<table>
<thead>
<tr>
<th>Condition</th>
<th>Cytology</th>
<th>ACT</th>
<th>PTT</th>
<th>BMBT</th>
<th>Platelets</th>
<th>MPV/PDW</th>
<th>FDPs/d-Dimers</th>
<th>Exam</th>
<th>Bone Marrow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Von Willebrand's Disease</td>
<td>Normal</td>
<td>Increased only if very severe</td>
<td>Increased only if severe</td>
<td>Normal</td>
<td>Prolonged</td>
<td>May have mild thrombocytopenia if hypothyroid</td>
<td>Normal</td>
<td>Normal</td>
<td>Any form of bleeding if severe</td>
</tr>
<tr>
<td>Hemophilia A (factor 8) and B (factor 9)</td>
<td>Normal</td>
<td>Prolonged when &lt;5% factor</td>
<td>Prolonged when &lt;30% factor</td>
<td>Normal</td>
<td>Normal, then Re-bleeding</td>
<td>Normal</td>
<td>Normal</td>
<td>Normal</td>
<td>Hematomas, body cavity bleeds, re-bleeding</td>
</tr>
<tr>
<td>Hagemann (factor 12) and Factor 11 Disease</td>
<td>Normal</td>
<td>Prolonged when &lt;5% factor</td>
<td>Prolonged when &lt;30% factor</td>
<td>Normal</td>
<td>Normal</td>
<td>Normal</td>
<td>Normal</td>
<td>Normal</td>
<td>Bleeding absent with 12 and mild with 11</td>
</tr>
<tr>
<td>Factor 7 Deficiency</td>
<td>Normal</td>
<td>Normal</td>
<td>Normal</td>
<td>Prolonged when &lt;30% factor</td>
<td>Usually Normal</td>
<td>Normal</td>
<td>Normal</td>
<td>Normal</td>
<td>Hematomas, body cavity bleeds, re-bleeding</td>
</tr>
<tr>
<td>Factor X (10) Deficiency</td>
<td>Normal</td>
<td>Prolonged when &lt;5% factor</td>
<td>Prolonged when &lt;30% factor</td>
<td>Normal</td>
<td>Normal, then Re-bleeding</td>
<td>Normal</td>
<td>Normal</td>
<td>Normal</td>
<td>Hematomas, body cavity bleeds, re-bleeding</td>
</tr>
<tr>
<td>Liver Failure</td>
<td>acanthocytes</td>
<td>Prolonged if severe</td>
<td>Prolonged</td>
<td>Normal, then Re-bleeding</td>
<td>Normal</td>
<td>Normal</td>
<td>Increased if ATIII very low</td>
<td>Hematomas, body cavity bleeds, re-bleeding</td>
<td>Not indicated</td>
</tr>
<tr>
<td>Anticoagulant rodenticide</td>
<td>Normal</td>
<td>Prolonged if severe</td>
<td>Prolonged</td>
<td>Prolonged</td>
<td>Normal, then Re-bleeding</td>
<td>Normal</td>
<td>Normal</td>
<td>Increased if chronic bleeding</td>
<td>Any form of bleeding if severe</td>
</tr>
<tr>
<td>DIC</td>
<td>Schistocytes</td>
<td>Prolonged</td>
<td>Prolonged</td>
<td>Prolonged</td>
<td>&lt;150,000/ul</td>
<td>Increased if chronic bleeding</td>
<td>Increased</td>
<td>Any form of bleeding</td>
<td>Normal to increased megakaryocytes</td>
</tr>
<tr>
<td>Ehrlichia</td>
<td>May see E Platys in platelets</td>
<td>Normal to slightly prolonged (&lt;10 sec)</td>
<td>Normal</td>
<td>Normal</td>
<td>Usually prolonged</td>
<td>&lt;150,000/ul</td>
<td>Variable</td>
<td>Normal</td>
<td>Possible petechiae, ecchymoses, epistaxis due to vasculitis</td>
</tr>
<tr>
<td>Immune mediated thrombocytopenia</td>
<td>Giant platelets</td>
<td>Normal to slightly prolonged (&lt;10 sec)</td>
<td>Normal</td>
<td>Normal</td>
<td>May be prolonged if platelets &lt;20,000/ul</td>
<td>Low, often &lt; 20,000/ul</td>
<td>MPV Low</td>
<td>Normal</td>
<td>Bleeding is rare until end stage, then severe</td>
</tr>
<tr>
<td>Tpenia due to bone marrow dz</td>
<td>few platelets</td>
<td>Normal to slightly prolonged (&lt;10 sec)</td>
<td>Normal</td>
<td>Normal</td>
<td>May be prolonged if platelets &lt;20,000/ul</td>
<td>Low</td>
<td>MPV normal to high</td>
<td>Normal</td>
<td>Petechiae, epistaxis, ecchymoses, GI blood</td>
</tr>
<tr>
<td>thrombocytopathia</td>
<td>Otter hounds giant bizarre platelets</td>
<td>Normal to slightly prolonged (&lt;10 sec)</td>
<td>Normal</td>
<td>Normal</td>
<td>Prolonged</td>
<td>Usually normal, Otter hounds low</td>
<td>MPV normal to high</td>
<td>Normal</td>
<td>Petechiae, epistaxis, ecchymoses, GI blood</td>
</tr>
<tr>
<td>Vasculitis</td>
<td>Giant platelets</td>
<td>Normal</td>
<td>Normal</td>
<td>Normal</td>
<td>Prolonged</td>
<td>Low</td>
<td>MPV normal to high</td>
<td>Normal</td>
<td>Petechiae, epistaxis, ecchymoses, GI blood</td>
</tr>
</tbody>
</table>
ACT = activated clotting time (less sensitive substitute for PTT)
BMBT = buccal mucosal bleeding time (assesses platelet and capillary function)
DIC = disseminated intravascular coagulopathy
FPDs = fibrin degradation products; aka FSP = fibrin split products (screens for fibrinolytic activity)
MPV = mean platelet volume
PDW = platelet distribution width
PTT = activated partial thromboplastin time (assesses intrinsic and common coagulation pathways)
PT = prothrombin time (assesses extrinsic and common coagulation pathways)
Thrombocytopathia = platelet function defect (eg, von Willebrand’s disease, paraneoplastic disease especially lymphoma, aspirin, congenital in Basset hounds, Otter hounds, Spitz, Great Pyrenees, and cocker spaniels)

