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CEN REVIEW

CARDIOVASCULAR

Presented By:

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TOPICS

- 20 / 150 questions 6.5%
- A&P
- Dysrhythmias
- EKG's
- MI / Chest Pain
- Thrombolytic vs Antiplatelet drugs
- REVIEW QUESTIONS

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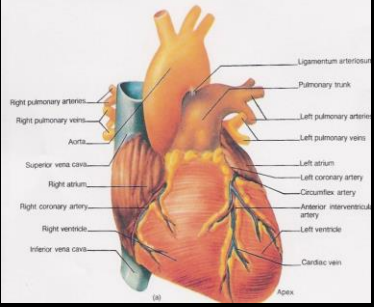
Additional Topics

- Pericarditis / Endocarditis
- CHF / Pulmonary edema
- HTN, PVD
- Aortic Aneurysm, Thromboembolytic disease
- Electrical Devices (AICD / Pacemakers)
- Cardiac Tamponade, Cardiac Contusions
- Arterial Injuries / Injuries to great vessels

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Anatomy

- Location
- Position
 - Base vs. Apex
- Position
 - R Ventricle
 - L Ventricle
- Size




The diagram shows a frontal view of the human heart. Labels on the left side include: Right pulmonary artery, Right pulmonary vein, Aorta, Superior vena cava, Right atrium, Right coronary artery, Right ventricle, and Inferior vena cava. Labels on the right side include: Ligamentum arteriosum, Pulmonary trunk, Left pulmonary artery, Left pulmonary vein, Left atrium, Left coronary artery, Circumflex artery, Anterior interventricular artery, Left ventricle, and Cardiac vein. The apex of the heart is indicated at the bottom.

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Anatomy Layers of the Heart

- **Pericardium**
- **Epicardium**
- **Myocardium**
- **Endocardium**



A blue oval labeled "Pericardial Sac" is positioned to the right of the list of heart layers.

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Blood Flow Right Side

- Superior / Inferior Vena Cava
 - R Atrium
 - Tricuspid Valve
 - R Ventricle
 - Pulmonic Valve
- Pulmonary Artery

Kelly, Smith, 2004

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Blood Flow Left Side

- Pulmonary Vein
 - Left Atrium
 - **Bicuspid Valve**
 - L Ventricle
 - Aortic Valve
- Aorta

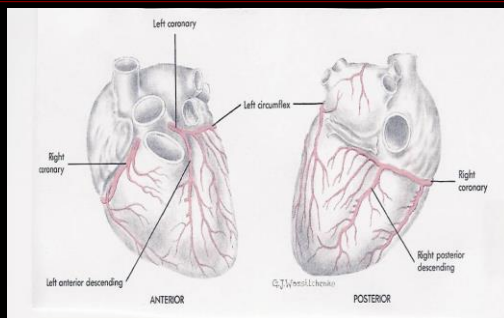
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Coronary Blood Supply

- Right Coronary Artery (RCA)
- Left Coronary Artery (LCA)
 - Divides into 2 major arteries
 - Left Anterior Descending (LAD)
 - Circumflex
- Coronary vessels filled during diastole

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Coronary Blood Supply



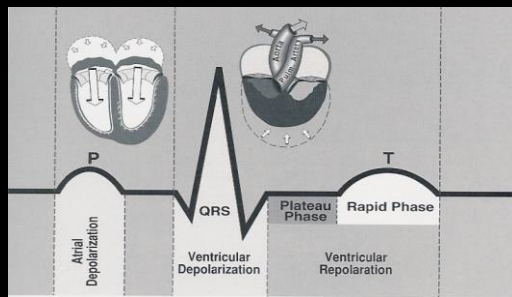
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Electrical Conduction

- Vagus Nerve
- Sinoatrial (SA) Node
- Atrioventricular (AV) Node
- Bundle of His & Perkinjie Fibers

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Conduction Through the Myocardium



