

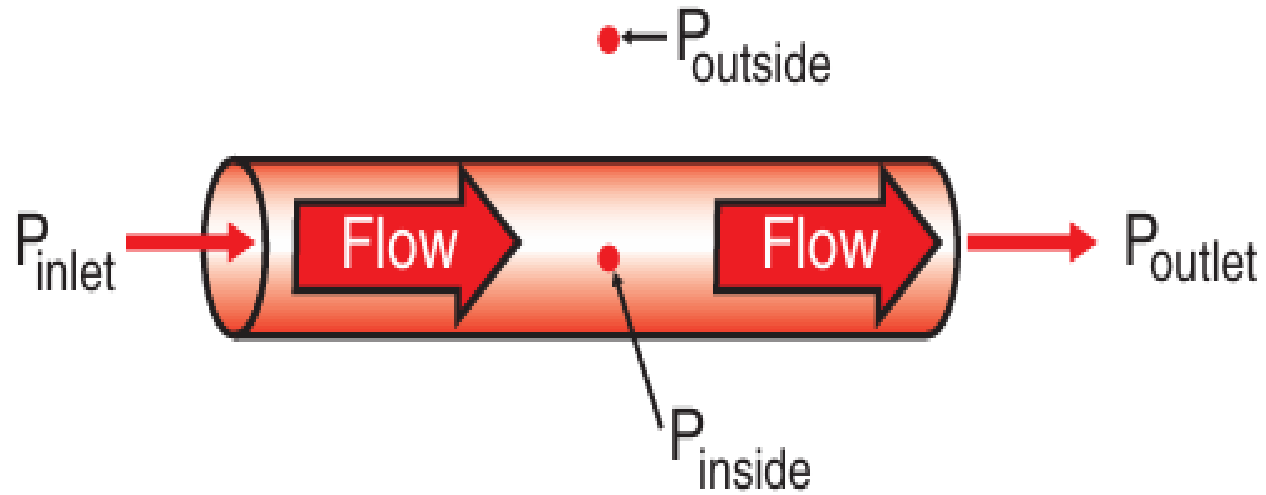
Functions of the blood circulation:

1- Transport (Oxygen, Nutrients, Wastes)

2- Regulation of body temperature

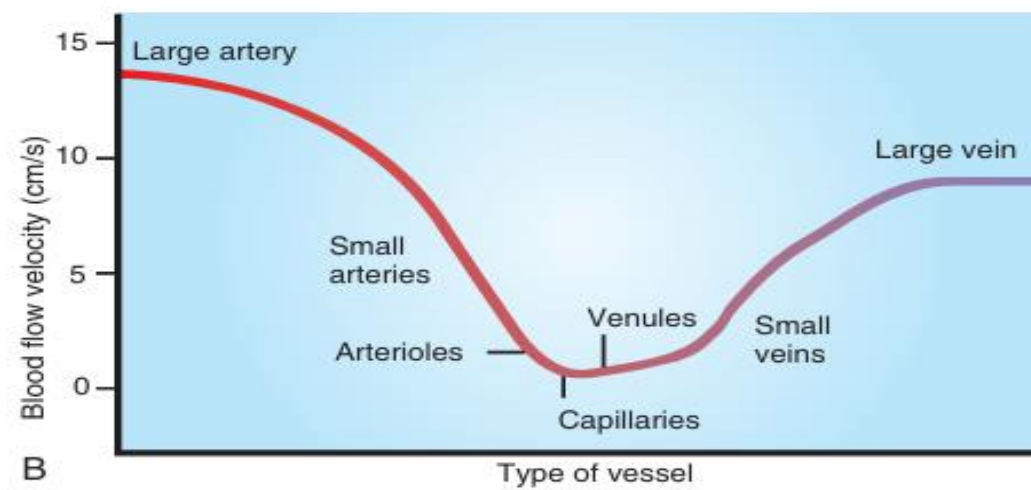
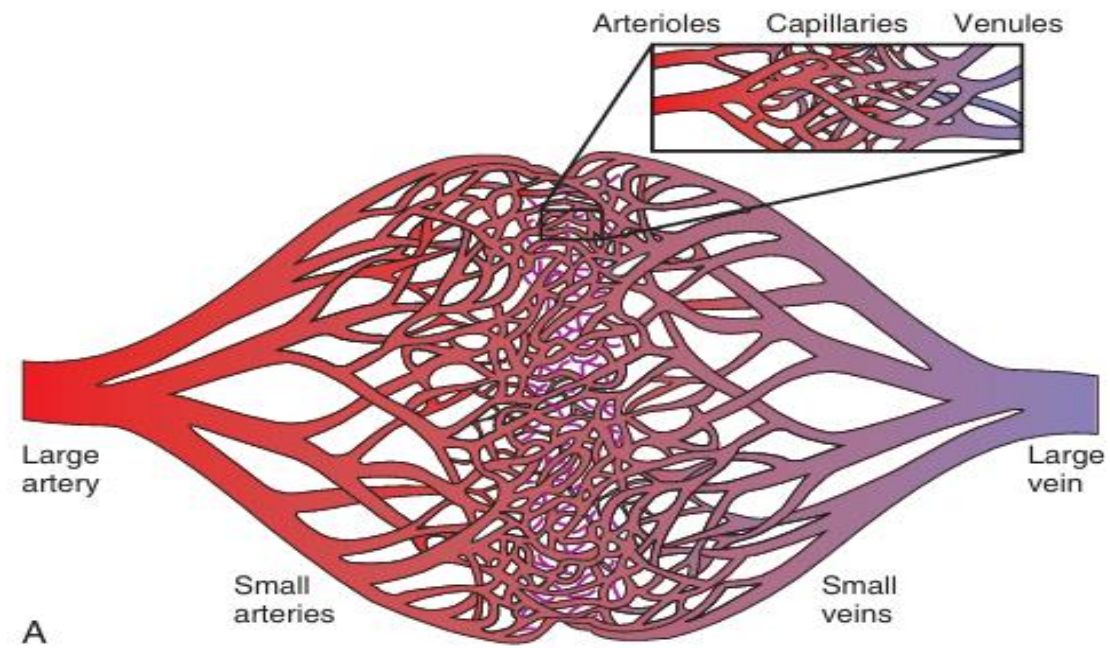
3- Immunity

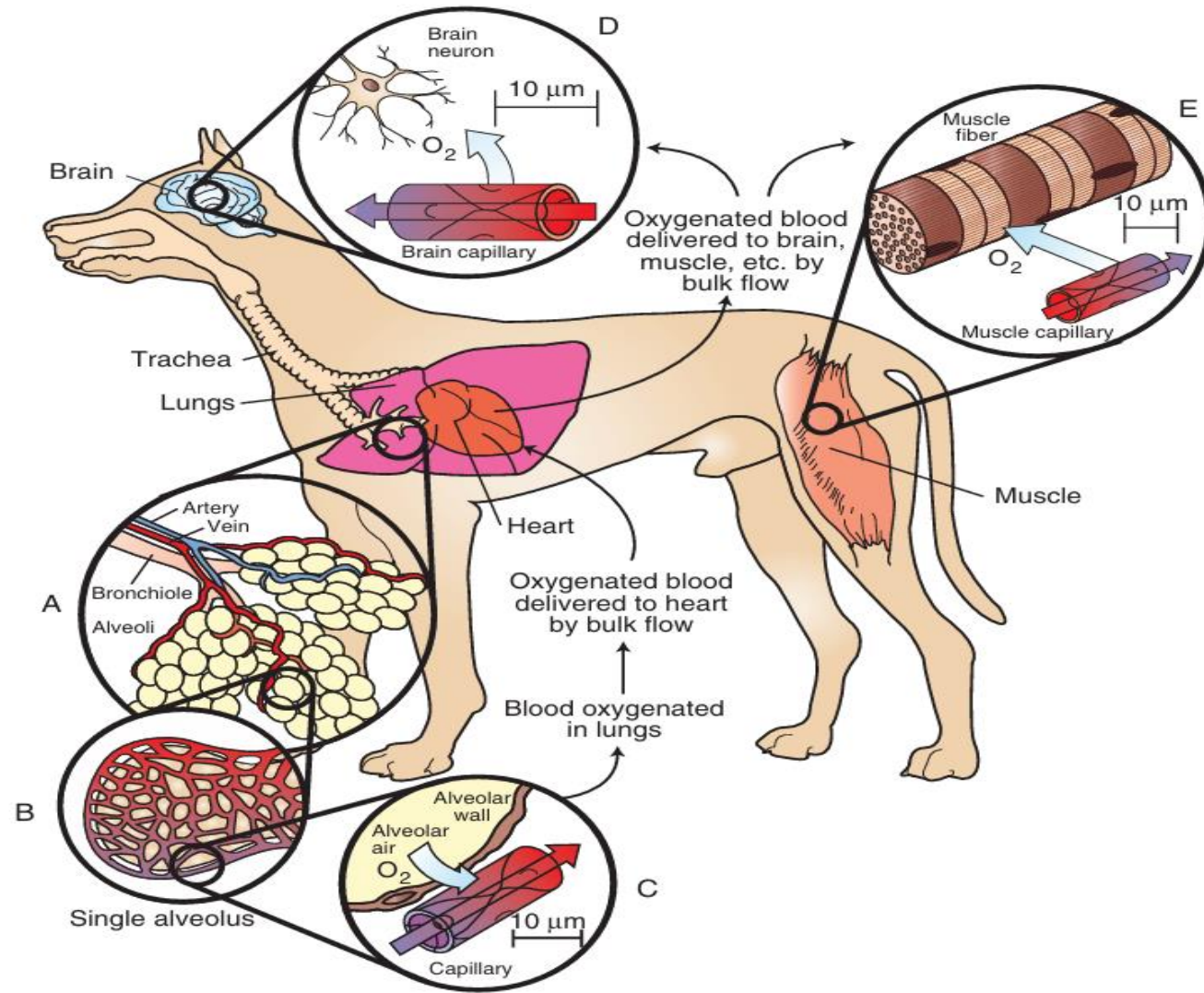
4- Cell to Cell signaling

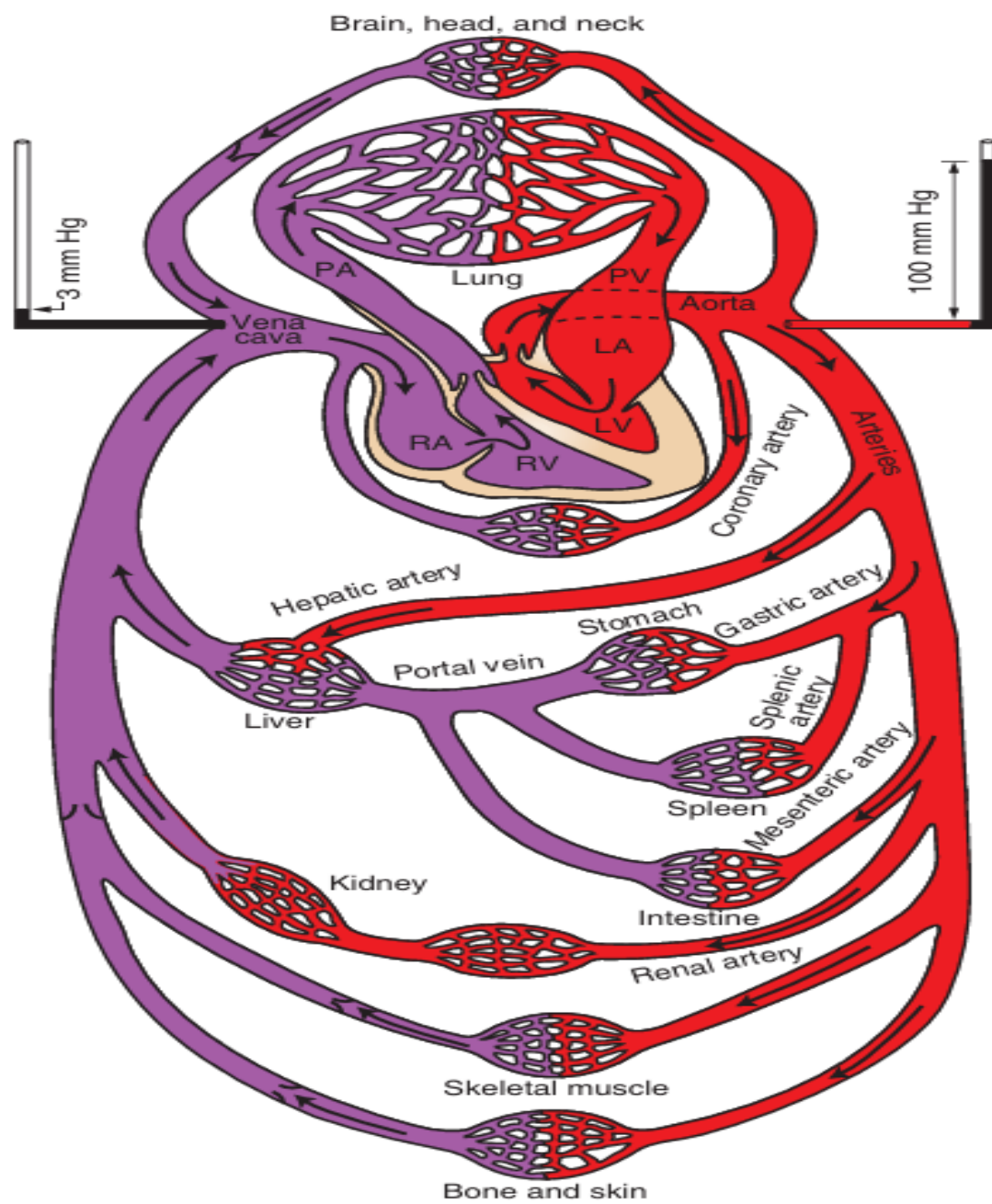


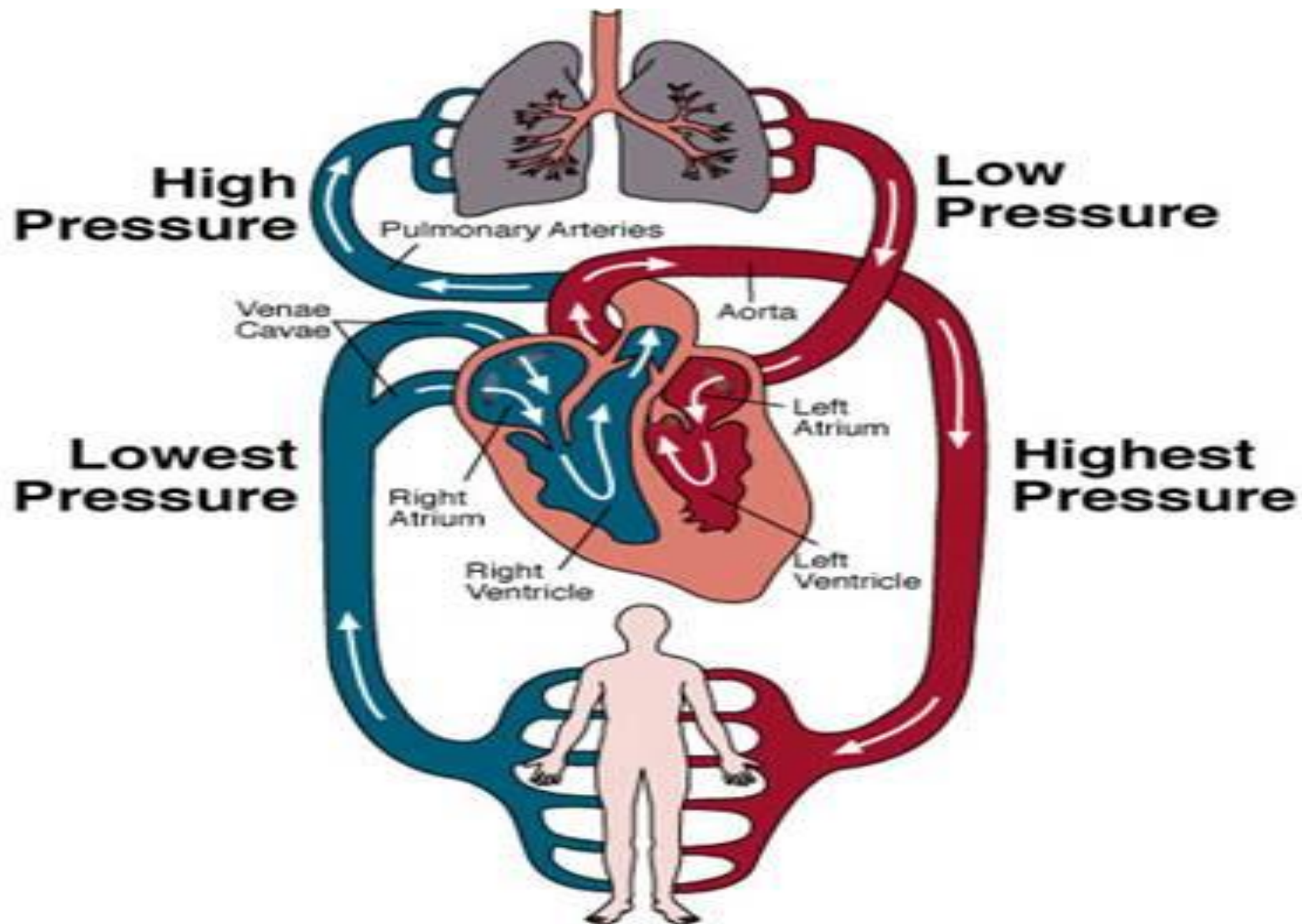
$$\text{Perfusion pressure} = (P_{\text{inlet}} - P_{\text{outlet}})$$

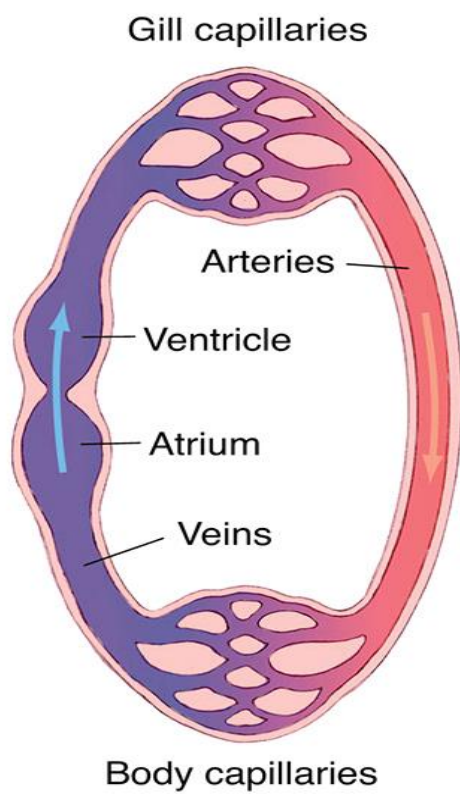
$$\text{Transmural pressure} = (P_{\text{inside}} - P_{\text{outside}})$$



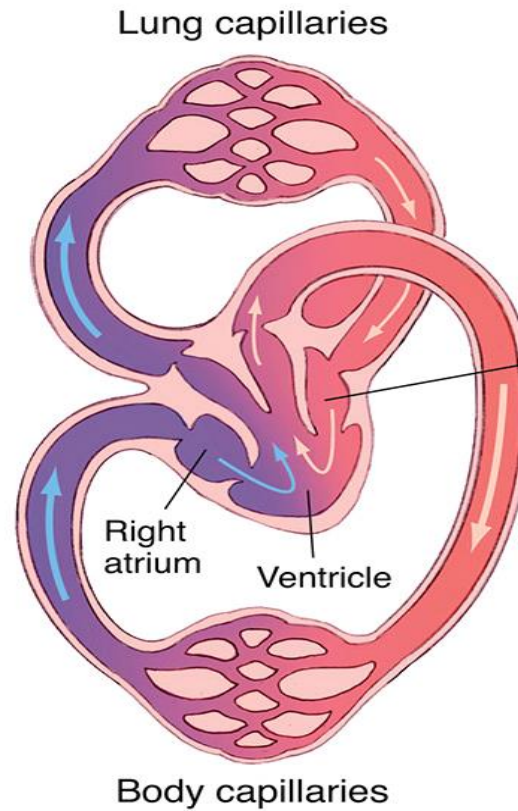




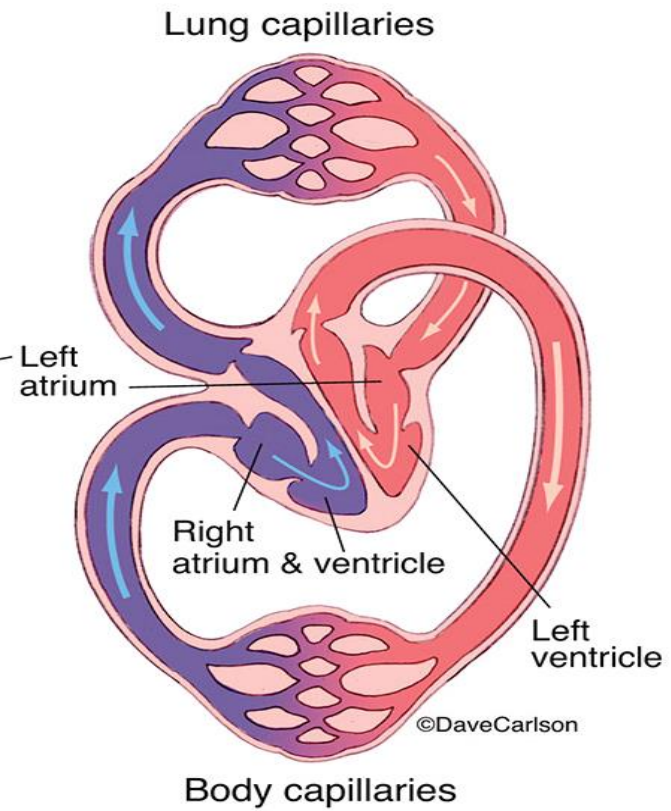




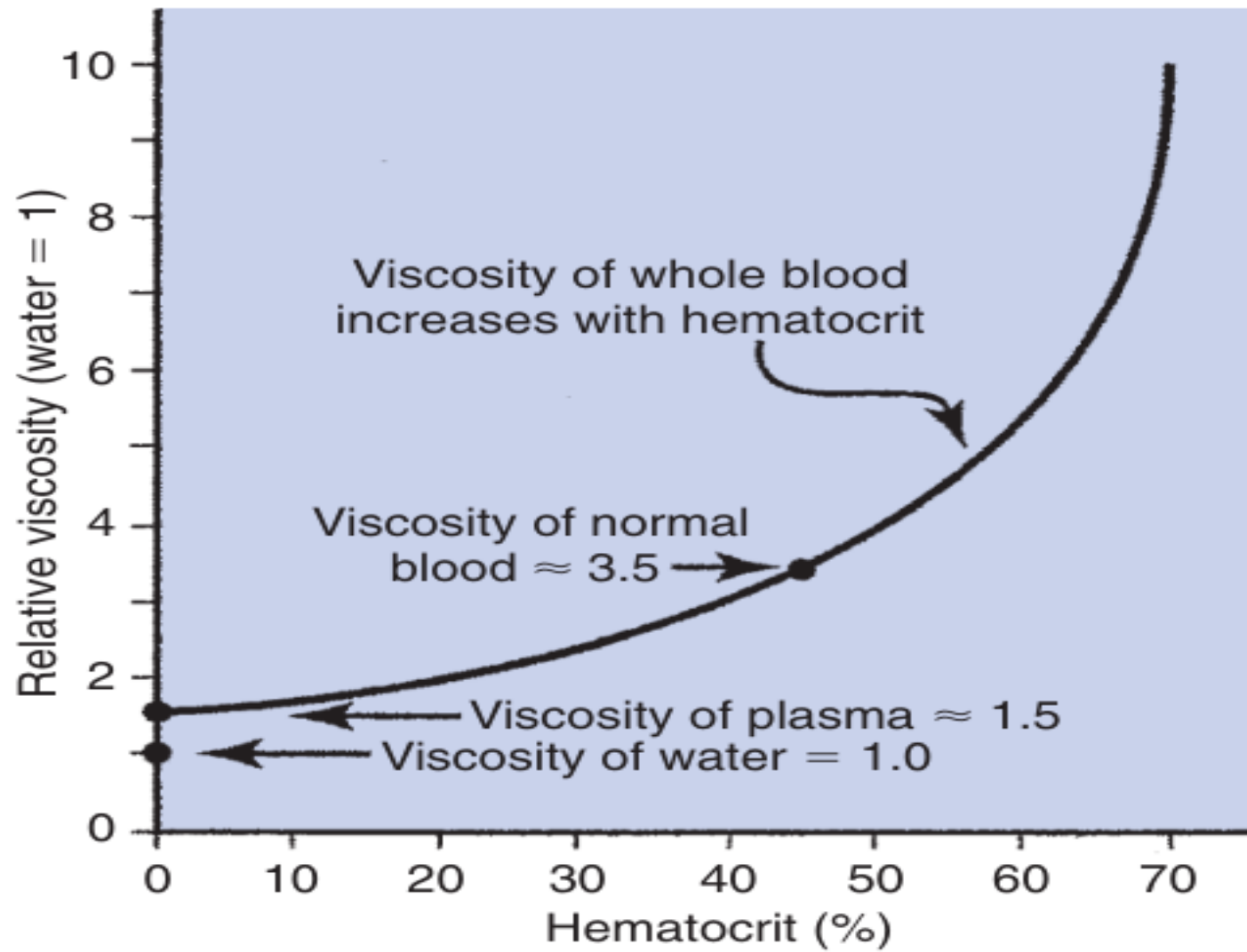
A. Fish (2 chambers)



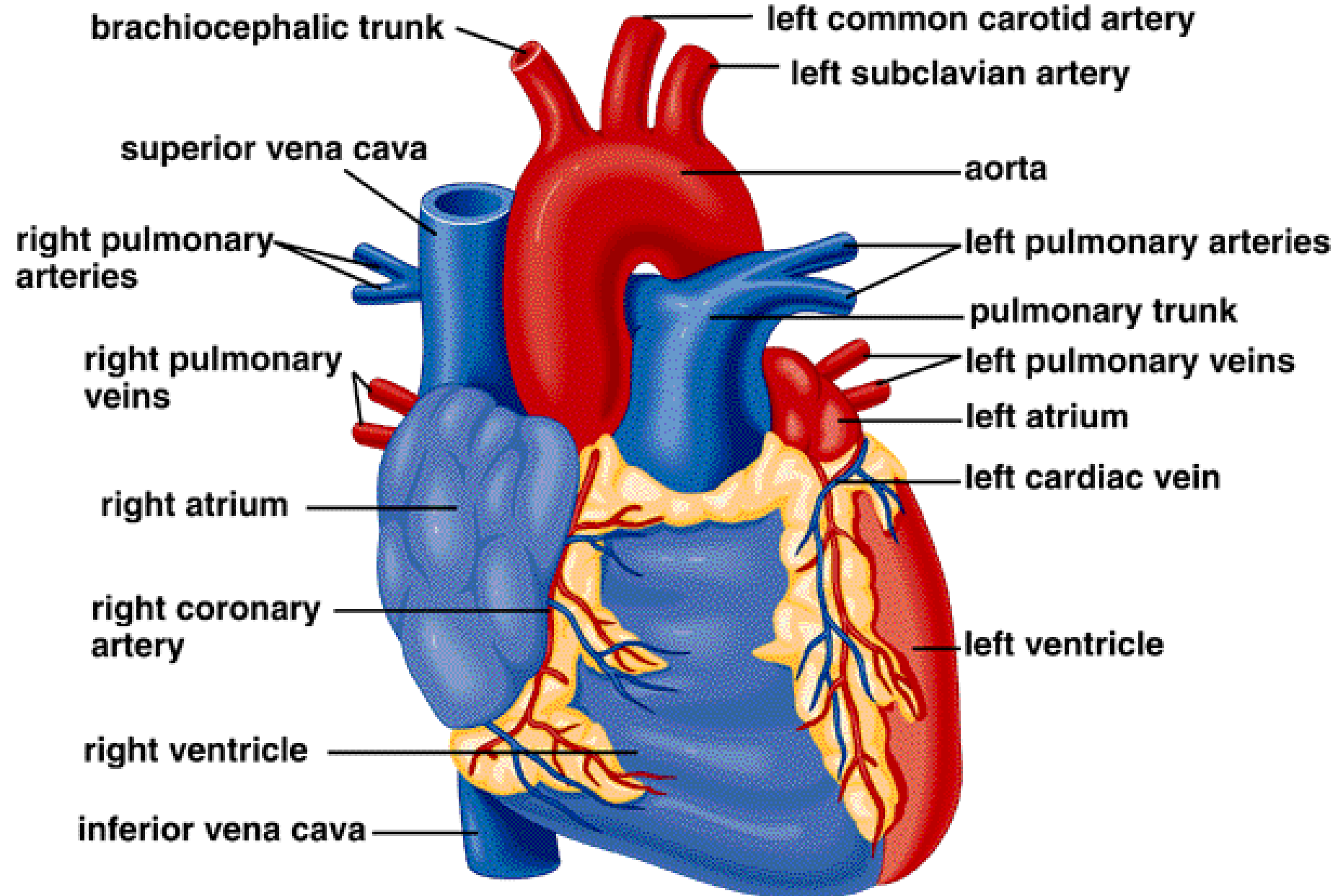
B. Amphibians and most reptiles (3 chambers)



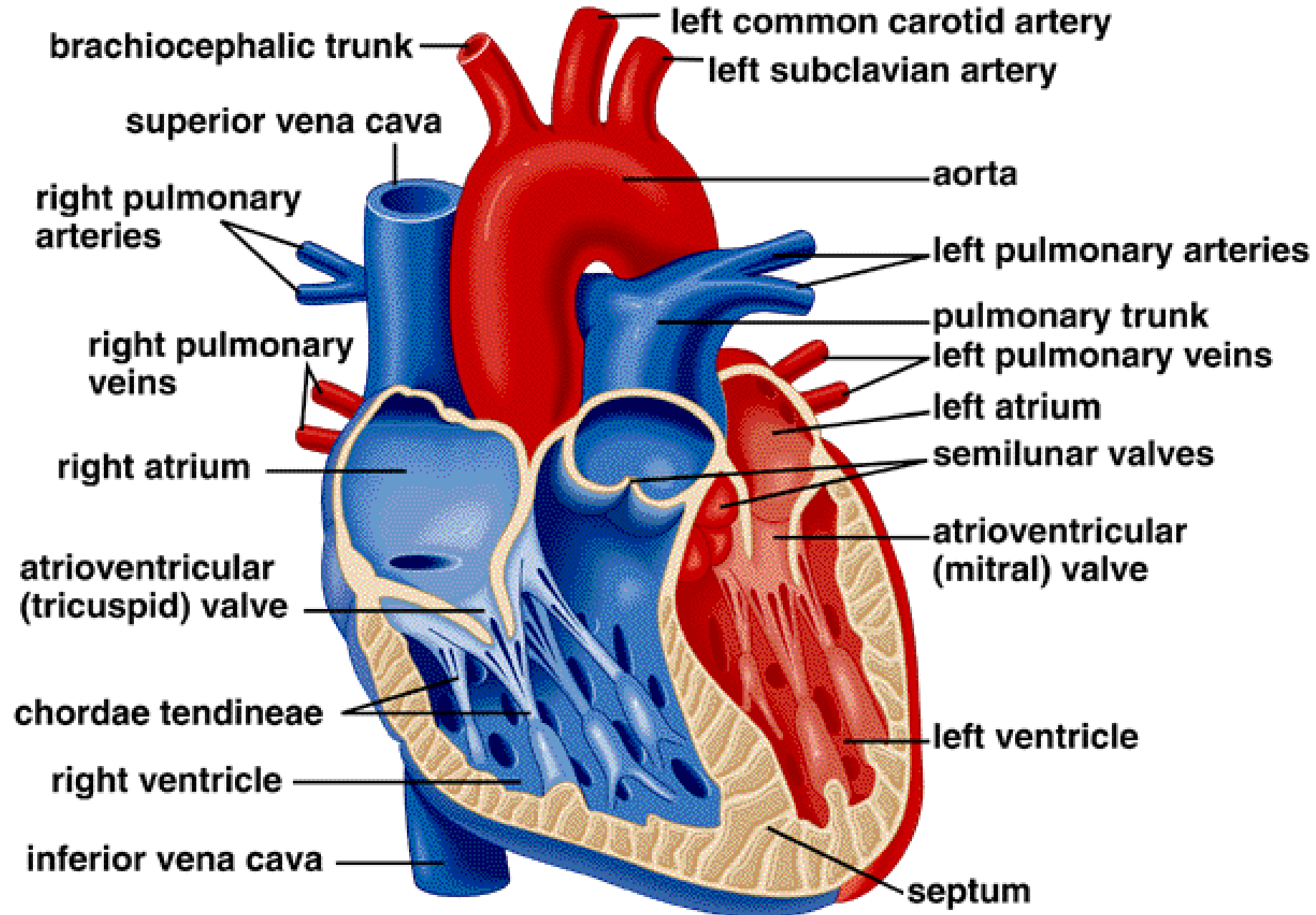
C. Birds and mammals (4 chambers)

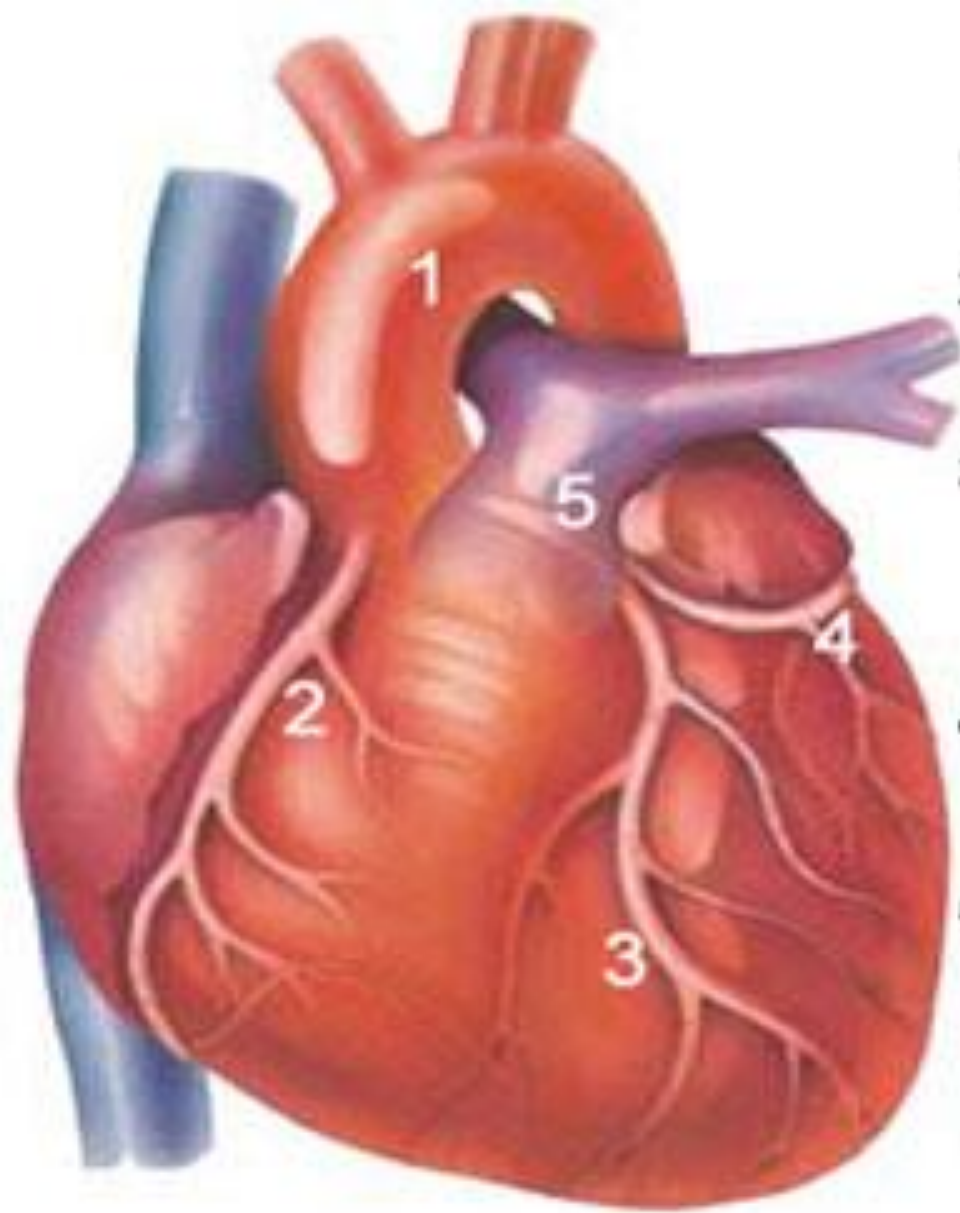


External Heart Anatomy



Internal View of Heart





1. Aorta

2. Right Coronary
Artery

3. Left Anterior
Descending
Coronary Artery

4. Circumflex Coronary
Artery

5. Left Main
Coronary Artery

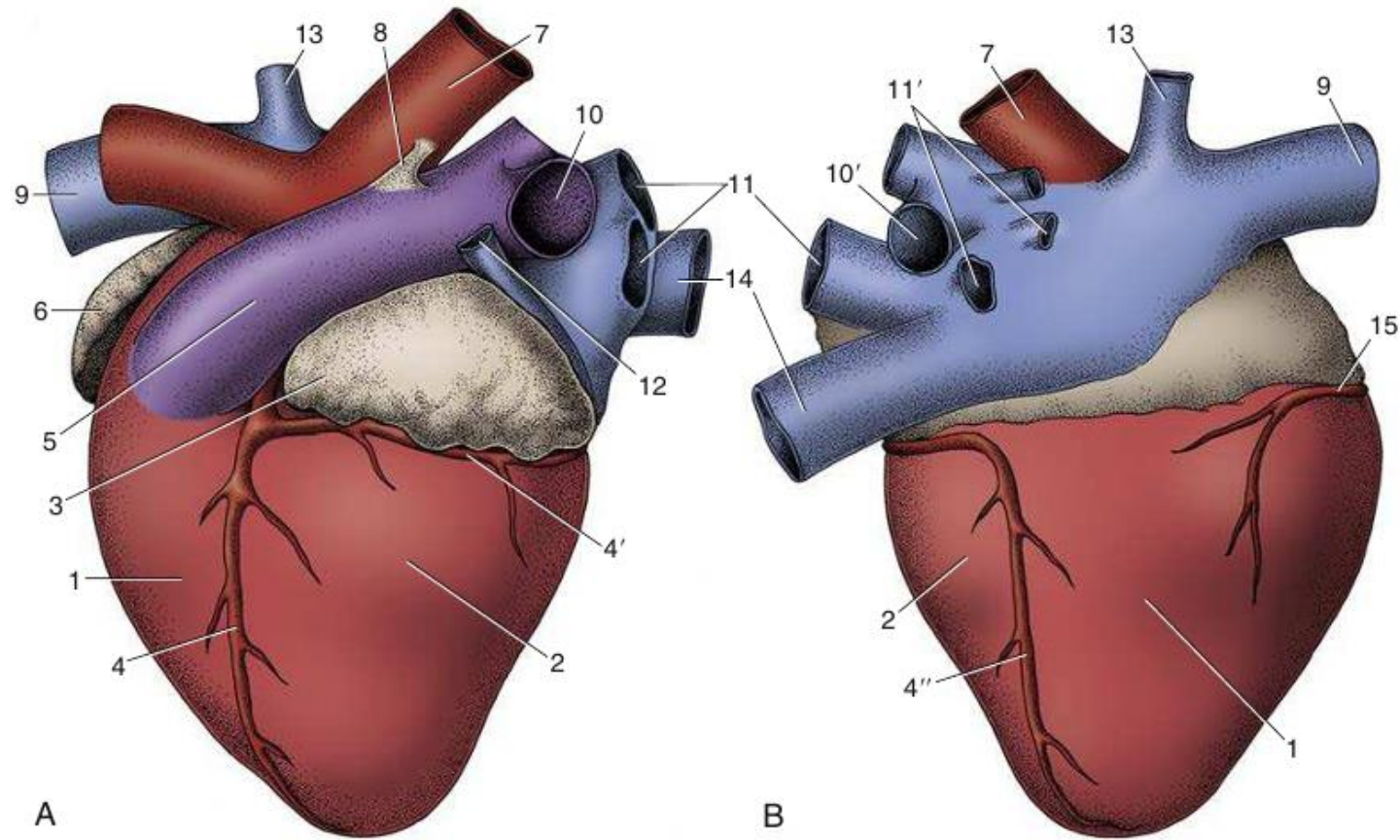


Fig. 7.9 (A) Left and (B) right views of the bovine heart. 1, Right ventricle; 2, left ventricle; 3, left auricle; 4, paraconal interventricular branch of left coronary artery (a.); 4', circumflex branch of left coronary a.; 4'', subsinuosal interventricular branch of left coronary a.; 5, pulmonary trunk; 6, right auricle; 7, aorta; 8, ligamentum arteriosum; 9, cranial vena cava; 10 and 10', left and right pulmonary arteries; 11 and 11', left and right pulmonary veins; 12, left azygos vein (v.); 13, right azygos v.; 14, caudal vena cava; 15, right coronary a.

