Inflammatory Cardiovascular Disorders

Williams & Hopper

Chapter 17

Rheumatic Fever

Pathophysiology

- Hypersensitivity reaction
  - To antigens of group A beta-hemolytic streptococci
- Usually in children (commonly - 5 to 15yrs)
- Complication of strep infection; strep throat
- Onset 2-3 weeks after infection
- Inflammatory response targeting joints and heart

Rheumatic Fever

Signs and Symptoms

- Polyarthritis
- Subcutaneous nodules
- Chorea
- Carditis
- Fever
- Arthralgia
- Pneumonitis

Rheumatic Fever

Diagnostic Tests

- Throat culture
- No specific test for RF
- Antistreptolysin O titer > 250
- ESR
- WBC

Rheumatic Fever

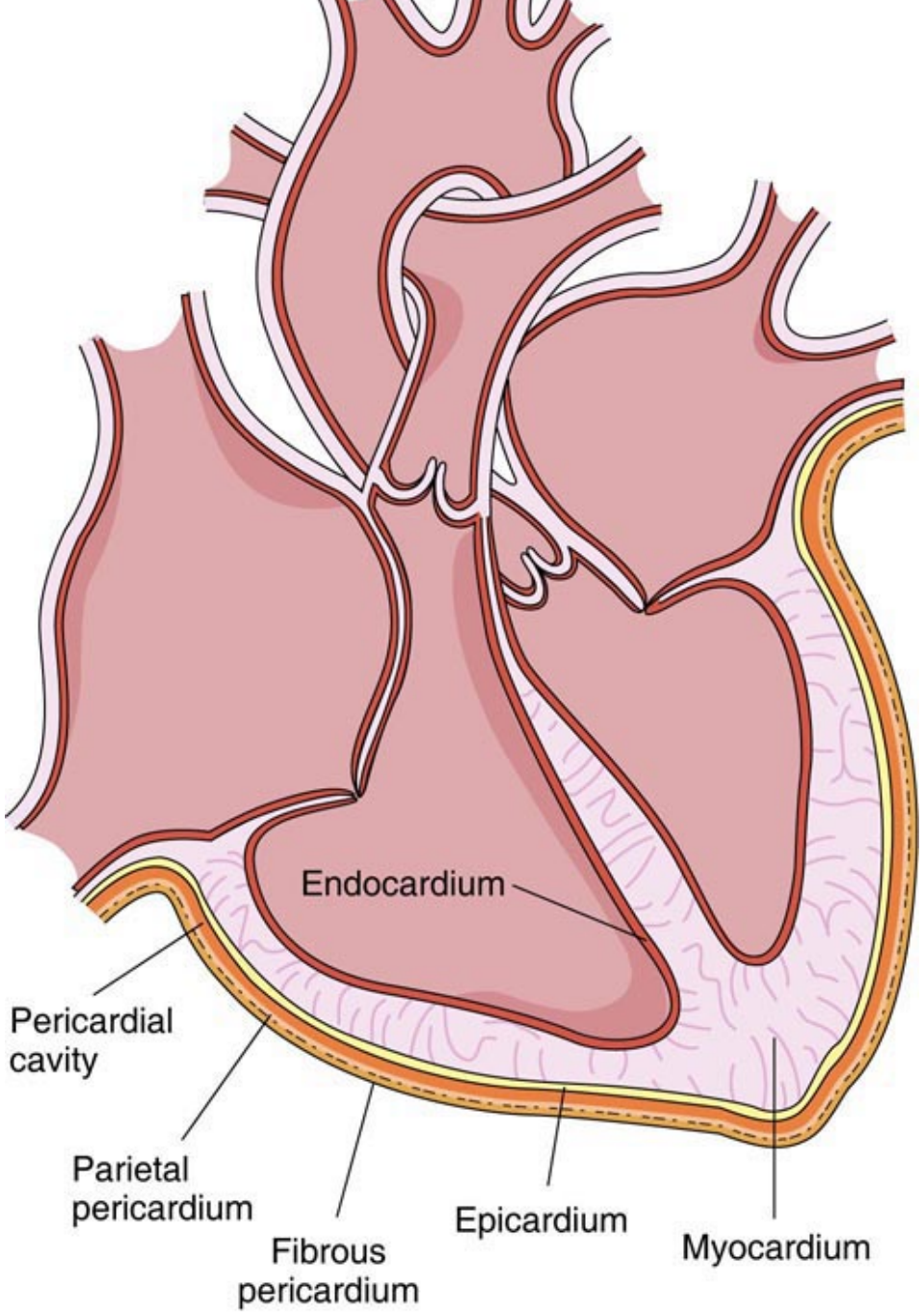
Medical Treatment

- Aim is controlling the symptoms, no cure
- Anti-inflammatory medications
  - Aspirin or corticosteroids
    - Control fever, joint inflammation and pain
- Limit activity

Rheumatic Fever

Complications

- Rheumatic Carditis
  - Pancarditis
    - All layers of heart affected
  - Pericarditis
    - Layers are covered with exudate and become thickened
  - Myocarditis
    - Nodules in myocardial tissue
      - Become scarred, weakens the heart's contraction and may lead to heart failure.



Rheumatic Carditis
Pathophysiology

- Endocardium
  - Most serious part of the heart affected
  - Vegetation on valve leaflets from blood and fibrin
  - Leads to thickening, fibrosis, and calcification of valve leaflets
  - Valves don’t close completely
    - Regurgitation
  - Valves do not fully open
    - Valvular stenosis, resulting in severe heart failure

Rheumatic Carditis

Signs and Symptoms

- Depends on area of heart involved
- New murmur
- Pericarditis signs & symptoms
  - Tachycardia
  - Heart murmur
  - Pericardial friction rub
  - Chest pain
  - Cardiomyopthy
  - EKG changes
  - Heart failure

Rheumatic Carditis

Diagnostic Tests

- CXR
  - Heart enlargement
- Echocardiogram
  - Valvular damage
- EKG
  - Changes in conduction times (ie., BBB)

Rheumatic Carditis
Treatment

- Aim is to control symptoms
- No cure
- Aspirin
- Corticosteroids
- Activity limitations
  - Depend on severity of cardiac involvement
- Prevention – **TREAT STREP THROAT**

Rheumatic Carditis

Nursing Management

- History
  - Recent illness
    - Sore throat, strep throat, scarlet fever
- Physical exam
  - Murmurs, pericardial friction rub
  - s/s heart failure
  - Vital signs

Rheumatic Carditis

Nursing Management

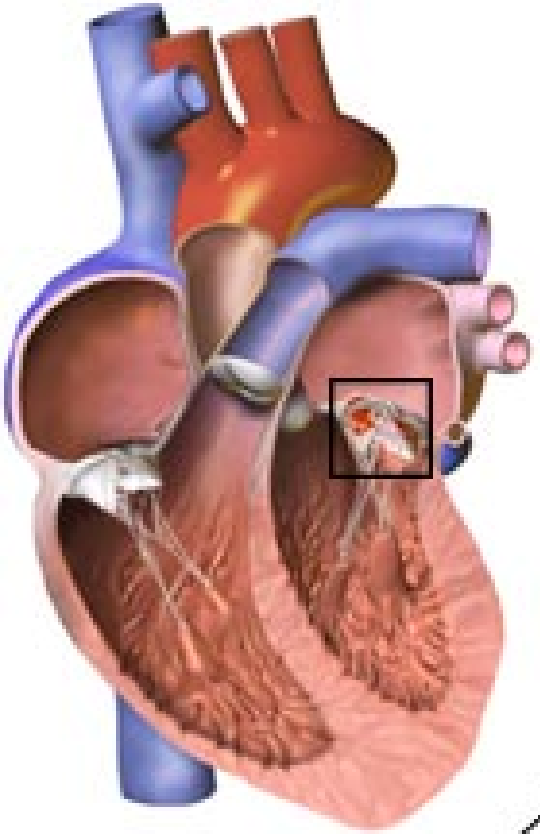
- Nursing care
  - Pain relief
  - Minimizing anxiety
  - Maintaining normal cardiac function
  - Patient teaching

