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Other Cardiac Conditions and the ECG

Fast & Easy ECGs – A Self-Paced
Learning Program

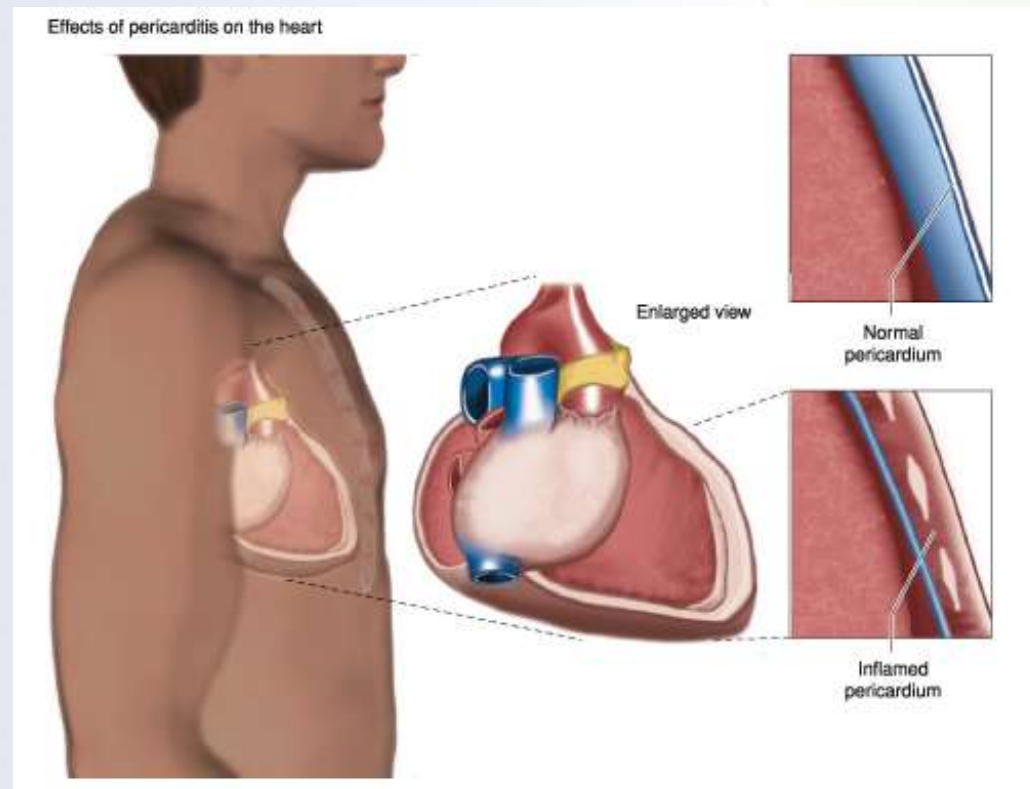


Other Cardiac Conditions

- Many conditions cause changes to the ECG
 - Electrolyte abnormality
 - Ischemia
 - Infarction
 - Inflammation
 - Medications

