General Principles of Hemostasis
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Hemostasis is a balancing act!
- pro-clotting plugs up holes in blood vessels
- anti-clotting keeps clotting under control

How to make a clot

Constrict vessel + Form platelet plug + Seal plug with fibrin = clot

Coagulation Cascade

Intrinsic
- Xa + IXa + FVIIIa + FIX
- Final common pathway
- V + Xa + IIa + FVIIIa = thrombin
- prothrombin + thrombin = fibrinogen + fibrin

Extrinsic
- Xa + IXa + FVIIIa + FIX
- Tissue factor (TF) + VIIa = thrombin
- prothrombin + thrombin = fibrinogen + fibrin

Exposed TF
- VIIIa + IXa + FIX = thrombin
- prothrombin + thrombin = fibrinogen + fibrin
Where does tissue factor come from?

- “Hidden” cells exposed during injury
- Microparticles floating in blood
- Endothelial cells and monocytes (during inflammation)
How to keep clotting under control

\[
\text{inhibit the cascade}
\]

lyse the clot
Tissue plasminogen activator (t-PA)

plasminogen → plasmin → clot → fibrin degradation products (FDPs)

Hemostasis Outline

• The big picture
• Laboratory tests

Platelet Lab Tests

Count
• Done by particle counter
• 150 – 450 x 10⁹/L

Morphology
• Size
• Granulation

Platelets

Bleeding Time

Why?
• Evaluate platelet response to vascular injury
• Some platelet disorders have a long bleeding time

How?
• Inflate blood pressure cuff
• Make incision
• Time how long it takes to stop bleeding

Careful!
• Lots of things affect the test!
• Some consider the test unreliable.
Coagulation Lab Tests

- Draw blood into citrate tube
- Spin tube, decant plasma
- Add reagents to plasma
- Watch for formation of fibrin

Prothrombin Time

- Plasma + thromboplastin
- Measures extrinsic pathway
- INR = a “corrected” PT

Partial Thromboplastin Time

- Plasma + phospholipid
- Measures intrinsic pathway

Fibrin Degradation Product Assay

- Measures FDPs
- VERY, VERY sensitive test
- Best used to rule OUT a thrombus!