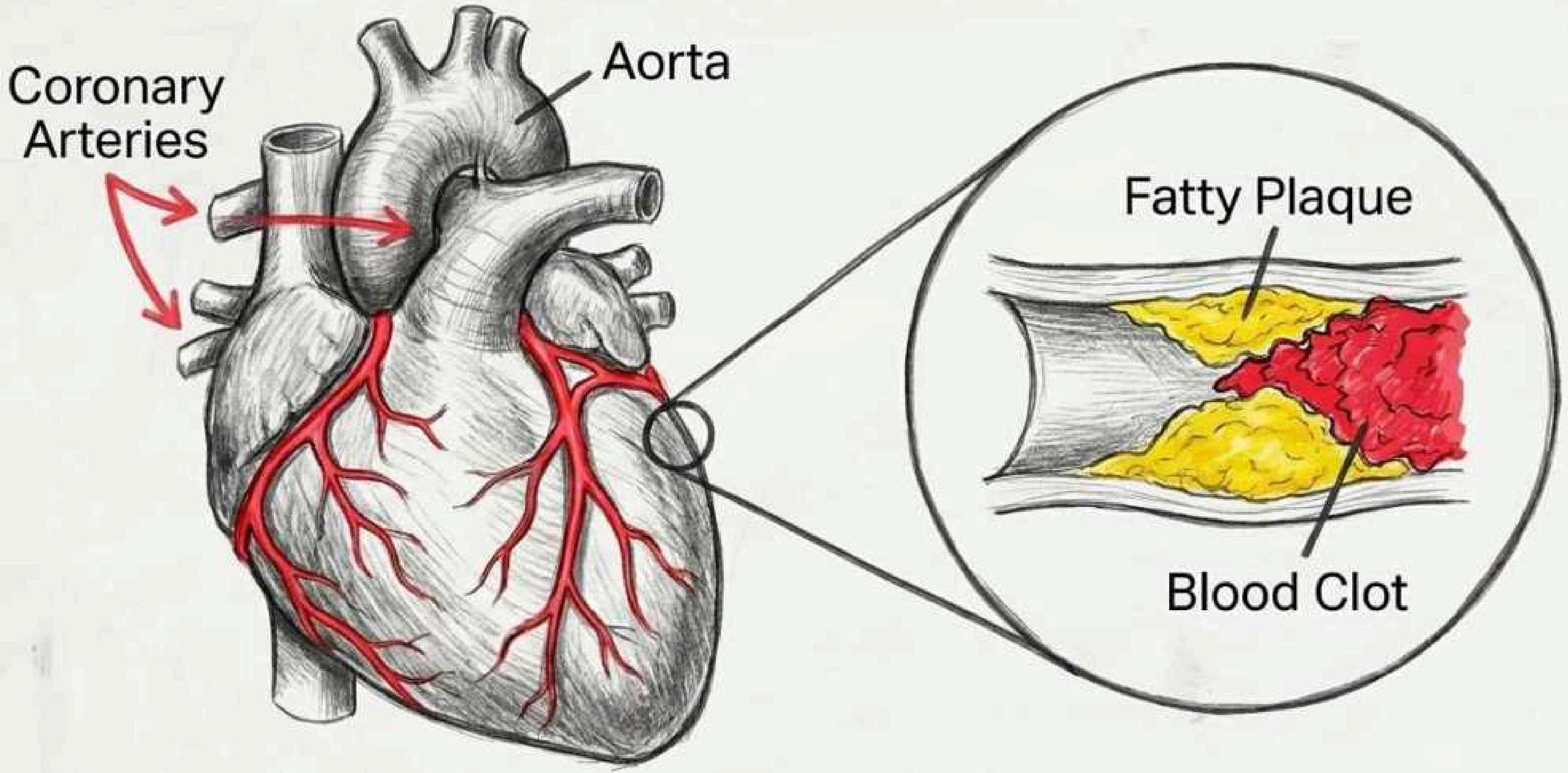
Aortic



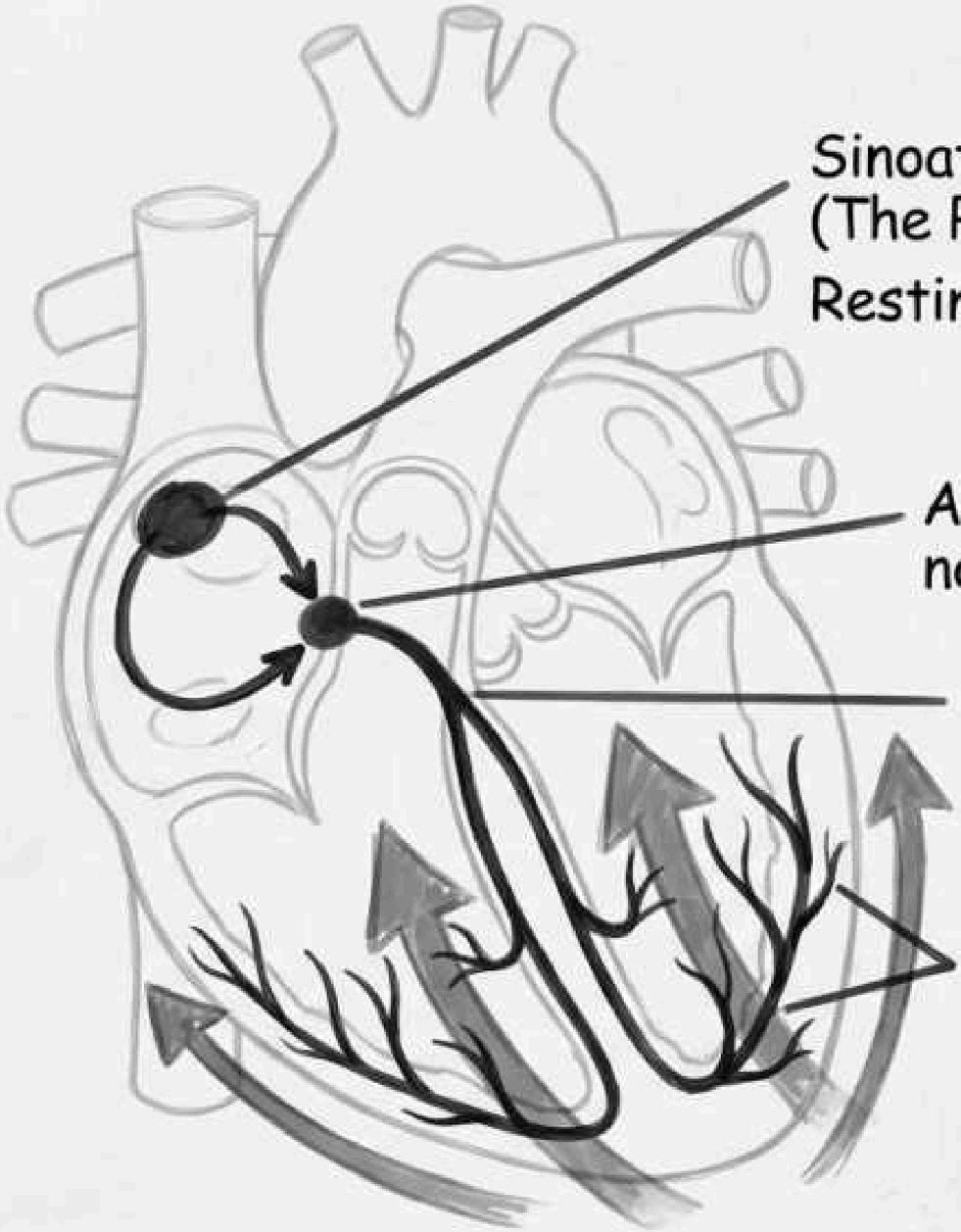


One-way flow control. The heart sounds are the physical closing of these specific valves.


Lungs
Pulmonary Arteries
Pulmonary Veins
Pulmonary Valve
Left Atrium
Venae Cavae
Mitral Valve
Right Atrium
Left Ventricle
Tricuspid Valve
Right Ventricle
Aorta
Aortic Valve



Blockage (Plaque + Clot) → Zero $\not{O}_2$ to Muscle → Myocardial Infarction (Heart Attack)



Sinoatrial (SA) node
(The Pacemaker)

Resting Rate = 60-100 bpm

Atrioventricular (AV)
node (The Pause)