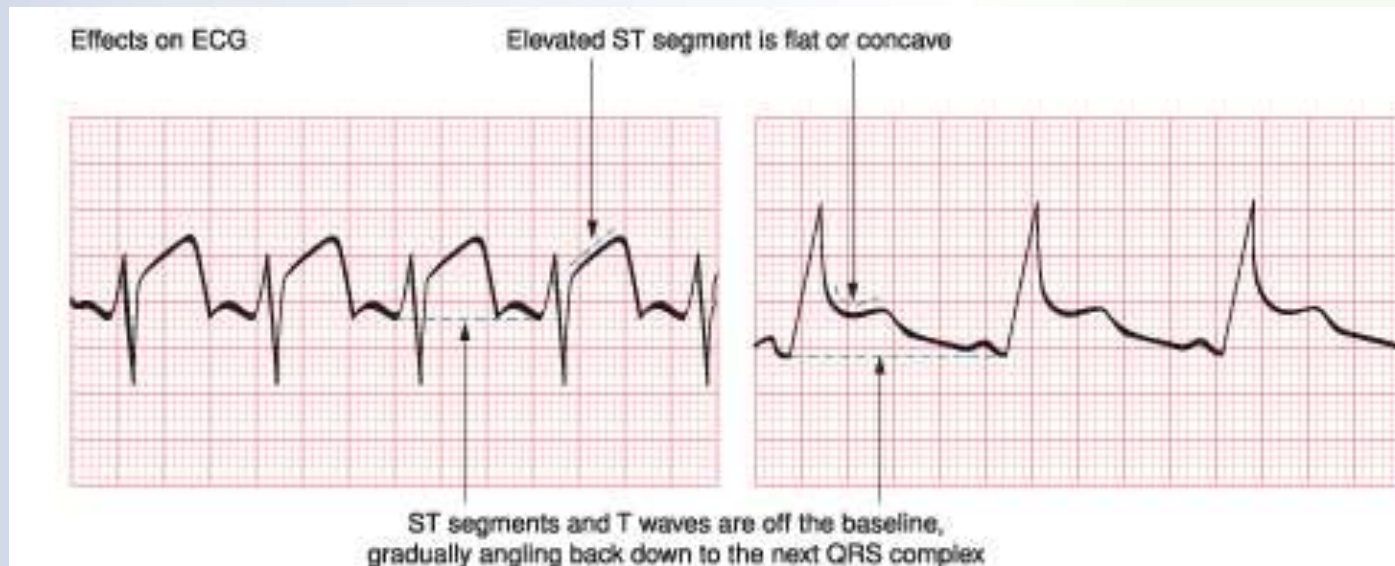
Pericarditis

- Inflammation of pericardium



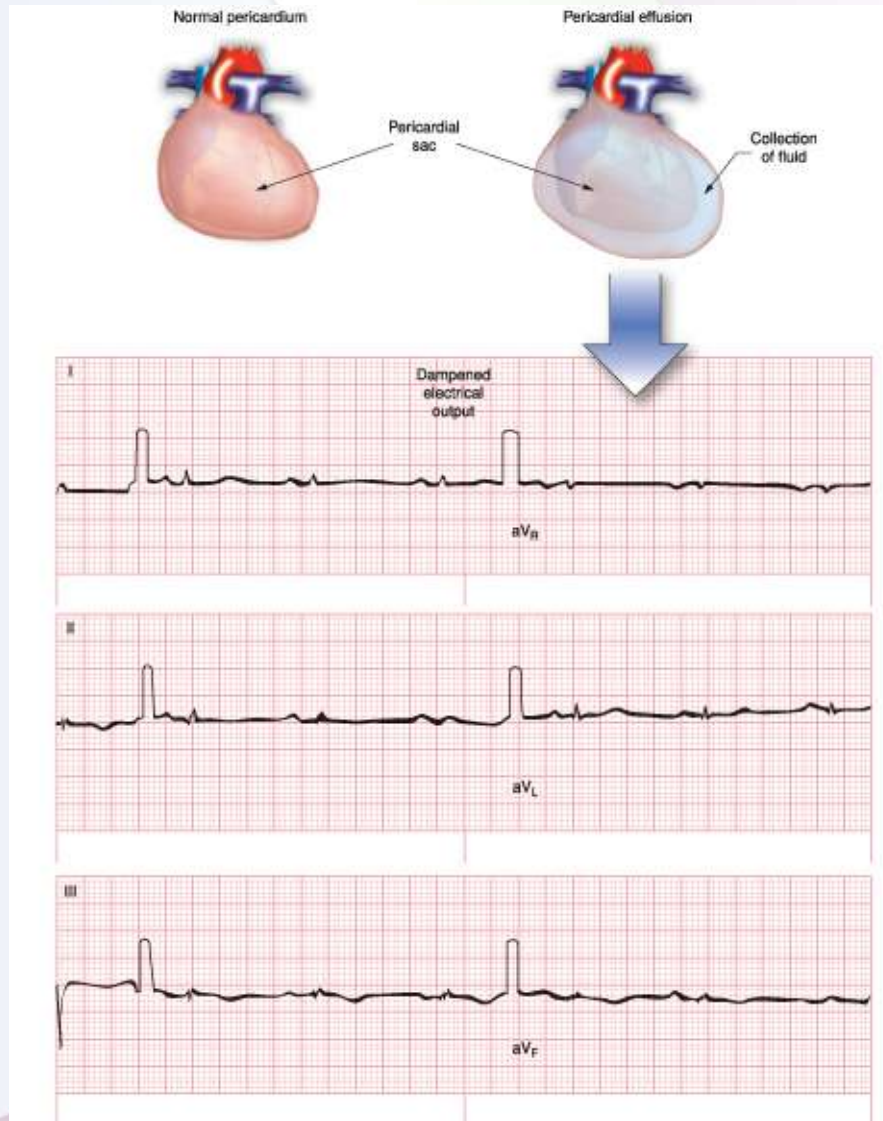
ECG Changes in Pericarditis

- T wave initially upright and elevated but then during recovery phase it inverts
- ST segment elevated and usually flat or concave