**Bleeding Times**
--If you suspect a severe hemostatic problem such as rat poisoning or severe DIC, don’t do a BMBT (bleeding may never stop) and don’t take blood from a jugular vein (hematoma can result in suffocation)

**Platelets**
--Platelets can be low any time there is active bleeding that is severe
--Platelet clumping at the feathered edge of the blood smear indicates that another sample needs to be taken, to get an accurate platelet count
--King Charles Cavalier Spaniels often have very large platelets, and low platelet counts, but this is rarely clinically significant, and all clotting tests are normal
  - Platelet mass = platelet count x MPV, usually normal
--Large, bizarre platelets can be seen in Otter hounds with thrombasthenic thrombopathis and in cats with myeloproliferative disease
--Lipid droplets can falsely increase platelet count in lipemic animals
  - RBC fragments can falsely increase platelet count in dogs with IMHA (immune mediated hemolytic anemia)
  - Sharp spikes on the platelet histogram and low MPV suggest this error
--small RBC due to iron deficiency can be counted as platelets, MPV will be low
--dogs and cats with normal platelet counts will have at least 8-10 platelets per high power (100x) field
--antiplatelet and antimegakaryocytic antibodies can diagnose IMT (immune mediated thrombocytopenia) directly
--Platelet count must be less than 50,000/ul to cause spontaneous bleeding due to thrombocytopenia alone

**Coagulation Factors**
--intrinsic pathway – factors 8, 9, 11, 12, PF3
--extrinsic pathway – factor 7
--common pathway – 2, 5, 10, PF3, prothrombin, fibrinogen
--vitamin K dependent factors – 2, 7, 9, 10 (7 is most sensitive)
--Diagnose von Willebrand’s by sending vW factor off to Cornell (transfusion will falsely increase), <30% at risk for bleeding
--PT or PTT shorter than usual are not clinically significant
--PT less than 3 seconds above normal and PTT less than 5 seconds above normal may not be clinically significant
--Hemophilia A and B are sex linked (more common in males)

**Vasculitis**
--uremia, severe infection, rickettsial disease and immune mediated disease are the most common causes of vasculitis

**FDPs and d-Dimers**
--FDPs can be high any time there is chronic clot formation and breakdown – can happen with chronic bleeding, or diseases that cause hypercoagulable states (liver failure, protein losing enteropathy, Cushing’s Disease, Immune mediated hemolytic anemia, etc.)
--d-Dimers are more specific for DIC than FDPs