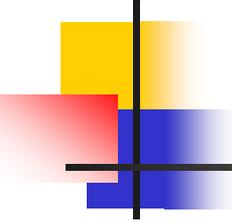


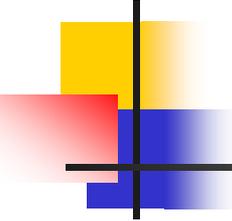
Occlusive Cardiovascular Disorders

Williams & Hopper
Chapter 18



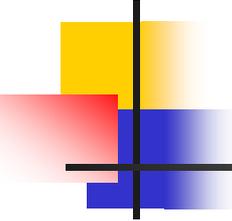
Occlusive Cardiovascular Disorders

- Arteriosclerosis
 - Arterial lining becomes thick and hardened
 - “Hardening of the Arteries”
- Atherosclerosis
 - Type of arteriosclerosis
 - Plaque formation within arterial wall



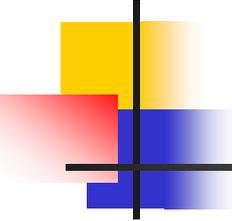
Occlusive Cardiovascular Disorders - Causes

- Genetics
- Hyperlipidemia
- Diabetes Mellitus
- Contributing factors
 - Hypertension
 - Smoking
 - Obesity, sedentary lifestyle
 - Stress, infection
 - ↑ serum homocysteine levels
 - ↑ serum iron levels



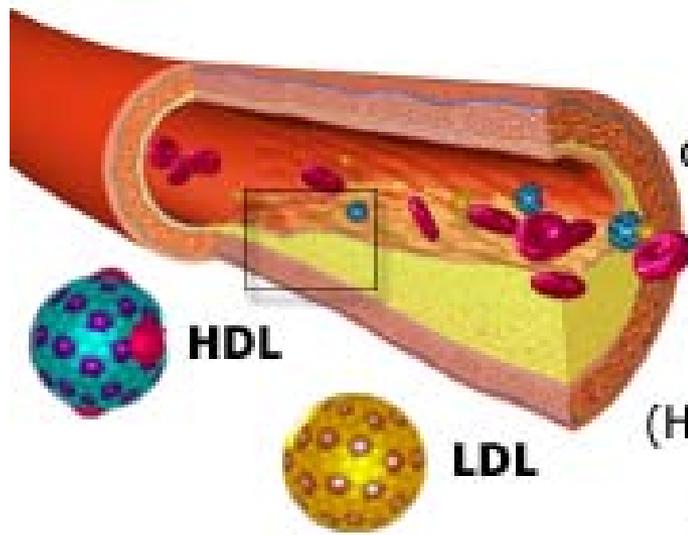
Occlusive Cardiovascular Disorders – Signs & Symptoms

- Chest pain
- Nail bed pallor
- Reddish-purple extremities
- Prolonged capillary refill
- Thick nails
- Dry skin
- Hair loss on extremities
- ↓ or absent pulses
- Cool extremities

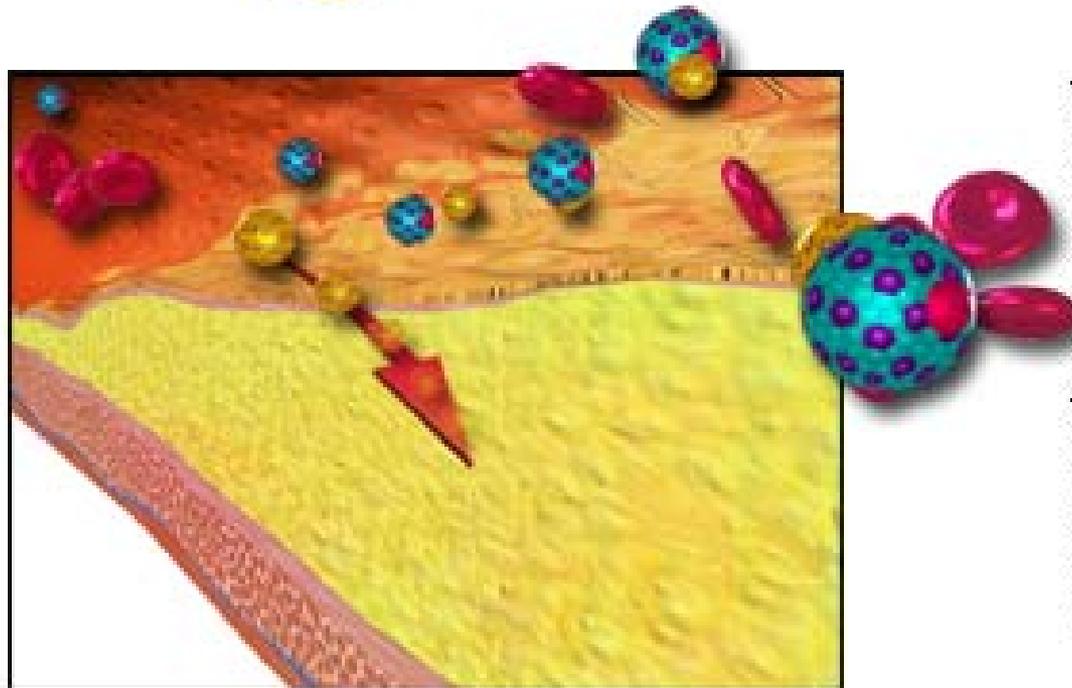


Occlusive Cardiovascular Disorders – Diagnosis

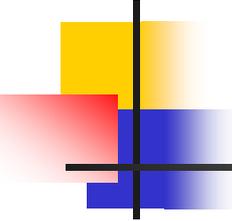
- Cholesterol & triglyceride levels
 - Total
 - HDL
 - LDL
- Glucose
 - Elevations may ↑ risk for atherosclerosis
- Radiological studies



Cholesterol is a waxy fat (lipid) carried through blood by lipoproteins. The two main types of lipoproteins are high density lipoproteins (HDLs) and low density lipoproteins (LDLs).

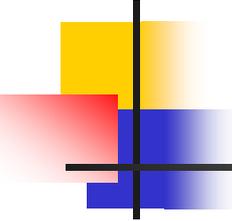


HDLs (good cholesterol) carry LDLs (bad cholesterol) away from artery walls. LDLs stick to artery walls and can lead to plaque build-up (atherosclerosis).



Occlusive Cardiovascular Disorders – Treatment

- Diet
- Smoking
- Exercise
- Lipid lowering agents
 - Statins
 - Fibrates
 - Bile acid sequestrants
 - Niacin



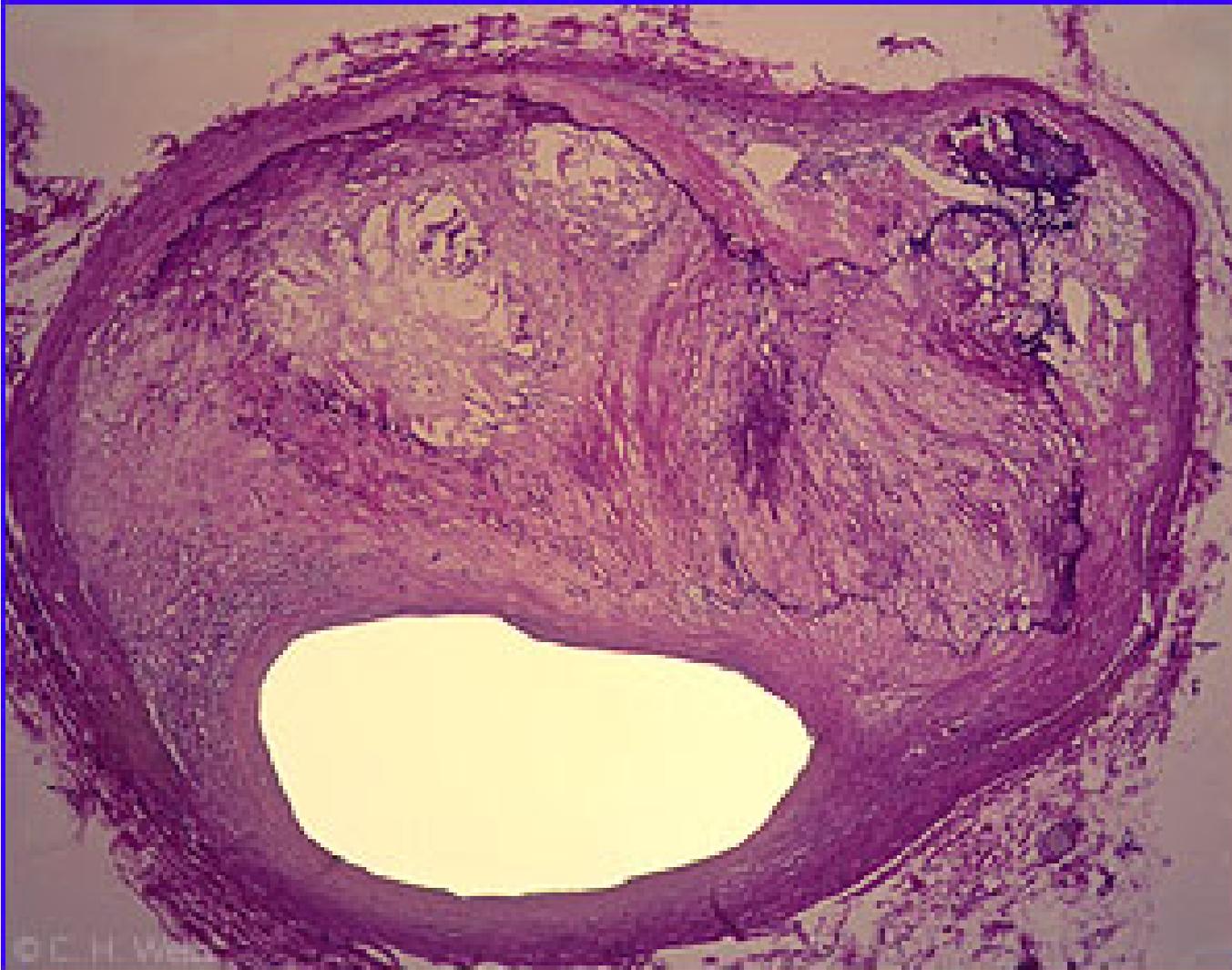
Coronary Artery Disease

- Obstructed blood flow
 - Through coronary arteries
- Atherosclerosis
 - Primary cause
- Arteries unable to dilate
- Decreased myocardial blood flow
- Ischemia results
 - Chest pain – **angina pectoris**

