Cardiology for the interpreter

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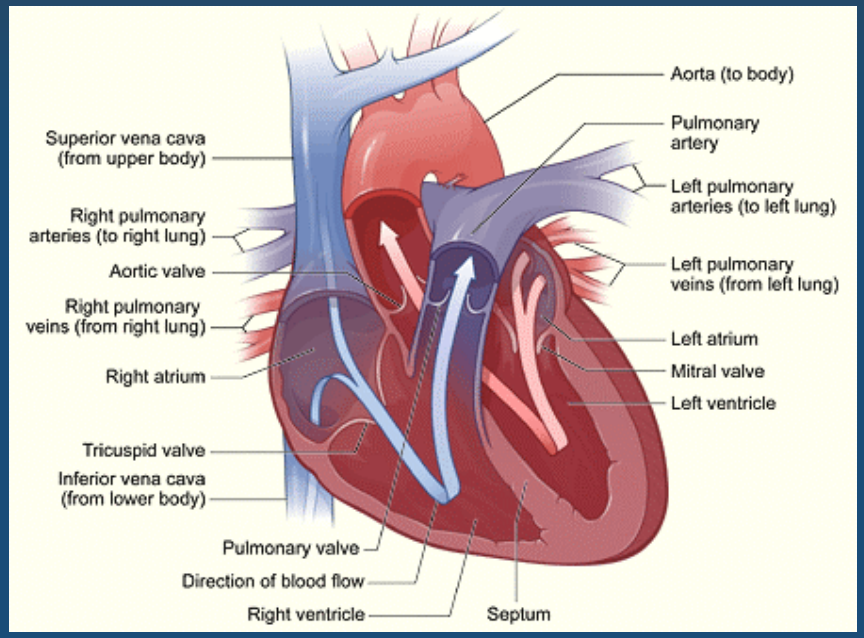
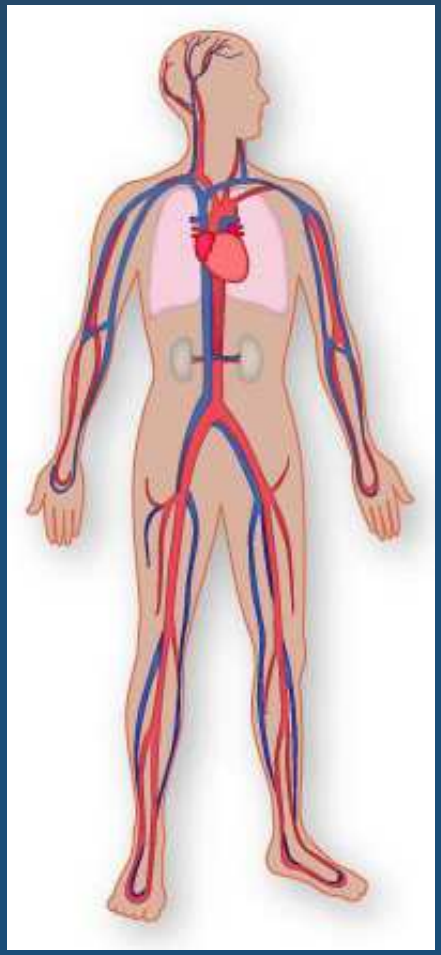
Anatomy