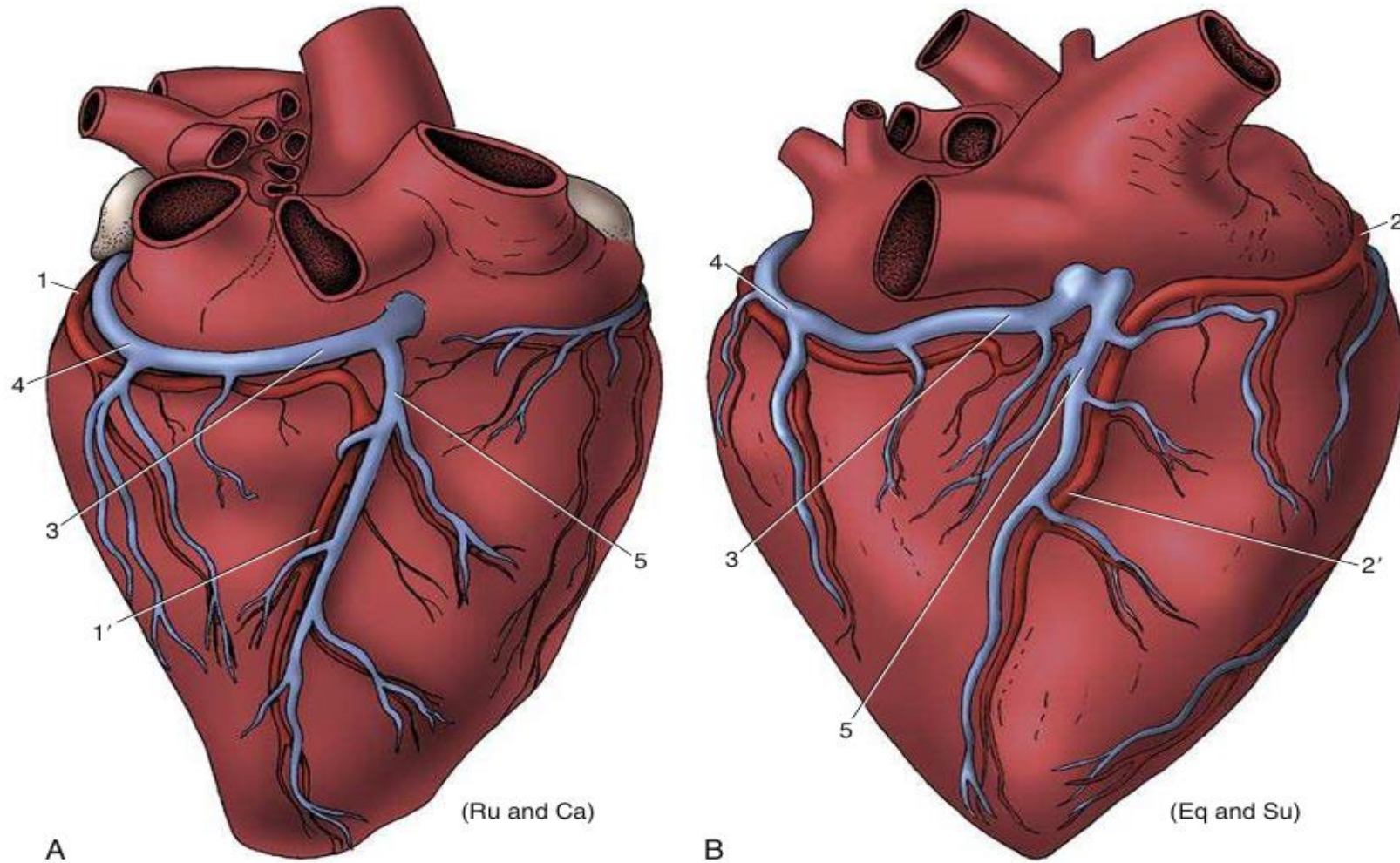
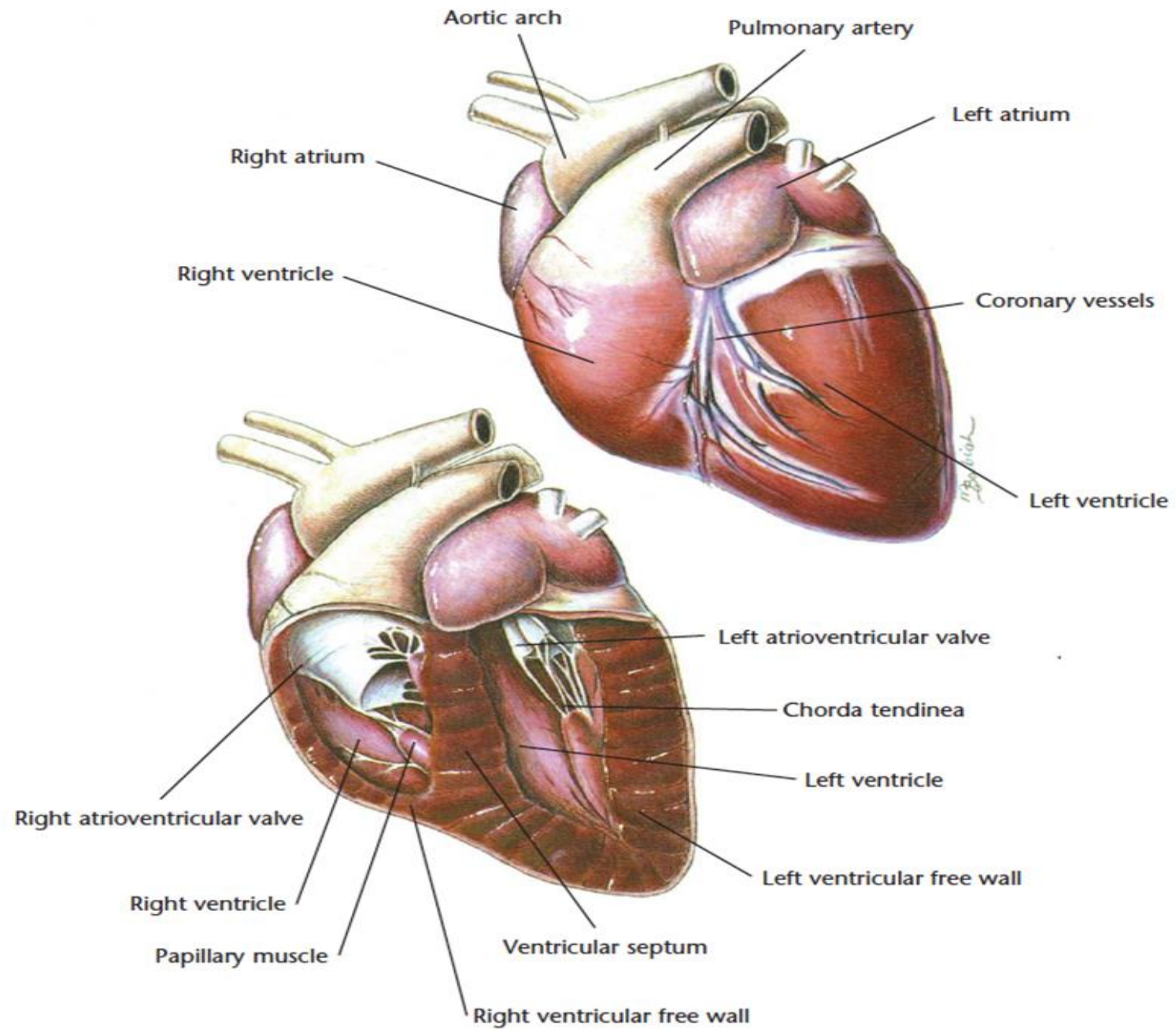
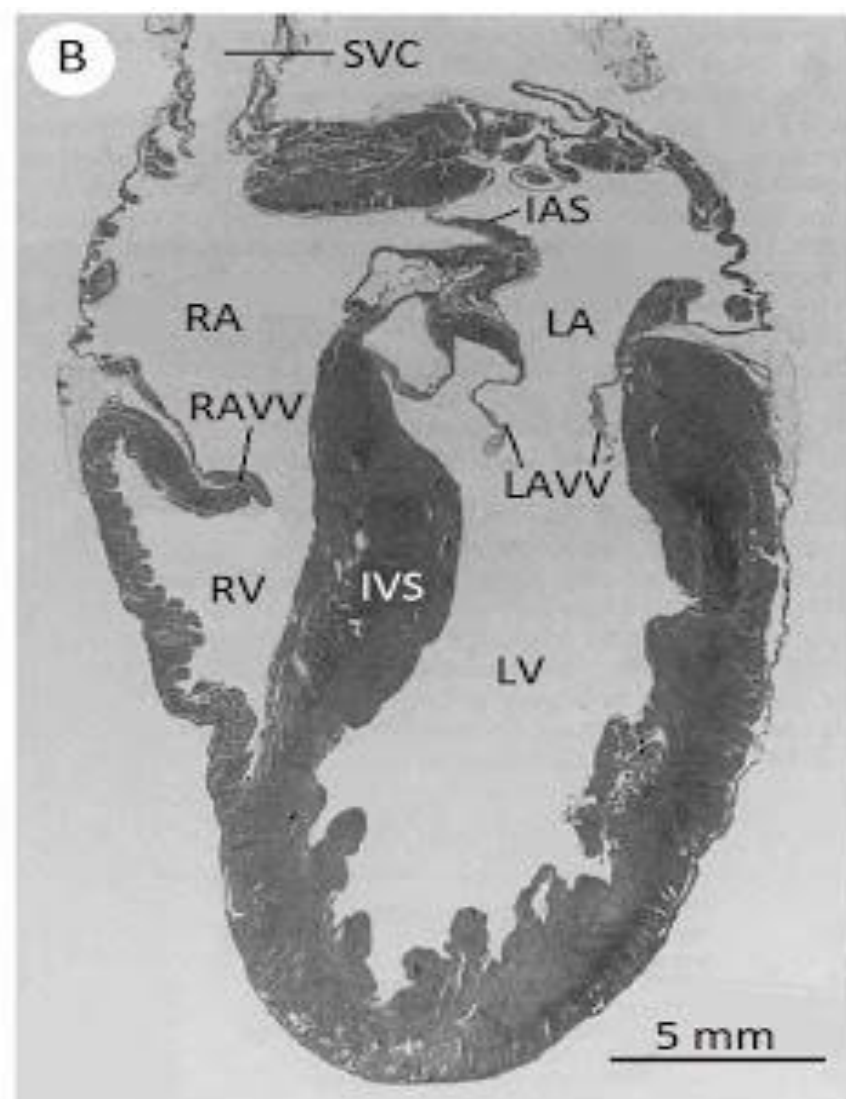
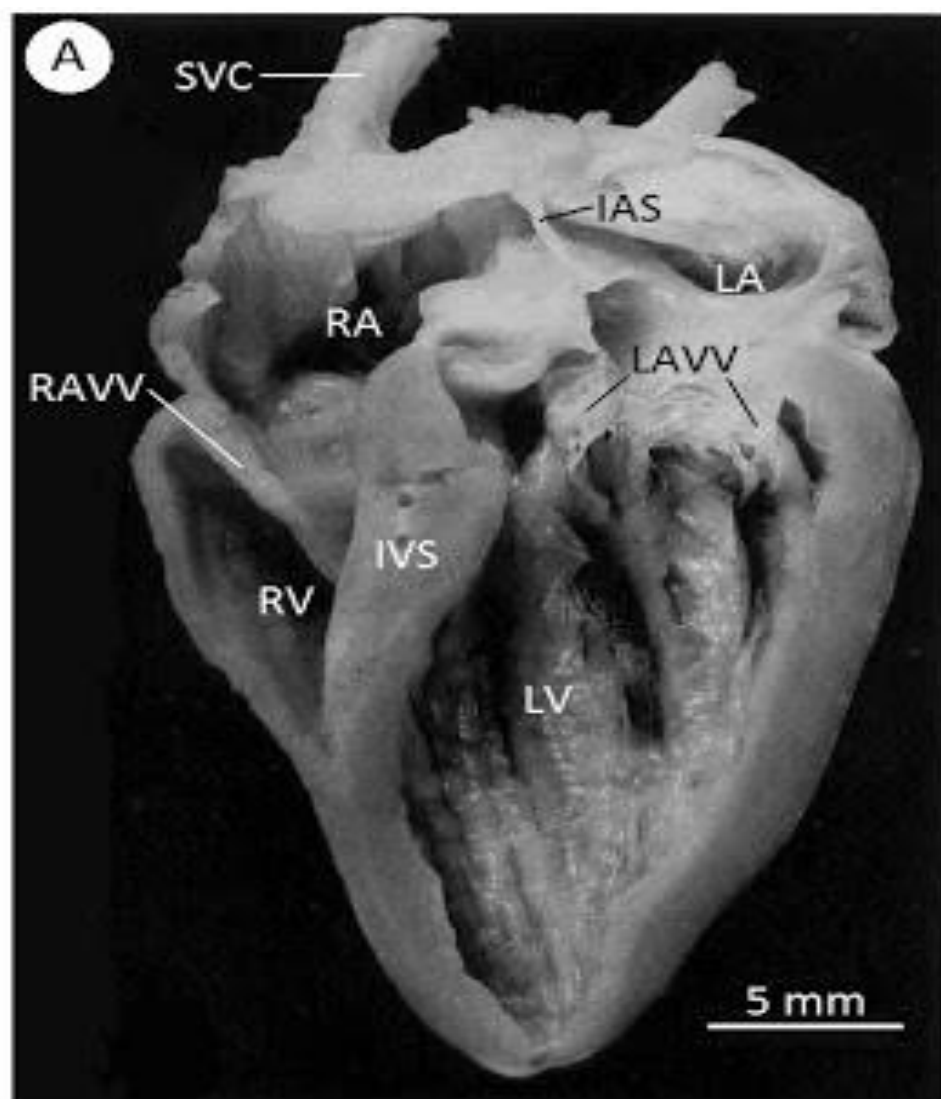
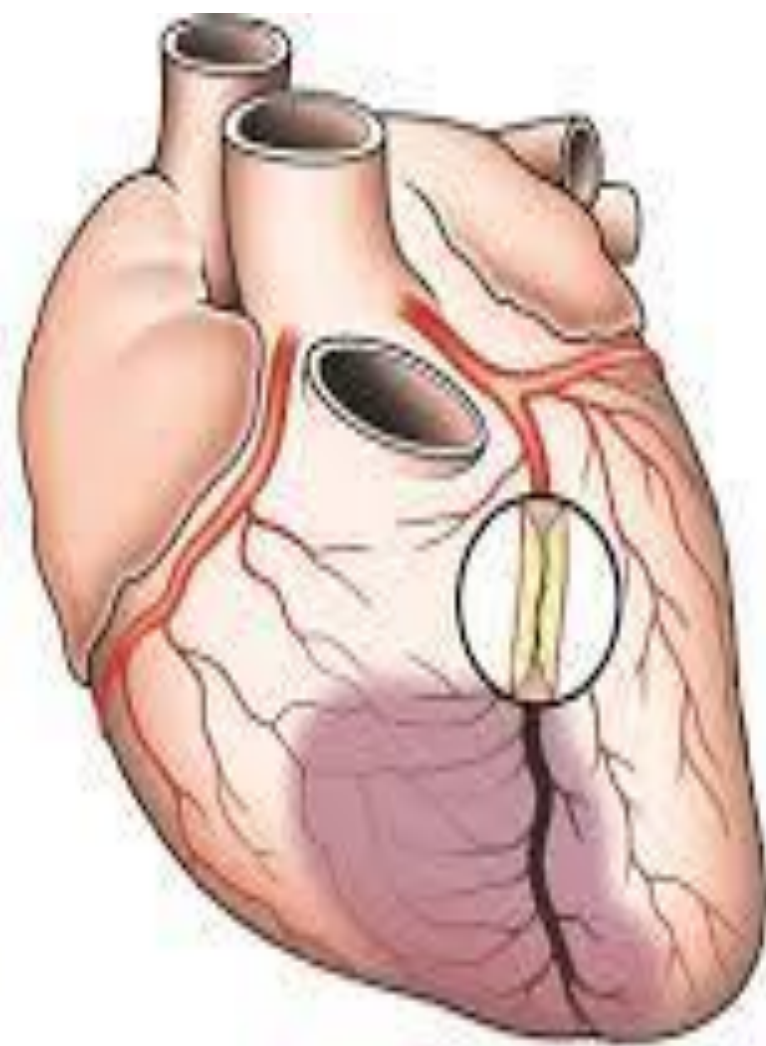
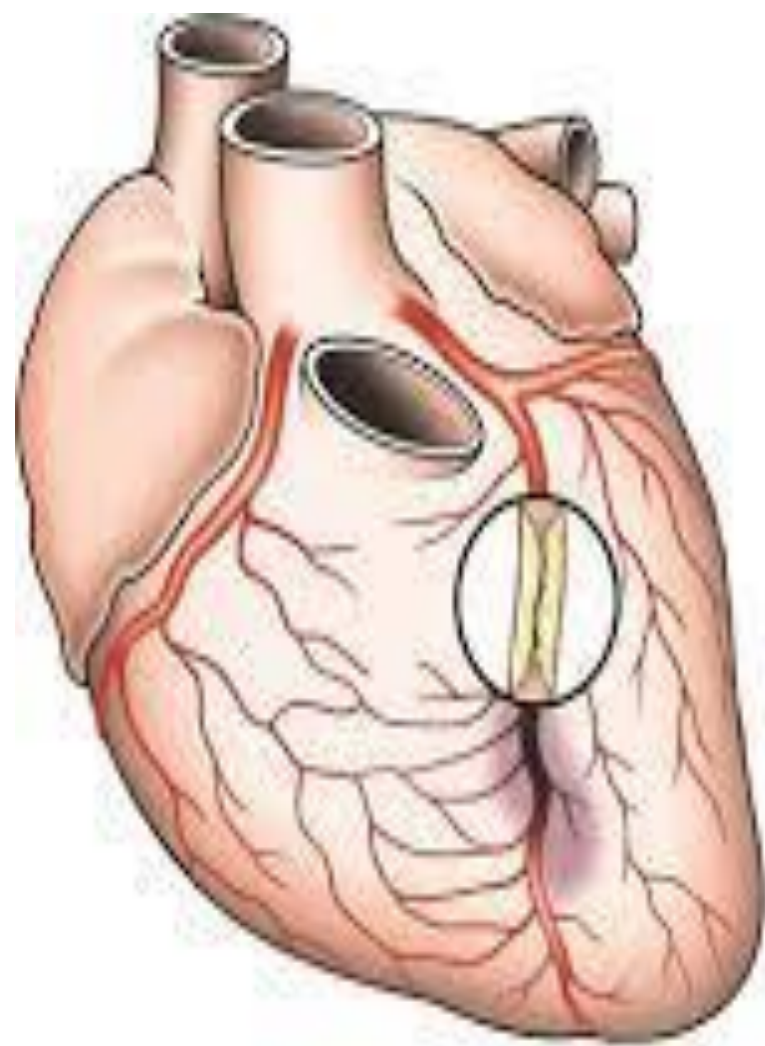
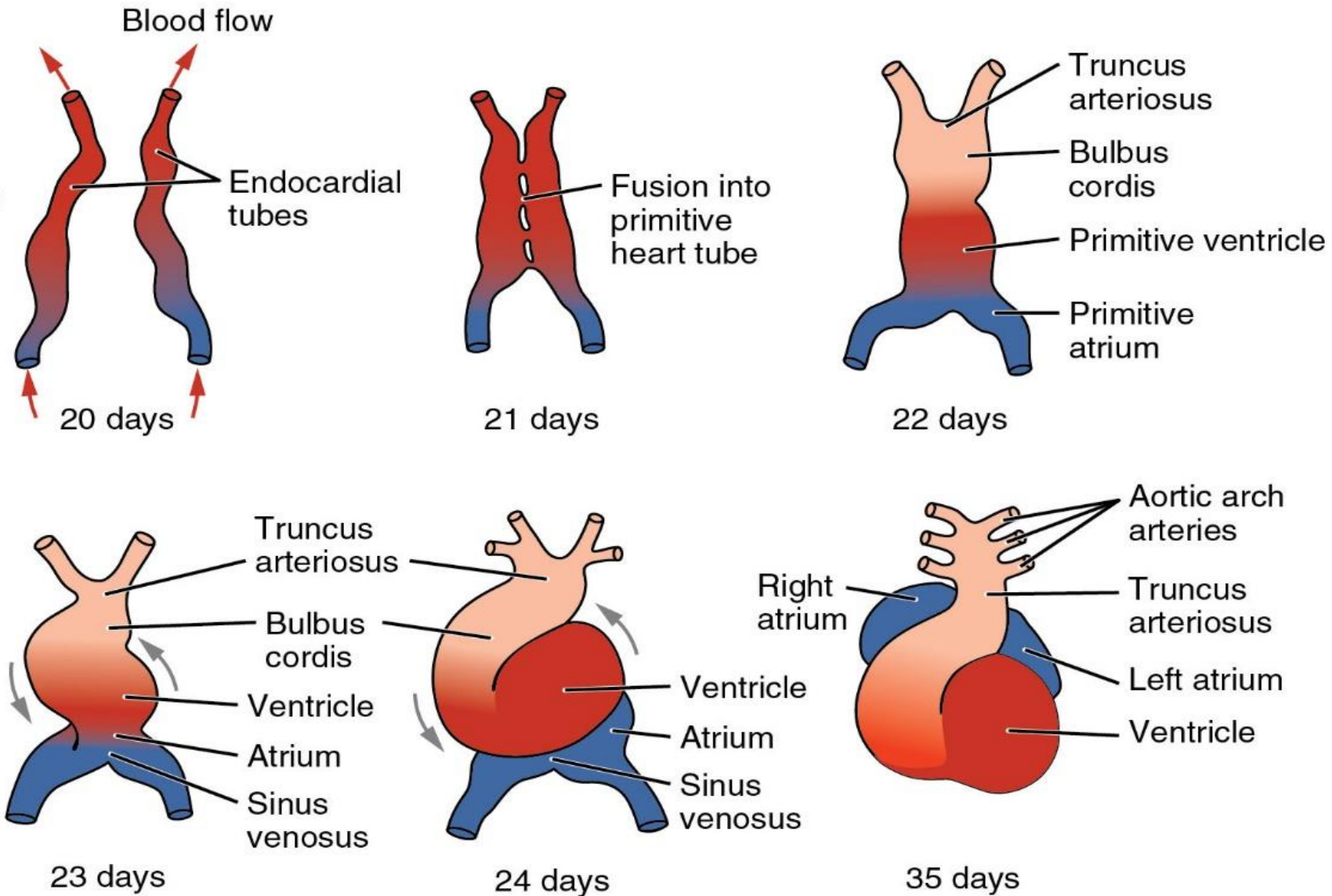


Fig. 7.20 Patterns of coronary circulation of the heart viewed from the right. (A) Situation in ruminants (*Ru*) and carnivores (*Ca*); the right (subsinoosal) interventricular branch (1') is a continuation of the left coronary artery. (B) Situation in the horse (*Eq*) and pig (*Su*); the right (subsinoosal) interventricular branch (2') is a continuation of the right coronary artery. 1, Circumflex branch of left coronary artery; 2, right coronary artery; 3, coronary sinus; 4, great cardiac vein; 5, middle cardiac vein.



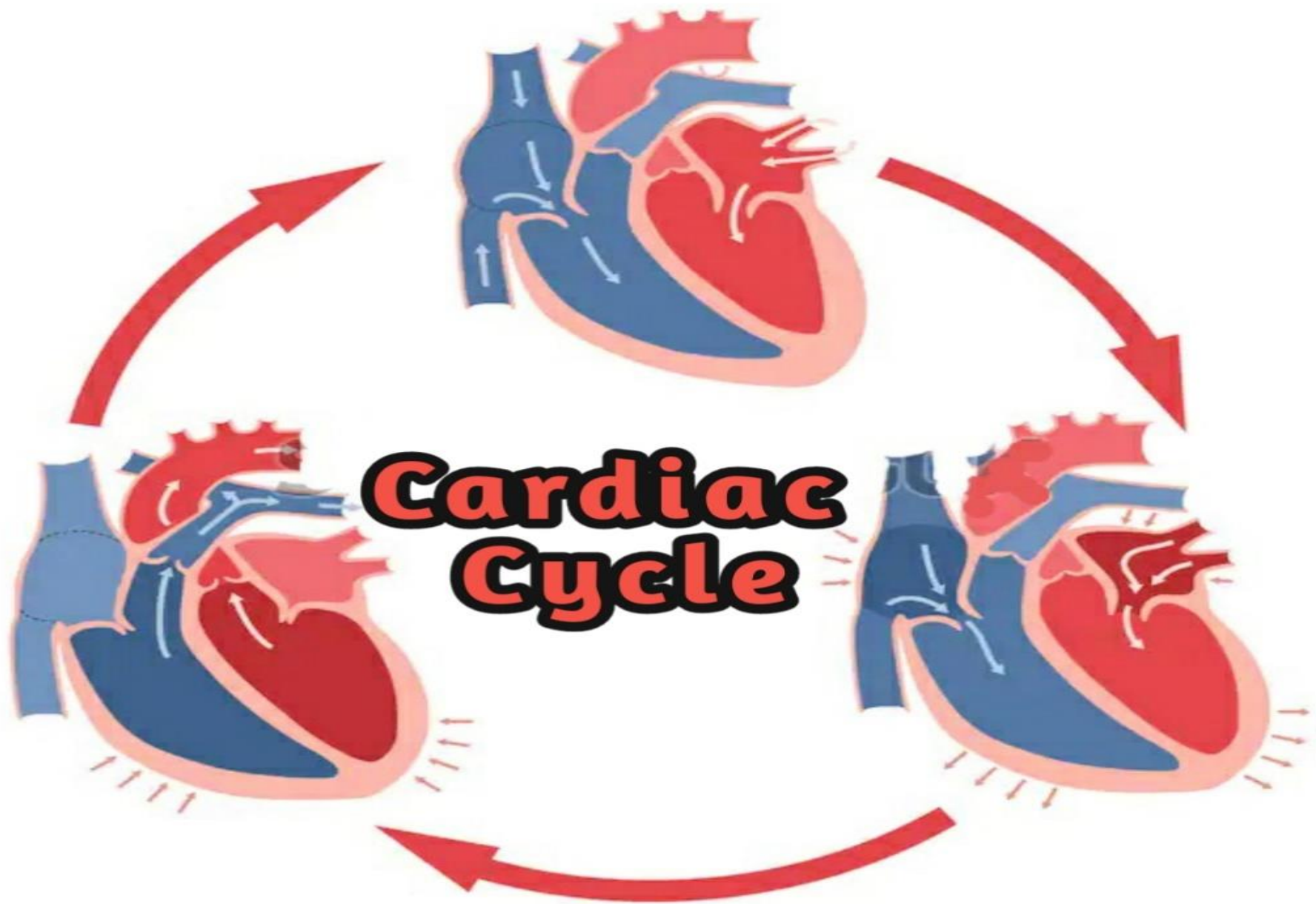


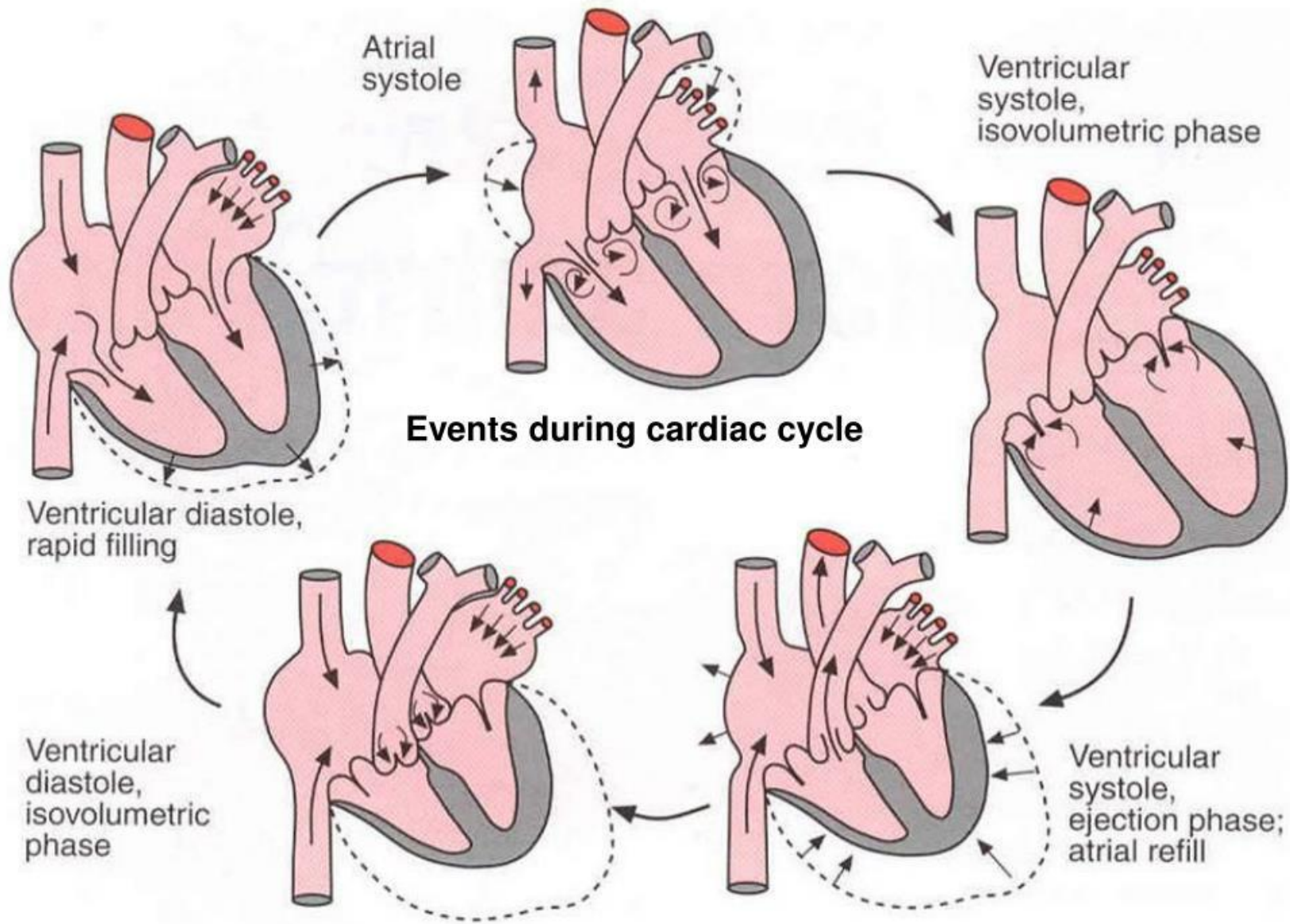


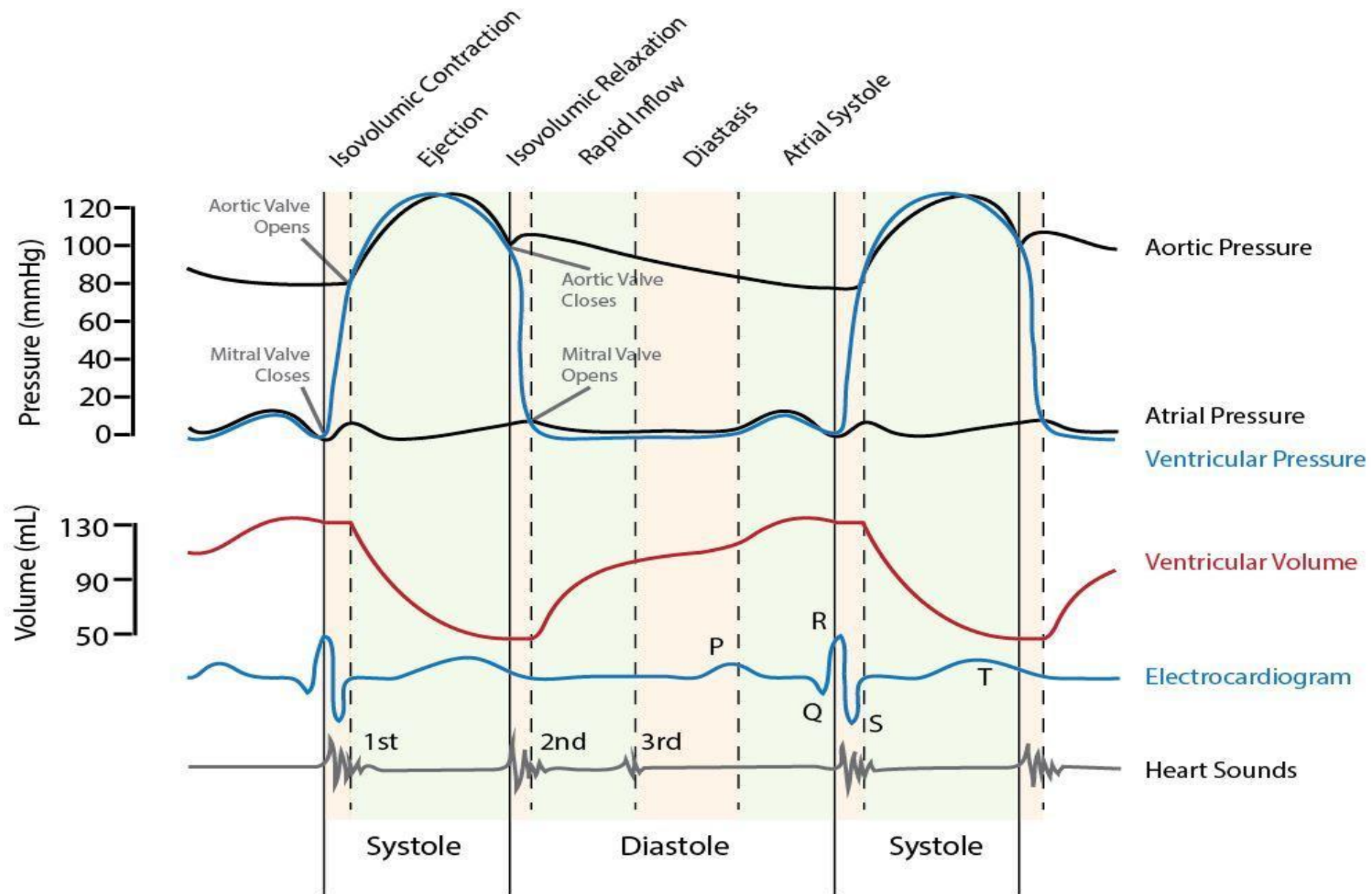


The **Heart** As a **Pump**









- End Diastolic Volume(**EDV**)
- End Systolic Volume(**ESV**)
- Stroke Volume(**SV**)
- Ejection Fraction(**EF**)

- Cardiac Output(**CO**)

- Venous Return

- **Preload**

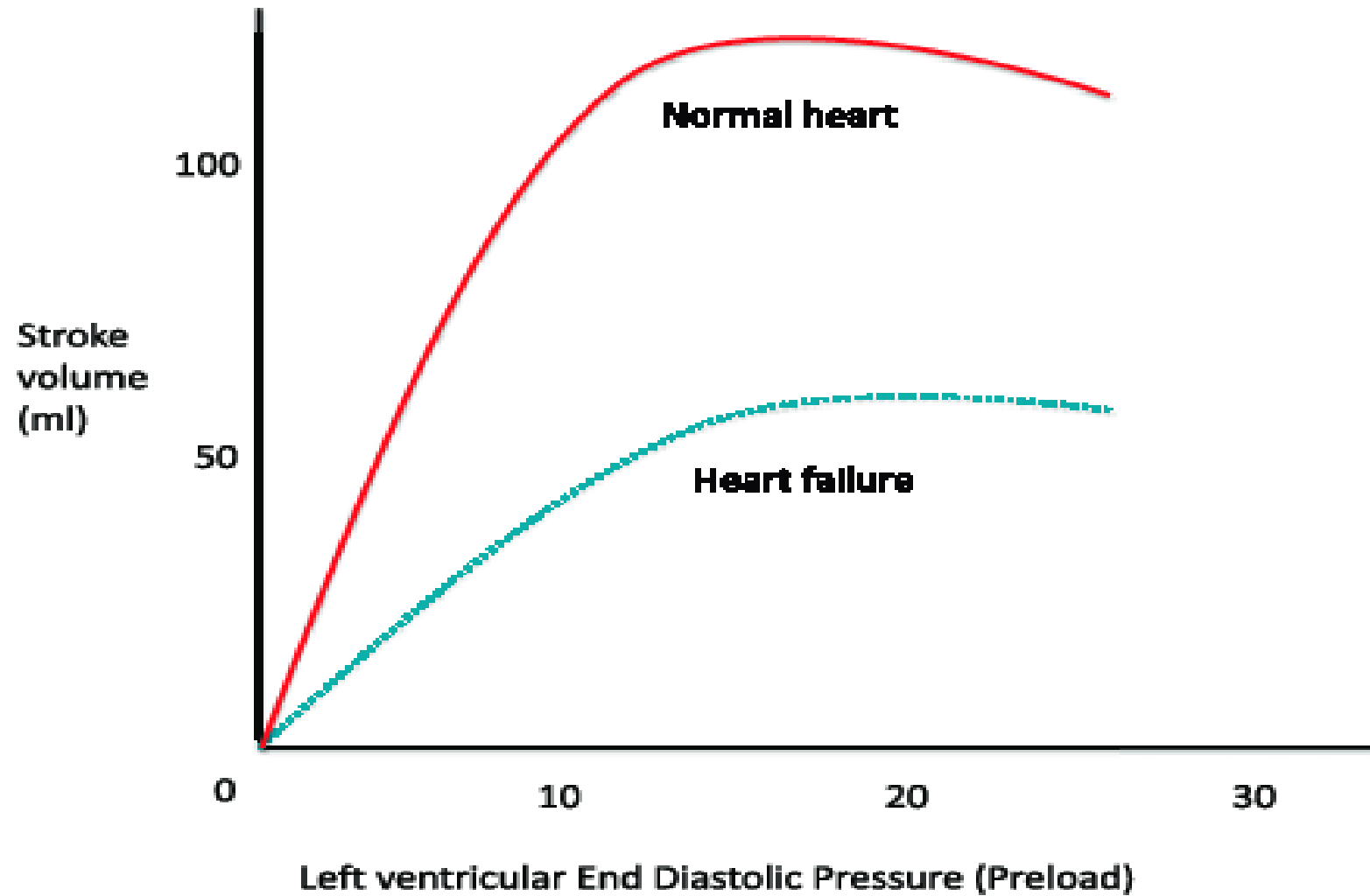
- **Afterload**



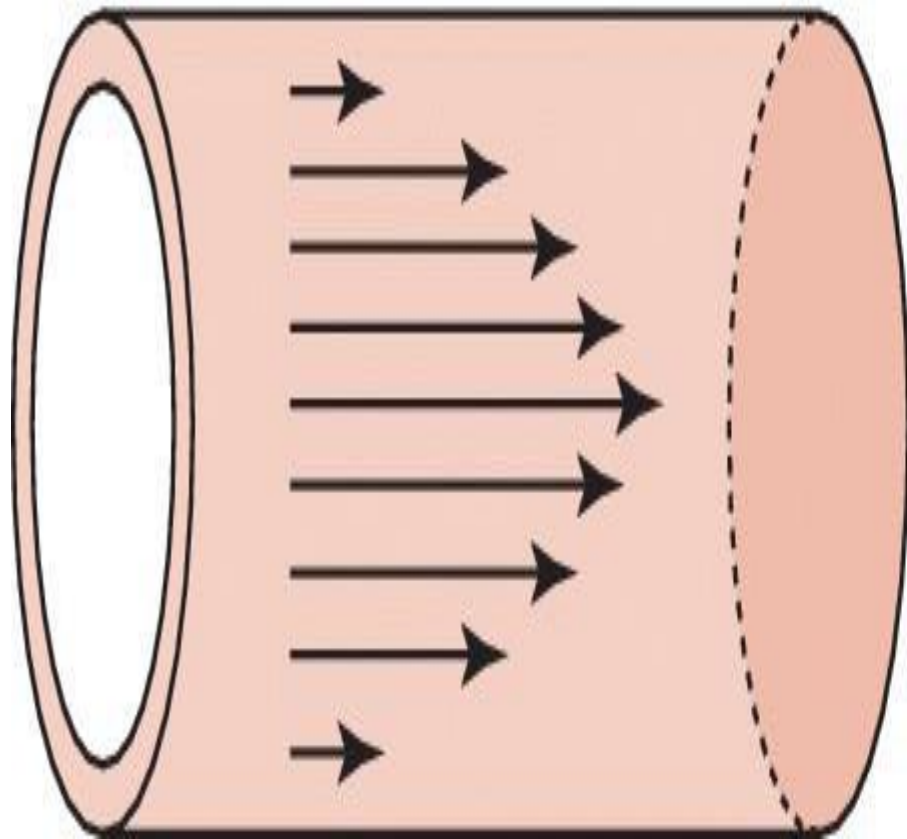
Frank Starling Law of the Heart



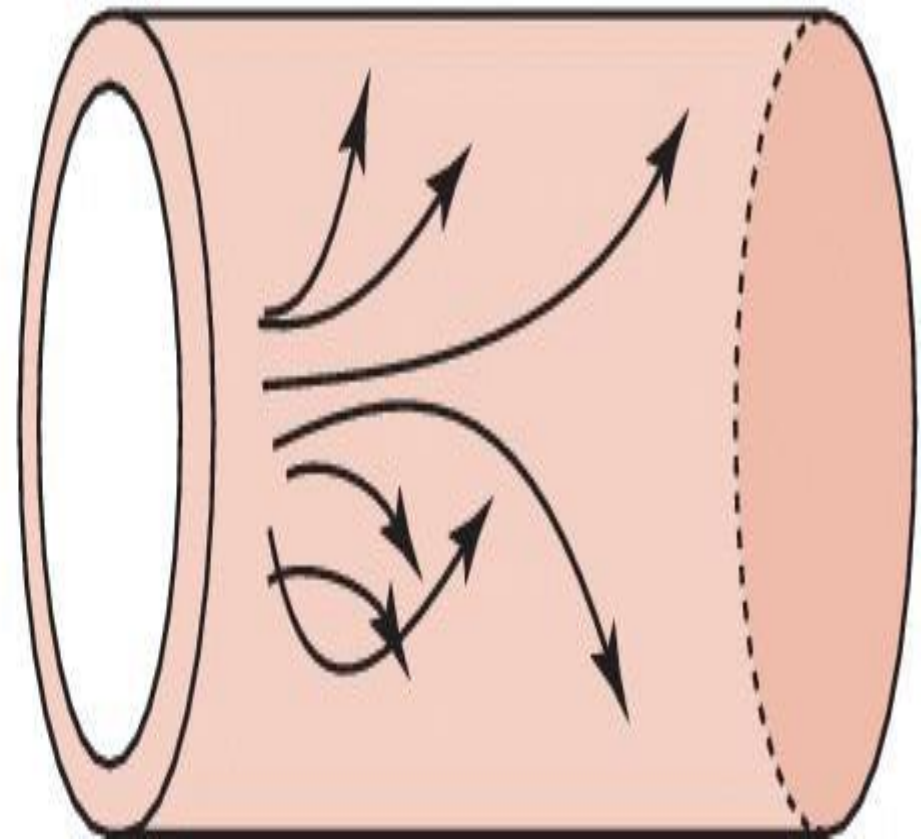
FRANK-STARLING MECHANISM



Laminar
(streamline)