Coronary Artery Disease

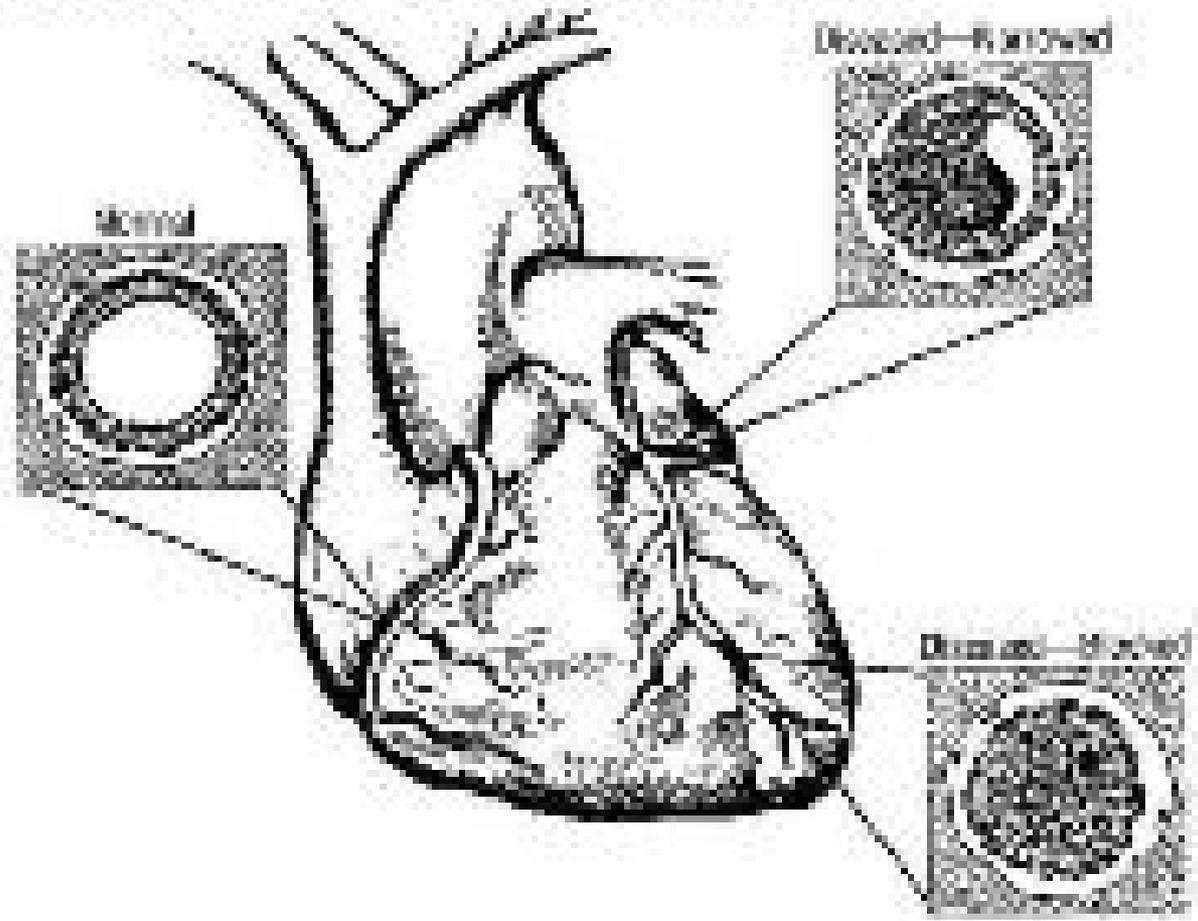
Etiology

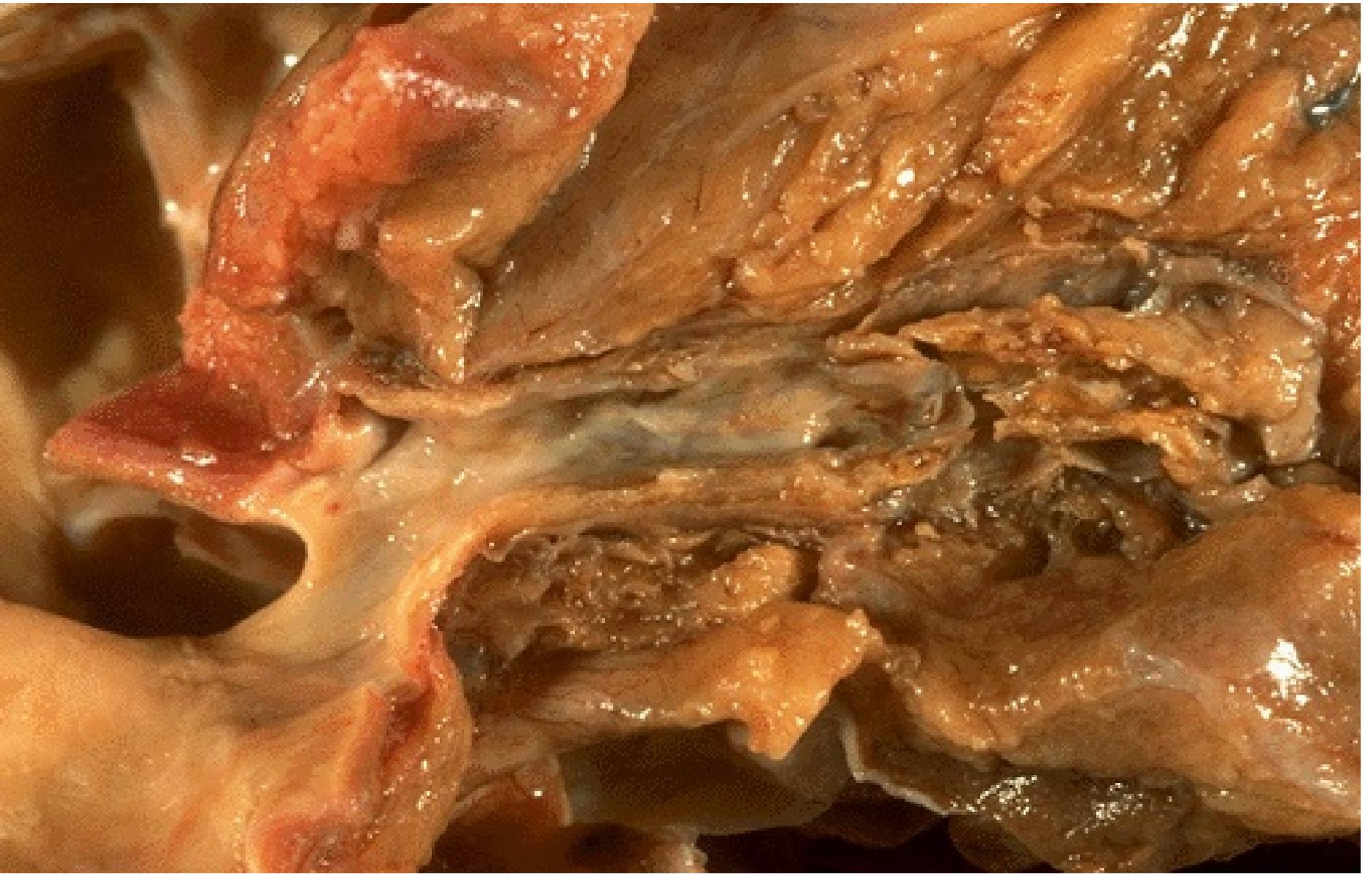
- Accumulation of fatty deposits & minerals in coronary arteries
 - Atheroma (plaque)
 - Leads to stenosis – eventual occlusion
- Go to
 - www.heartcenteronline.com



This photograph shows a cross-section of a coronary artery affected by atherosclerosis. Deposits of plaque – fatty material, cholesterol, calcium and blood clot – have narrowed the artery considerably. A heart attack happens when the coronary artery becomes blocked.

Front View of Heart Showing Cross Sections of Arteries

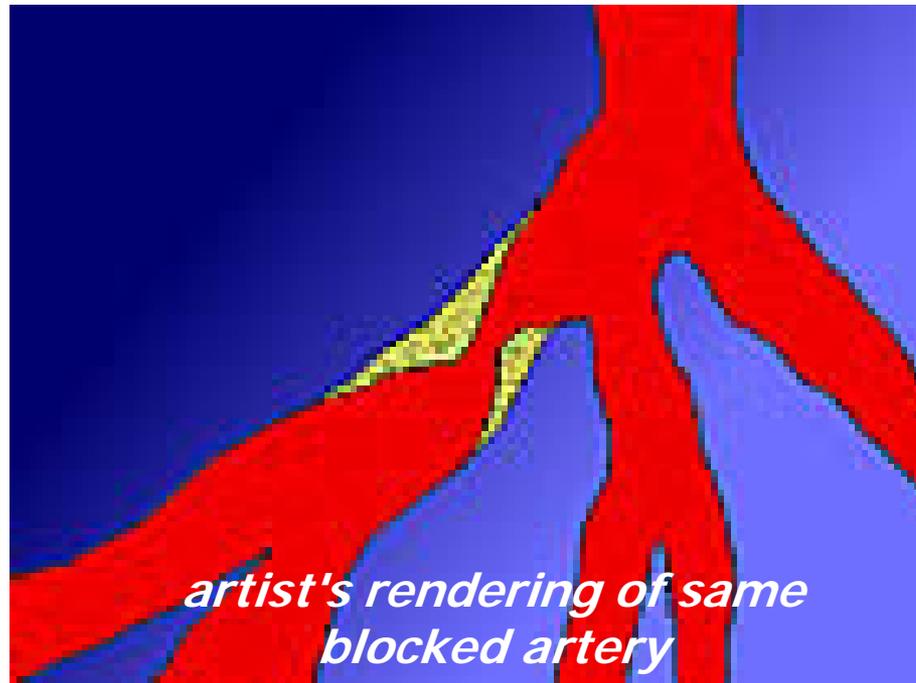




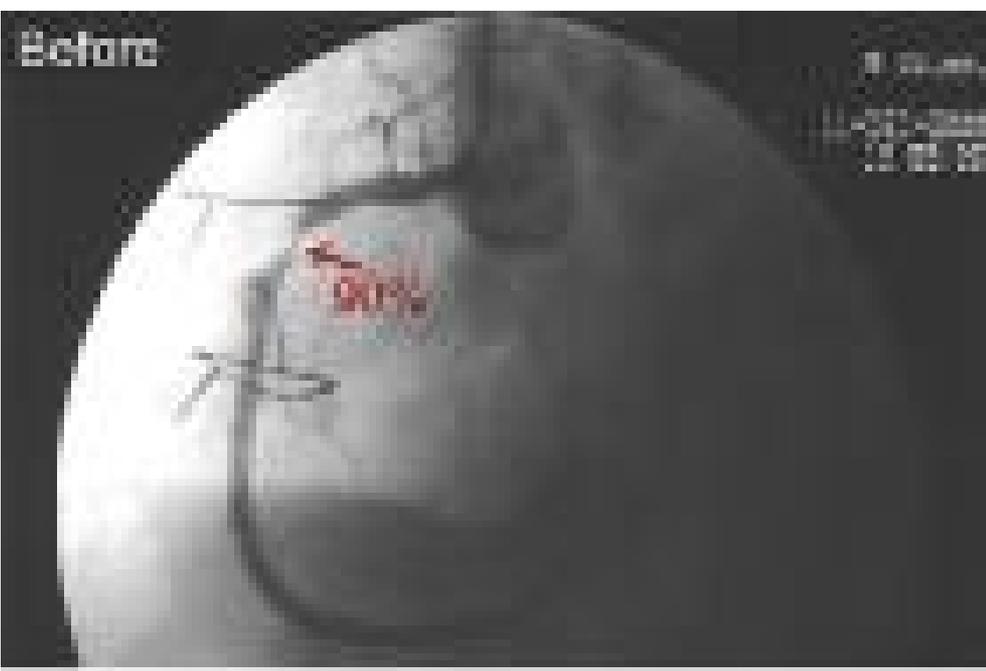
*actual fluoroscopic image of
blocked artery*



*artist's rendering of same
blocked artery*



Before



After



Coronary Artery Disease

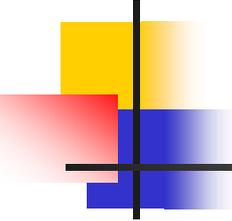
Risk Factors

- Non-modifiable
 - Heredity
 - Ethnicity
 - Gender
 - Age

Coronary Artery Disease

Risk Factors (cont.)

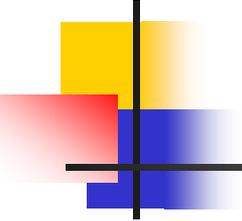
- Modifiable
 - Smoking
 - Hypertension
 - Elevated serum cholesterol
 - Diabetes
 - Stress
 - Elevated serum homocysteine
 - Sedentary lifestyle



Coronary Artery Disease

Risk Factors (cont.)

- Metabolic Syndrome
 - Requires ≥ 3 of the following:
 - Abdominal obesity (waist circumference)
 - Men > 102 cm (40 in)
 - Women > 88 cm (35 in)
 - Triglycerides ≥ 150 mg/dL
 - HDL cholesterol
 - Men < 40 mg/dL
 - Women < 50 mg/dL
 - Blood pressure $\geq 130/85$ mm Hg
 - Impaired fasting glucose (fasting glucose 100-125mg/dL)



Coronary Artery Disease

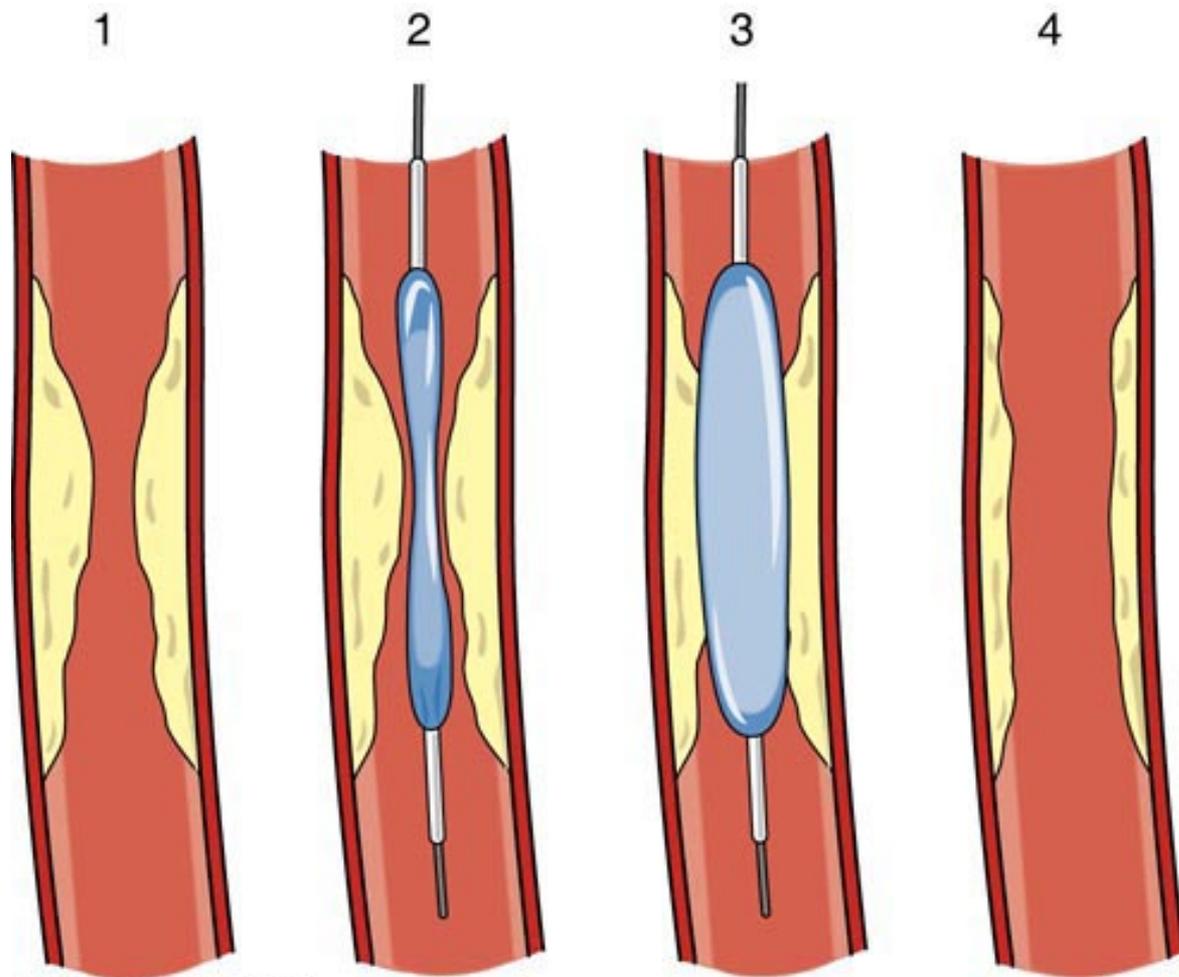
Medical Management

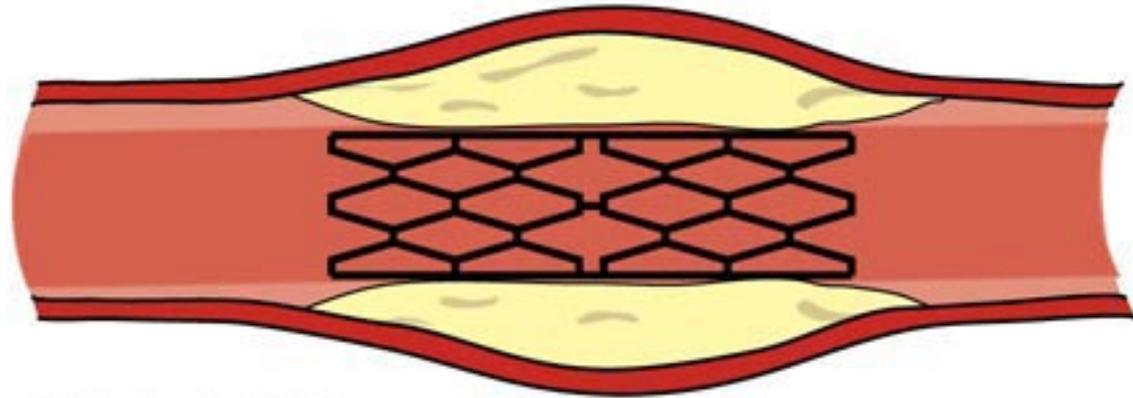
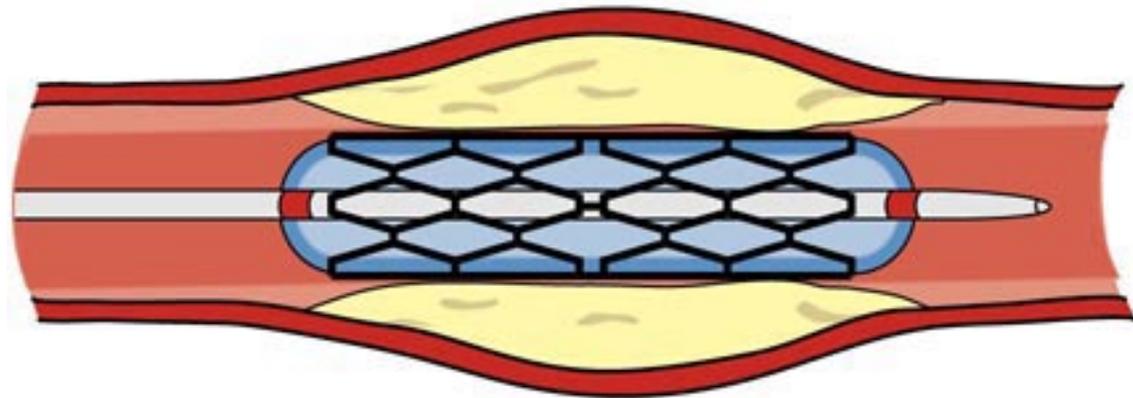
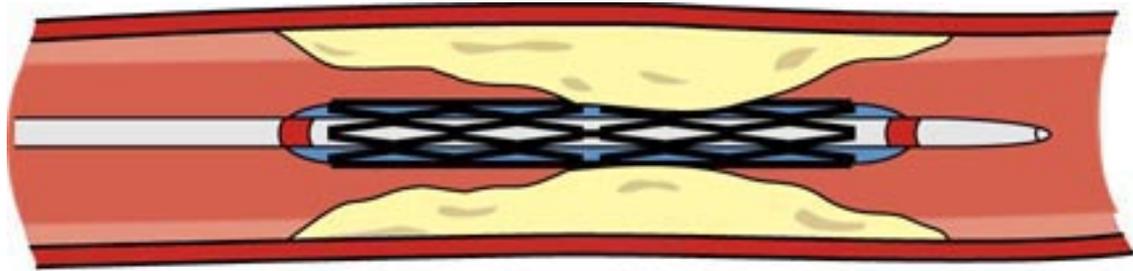
- **Prevention → Education!**
 - Teaching re: modifiable risk factors
- Cholesterol < 300mg/day
- Medication
 - Lipid lowering agents
- Anticoagulants
 - Prevent thrombus formation