Bundle of His

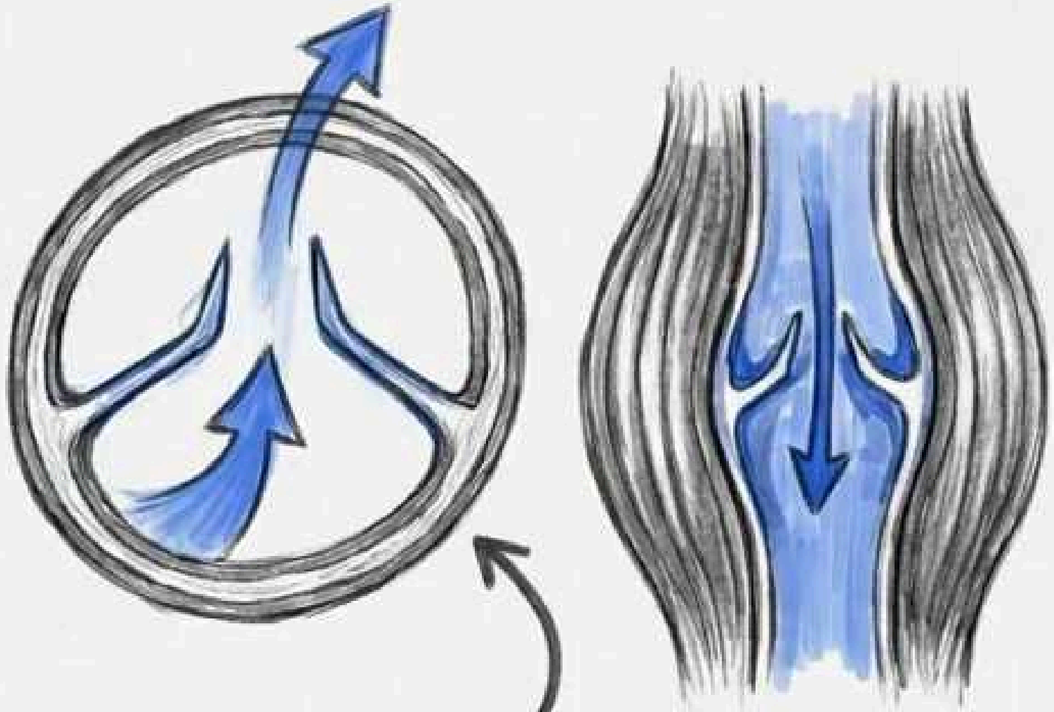
Purkinje fibres

Arteries

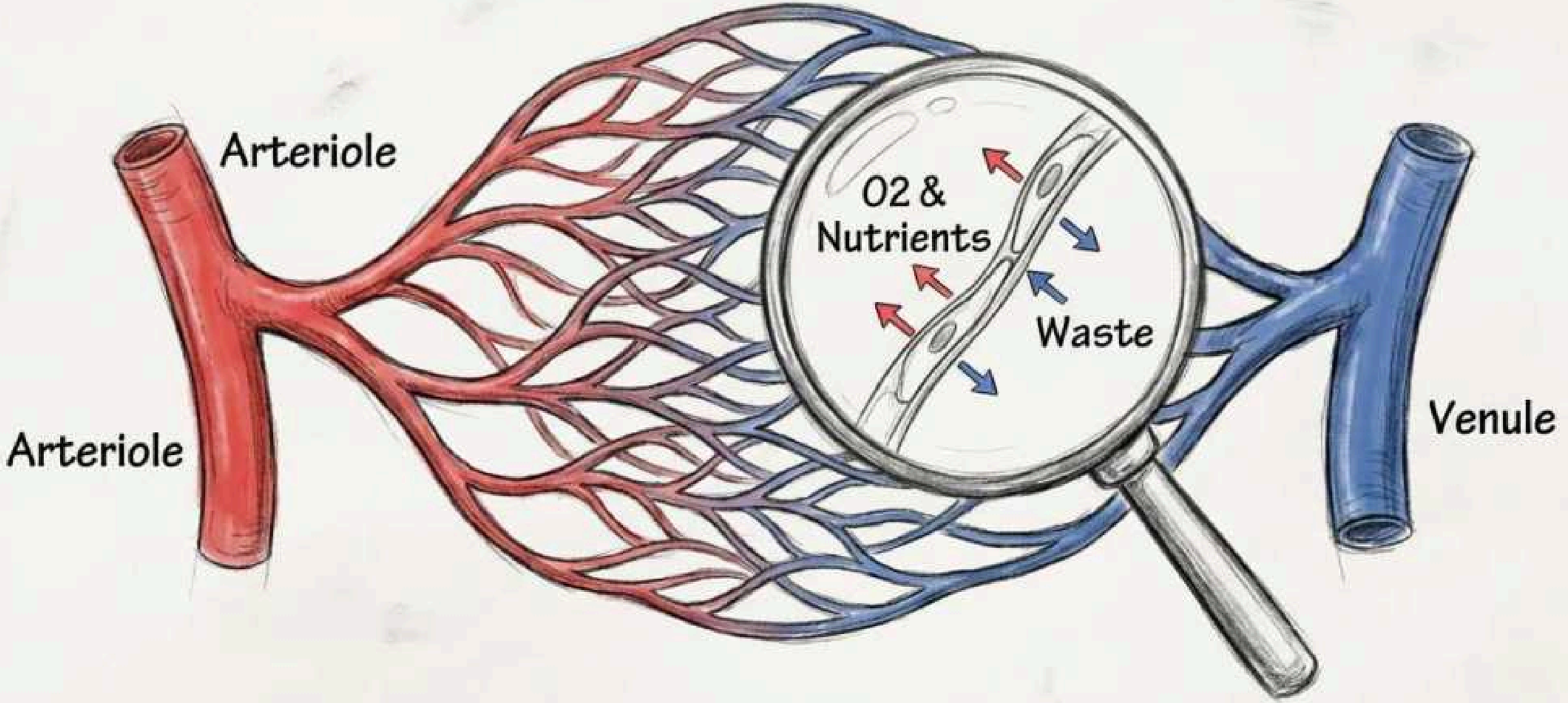


- Away from heart
- High Pressure
- Branches into arterioles

Veins



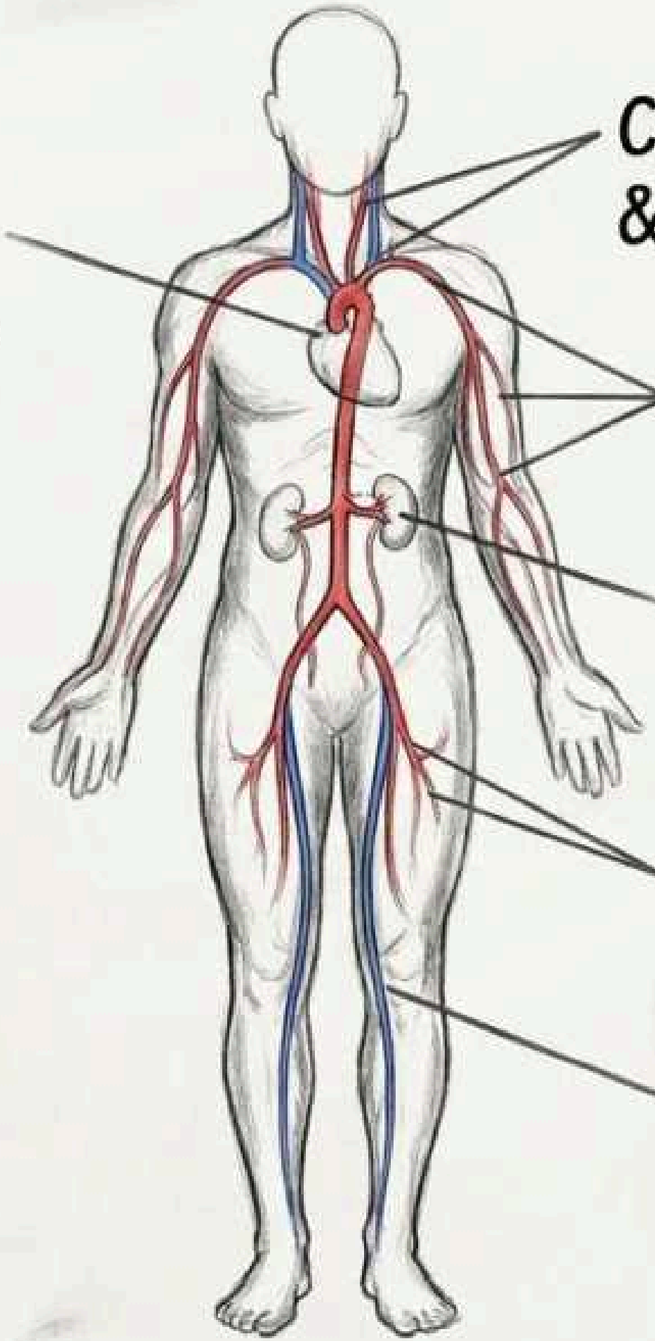
- Toward heart
- Low Pressure