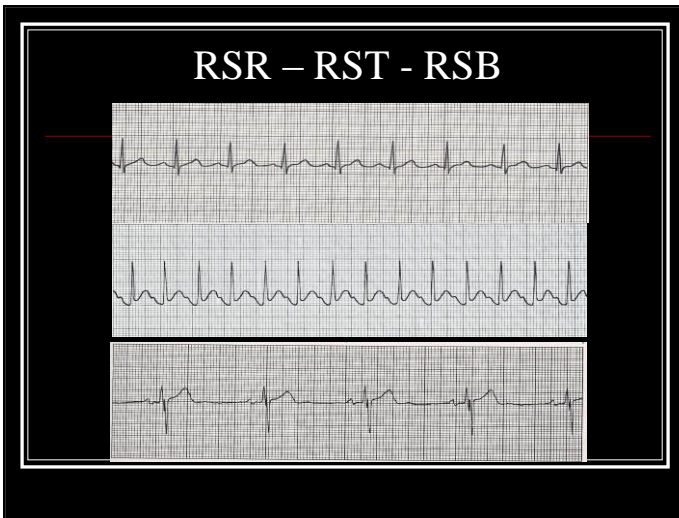
Kelly, Smith, 2004

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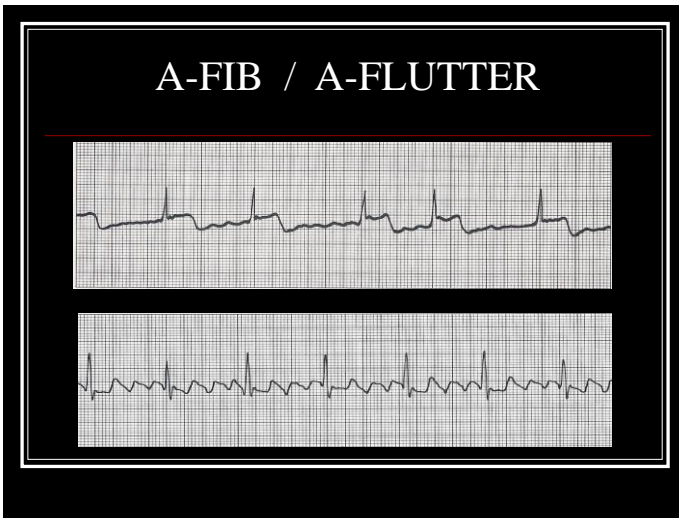
Atrial Rhythms

- Sinus Rhythm
- Sinus Brady
- Sinus Tach
- Sinus Arrhythmia
- A-Fib
- A-Flutter

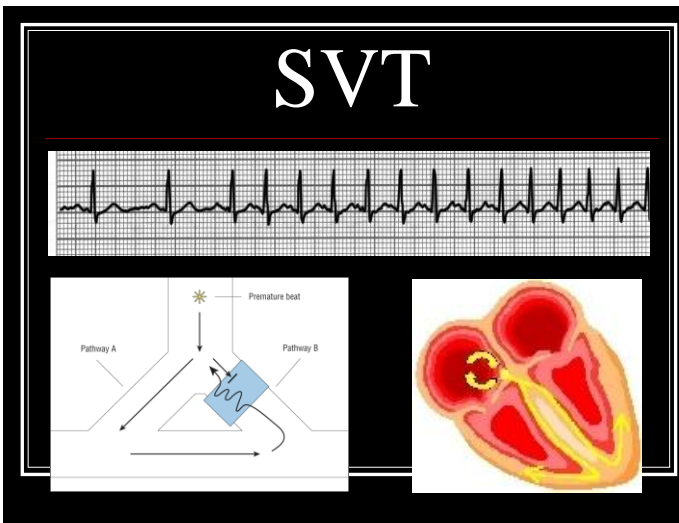
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Ventricular Rhythms

- V-Tach
- V-Fib
- Asystole
- Idioventricular

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V-Fib



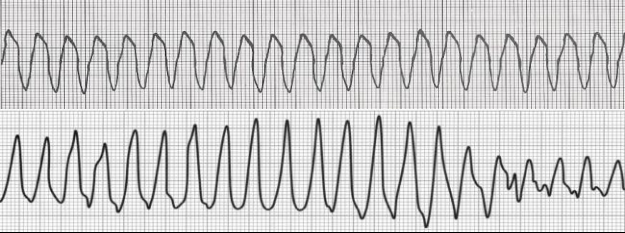
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V-Fib

