e-Learn LAB — Immunology

Based on IQMH Centre for Proficiency Testing Survey IMGY-1709

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Focus of this Presentation

This is an immunology case study.
You will be presented with clinical information and images and will be prompted with self-learning questions.
Images, case studies and discussions provided by the members of the IQMH Endocrinology and Immunology Scientific Committee, and the IQMH Consultant Technologist.
A specimen arrives in your laboratory and is immediately analyzed for routine chemistry including total protein, albumin and immunoglobulins.

Two days later gel-based serum protein electrophoresis is performed. There is a discrepancy between the albumin and immunoglobulins performed on the chemistry analyzer and the albumin and total gamma globulin estimated by protein electrophoresis.
## Laboratory Data – Routine Chemistry

<table>
<thead>
<tr>
<th></th>
<th>Result</th>
<th>Reference Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albumin</td>
<td>42</td>
<td>34–46 g/L</td>
</tr>
<tr>
<td>Protein Total</td>
<td>115</td>
<td>64–82 g/L</td>
</tr>
<tr>
<td>IgG</td>
<td>2</td>
<td>9–14 g/L</td>
</tr>
<tr>
<td>IgA</td>
<td>&lt;1</td>
<td>1–3 g/L</td>
</tr>
<tr>
<td>IgM</td>
<td>62</td>
<td>2–6 g/L</td>
</tr>
</tbody>
</table>
# Lab Data – Protein Electrophoresis

<table>
<thead>
<tr>
<th></th>
<th>Result</th>
<th>Reference Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albumin SPE</td>
<td>59</td>
<td>43–56 g/L</td>
</tr>
<tr>
<td>Alpha 1 Globulins</td>
<td>5</td>
<td>1–3 g/L</td>
</tr>
<tr>
<td>Alpha 2 Globulins</td>
<td>14</td>
<td>6–11 g/L</td>
</tr>
<tr>
<td>Beta Globulins</td>
<td>11</td>
<td>5–10 g/L</td>
</tr>
<tr>
<td>Gamma Globulins Total</td>
<td>8</td>
<td>6–12 g/L</td>
</tr>
<tr>
<td>Abnormal Band</td>
<td>1.2</td>
<td>≤0.0</td>
</tr>
</tbody>
</table>
What could be causing the discrepancy in albumin concentration? Click on the most likely answer.

a) This is normal, SPE and chemistry analyzers produce different results
b) The patient has a monoclonal protein and it is interfering with albumin measurement
c) The patient has a cryoglobulin and it precipitated during 48h of 4°C storage
The most likely answer is the patient has a cryoglobulin and it precipitated during 48 hours of 4°C storage.

Continue e-Learn Module
That is not correct

Try Again!
Discussion

• It is not unexpected to see different albumin results between chemistry analyzers and protein electrophoresis due to the different measurement techniques.

• In this example, albumin is within the reference interval when measured by a general chemistry analyzer and above the reference interval when quantitated by electrophoresis, suggesting a measurement error.
Discussion

• Monoclonal proteins, most commonly IgM monoclonal proteins, can interfere with measurement of various analytes, particularly those using turbidimetry and nephelometry; however, albumin measurement is less susceptible to interference.
• Review of the patient’s results shows a highly elevated IgM value that would be expected to either produce a large monoclonal protein or highly elevated polyclonal gamma globulins.

• However, review of the protein electrophoresis results shows elevation of all protein fractions with a small monoclonal protein.

• Taken together these results are highly suggestive of the presence of a cryoglobulin.
Discussion

• Protein electrophoresis systems use the total protein measured by another method (commonly a dye-binding assay on a general chemistry analyzer) to assign protein concentration to fractions identified by densitometry scanning of a gel or direct measurement by capillary electrophoresis.

• Electrophoresis of a specimen that does not include the cryoglobulin protein and fraction calculation using the total protein that does include the cryoglobulin will generate falsely elevated protein values for all protein fractions and a falsely low monoclonal protein concentration.
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Julie Coffey, Director of Education at jcoffey@iqmh.org to let her know what you thought of the learning material.
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