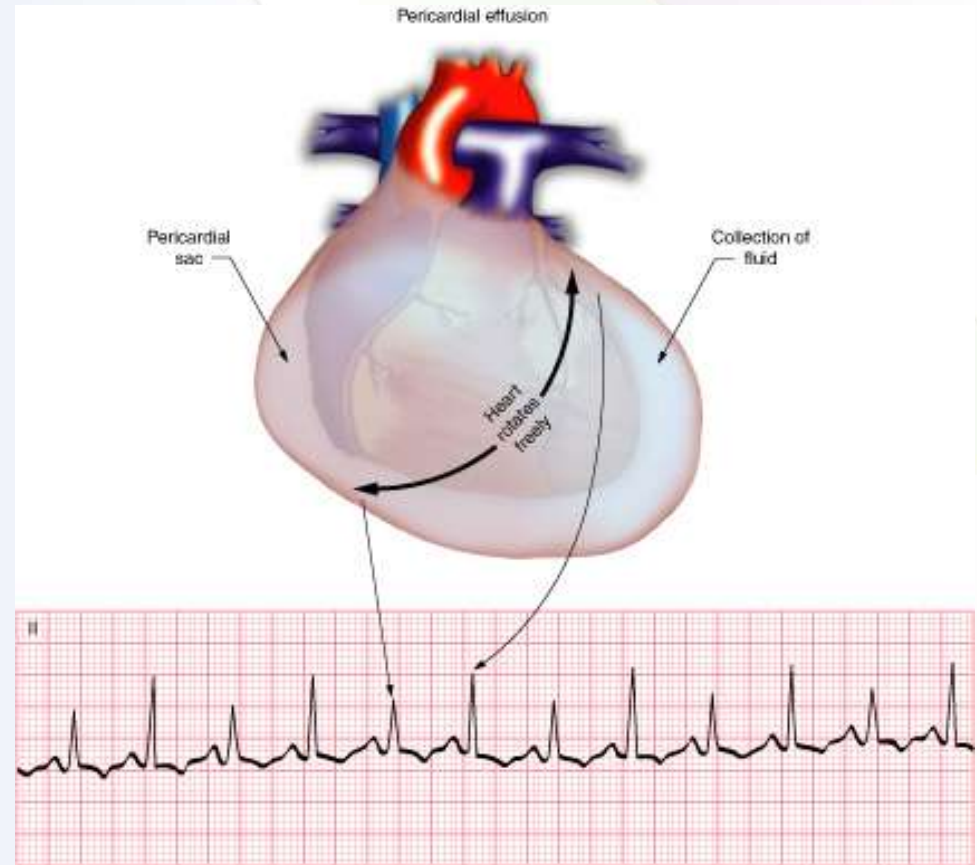
Pericardial Effusion

- Can occur with pericarditis
- Can cause low-voltage QRS complexes in all leads and electrical alternans



