Pregnant Woman with Markedly Increased Iron Binding Capacity
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CASE DESCRIPTION
A 39-year-old woman who was 15 weeks pregnant was found to be iron deficient, with very high unsaturated iron binding capacity (UIBC) and total iron binding capacity (TIBC) concentrations (Table 1).

QUESTIONS
1. What changes in TIBC are expected in pregnancy?
2. How are UIBC and TIBC measured?
3. What could explain the unusually high TIBC and UIBC results, and what additional testing could be performed to confirm the cause of these results?

The answers are below.

ANSWERS
In pregnancy, an increased nutritional demand for iron is reflected in trimester-specific increases in TIBC (1).

UIBC can be measured indirectly using the formula (UIBC = TIBC – iron). Here, UIBC was measured

Table 1. Serum results on a gold-top tube.

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Result</th>
<th>Nonpregnant reference interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron, μg/dL</td>
<td>23</td>
<td>40–160</td>
</tr>
<tr>
<td>UIBC, μg/dL</td>
<td>&gt;500</td>
<td></td>
</tr>
<tr>
<td>UIBC at 1:50 dilution, μg/dL</td>
<td>17450</td>
<td></td>
</tr>
<tr>
<td>TIBC at 1:50 dilution, μg/dL</td>
<td>17473</td>
<td>175–400</td>
</tr>
<tr>
<td>Iron saturation, %</td>
<td>0.13</td>
<td>15–60</td>
</tr>
<tr>
<td>Ferritin, ng/mL</td>
<td>9</td>
<td>13–150</td>
</tr>
</tbody>
</table>

* The first dilution that yielded a reportable value; all analytes were measured on Roche Cobas.
directly by adding a known amount of iron to the sample and measuring remaining unbound iron (UIBC = iron added − unbound iron).

TIBC can be calculated based on transferrin (TIBC = transferrin × 1.43). Here, TIBC was calculated as TIBC = UIBC + iron.

These results suggested preanalytical error. Calcium <0.2 mg/dL (reference interval 8.5–10.5 mg/dL) and potassium 22 mmol/L (reference interval 3.5–5.0 mmol/L) confirmed this hypothesis.

The blood was incorrectly collected into a K-EDTA tube and transferred to a gold-top tube. EDTA complexed the iron in the sample and the added iron for the UIBC test, resulting in a falsely low iron and falsely increased UIBC and TIBC (2, 3).

Author Contributions: All authors confirmed they have contributed to the intellectual content of this paper and have met the following 3 requirements: (a) significant contributions to the conception and design, acquisition of data, or analysis and interpretation of data; (b) drafting or revising the article for intellectual content; and (c) final approval of the published article.

Authors’ Disclosures or Potential Conflicts of Interest: No authors declared any potential conflicts of interest.

References