Ineffective Endocarditis
Pathophysiology

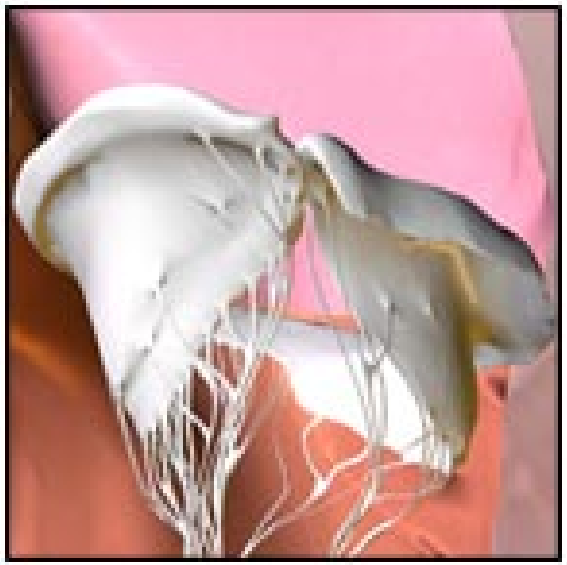
- Microorganisms infecting the endocardium
  - Usually the valves – esp. the mitral
- Vegetation
  - Growths of the infecting organism
  - May break off and become emboli
- Portals of entry
  - Invasive catheters, IV drug use, dental and invasive procedures
- Weakened immune systems

Endocarditis

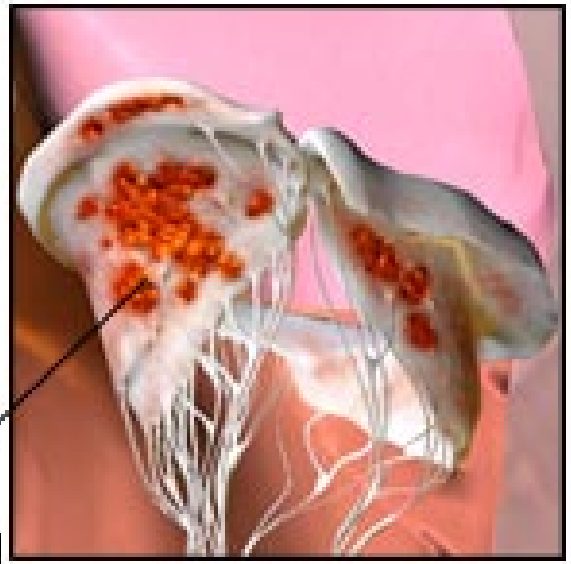
An infection of the innermost layers of the heart. It may occur in people with congenital and valvular diseases, and those who have had rheumatic fever.



Healthy valve



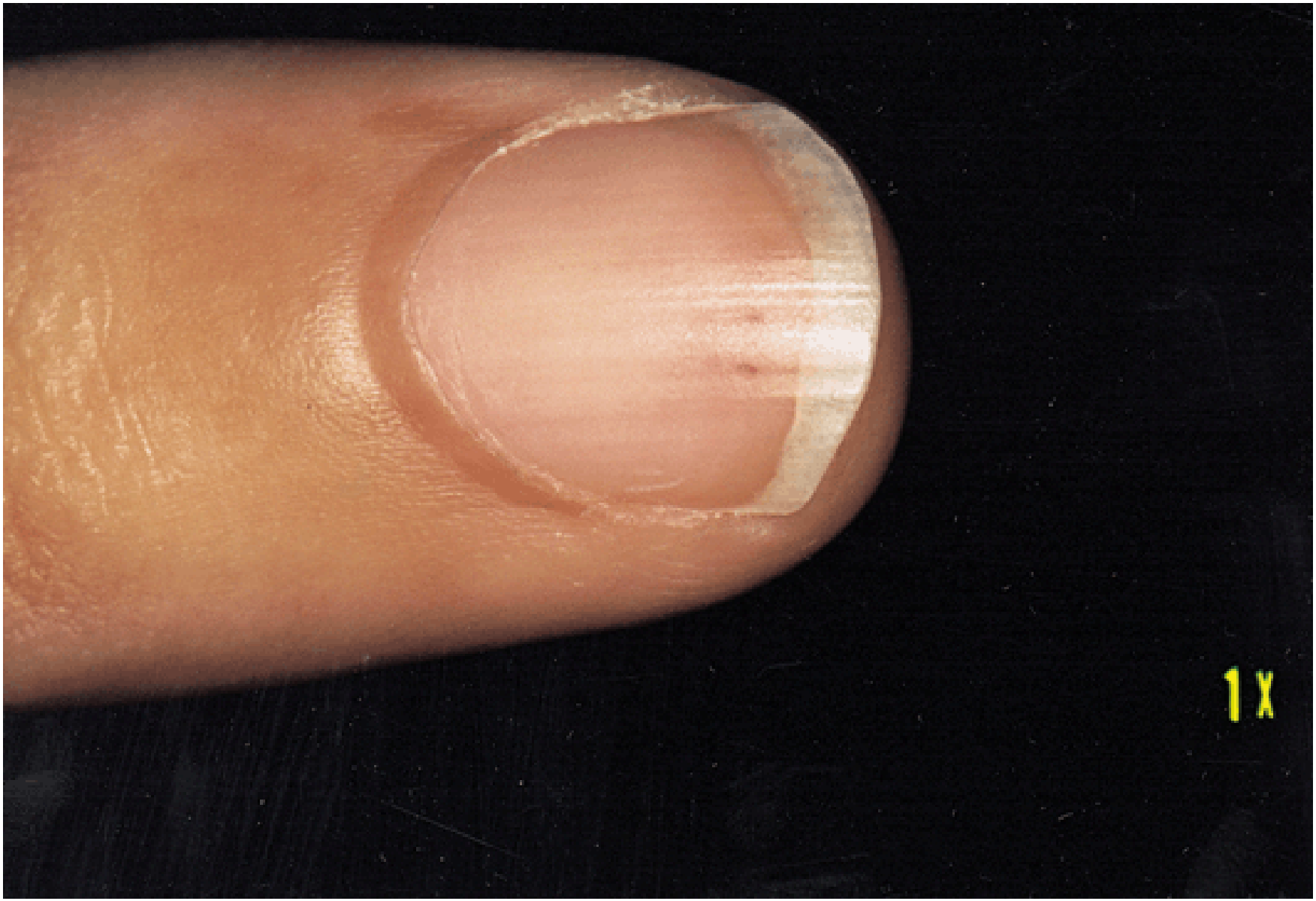
Infected valve



Vegetations

Infective Endocarditis
Signs & Symptoms

- Fever, chills, night sweats
- Fatigue, malaise, weakness
- Weight loss
- Abdominal pain, anorexia
- Joint and back pain
- Vascular sign
  - Splinter hemorrhages in nails
  - Petechiae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Infective Endocarditis Diagnostic Tests

- Blood cultures
  - Identify causative organism
- CBC → WBC
- ESR
- EKG
- Echo
  - Transesophageal echo
    - Identifies vegetations on valves
- Cardiac catheterization

Infective Endocarditis Treatment

- Acute
  - Hospitalization
  - IV antimicrobial meds
    - PNC, vancomycin, amphotericin B
  - Antipyretics
  - Rest
    - Decreases cardiac workload
  - Surgical valve replacement
  - Commissurotomy
    - Incising the adhesions of mitral valve

Infective Endocarditis
Complications

- Emboli
- Regurgitation
- Stenosis
- Heart failure

Infective Endocarditis
Nursing Management

- Subjective & objective data
  - Refer to Table 17-3
- Notify MD w/changes in circulation
  - Cold skin
  - ↓ capillary refill
  - Cyanosis
  - Absent peripheral pulses