Electrical Alternans

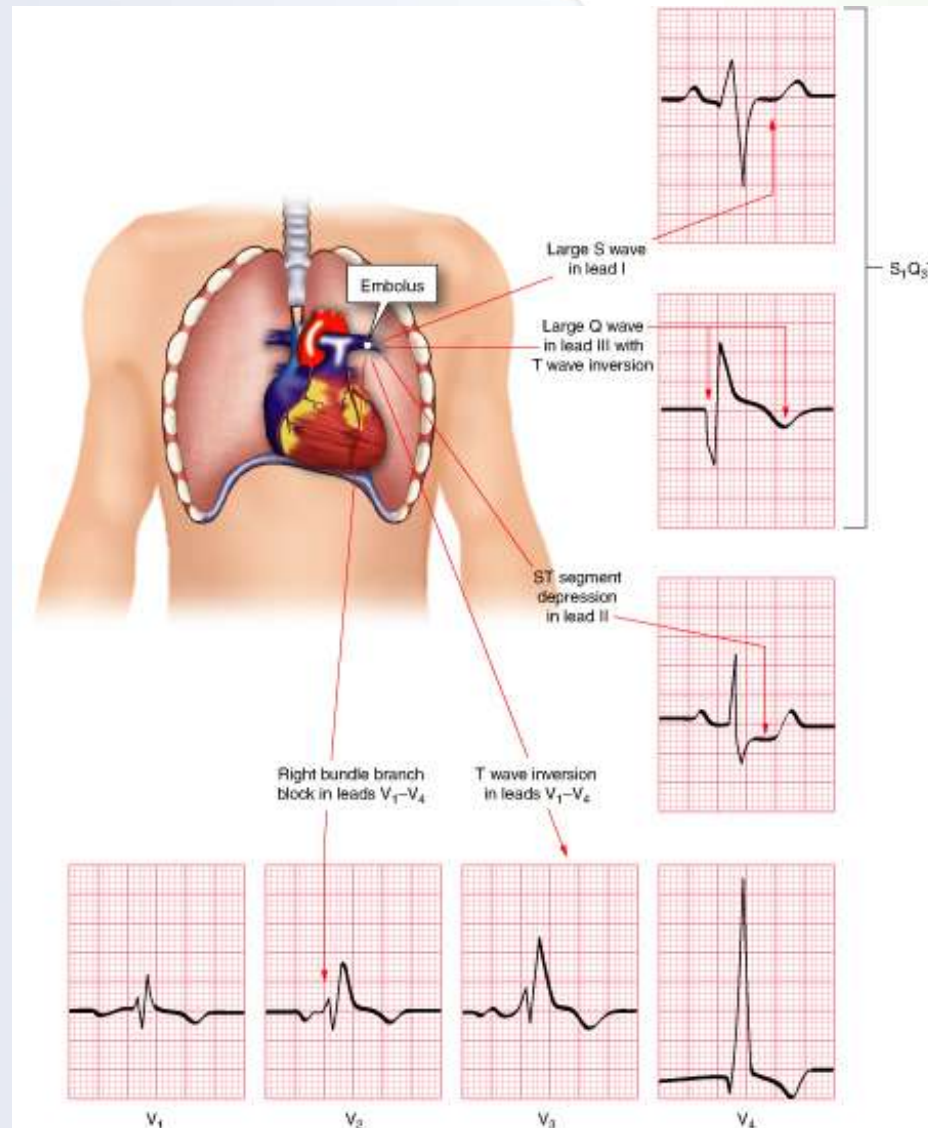
- QRS complexes change in height with each successive beat



Pulmonary Embolism

- Acute blockage of one of the pulmonary arteries
- Leads to obstruction of blood flow to the lung segment supplied by the artery
- Produces large S wave in lead I, deep Q wave in lead III, inverted T wave in lead III
 - Called the *S1 Q3 T3* pattern