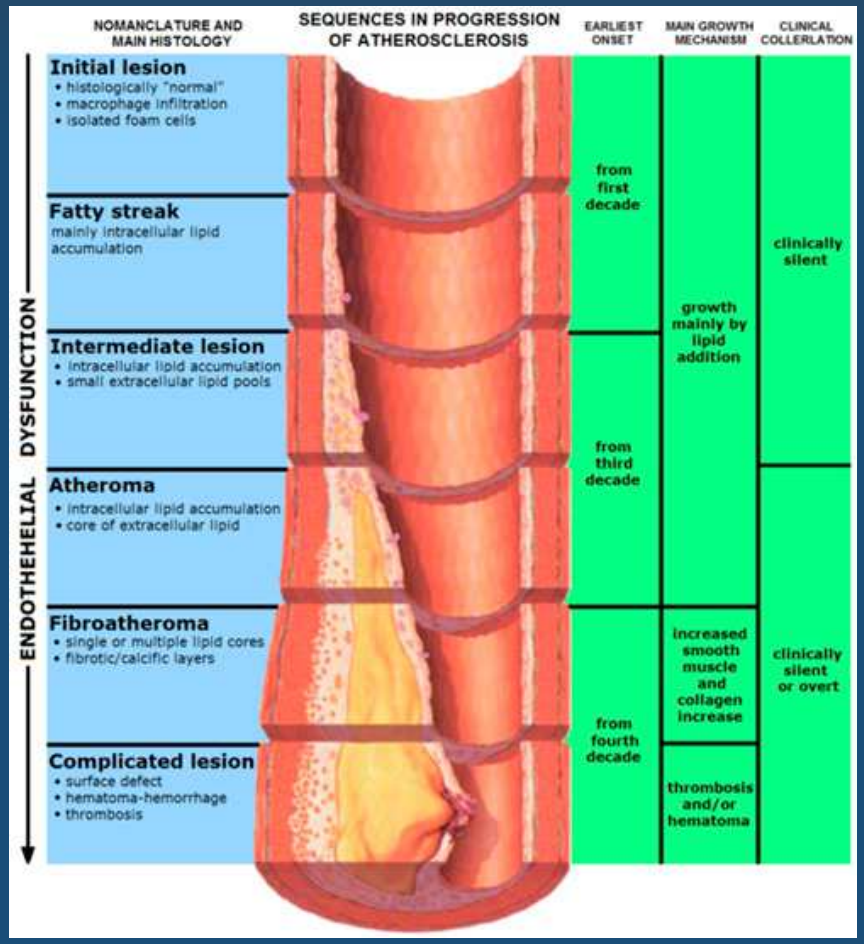
- Deoxygenated blood returns to heart via superior and inferior vena cava into the right atrium
- Right ventricle pumps blood away to lungs via pulmonary arteries
- Oxygenated blood returns via pulmonary veins to left atrium
- Left ventricle pumps blood to body via Aorta
- The two upper chamber (atria) contract at same time
- Followed by the two lower chambers (ventricles) contracting at the same time

Circulatory System



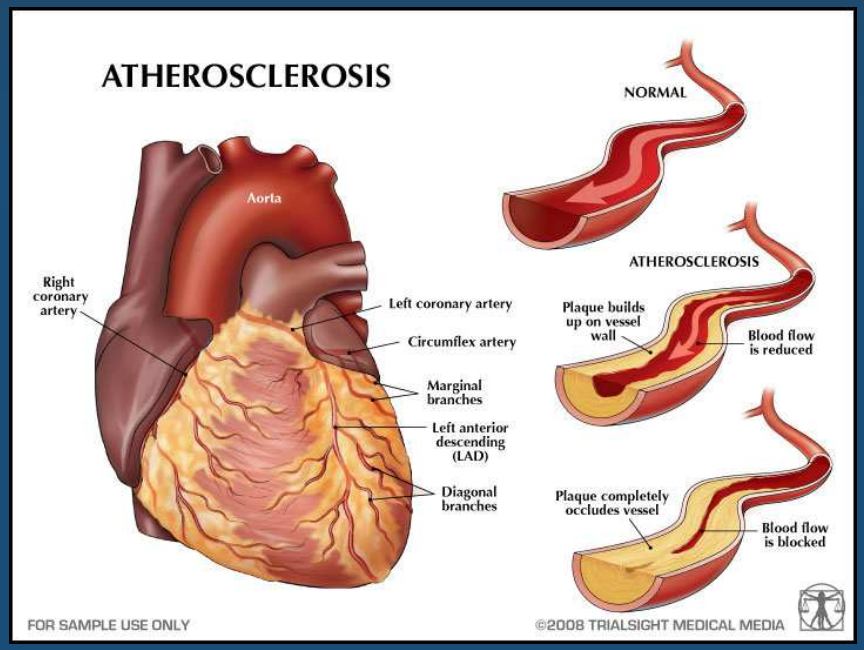
- Very little difference in color of venous vs arterial blood.
- Arteries take blood away from heart under pressure, stretch and then contract using a thin muscular layer - pulse and blood pressure
- Capillaries are microscopic vessels found in all tissue within body where oxygen (O2) and carbon dioxide (CO2) are exchanged
- Veins return deoxygenated blood to heart, not under pressure and use valves