- Start CPR while waiting for De-fib
- RX – Defib
 - Monophasic – 360 Joules
 - Biphasic - 120 – 200 joules
- CPR for 2 minutes then check a rhythm
- Epinephrine (Adrenaline)
- Amiodarone (Cordarone) / Lidocaine

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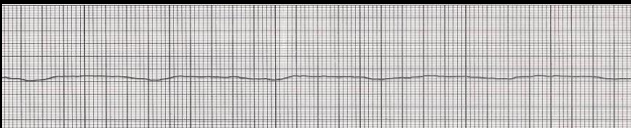
V-Tach



- Amiodarone 150 mg IV over 10 minutes
- Lidocaine 1-1.5 mg / kg IVP
- Synchronized cardioversion 100j

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Asystole



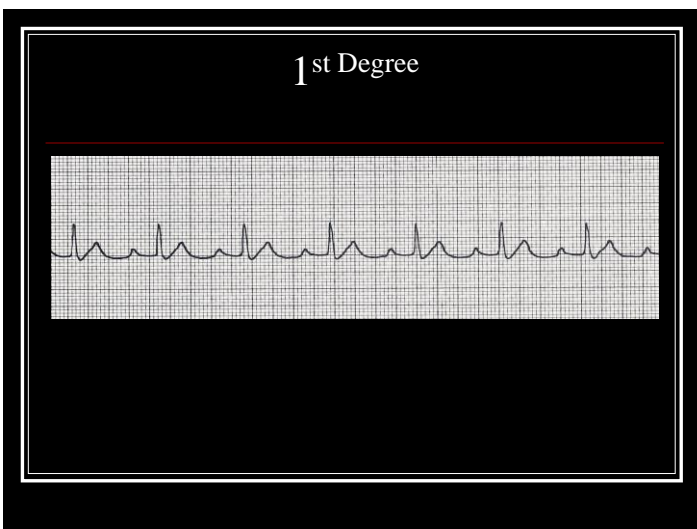
- 30 compressions to 2 breaths
- Epinephrine 1mg / IVP (q 3-5 minutes)

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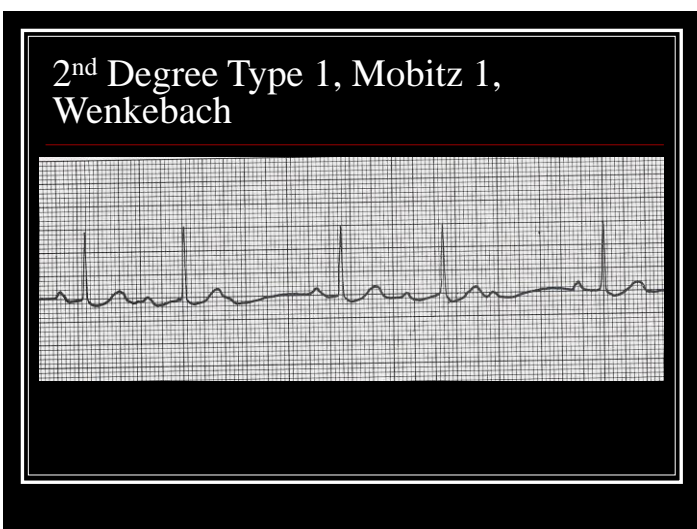
Heart Blocks

First Degree Heart Block	<ul style="list-style-type: none">• Not a true block• Delay at the AV node• Each impulse is eventually conducted
Second Degree Heart Blocks <ul style="list-style-type: none">• Wenckebach (Mobitz I)• Classical (Mobitz II)	<ul style="list-style-type: none">• Intermittent block• Delay gets progressively longer, until . . .• One beat is eventually blocked• Some beats are conducted• Others are intermittently blocked
Third Degree Heart Block (Complete Heart Block)	<ul style="list-style-type: none">• Atria and ventricles are completely dissociated• There is a total block at the AV node