Pulmonary Embolism

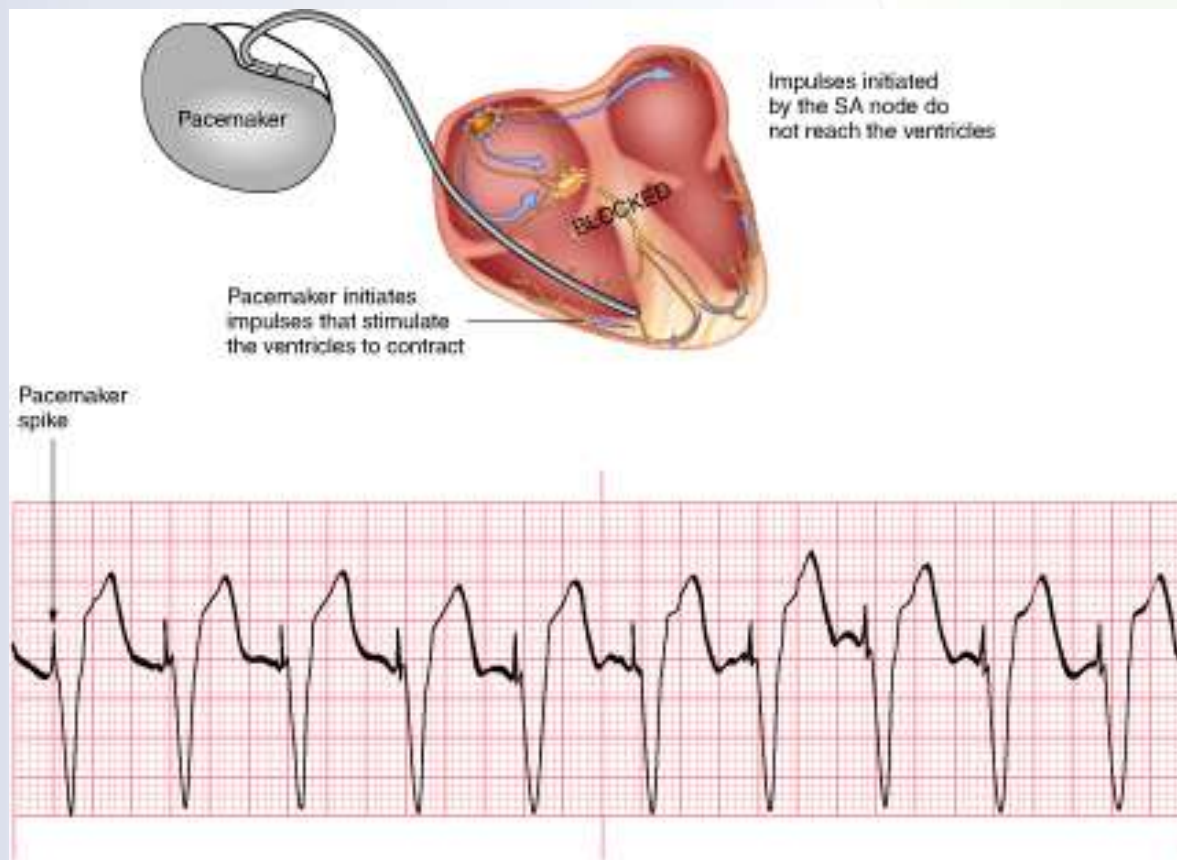


Pacemakers

- Implanted pacemakers regulate heart rate
- Patients often have:
 - A condition which causes the heart rate to occasionally slow down
 - A complete heart block where the ventricular escape rate is too low
- Artificial devices produce an impulse and convey it to the myocardium

