# Coagulation Modifier Agents
## NAPNES Guidelines

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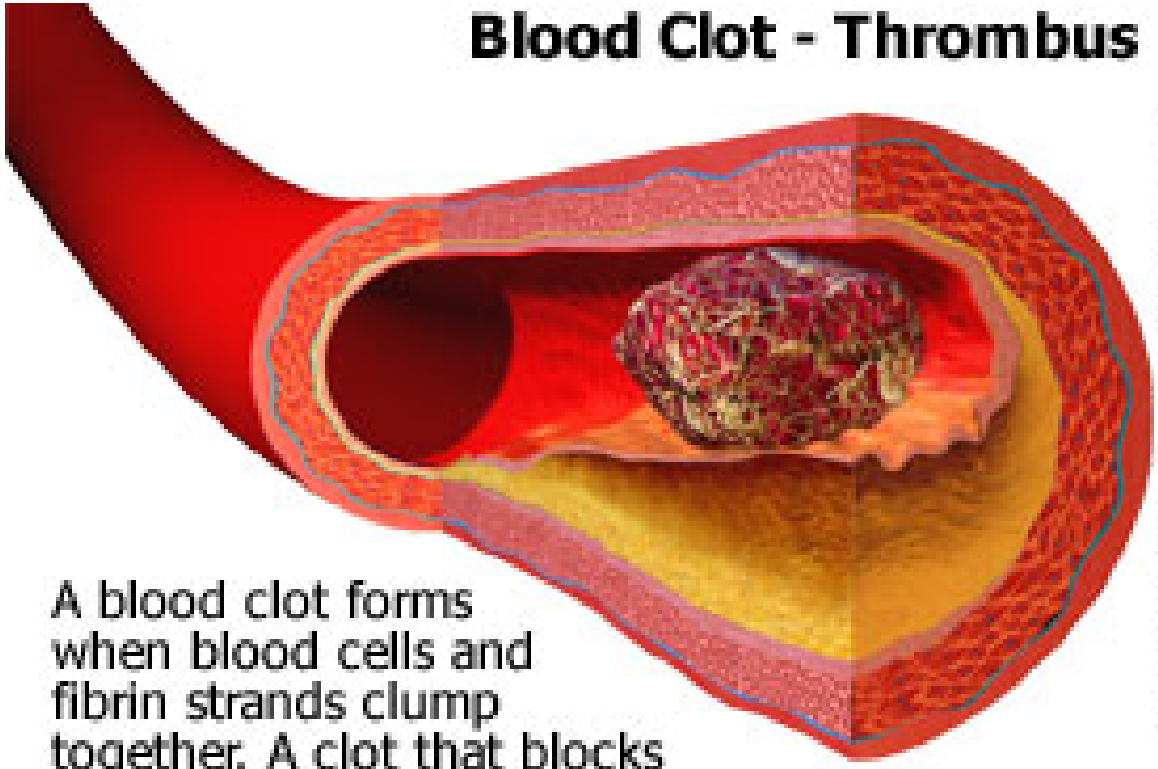

# Terms

- Hemostasis
  - Process that halts bleeding after injury
  - *Coagulation Cascade* (next slide)
    - Complex interaction of substances
    - Each substance (factor) activates another
- Anticoagulants
  - Inhibit the action or formation of clotting factors
    - Prevent clots from forming

# Coagulation System

- “Cascade”
- Each activated factor serves as a catalyst that amplifies the next reaction
- Result is fibrin
  - Clot-forming substance
- Intrinsic pathway and extrinsic pathway