Coronary Artery Disease

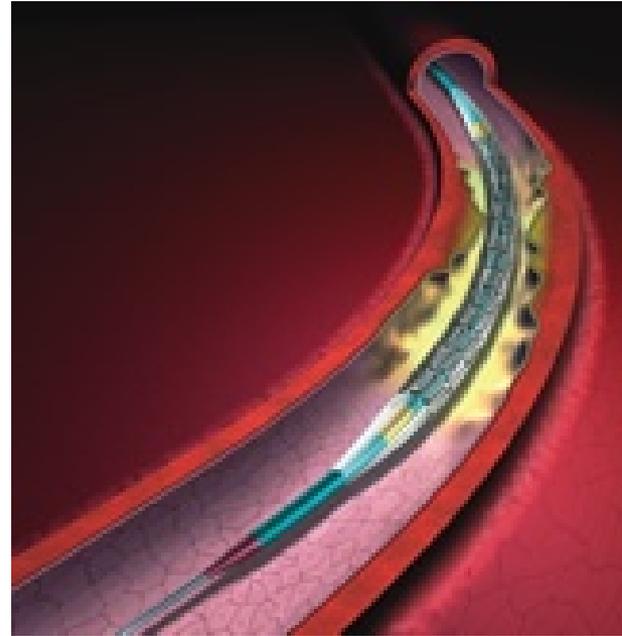
Surgical Management

- Percutaneous Transluminal Coronary Angioplasty (PTCA)
- Coronary atherectomy
- Coronary artery stents
- Coronary artery bypass graft (CABG)
- Transmyocardial laser revascularization





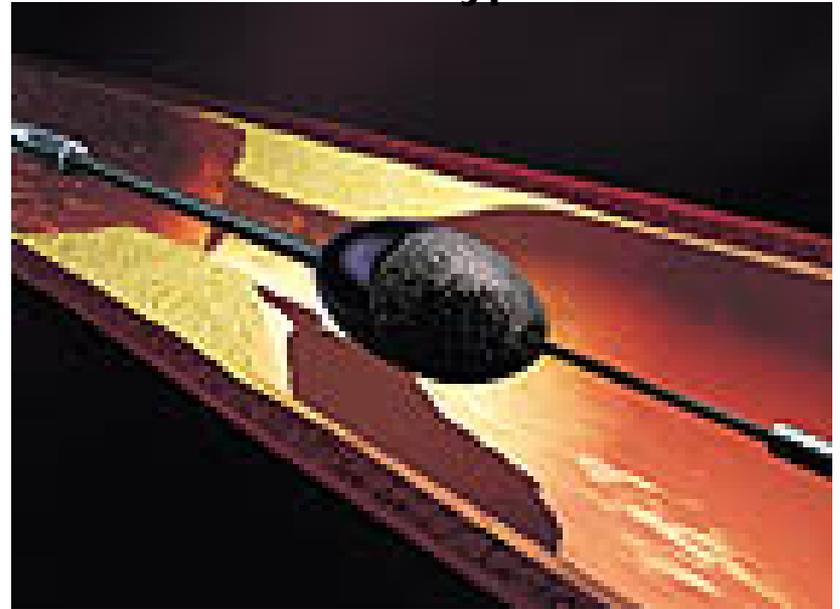
© F.A.Davis 2003 www.fadavis.com



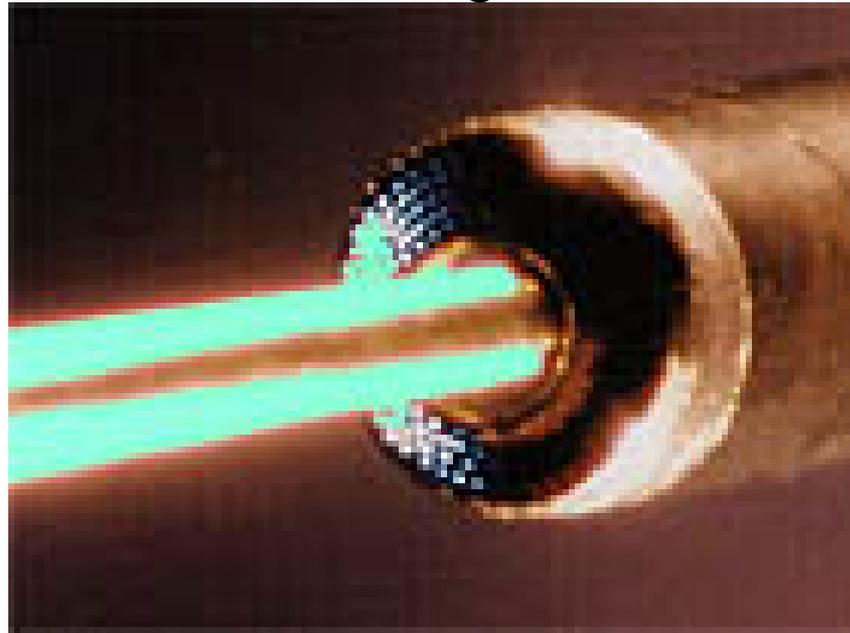
A. Shaver type

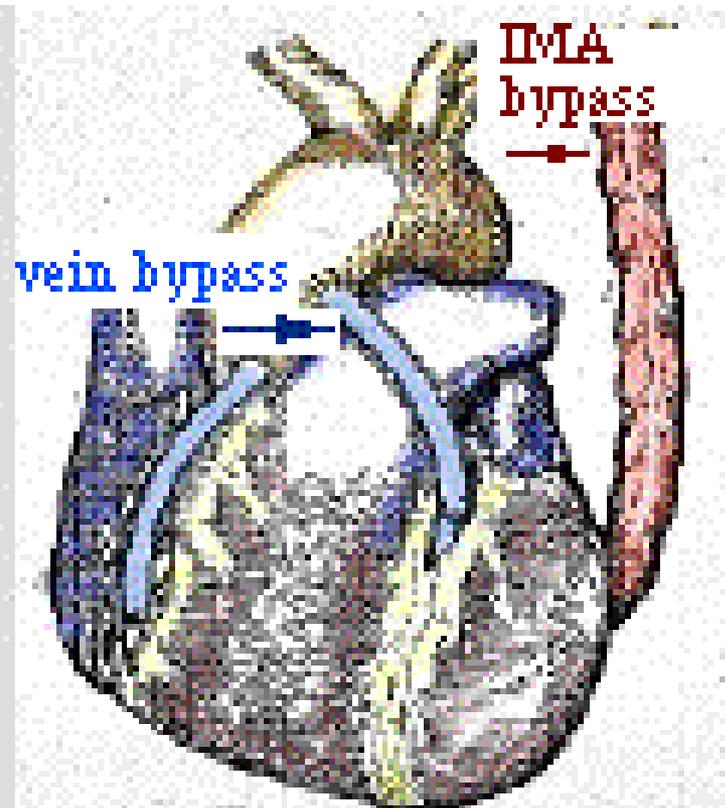
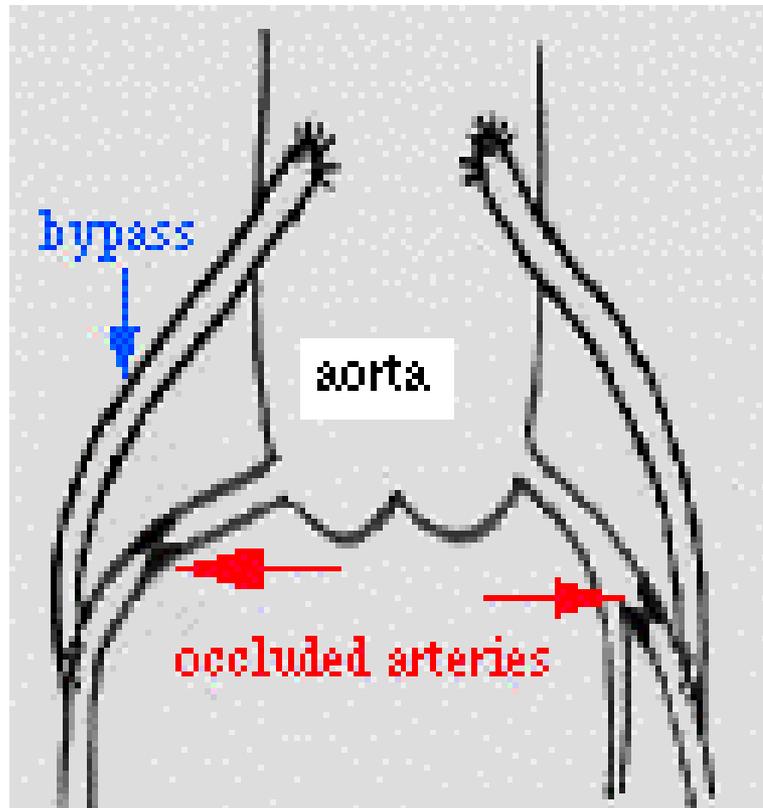