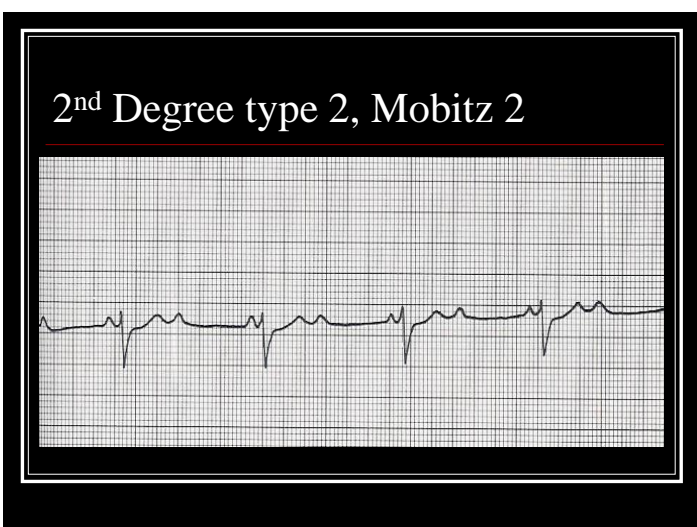
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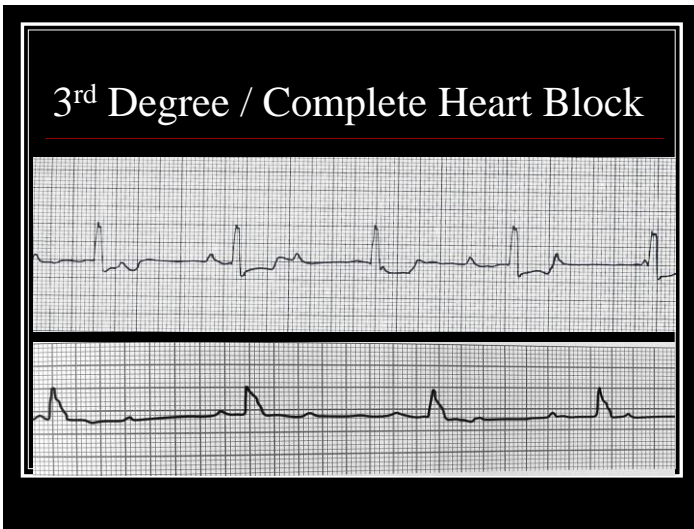
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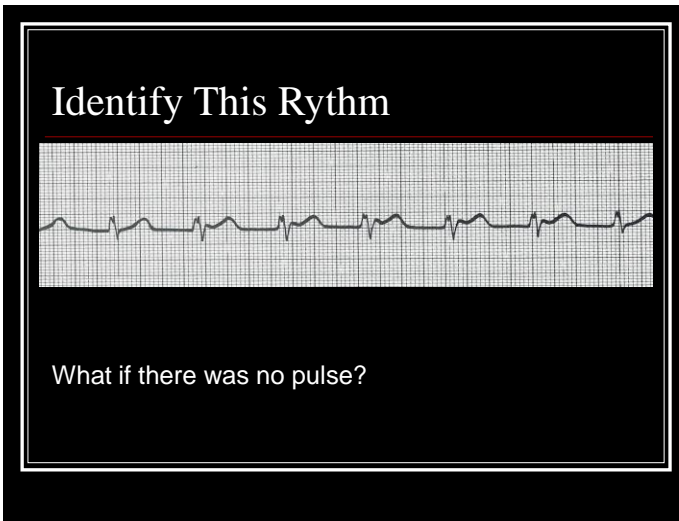
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- ### Causes of PEA
- | | |
|-------------------------------|--------------------|
| 5 H's | 5 T's |
| ■ Hypovolemia | ■ Trauma |
| ■ Hypoxia | ■ Toxins |
| ■ H ⁺ ion acidosis | ■ Tamponade |
| ■ Hyper/hypo kalemia | ■ Tension Pneumo |
| ■ Hypothermia | ■ Thrombosis (ACS) |
| ■ Hypoglycemia | ■ Thrombosis (PE) |

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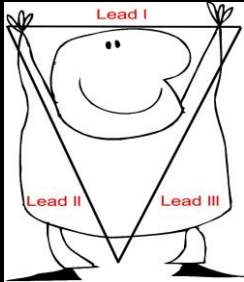
EKG's

- Show electrical impulses as they pass through the heart.
- Leads
 - I, II, III
 - AVL, AVR, AVF
 - V1 – V6