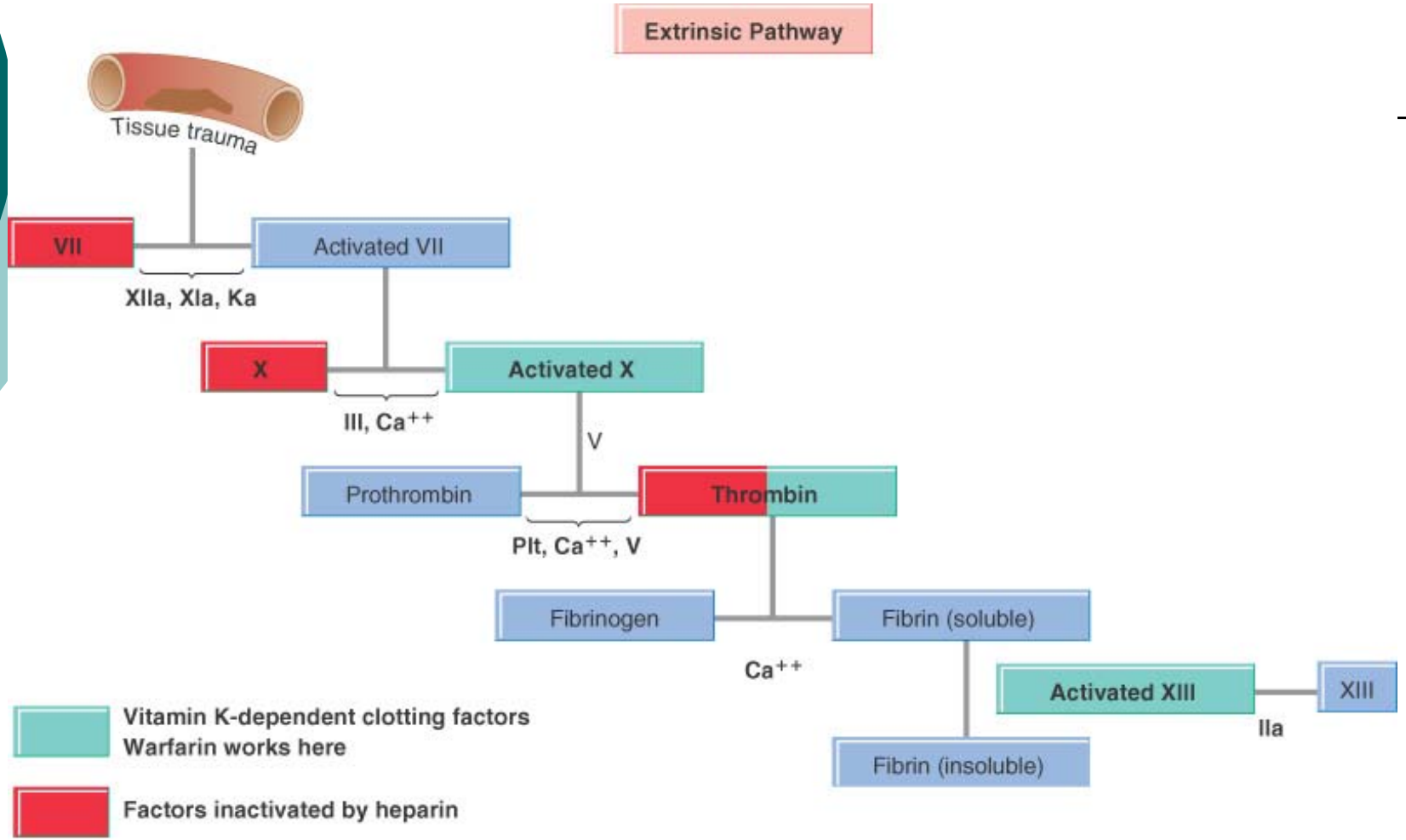




Figure 27-1 Coagulation pathway and factors: extrinsic pathway. *Plt,* Platelets.