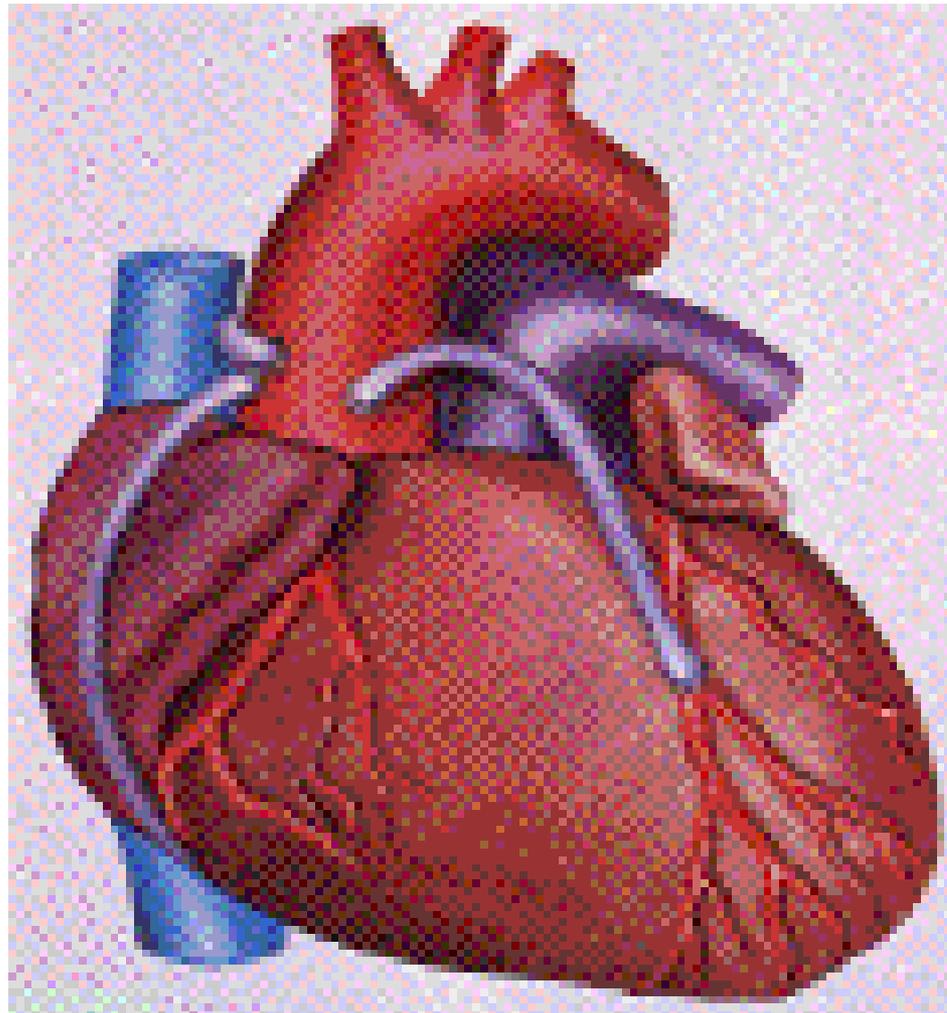
B. Rotational type

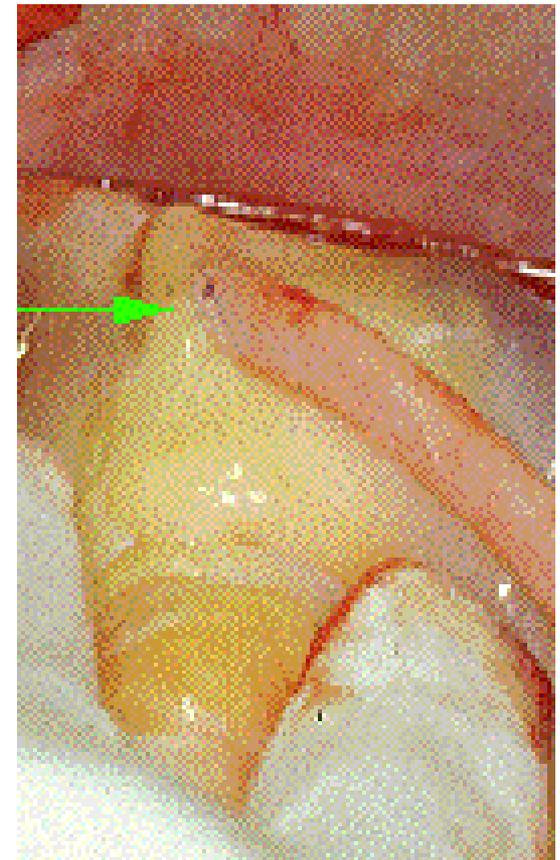
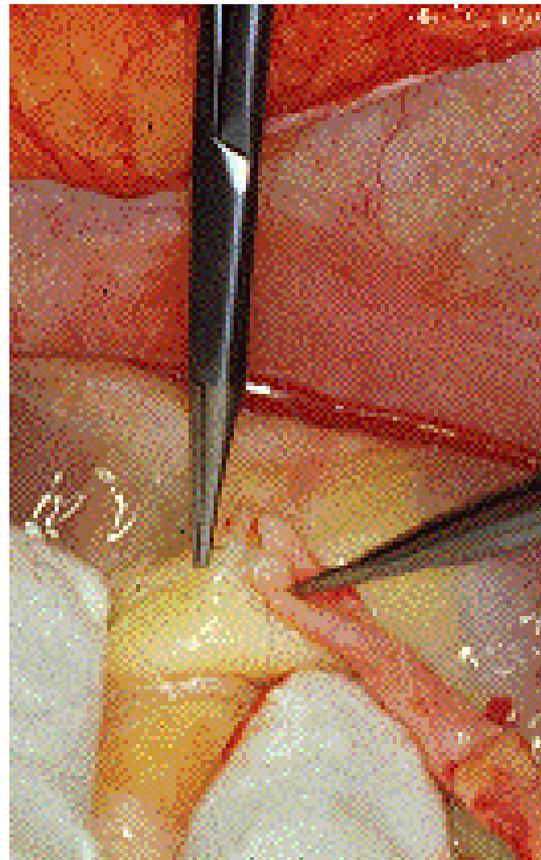
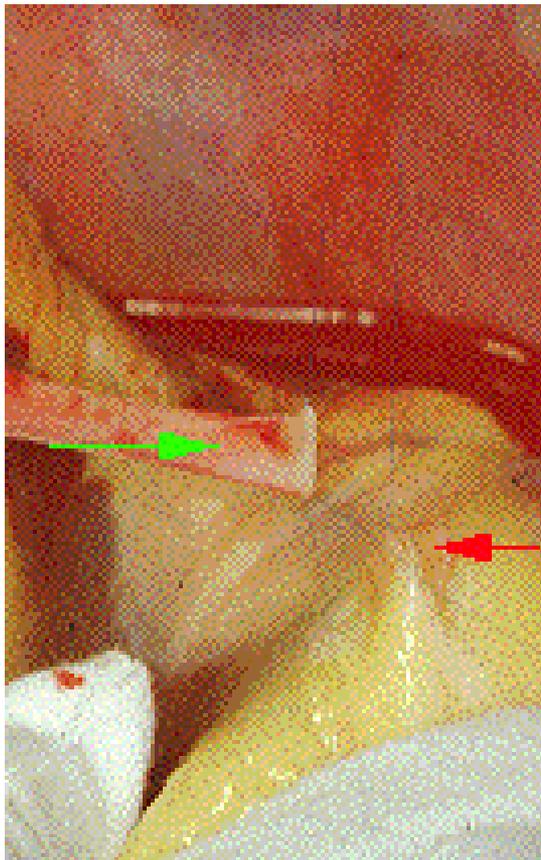


C. Laser fitting



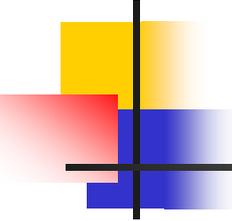






TRANSMYOCARDIAL LASER REVASCLARIZATION



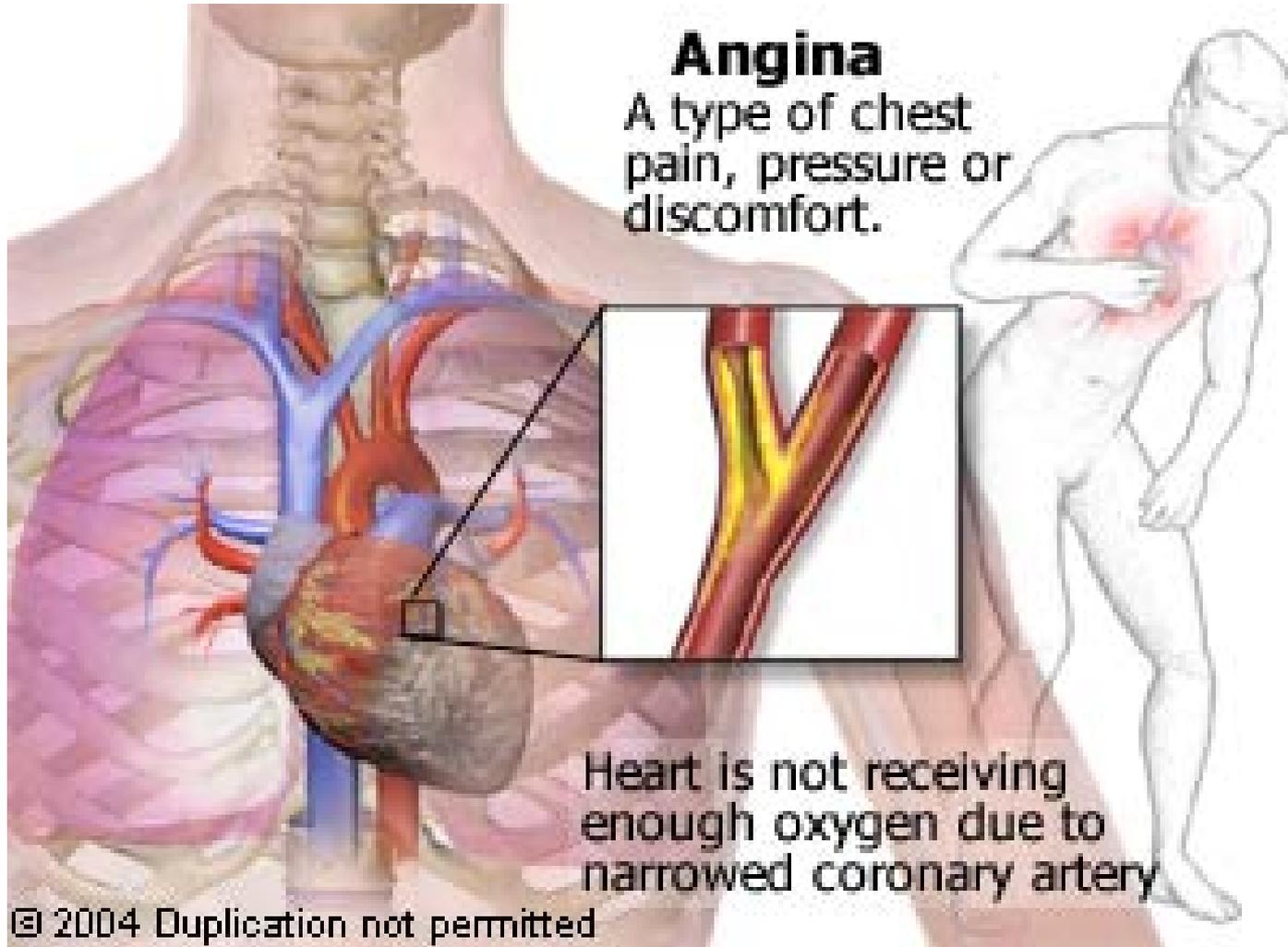


Angina Pectoris

- **Symptom of ischemia**
 - Caused by CAD
- ↑ need for oxygen
 - Caused by ↑ heart workload
- Inadequate blood supply
 - Ischemia
- Chest pain
 - Until activity stopped
- **NO PERMANENT MYOCARDIAL DAMAGE**

Angina

A type of chest pain, pressure or discomfort.



Heart is not receiving enough oxygen due to narrowed coronary artery

Angina Pectoris

Signs & Symptoms

- Chest pain
 - Heaviness
 - Tightness
 - Viselike
 - Crushing
- Feeling of impending doom
- Radiation
 - Both arms
 - Left arm
 - Shoulder
 - Neck
 - Jaw back
- Pale skin
- Diaphoresis
- dyspnea

Angina Pectoris

Types

- Stable
 - Symptoms with activity
- Unstable
 - ↑ frequency of episodes, ↑ severity
 - Indicative of worsening CAD
- Variant (Prinzmetal's) Angina
 - Pain same as stable
 - Longer duration
 - Can occur at rest

Angina Pectoris

Diagnosis

- EKG
- Stress test
- Radioisotope imaging
- Coronary angiography

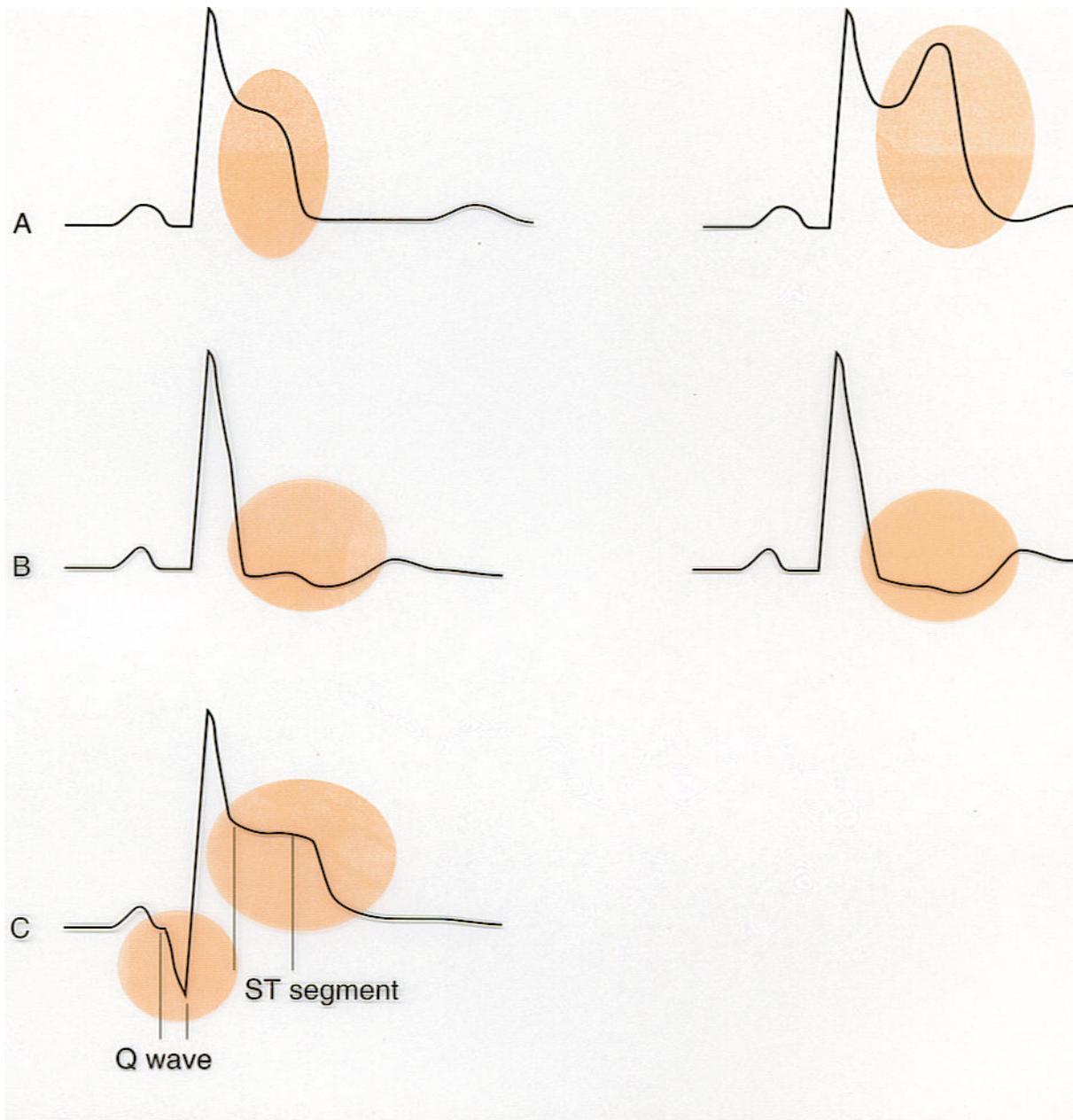


Figure 18-3. ECG changes during myocardial infarction. (A) ST segment elevation—injury (B) ST segment inverted—ischemia. (C) Large Q wave—ST segment elevation—necrosis.

Angina Pectoris

Treatment

- Three major medication groups
 - Vasodilators
 - Calcium channel blockers
 - Beta blockers

Angina Pectoris

Treatment - Vasodilators

- Nitroglycerine
 - Routes
 - Sublingual
 - Buccal spray
 - IV
- Isosorbide dinitrate (Isordil)
- Isosorbide mononitrate (ISMN)

Angina Pectoris

Treatment - Vasodilators

- Side effects
 - Headache
 - Light headedness
 - Postural hypotension
 - Tachycardia
 - flushing

Angina Pectoris

Treatment - Vasodilators

- Nursing Implications
 - Monitor BP and apical rate
 - Warn pt of orthostatic ↓ BP
 - Administration
 - 1 tab sl q 5mins X3
 - If not effective – immediate medical treatment
 - Keep in light protected glass bottle
 - Burning/tingling under tongue

Angina Pectoris

Treatment

- Calcium channel blockers (CCBs)
 - Diltiazem (Cardizem)
 - Nifedipine (Procardia)
 - Verapamil (Calan, Isoptin)

Angina Pectoris

Treatment - CCBs

- Side effects
 - Headache
 - Peripheral edema
 - Dysrhythmias
 - Flushing
 - Dizziness
 - AV block

Angina Pectoris

Treatment - CCBs

- Nursing implications
 - Monitor BP & apical rate
 - Hold if BP < 90 systolic
 - Hold if HR < 50

Angina Pectoris

Treatment

- Beta Blockers
 - Propranolol (Inderal)
 - Metoprolol (Lopressor)
 - Atenolol (Tenormin)

Angina Pectoris

Treatment – Beta Blockers

- Side effects
 - Dizziness
 - Bradycardia
 - Hypotension
 - Nausea
 - Confusion
 - Fatigue
 - Agranulocytosis
 - laryngospasm