Atherosclerosis



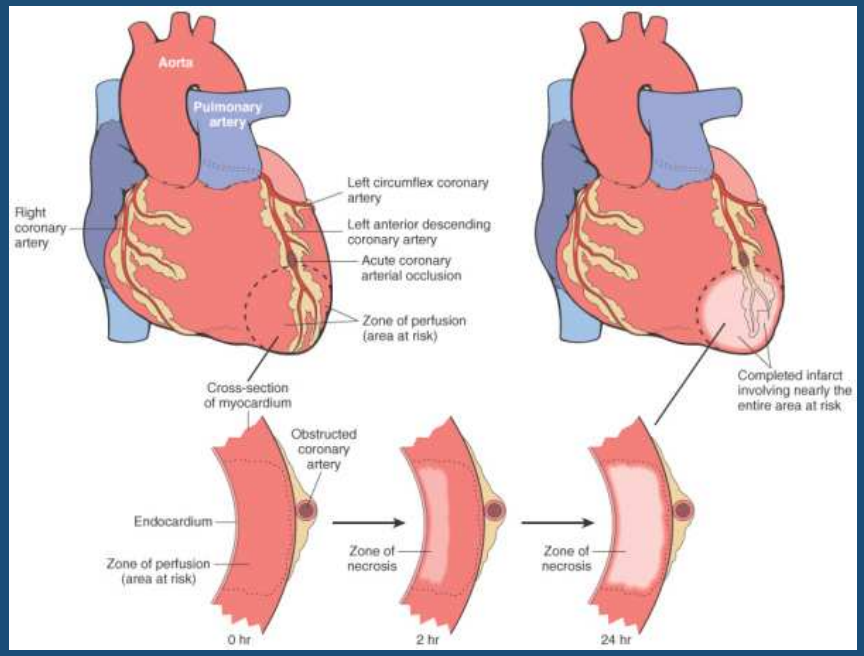
- Narrowing of arteries brought on by age, hypertension, diabetes, diet, genetics, lifestyle
- Occurs throughout body.
- Calcium deposits over lipid core lead to hard, stable plaque formation.
- Rupture of plaque exposes blood to fibrin causing sudden thrombosis (blood clot) formation - M.I.

Coronary Artery Disease



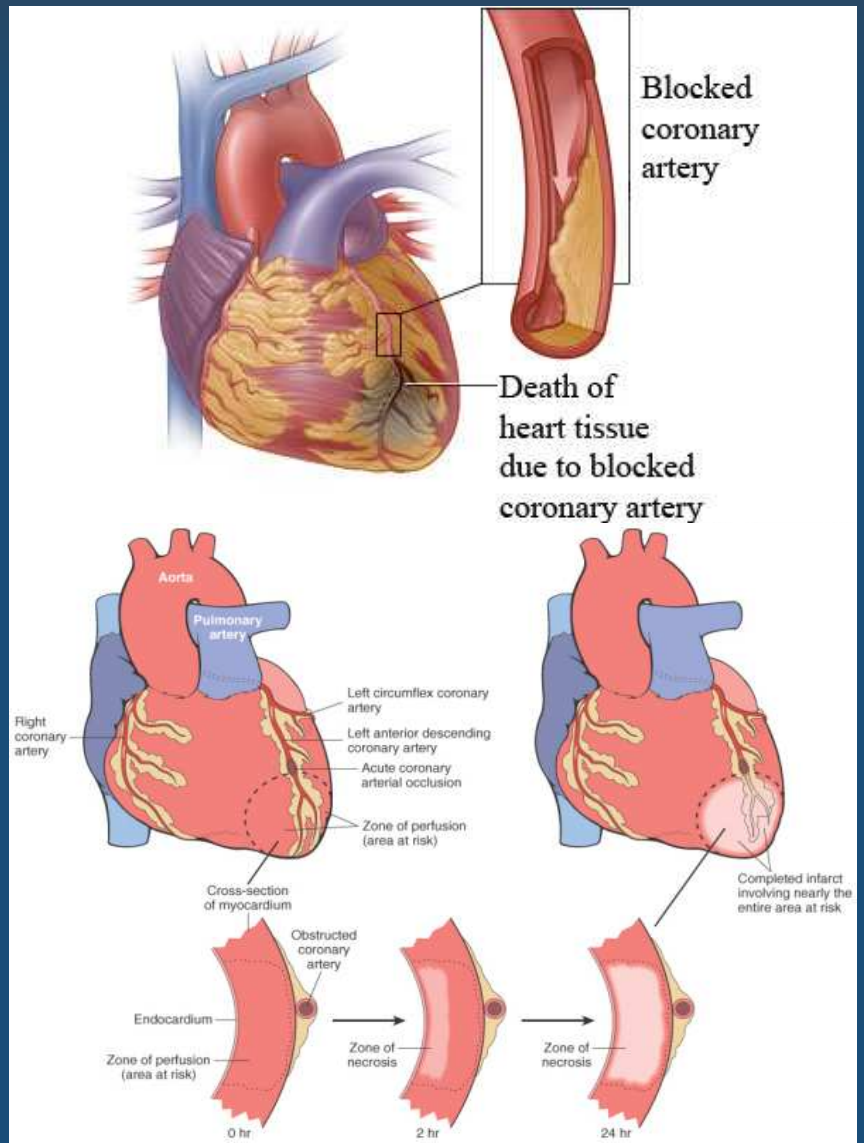
- CAD - thickened lining of coronary arteries leading to decreased or complete obstruction of blood flow to heart muscle
- CAD leads to angina and myocardial infarction (MI, heart attack, infarct)