Turbulent



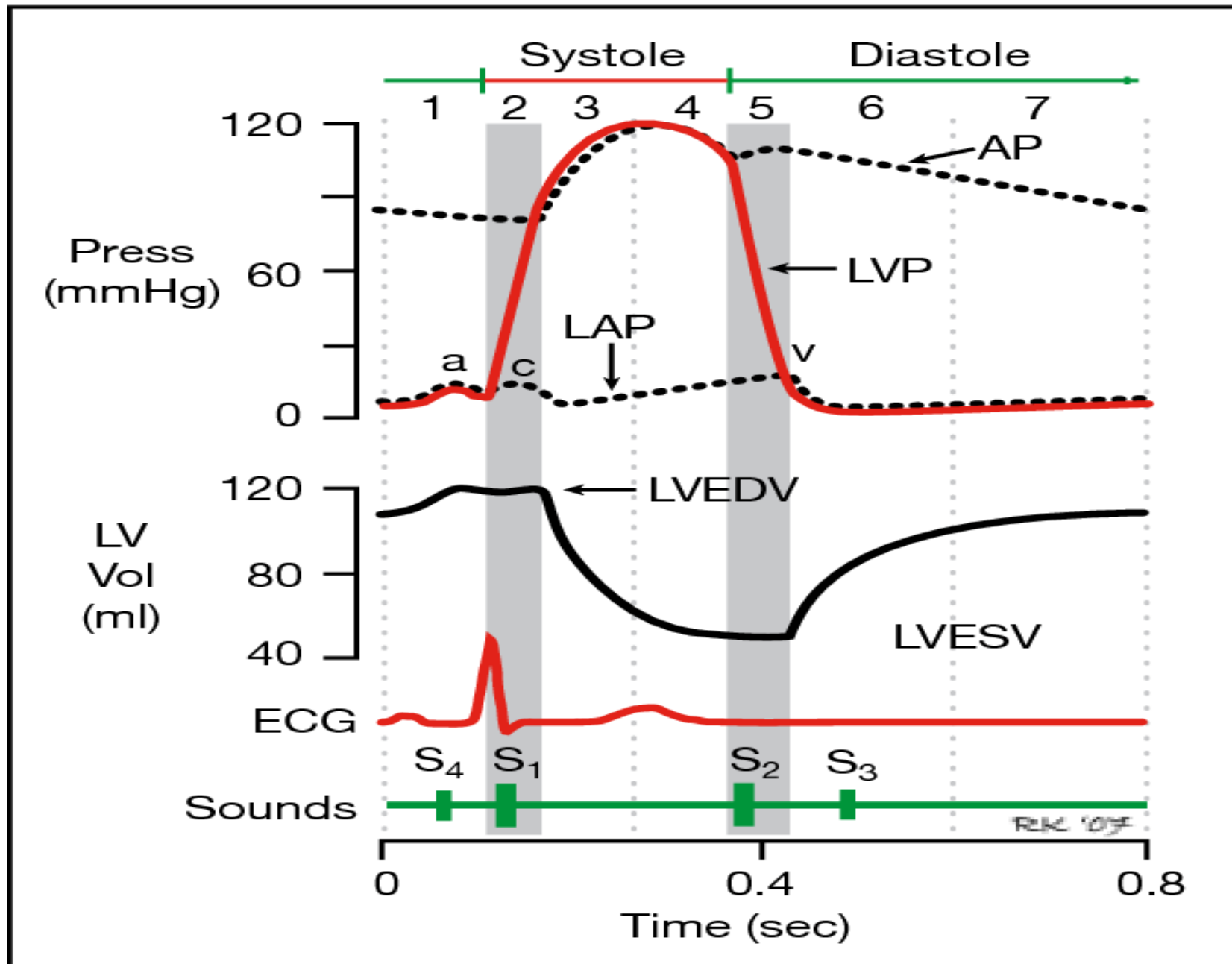
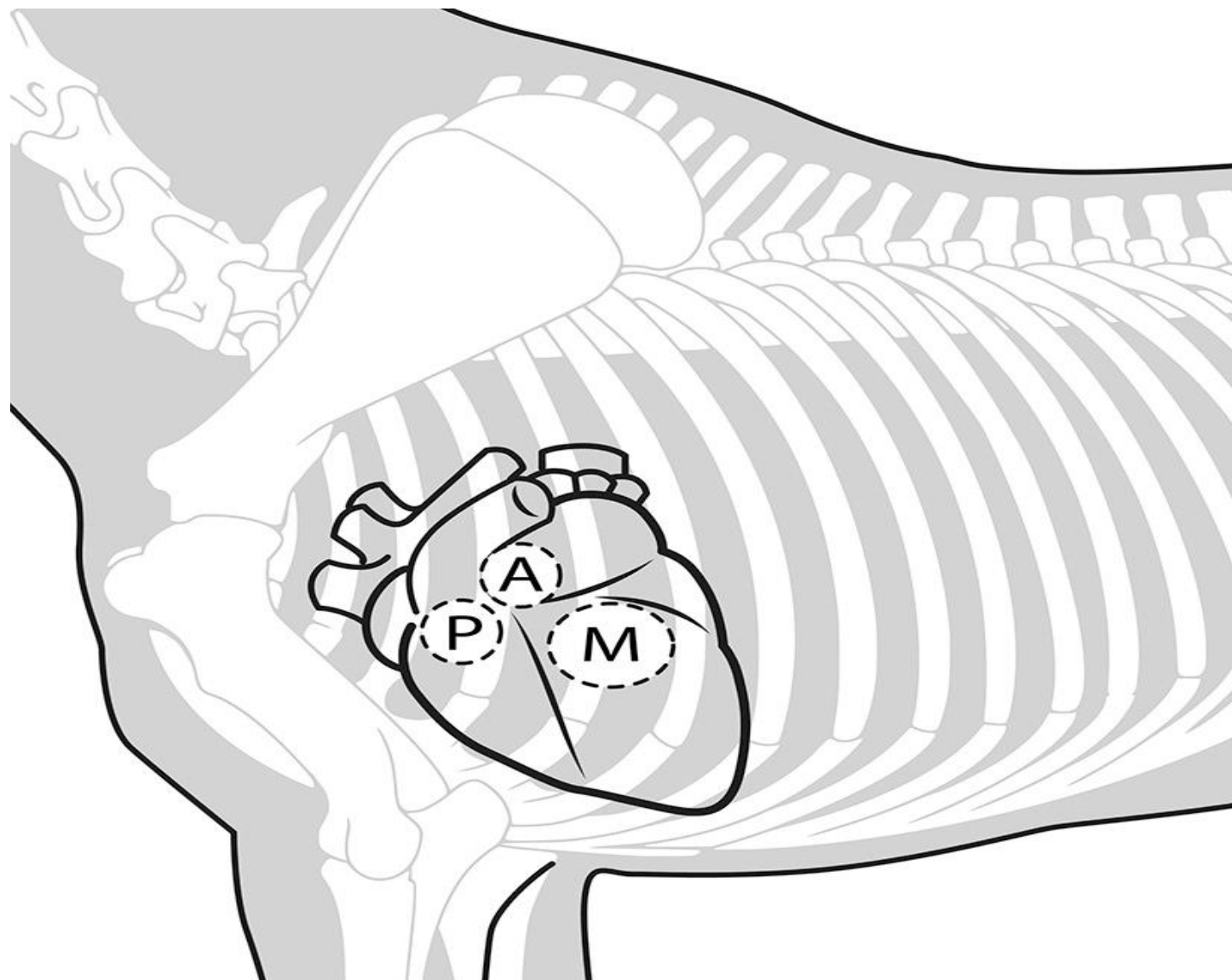
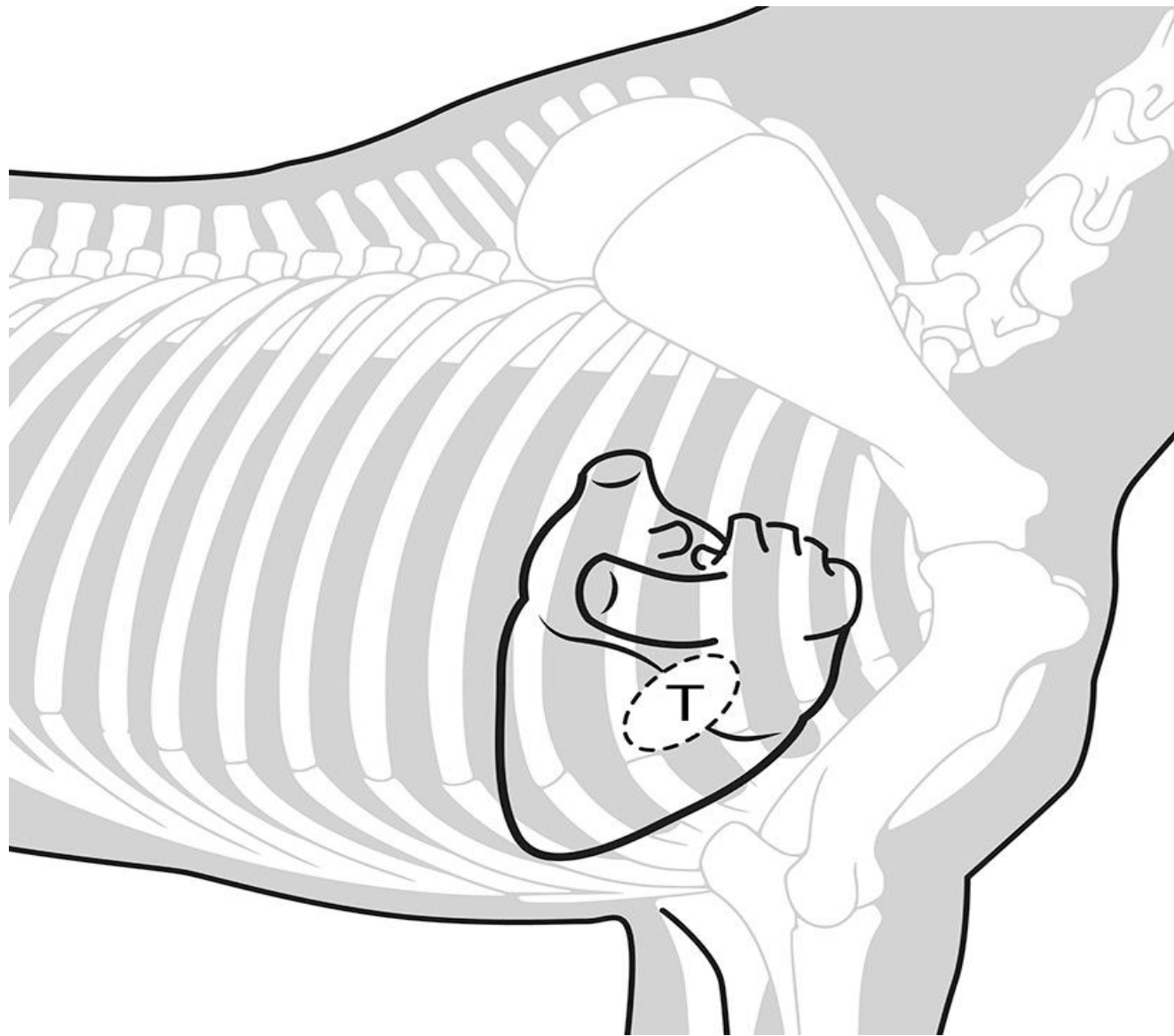


Figure 2: Heart sounds in relation to the cardiac cycle









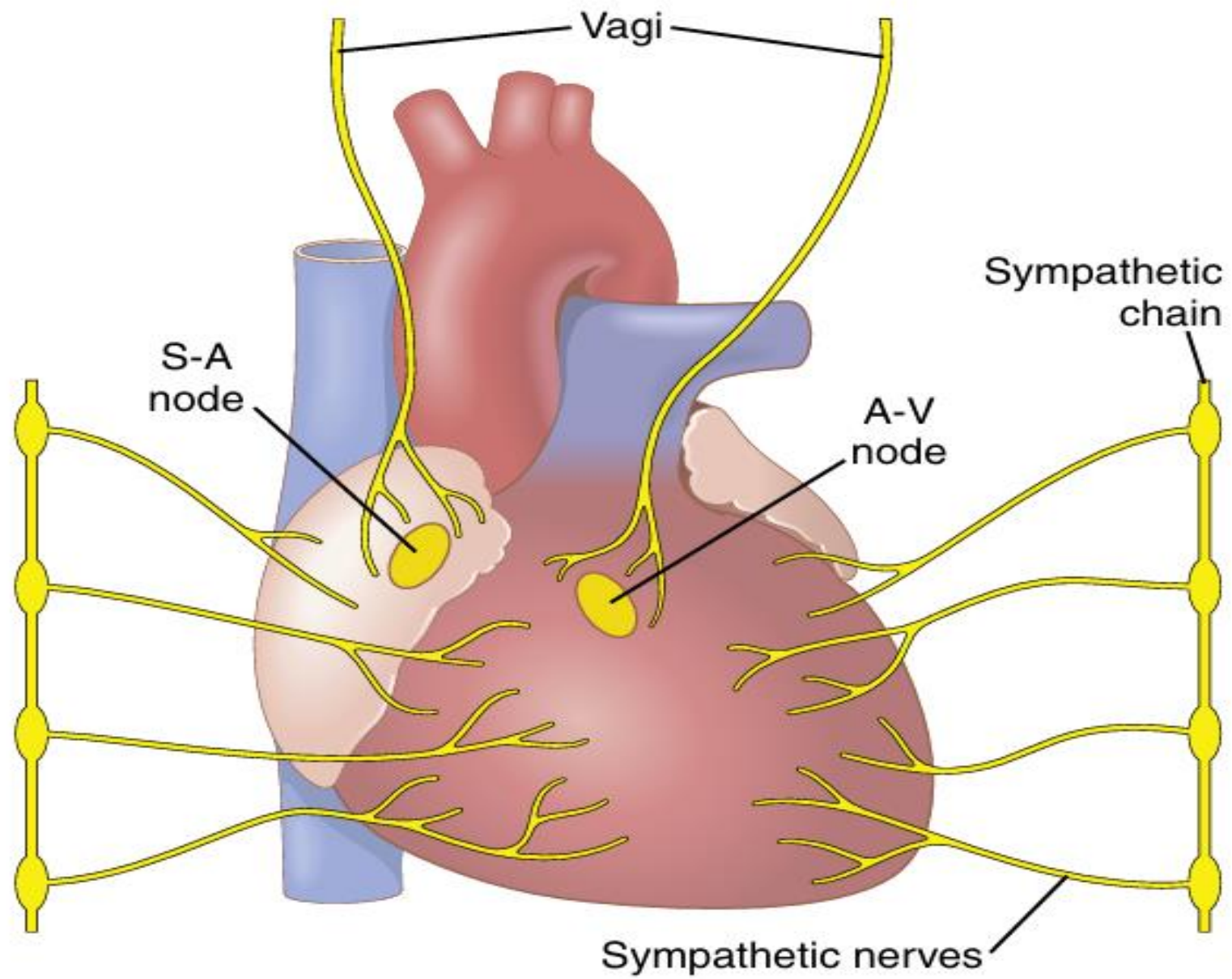
HEART MURMUR

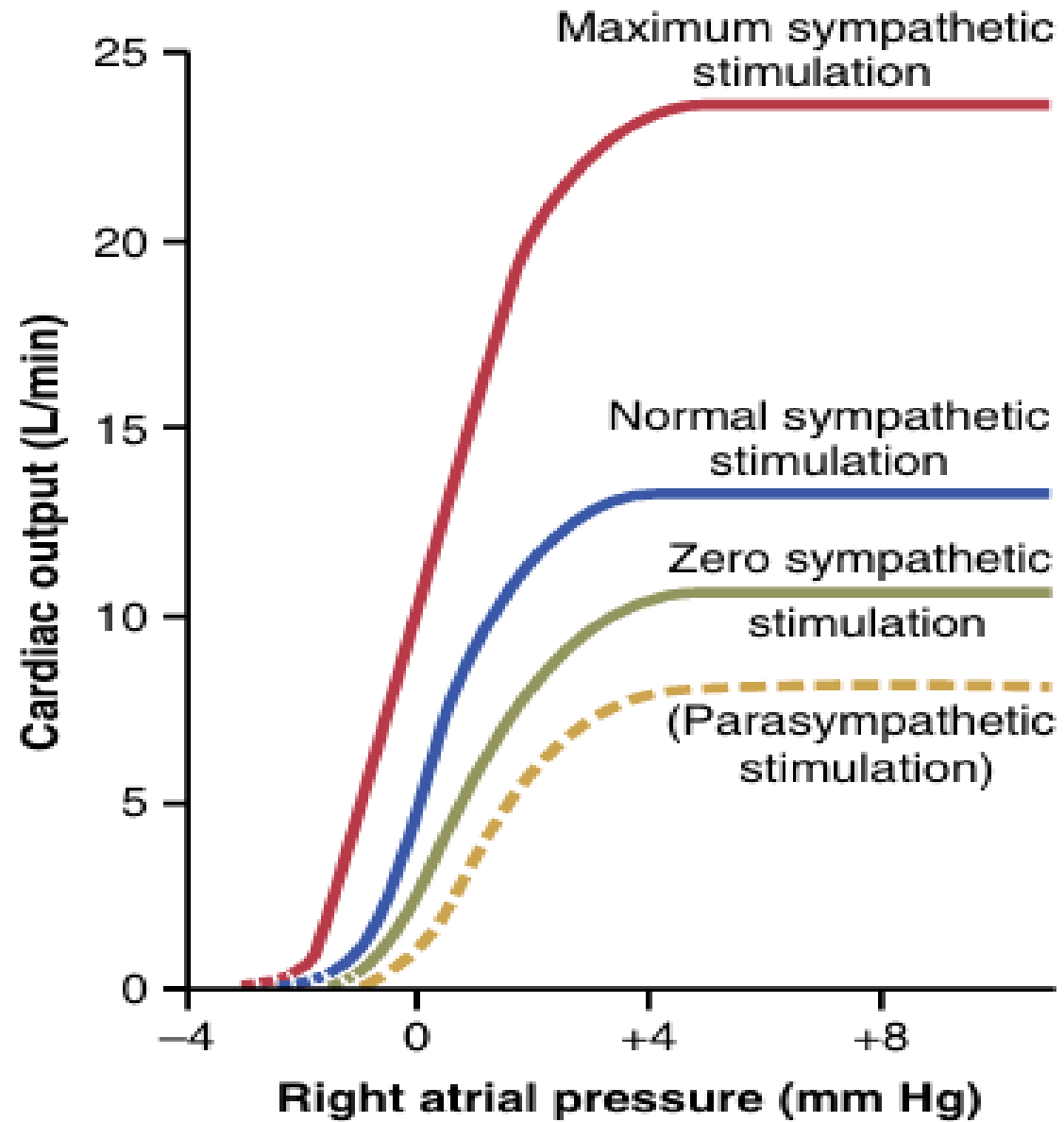
> Systolic heart murmur

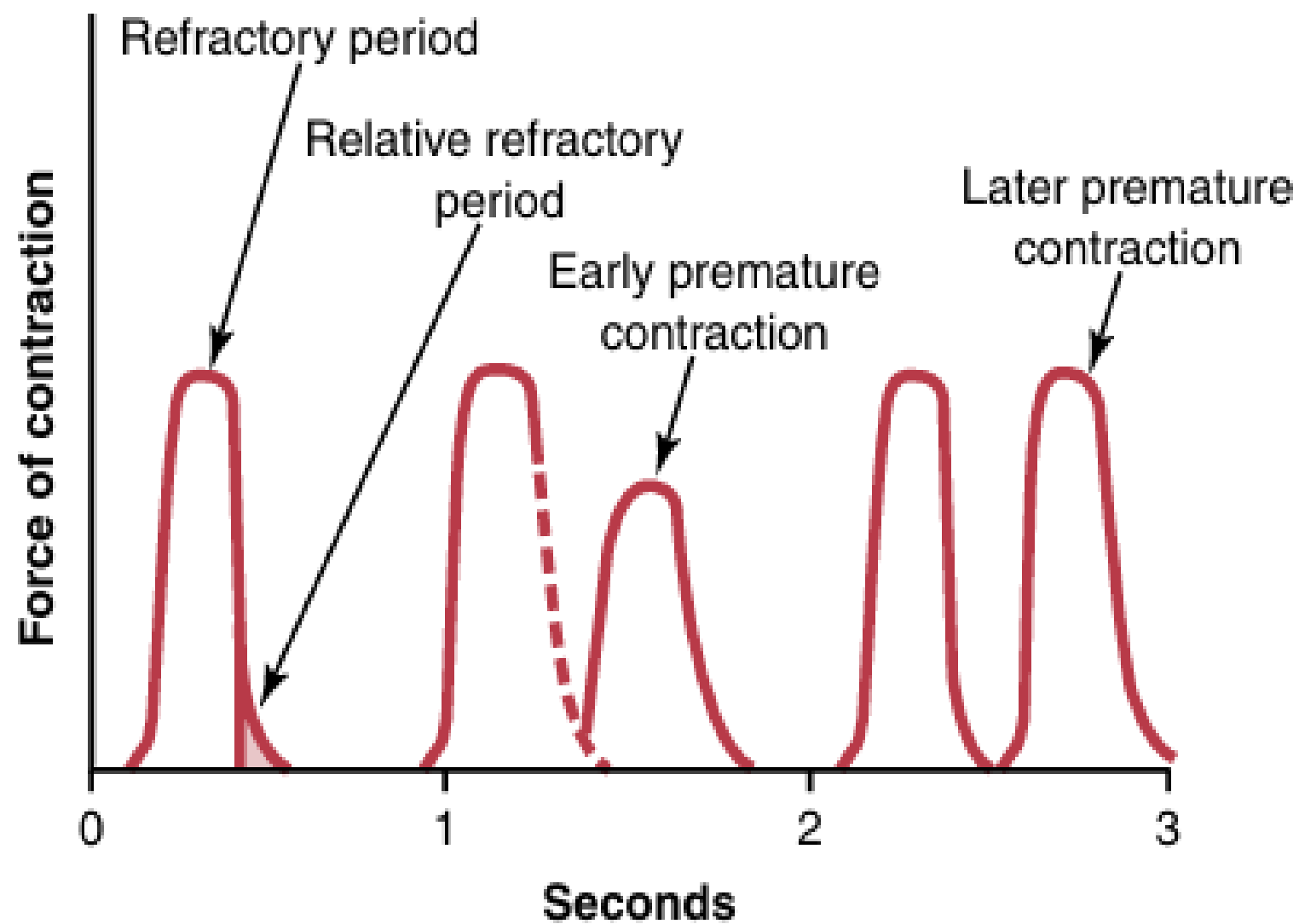


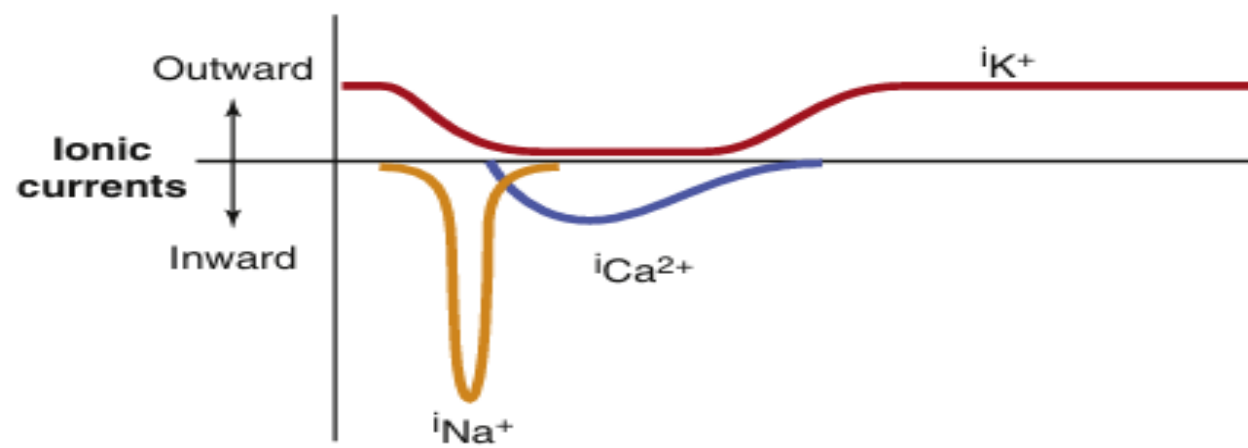
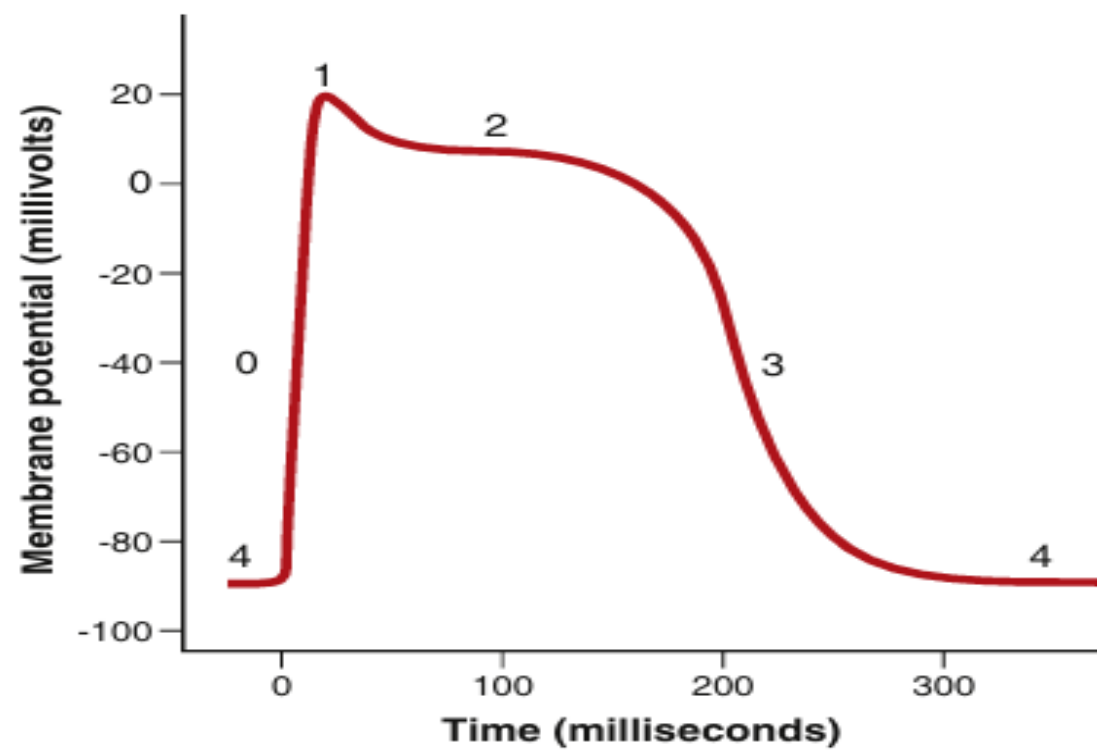
> Diastolic heart murmur

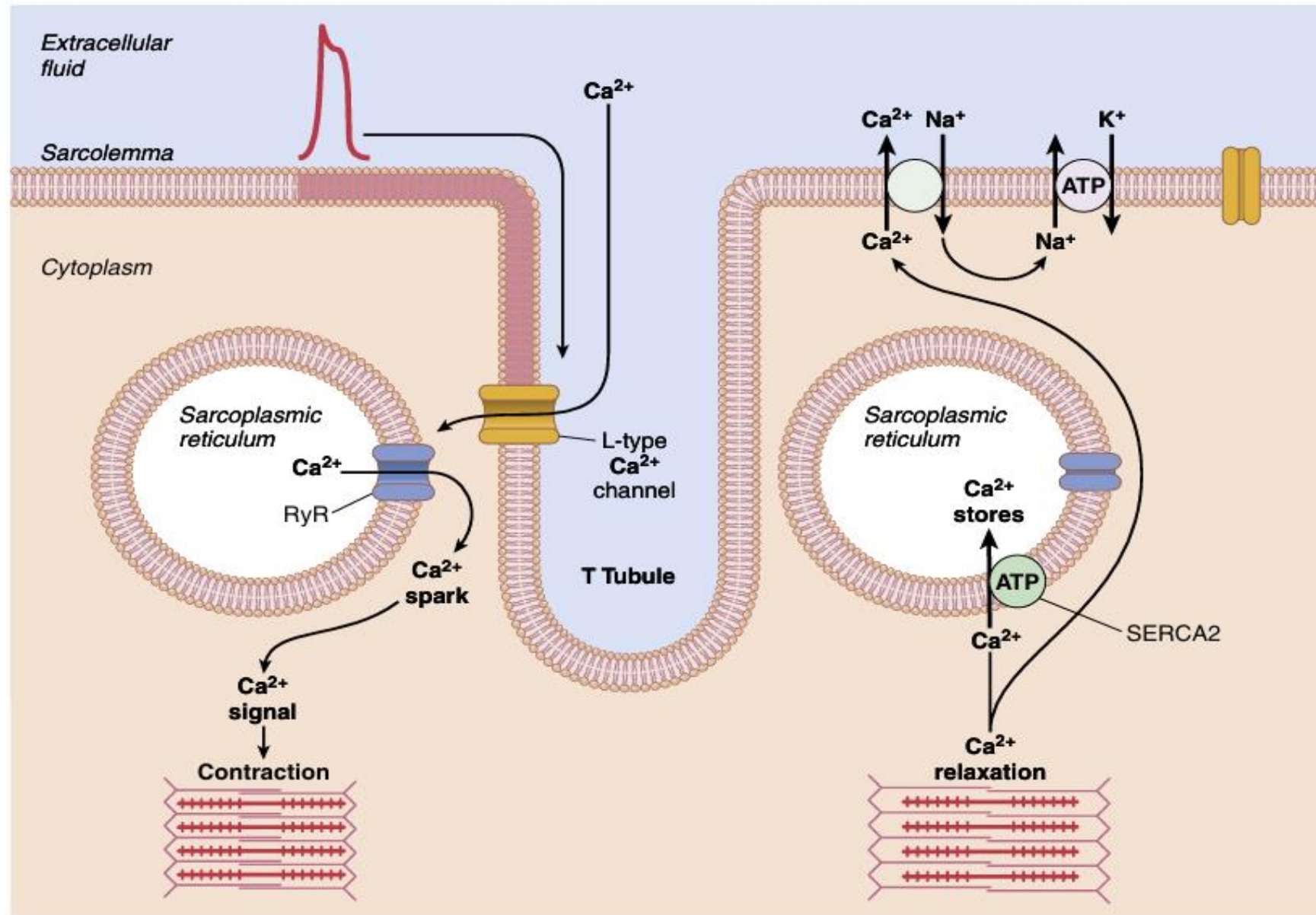




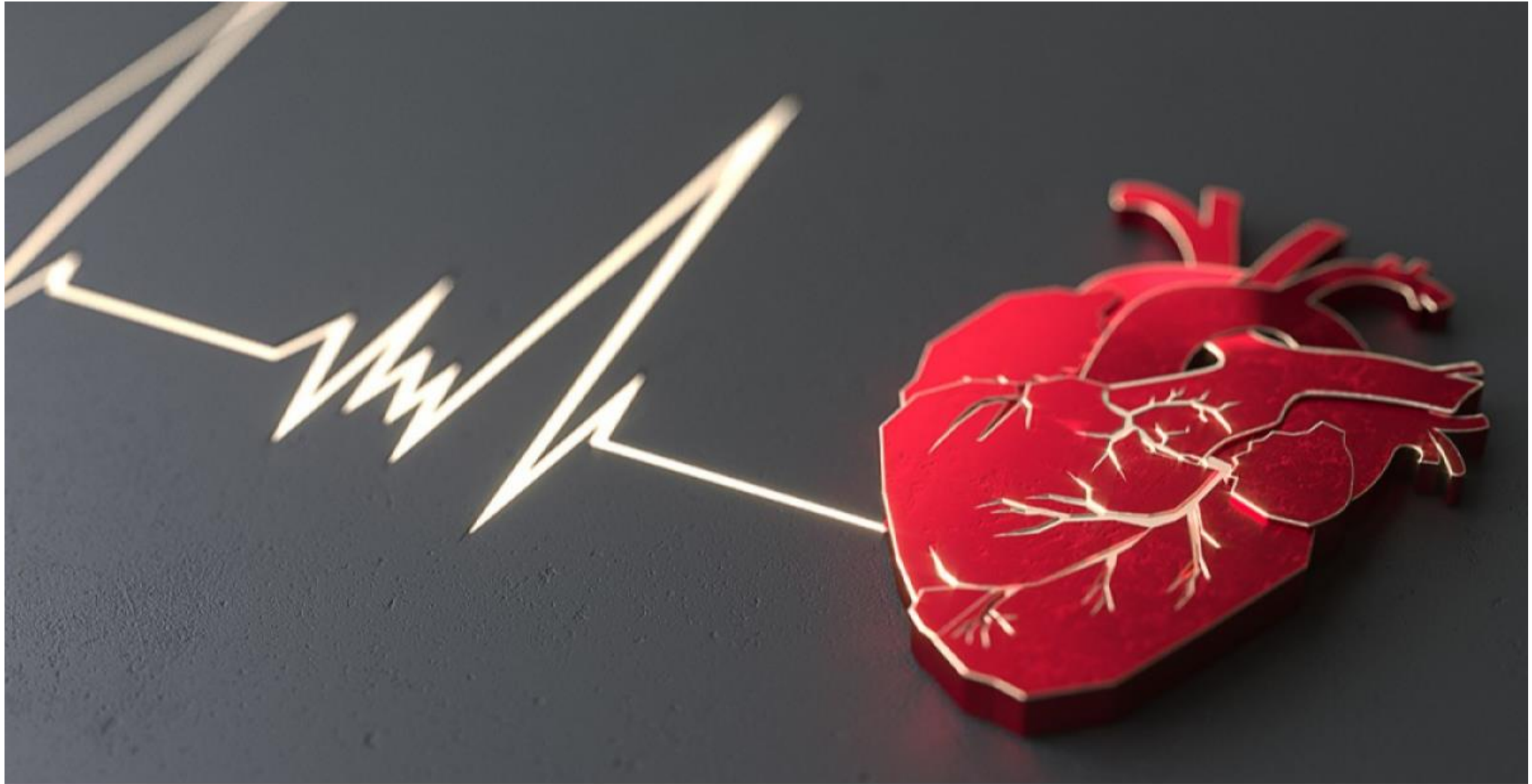




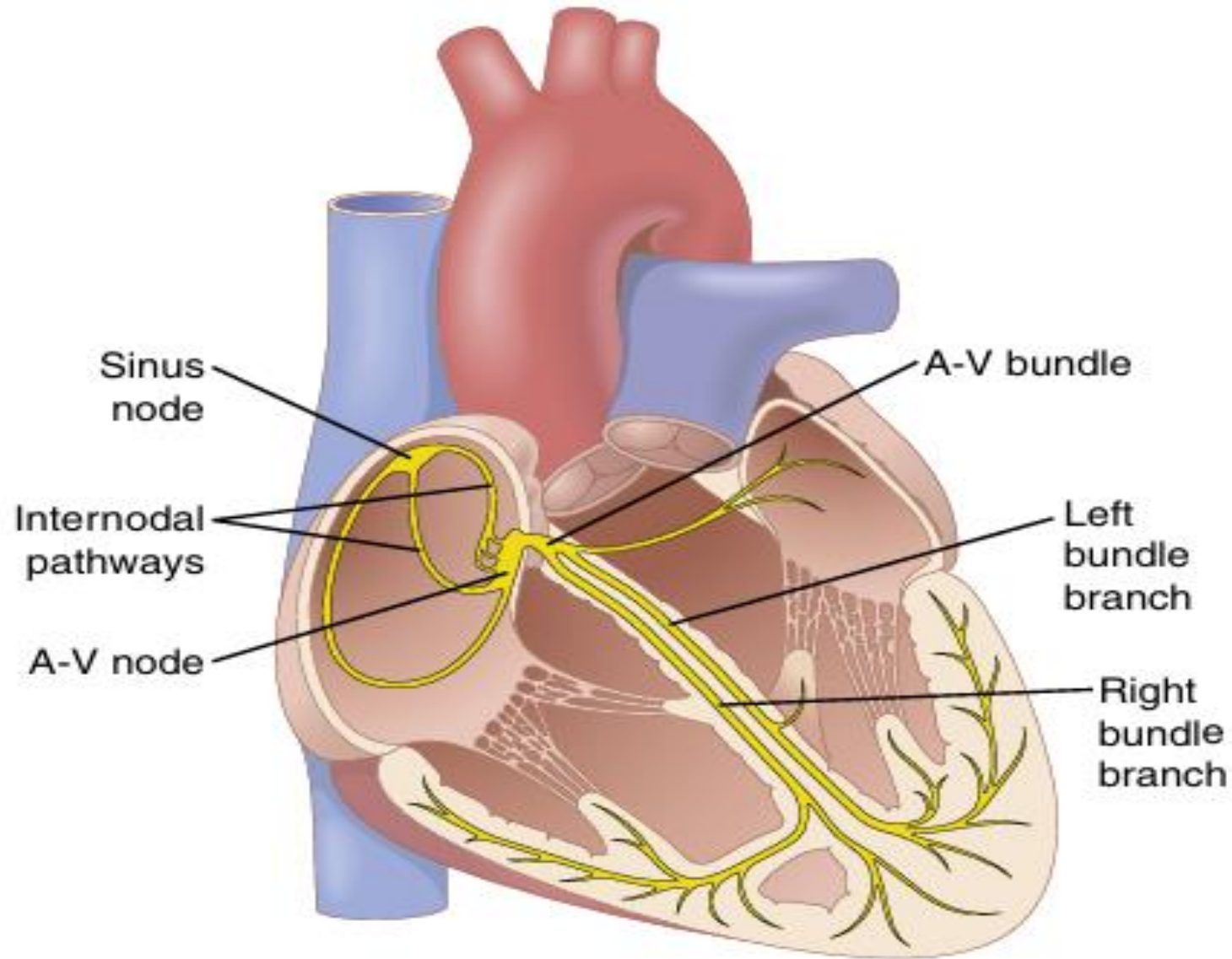




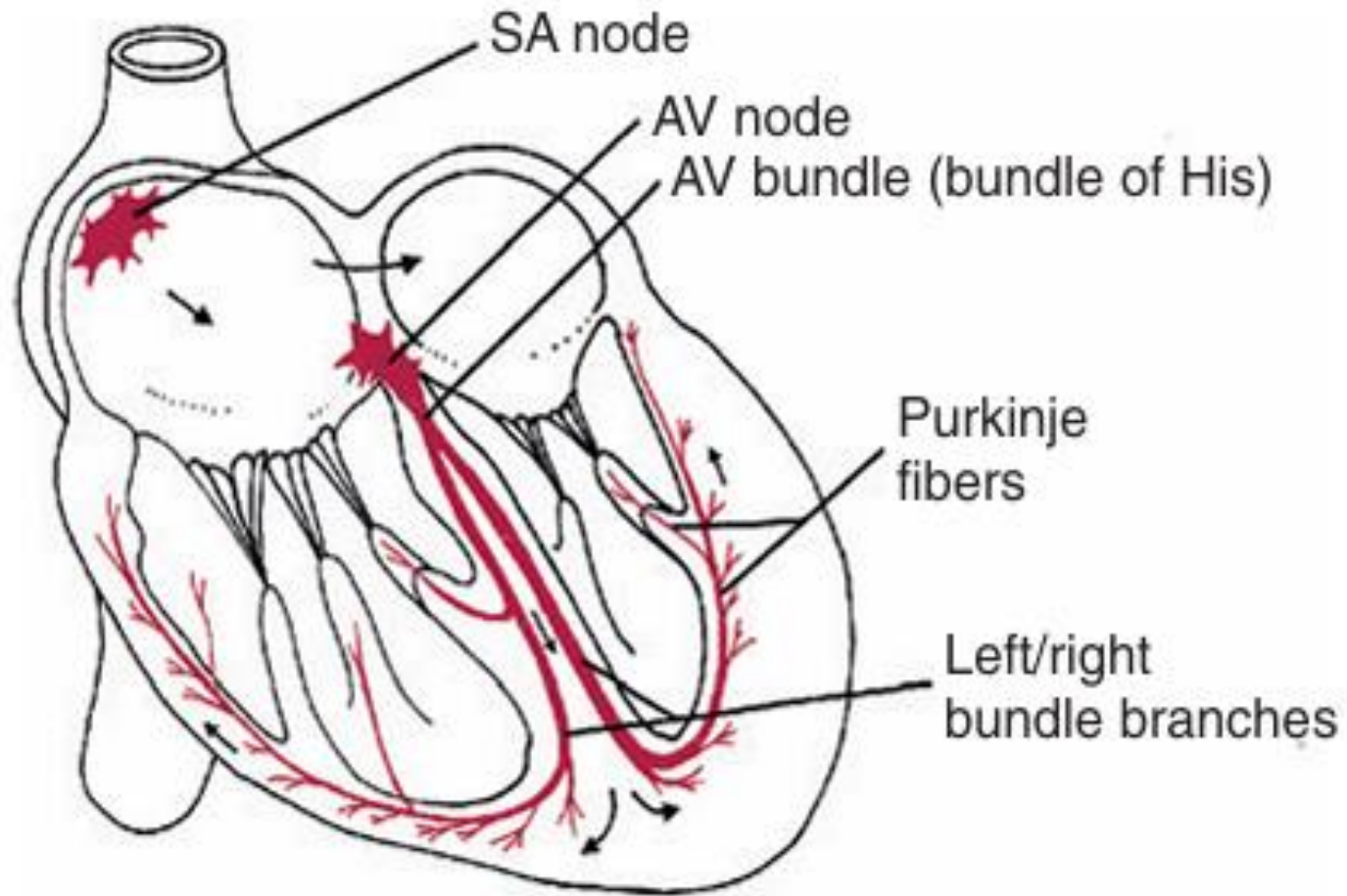
Cardiac Electrophysiology



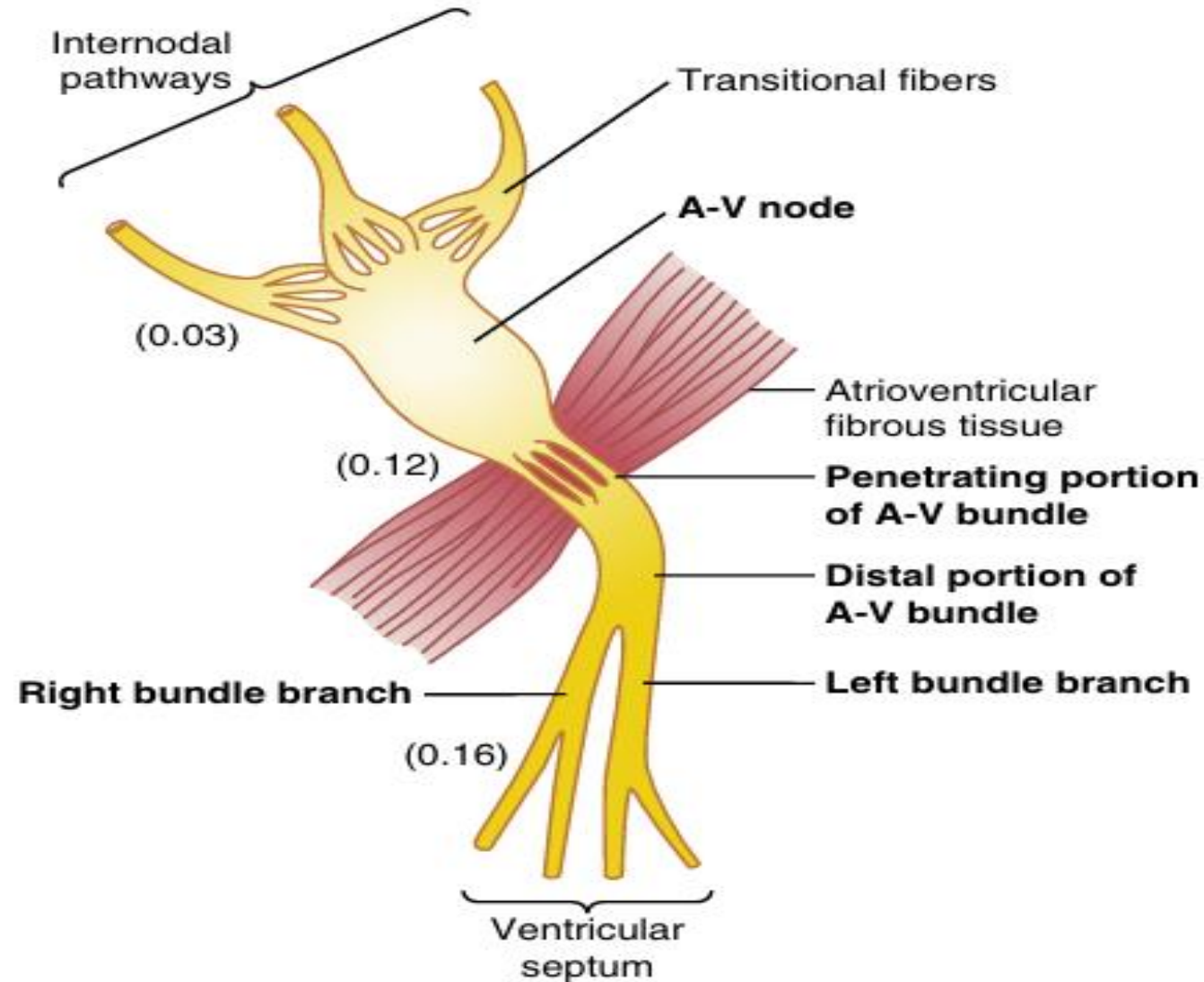
Cardiac Excitatory and Conductive System