Infective Endocarditis
Nursing Management

- Goal of nursing care
  - Maintain normal cardiac function
  - Monitor symptoms and complications
  - Provide medications as ordered
  - Patient/family education
    - Home antibiotic therapy
    - Good hygiene
      - Soft toothbrush

Pericarditis

Pathophysiology

- Inflammation of the pericardium
- Increased pericardial fluid (**pericardial effusion)**
- Inflammation of nearby tissues
- Acute or chronic

Pericarditis

Etiology

- Infections
- Post acute MI
- Connective tissue disorders
- Trauma from chest injuries
- Dissecting aneurysm
- Pulmonary disease
- Neoplastic disease
- Renal dx or uremia
- Drug reactions
- Postpericardiotomy
  - i.e, After cardiac surgery

Pericarditis

Signs and Symptoms

- Pericardial chest pain
- Dyspnea
- Lo grade fever
- Chills
- Cough
- **Pericardial friction rub**
  - Grating, scratchy, high pitch sound
  - Inflamed pericardial and epicardial layers rubbing together

Pericarditis

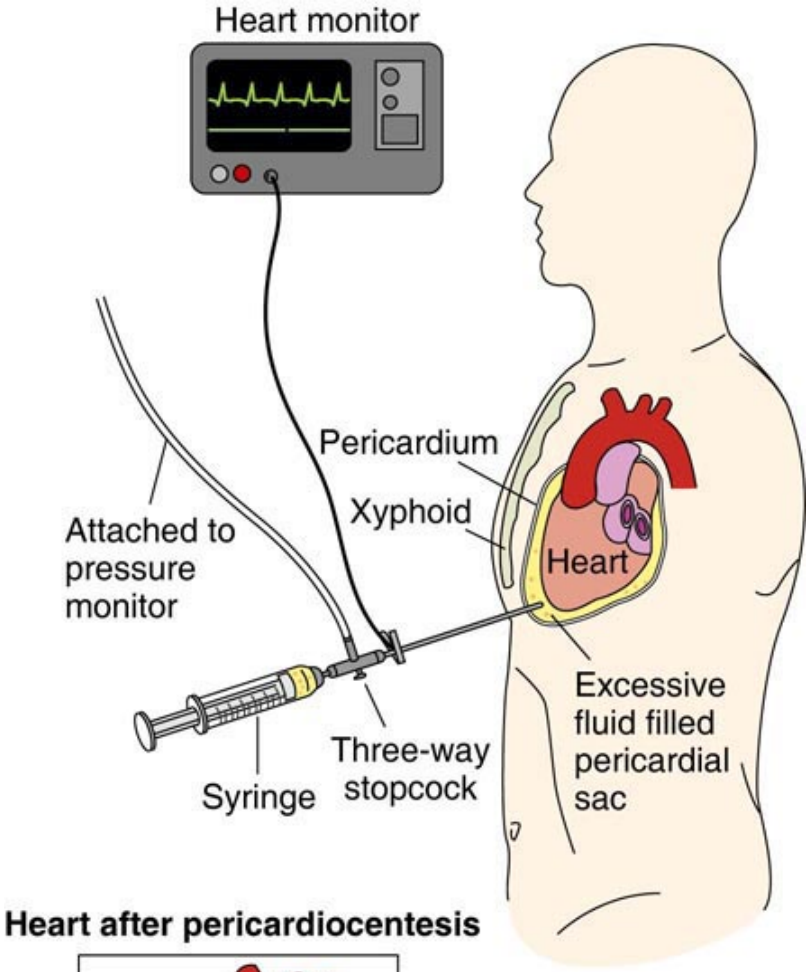
Diagnosis

- CBC → WBC
- BUN & Creatinine
  - Elevation may indicate uremia
- EKG
  - ST – T wave elevation in **all** leads
- Echocardiogram
  - Reveals pericardial effusions
- MRI or CT
  - May show thickened pericardium in chronic disease

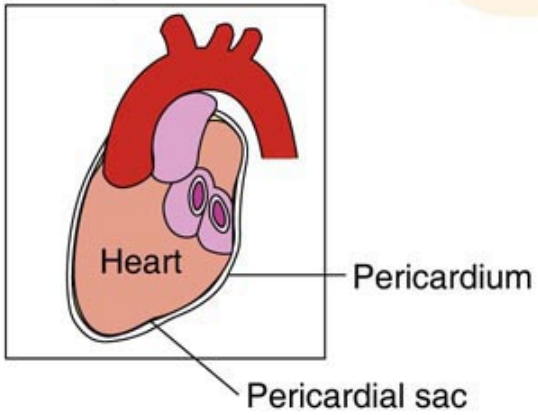
Pericarditis

Medical Treatment

- Antibiotics
- Anti-inflammatory meds
  - NSAIDS – esp. indomethacin (Indocin®)
  - Corticosteroids
- Bedrest
- Hemodialysis
  - To treat uremic pericarditis
- Pericardial window
- Pericardiectomy



Heart after pericardiocentesis



Pericarditis

Complications

- Pericardial effusion
  - Dyspnea, cough, tachypnea
  - Distant heart sounds
- Cardiac tamponade
  - Life-threatening compression of heart by fluid
    - ↓ BP, decreased cardiac output
    - Restlessness, confusion, tachycardia, tachypnea
  - Requires immediate treatment

Pericarditis

Nursing Management

- History
  - Cardiac dx, recent infections, current meds
- Physical assessment
  - Evidence of chest pain or pericardial friction rub
  - Note heart sounds
  - Signs of heart failure
  - Vital signs

Pericarditis

Nursing Management

- Nursing care
  - Relieve pt's pain & anxiety
  - Maintain normal cardiac function
  - Monitor signs & symptoms
    - Report to MD
  - Patient teaching

Myocarditis

Pathophysiology

- Inflammation of myocardium
- Muscle destruction and necrosis
- Heart may enlarge
- Most cases are benign
  - Produce minimal signs & symptoms

Myocarditis

Etiology

- Microorganisms
  - Viral, bacterial, parasitic, fungi, spirochetes
- Medications
- Lead toxicity
- Autoimmune factors
  - Lupus, RHD, HIV
- Pericarditis, infective endocarditis
- Cardiac transplant rejection

Myocarditis

Signs & Symptoms

- None to severe
- Fatigue, fever, pharyngitis
- Malaise, dyspnea
- Palpitations, muscle aches
- GI discomfort
- Enlarged lymph nodes
- Cardiac manifestations
  - Chest pain, tachycardia or pericardial friction rub
  - Sudden death may occur

Myocarditis

Diagnostic Tests

- Percutaneous endomyocardial biopsy
  - During 1st 6 weeks of inflammation
  - Preferred test for diagnosis
    - Positive only 30% of times
- MRI
- Galluim-67 scanning
- EKG
  - Reveal arrhythmias

Myocarditis

Treatment

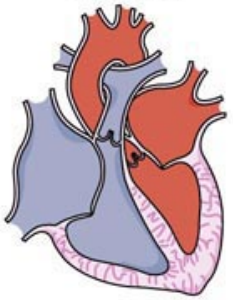
- Aimed at cause
- Antibiotics
- Reduce cardiac workload
  - Bed rest, limit activity
  - Supplemental oxygen
- Cardiac monitoring
- Digoxin
  - Treat heart failure
  - Monitor for toxicity
- Immunosuppressants

Cardiomyopathy

Pathophysiology

- Enlargement of heart muscle
- 3 Types
  - Dilated or congestive
  - Hypertrophic
  - Restrictive

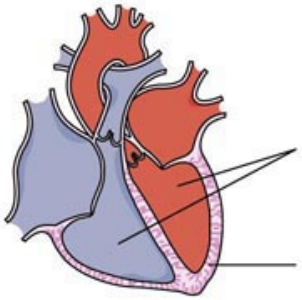
Normal



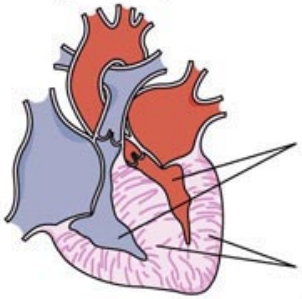
Comparison to normal

Note normal size of chambers and thickness of ventricle walls for comparison with cardiomyopic heart changes.