Myocardial Infarction (MI)



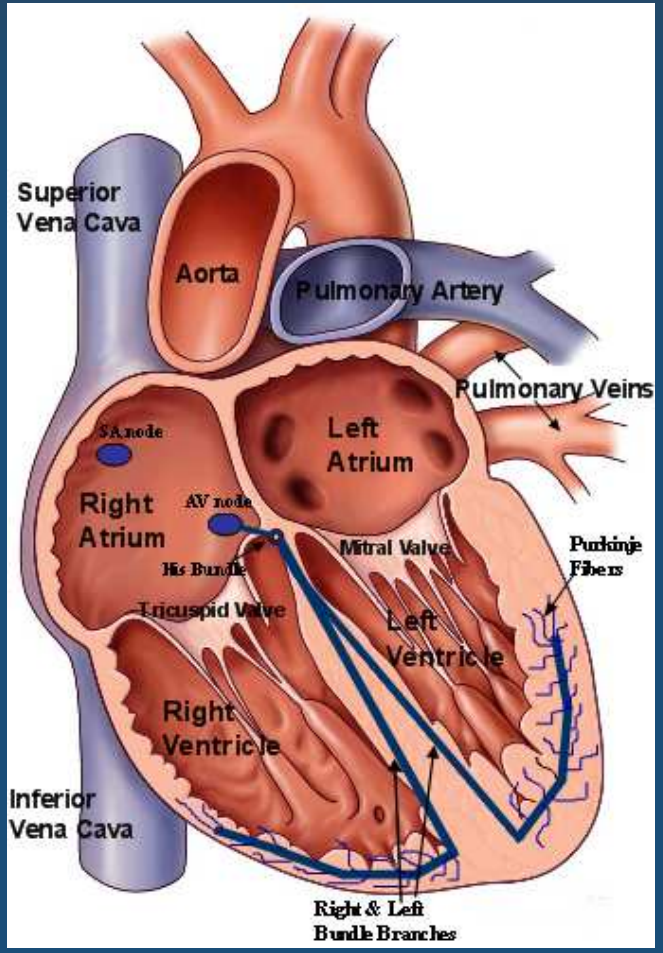
- Permanent damage to heart muscle which leads to scar formation and loss of pump function or contractility
- Usually occurs from rupture of plaque which cause a blood clot to form within coronary artery
- Extent of injury depends on which coronary artery is affected and where

MI



- If small/distal coronary artery involved, then only small amount of muscle lost (Silent MI)
- If large/proximal artery involved then a large area of heart muscle affected causing sudden decrease in contractility (pump function) resulting in death
- Also leads to arrhythmias