- Valves prevent backflow (especially in legs)



Total Length if laid end-to-end > 10,000 km

Every single cell in the body lies close to a capillary.

¶ 4.10



Aorta
(arches over heart,
runs down trunk)

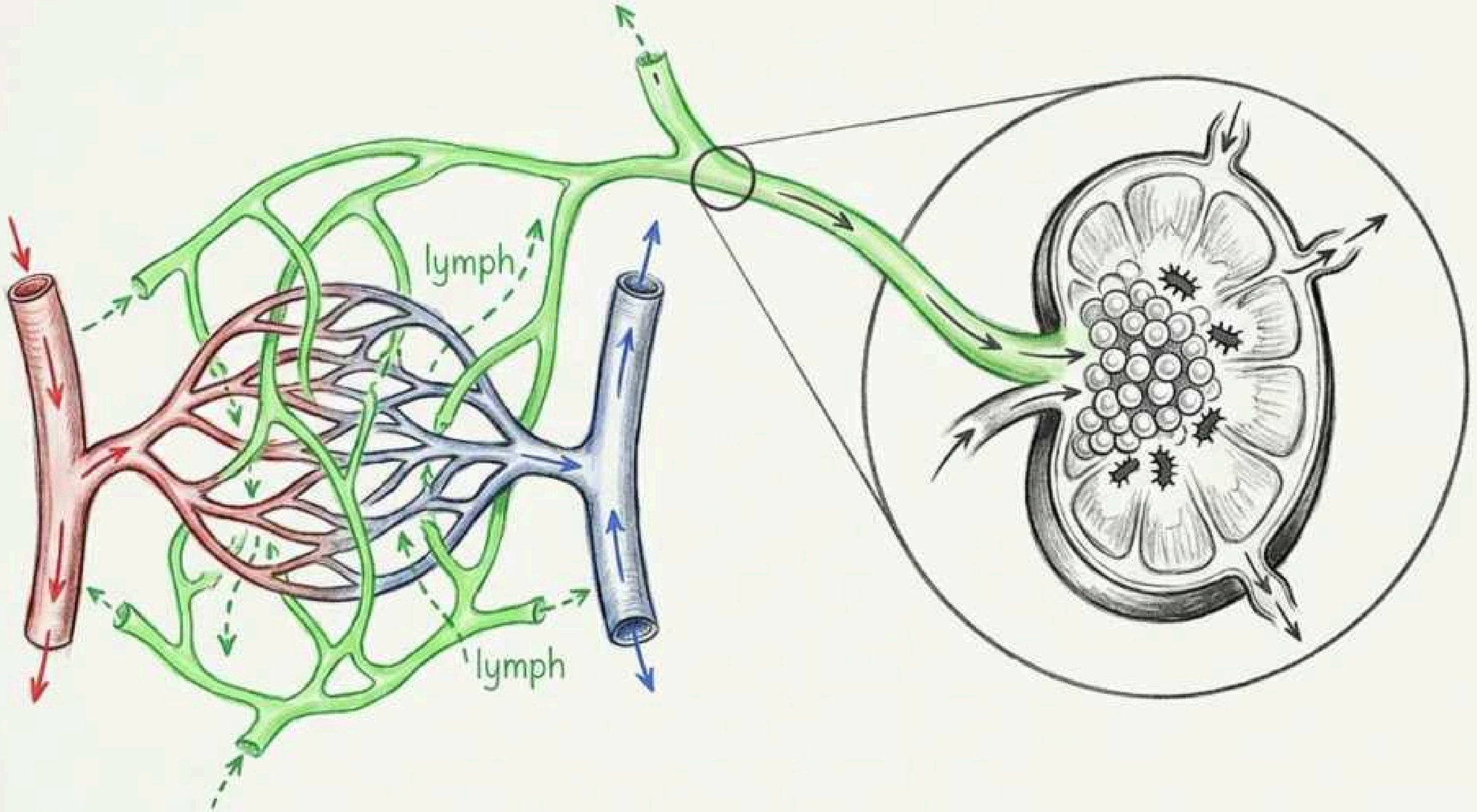
Carotid arteries (pulse point)
& Jugular veins (drainage)

