

Kaplan USMLE Step 2 prep: What will the ECG show?

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If you're preparing for the United States Medical Licensing Examination® (USMLE®) Step 2 exam, you might want to know which questions are most often missed by test-prep takers. Check out this example from Kaplan Medical, and read an expert explanation of the answer. Also check out all posts in this series.

This month's stumper

A 65-year-old man with a history of peripheral vascular disease develops thromboembolic disease in his left leg accompanied by dry gangrene. Laboratory tests show elevated serum lactic acid, and his arterial pH is 7.27.

An ECG in this patient is most likely to show which of the following?

- A. Peaked T waves.
- B. QT prolongation.
- C. ST depression.
- D. T wave inversion.
- E. U waves.

The correct answer is A.

Kaplan Medical explains why

Peaked T waves are associated with significant hyperkalemia that may lead to arrhythmia. In this patient, the primary mechanism of hyperkalemia is acidosis. As a result of the lowered pH, the extracellular concentration of protons increases, thereby increasing the H⁺/K⁺ antiports on the cell surface, driving protons into the cells and potassium into the extracellular space. ECG changes indicate an increased risk for cardiac arrhythmia and therefore the hyperkalemia should be immediately corrected. Calcium gluconate should be administered to decrease membrane excitability.

Why the other answers are wrong

Choice B: Hypocalcemia causes prolonged QT intervals. The QT interval is the time difference between ventricular depolarization and repolarization. Since the QT interval depends on the heart rate, the corrected QT interval (QTc) is often used. The correction factor incorporates the interval between consecutive P waves.

Choice C: ST depression would be seen in an ischemic event. It is important to compare the new ECG with an old one to determine whether the depression is new. If this is the case, the patient with such ECG changes should at least be placed on aspirin and observed for an ischemic event.

Choice D: T wave inversion is another indication that the patient may be undergoing an ischemic event. Once again, it is important to compare the new ECG with an old one. Furthermore, if the new ECG shows upright T waves, but the old one shows inverted T waves, this denotes “pseudonormalization” and once again indicates an ischemic event.

Choice E: U waves are seen in hypokalemia. If an ECG shows these changes, the risk of an arrhythmia is significant, and the hypokalemia must be corrected immediately. This can usually be achieved by administering oral potassium, but occasionally IV potassium may be required.

For more prep questions on USMLE Steps 1, 2 and 3, view other posts in this series.

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