Kaplan USMLE Step 1: Blood accidentally drawn from femoral vein

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If you’re preparing for the United States Medical Licensing Examination® (USMLE®) Step 1 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 48-year-old man with quadriplegia is admitted to the intensive care unit because of urosepsis. While trying to get a blood sample for arterial blood gas from the femoral artery, it is accidentally drawn from the femoral vein.

When compared to the arterial blood sample, the venous sample will most likely show which of the following differences?
<table>
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<tr>
<th></th>
<th><strong>Po₂</strong></th>
<th><strong>Pco₂</strong></th>
<th><strong>pH</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Decreased</td>
<td>Decreased</td>
<td>Decreased</td>
</tr>
<tr>
<td>B</td>
<td>Decreased</td>
<td>Increased</td>
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<tr>
<td>C</td>
<td>Decreased</td>
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<tr>
<td>D</td>
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<td>E</td>
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<tr>
<td>F</td>
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</tbody>
</table>
The correct answer is B.

Kaplan Medical explains why

This patient had blood drawn from the femoral vein instead of the femoral artery. The arteries carry oxygenated blood to the tissues and the tissues use oxygen, so venous blood has decreased $P_{O_2}$ compared to arterial blood. The tissues produce $CO_2$, which dissolves in water to form carbonic acid, and thus causes the venous blood to be slightly more acidic (decreased pH) than arterial blood.

Why the other answers are wrong

**Choices A, D and E:** These options can be ruled out because venous blood should have a higher $P_{CO_2}$ than arterial blood.

**Choices D, E and F:** These options can be ruled out because venous blood should have a lower $P_{O_2}$ than arterial blood.

**Choices C, E and F:** These options can be ruled out because the pH of venous blood should be less than arterial blood.

This just leaves choice B, which is the answer. Venous blood has a lower $P_{O_2}$, higher $CO_2$ and lower pH than arterial blood.

Tips to remember

Venous blood compared with the arterial blood has:

- Lower $P_{O_2}$.
- Higher $P_{CO_2}$.
Lower pH (because of increased CO₂).

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

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