Angina Pectoris

Treatment – Beta Blockers

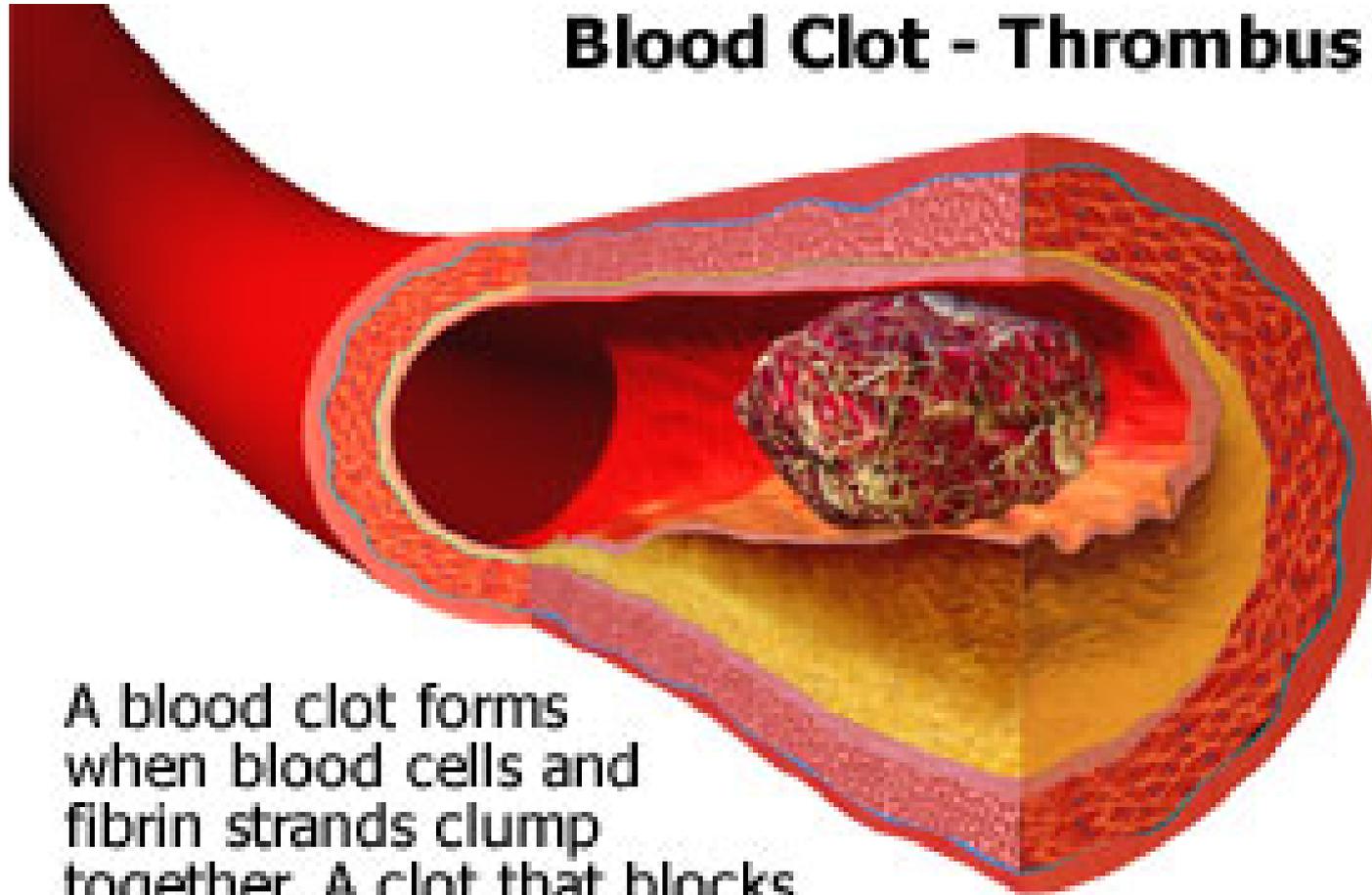
- Nursing Implications
 - Assess HR and BP
 - Administer with food
 - Do not give non cardio selective w/asthma
 - Do not stop abruptly

Myocardial Infarction

Pathophysiology

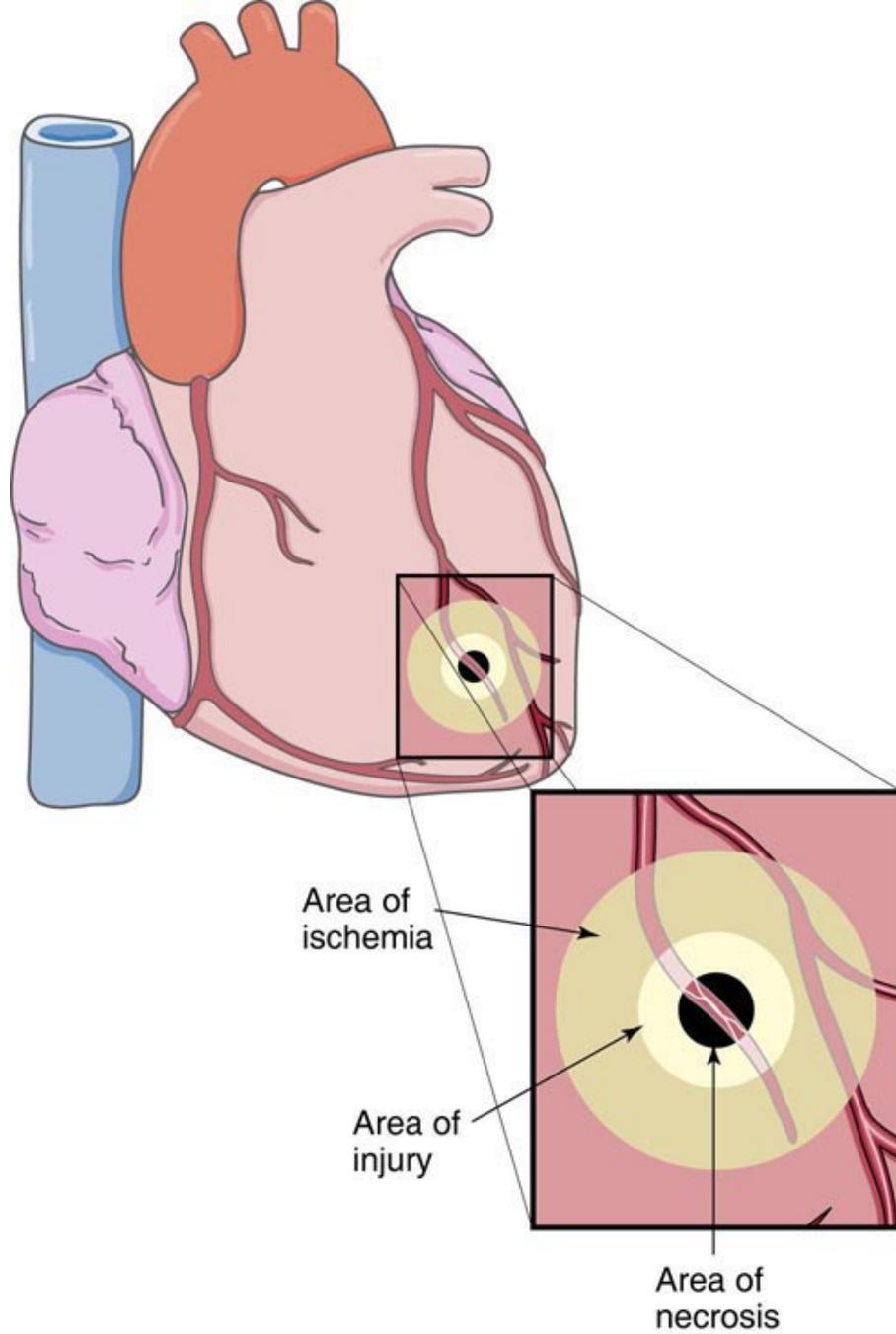
- Myocardial necrosis
 - Takes several hours for complete necrosis
 - Depressed myocardial contractility
- Sympathetic NS effects
 - Increased HR
 - Increases myocardial O₂ demand
 - Can increase infarction size
- **Size of infarction depends on how quickly blood supply can be restored**

Blood Clot - Thrombus

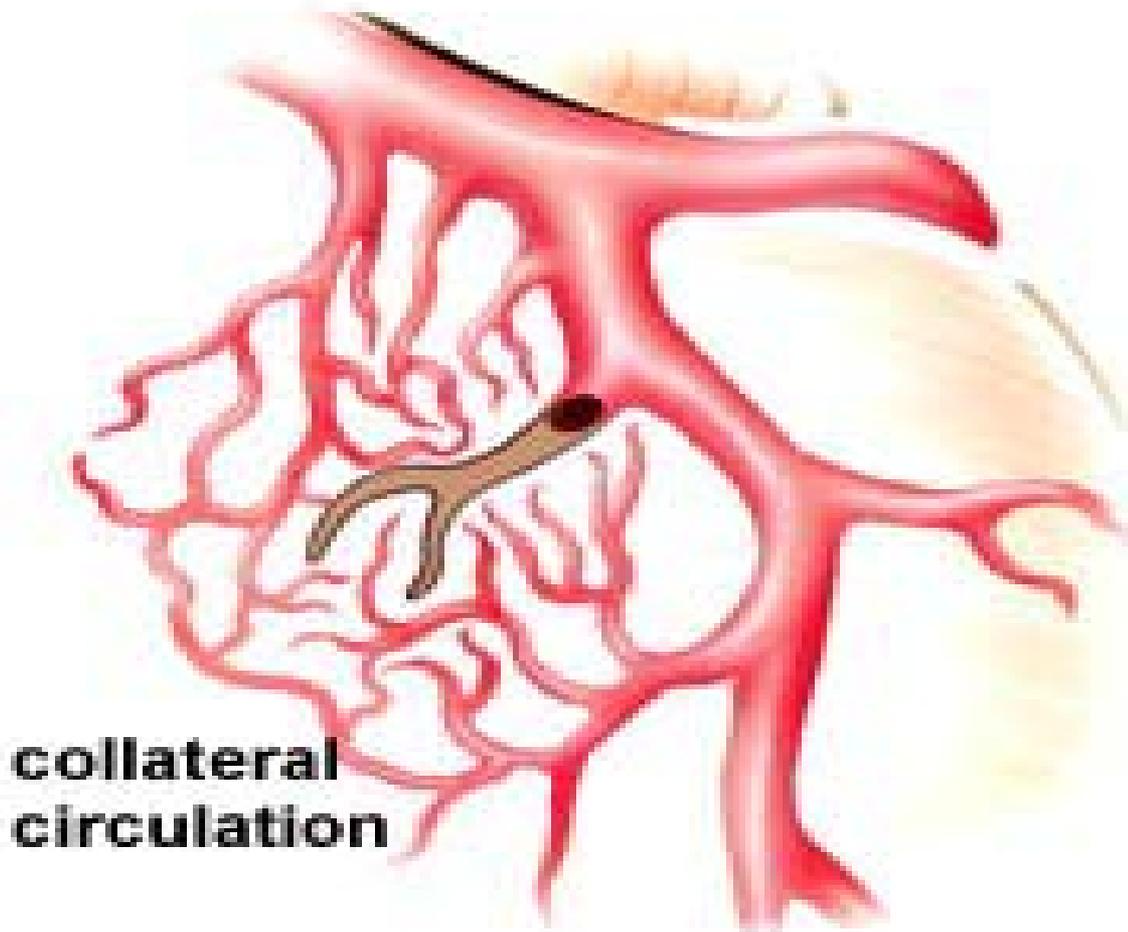


A blood clot forms when blood cells and fibrin strands clump together. A clot that blocks blood flow is called a thrombus.

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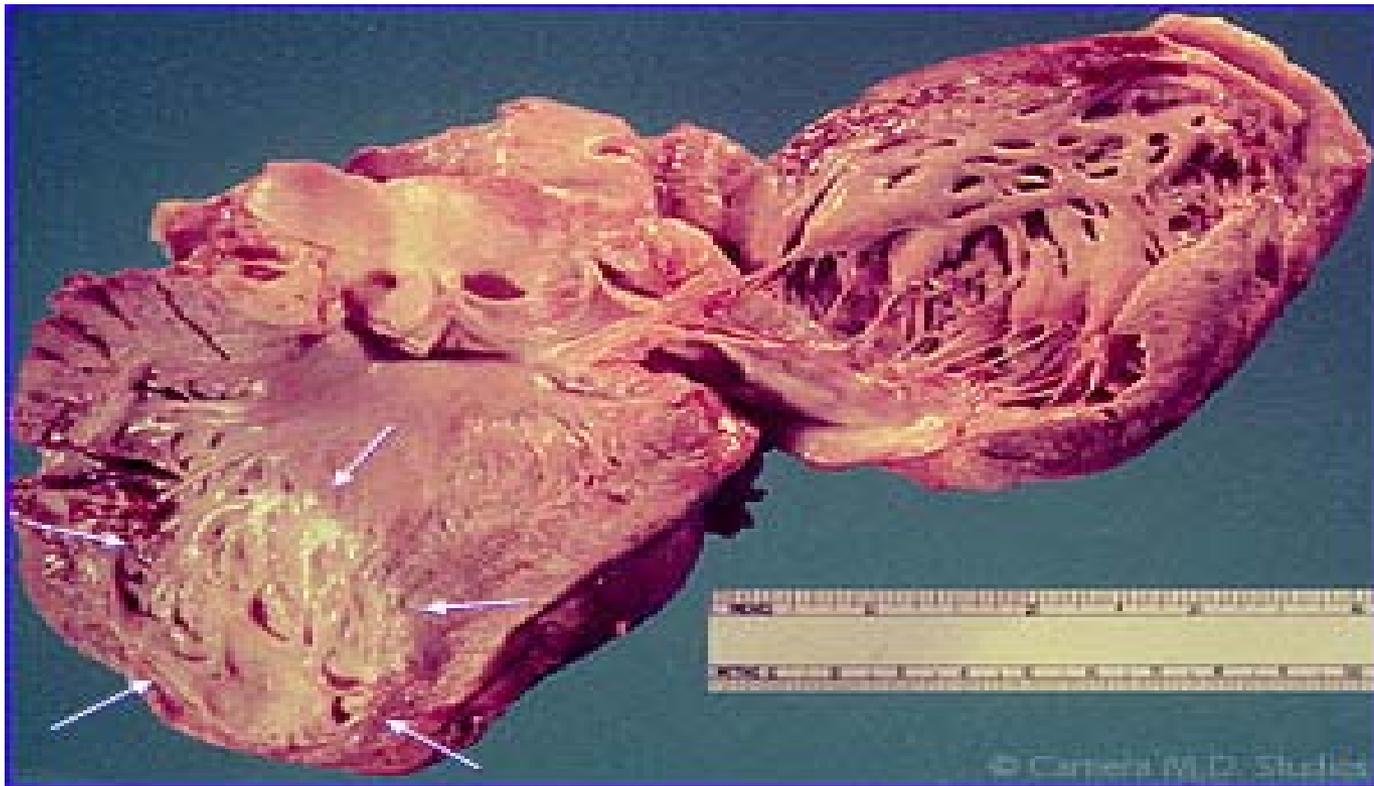