Subclavian arteries

Renal arteries
(kidneys)

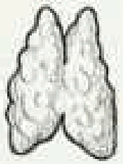
Femoral arteries

Great saphenous vein
(longest in the body)





Spleen

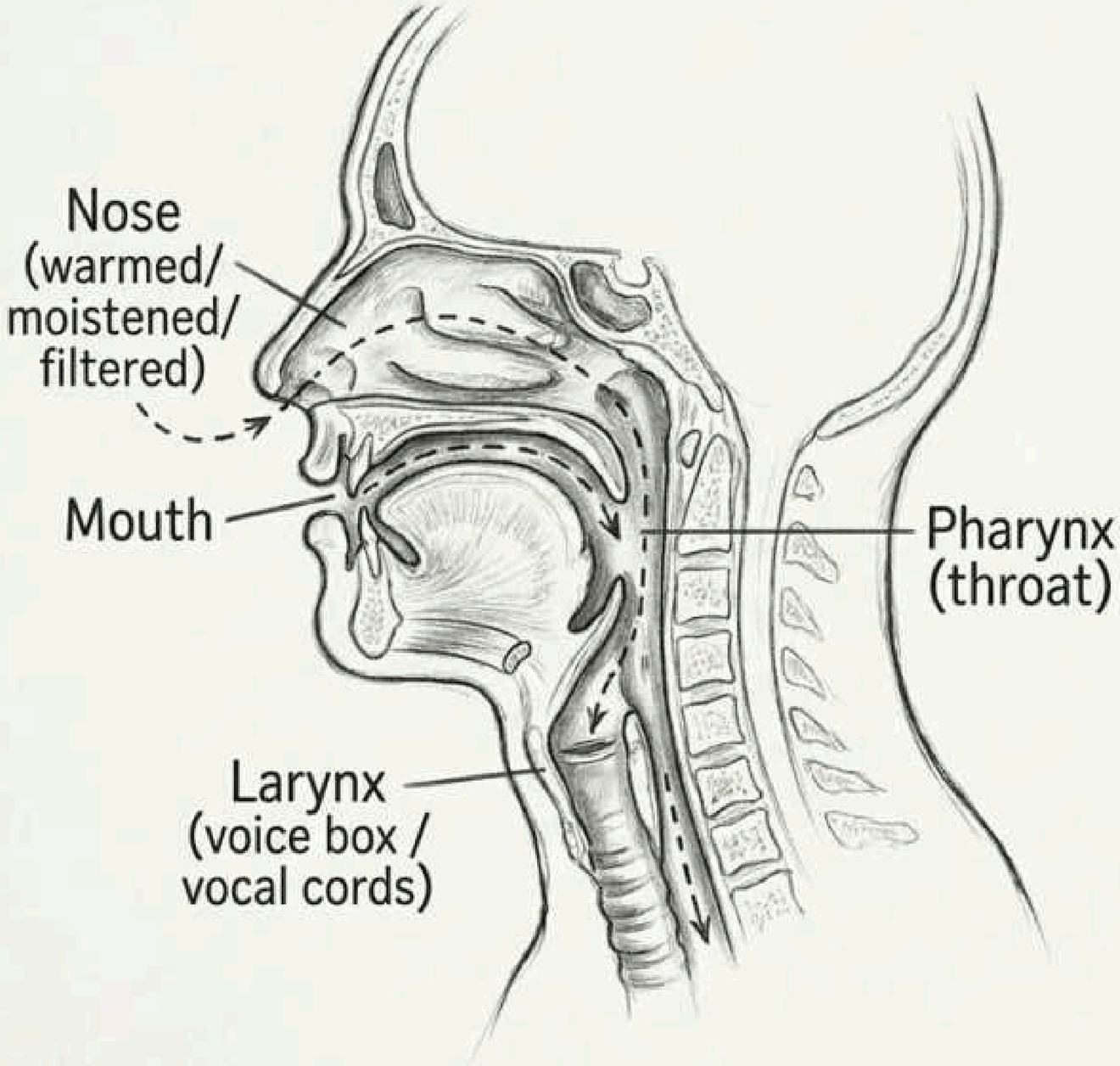


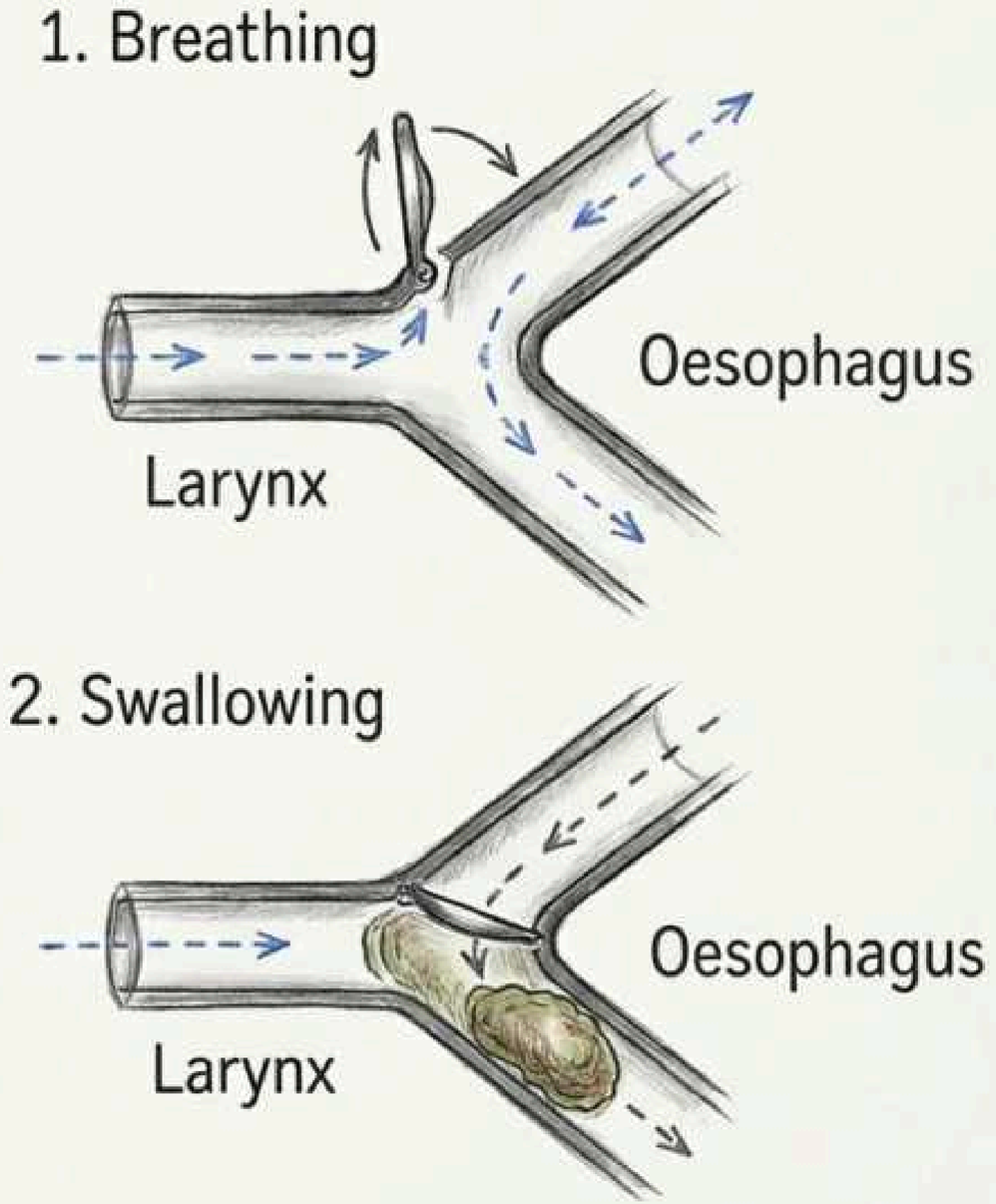
Thymus



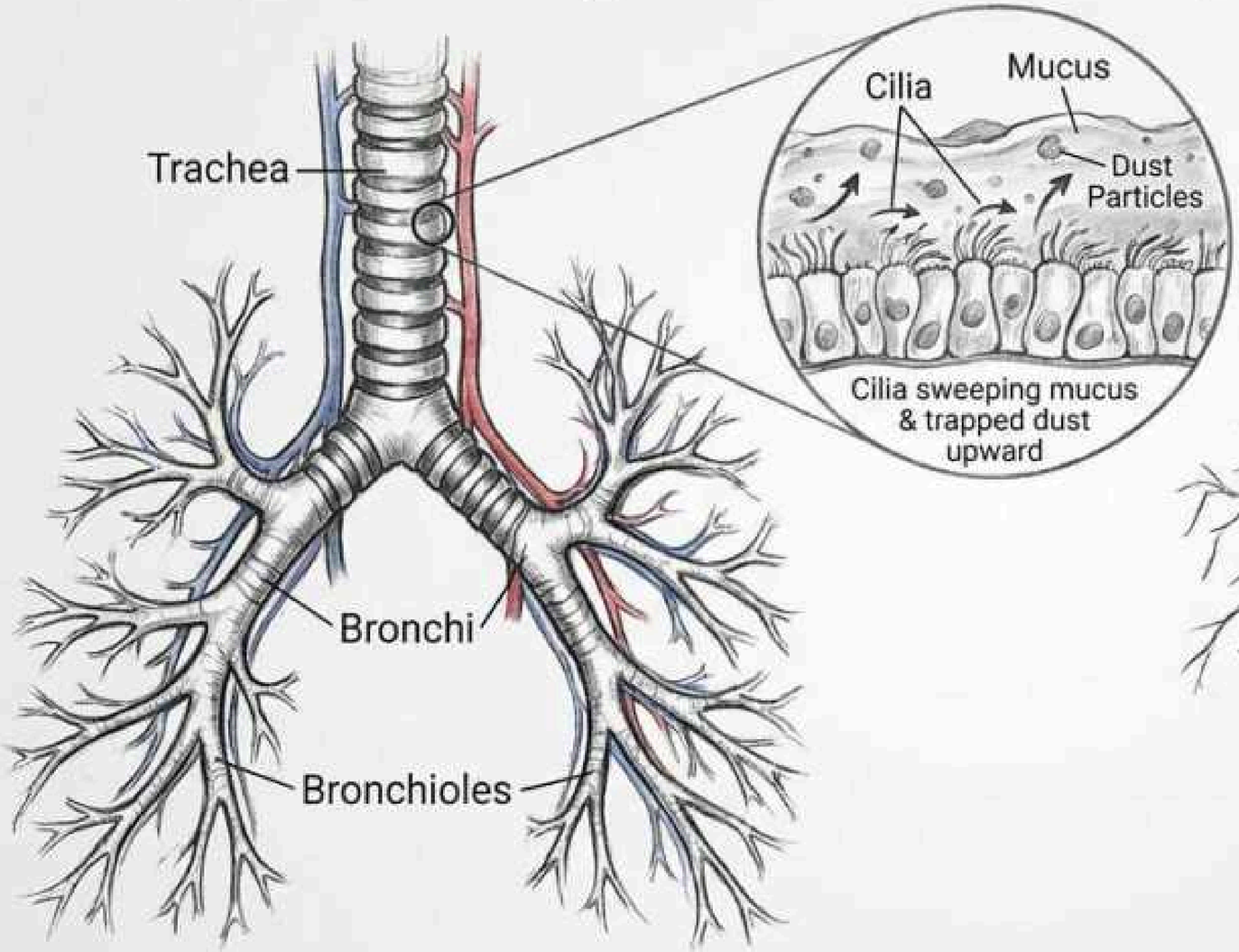
Tonsils

Swollen neck nodes = immune nodes actively at work.