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Leads I II III

- Lead I
- Lead II
- Lead III

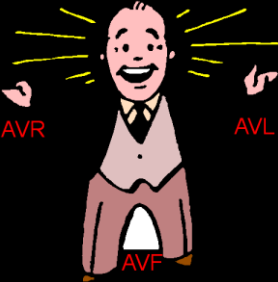


(Kelly, Smith, 2004)

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LEAD AVR, AVL, AVF

- ❖ Lead aVL
- ❖ Lead aVR
- ❖ Lead aVF

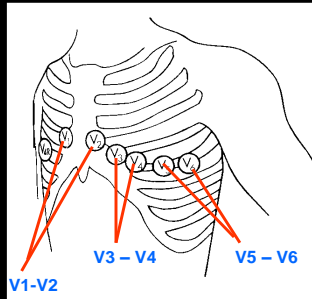


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Precordial Leads V1 – V6

Leads V1 and V2
Leads V3 and V4
Leads V5 and V6



Knaut, 2003

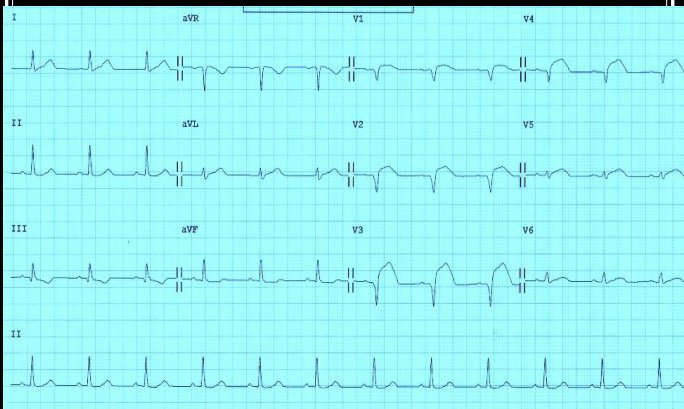
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Location of ST Changes in MI

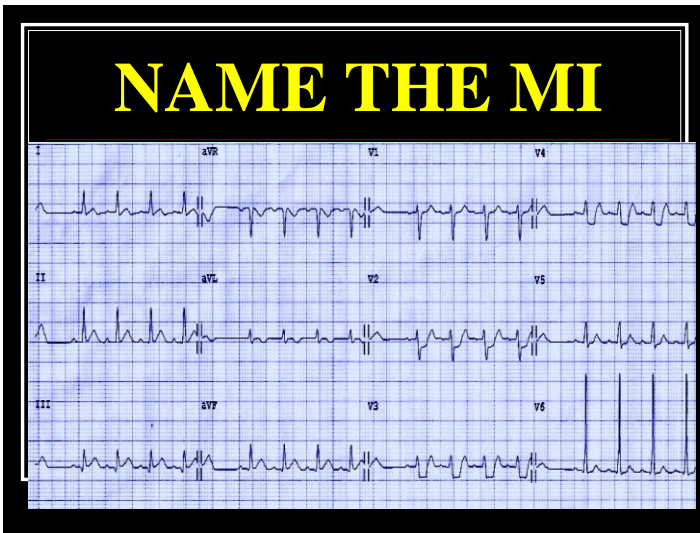
I Lateral	aVR	V1 Septal	V4 Anterior
II Inferior	aVL Lateral	V2 Septal	V5 Lateral
III Inferior	aVF Inferior	V3 Anterior	V6 Lateral

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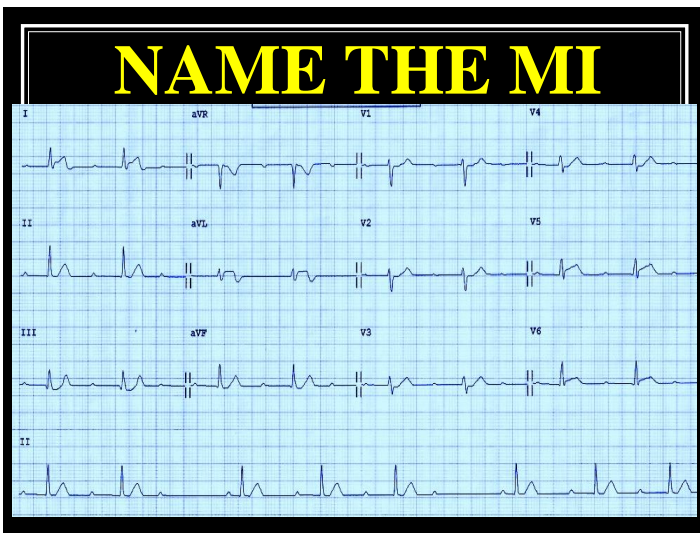
NAME THE MI