Collateral Circulation

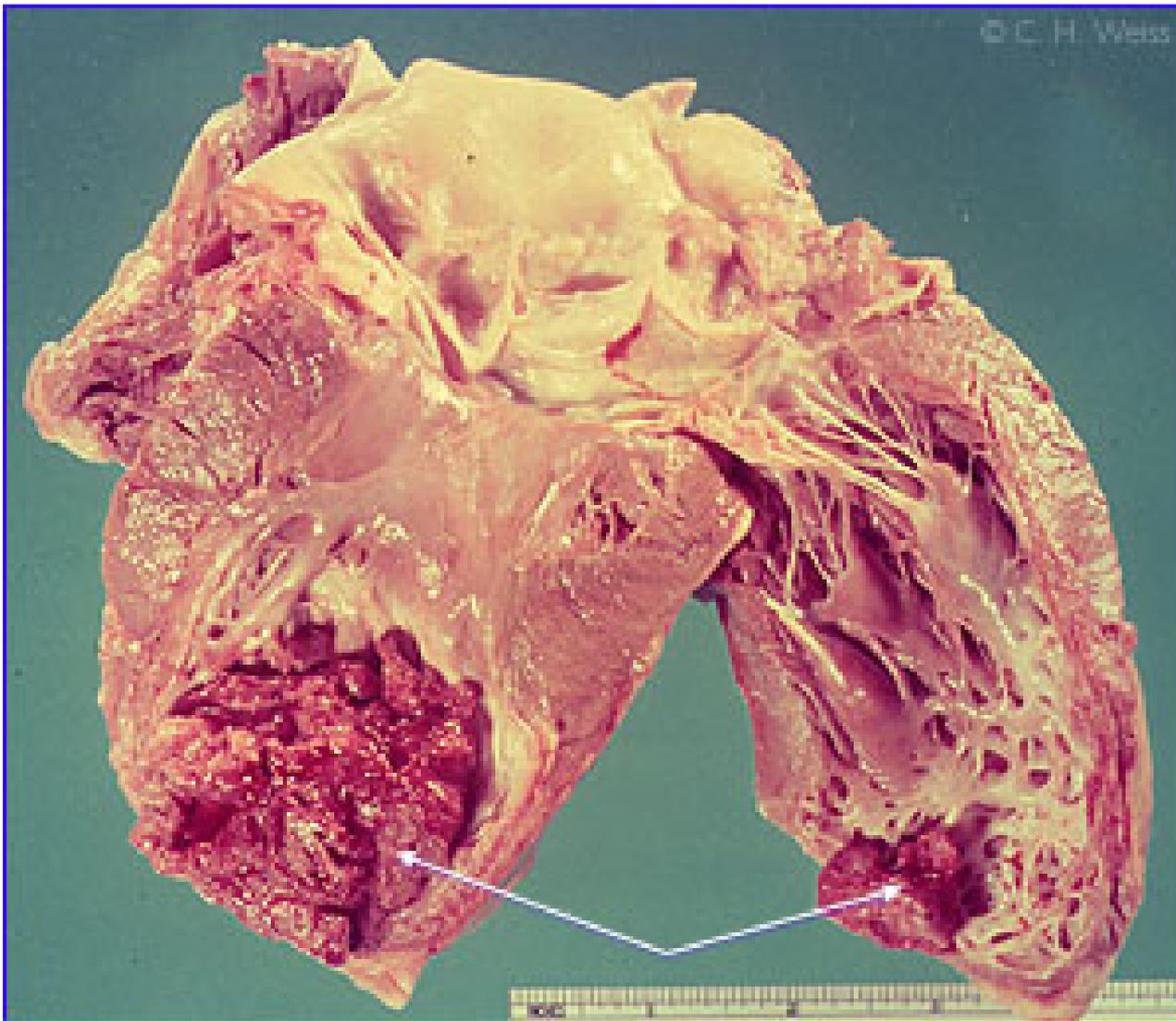


**collateral
circulation**

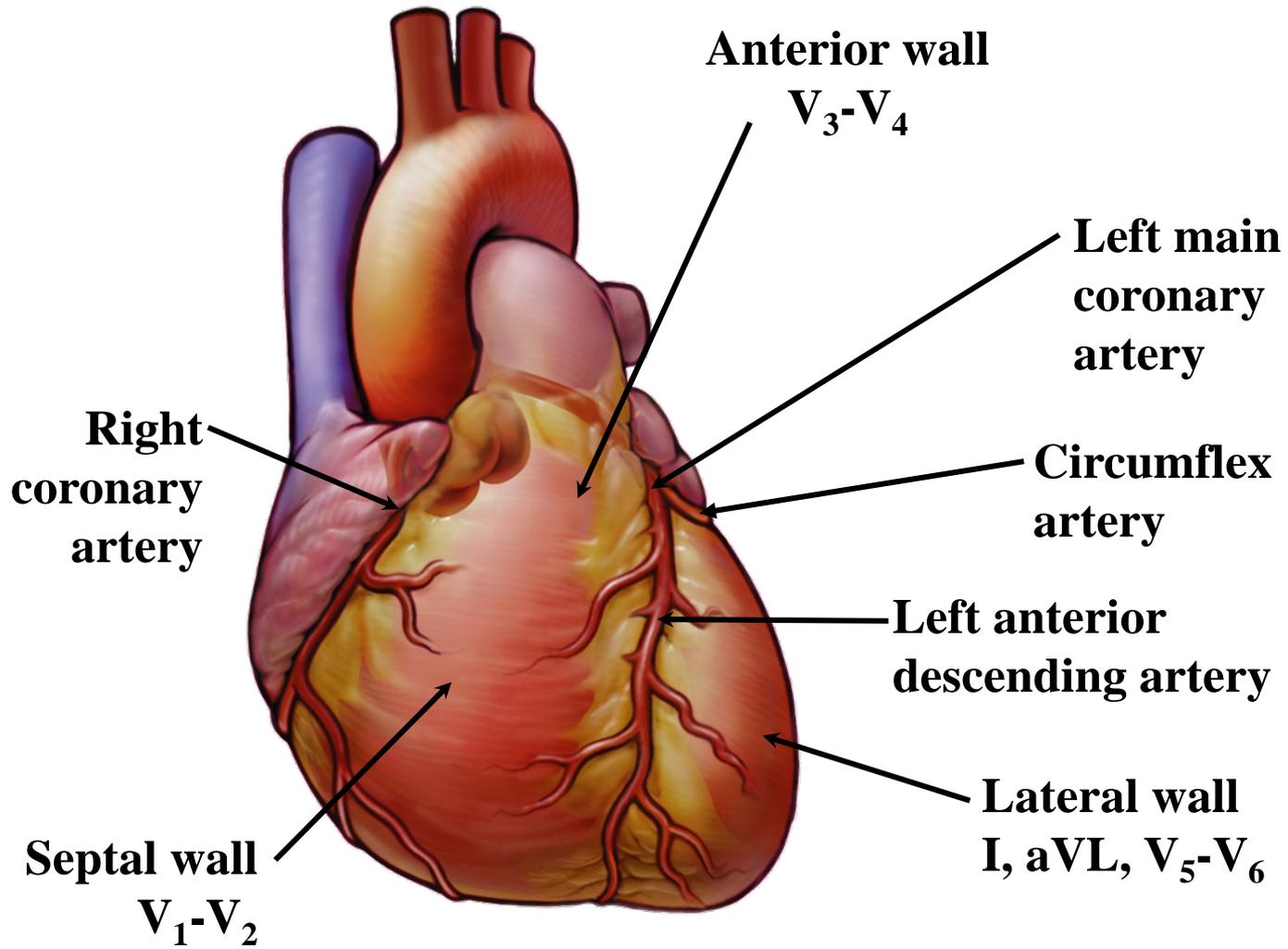
Myocardial Infarction

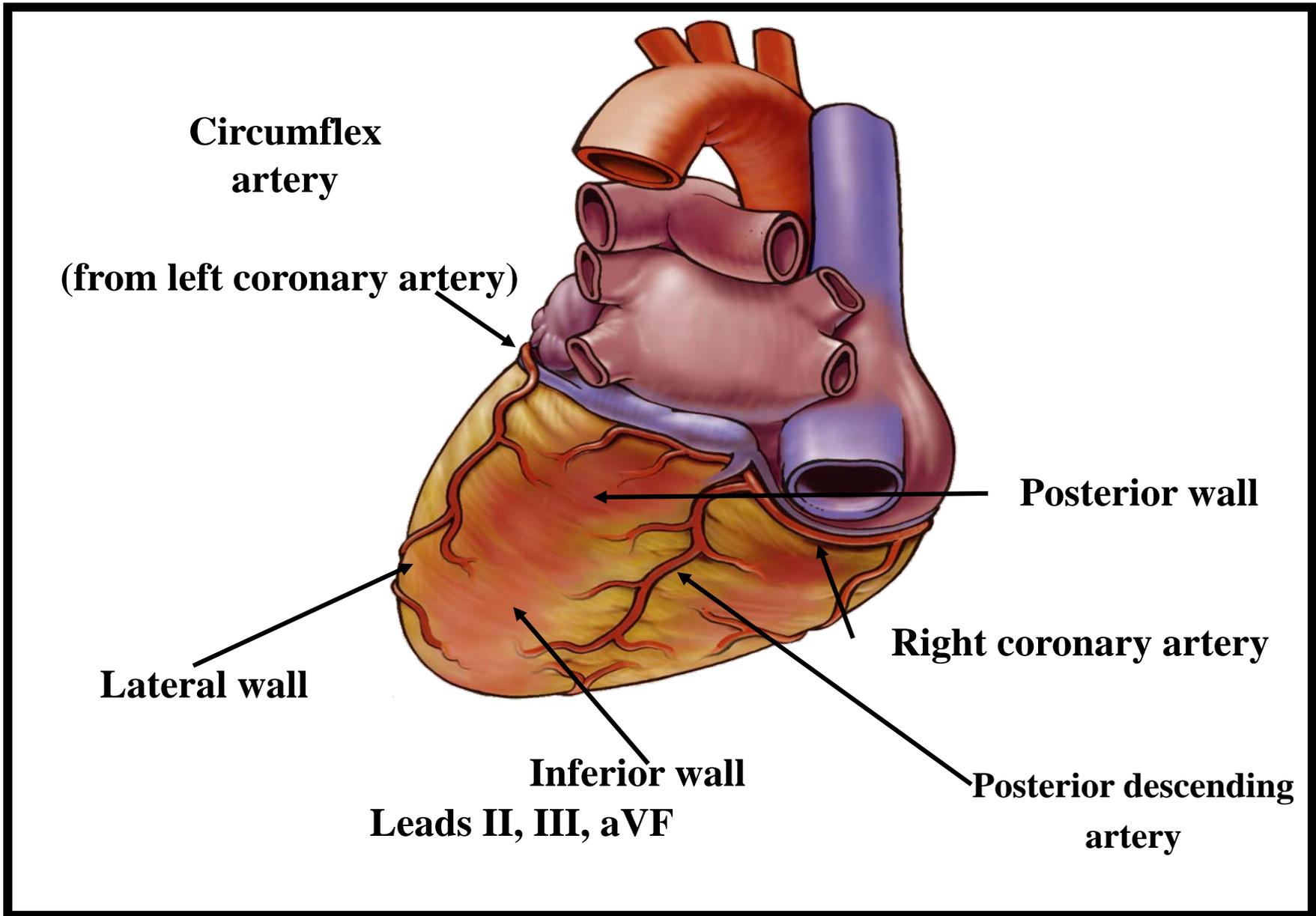


The arrows point to the site of a heart attack, where the heart muscle has died from oxygen deprivation. Normally, the area would look pink.



In some heart attacks, a condition called mural thrombus occurs. Blood that is no longer pumping through the heart starts clotting, eventually turning into a fibrous tissue that marks the exact location of the heart attack.







Coronary arteries are the network of blood vessels that supply the heart. In this photograph, the left coronary artery has been injected with a red dye, and the right coronary artery with white.

Myocardial Infarction

Signs & Symptoms

- Pain
 - Continued at rest
 - “Crushing or viselike”
 - May radiate
- Dyspnea
- Restlessness
- Feeling of impending doom
- Nausea & vomiting
- Diaphoresis
- Cold, ashen skin
- Crackles & wheezes
- Rapid HR
- Irregular HR
- Extra heart sound
 - S3 or S4

Myocardial Infarction

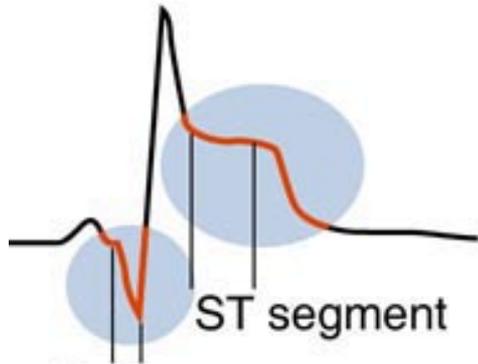
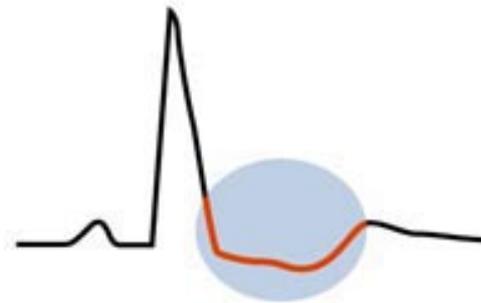
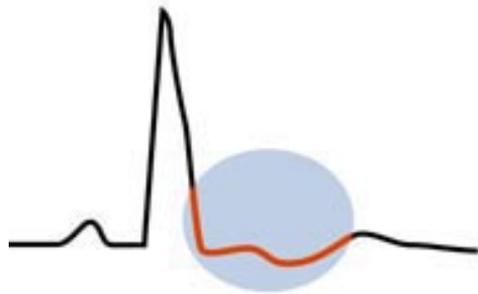
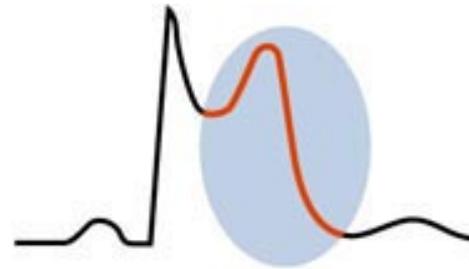
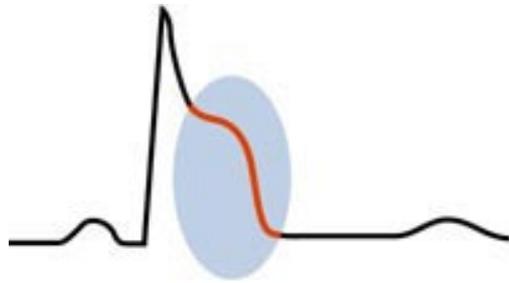
Gerontological Implications

- Silent MI
 - Over 85 yrs
 - No pain
 - Sudden onset
 - Shortness of breath
 - Fainting
 - Restlessness
 - Fall
- More collateral circulation
 - Fewer complications

Myocardial Infarction

Diagnostic Tests

1. History
2. Serial ECG
3. Serial cardiac troponin I
4. Myoglobin
5. Serial CK – MB
6. Magnesium levels
7. PT/PTT



Q wave

ST segment

Myocardial Infarction

Initial Treatment

- ASA 325mg @ onset of chest pain
- Oxygen
- CCU
- Cardiac monitor
- Bedrest
- Prompt medical intervention

