The Clotting System

The Big Cover-Up
The Platelets
Platelets

- Last only 4 to 7 days in circulation
- Originate from the bone marrow from megakaryocytes
- Are responsible for bleeding from the skin and mucosal surfaces
- **Deficiency:** leads to petechiae, purpura and ecchymoses and mucosal bleeding
Thrombocytopenia

• Mcc: (1) viral infection (2) drugs
• Idiopathic Thrombocytopenic Purpura
  – 90% resolve without problems in children
  – 90% remain chronic in adults
  – Can precede SLE in adolescent females
  – Tx: Steroids. Do NOT transfuse platelets into a destructive process
ITP

• Platelet counts you should know
  – **Normal**: 150,000 to 350,000
  – When to begin **steroids**: <40,000
  – Risk of **spontaneous bleeding**: <20,000
    • Plasmapheresis or IV gammaglobulins
  – Risk of spontaneous **intracranial bleeding** begins <10,000
    • **Splenectomy** will raise platelet count over 100,000

One unit of platelets
Thrombocytopenia

• Viruses:
  – Parvovirus B-19
  – Hepatitis C
  – Hepatitis E

• Drugs:
  – AZT
  – Vinblastine
  – Chloramphenicol
  – Benzene
Clotting Factors
Clotting Factors

• Stop bleeding in cavities

• Intrinsic clotting system
• Extrinsic clotting system
Large Cavities

- Intracranial
- Mediastinum
- Pleural
- Pericardium
- Abdominal
- Pelvis
- Retroperitoneum
- Thighs
Glycoprotein IIb:IIIA

- **Bernard-Soulier syndrome**: defective glycoprotein IB
  - Big platelets
- **Glanzman’s Thrombosthenia**: congenital absence of glycoproteins
ADP-Receptor Blockers

- Ticlopidine
- Dipyridamole
- Clopidogrel
Phosphodiesterase Inhibitor

- Cilastozole
Inhibiting Thromboxane

- Aspirin
- NSAIDs
NSAIDs

- Ibuprofen
- Indomethacin
- Phenylbutazone
- Baclofen
- Cyclobenzaprine
- Ketorelax
Vitamin K

- A cofactor for the enzyme involved in gamma-carboxylation
- The extra negative charges helps anchor them to the calcium on the surface of the platelets
- Factors X, IX, VII, II, protein C & protein S
Warfarin

- Blocks vitamin K
- Protein C disappears first (half life is 6hrs)
- Factor VII is first clotting factor to disappear (half life is 2 days)
- Follow PT (INR 2 to 3 x normal)
- To reverse PT: give vitamin K
- If patient acutely bleeding: give FFP
Von Willebrand’s Disease

- Autosomal dominant
- VWF anchors factor VIII to platelets and anchors the platelet to the glycoproteins
- Elevated PTT and bleeding time
- Bleeding into cavities and from skin and mucosal surfaces
Von Willebrand’s Disease: Treatment

• Mild bleeding: DDAVP
• Moderate bleeding: cryoprecipitate
• Severe bleeding: FFP
Hemophilia A

- X-linked recessive
- Bleeding into cavities
- Check PTT
- This is a factor ACTIVITY deficiency
Hemophilia A: Treatment

• Mild bleeding: DDAVP
• Moderate bleeding: cryoprecipitate
• Severe bleeding: factor VIII concentrate
Hemophilia B

- Factor IX deficiency
- X-linked recessive
- Low factor IX levels
- Elevated PTT
- Bleeding into cavities

- Treatment: FFP for all levels of bleeding
Fibrin

- Is laid down after about 2 hours
- Forms white lines (of Zahn)
- Dysfibrinogenemias: initial clot is made; then, it falls apart after 2 hours
- Fibrin stabilization factor tightens the fibrin after it is laid down
Fibrin Stabilization Factor Deficiency

- Presentation: recurrent umbilical stump bleeding
- Treatment: FFP
What if you don’t need the clot?
Convert Plasminogen to Plasmin

- tPA
- Streptokinase
- Urokinase

- Antidote: aminocaproic acid
The End... of The Bleeding