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 Thrombesthenia**: congenital absence of glycoproteins

ADP-Receptor Blockers

- Ticlopidine
- Dipyridamole
- Clopidogrel

Phosphodiesterase Inhibitor

- **Cilastozole**

Inhibiting Thromboxane

- Aspirin
- NSAIDs

NSAIDs

- Ibuprofen
- Indomethacin
- Phenylbutazone
- Baclofen
- Cyclobenzaprine
- Ketorelac

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