Pacemakers

- Firing of a pacemaker produces one or two small spikes on the ECG



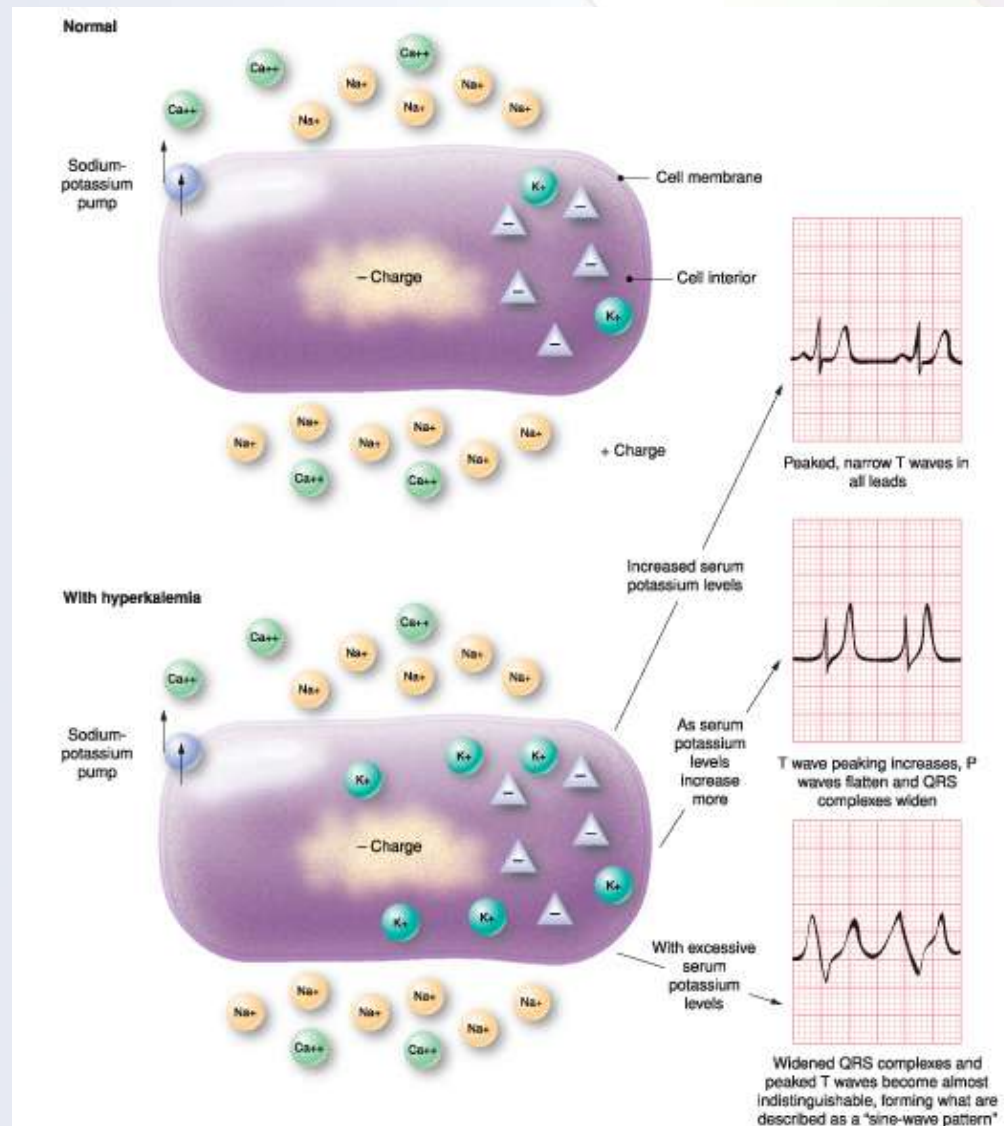
Electrolyte Imbalances

- Increases or decreases in potassium and calcium serum levels can have a profound effect on the ECG

Hyperkalemia

- Key characteristics include:
 - T wave peaking
 - Flattened P waves
 - 1st-degree AV heart block
 - Widened QRS complexes
 - Deepened S waves
 - Merging of S and T waves