Myocardial Infarction

Treatment - Diet

- Acute phase
 - Small easily digestible meals
 - Caffeine restricted
 - Room temp fluids
- Cardiac diet
 - Low cholesterol, low fat, low sodium

Myocardial Infarction

Treatment - Medications

- Analgesics
- Nitrates
- Thrombolytics
- Anticoagulants
- Beta blockers
- ACE inhibitors
- Antidysrhythmics

Myocardial Infarction

Complications

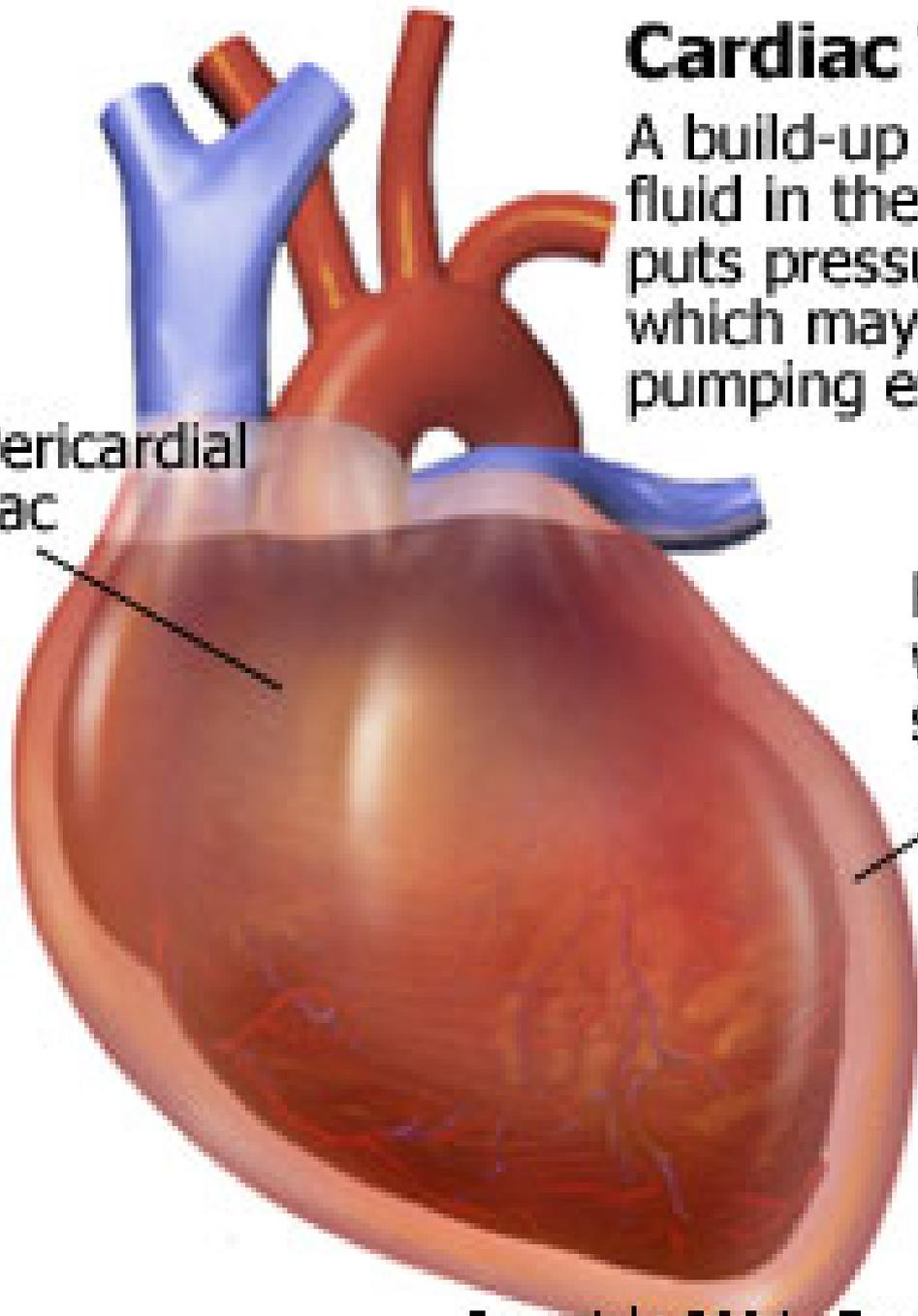
1. Cardiogenic shock
2. Acute pulmonary edema
3. Cardiac tamponade/pericarditis
4. Arrhythmias

Cardiac Tamponade

A build-up of blood or other fluid in the pericardial sac puts pressure on the heart, which may prevent it from pumping effectively.

Pericardial
sac

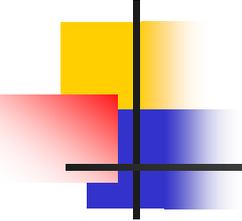
Fluid build-up
within pericardial
sac



Myocardial Infarction

Nursing Interventions

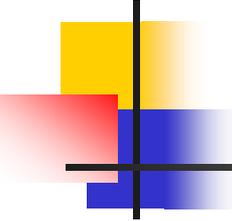
- Semi-fowler's position
- Support arms with pillows
- Avoid Valsalva maneuver
- Provide emotional support
- Patient education
 - Prevention of complications
 - Smoking cessation



Myocardial Infarction

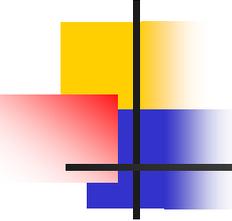
Cardiac Rehabilitation

- Initiated after acute s/s resolved
- Goal
 - Improve cardiac function
 - Return to as normal life as possible
- Started in hospital
- Continued as outpatient



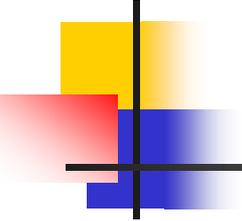
Peripheral Vascular Disease (PVD)

- Either arterial or venous in origin
- Arterial
 - Leg pain with leg elevation
 - Calf pain with activity (disappears w/rest)
- Venous
 - Slower onset
 - Not necessarily associated with activity
 - Leg pain when in dependent position



PVD (cont.)

- Thrombus
 - Blood clot adherent to vessel
- Embolus
 - Clot (thrombus) that develops elsewhere
 - Dislodges
 - Travels and blocks smaller vessel



(PVD)

Etiology

- Thrombus
 - Injury to arterial wall
 - Sluggish blood flow
 - Plaque formation
 - Secondary to atherosclerosis
- Embolism
 - Dysrhythmias
 - Prosthetic heart valves
 - Rheumatic heart disease

PVD (cont.)

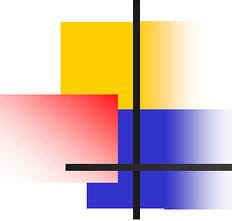
Thrombosis & Emboli

- Numbness
- Decreased movement
- Pale
- Cool
- Progression to necrosis/gangrene
 - Within hours
- Six P's of acute arterial occlusion
 - Pain
 - Pallor
 - Pulselessness
 - Paresthesia
 - Paralysis
 - poikilothermia

PVD (cont.)

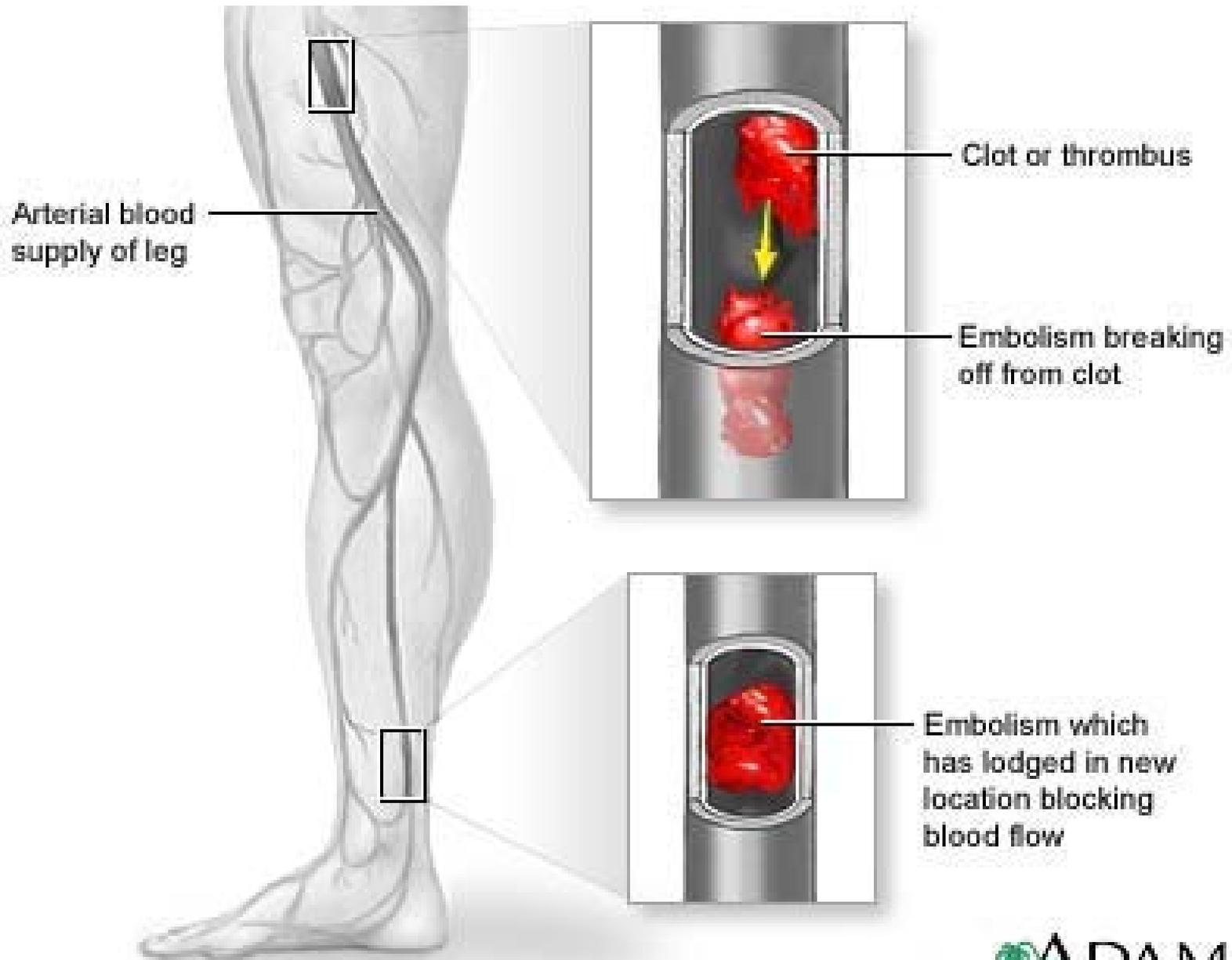
Treatment

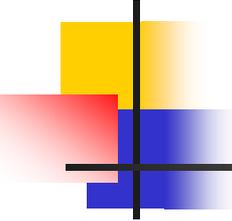
- Anticoagulant therapy
 - IV heparin is drug of choice
 - Coumadin – after 3-7 days
- Thrombolytic therapy
- Embolectomy or thrombectomy
 - Severe occlusion



Peripheral Arterial Disease

- Chronic, progressive narrowing & obstruction of arterial vessels
 - Lower extremities most commonly affected
- Atherosclerosis most common cause

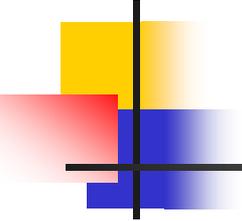




Peripheral Arterial Disease

Pathophysiology

- Impedance of blood flow distal to blockage
 - Decreased nutrition
 - Cellular waste accumulation
 - Development of ischemia
 - Necrosis and gangrene



Peripheral Arterial Disease

Pathophysiology (cont.)

- Compensatory mechanisms
 - Peripheral vasodilatation
 - Anaerobic metabolism
 - Development of collateral circulation

Peripheral Arterial Disease

Signs & Symptoms

- Occur late in disease process
- Intermittent claudication
 - Due to ↓ blood supply to muscles
- Skin color changes
- Cool extremities
- Diminished or absent pulses

Peripheral Arterial Disease

Stages

- Stage I
 - Asymptomatic
- Stage II
 - Claudication
- Stage III
 - Rest pain
- Stage IV
 - Necrosis/gangrene

Peripheral Arterial Disease

Diagnostic Tests

- Ankle-brachial index
 - Normally equal
- Doppler ultrasound
- MRI
- Arteriography

Peripheral Arterial Disease

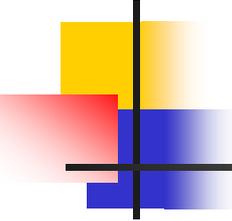
Treatment

- Conservative treatment
 - Diet
 - Low calorie, low fat, low cholesterol
 - Medications
 - Lipid lowering agents
 - Vasodialators
 - Trental

Peripheral Arterial Disease

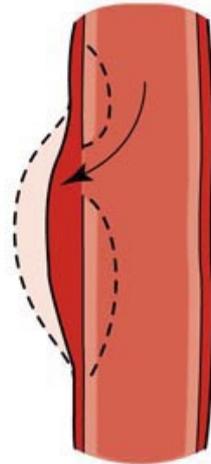
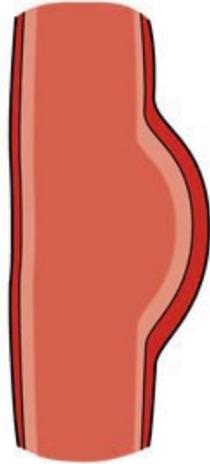
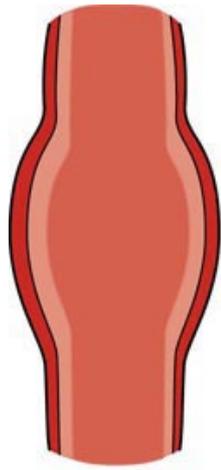
Treatment (cont.)