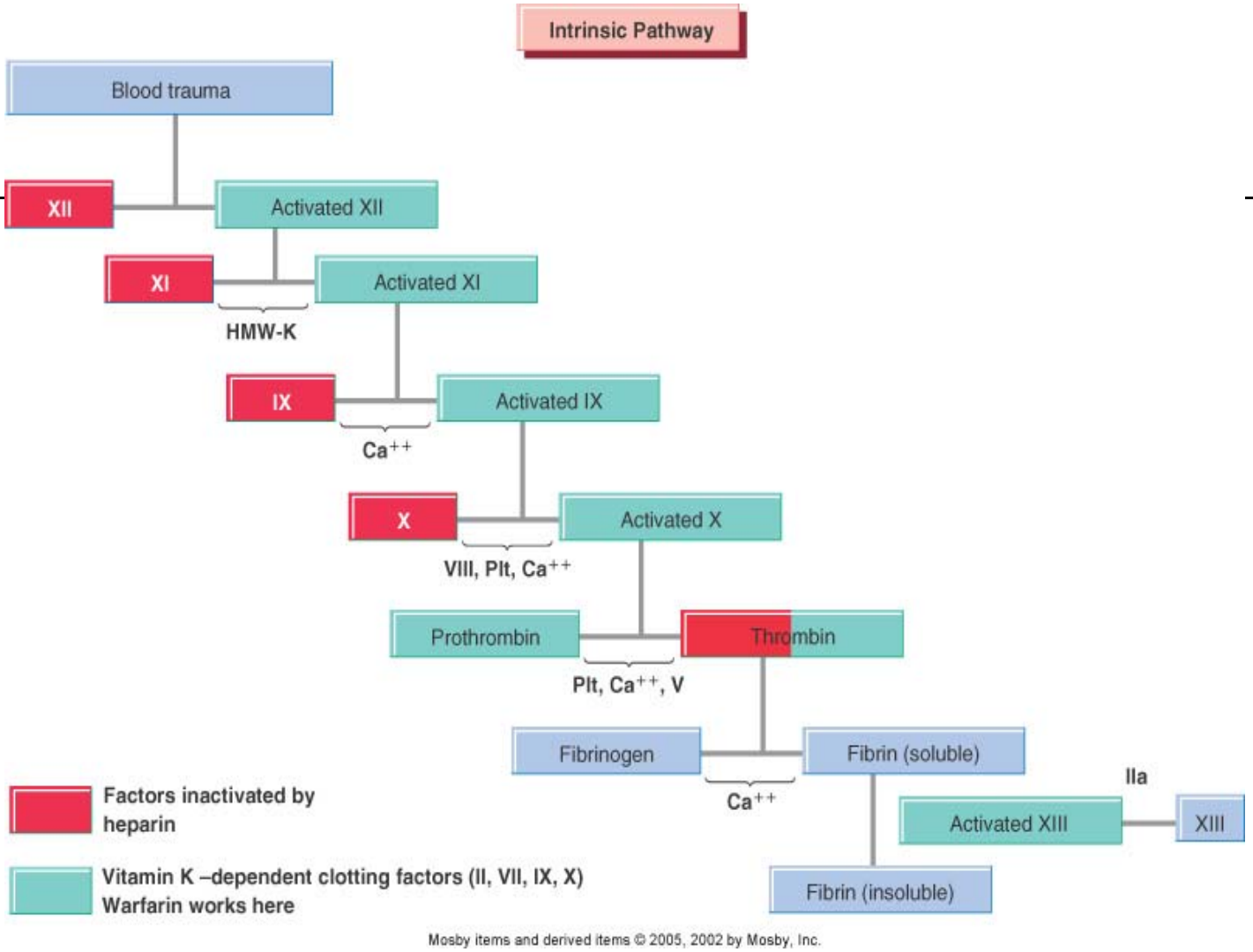


Figure 27-2 Coagulation pathway and factors: intrinsic pathway. *HMW-K,* High-molecular weight kininogen; *Plt,* platelets.