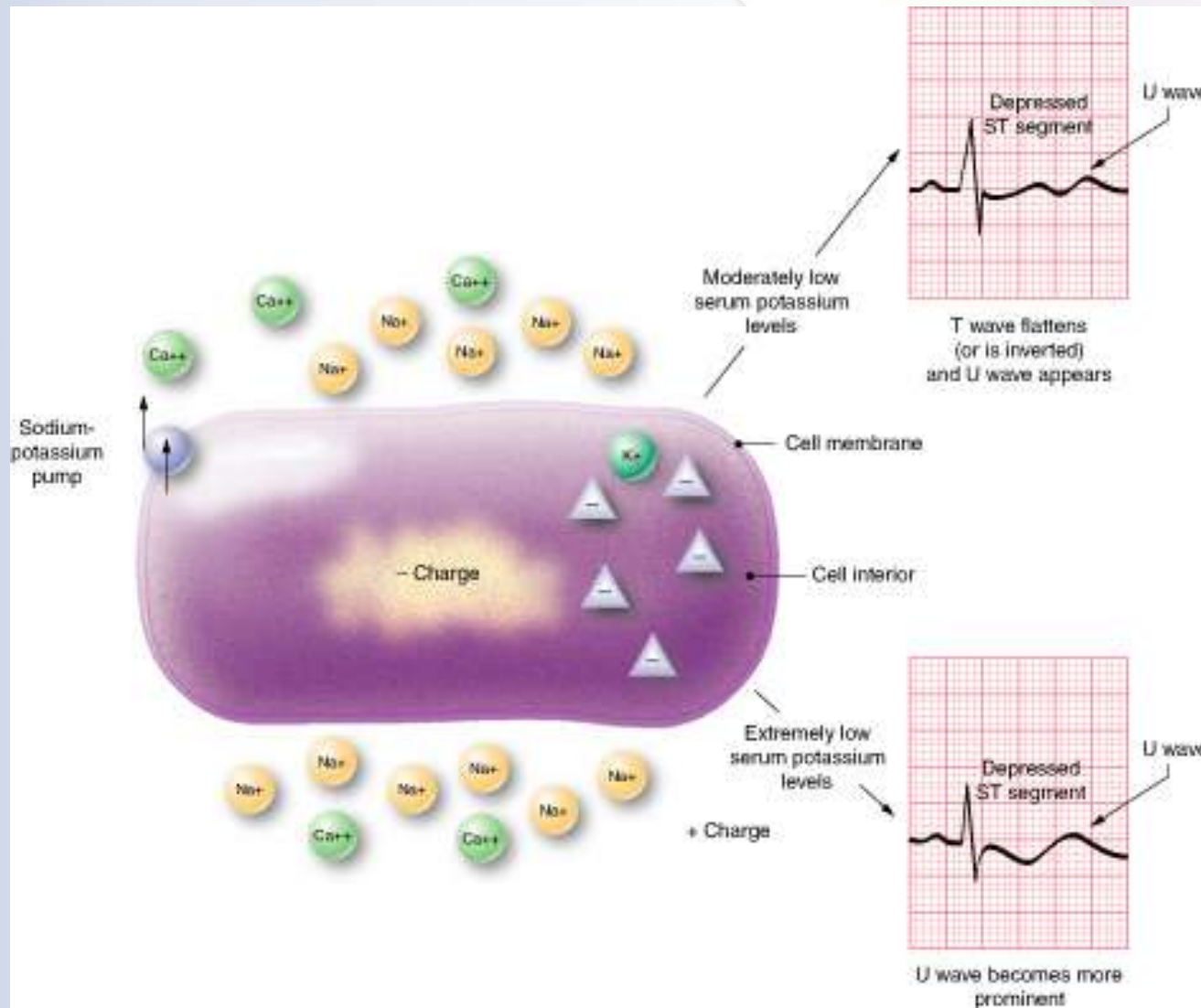
Hyperkalemia



Hypokalemia

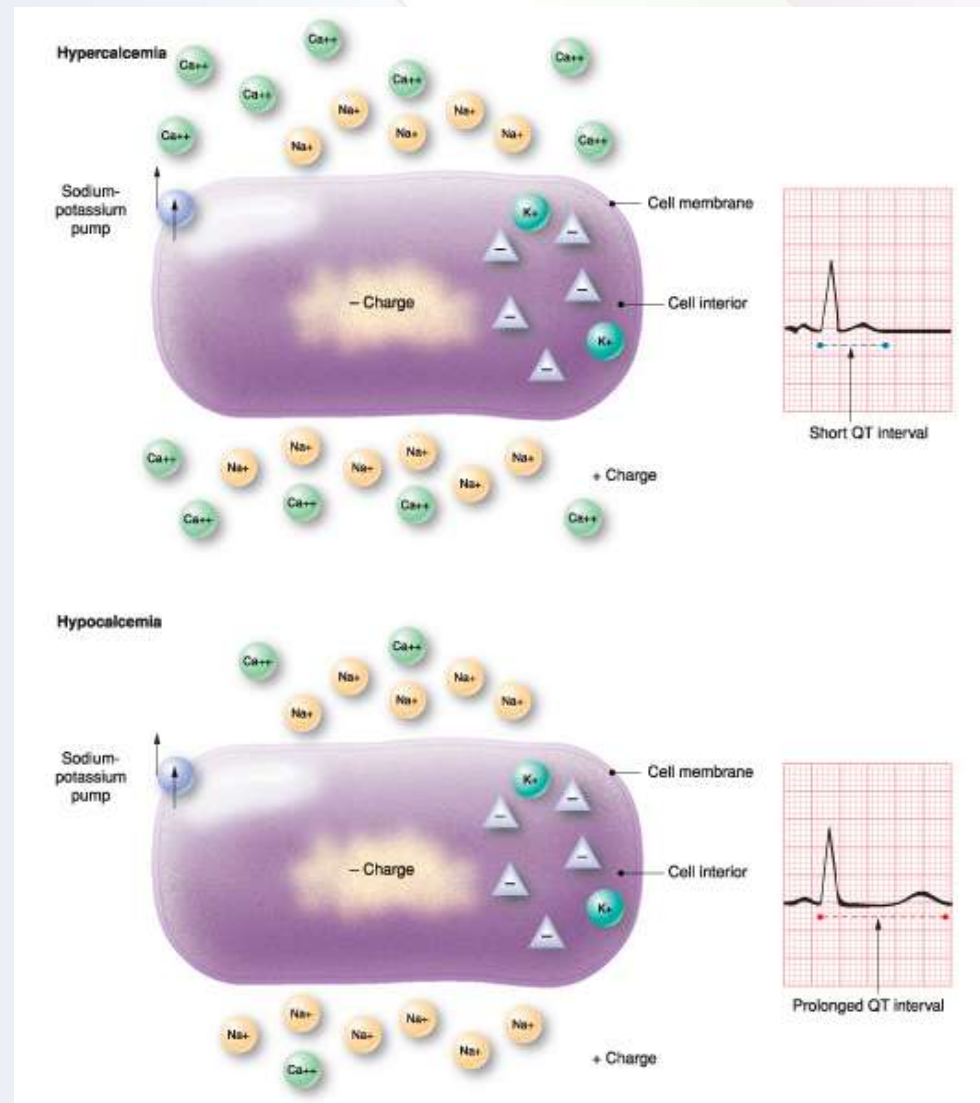
- Key ECG characteristics include:
 - ST segment depression
 - Flattening of the T wave
 - Appearance of U waves

Hypokalemia



Hypocalcemia

- QT interval slightly prolonged



Digoxin

- Slows influx of sodium while allowing a greater influx of calcium
- Increases myocardial contractility and improves the heart's pumping ability
- Slows heart rate and AV conduction
- Useful in the treatment of fast atrial dysrhythmias

Digoxin

- Gradual downward curve of the ST segment



Gradual downward curve of the ST segment

Digoxin

- Very narrow therapeutic margin
- Excreted from the body slowly
- Excessive levels can cause slower heart rates, faster heart rates and PVCs

Practice Makes Perfect

- Determine the type of condition

Identify if pulmonary embolism, low-amplitude waveforms, electrical alternans, pacemaker, electrolyte imbalance, or digitalis use are present.