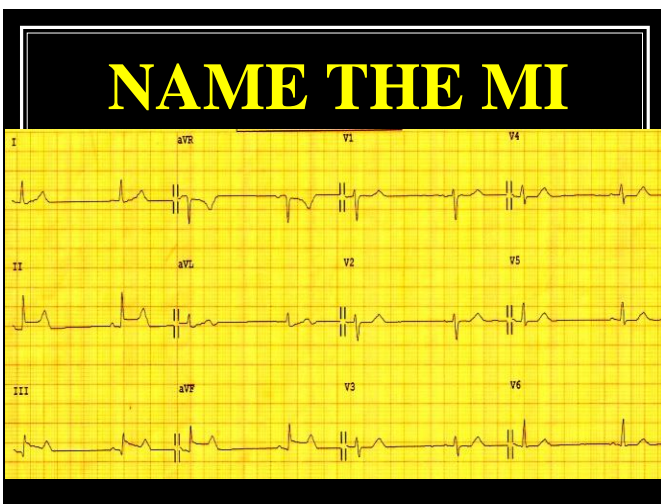
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Reasons for Chest Pain

- The DDX of chest pain is therefore quite broad
- Cardiac
- Vascular
- Pulmonary
- Musculoskeletal
- GI
- Other

```
graph TD; CP[CHEST PAIN] --> C[CARDIAC]; CP --> NC[NON-CARDIAC]; C --> CAD[CORONARY ARTERY DISEASE]; C --> NCAD[NON-CORONARY ARTERY DISEASE]; CAD --> CAD_L["Chronic stable angina<br/>Unstable angina<br/>Myocardial infarction"]; NCAD --> NCAD_L["Pericarditis<br/>Pulmonary hypertension<br/>Pulmonary embolism<br/>Mitral valve prolapse<br/>Aortic dissection<br/>Myocarditis"]; NC --> NC_L["Musculoskeletal (including costochondritis)<br/>Esophageal disease (GERD, motility disorders, etc.)<br/>Lung disease<br/>Pleural disease<br/>Gall bladder or biliary disease<br/>Anxiety"]; style C fill:none,stroke:none; style NC fill:none,stroke:none;
```

The diagram is a flowchart titled 'CHEST PAIN'. It branches into 'CARDIAC' and 'NON-CARDIAC'. 'CARDIAC' further branches into 'CORONARY ARTERY DISEASE' and 'NON-CORONARY ARTERY DISEASE'. 'CORONARY ARTERY DISEASE' includes Chronic stable angina, Unstable angina, and Myocardial infarction. 'NON-CORONARY ARTERY DISEASE' includes Pericarditis, Pulmonary hypertension, Pulmonary embolism, Mitral valve prolapse, Aortic dissection, and Myocarditis. 'NON-CARDIAC' includes Musculoskeletal (including costochondritis), Esophageal disease (GERD, motility disorders, etc.), Lung disease, Pleural disease, Gall bladder or biliary disease, and Anxiety.

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Referred Pain

- Afferent pain fibers divided into *somatic* and *visceral*
- Somatic
- Visceral

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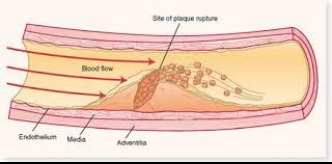
Risk Factors

- Age > 40
- Male or post-menopausal female
- Family history
- Smoking
- Hypertension
- Hypercholesterolemia
- Diabetes mellitus
- Cocaine use

Knaut, 2003

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- **ANGINA**
- **Unstable Angina**
- **ACS**
 - **Ischemia**
 - **Infarct**