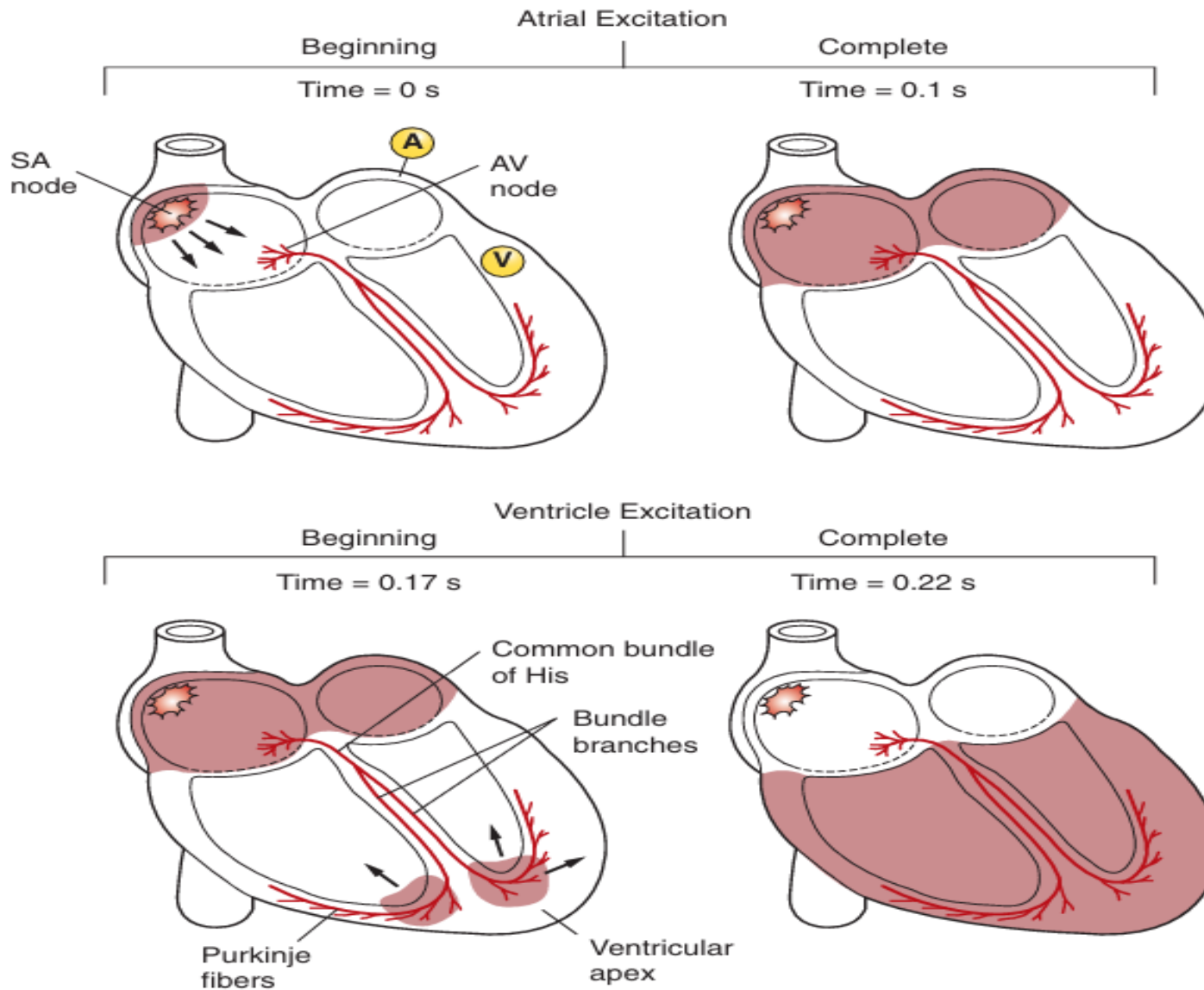
Cardiac Excitatory and Conductive System



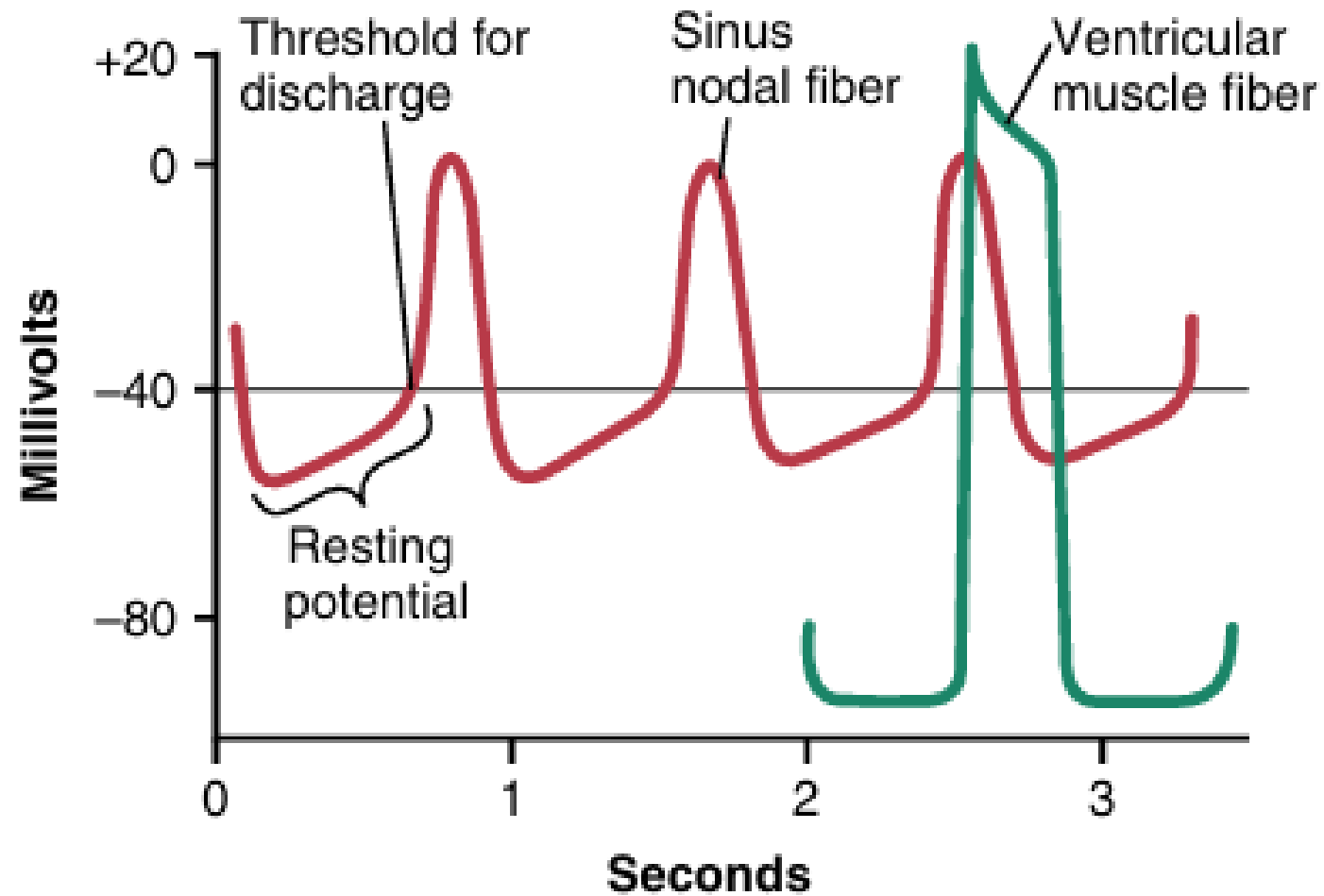
Cardiac Excitatory and Conductive System

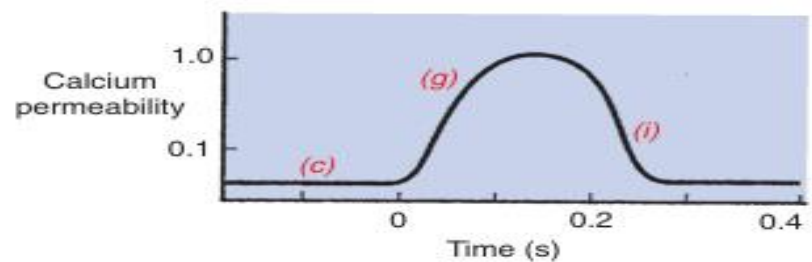
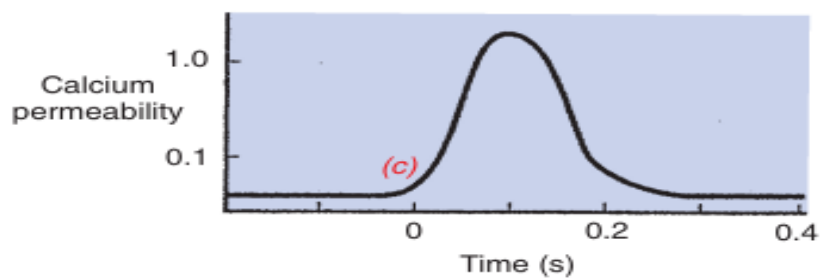
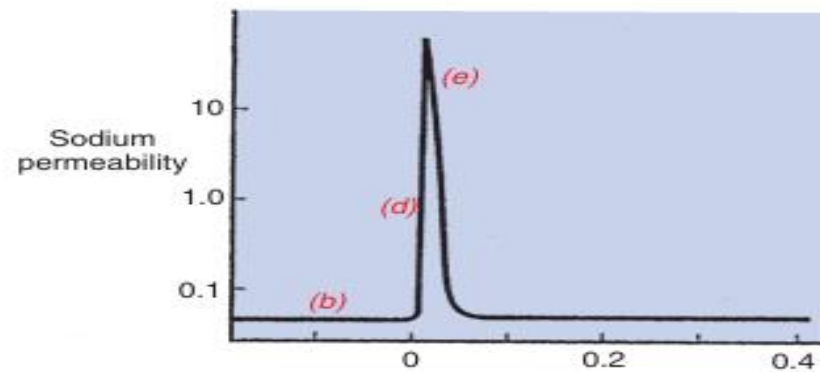
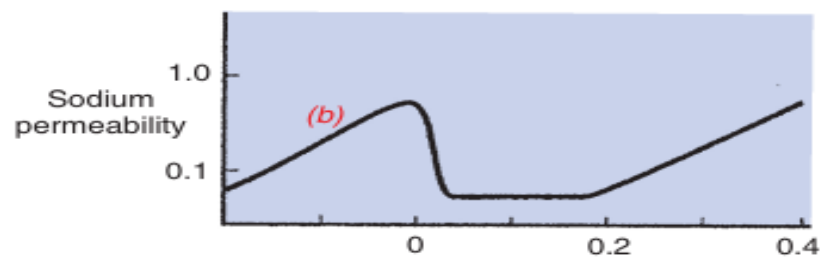
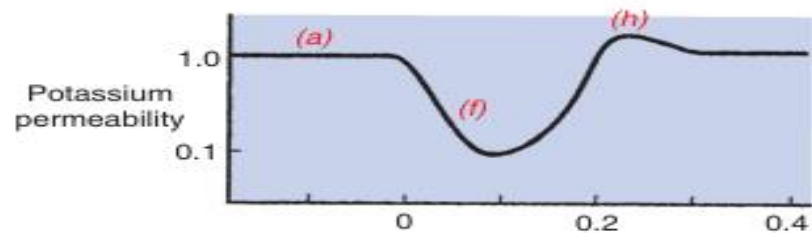
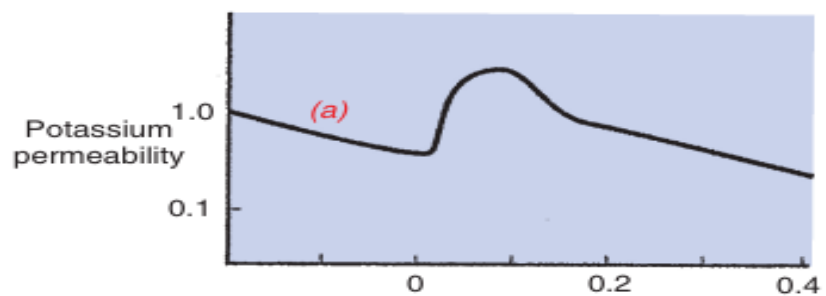
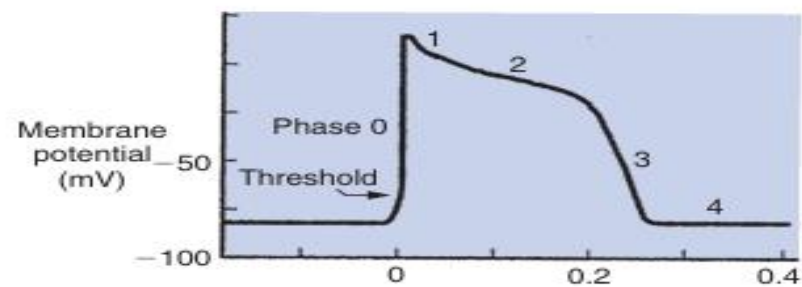
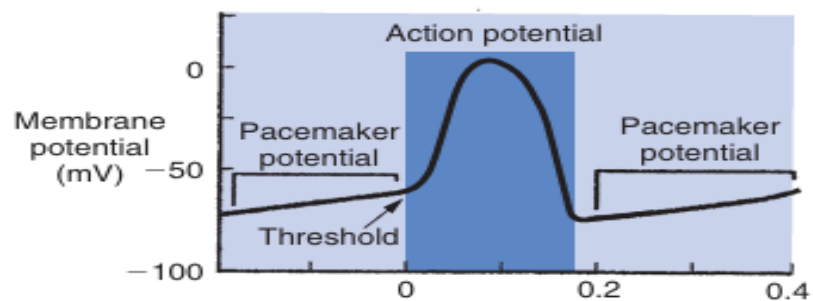


Cardiac Excitatory and Conductive System

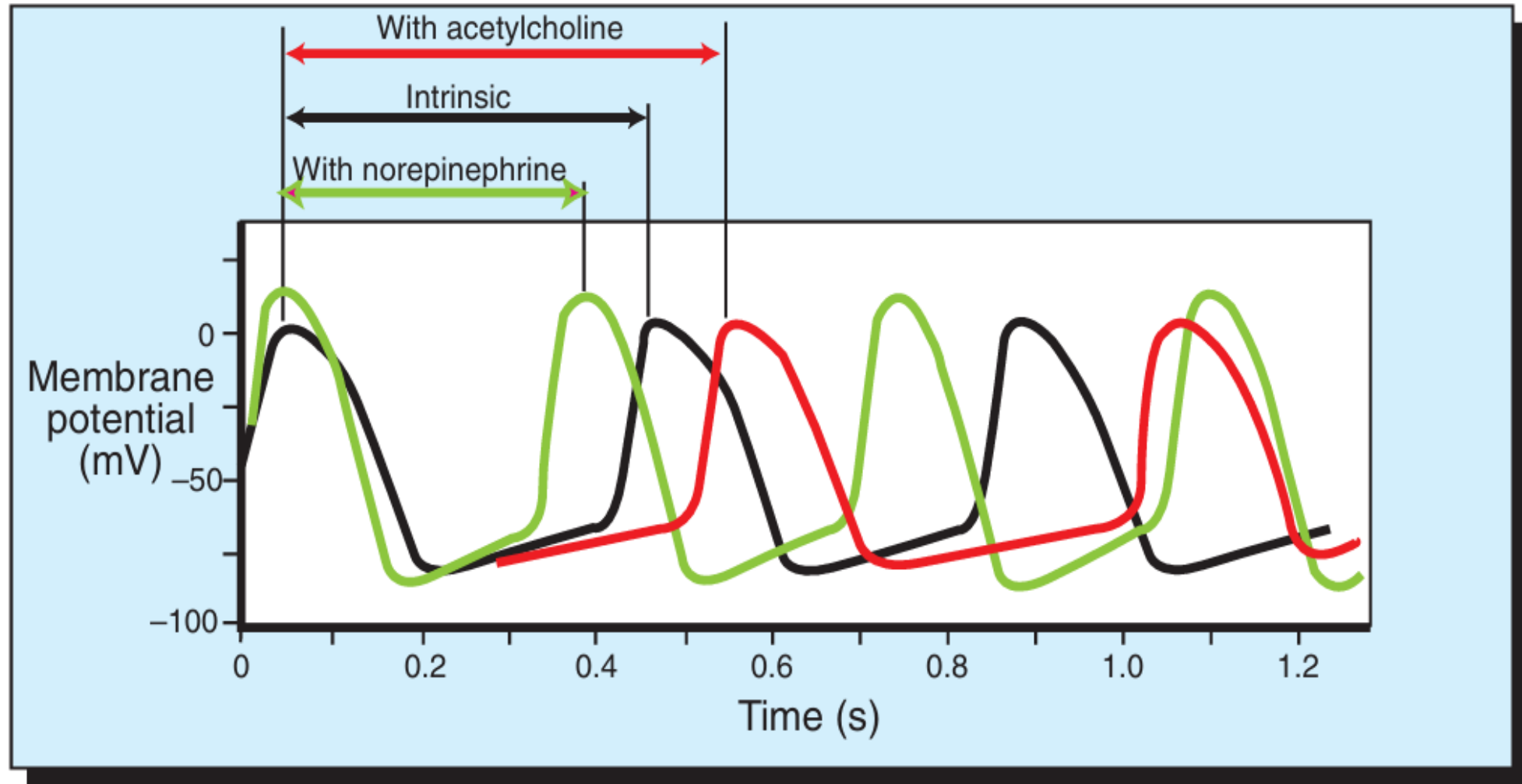


Cardiac Excitatory and Conductive System



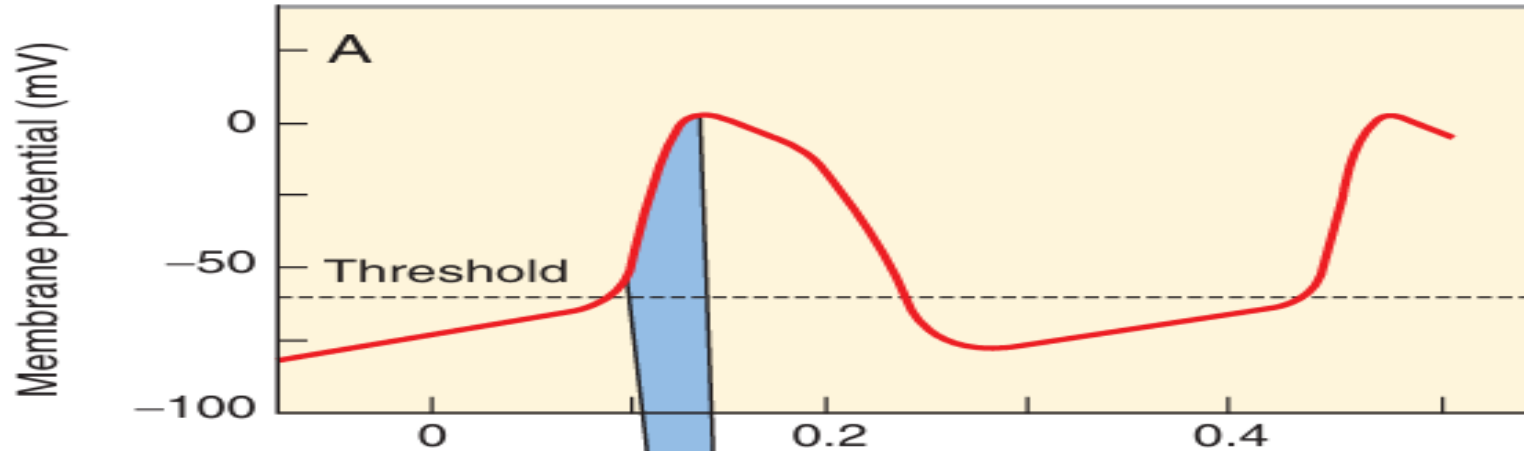


Cardiac Excitatory and Conductive System

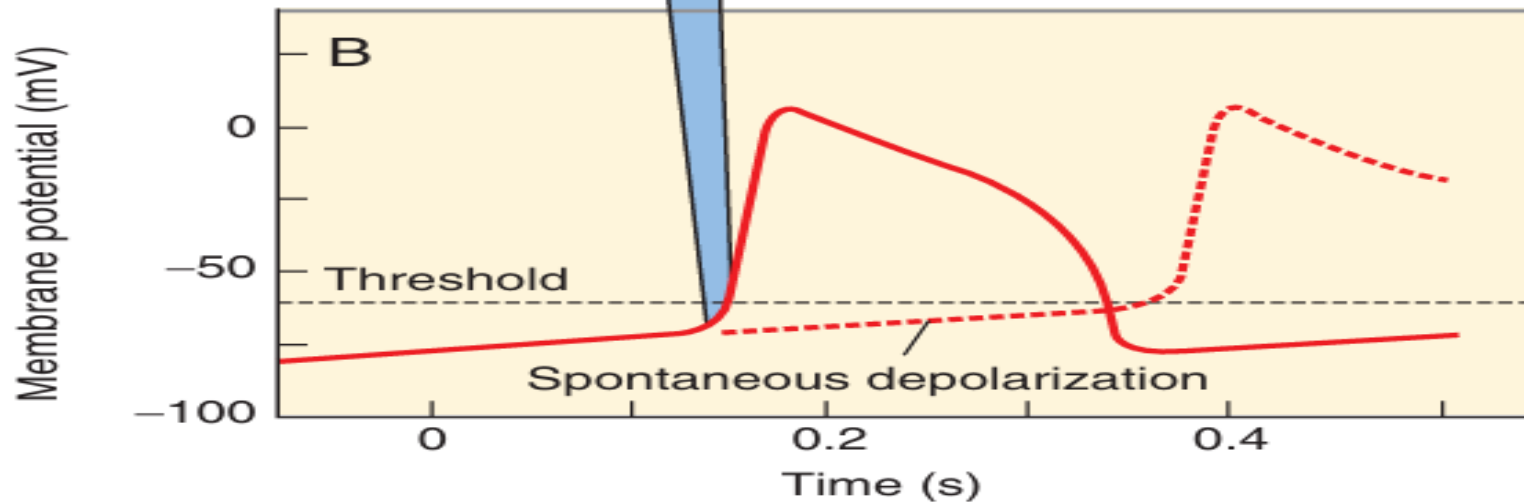


Cardiac Excitatory and Conductive System

SA node cell (first one to reach threshold)



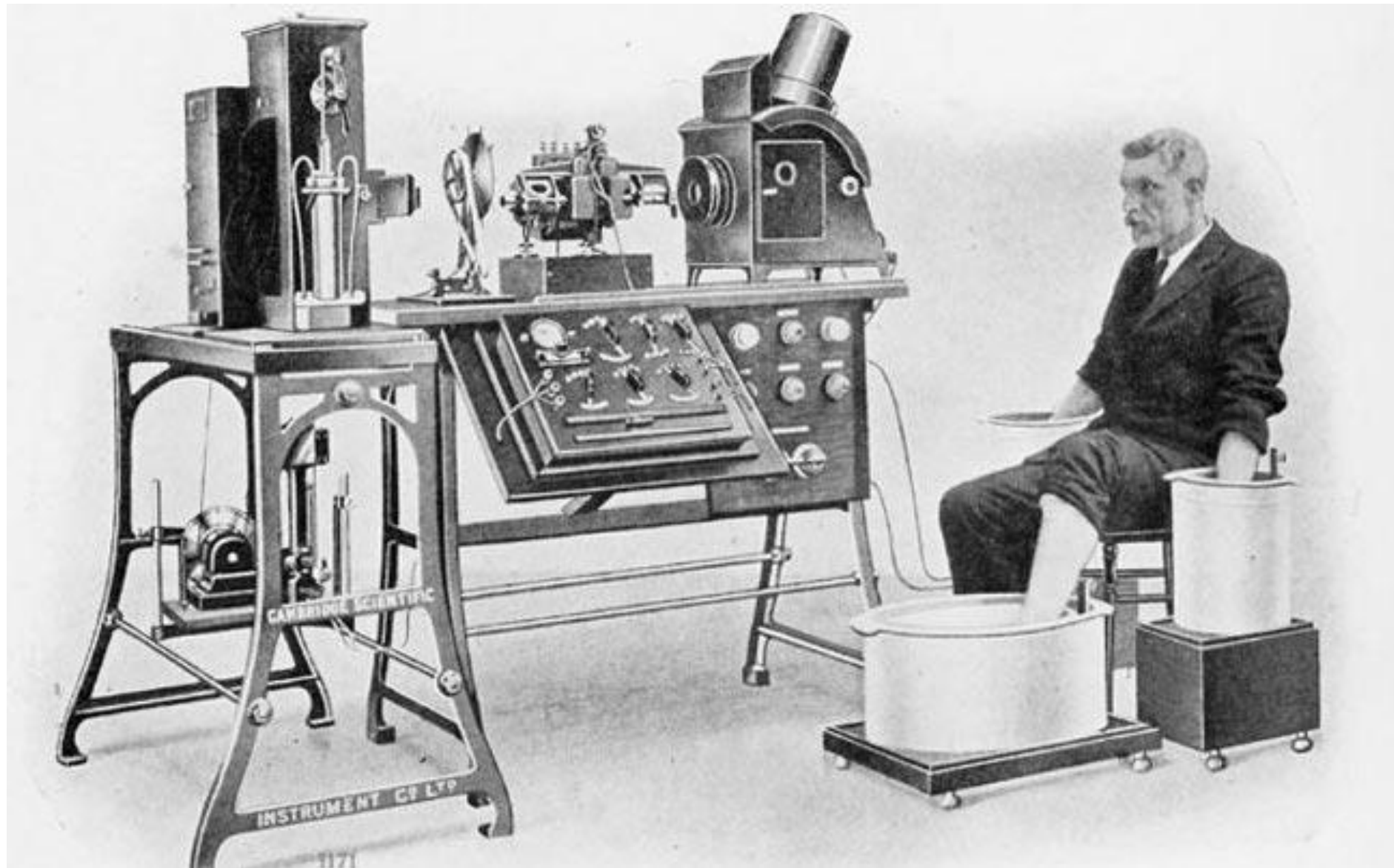
AV node cell (early in AV node)



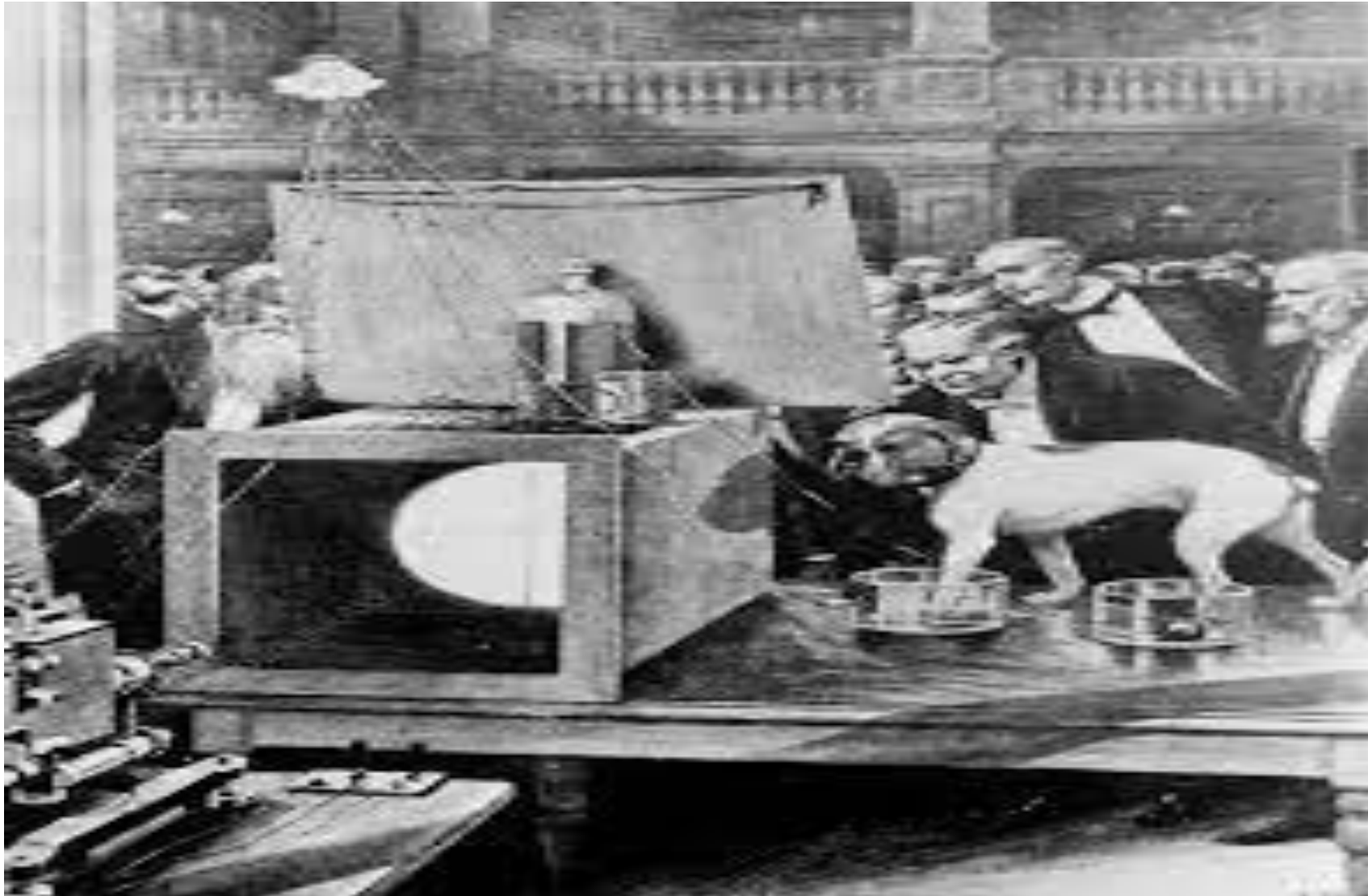
Fundamentals of Electrocardiography



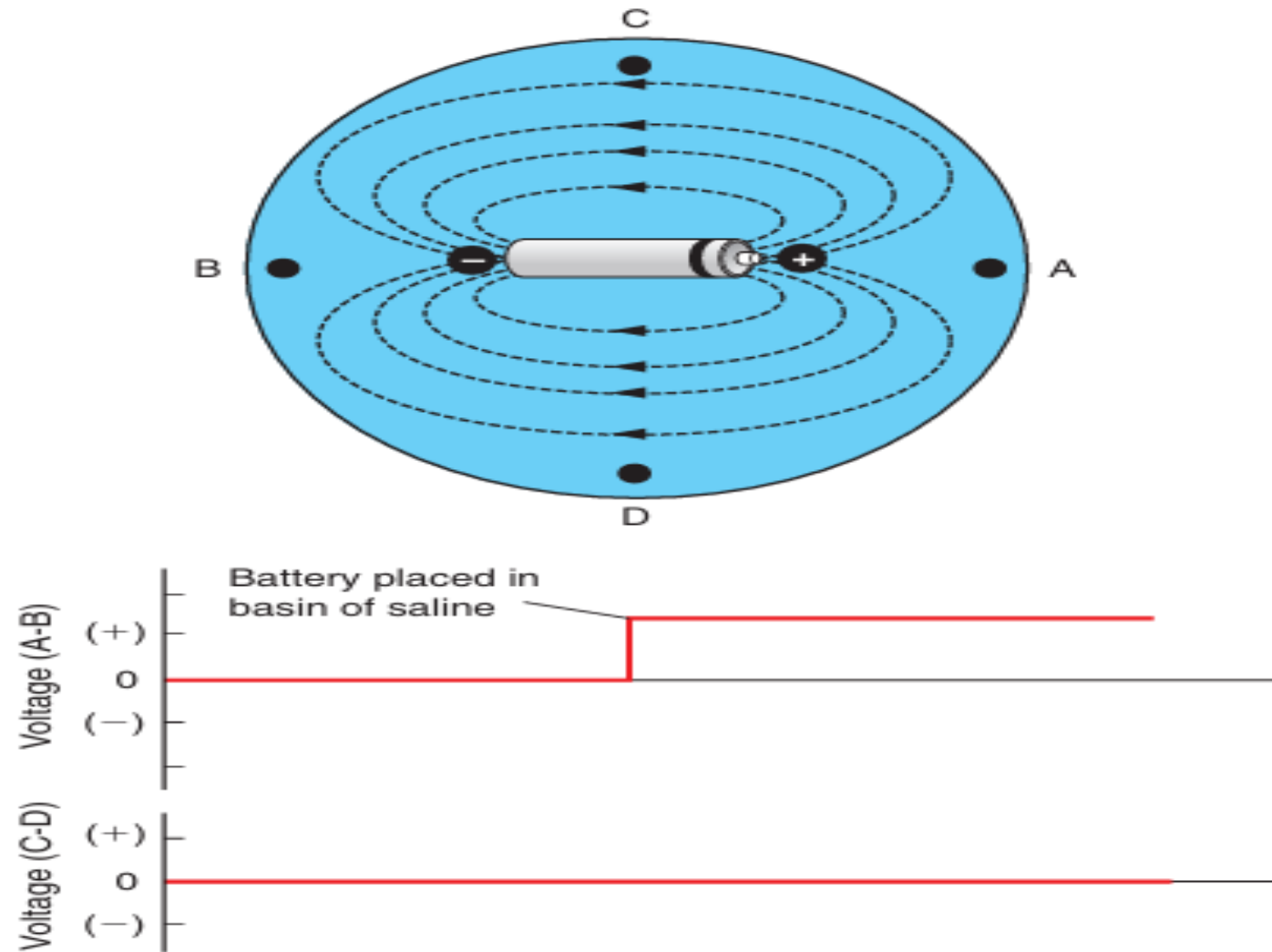
Fundamentals of Electrocardiography



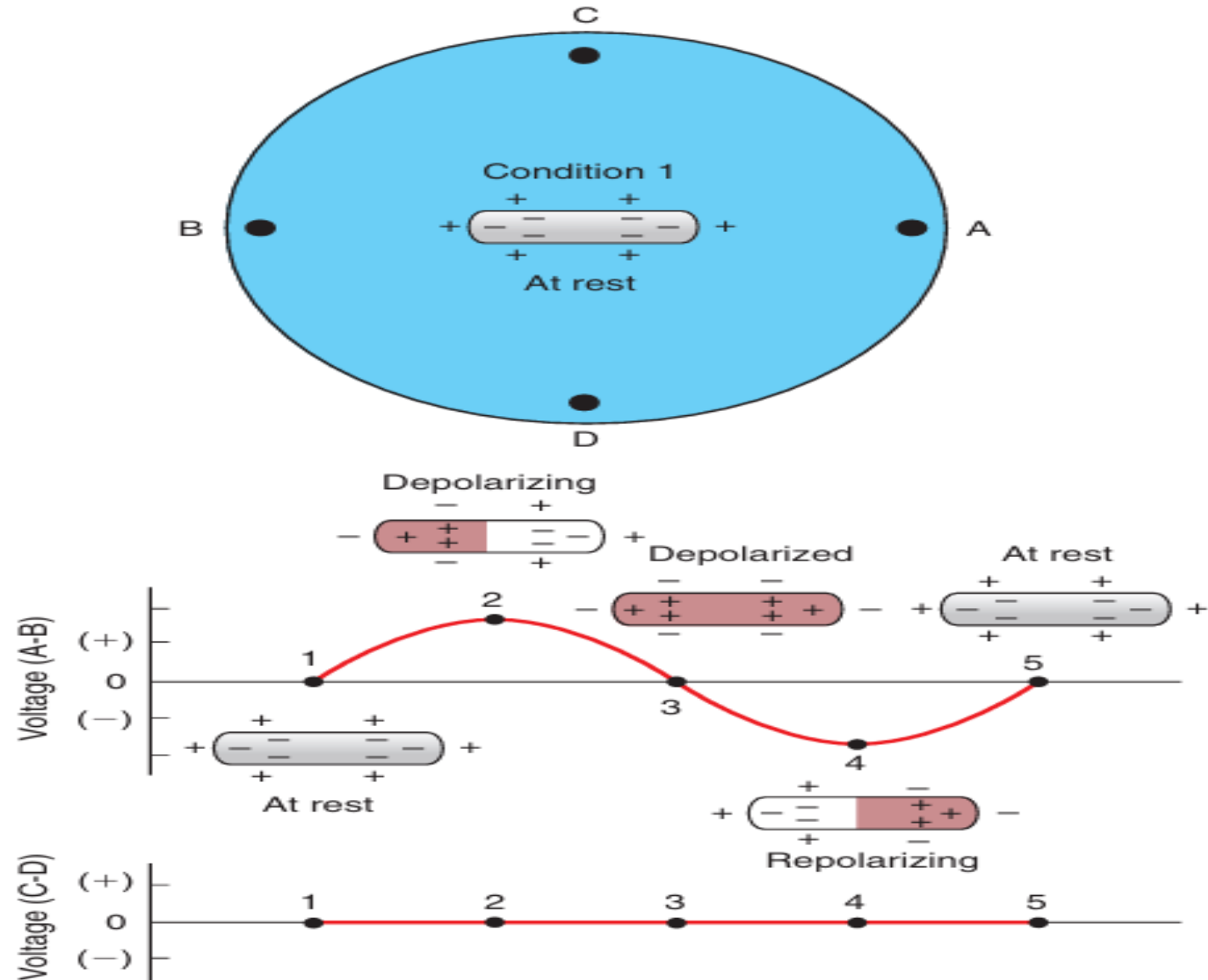
Fundamentals of Electrocardiography



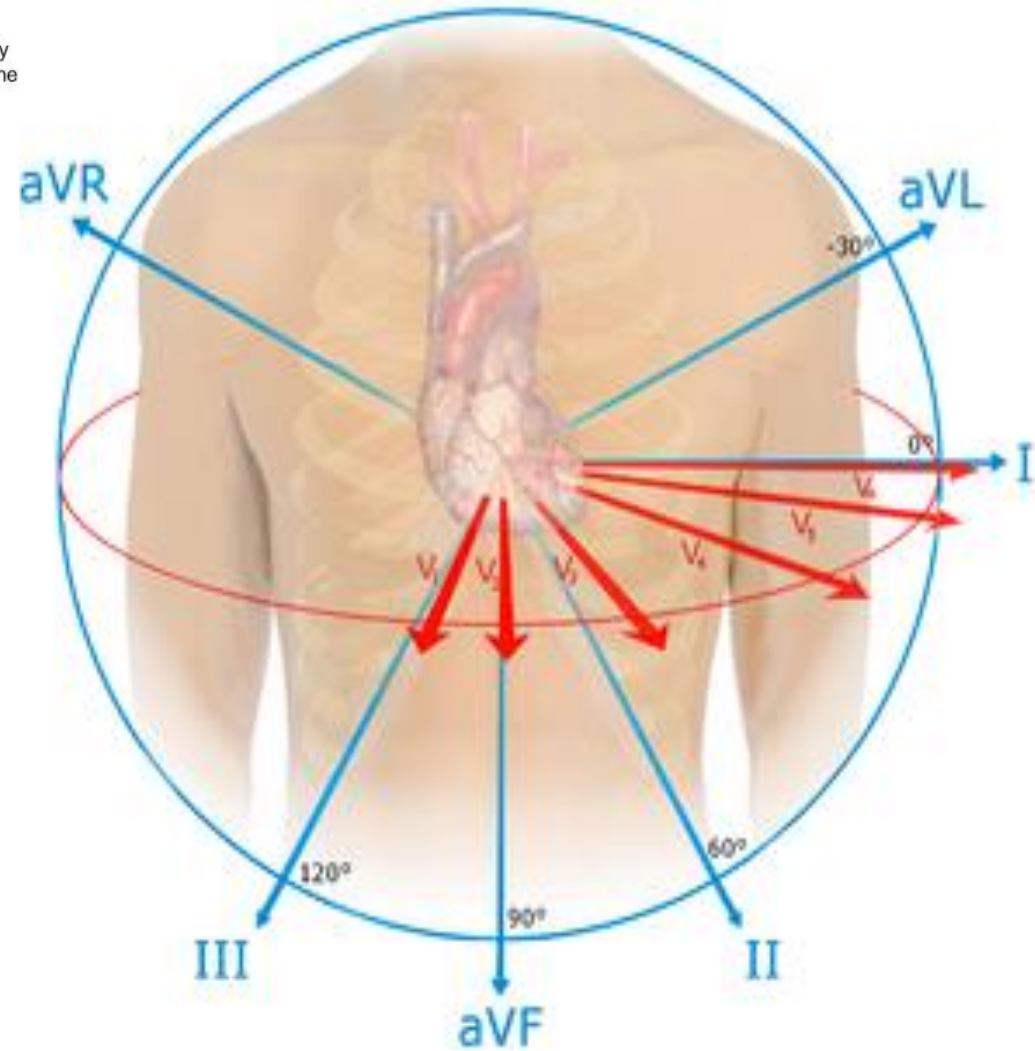
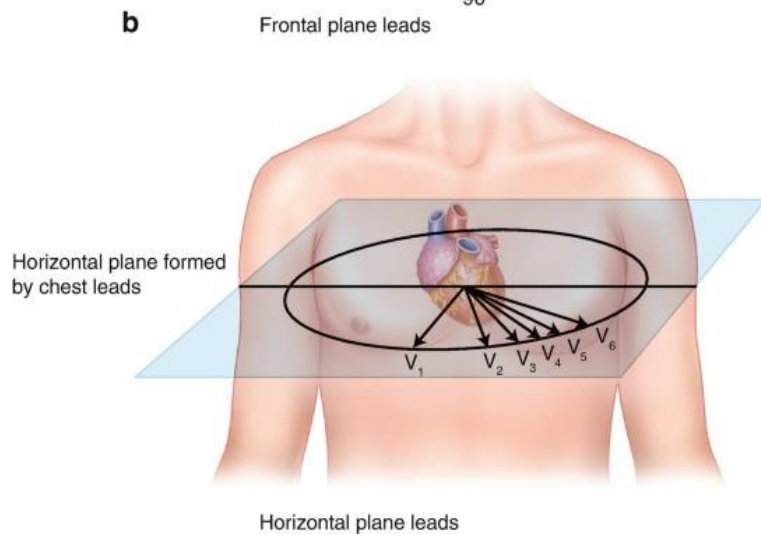
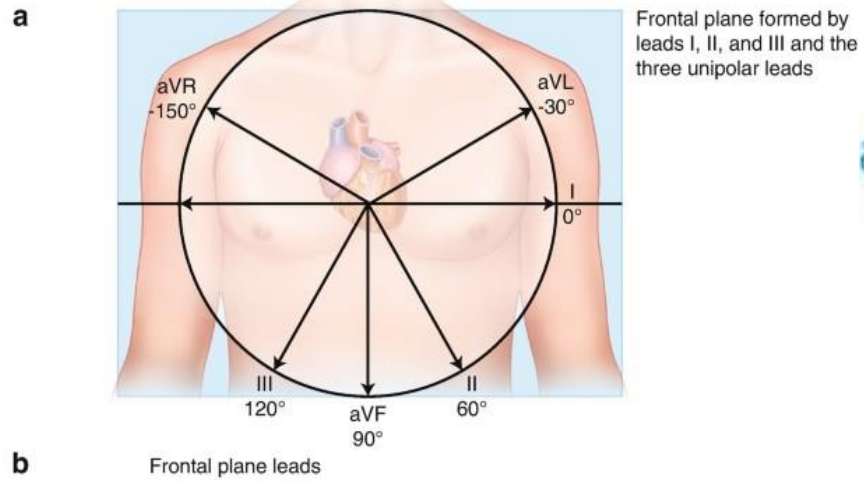
Fundamentals of Electrocardiography