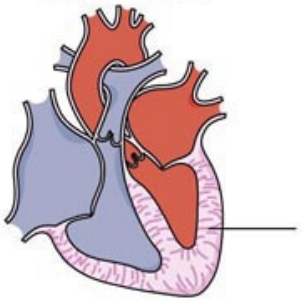
- **Dilated or (congestive)**



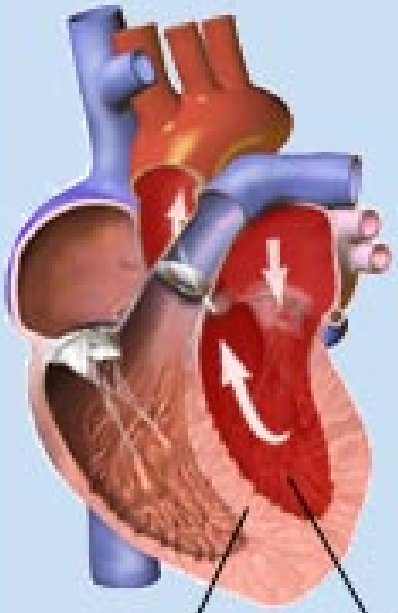
Hypertrophic



Restrictive



Normal



Healthy septum

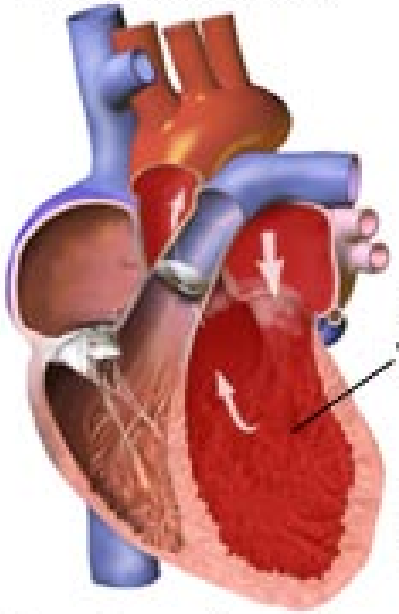
Healthy left ventricle

A healthy left ventricle pumps enough oxygenated blood to meet the body's needs.

Cardiomyopathy

A condition in which a ventricle has become enlarged, thickened and/or stiffened. As a result, the heart's ability to pump is reduced. Two types of cardiomyopathy include:

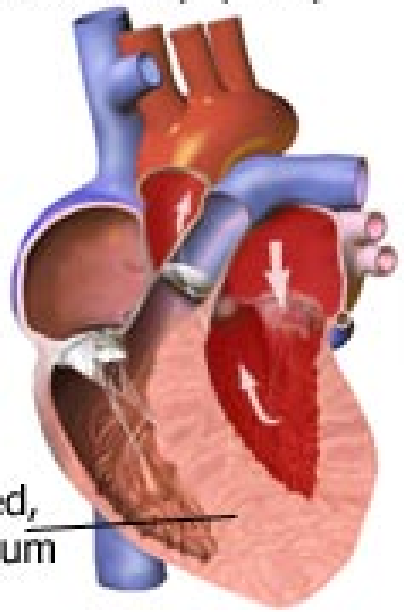
Dilated cardiomyopathy



Enlarged ventricle

An enlarged, weakened left ventricle struggles to pump enough blood to meet the body's needs.

Hypertrophic cardiomyopathy



Thickened, stiff septum

Left ventricle cannot fully relax between heartbeats, resulting in less blood flow.

Cardiomyopathy
Signs & Symptoms

- Depends on type
- Signs of heart failure in varying degrees
  - Dyspnea on exertion
  - Angina
  - Syncope
  - Fatigue
  - Arrhythmias

Cardiomyopathy
Diagnostic Tests

- CXR
  - Reveals *cardiomegaly*
- Echocardiography
  - Reveals muscle thickness/chamber size
  - Differentiates type
- EKG
  - Dysrhythmias
- Cardiac catheterization

Cardiomyopathy
Treatment

- No cure
- Palliative
- Manage heart failure
  - Vasodilators
  - Digoxin
  - Beta blockers, calcium channel blockers
  - Anticoagulants
  - Antidysrhythmics
- Heart transplant – when medical tx fails

Cardiomyopathy
Nursing Management

- History & physical examination
- Aim is to maintain normal cardiac function
  - Careful monitoring of s/s
  - Frequent rest periods, small meals
  - Avoid ETOH
  - Reduce anxiety
    - Pt teaching
    - Emotional support

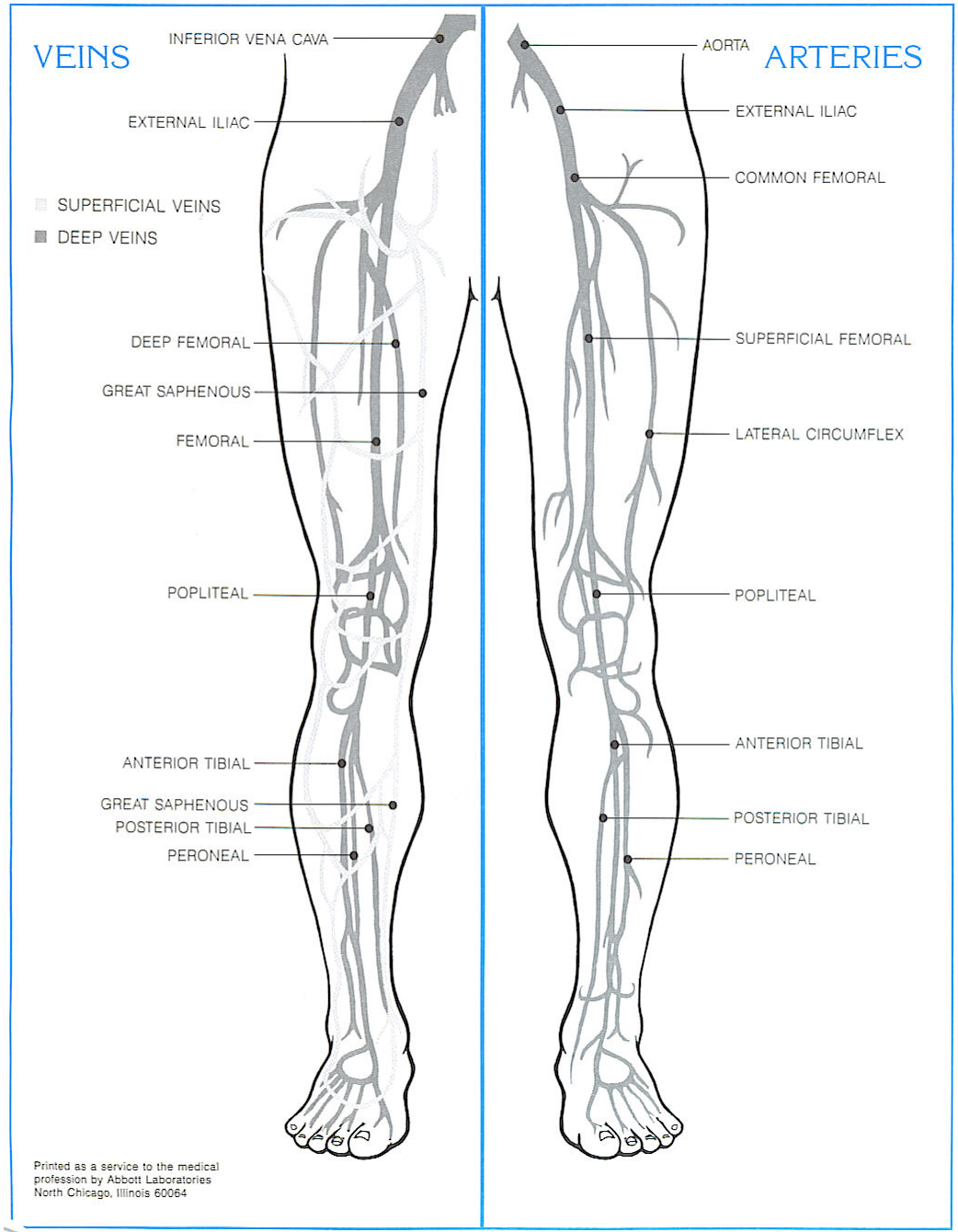
Venous Disorders

Thrombophlebitis

Pathophysiology

- Formation of a clot and inflammation within a vein
- Most common disorder of veins
- Affects superficial or deep veins
- DVT most serious
  - PE if detaches