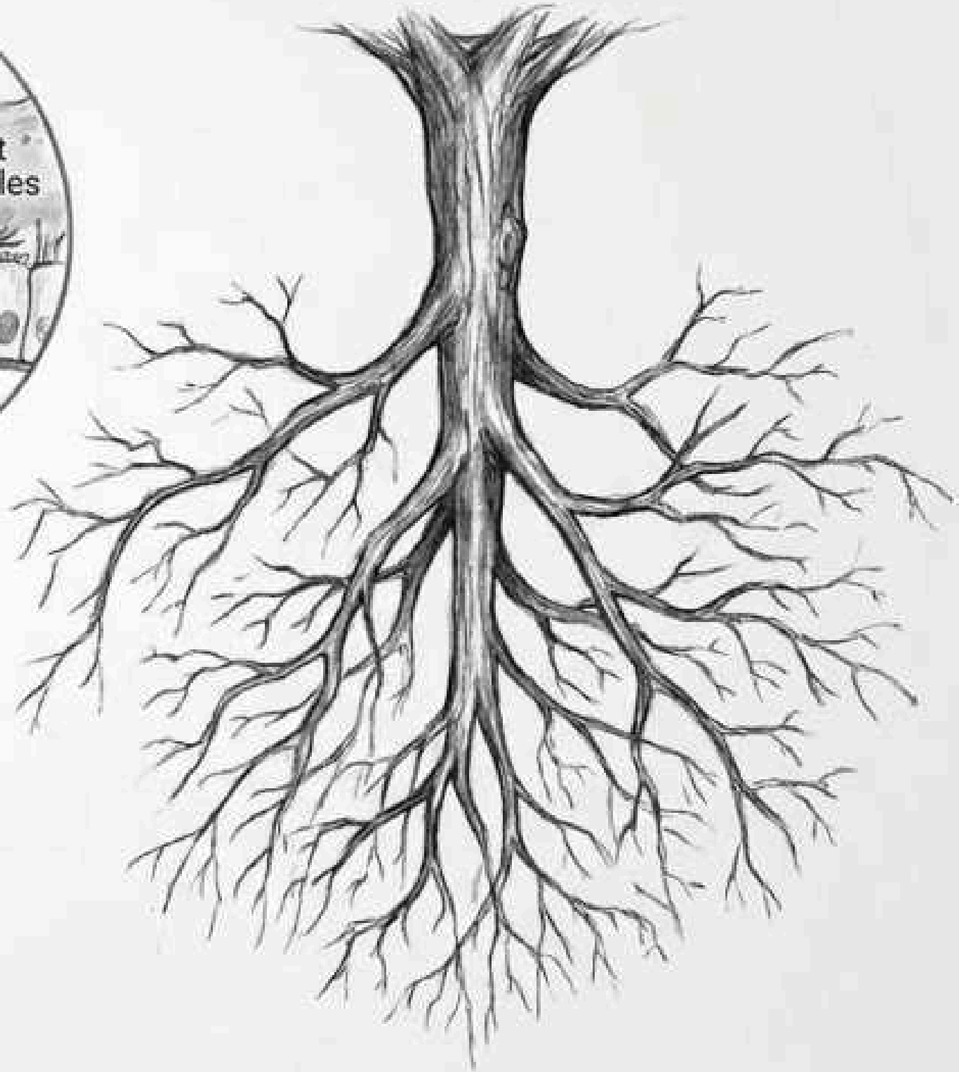

Nose
(warmed/
moistened/
filtered)
Mouth
Pharynx
(throat)
Larynx
(voice box /
vocal cords)