- Thrombolytic therapy
 - Used with thrombus or emboli
- Surgical treatment
 - PCTA
 - Peripheral artherectomy
 - Intravascular stents



Aneurysms

- Pathophysiology
 - Bulging or dilatation of weakened arterial wall
- Etiology
 - Atherosclerosis, trauma, congenital
- Risk factors
 - Men
 - > 60yrs of age
 - hypertension



Aneurysms

Signs & Symptoms

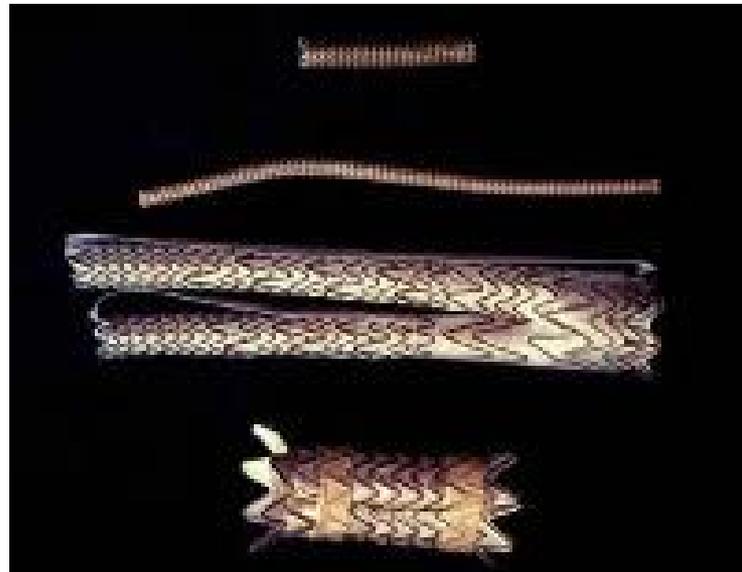
- Back or flank pain
- Full feeling
- Abdominal bruit
- Palpable pulsating mass in abdomen
- Severe sudden back/abdominal pain
 - May indicate rupture
 - Mortality very high

Aneurysms

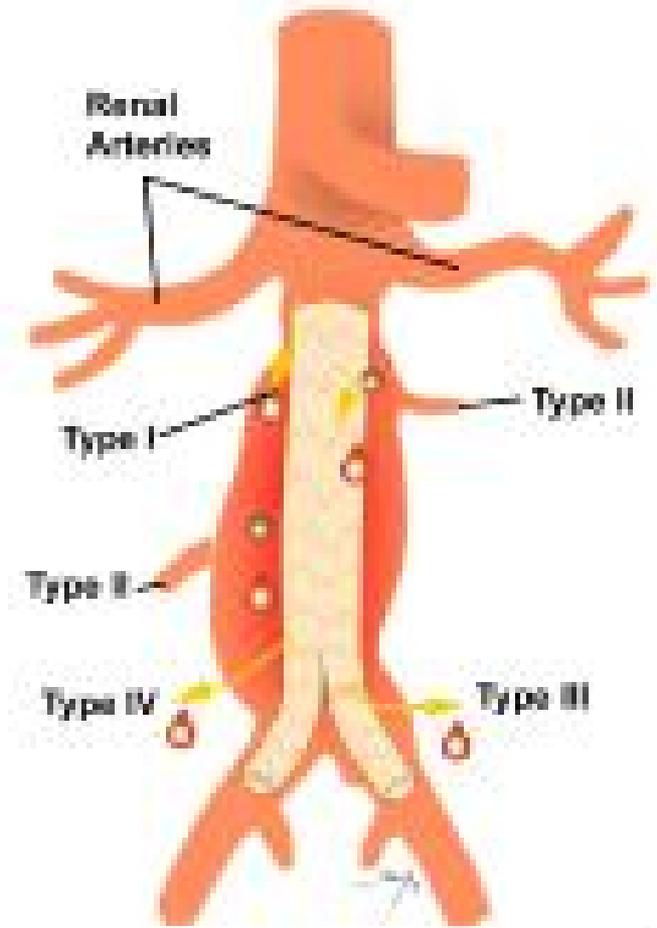
Treatment

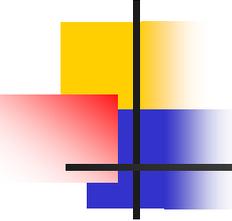
- Lower BP
 - Antihypertensives
- Surgery
 - Bypass graft indicated
 - Severe pain
 - Circulatory compromise
 - > 5 cm





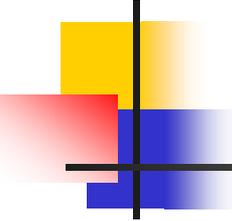
Aortic Stent Grafts





Buerger's Disease (Thromboangiitis Obliterans)

- Chronic inflammation
 - Small & medium arteries & veins
 - Lower extremities
- Definite link to smoking
- Common in smoking males
 - 20 - 40yrs of age



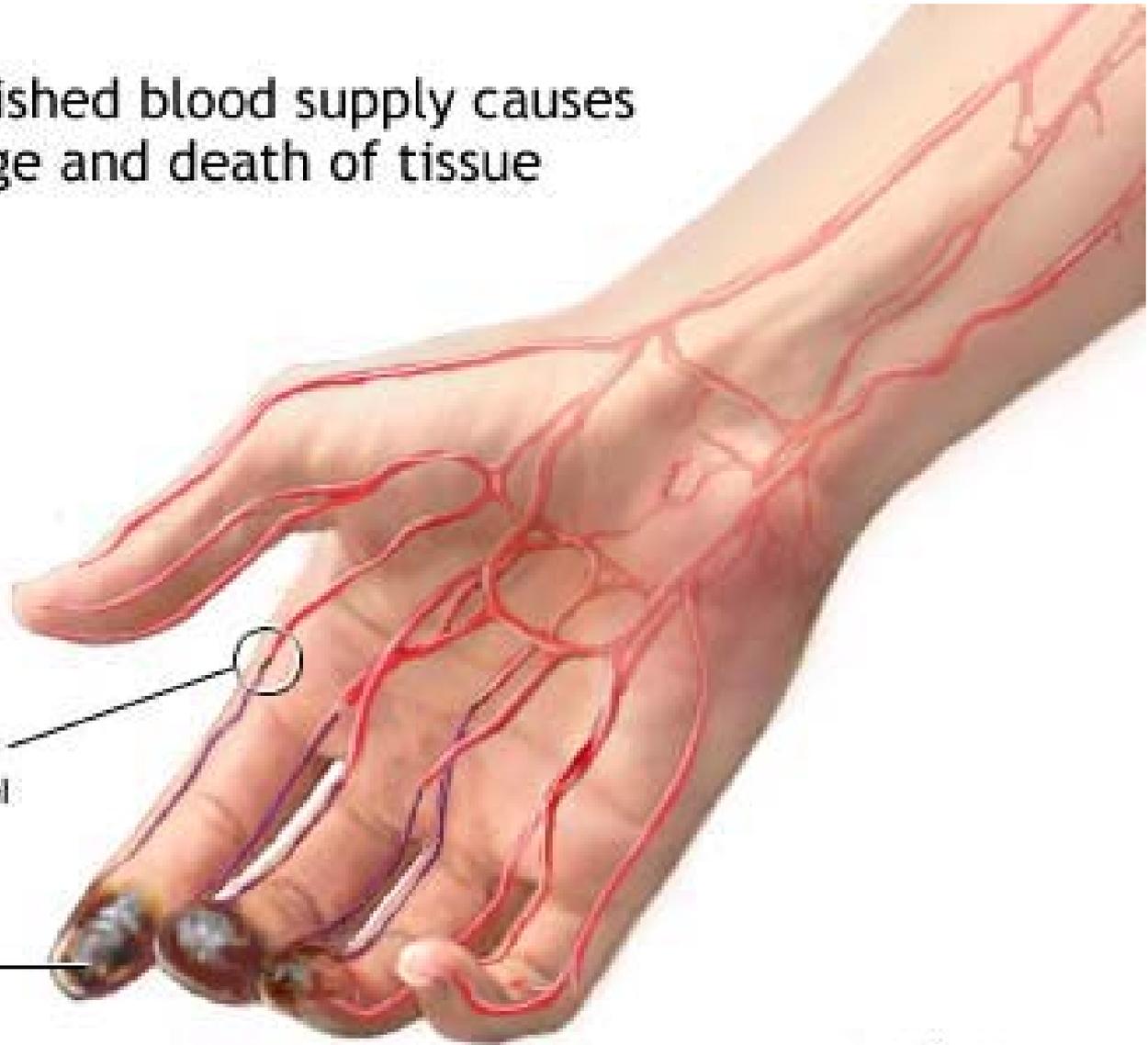
Buerger's Disease (cont.)

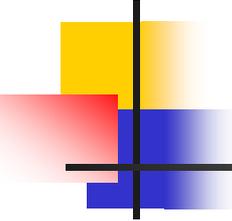
- Signs & symptoms
 - Intermittent claudication
 - Numbness
 - Decreased sensation
- Treatment
 - Stop smoking
 - Calcium channel blockers

Diminished blood supply causes damage and death of tissue

Obstructed
blood vessel

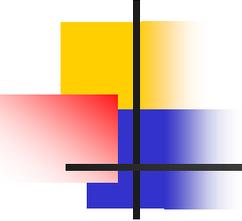
Dead tissue
beyond
obstruction





Raynaud's Disease

- Spasms of small arteries
 - Usually in response to cold exposure
- Primarily affects hands
 - Feet, ears, nose may be affected
- Intermittent attacks for 2 years
 - To make diagnosis
- More common in women



Raynaud's Disease

Signs & Symptoms

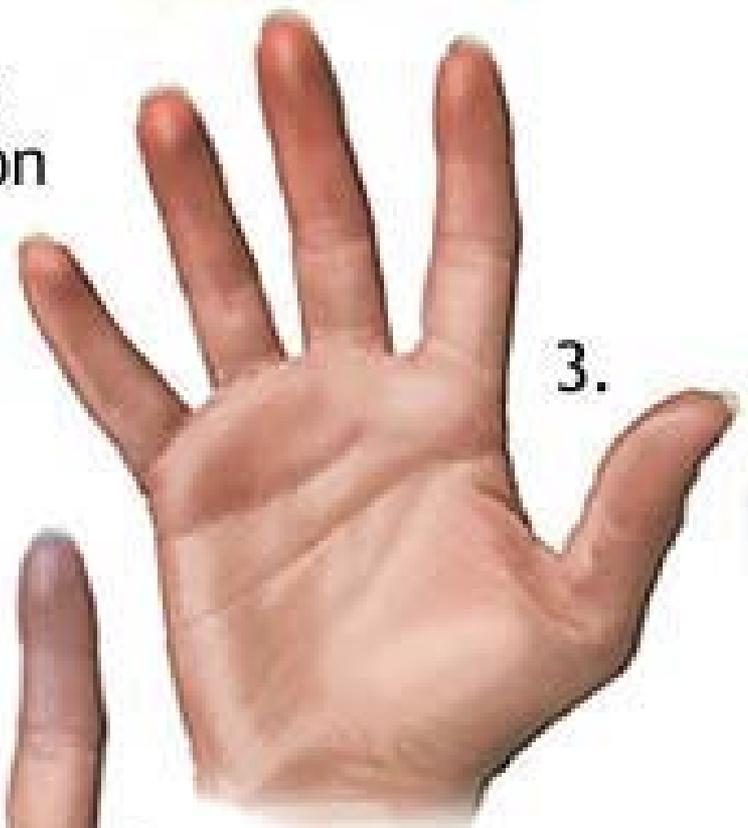
- Intense pain
- Hyperemia
 - Intense reddening of skin
- Phases of skin blanching
- Disease progression over time
 - Continued constriction
 - Severe decreased blood flow
 - Necrosis & gangrenous

Raynaud's phenomenon

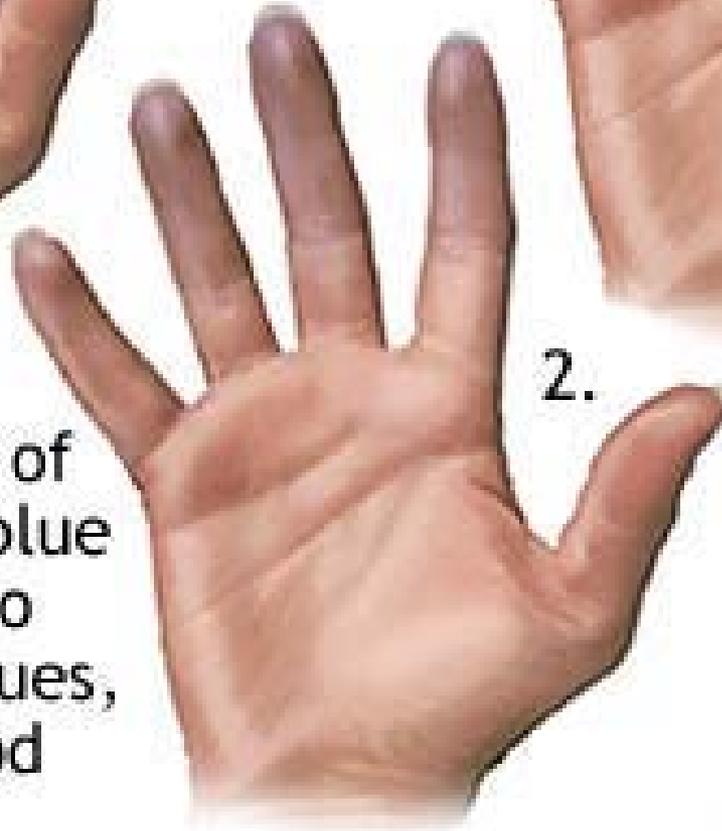
1.



3.



2.



Fingers become white due to lack of blood flow, then blue as vessels dilate to keep blood in tissues, finally red as blood flow returns

Raynaud's Disease

Treatment

- Conservative
 - Keep extremities warm
 - Avoid smoking, alcohol, caffeine
 - Reduce stress
 - Vasodilators
 - Nifedipine (Procardia)
 - Long acting nitrates
- Surgical intervention
 - Sympathectomy

Varicose Veins

Pathophysiology

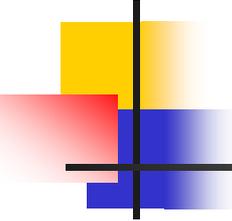
- Structural defect in vessel wall
- Incompetent vessel valves
- Venous dilation
 - Elongated & tortuous veins



Varicose Veins

Treatment

- Conservative treatment
 - Weight loss
 - Increase activity
 - Avoid tight clothing
 - Elastic compression stockings
- Surgical treatment
 - Injection sclerotherapy
 - Vein stripping
 - Closure procedure
 - Radio frequency energy to close off vein



Venous Stasis Ulcers

- Pathophysiology
 - Dysfunctional venous valves
 - Prevents or reduces venous return
- Etiology
 - Chronic venous insufficiency
 - Increased pressure & rupture of small veins

Venous Stasis Ulcers

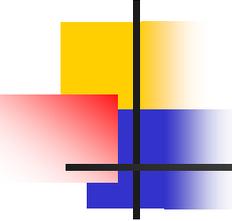
Signs & Symptoms

- Edema
- Brownish discoloration
 - Commonly seen at medial malleolus
- Hard, leathery skin

Venous Stasis Ulcers

Treatment

- Ace wraps
- Bedrest
- Extremity elevation
- Do not cross legs
- Ulcers
 - Topical antibiotics
 - Unna Boot
 - Skin grafting



Lymphangitis

- Inflammation of lymphatic channels
 - Infection
 - Staph or strep
- Signs & Symptoms
 - Pain, redness at site
 - Chills & fever
 - Enlarged regional lymph nodes
 - Lymphatic streak

Lymphangitis

Treatment

- Antibiotic therapy
- Heat
- Elevation
- Pneumatic pressure devices
- Monitor size of extremity