VASCULATURE OF THE LEG



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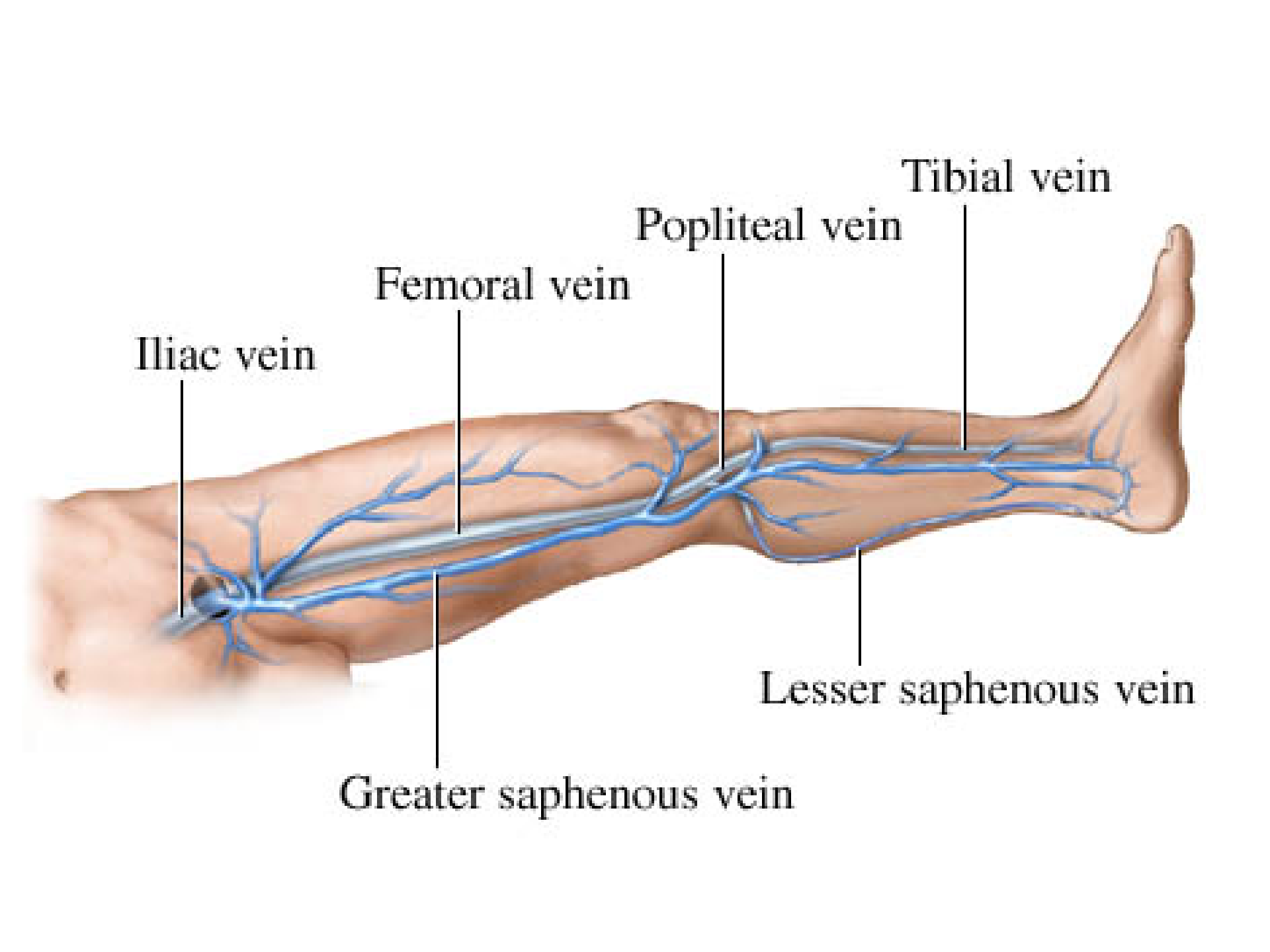
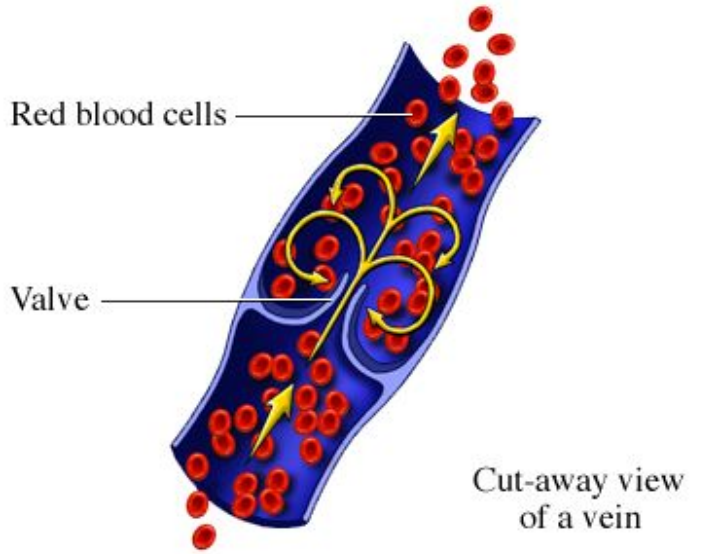

Tibial vein
Popliteal vein
Femoral vein
Iliac vein
Lesser saphenous vein
Greater saphenous vein