Electrical Conduction

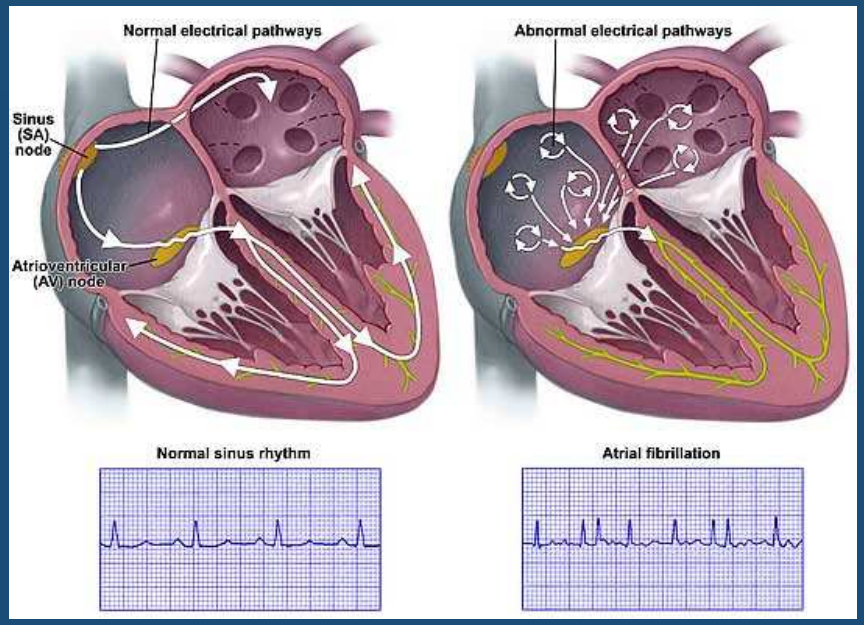


- SA (sinoatrial) node initiates electrical impulse which causes the atria to contract.
- The AV (atrioventricular) node receives the impulse from atria and sends it to the bottom of heart where it causes the ventricles to contract.
- Normal sinus rhythm

Arrhythmias

- Abnormal conduction of electrical impulse within heart
- Caused by electrolyte (calcium, sodium, potassium) imbalance, alcohol, MI, thyroid imbalance
- Atrial fibrillation (AFib) most common
- Ventricular tachycardia (Vtach) and Ventricular fibrillation (Vfib) are the most common cause of cardiac arrest and is characterized by a quivering ventricle which is unable to pump blood. Treated with electrocardioverison

Atrial Fibrillation



- Abnormal signals with atria cause it to quiver or shake like a sheet in the wind
- AV node showered by irregular, fast signals leading to fast irregular contractions of ventricle
- Patient has fast, irregular pulse

Atrial Fibrillation

- No organized contraction of atria leads to increase risk of blood clot formation, leading to increased risk of stroke
- Treated with blood thinners like coumadin
- Fast, irregular ventricular contractions treated with medicine to slow pulse back into normal range
- Patients are either left in this rhythm on blood thinners and rate controlling medication or are electrocardioverted in which electricity is used to reset the heart into normal sinus rhythm

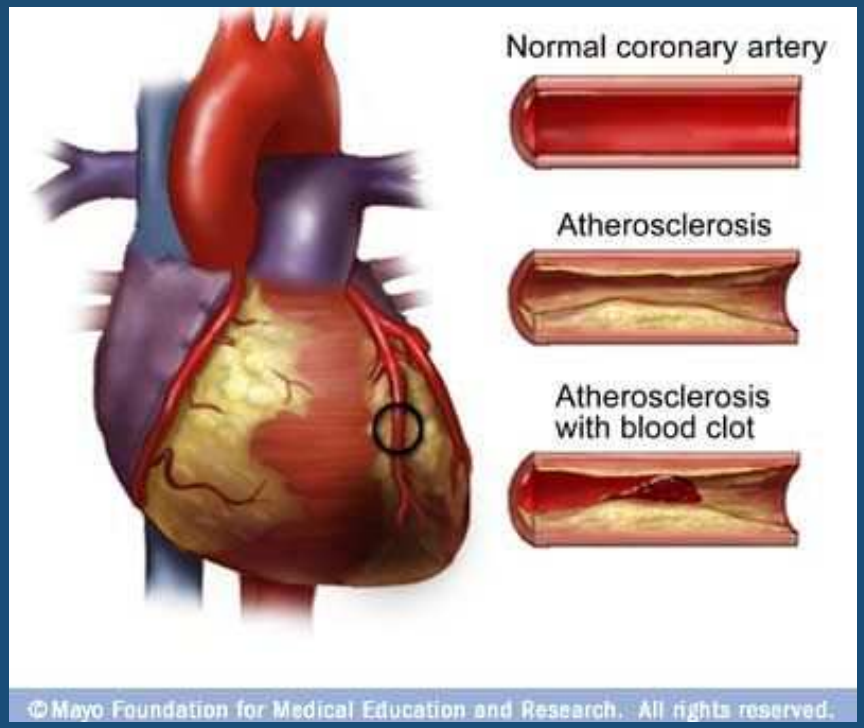
Palpitations

- Defined as an abnormal awareness of the heart, such as too fast, irregularly or pauses
- Very common and usually due to anxiety, stress, lack of sleep, dehydration, alcohol use
- May represent an arrhythmia
- Premature Ventricular Contraction (PVC) very common cause of palpitations where ventricle contracts before receiving signal from atria. Causes a pause in conduction which gives patient sensation that heart is skipping a beat. Treated with reassurance only.