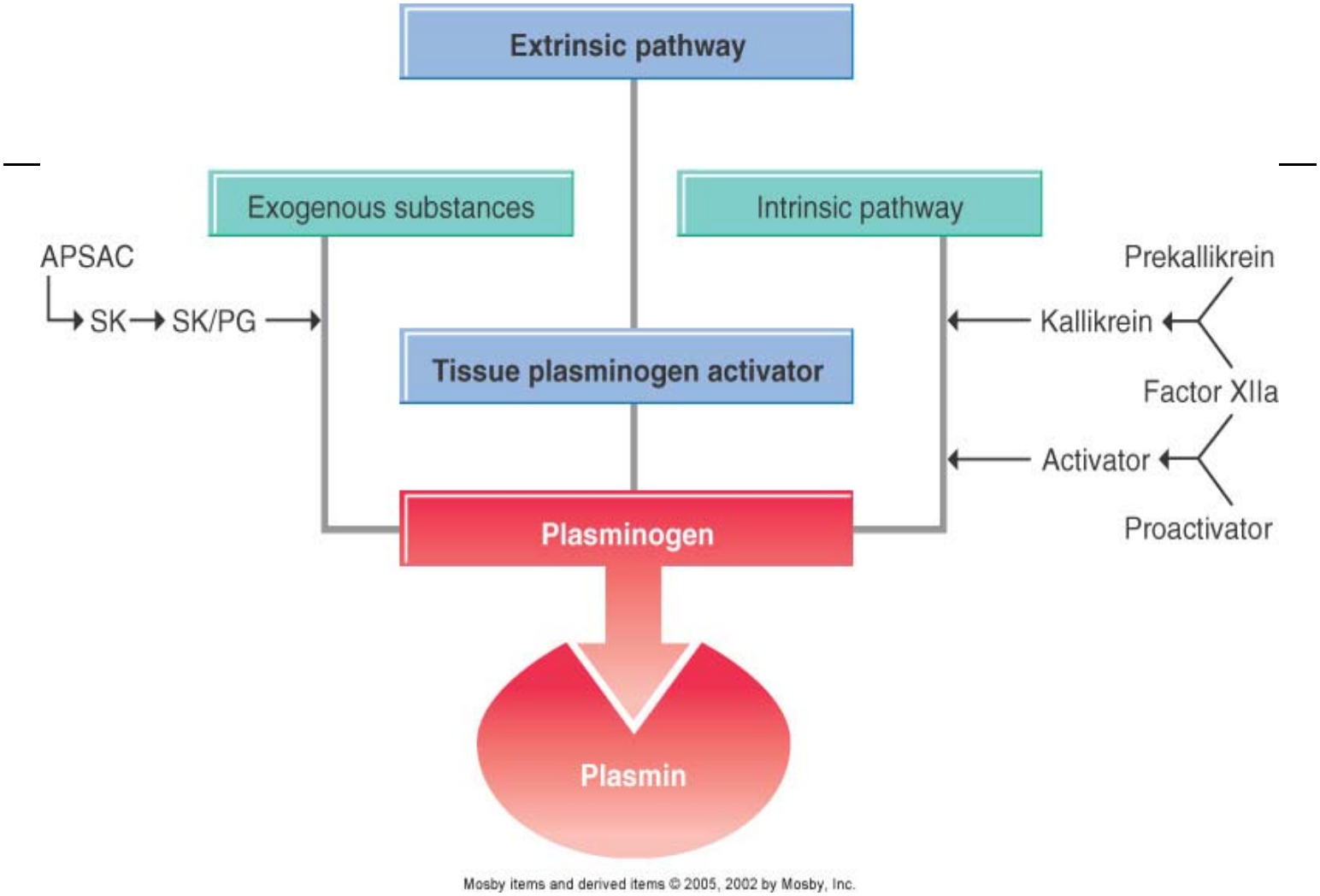


Figure 27-3 The fibrinolytic system. *APSAC,* Anisoylated plasminogen streptokinase activator complex; *PG,* plasminogen; *SK,* streptokinase.

# Terms (cont.)

- Antiplatelet drugs
  - Prevent platelet plugs from forming
    - Inhibiting platelet aggregation
- Hemorrheologic drugs
  - Alter platelet function without preventing them from working
- Thrombolytic agents
  - Lyse (breakdown) preformed clots
- Hemostatic agents
  - Promote blood coagulation

# Anticoagulants

- Examples
  - Anisindione (Miradone)
  - Enoxaparin (Lovenox)
  - Heparin
    - Most common IV form
  - warfarin (Coumadin)
    - Most common oral form