1. Breathing
Oesophagus
Larynx
2. Swallowing
Oesophagus
Larynx

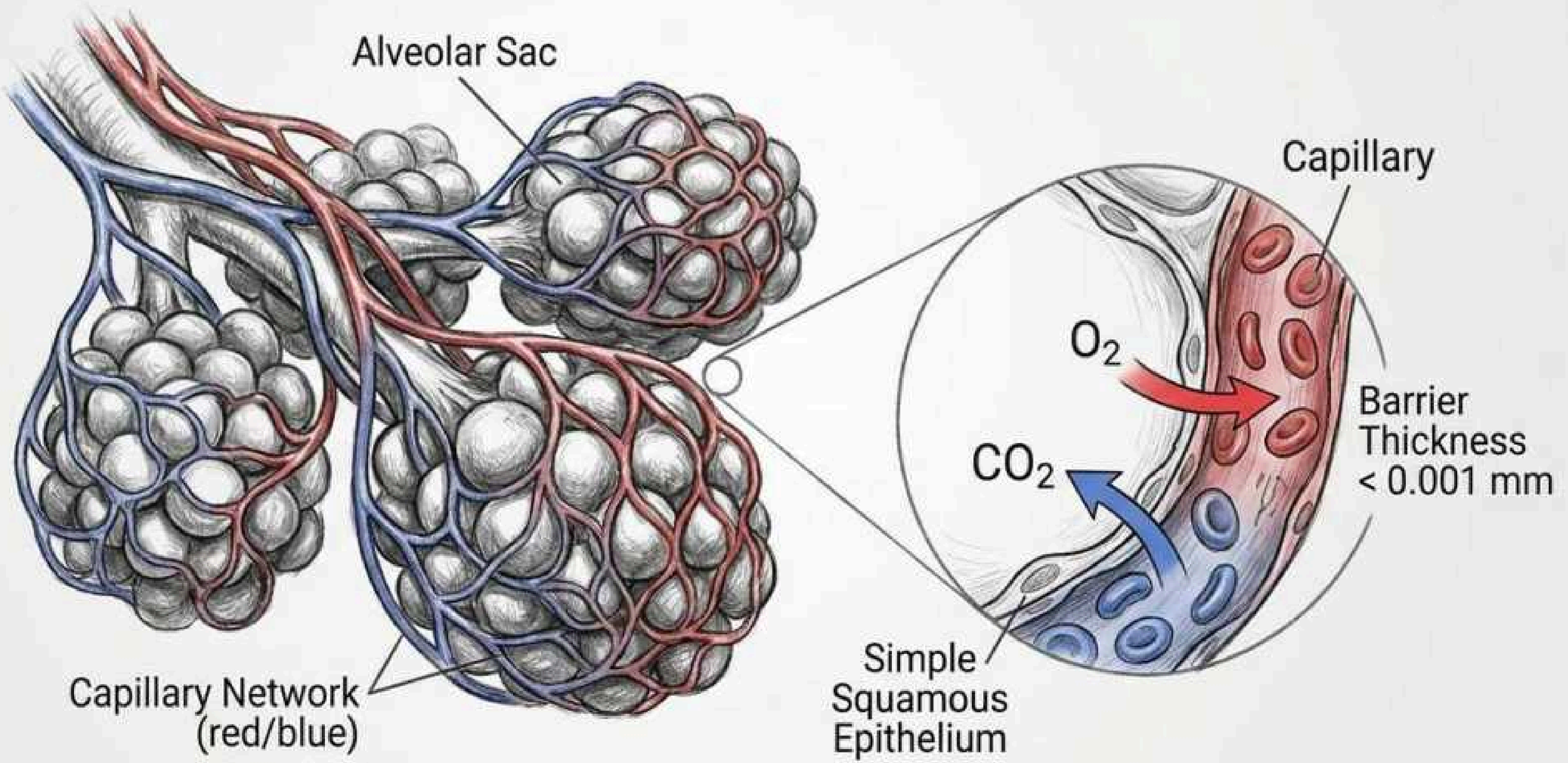
Lower Airway



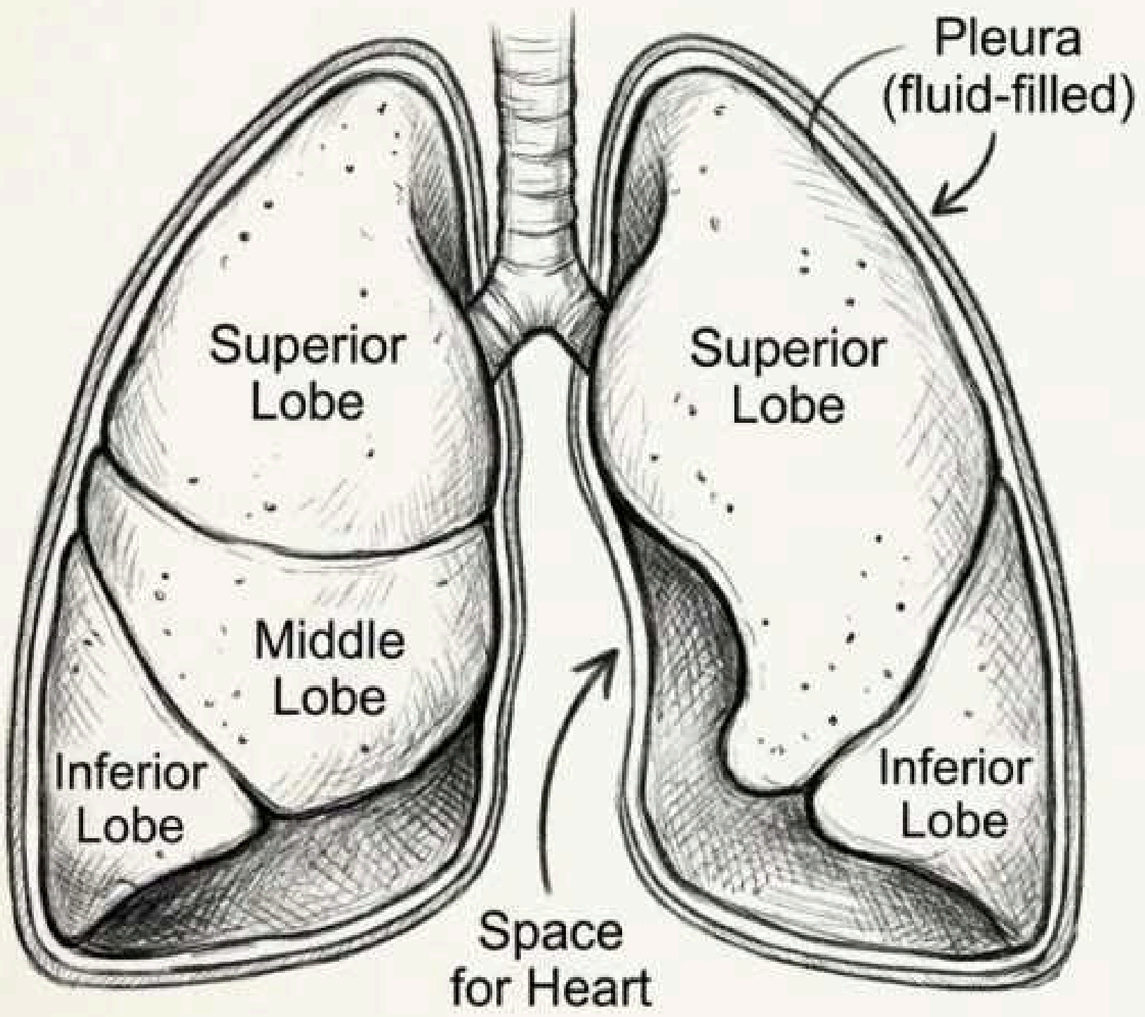
Inverted Bronchial Tree



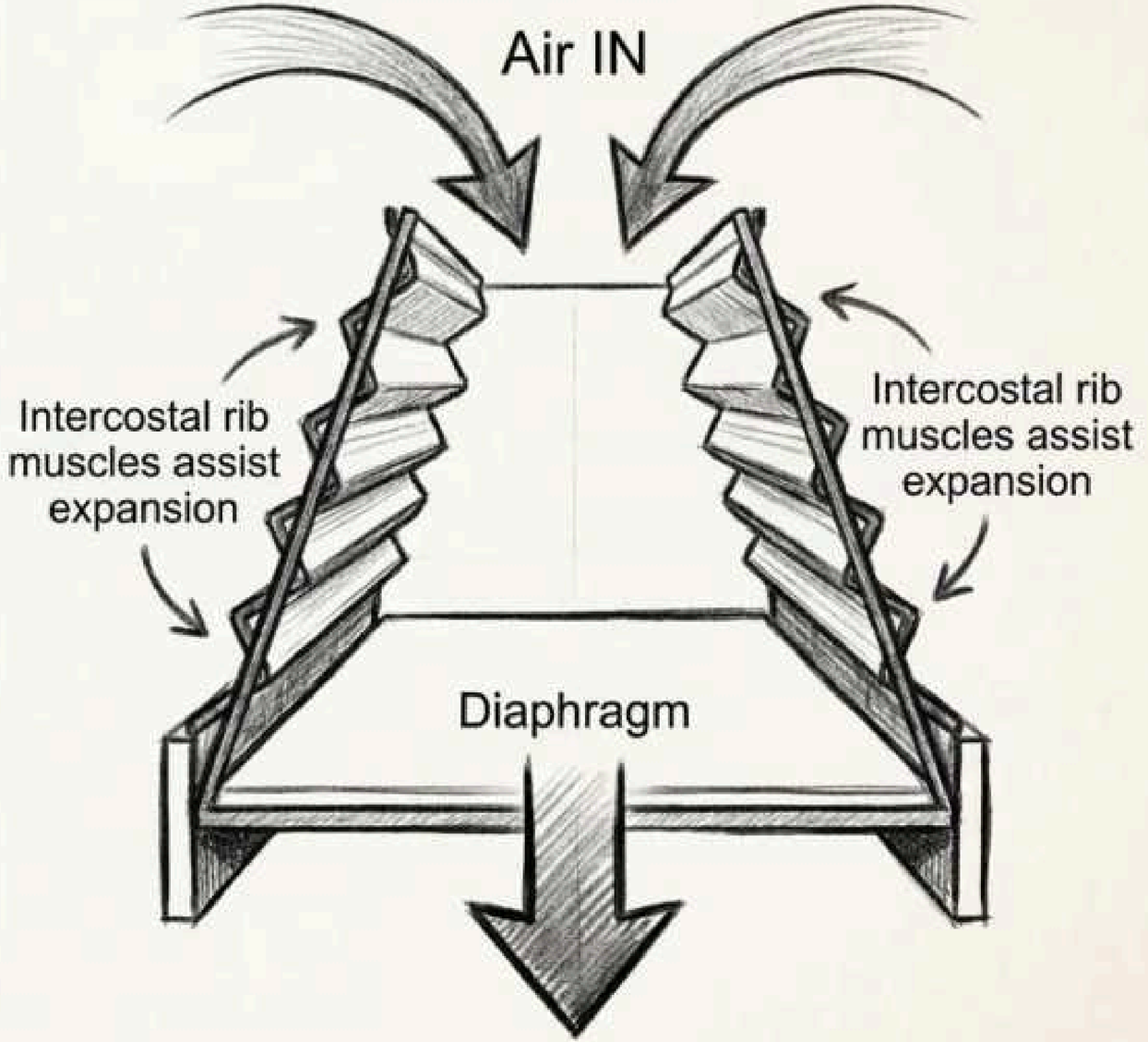
300-500 × 10^6 alveoli = Total Surface Area of a Tennis Court