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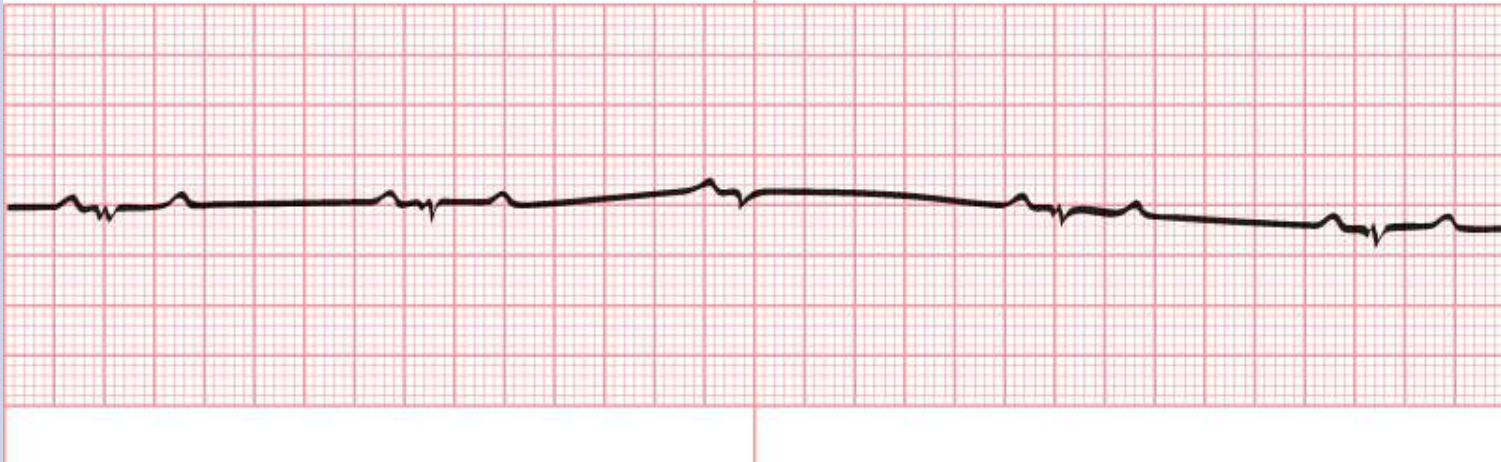
Identify if pulmonary embolism, low-amplitude waveforms, electrical alternans, pacemaker, electrolyte imbalance, or digitalis use are present.



Practice Makes Perfect

- Determine the type of condition

Identify if pulmonary embolism, low-amplitude waveforms, electrical alternans, pacemaker, electrolyte imbalance, or digitalis use are present.



Summary

- Pericarditis is an inflammation of the pericardium.
- In pericarditis the T wave is initially upright and elevated but then during the recovery phase it inverts. The ST segment is elevated and usually flat or concave.
- Substantial pericardial effusion can occur with pericarditis and produce ECG changes which include low voltage QRS complexes in all leads and electrical alternans.

Summary

- A pulmonary embolism is an acute blockage of one of the pulmonary arteries.
- Characteristic ECG changes seen with massive pulmonary embolus include a large S wave in lead I, a deep Q wave in lead III and an inverted T wave in lead III.

Summary

- A pacemaker is an artificial device that produces an impulse and conveys it to the myocardium.
- The firing of a pacemaker produces one or two small spikes on the ECG.
- Increases or decreases in the potassium and calcium serum levels can have a profound effect on the ECG.
- Key characteristics of hyperkalemia include T wave peaking, flattened P waves, 1st-degree AV heart block, widened QRS complexes, deepened S waves and merging of S and T waves.

Summary

- Key ECG characteristics of hypokalemia include ST segment depression, flattening of the T wave and appearance of U waves.
- In hypocalcemia the QT interval is slightly prolonged.
- Digoxin slows the influx of sodium while allowing a greater influx of calcium.
- A characteristic gradual downward curve of the ST segment is seen with digoxin.