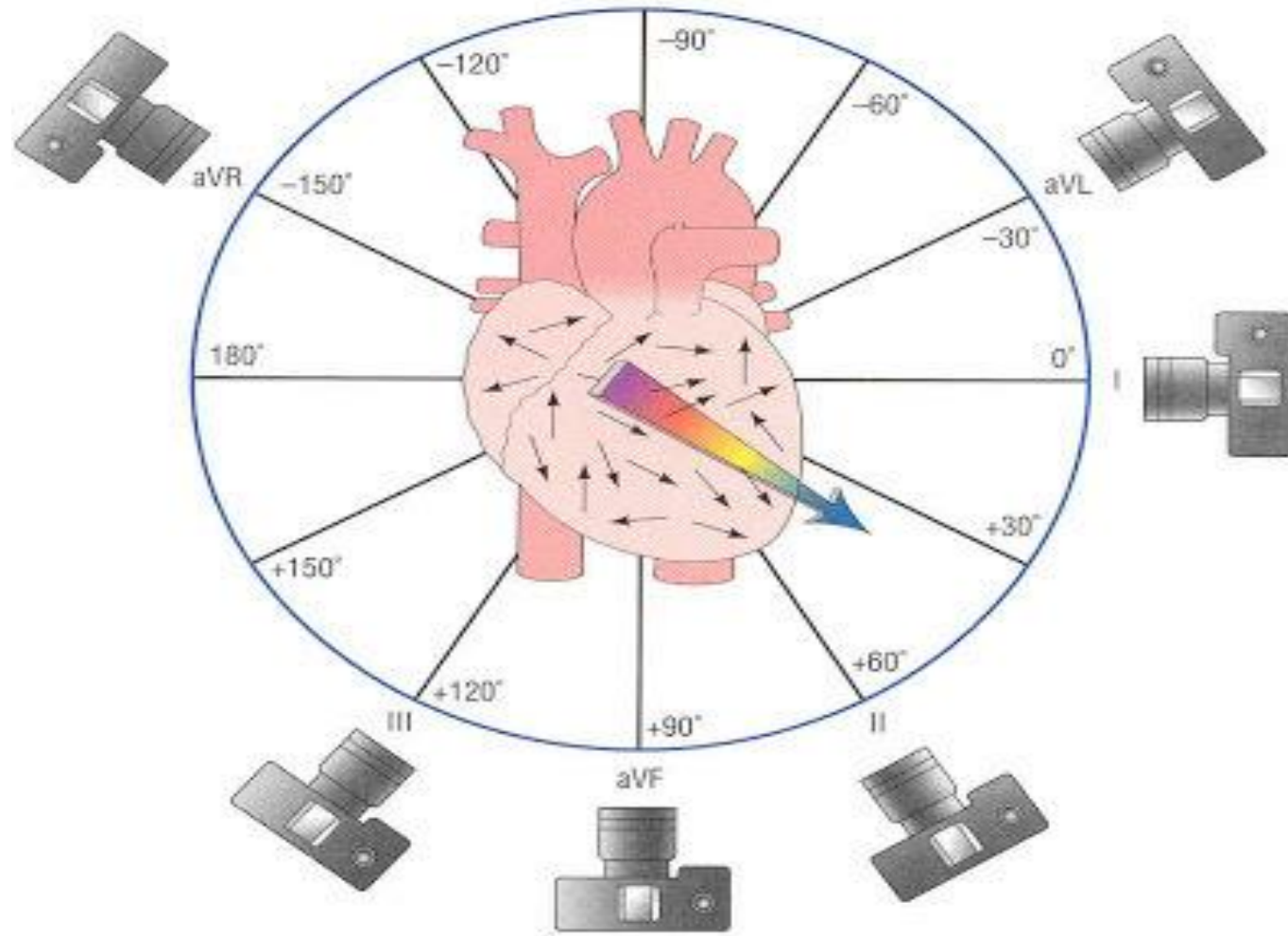
Fundamentals of Electrocardiography



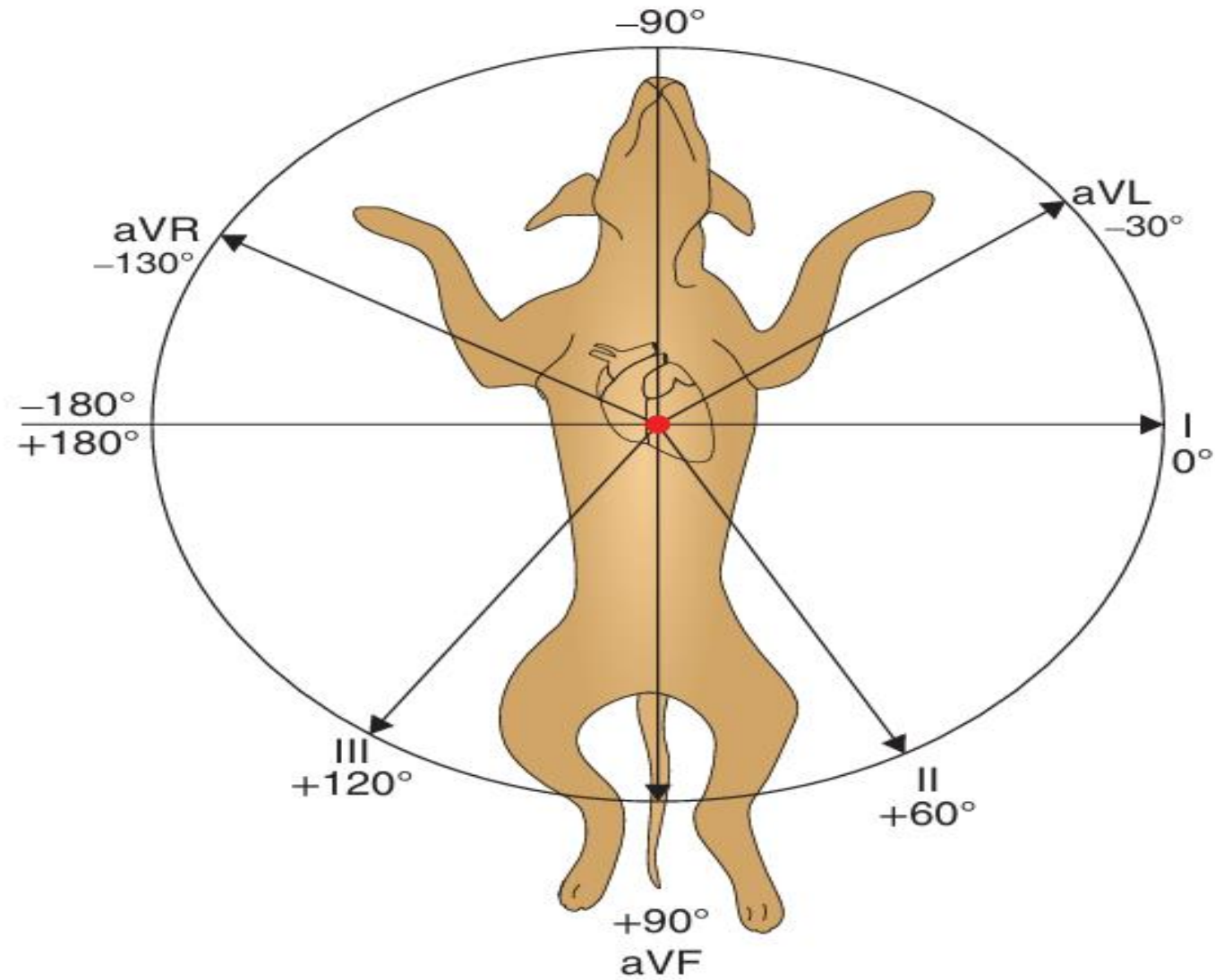
Fundamentals of Electrocardiography



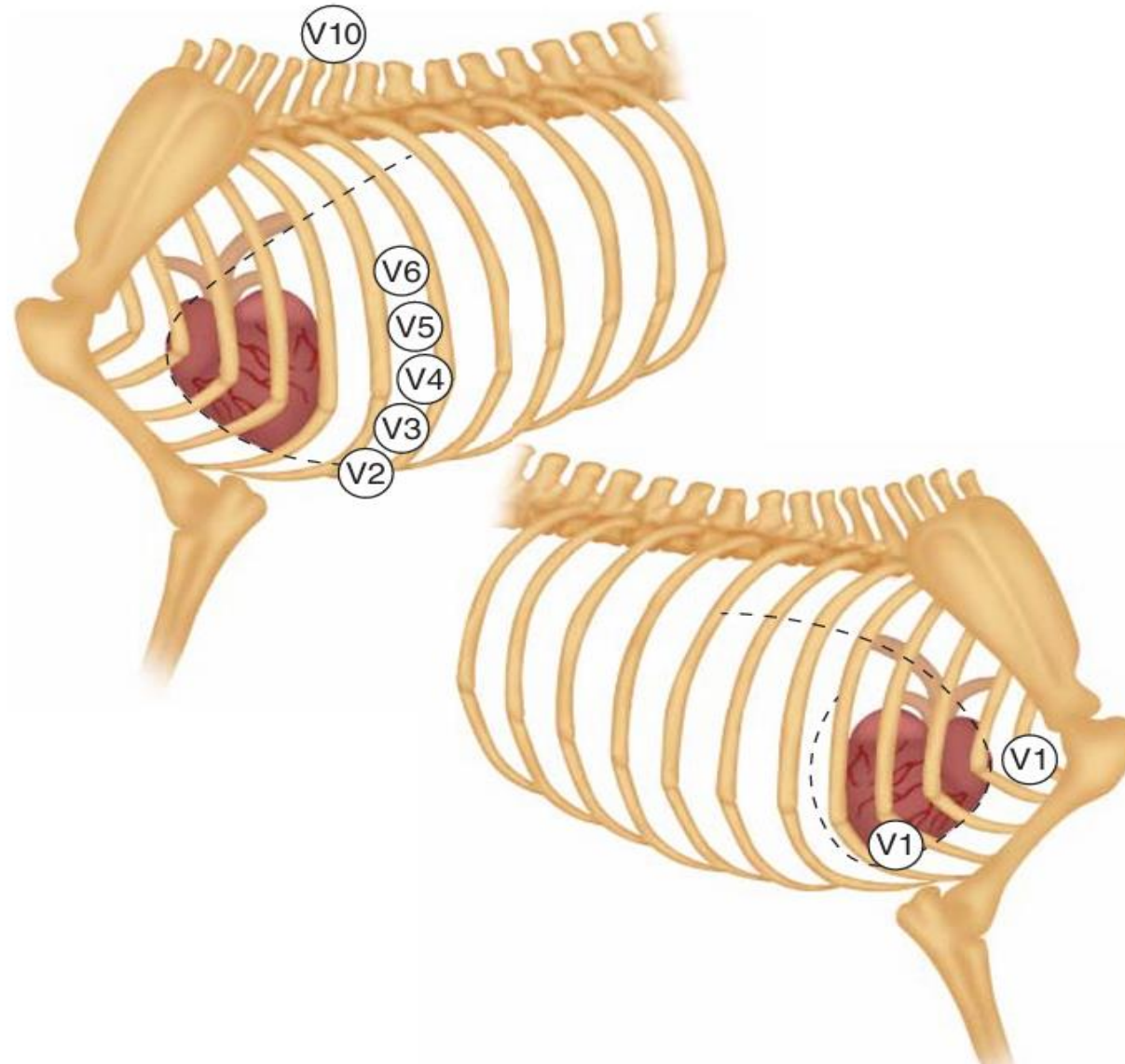
Fundamentals of Electrocardiography



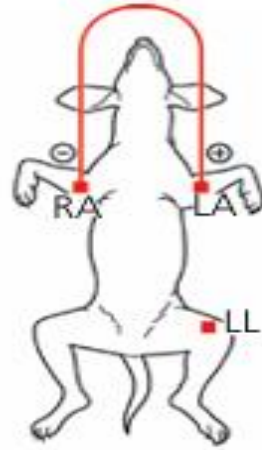
Fundamentals of Electrocardiography



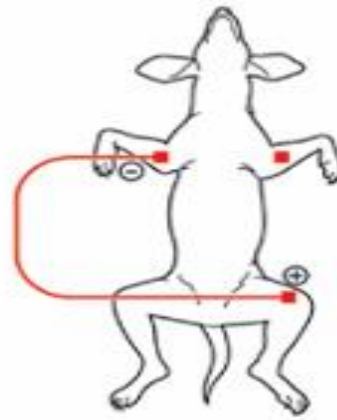
Fundamentals of Electrocardiography



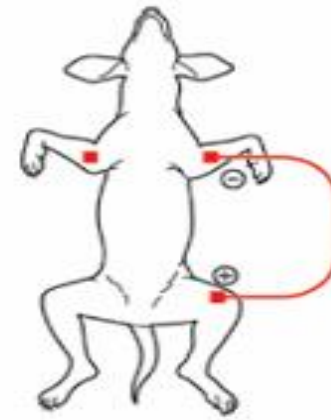
Fundamentals of Electrocardiography



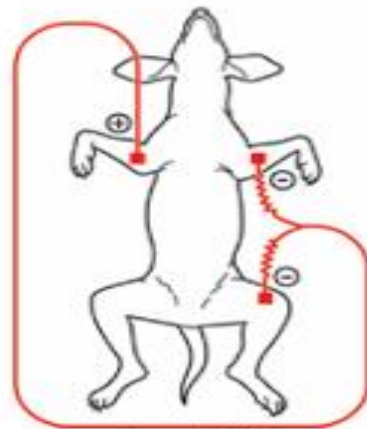
Lead I



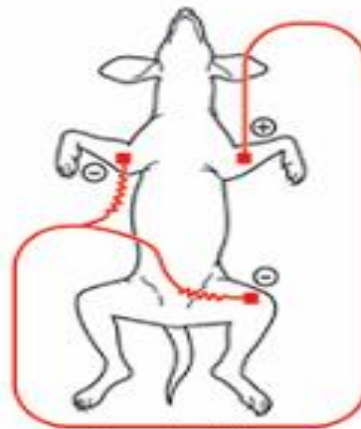
Lead II



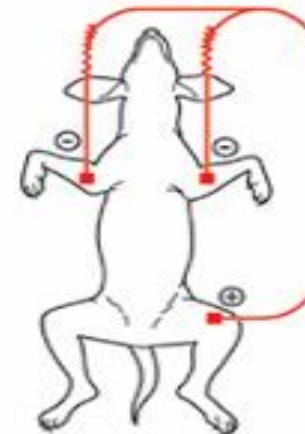
Lead III



Lead aVR

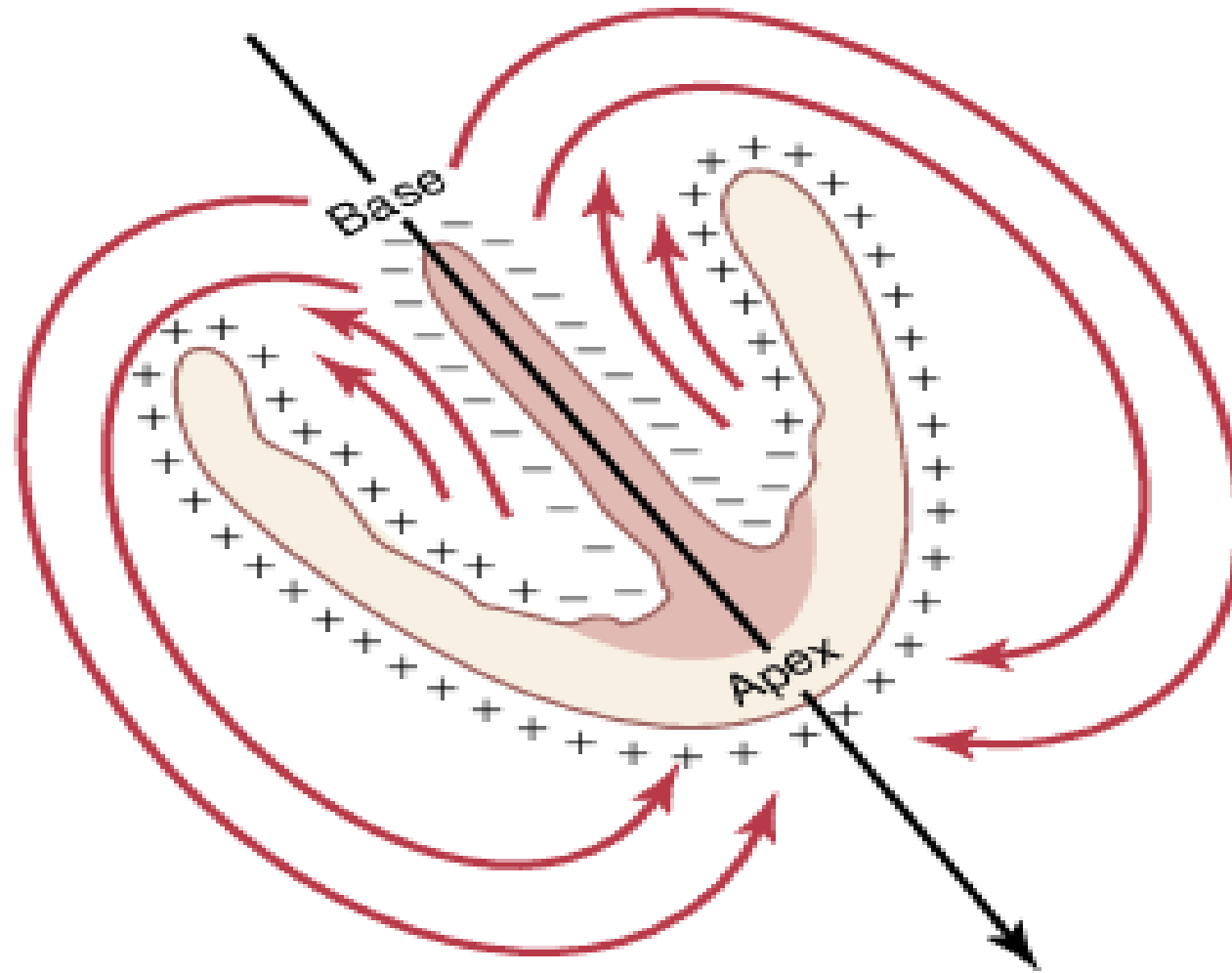


Lead aVL

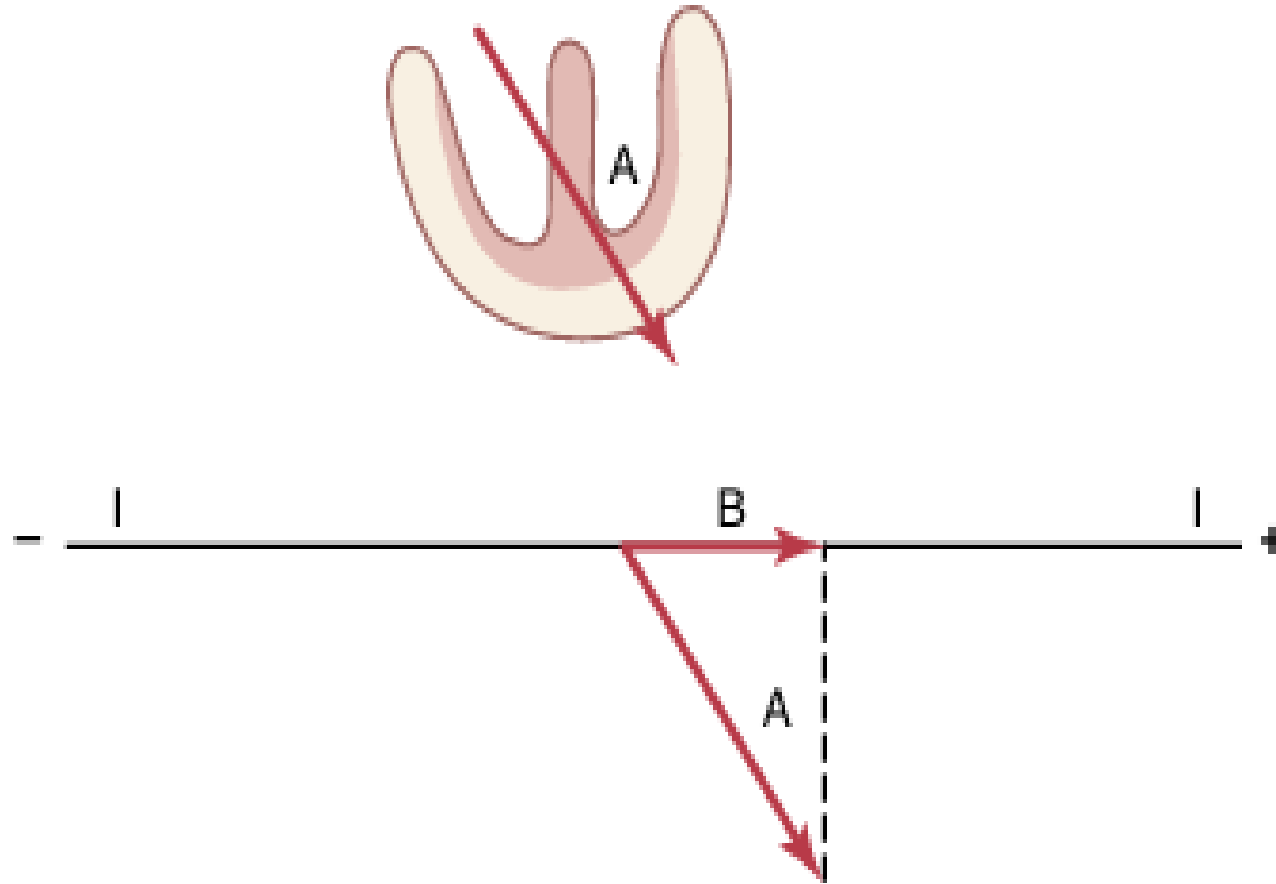


Lead aVF

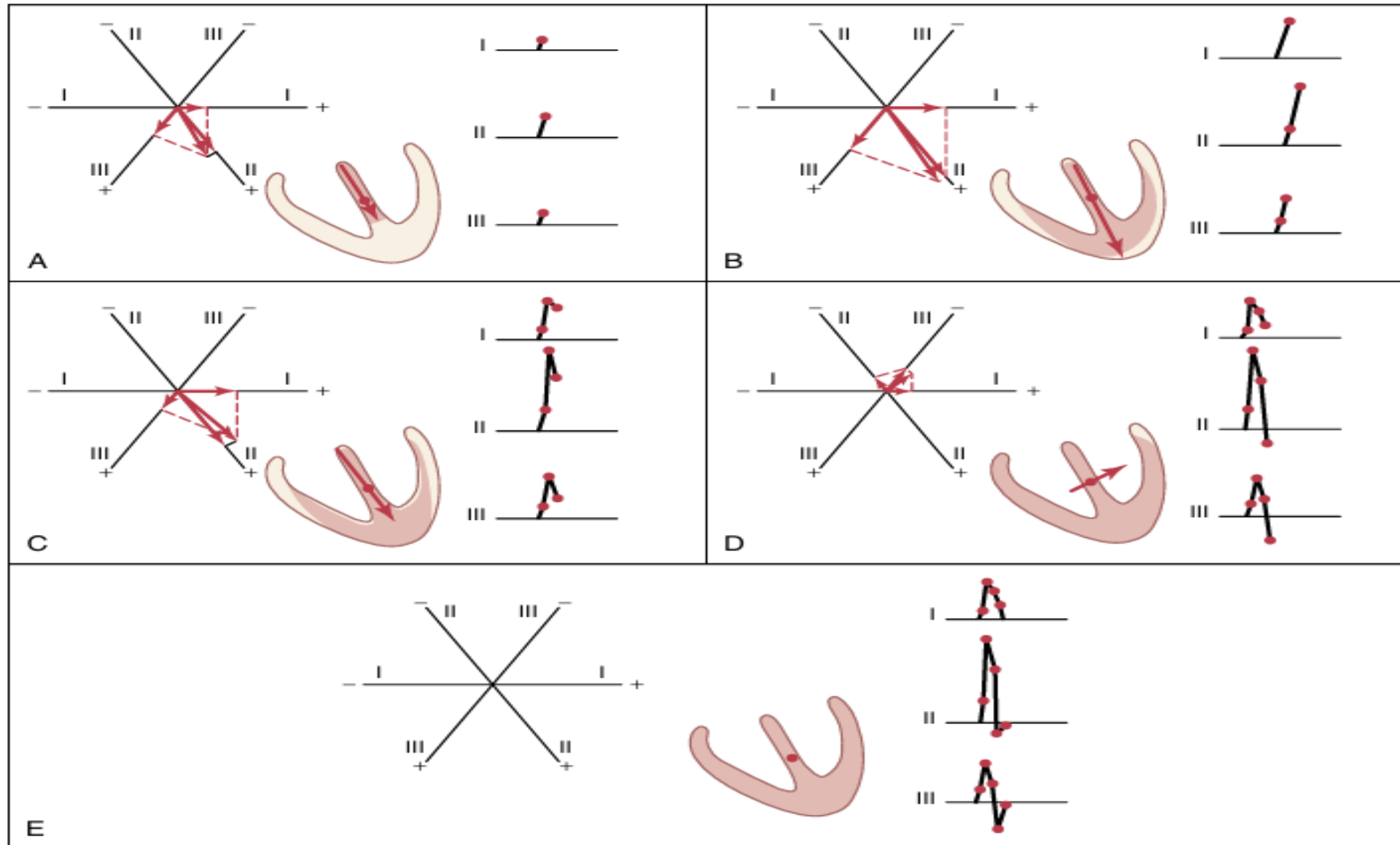
Fundamentals of Electrocardiography



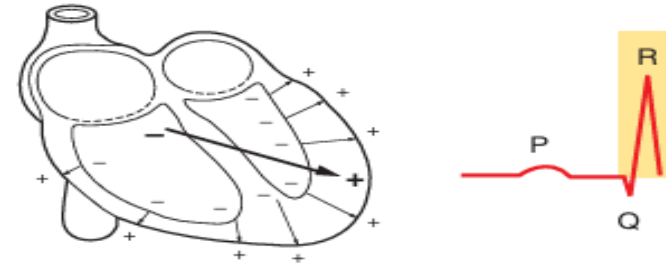
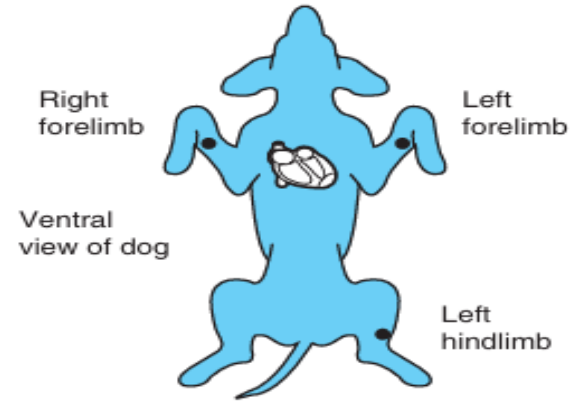
Fundamentals of Electrocardiography



Fundamentals of Electrocardiography



Fundamentals of Electrocardiography



C Ventricular depolarization



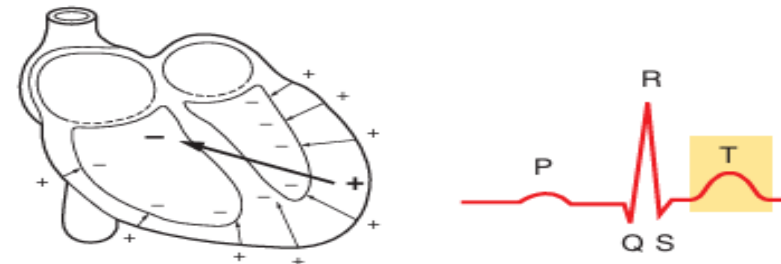
A Atrial depolarization



D Late ventricular depolarization

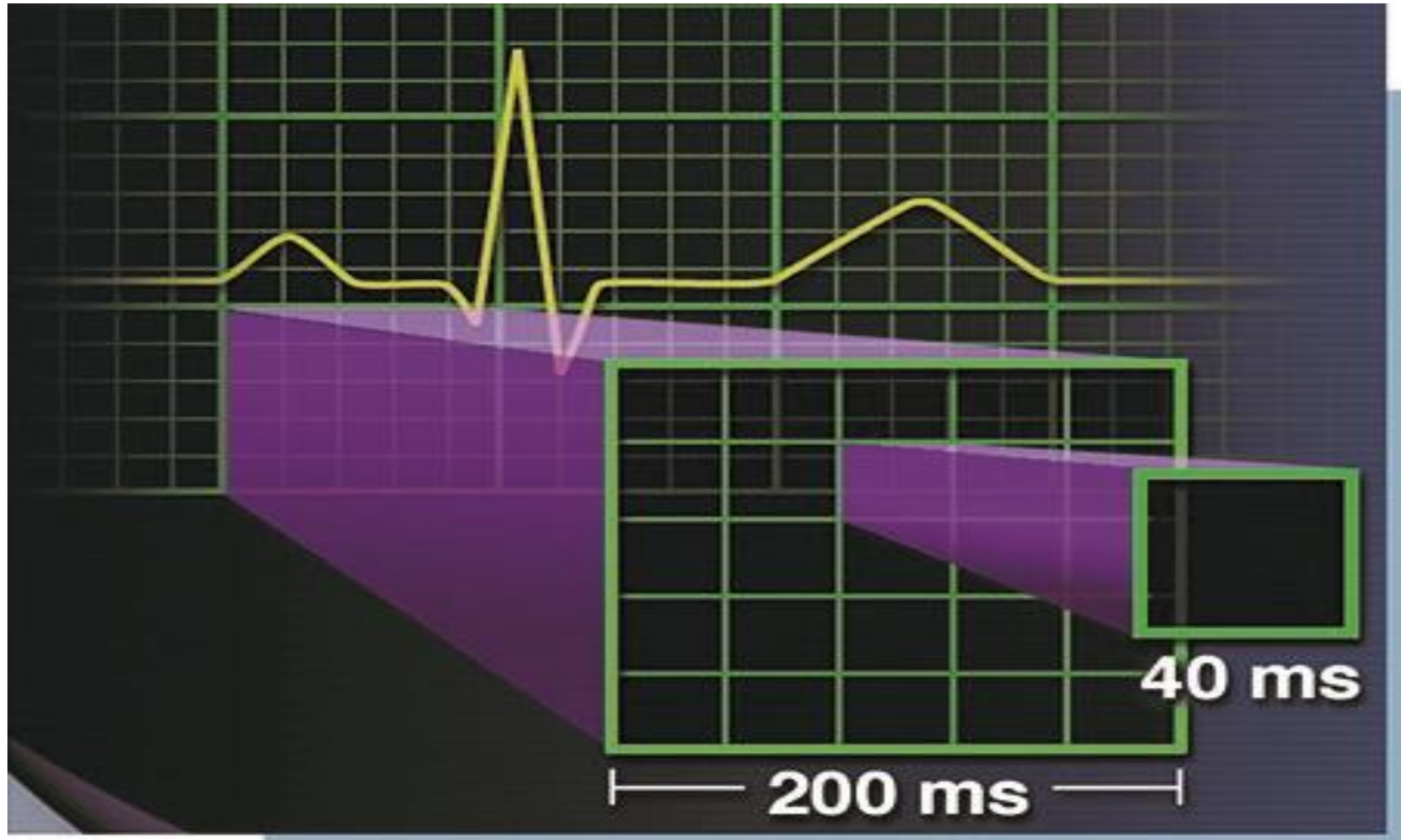


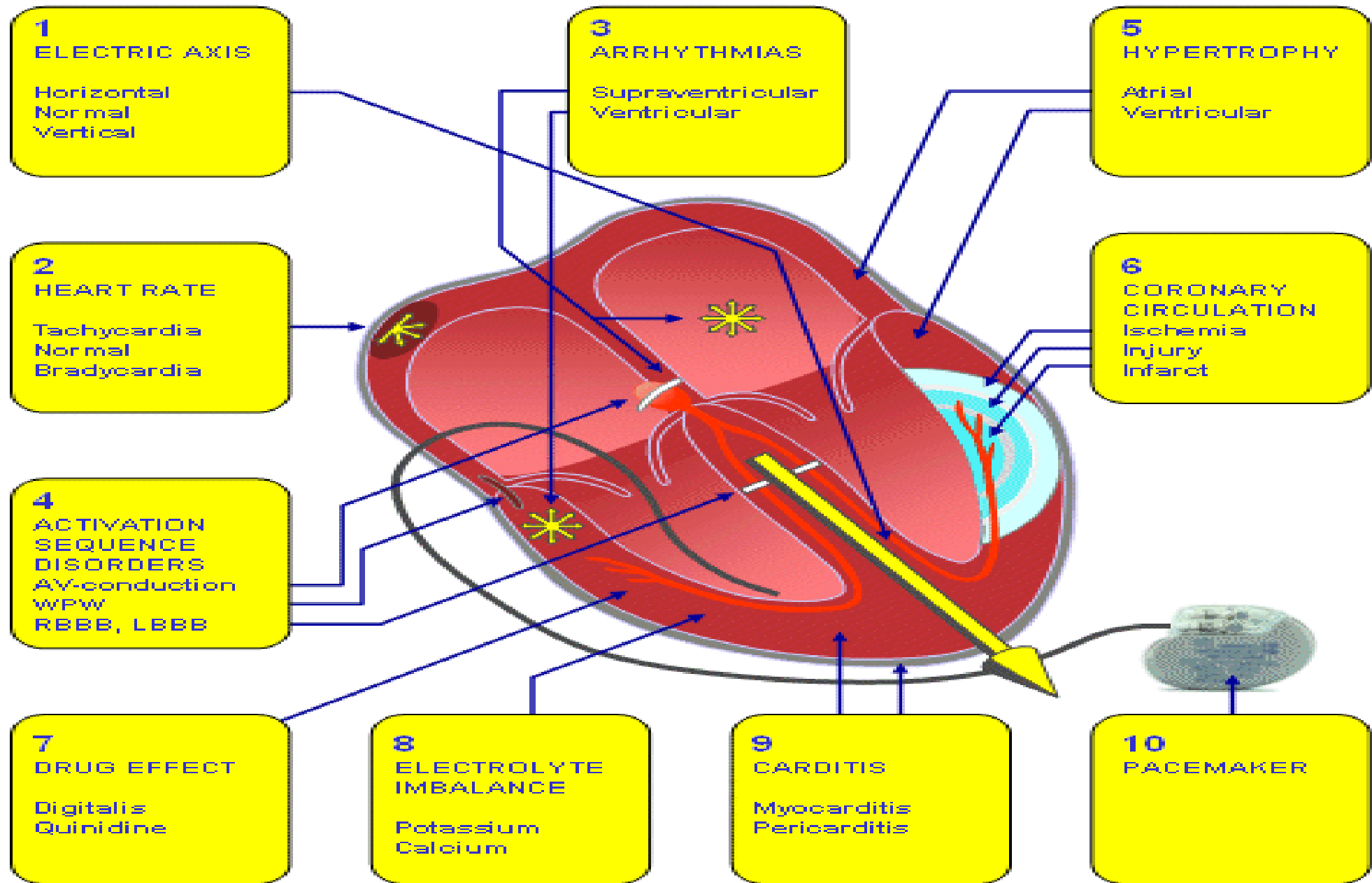
B Early ventricular depolarization



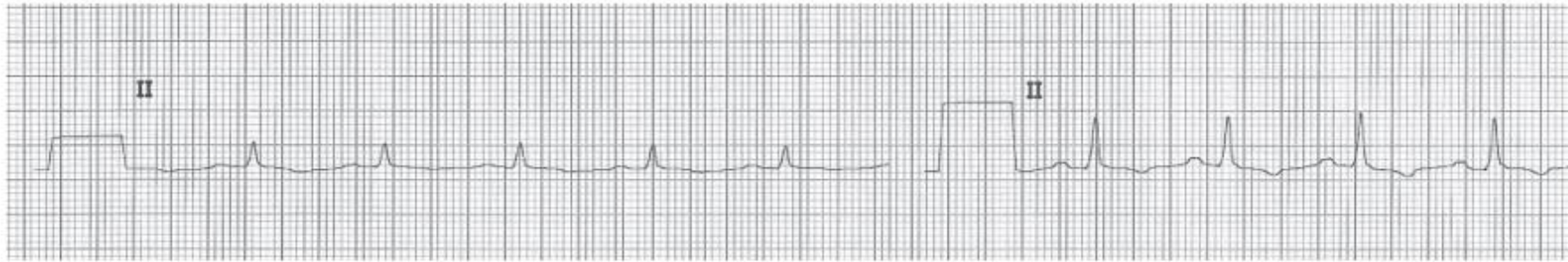
E Ventricular repolarization

Interpretation of the Electrocardiogram(ECG,EKG)





Interpretation of the Electrocardiogram(ECG,EKG)



(a)

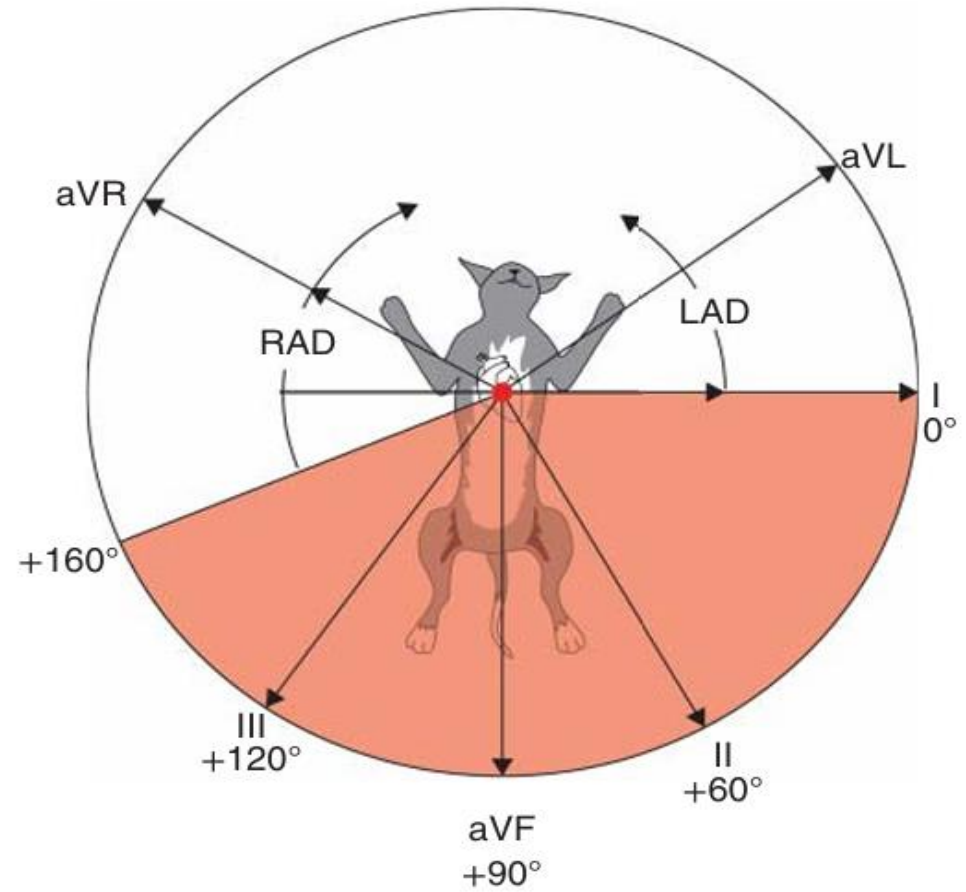
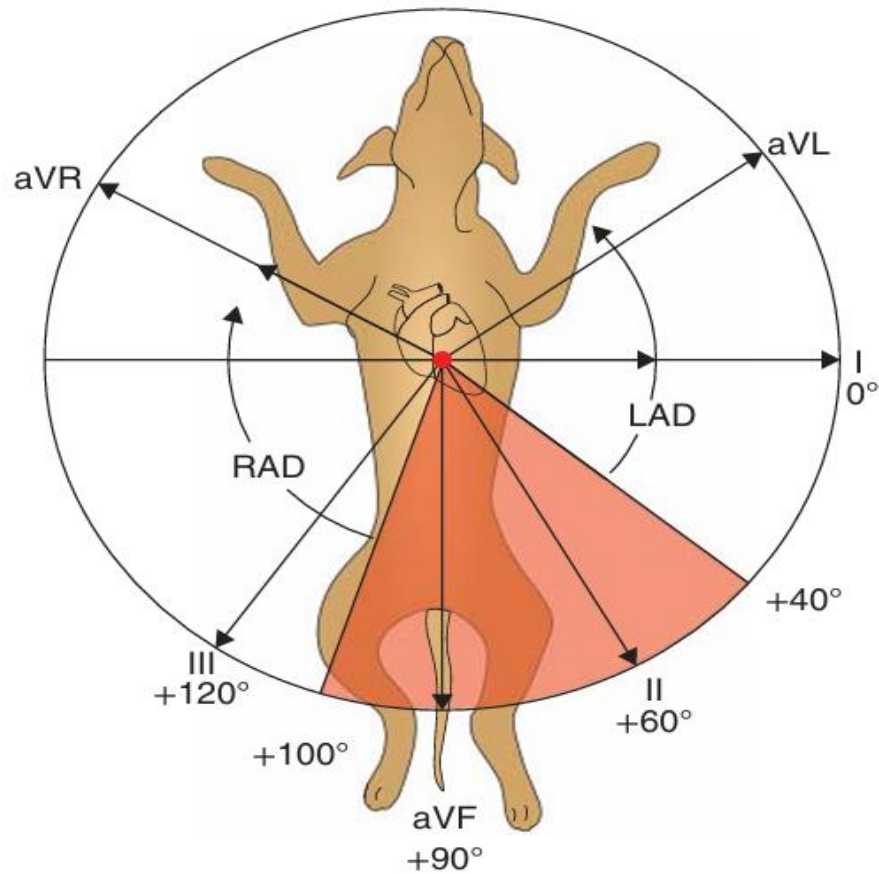
Figure 1.4a Paper speed 50 mm/s, lead II, canine. Comparison of half-sensitivity to full-sensitivity. Note the calibration marks. Both are 1 cm wide indicating a consistent paper speed of 50 mm/s. The first has an amplitude of 0.5 cm tall corresponding to **0.5 cm/mV**, and the second has an amplitude of 1 cm indicating **1 cm/mV**. Note all waveforms have the same duration, but the second set of waveforms is twice as tall. Lower sensitivity makes the waveforms more difficult to tell apart.