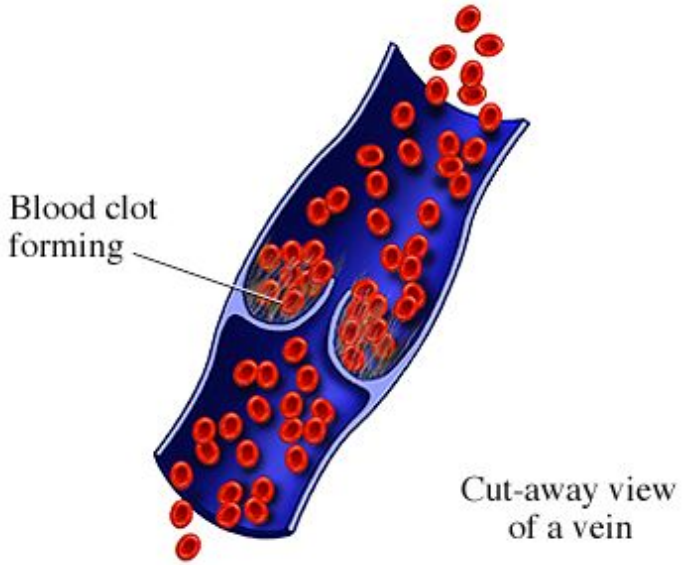
Thrombophlebitis

Etiology

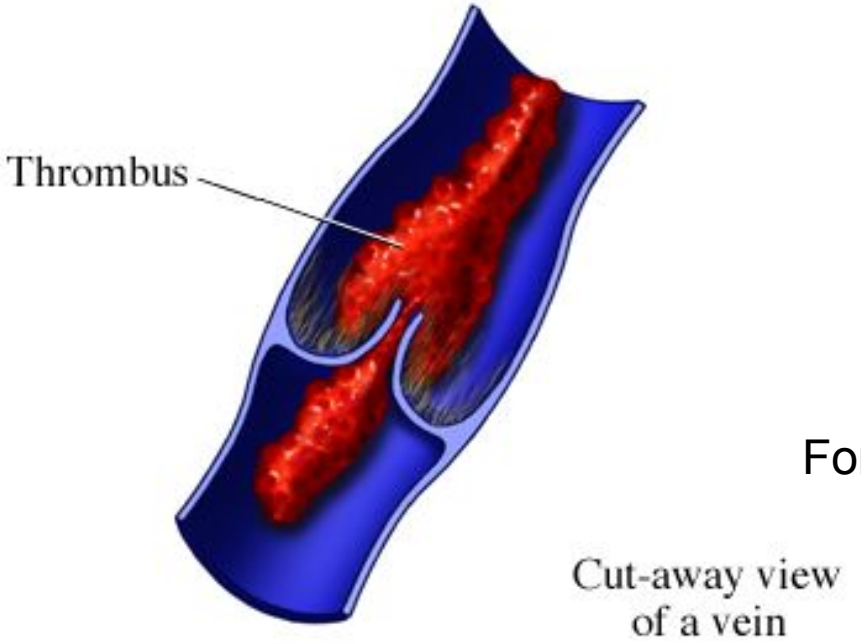
- 3 Factors
  - Stasis of blood flow
  - Damage to lining of the vein wall
  - Increased blood coagulation



Normal venous blood flow.

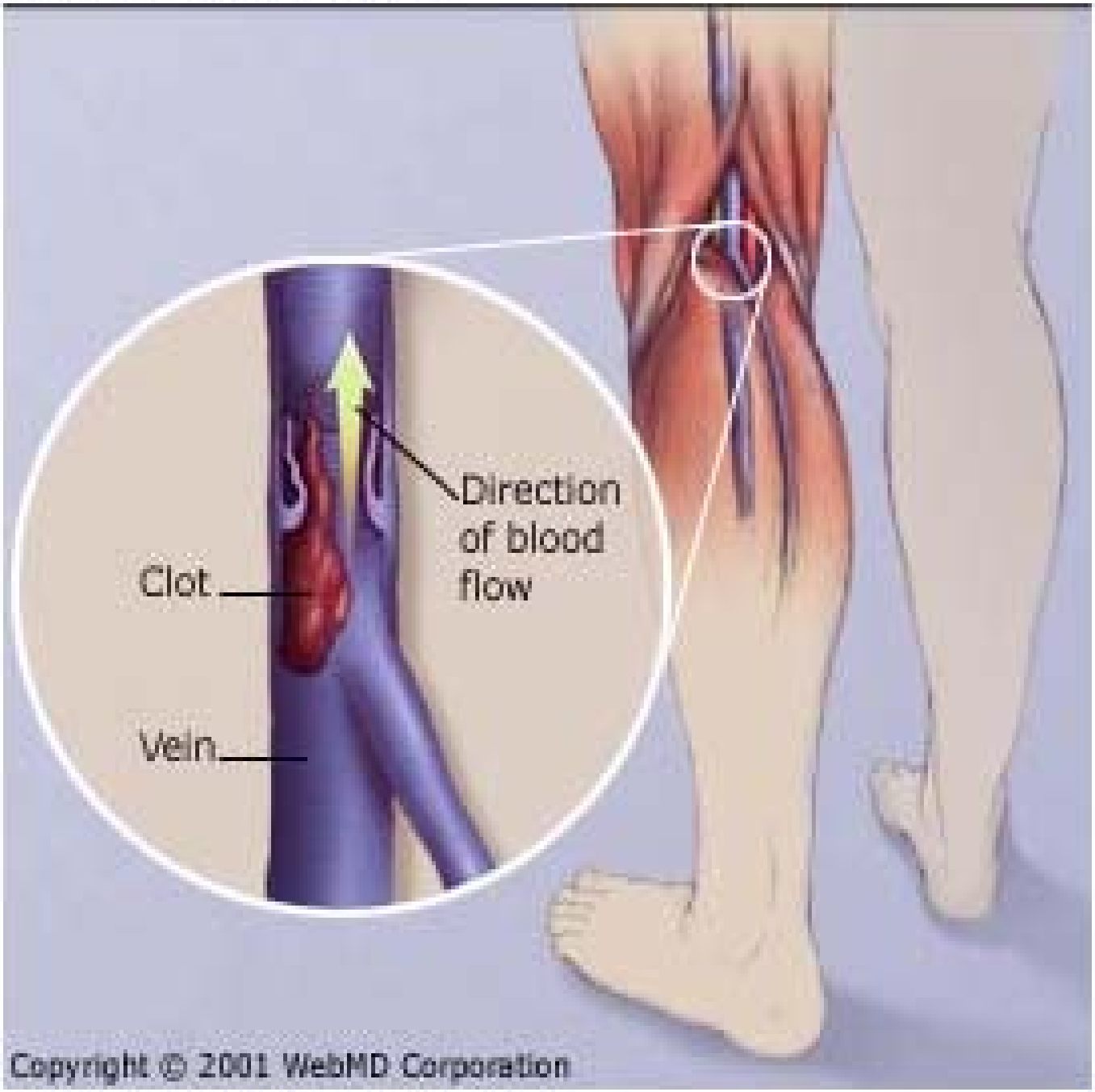


Formation of a blood clot.



Formation of a thrombus.