**STANDING PHYSICIAN'S ORDERS**

**Form # PHY 182**

| DATE | TIME | PHARMACY HEPARIN PROTOCOL |
|---|---|---|
| | | 1. Baseline aPTT, PT, and CBC NOW if not already available or ordered. |
| | | 2. HEPARIN Bolus _____ units IV push. |
| | | 3. Start standard Heparin drip(25,000u/500 ml) at _____ units/hr. |
| | | 4. Stat aPTT in 6 hours. |
| | | 5. Adjust heparin per aPTT results as follows: |
| | | – if aPTT <40, give _____ bolus, increase rate by _____ units/hr, stat aPTT in 6 hours. |
| | | – if aPTT 40-60, give _____ bolus, increase rate by _____ units/hr, stat aPTT in 6 hours. |
| | | – if aPTT 61-102, continue same rate; aPTT in AM. |
| | | – if aPTT 103-120, decrease rate by _____ units/hr, stat aPTT in 6 hours. |
| | | – if aPTT > 120, stop heparin for 1 hour, decrease rate by _____ units/hr, stat aPTT in 6 hours after heparin restarted. |
| | | 6. Write all rate adjustments as a Physician's Order per Protocol. |
| | | *i.e. aPTT = _____ give _____ unit bolus, inc. rate by _____ units/hour from _____ units/hour to _____ units/hour, stat aPTT in 6 hours.* |
| | | *Per Pharmacy Protocol.* |
| | | *RN signature/ordering physician.* |
| | | 7. aPTT daily WHILE ON HEPARIN. |
| | | 8. CBC every 3 days WHILE ON HEPARIN. |
| | | 9. Call **821-6849** with any questions. |
| | | |
| | | **Doctor:** Please start coumadin therapy, if indicated, as soon as possible. |
| | | |
| | | Please note, all heparin infusions, including heparin protocol patients, require daily renewal. |

# Anticoagulants

- Mechanism of action
  - Vary depending on agent
  - Work in the clotting cascade
    - At different points
  - Heparin
    - Turns off the coagulation pathway
    - Prevents clots from forming
  - Warfarin (Coumadin)
    - Inhibit certain clotting factors
      - Which rely heavily on vitamin K for their synthesis

# Anticoagulants (cont.)

- heparin
  - Monitored by activated partial thromboplastin times (APTTs)
  - Parenteral
  - Short half-life (1 to 2 hours)
  - Effects reversed by protamine sulfate

# Anticoagulants (cont'd)

- Low-molecular-weight heparins
  - enoxaparin (Lovenox) and dalteparin (Fragmin)
  - More predictable anticoagulant response
  - Do not require frequent laboratory monitoring
  - Given subcutaneously

# Anticoagulants (cont'd)

- warfarin sodium (Coumadin)
  - Given orally only
  - Monitored by prothrombin time (PT) or INR
  - Vitamin K can be given if toxicity occurs

# Anticoagulants (cont.)

- Therapeutic uses
  - Inhibition of new thrombi (clot) formation
  - Prevent enlargement of existing thrombi
  - Conditions with high likelihood of clot formation
    - MI, unstable angina, atrial fibrillation, indwelling devices (mechanical heart valves), after major surgery
  - Consequences of clots can result in
    - Stroke, heart attack, DVT, PE

# Anticoagulants (cont.)

- Side effects
  - Bleeding
    - Increases with increasing dosages
    - Increases with concurrent ASA administration
- May also cause:
  - Nausea, vomiting, abdominal cramps, thrombocytopenia, others
- Drug interactions
  - Numerous
    - See table 27-3 (Liley)

# Anticoagulants (cont.)

- Laboratory tests
  - Clotting studies
    - Prothrombin time (PT)
      - Used to monitor warfarin therapy
    - APTT
      - Used to monitor heparin therapy
    - Thrombin time
    - Hct
    - Platelet counts

# Anticoagulants (cont.)

- Prothrombin time (PT)
  - Used to monitor warfarin therapy
    - Pretreatment levels – 12 seconds
  - Therapeutic range is 1.5 - 2 X normal
  - Replaced by INR (international normalized ratio)
    - Therapeutic range – 2-3
      - Some patients as high as 3-4 ½
- APTT
  - Used to monitor heparin therapy
    - Normal – 40 seconds
    - Therapeutic range - 1 ½ - 2X normal
      - 60-80 range would indicate heparin working

# Anticoagulants (cont.)

- Toxicity
  - Symptoms
    - Hematuria, melena, petechiae, ecchymosis, gum/mucous membrane bleeding
  - Management
    - Stop anticoagulant
    - Administer a reversal agent (antidote)
      - Heparin
        - Protamine sulfate
      - Warfarin
        - Vitamin K (Aquamephyton)