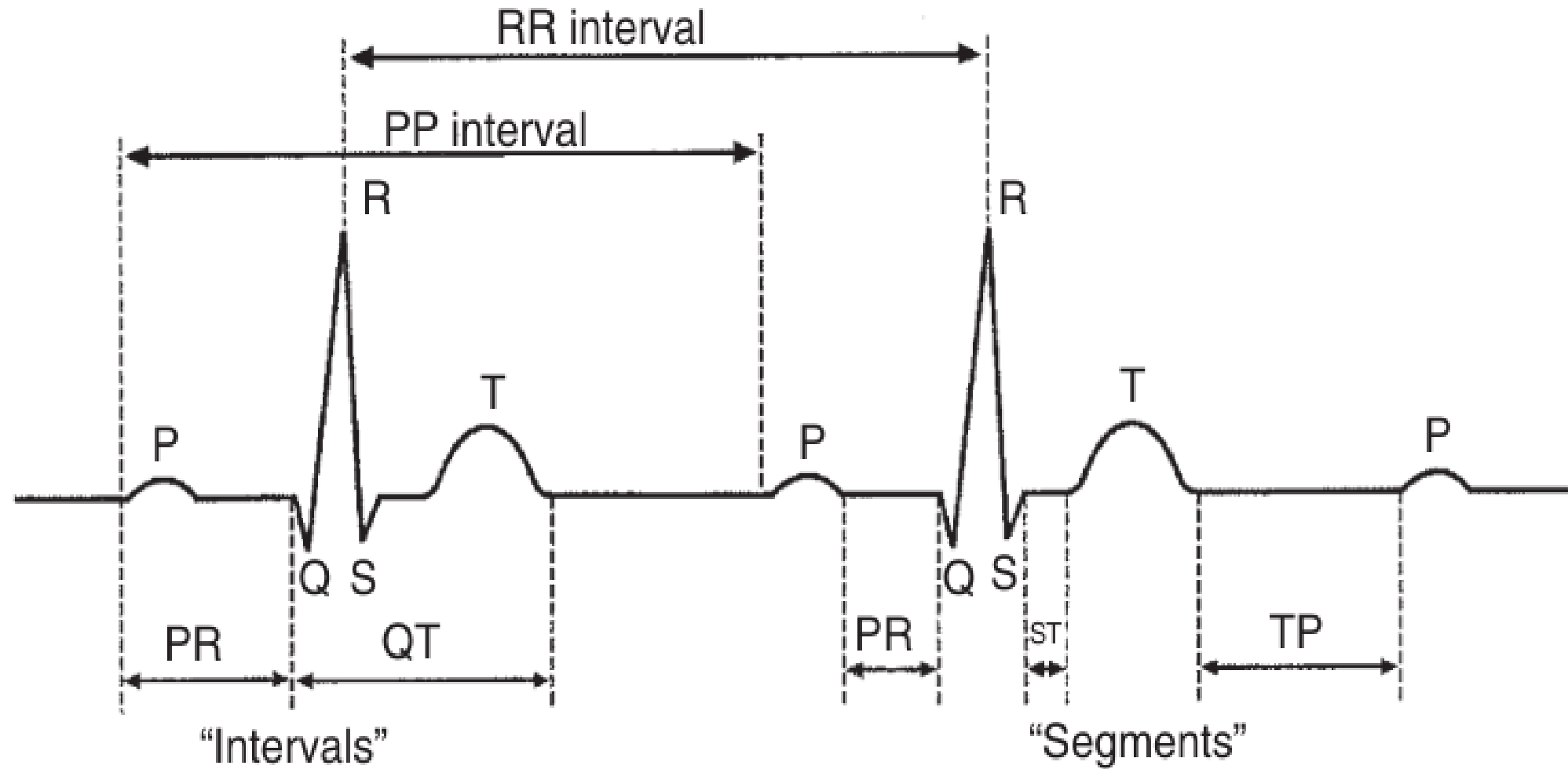
(b)

Figure 1.4b Paper speed 50 mm/s, lead II, same dog. Comparison of full-sensitivity to double-sensitivity. Again, note the calibration marks. Their widths are the same at 1 cm, alerting the examiner that the paper speed is 50 mm/s. The first has an amplitude of 1 cm (**1 cm/mV**), and the second has an amplitude of 2 cm (**2 cm/mV**), so the complexes are again now twice as tall. Higher sensitivity exaggerates the complexes and makes it easier to measure *amplitudes*, but it does amplify any underlying baseline artifact as well. The QRS complexes are all approximately 0.8 mV.

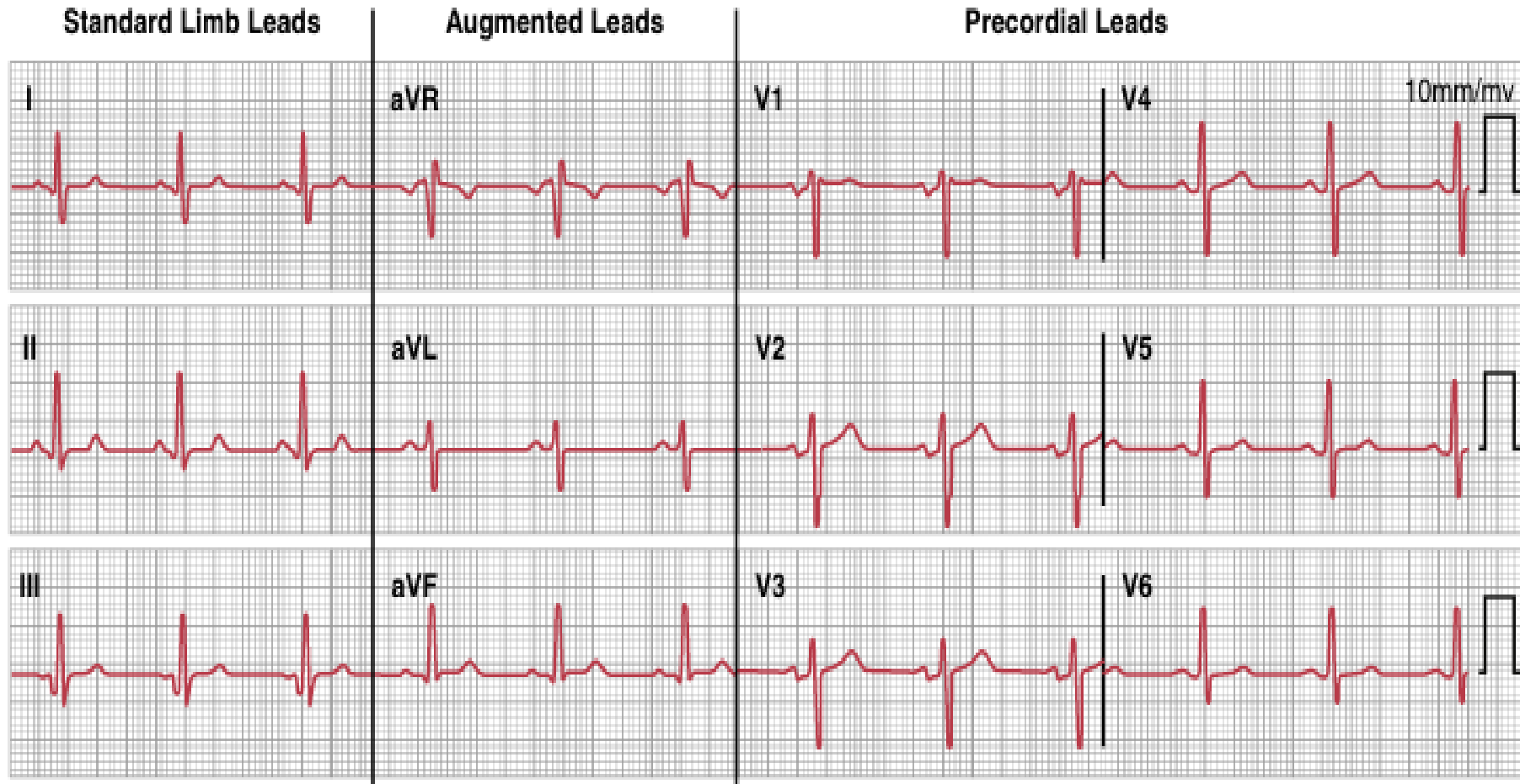
Mean Electrical Axis(MEA)



Interpretation of the Electrocardiogram(ECG,EKG)



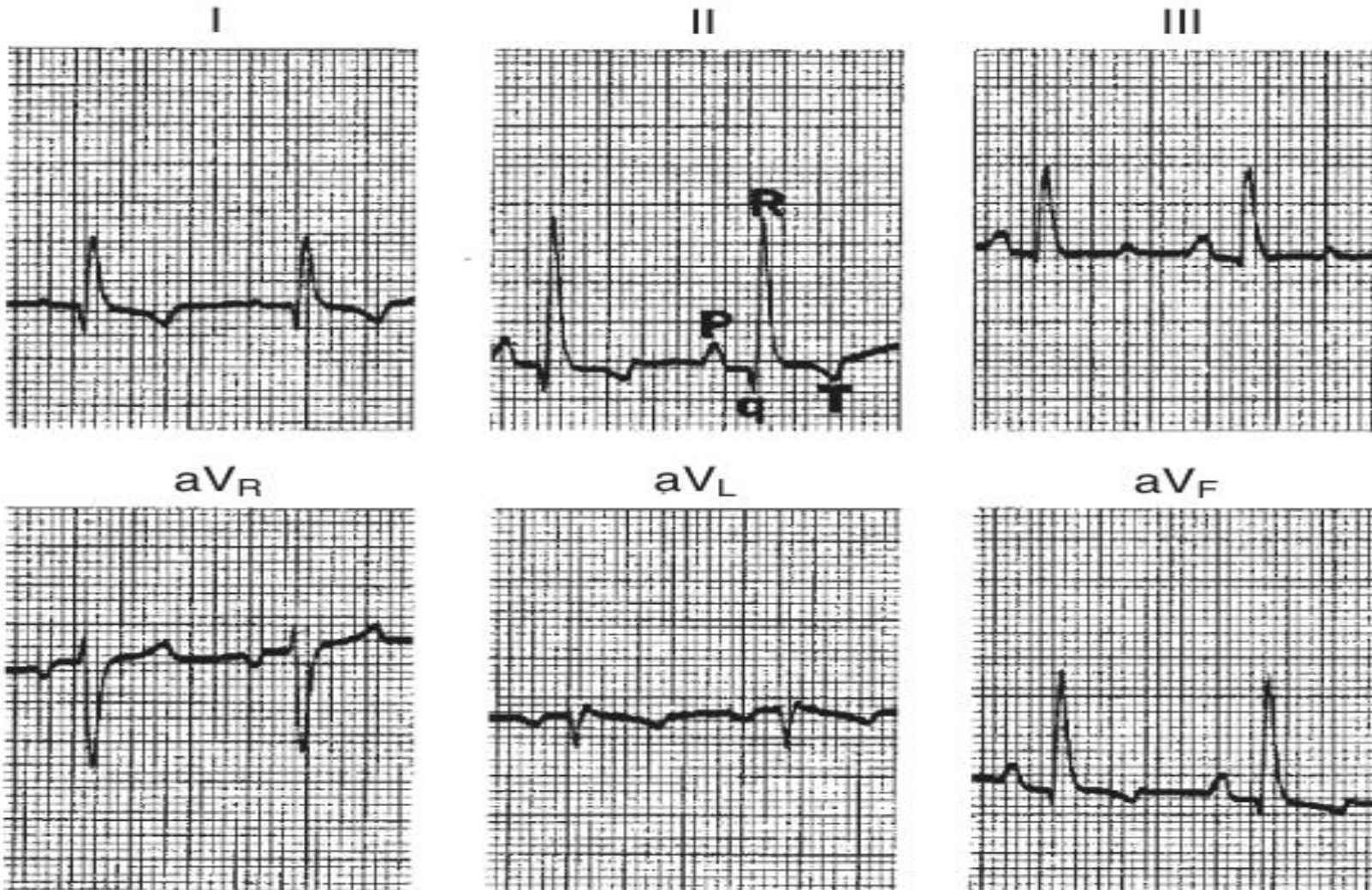
Normal Sinus Rhythm (NSR) in Human



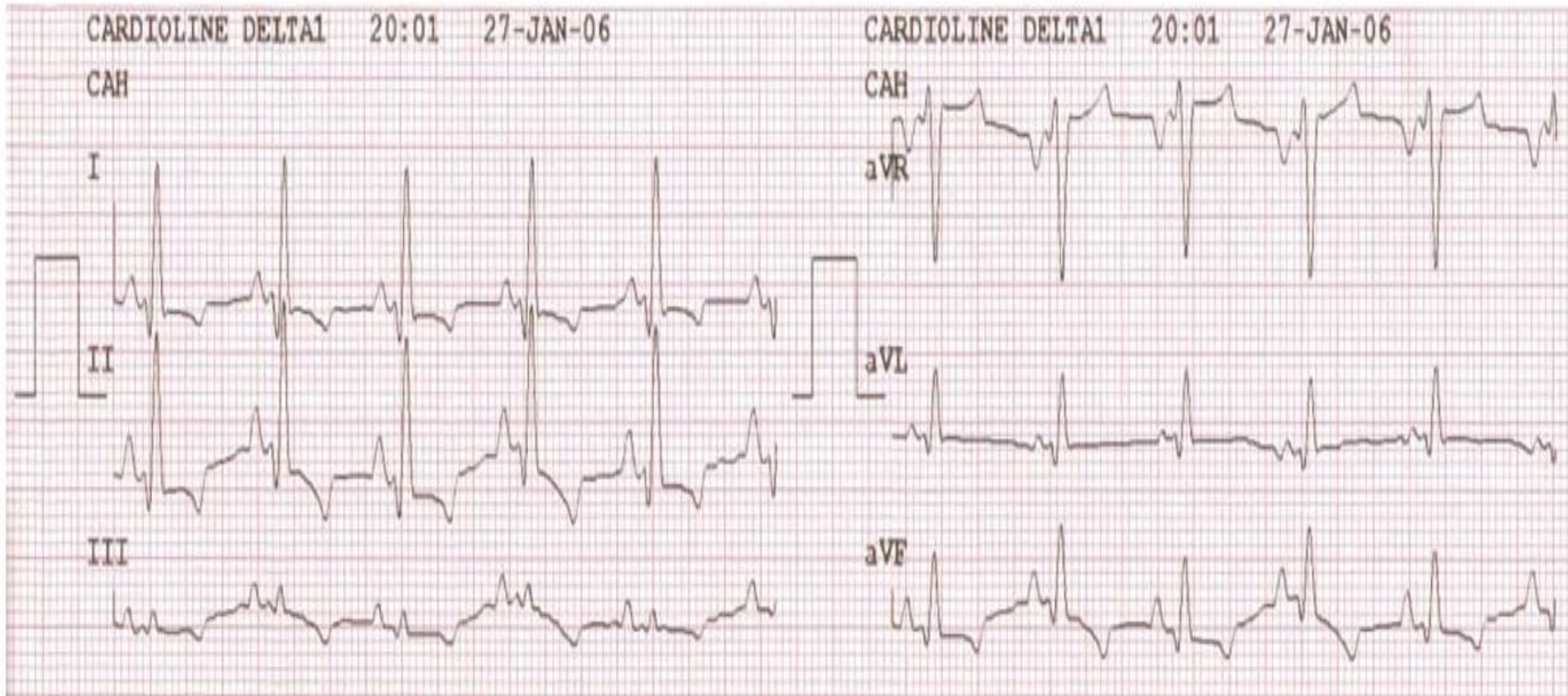
Interpretation of the Electrocardiogram(ECG,EKG)



Normal Sinus Rhythm (NSR) in Dog



Normal Sinus Rhythm (NSR) in Dog



Normal Sinus Rhythm, Sinus Bradycardia and Sinus Tachycardia in Dog

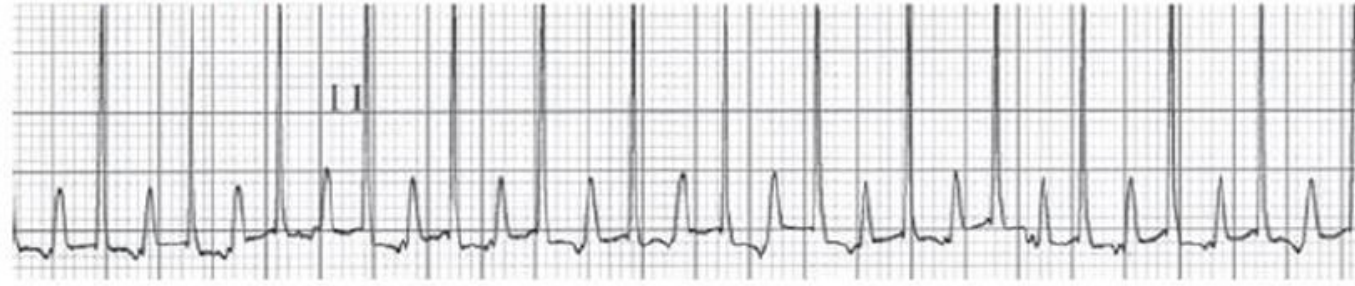
Normal sinus rhythm



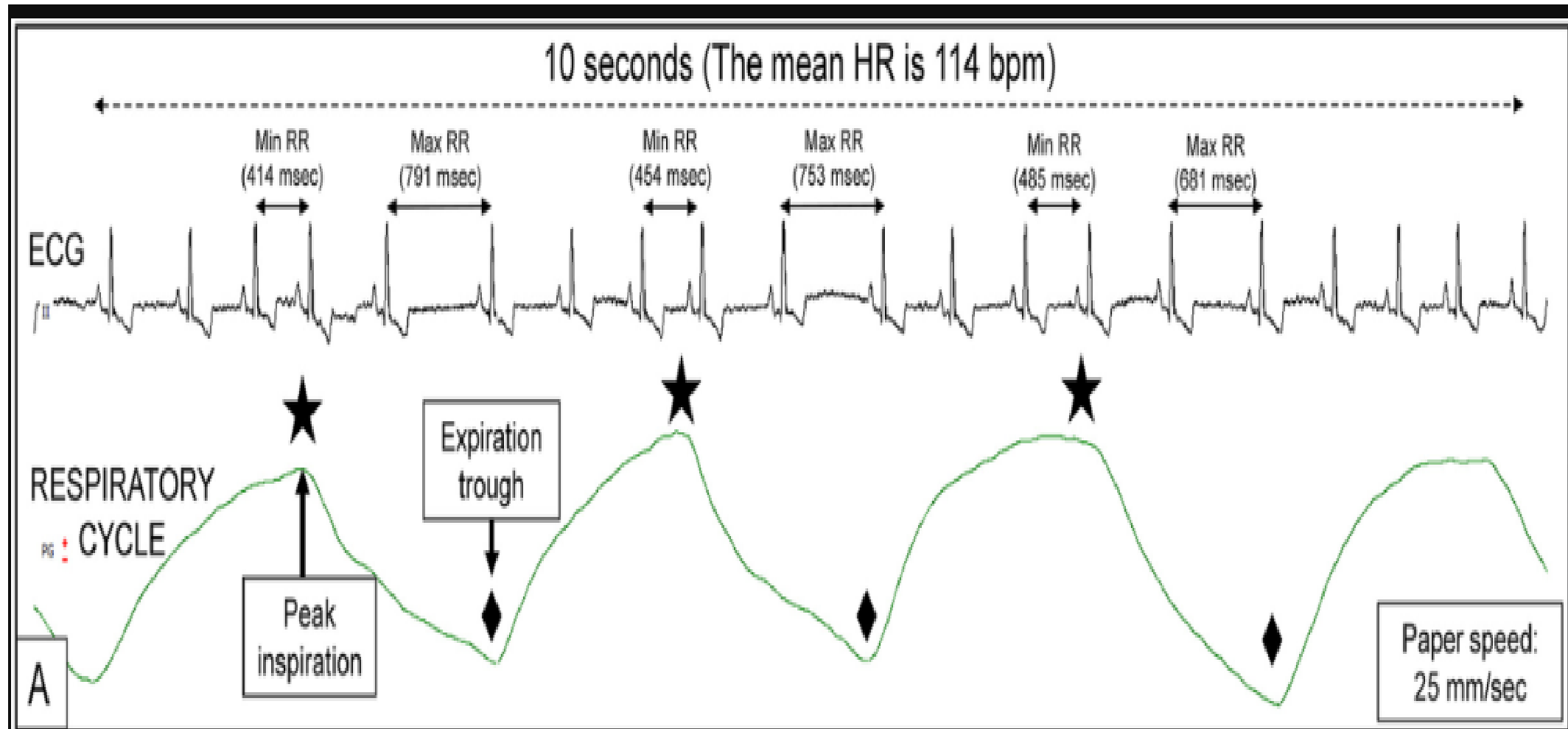
Sinus bradycardia



Sinus tachycardia



Respiratory Sinus Arrhythmia (RSA)



Supraventricular and Ventricular Tachycardia in Dog

Supraventricular tachycardia



Ventricular tachycardia

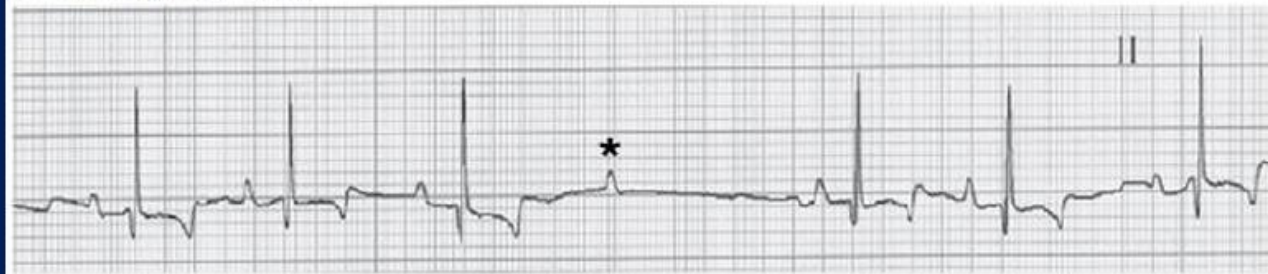


First, Second and Third-degree AV Block in Dog

First-degree AV block



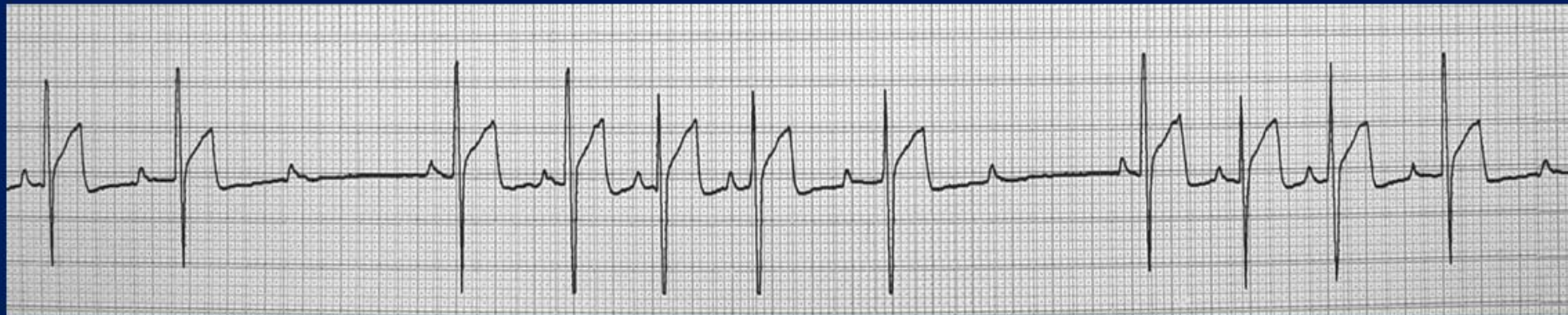
Second-degree AV block



Third-degree AV block

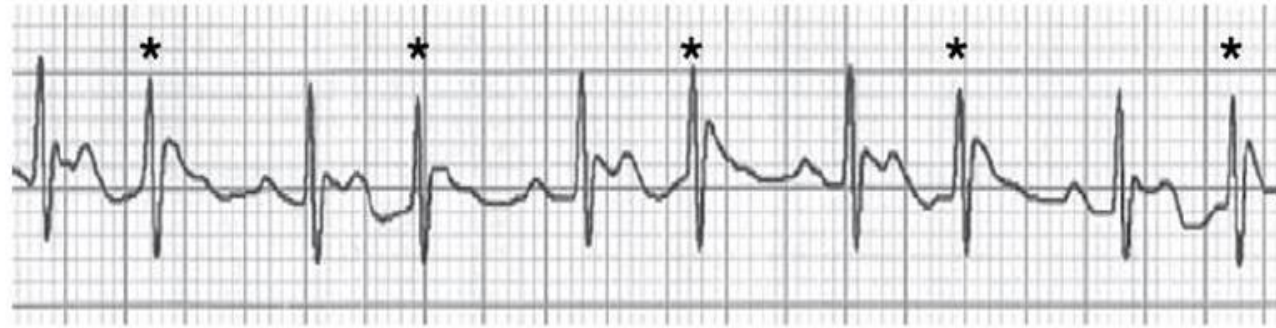


Type 1 and Type 2 Second-degree AV Block in Dog



PAC and PVC in Cat

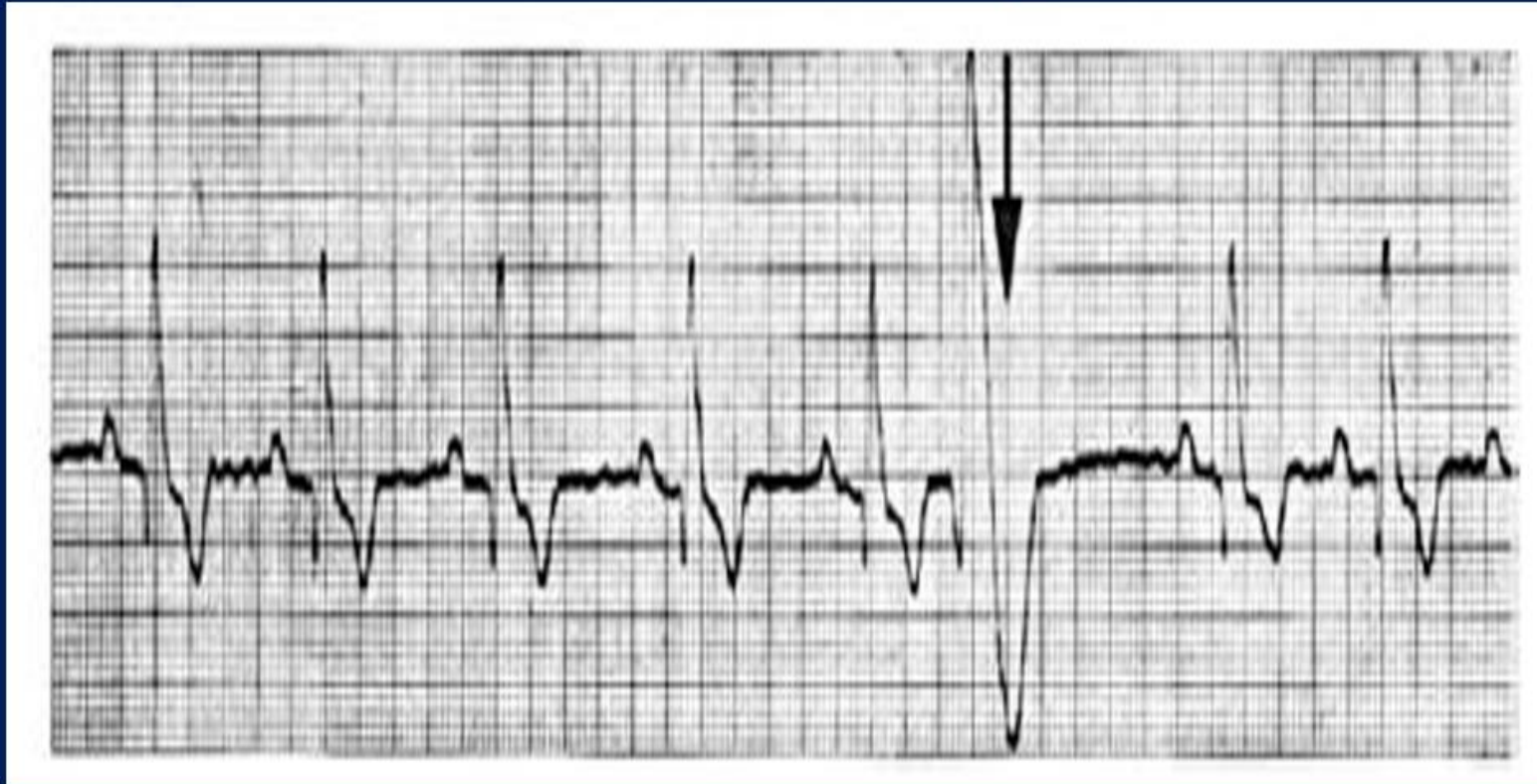
Premature atrial complexes



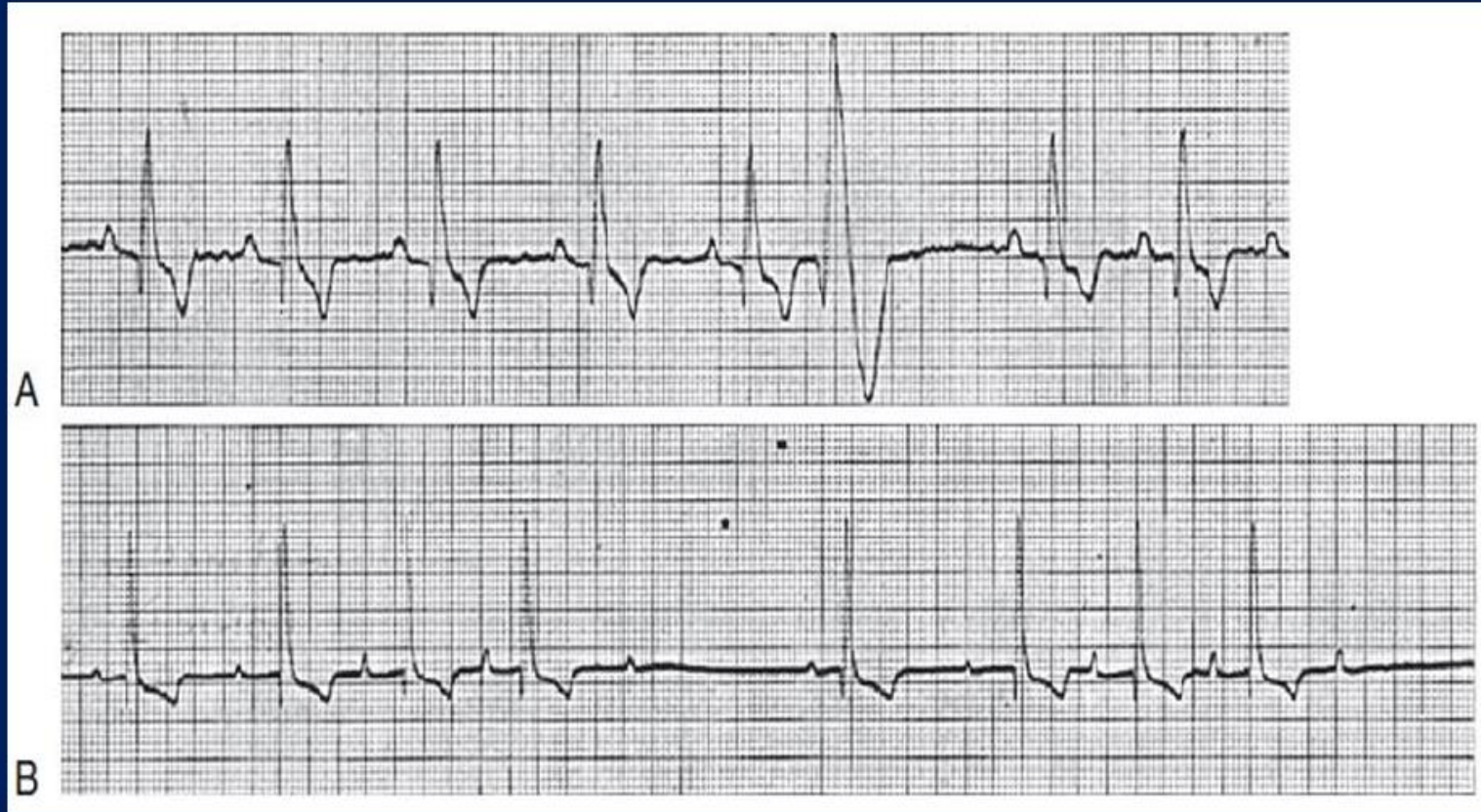
Premature ventricular complex



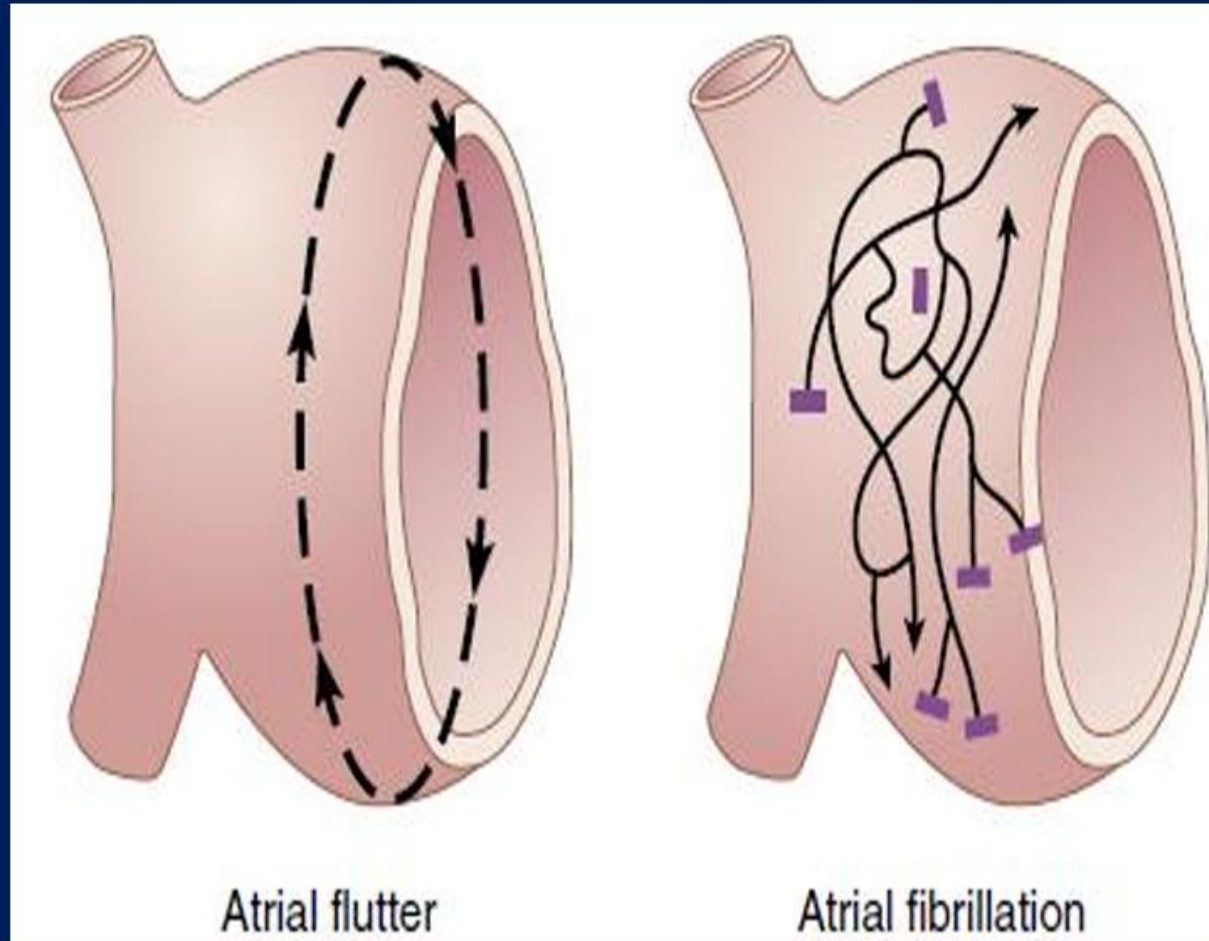
PVC in Dog



PVC and Second-degree AV Block in Dog

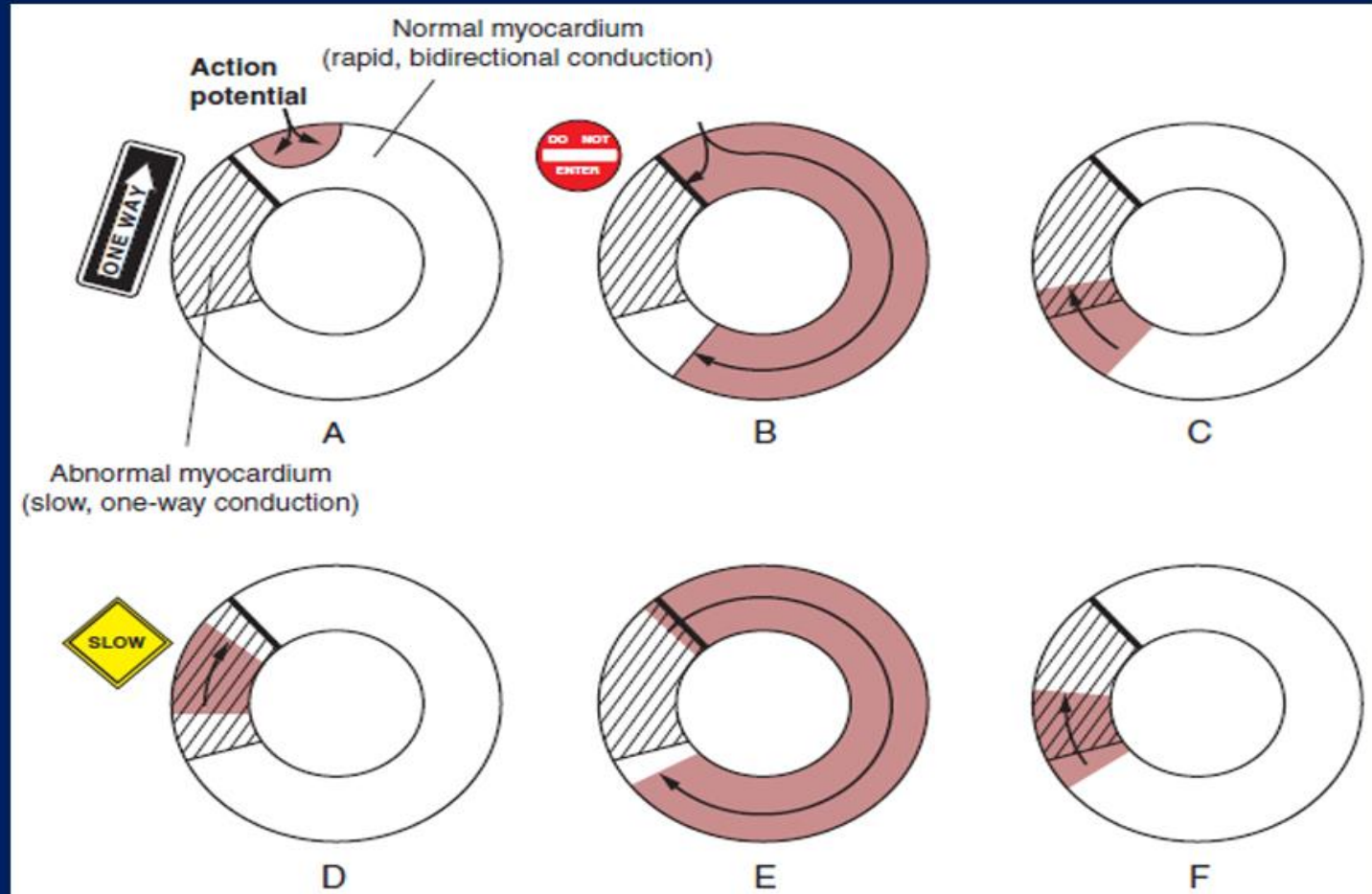


Interpretation of the Electrocardiogram(ECG,EKG)



Interpretation of the Electrocardiogram(ECG,EKG)