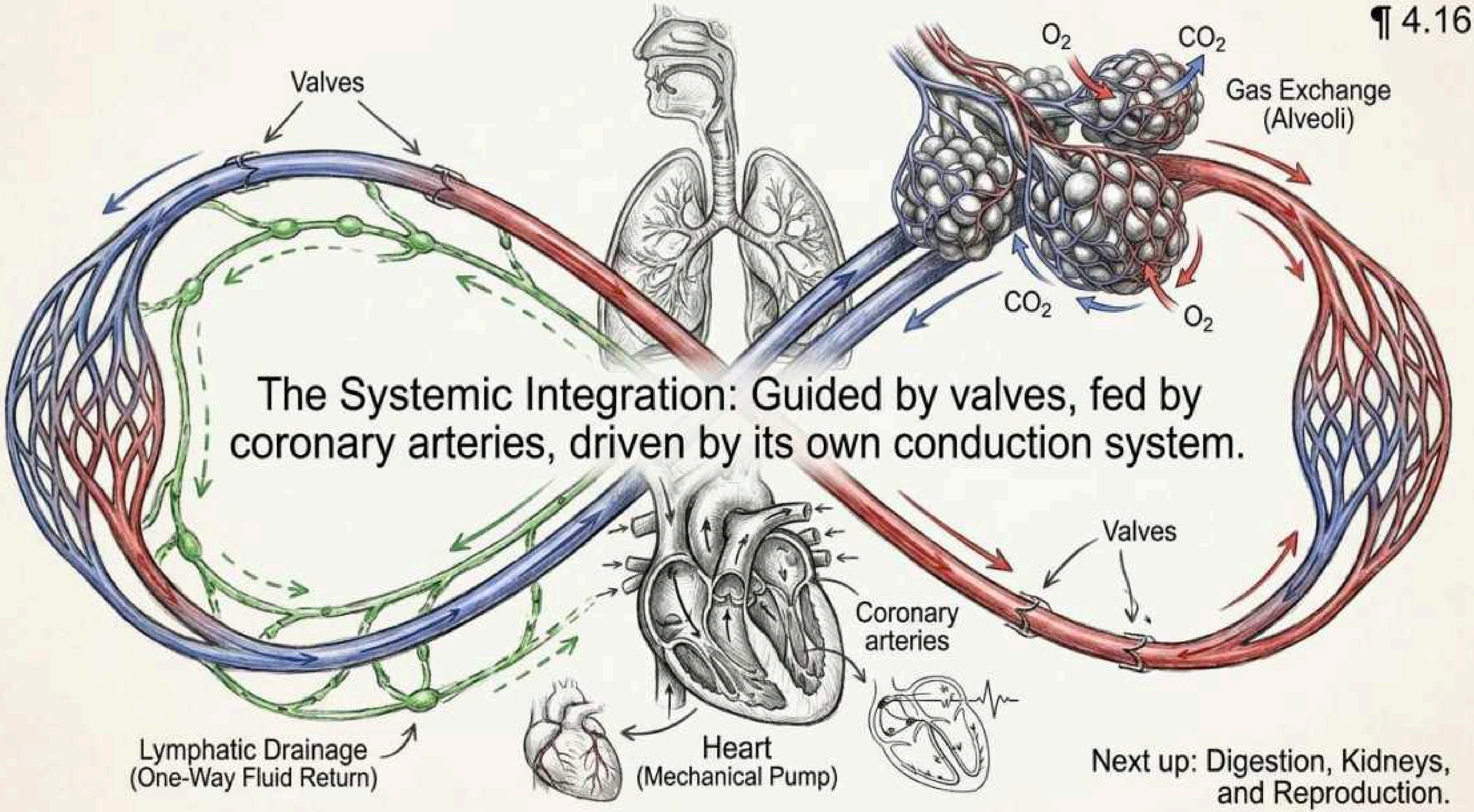


Lung Anatomy & Pleura



Breathing Mechanics: The Bellows Analogy





The Systemic Integration: Guided by valves, fed by coronary arteries, driven by its own conduction system.

Next up: Digestion, Kidneys, and Reproduction.