Thrombophlebitis

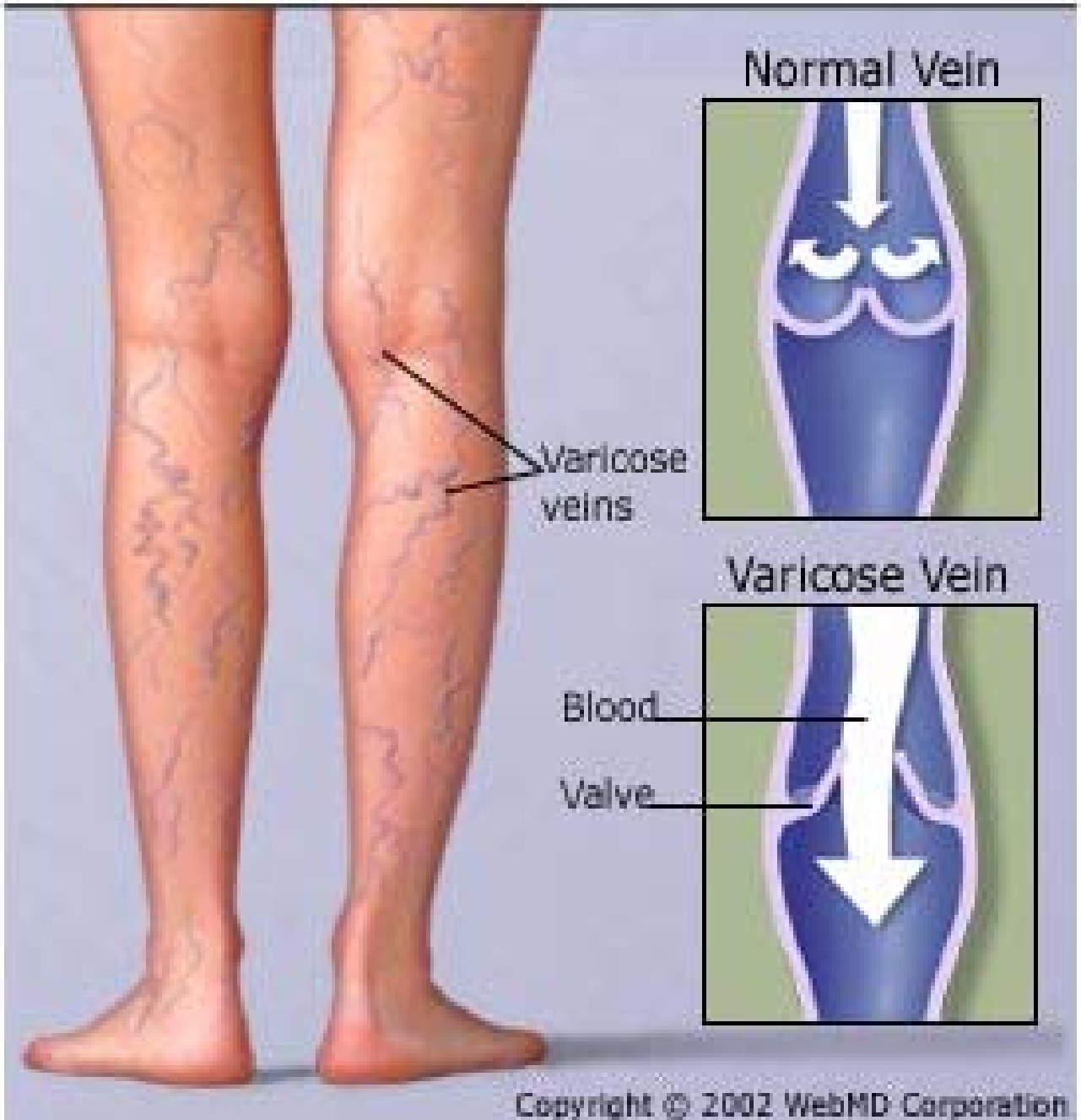


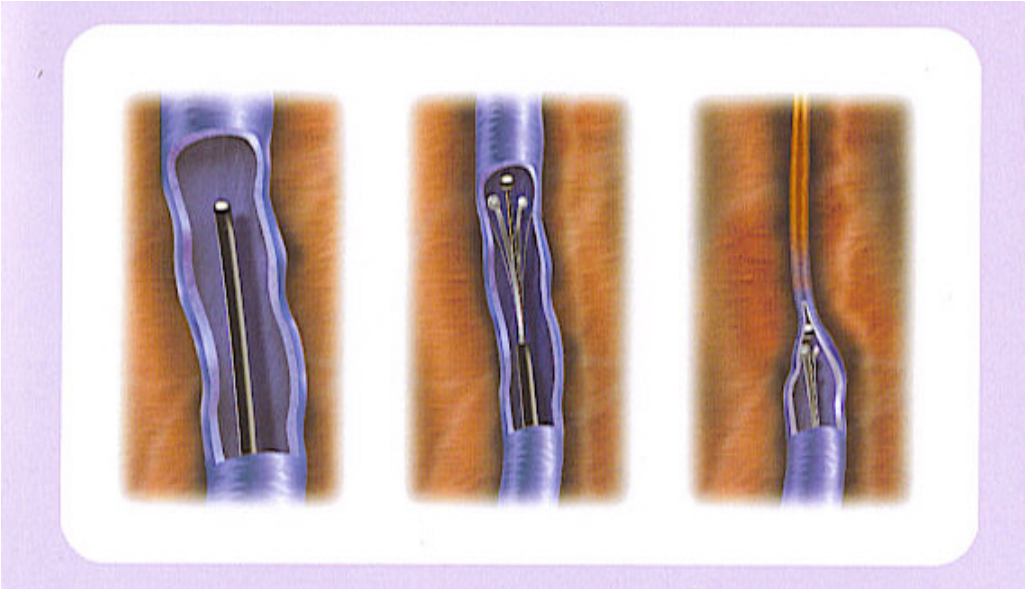
Thrombophlebitis

Signs and Symptoms

- Superficial Veins:
  - Redness
  - Warmth
  - Swelling
  - Tenderness
  - Induration (firm cord)
- Deep Veins:
  - Swelling
  - Edema
  - Pain
  - Tender w/palpation
  - Warmth
  - Venous distention
  - Fever
  - + Homan's Sign

Varicose Veins





Pre-treatment

One week post-treatment*

*Individual results may vary.

Thrombophlebitis

Diagnostic Tests

- Coagulation tests: PT, INR, PTT, platelet count
- D-dimer
- Venous doppler ultrasonography
- Duplex venous scanning
- MRI
- Lung scan

Thrombophlebitis

Complications

- Pulmonary embolism
- Chronic venous insufficiency
  - Edema
  - Pain
  - Brownish discoloration
  - Ulceration of medial ankle
  - Venous distention
  - Dependent cyanosis

Thrombophlebitis

Prevention

- Identification of risk factors
  - Dehydration
  - Immobility
  - Abdominal surgery
  - Pregnancy
  - Obesity
- Patient teaching

Thrombophlebitis
Prophylaxis

- Antiembolism devices
  - Antiemboli stockings
  - Intermittent pneumatic devices
- Medication
  - Heparin 5000U subq
  - Coumadin
  - Low-molecular-weight heparin (LMWH)
- Monitor IV therapy

Thrombophlebitis
Medical Treatment

- Goals is to prevent
  - Thrombus enlargement
  - Pulmonary emboli
  - Further thrombus formation
  - Relieve pain

Thrombophlebitis
Medical Treatment (cont.)

- Superficial
  - Bedrest
  - Extremity elevation
  - Warm, moist heat
  - Analgesics
  - NSAIDs
  - Compression stockings
- Deep Vein
  - Bedrest
  - Extremity elevation above level of heart 5-7 days
  - Warm, moist heat
  - Elastic stockings
  - Anticoagulants
  - Thrombolytic therapy
  - Surgery

Thrombophlebitis

Anticoagulants

- Heparin
  - Continuous IV infusion for up to 10 days
  - Oral anticoagulant 4-7 days before heparin stopped
  - Oral anticoagulant continued for several months

Thrombophlebitis
Heparin

- Anticoagulant
- Natural substance
- Uses
  - DVT
  - Pulmonary embolism
  - Prophylaxis of DVT & PE
  - Acute peripheral arterial embolism
  - Unstable angina
  - DIC
- Given subq or IV
- Normal therapeutic range
  - APTT 1.5-2.5 Xs control
- Subq
  - Abdomen
  - 2 inches away from umbilicus
- Do not massage
- Rotate sites
- Do not aspirate

Thrombophlebitis

Heparin - Side Effects

- Hematoma formation
- Bleeding – hemorrhage
- Thrombocytopenia
- Hypersensitivity reaction

- Antidote: **Protamine sulfate**

Thrombophlebitis

Coumadin (Warfarin)

- Inhibits activity of Vitamin K
- Uses
  - PE, DVT, MI
  - RHD w/heart valve damage
  - Atrial arrhythmias
- Dosage based on prothrombin times
- Given PO
- No effect on existing clots

Thrombophlebitis
Prothrombin Times

- Therapeutic range is 1.5 to 2 times the normal prothrombin time range
- Example:
  - Client's value on Coumadin: 16 seconds
  - Normal PT range: 9-12 seconds

1.5		2
X 9 seconds		x 12 seconds
13.5 seconds	to	24 seconds

Thrombophlebitis

Coumadin (Warfarin)