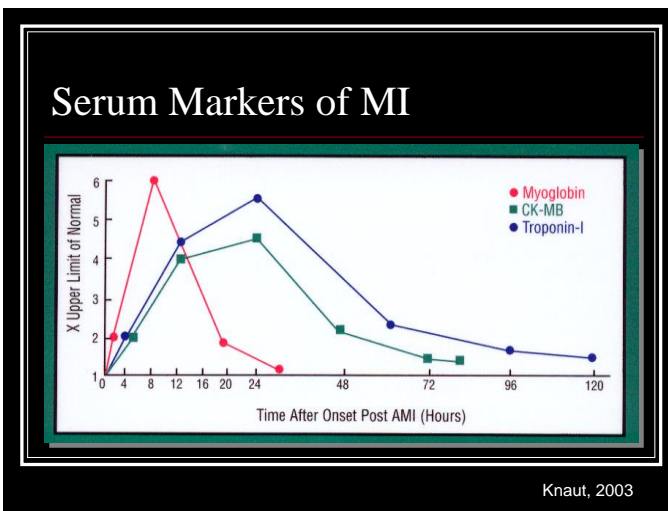


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Serum Markers of MI

- Myoglobin
- CK-MB (Total CK, CK Index)
- Troponin-T, Troponin-I

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TIME FOR MEDS

M
O
N
A

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The diagram illustrates the interaction between three types of atoms: Healthy Atoms, Free Radicals, and Antioxidants. Healthy Atoms are depicted as smiling faces with two blue spheres. Free Radicals are shown as angry faces with a single blue sphere. Antioxidants are represented as happy faces wearing sunglasses with two blue spheres. Arrows indicate that antioxidants neutralize free radicals, and healthy atoms are shown interacting with free radicals.

- 2-4 LPM if needed
- Maintain Hgb Saturation
AHA= 94-99%
 $CaO_2 = (0.003 \times PaO_2) + (1.36 \times HgB \times SaO_2)$

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ASPIRIN

- Blocks the formation of Thromboxane A-2
- DOSE-
 - 162-325 mg- Chewed
- USES-
 - Used in the initial treatment of possible ischemic chest pain.
- CONTRAINDICATION-
 - Hypersensitivity / Known allergies
 - Active bleeding disorders.
 - DO not use enteric coated aspirin

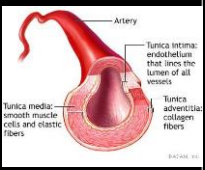


The image shows a microscopic view of red blood cells (erythrocytes) and platelets (thrombocytes). The red blood cells are large, biconcave discs, and the platelets are smaller, irregularly shaped cells with a granular appearance.

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NITROGLYCERIN

- **USES:**
 - Dilates peripheral and coronary vessels
- **DOSE**
 - 0.4 mg / SL
 - 1 tab every 5 minutes x 3
 - IV
 - Dilute in D5 or NS
 - Begin infusion at 10-20 mcg/min
 - May increase by 5-10mcg every 5-10 minutes



Artery

Tunica intima: endothelium that lines the lumen of all vessels

Tunica media: smooth muscle cells and elastic fibers

Tunica adventitia: collagen fibers

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NITROGLYCERIN

CONTRAINDICATIONS

SYSTOLIC BP	
HEART RATE	
PDI's	
MI	

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Antiplatelets vs Thrombolytics

- **Antiplatelets**
 - Minimize platelet aggregation on a ruptured atherosclerotic plaque
 - Aspirin
 - IIb-IIIa inhibitors
 - Aggrastat, ReoPro
- **Thrombolytics**
 - T-PA Clot specific
 - Streptokinase, urokinase, recombinant tissue plasminogen activator (r-TPA) cause a lytic state

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Thrombolytic Contraindications

- Recent major surgery
- Cerebrovascular disease
- Recent GI or GU bleeding
- Recent trauma
- Uncontrolled HTN
 - SBP>180, DBP>110
- Left heart thrombus
 - Mitral stenosis with a-fib
- Acute pericarditis
- Hemostatic defects
 - Severe renal or liver disease
- Hemorrhagic ophthalmologic condition
- Septic thrombophlebitis
- Advanced age
- Oral anticoagulants
- Other bleeding hazards

("Recent" means within 10 days)

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Questions