Reentrant Arrhythmias



Atrial Fibrillation in Cat and Ventricular Fibrillation in Dog

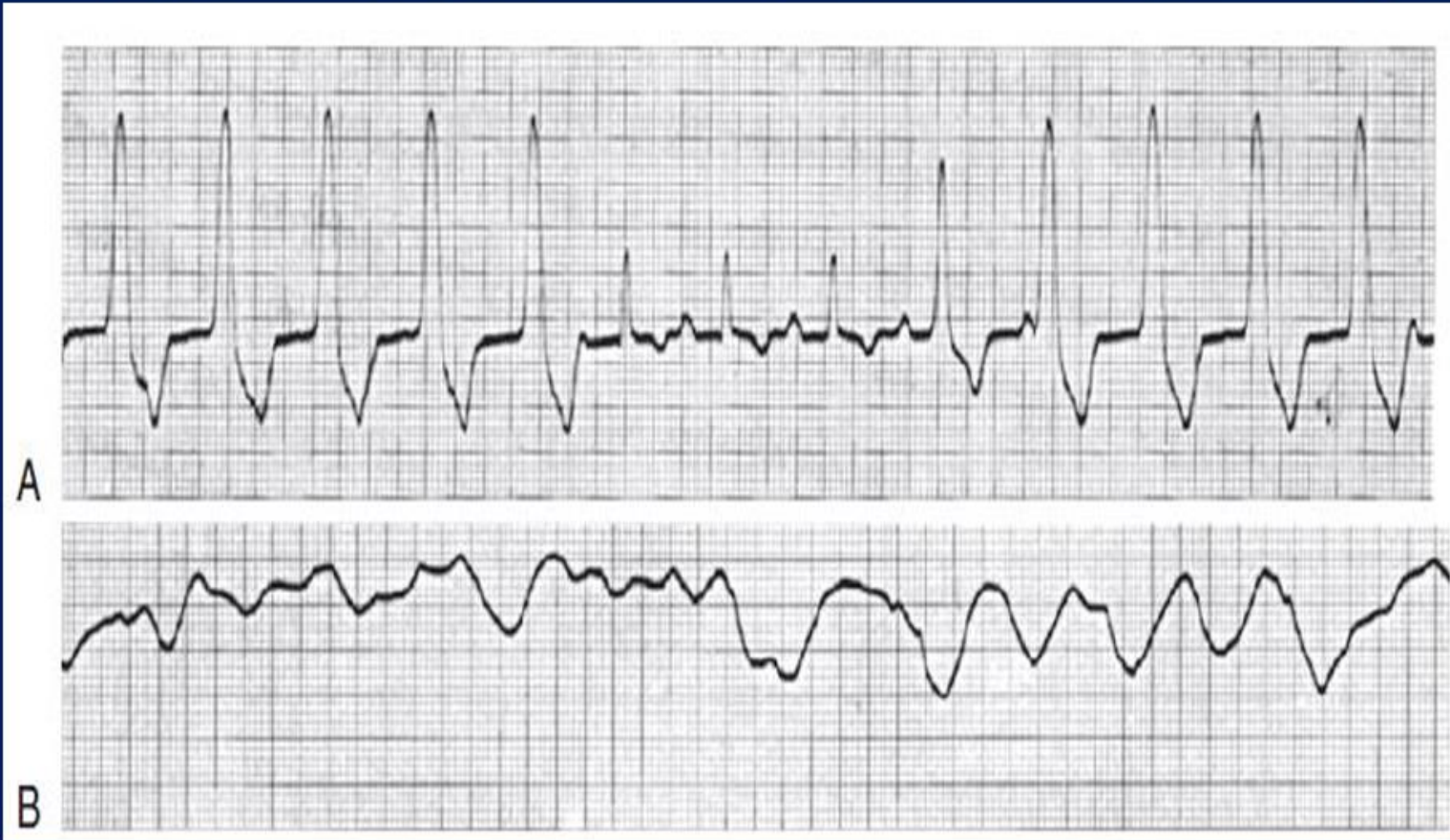
Atrial fibrillation



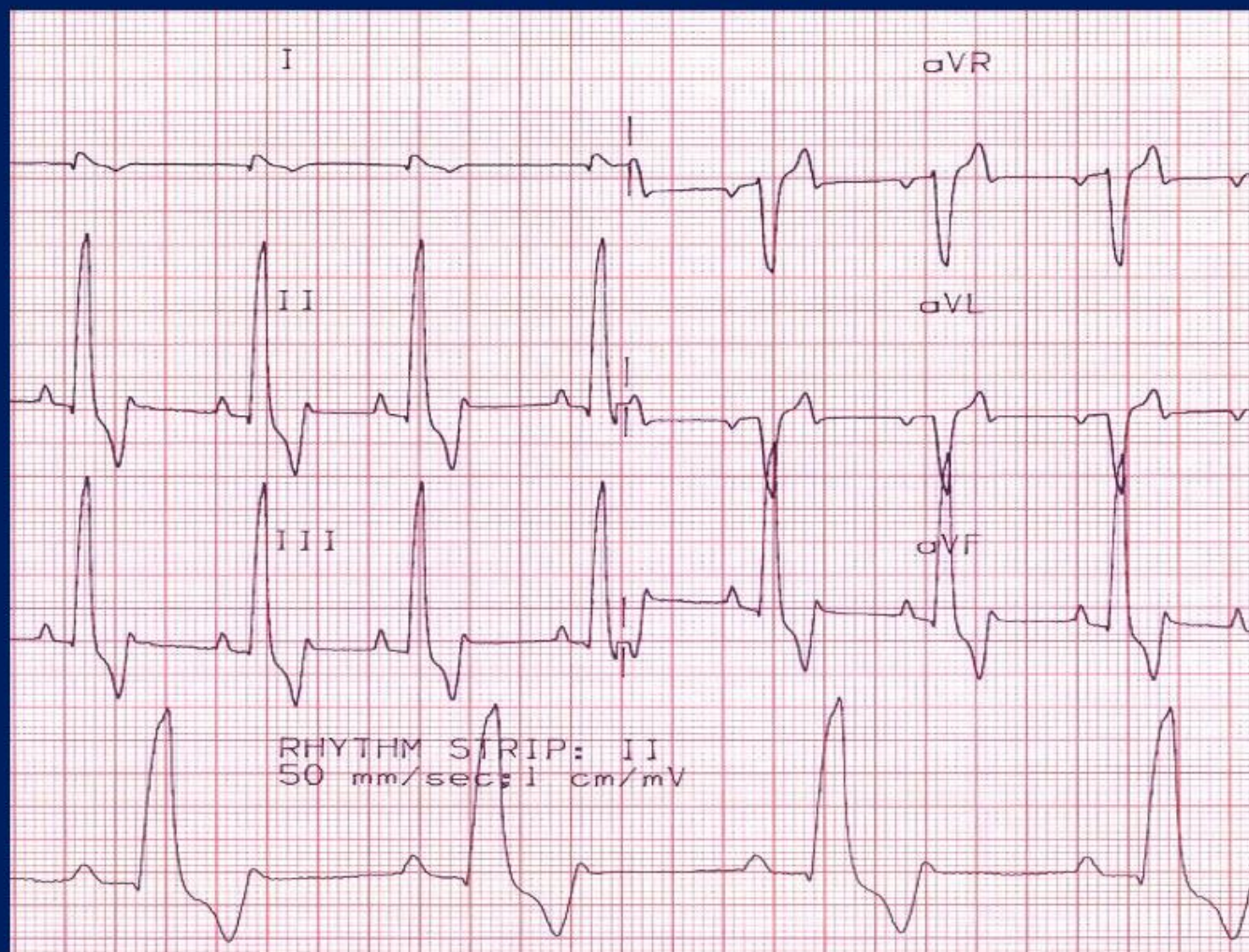
Ventricular fibrillation



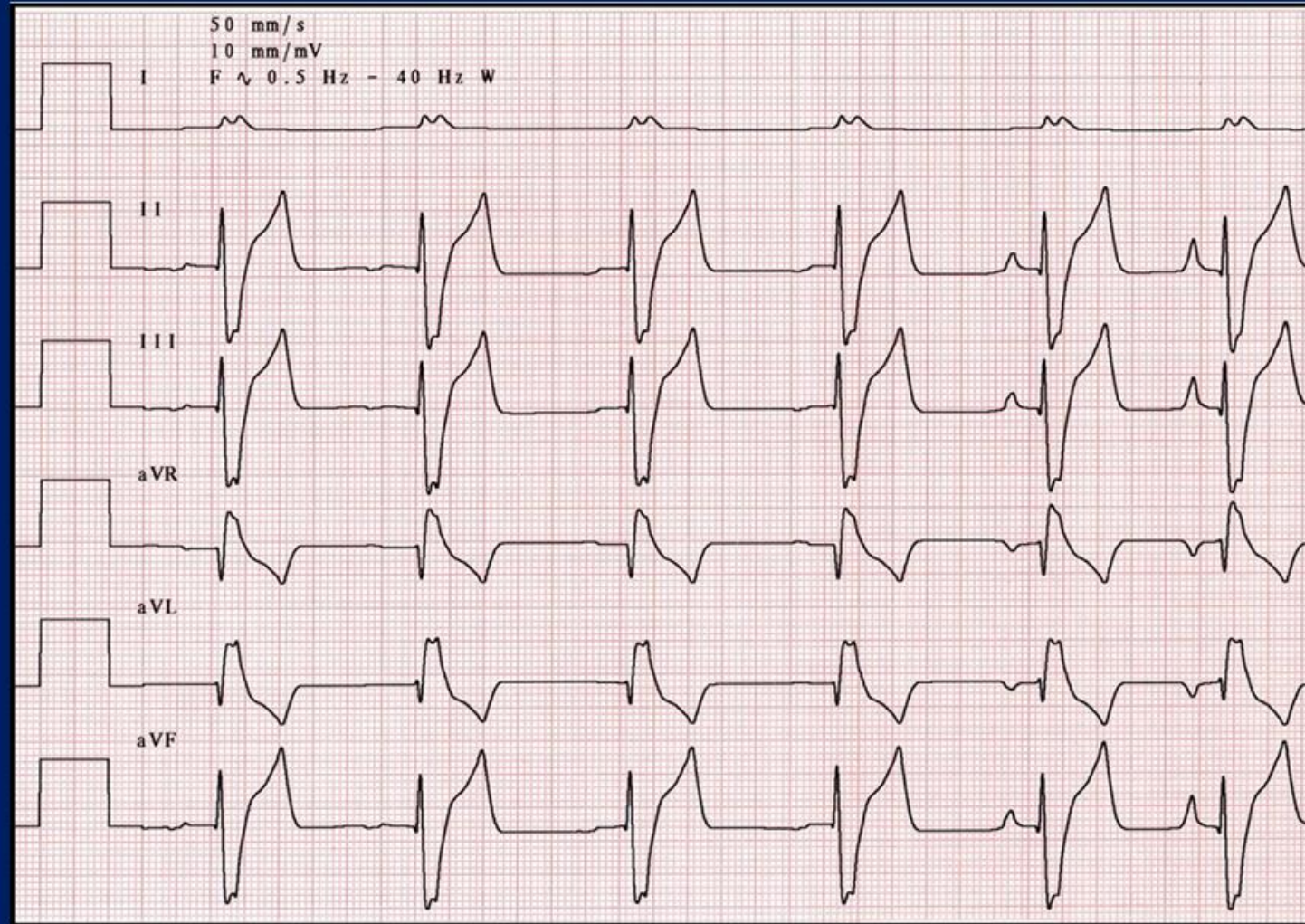
Ventricular Tachycardia and Ventricular Fibrillation in Dog



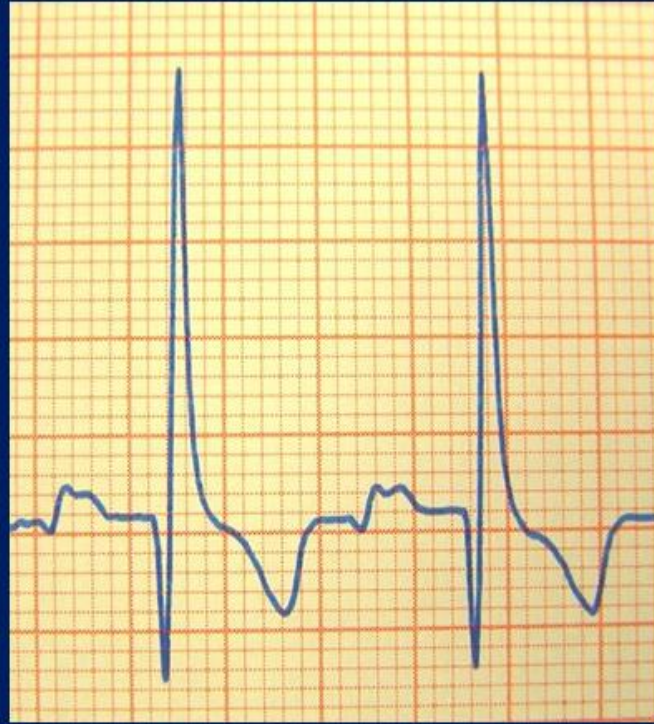
Canine LBBB



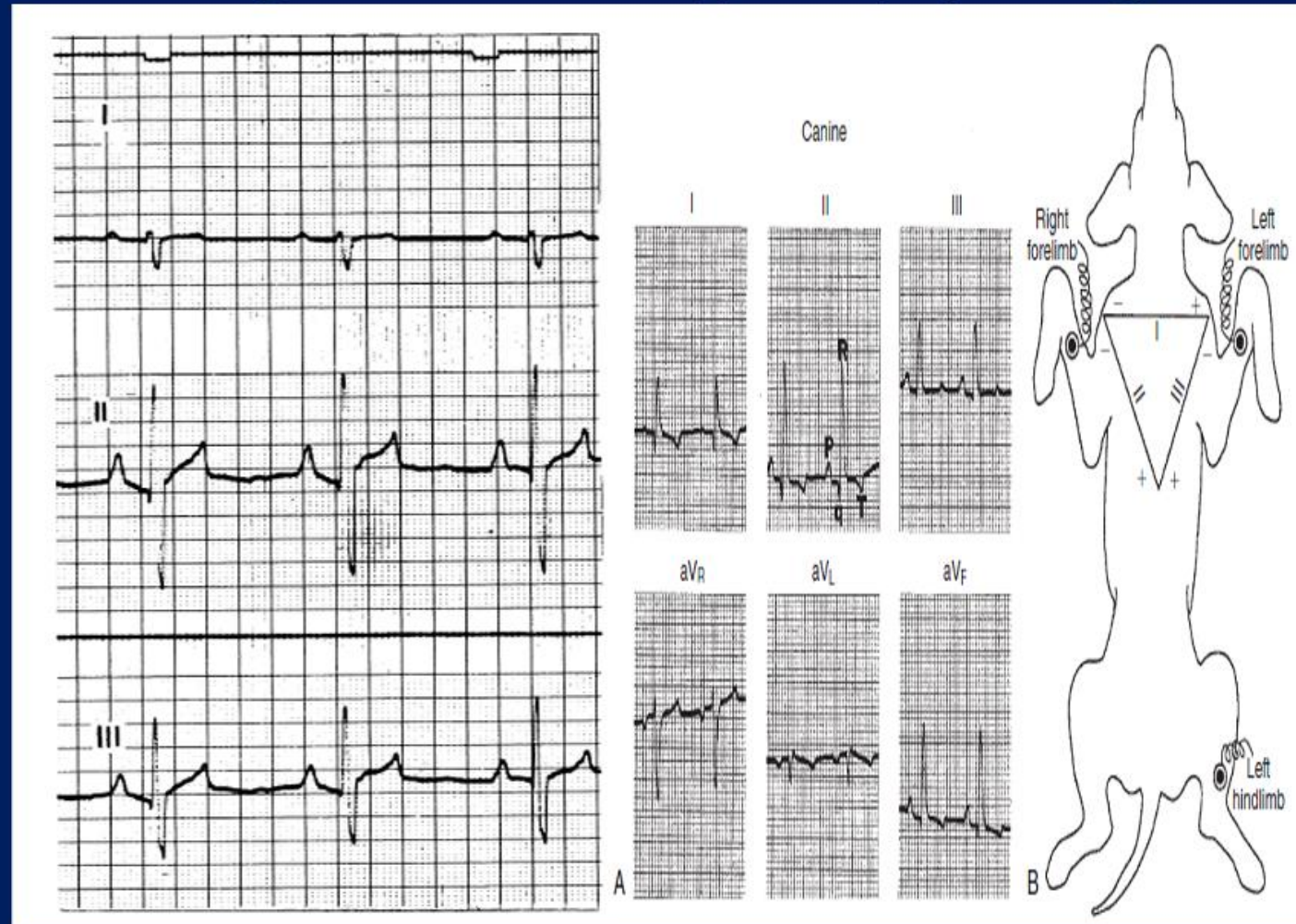
Canine RBBB



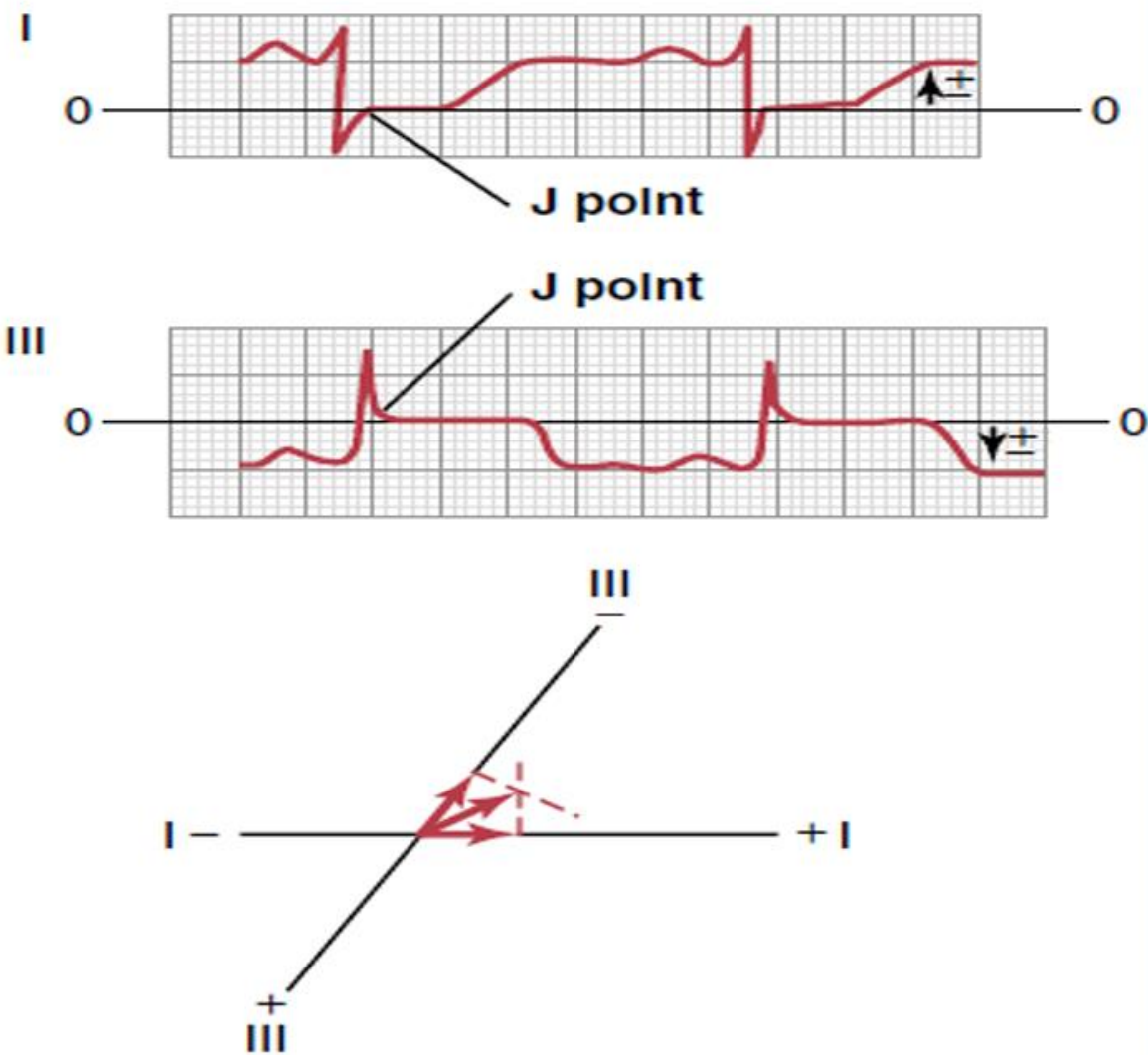
Canine Left and Right Atrial Enlargement



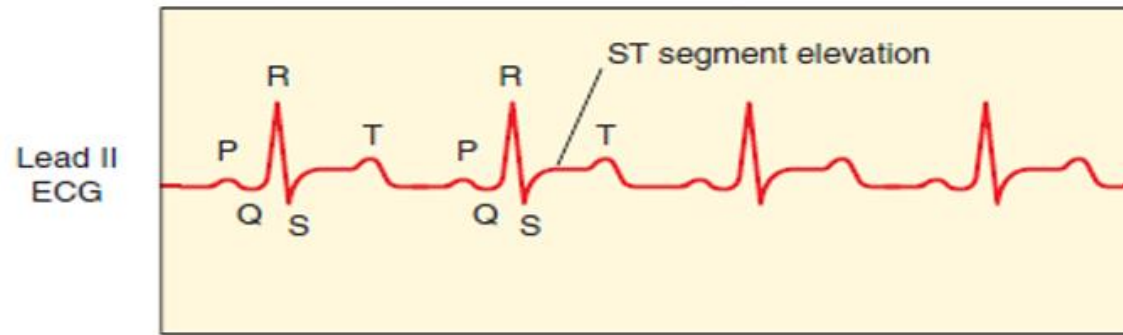
Right Ventricular Hypertrophy in Dog



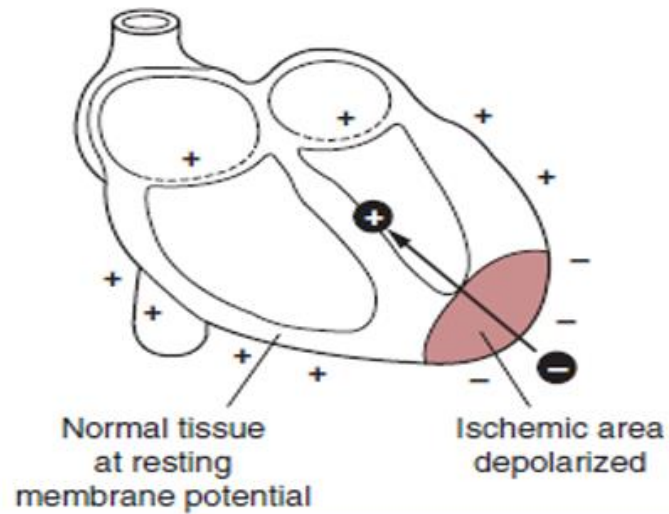
Current of Injury



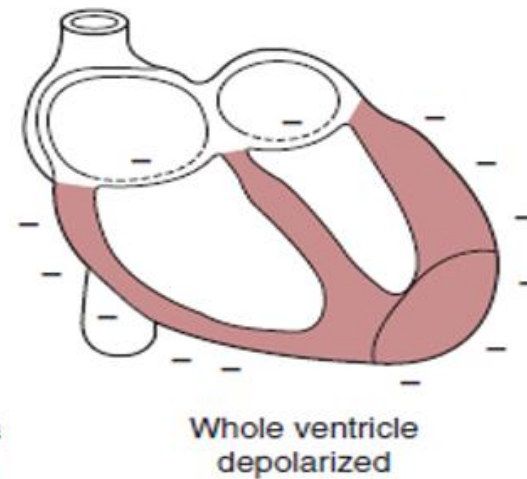
Inferior(Caudal) MI in Dog



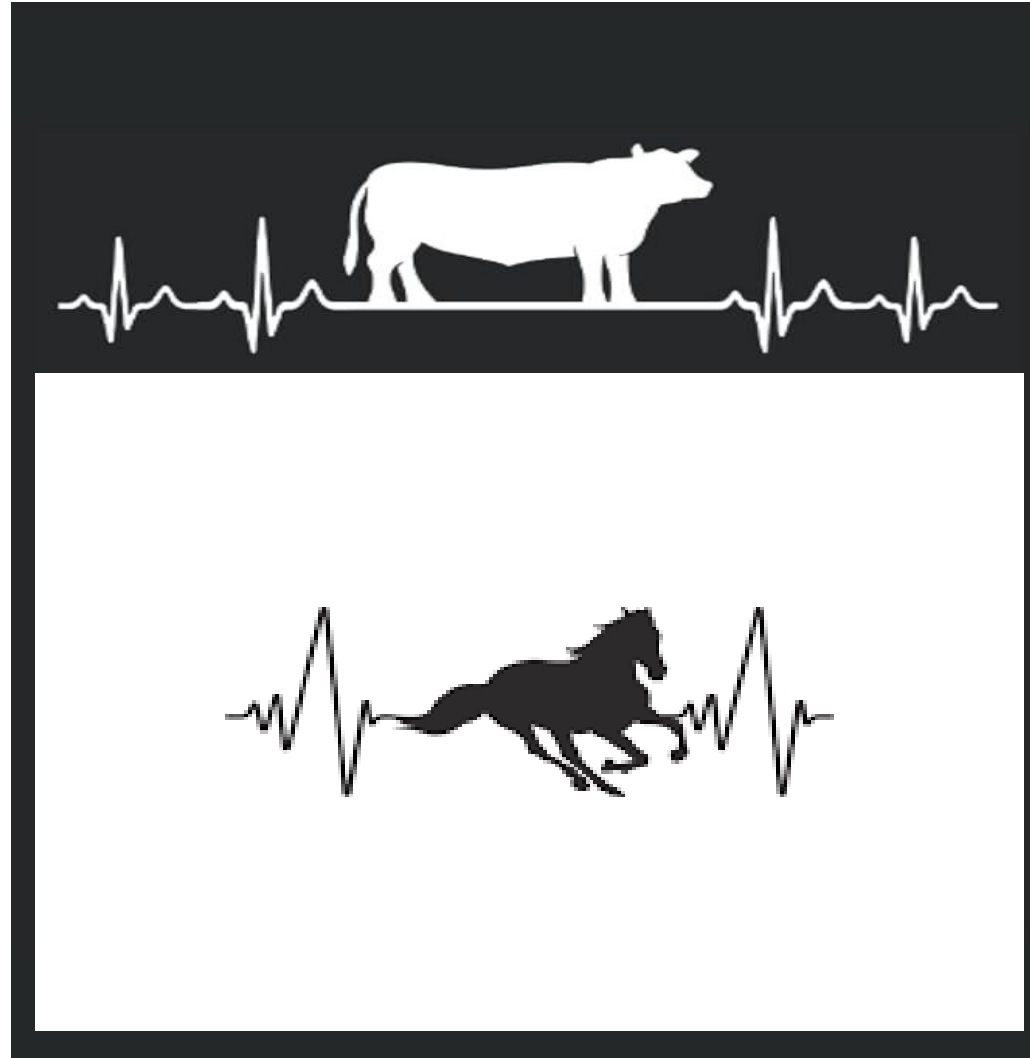
During TP segment



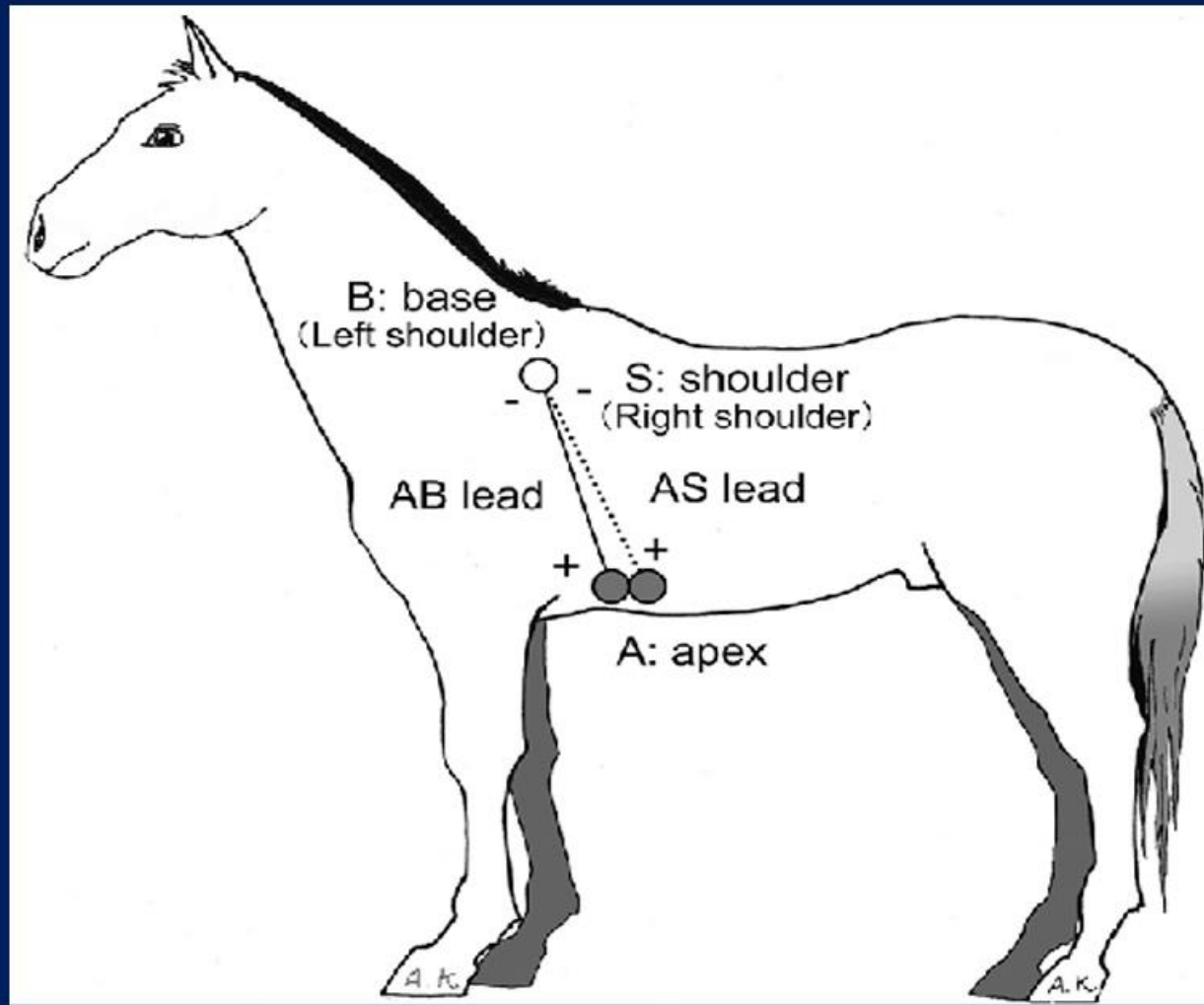
During ST segment



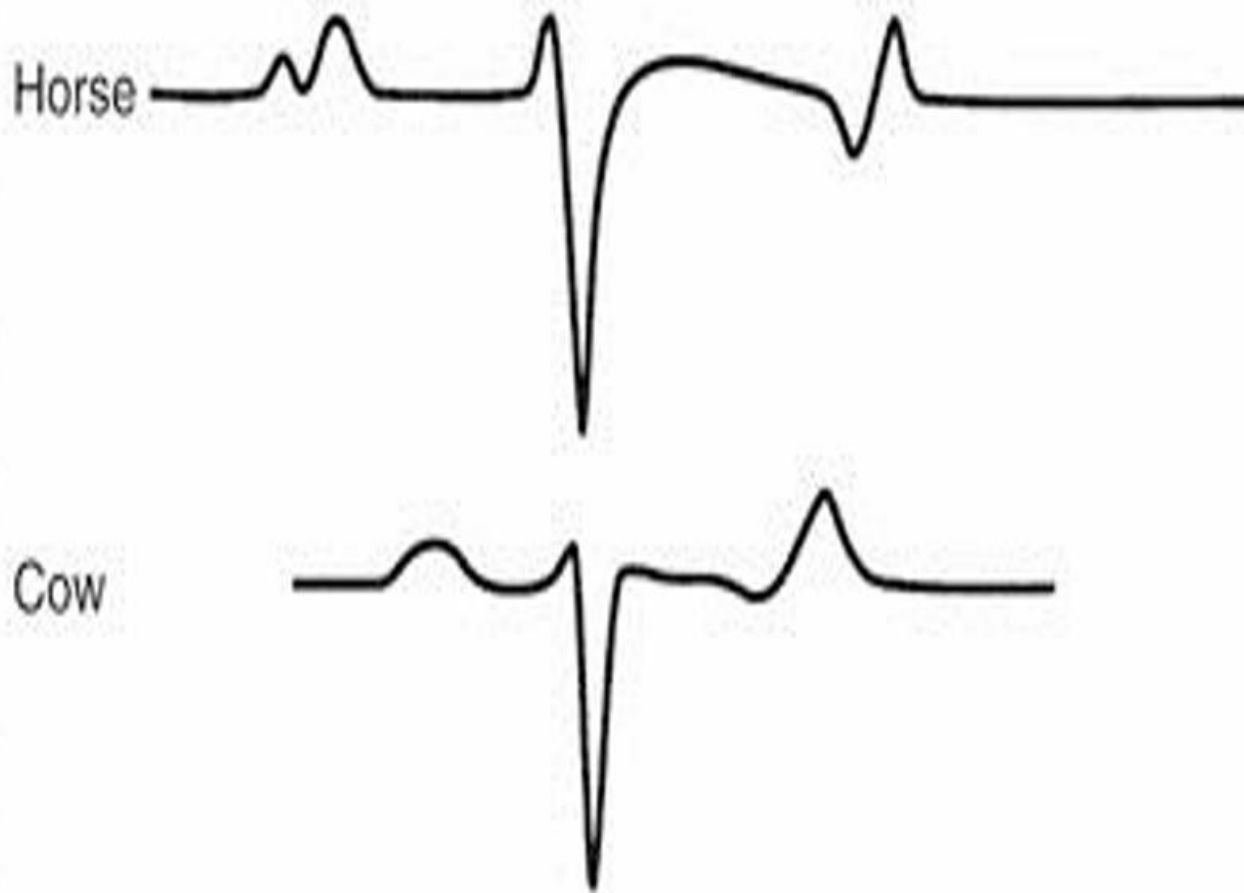
Interpretation of the Electrocardiogram(ECG,EKG)



