Blood smear from a dog

1EG Welles, 2A Durrance, 1M Sandey
1Departments of Pathobiology and
2Clinical Sciences, Auburn University
Signalment and history

- 8 yr. old, male, Siberian husky
- Left eye - corneal ulcer and anterior uveitis for 2 months
- Tx: oral and topical antibiotic and antifungal medications
- Progressively more lethargic, developed diarrhea
- Over the past 2 weeks: considerably worse
  - Anorexia, significant diarrhea, melena, unilateral epistaxis
- Physical exam at AUCVM
  - Dull, lethargic, normal TPR, 5-7% dehydrated, generalized muscle atrophy, cachexia, anterior uveitis left eye, epistaxis left nostril
## Pertinent CBC findings

<table>
<thead>
<tr>
<th></th>
<th>Patient’s values</th>
<th>Reference interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hct (%)</td>
<td>9.4</td>
<td>37-55</td>
</tr>
<tr>
<td>MCV (fL)</td>
<td>57.0</td>
<td>60-77</td>
</tr>
<tr>
<td>MCHC (mg/dL)</td>
<td>29.5</td>
<td>32-36</td>
</tr>
<tr>
<td>Absolute retics (/uL)</td>
<td>19,200</td>
<td>0-60,000</td>
</tr>
<tr>
<td>Fe (mg/dL)</td>
<td>31</td>
<td>110-220</td>
</tr>
<tr>
<td>Platelets (/uL)</td>
<td>89,000</td>
<td>150,000-354,000</td>
</tr>
<tr>
<td>WBC (/uL)</td>
<td>4,700</td>
<td>6,000-17,000</td>
</tr>
<tr>
<td>Neutrophils (/uL)</td>
<td>4,948</td>
<td>3,000-11,400</td>
</tr>
<tr>
<td>Lymphocytes (/uL)</td>
<td>188</td>
<td>1,000-4,000</td>
</tr>
<tr>
<td>Monocytes (/uL)</td>
<td>47</td>
<td>150-1,350</td>
</tr>
<tr>
<td>Others (/uL)</td>
<td>517</td>
<td>0</td>
</tr>
</tbody>
</table>
## Pertinent chemistry and hemostasis findings

<table>
<thead>
<tr>
<th></th>
<th>Patient’s values</th>
<th>Reference interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total protein (g/dL)</td>
<td>15.3</td>
<td>5.1-7.3</td>
</tr>
<tr>
<td>Albumin (g/dL)</td>
<td>0.8</td>
<td>2.6-3.5</td>
</tr>
<tr>
<td>Globulin (g/dL)</td>
<td>14.5</td>
<td>2.6-5.0</td>
</tr>
<tr>
<td>BUN (mg/dL)</td>
<td>55.1</td>
<td>10-25</td>
</tr>
<tr>
<td>Creatinine (mg/dL)</td>
<td>2.3</td>
<td>0-1.3</td>
</tr>
<tr>
<td>HCO₃ (mmol/L)</td>
<td>8.9</td>
<td>13.9-30</td>
</tr>
<tr>
<td>Na (mmol/L)</td>
<td>131</td>
<td>146-160</td>
</tr>
<tr>
<td>Cl (mmol/L)</td>
<td>107</td>
<td>108-125</td>
</tr>
<tr>
<td>Prothrombin time (secs)</td>
<td>10.8</td>
<td>7.4-9.1</td>
</tr>
<tr>
<td>APTT (secs)</td>
<td>24.3</td>
<td>11.6-14</td>
</tr>
<tr>
<td>Antithrombin (%)</td>
<td>41</td>
<td>&gt;150</td>
</tr>
</tbody>
</table>

SID
Na-Cl = 24
<32 → acidosis
Final diagnosis and outcome

• Multiple myeloma – dx = at least 2 criteria
  Hyperglobulinemia, monoclonal gammopathy
  Serum or urine
  Bence Jones proteinuria (Ig light chains)
  Plasma cells in bone marrow (>5%)
  Plasma cells in other organs
  Lytic bone lesions

• “Ideal candidates” for treatment - median survival time 578 days

• This patient very debilitated → humane euthanasia
Bone marrow
No urinalysis was done, but evidence of marked accumulation of protein in Bowman’s space and within tubules.
Hyperviscosity syndrome

Laboratory abnormalities
- Hyperproteinemia
- Hyperglobulinemia
  - IgM, IgA, IgG
- Azotemia
- Hemostasis abnormalities

Clinical signs
- Neurologic signs – dull, depressed
- Ophthalmic signs – retinal hemorrhage and edema
- Bleeding diathesis – epistaxis, melena
Hyperviscosity syndrome

- Decreased RBC deformability
  - rouleaux/agglutination
  - "sludging" of blood/vascular stasis
  - or ineffective O₂ & nutrient delivery to vascular endothelium & tissues

- Compromised vessel walls
  - hemorrhage/loss of plasma

- Focal/local area disorders
  - brain, retina, heart, kidneys, GI tract

Hyperglobulinemia

- M proteins interfere with platelet aggregation,
  - fibrin formation and polymerization

- Absorption of some minor clotting factors

- Thrombocytopenia – marrow involvement

- Decreased integrity of vascular walls

- Bleeding disorders
Typical myeloma patient:
anemia of chronic disease

This patient:
Fe-deficiency anemia
Questions ?