# Anticoagulants (cont.)

## Antiplatelet agents

- Prevent platelet aggregation
- Reduce the platelets' stickiness (*viscosity*)
- Examples
  - ticlopidine hydrochloride (Ticlid)
  - aspirin
  - clopidogrel (Plavix)
  - pentoxifylline (Trental)
  - dipyridamole (Persantine)
  - dipyridamole + ASA (Aggrenox)

# Anticoagulants (cont.)

## Antiplatelet agents

- Indications
  - MI & TIA prophylaxis
  - Reduction of atherosclerotic events
  - Intermittent claudication
    - Associated with peripheral arterial disease
  - Antithrombotic effects
    - Reduce risk of fatal and nonfatal strokes

# Anticoagulants (cont.)

## Antiplatelet agents

- Side effects/adverse effects
  - Vary according to agent
  - Side effects
    - Allergic reaction (sneezing, respiratory congestion, swelling of throat, restricted breathing, itching or skin rashes)
    - Nausea, indigestion or stomach pain
    - Unusual bleeding or bruising
    - Ringing in ears (*tinnitus*)
    - Bloody urine

# Blood Coagulants

# Blood Coagulants

- Drug effect
  - Increase platelet aggregation
  - Increase clot formation
- Therapeutic uses
  - Prevention/treatment of excessive bleeding
    - Systemic bleeding disorders
      - Hemophilia
      - Von Willebrand's disease
    - Surgical complications
    - Increase capillary permeability
    - Inactivate heparin
    - Topical hemostats

# Blood Coagulants (cont.)

- Examples
  - Antihemophilic factor
    - Used for Hemophilia A (factor VIII deficiency)
  - Aminocaproic acid (Amicar)
  - Protamine sulfate
  - Vitamin K (Aquamephyton)

# Nursing Implications

Assess:

- Patient history, medication history, allergies
- Contraindications
- Baseline vital signs, laboratory values
- Potential drug interactions
- History of abnormal bleeding conditions

# Heparin: Nursing Implications

- Doses usually double checked with another nurse
  - Check hospital policy
- Ensure that SC doses are given SC, not IM
- SC doses should be given in areas of deep subcutaneous fat, and sites rotated

# Heparin: Nursing Implications

- Do not give SC doses within 2 inches of:
  - The umbilicus, abdominal incisions, or unhealed wounds
- Do not aspirate SC injections (may cause hematoma formation)
- Do not massage SC injection sites

# Heparin: Nursing Implications

- IV doses may be given by bolus or IV infusions
- Anticoagulant effects seen immediately
- Laboratory values are done daily to monitor coagulation effects (APTT)
- Protamine sulfate can be given as an antidote in case of excessive anticoagulation

# LWMHs: Nursing Implications

- Given subcutaneously in the abdomen
- Rotate injection sites

# Warfarin Sodium: Nursing Implications

- May be started while the patient is still on heparin until prothrombin times indicate adequate anticoagulation
- Full therapeutic effect takes several days
- Monitor PT and PT-INR regularly
- Antidote is vitamin K (IM, IV, or PO)

# Anticoagulants: Patient Education

Education should include:

- Importance of regular lab testing
- Signs of abnormal bleeding
- Measures to prevent bruising, bleeding, or tissue injury

# Anticoagulants: Patient Education (cont'd)

Education should include (cont'd):

- Wearing a medical alert bracelet
- Avoiding foods high in vitamin K (tomatoes, dark leafy green vegetables, bananas, fish)
- Consulting physician before taking other meds or OTC products, including herbals

# Antiplatelet Drugs: Nursing Implications

Concerns and teaching tips same as for anticoagulants

- Dipyridamole should be taken on a empty stomach
- Nicotine causes vasoconstriction, which alters the effectiveness of antiplatelet agents
- Drug-drug interactions
- Adverse reactions to report
- Monitoring for abnormal bleeding

# Coagulation Modifier Agents Nursing Implications

- Monitor for therapeutic effects
- Monitor for signs of excessive bleeding
  - Bleeding of gums while brushing teeth, unexplained nosebleeds, heavier menstrual bleeding, bloody or tarry stools, bloody urine or sputum, abdominal pain, vomiting blood

# Coagulation Modifier Agents Nursing Implications

- Monitor for adverse effects
  - Increased BP, headache, hematoma formation, hemorrhage, shortness of breath, chills, fever