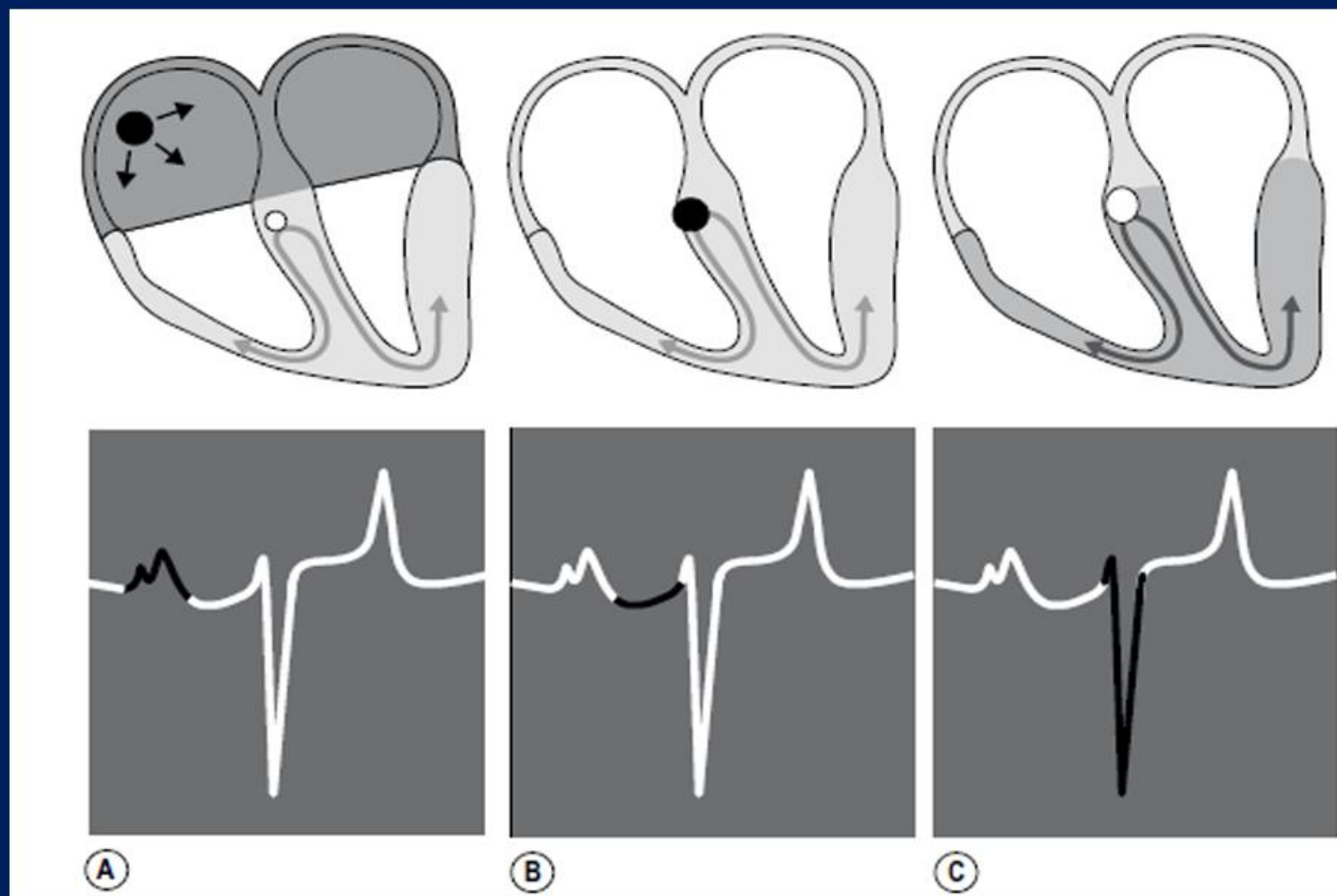
Base-apex Electrocardiogram



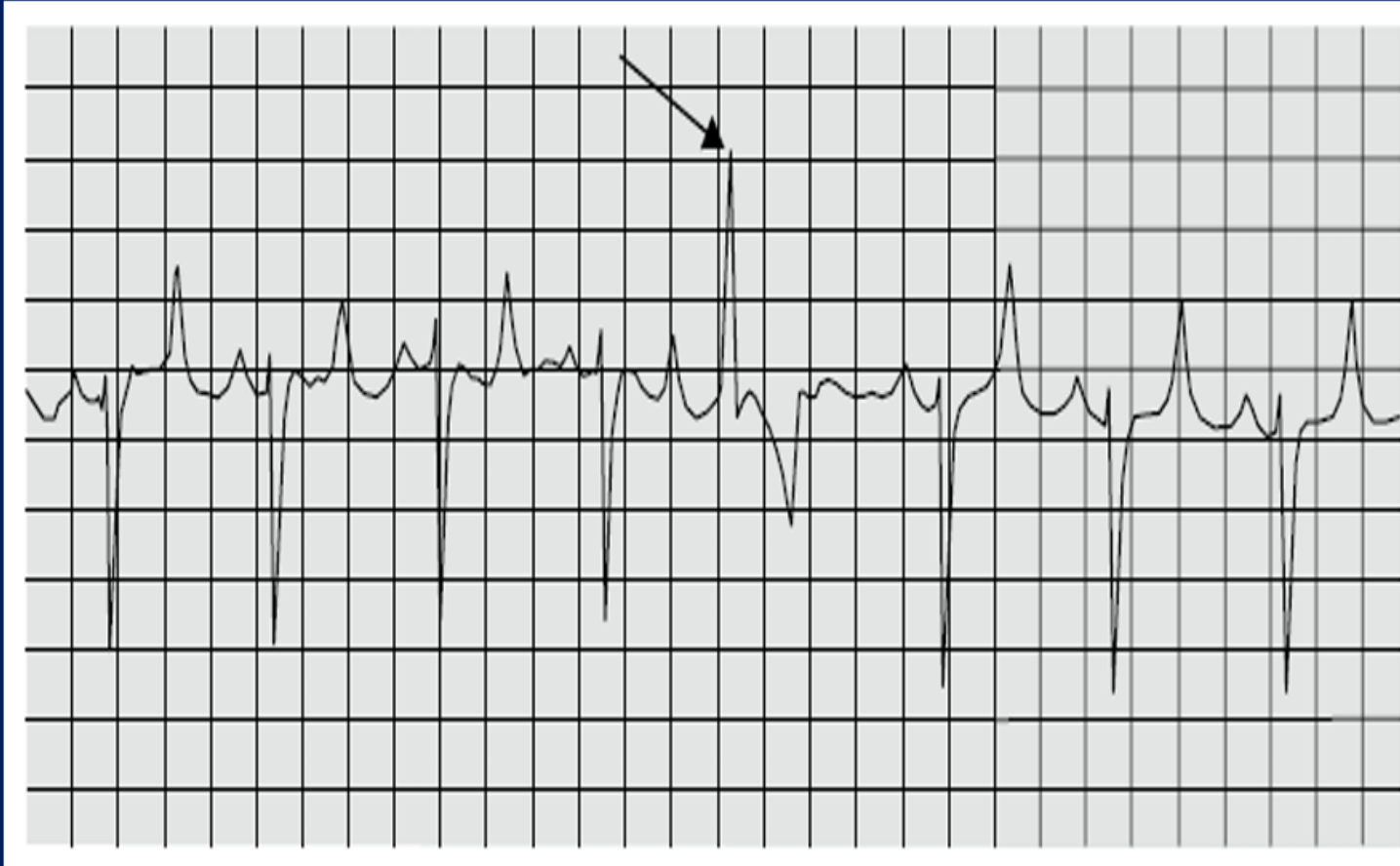
Normal ECG in Horse and Cow



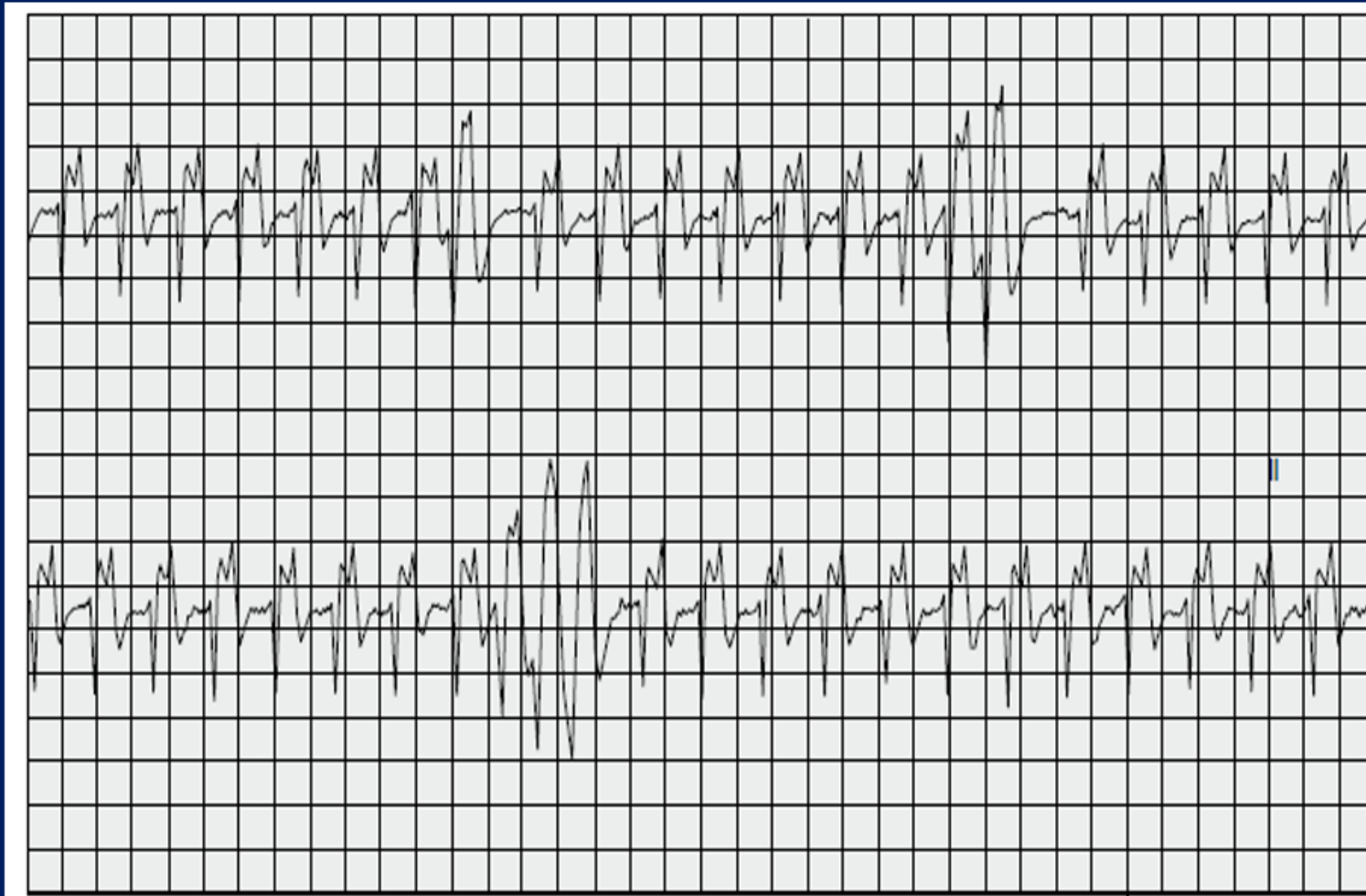
Cardiac Conduction System of the Horse



PVC in Horse



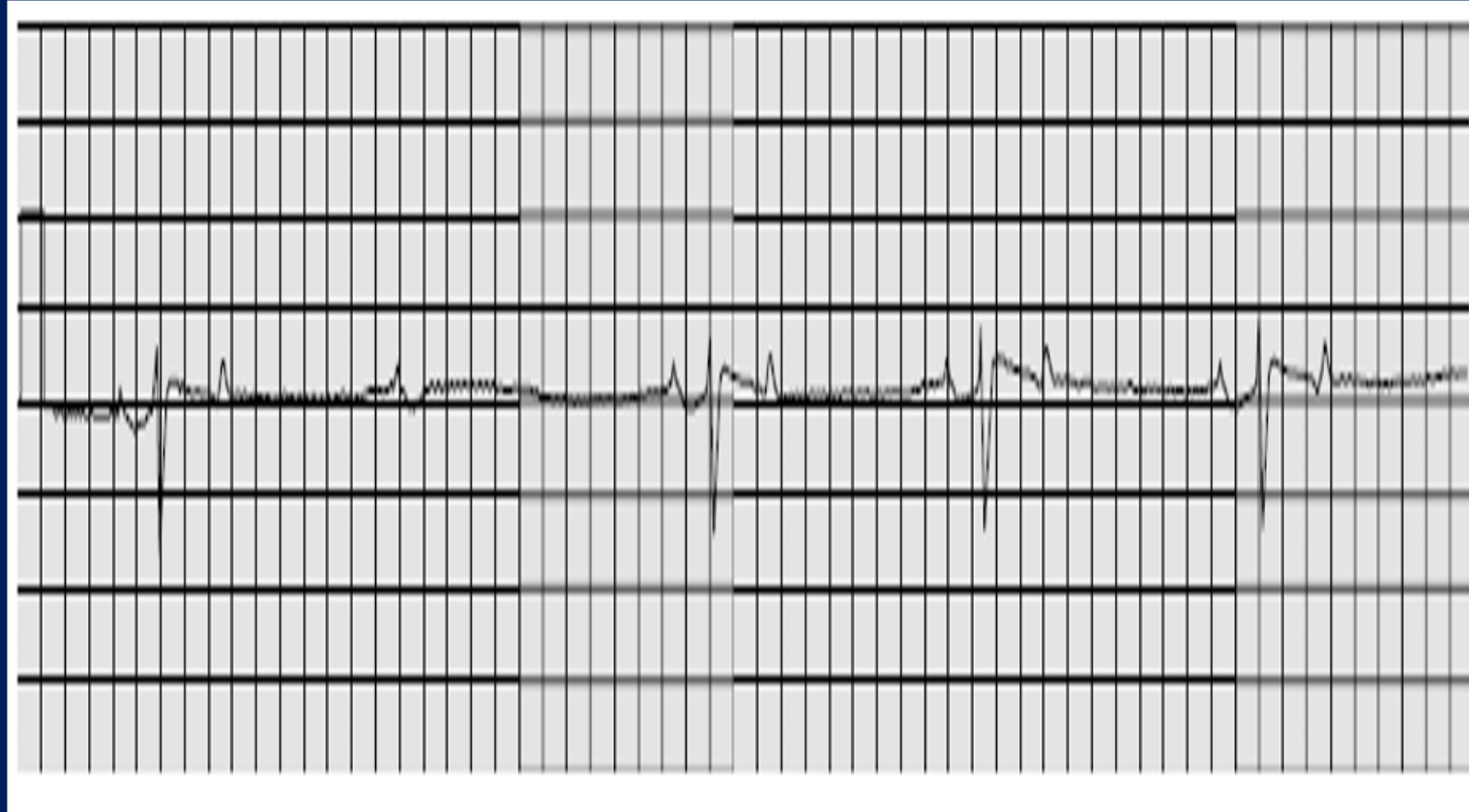
Sinus Tachycardia and PVC in Horse



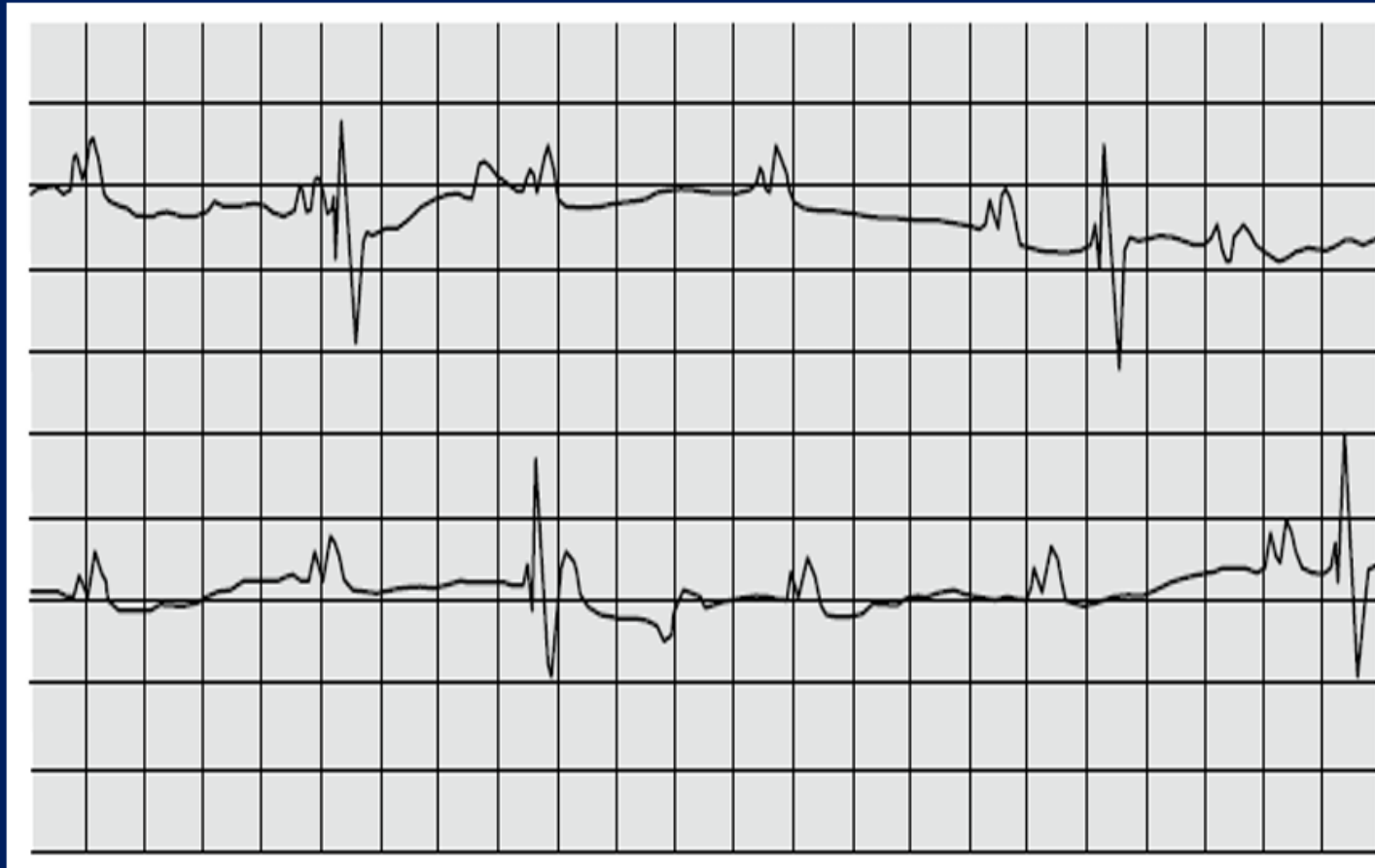
Second-degree AV Block and PVC in Horse



Second-degree AV Block in Horse



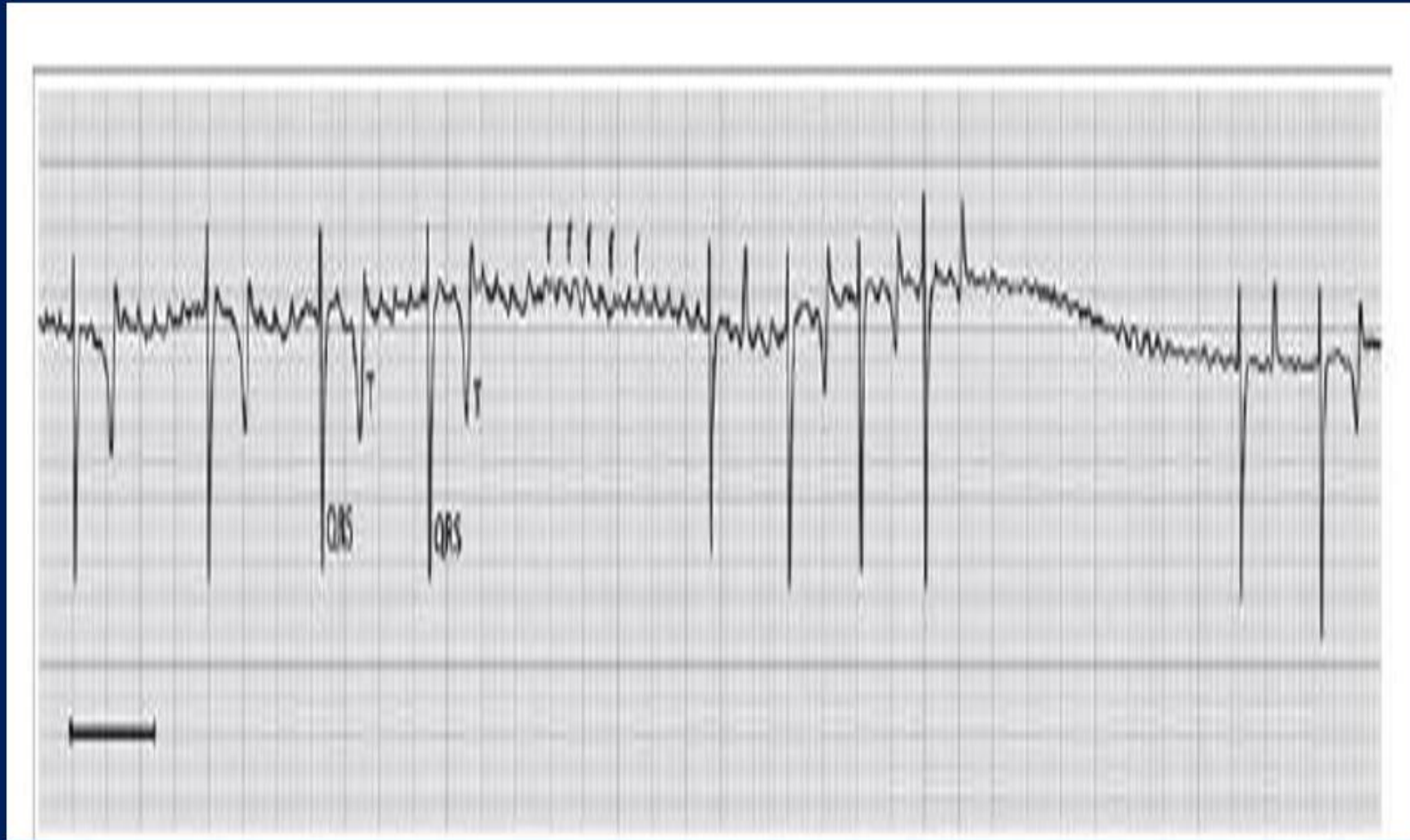
Complete AV Block in Horse



Atrial Flutter in Horse



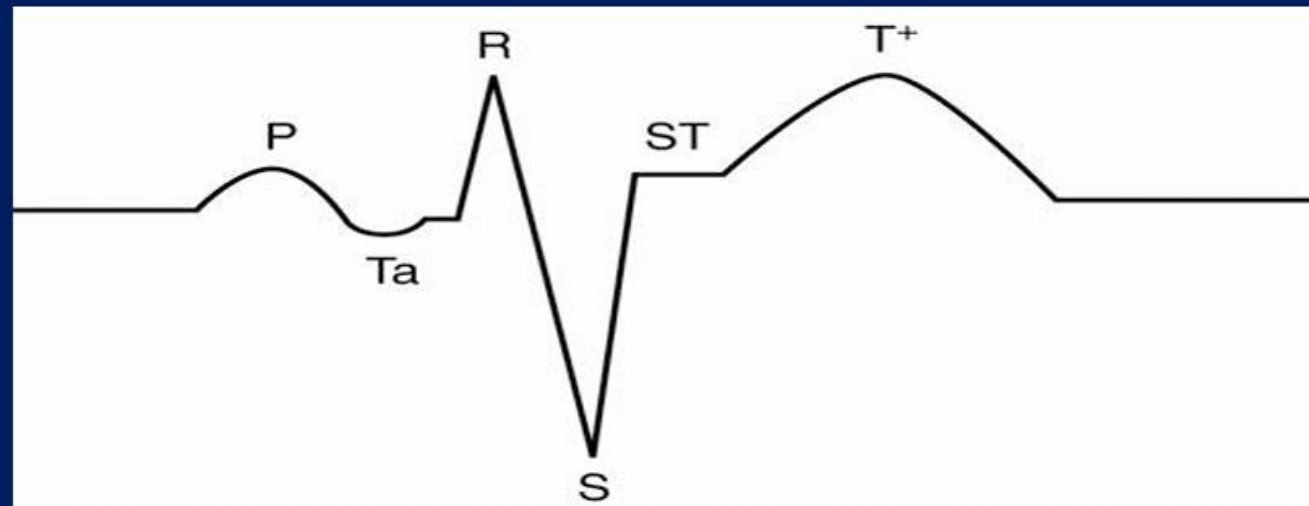
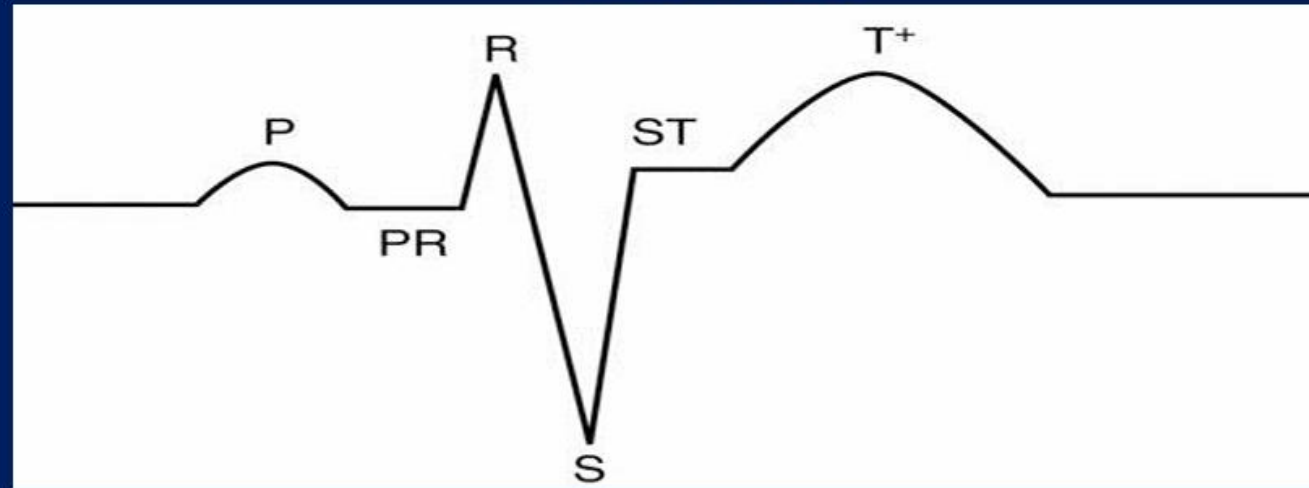
Atrial Fibrillation in Horse



Interpretation of the Electrocardiogram(ECG,EKG)



Avian ECG



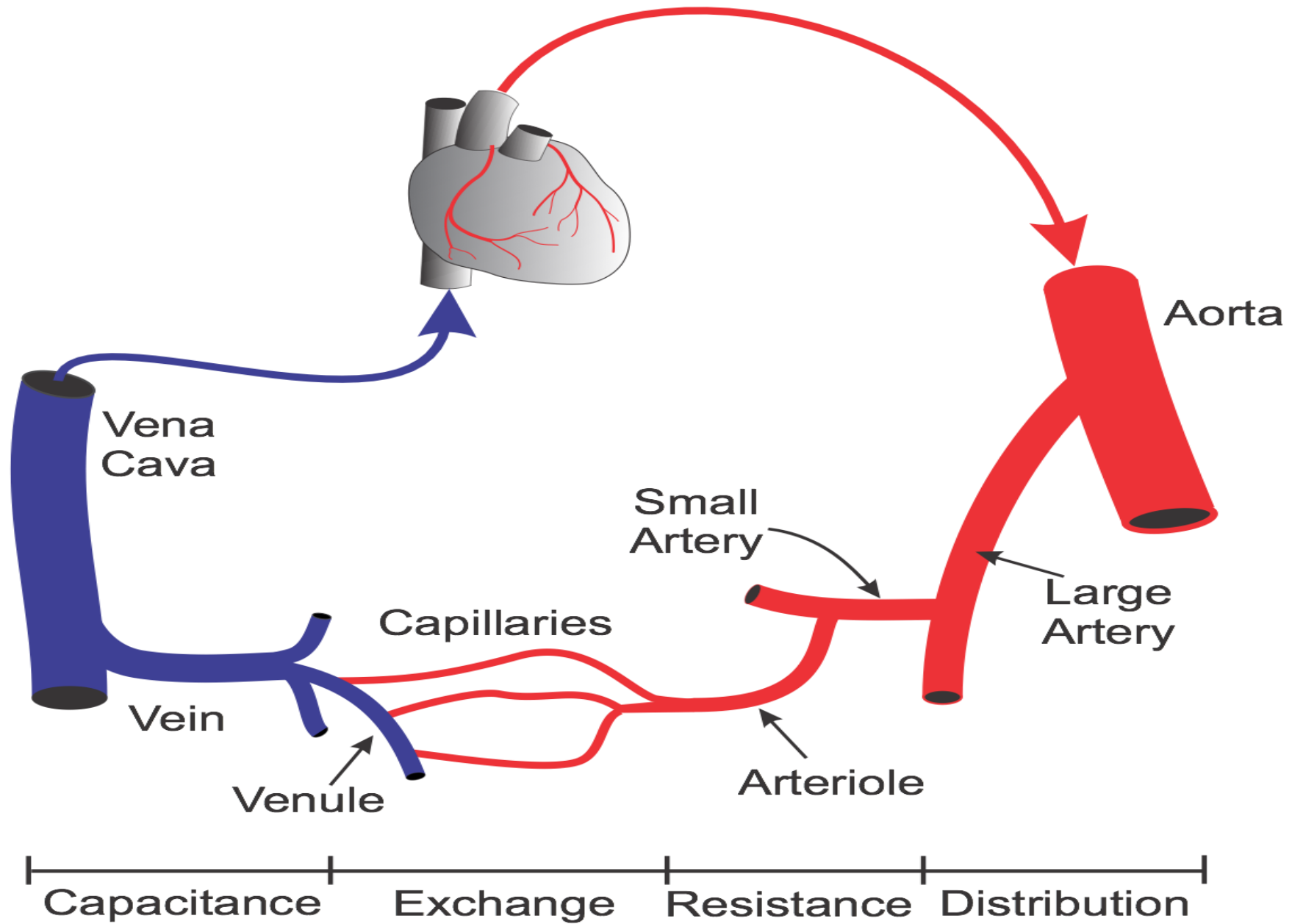
Resistance
Vessels

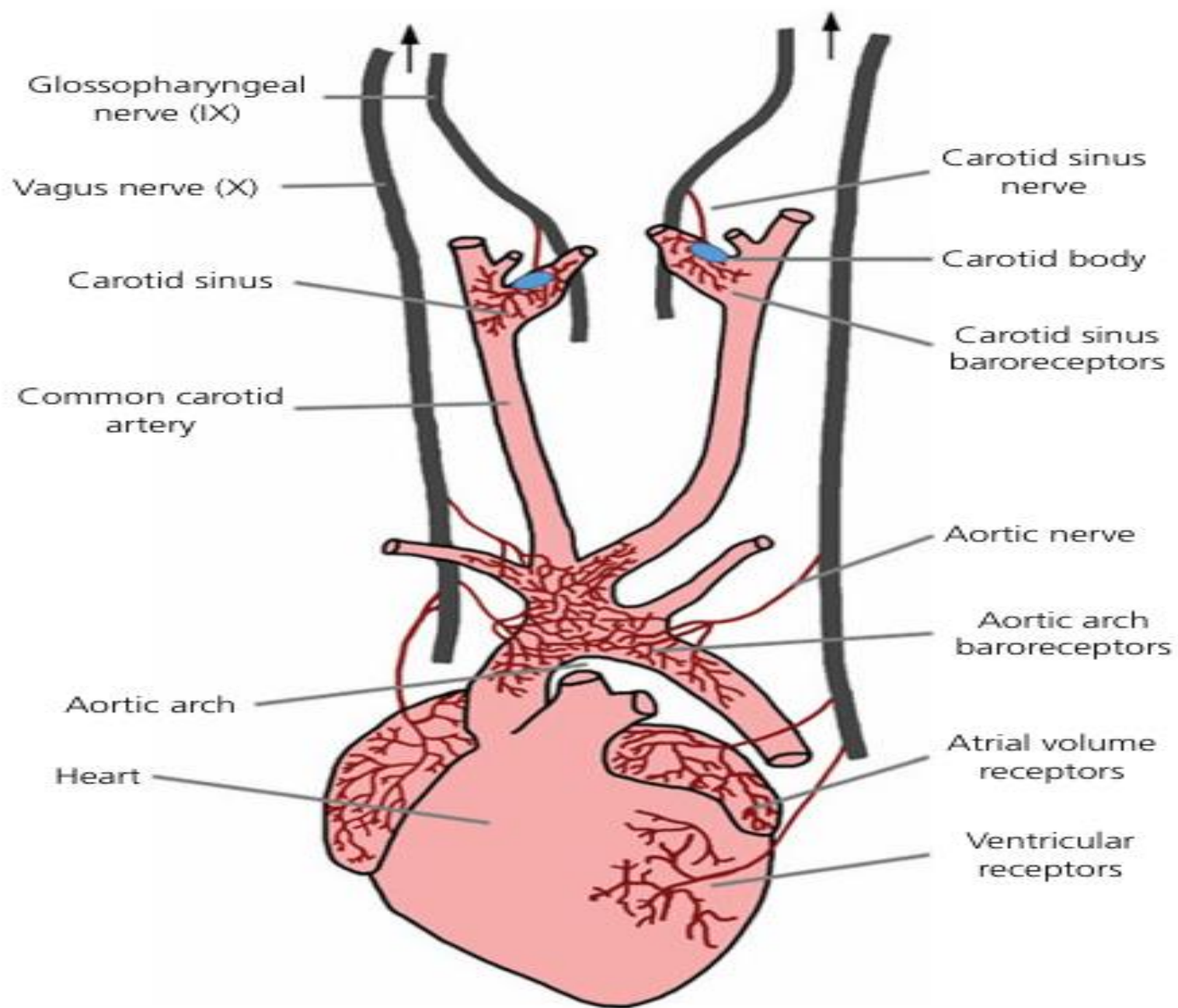


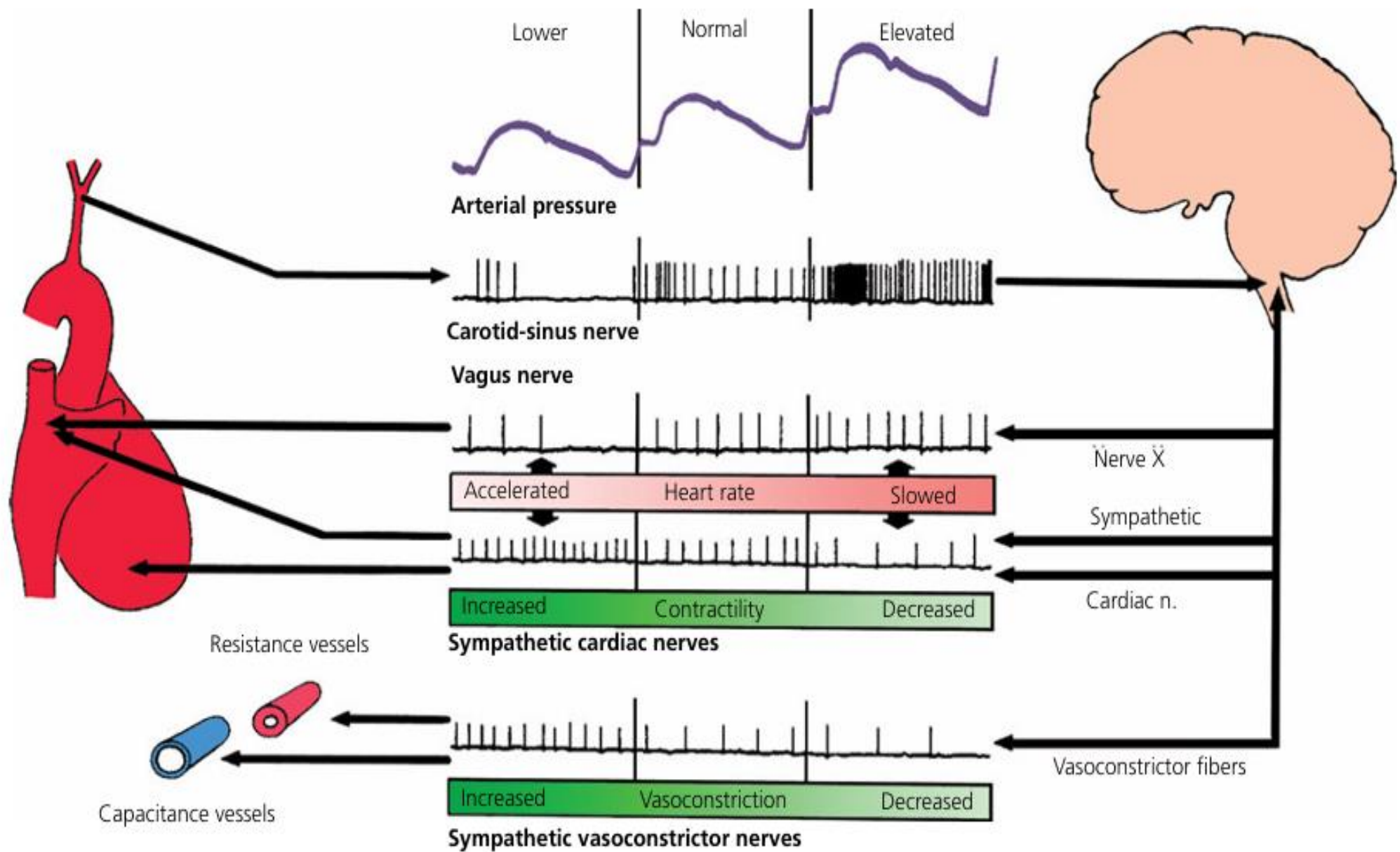
vs

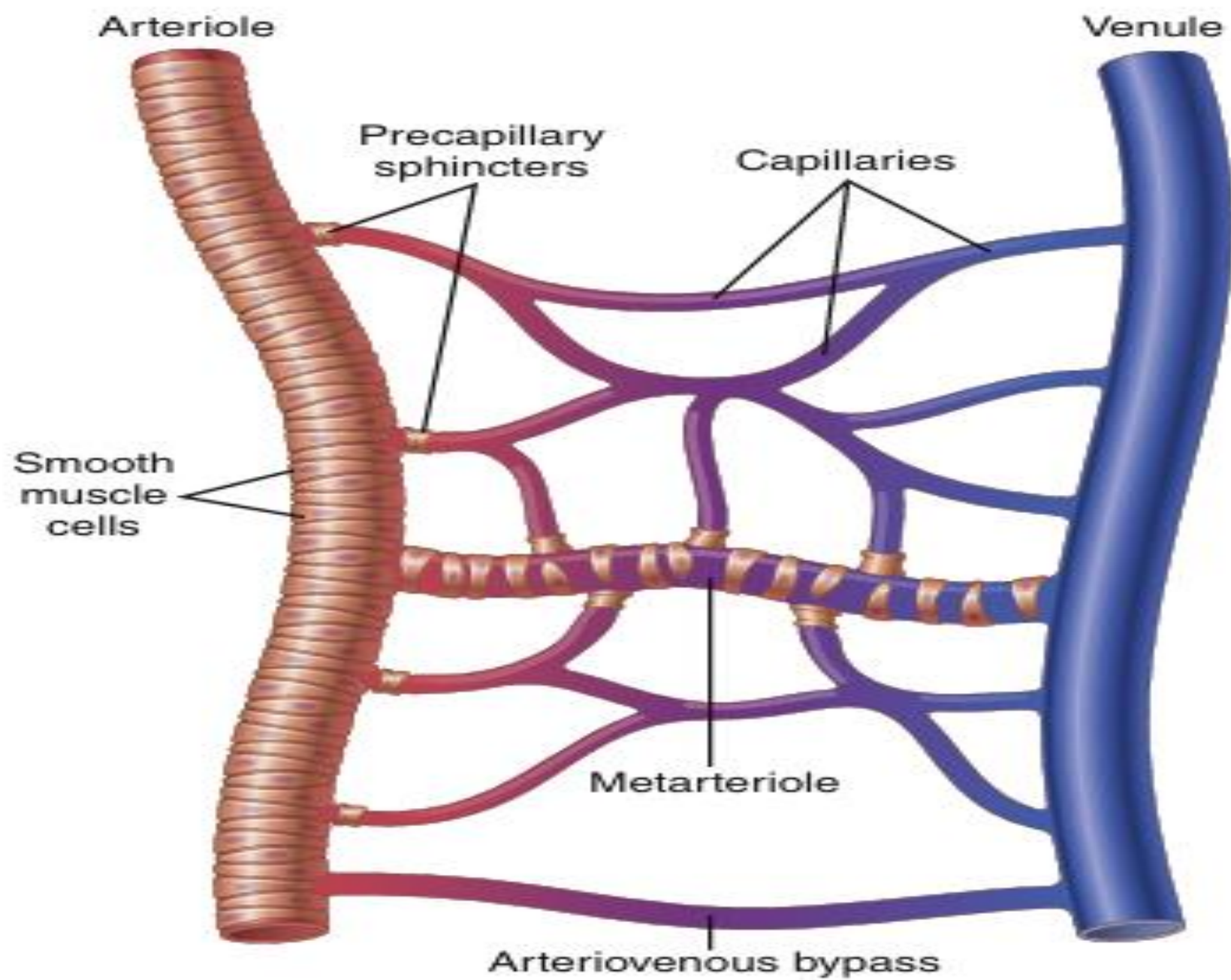
Capacitance
Vessels

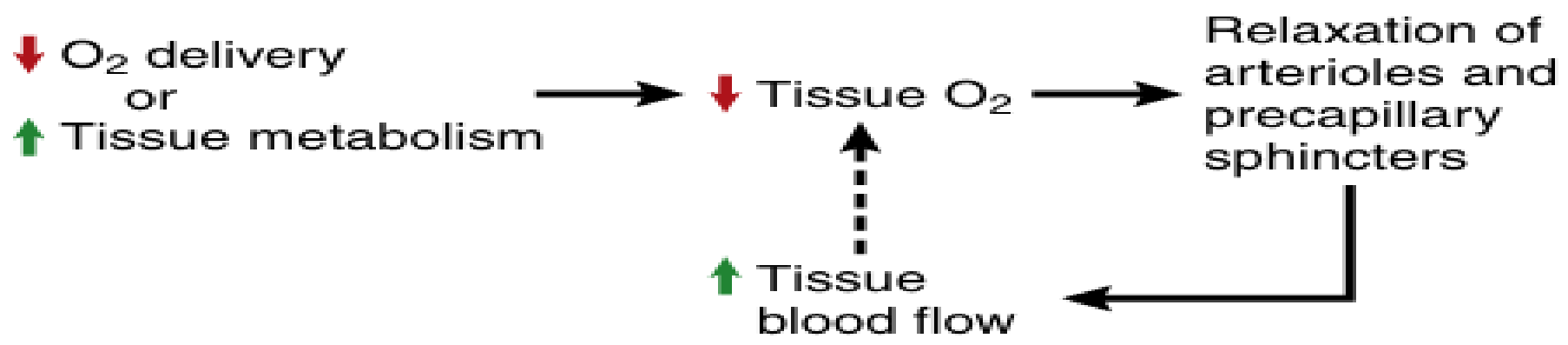
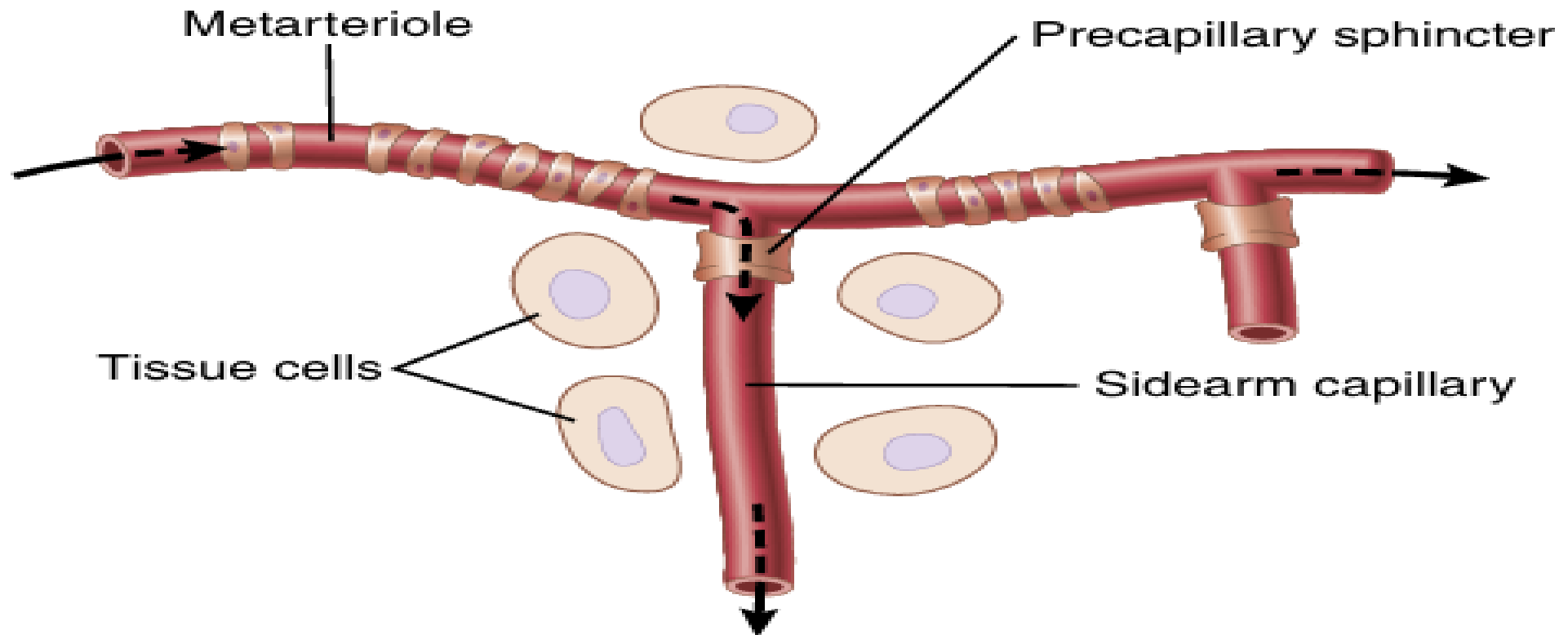




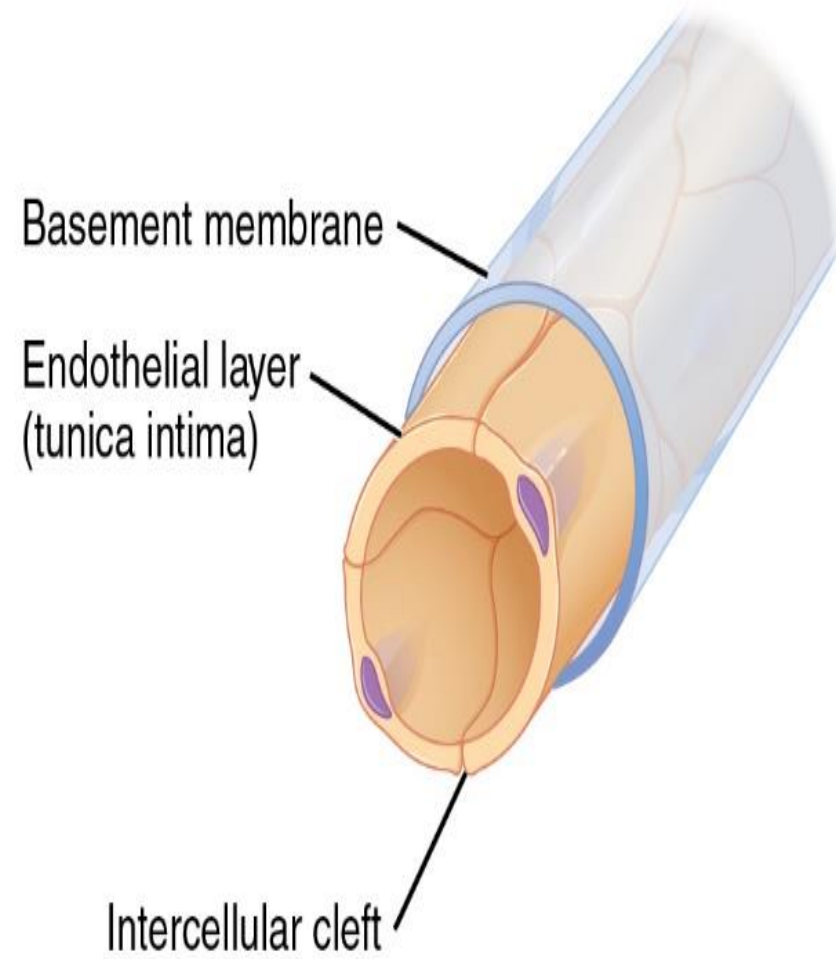




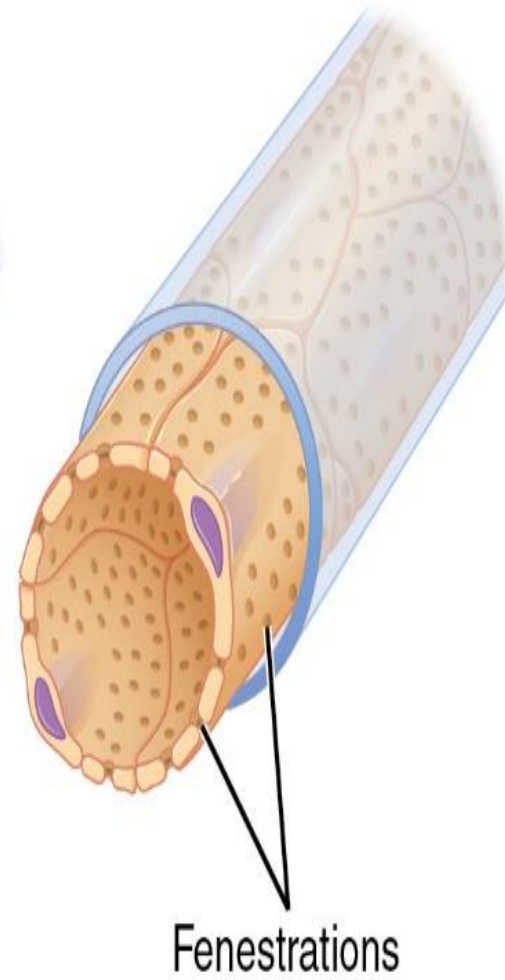




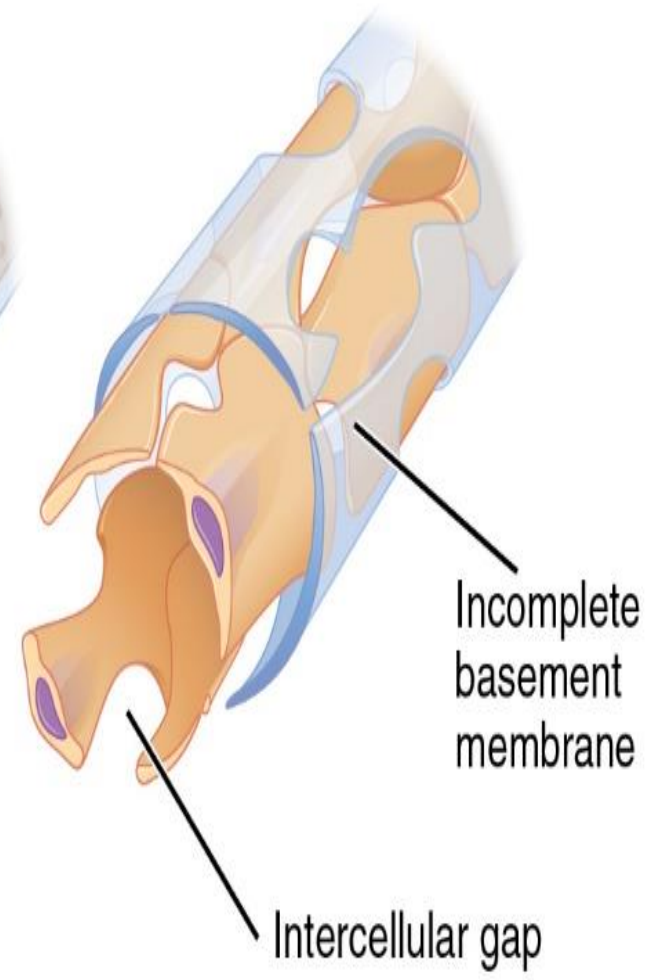
Continuous



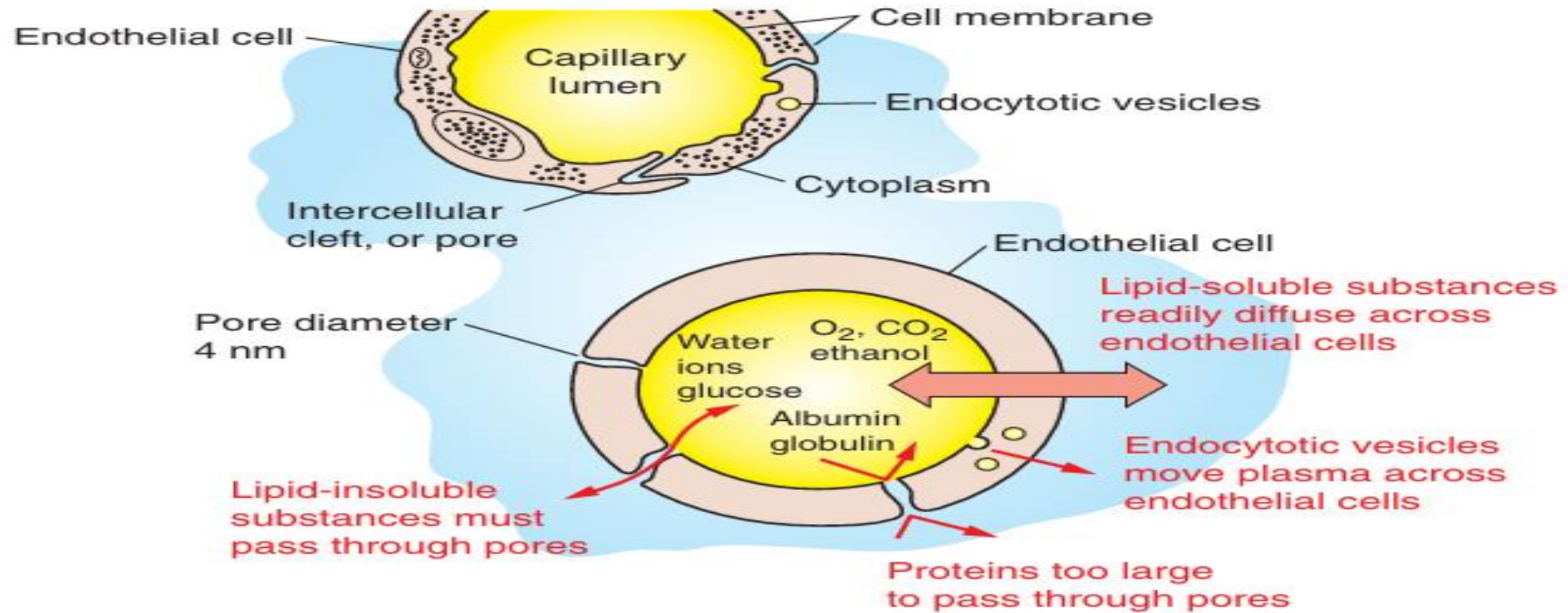
Fenestrated



Sinusoid



Typical continuous capillary



Discontinuous capillary (sinusoid)