- Complications
  - Hemorrhage
  - Drug interactions
  - No Aspirin

- Antidote: **Vitamin K**

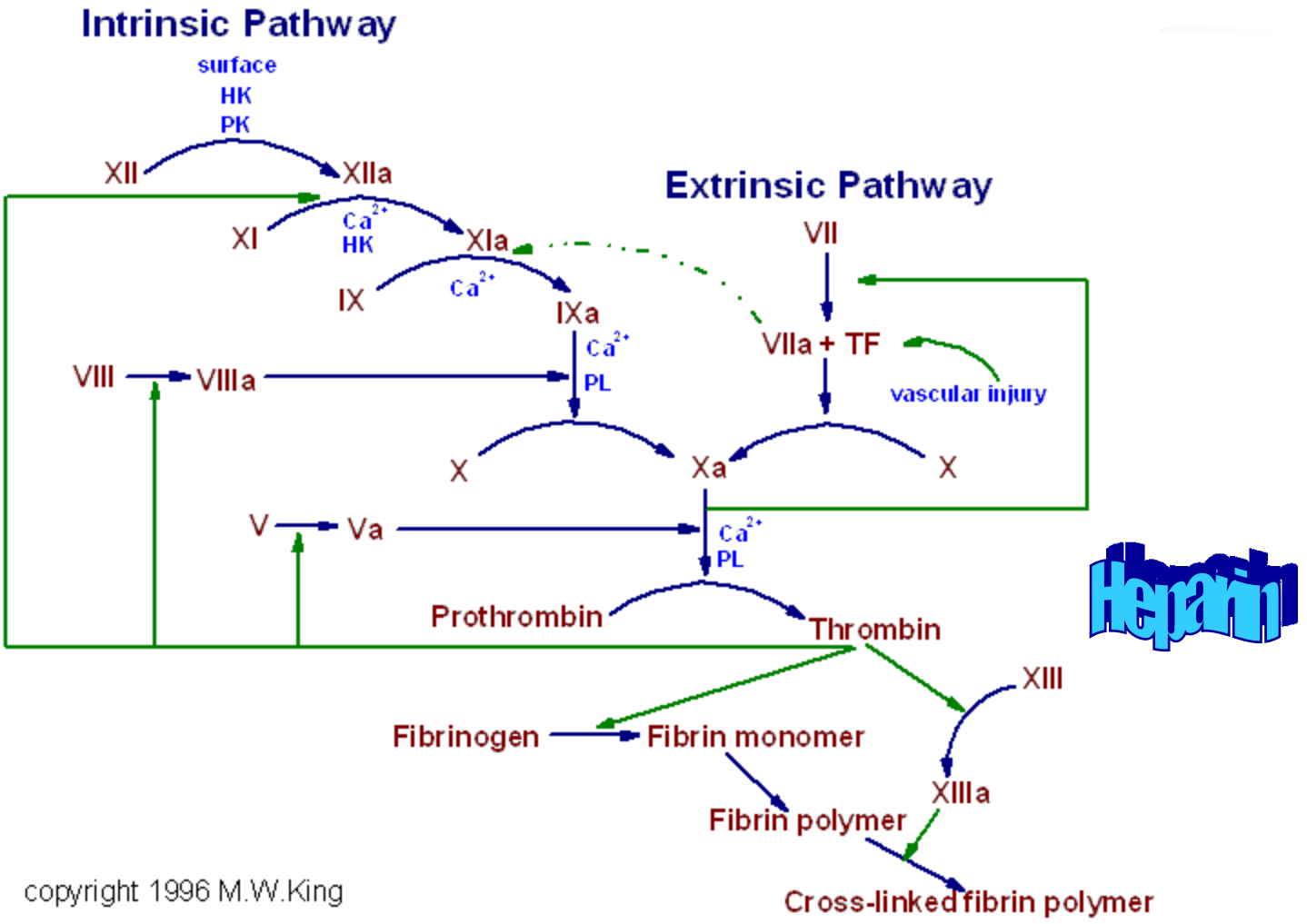
Thrombophlebitis

Lovenox (Enoxaparin sodium)

- Specific action at certain steps of coagulation pathway- less potential hemorrhage
- Uses
  - Prevention of DVT
  - Unstable angina or non-Q MI
- Subcutaneously in abdomen

  DO NOT INJECT INTRAMUSCULARLY
- Side Effects
  - Same as heparin
- Monitoring of clotting times not necessary

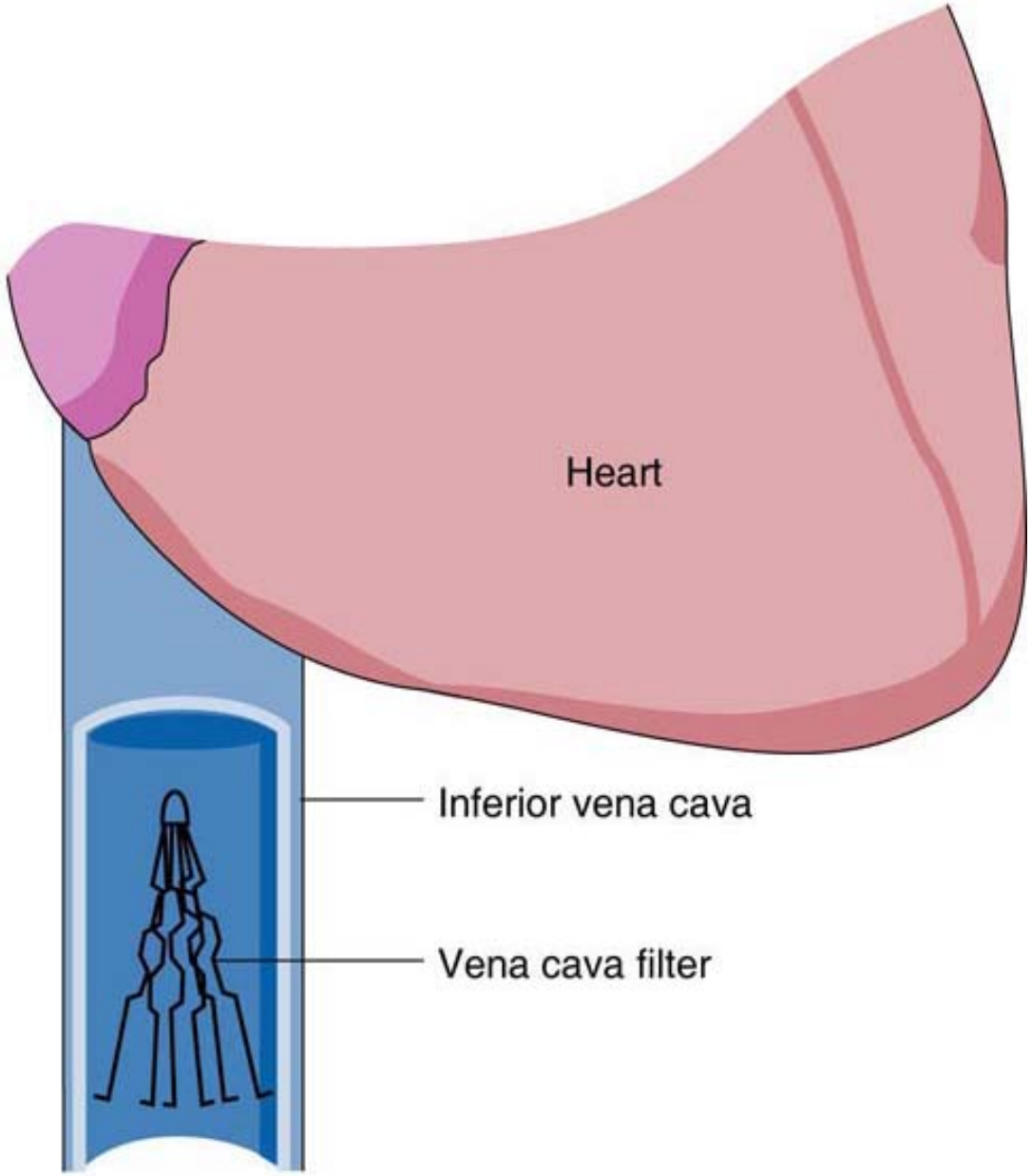
Coagulation Cascade



Thrombophlebitis

Surgical Treatment

- Used to prevent
  - Pulmonary emboli
  - Chronic venous insufficiency
    - When anticoagulants contraindicated
    - High risk of PE
- Venous thrombectomy
  - Removes clot
- Vena cava filter



Thrombophlebitis

Nursing Management

- History
  - Recent IV therapy, surgery, trauma, childbirth, bedrest, long trip, cardiac dx, recent infection, medication list
- Physical assessment
  - Note pain, fever, tenderness, + Homan's sign, redness, warmth, swelling, edema
  - Note firm, cordlike vein
  - Daily thigh/calf measurements
- Monitor coagulation tests