Angina

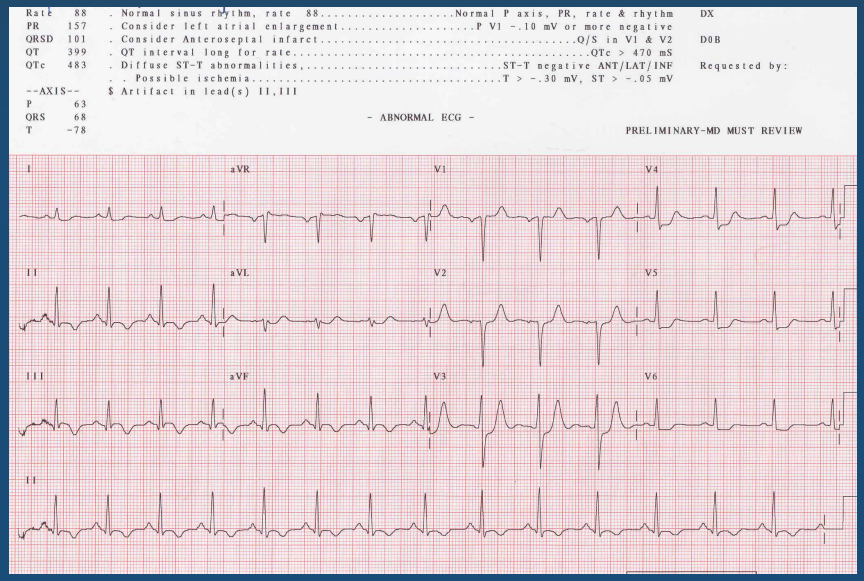
- Angina (angina pectoris) is chest pain from lack of blood flow to the heart muscle
- Often described as a tightness, heaviness, pressure or like something heavy sitting on the chest
- Caused by Athersosclerosis/CAD which narrows the coronary artery limiting flow of blood to the heart muscle causing chest pain

Angina



- Relieved with rest which decreases demand for blood and oxygen by heart muscle
- Relieved by Nitroglycerin which temporarily dilates the coronary artery
- No loss of cardiac muscle function
- Is reversible

Electrocardiogram



- ECG or EKG
- Measure electrical activity during contraction of heart
- Diagnostic in MI (old vs new), arrhythmia, electrolyte imbalance
- Normal in 50% of patients with MI

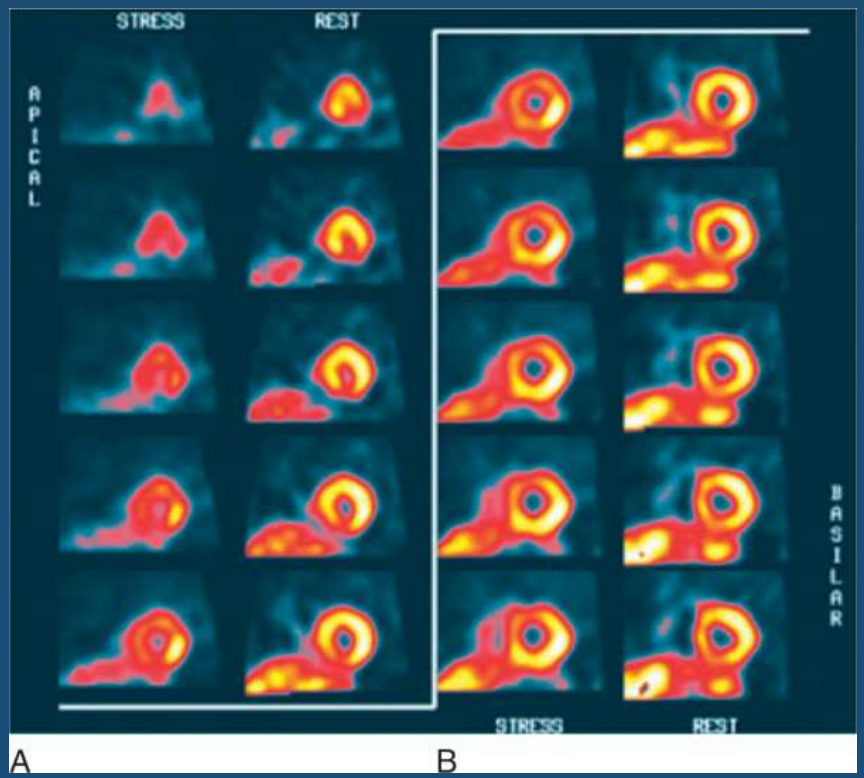
Cardiac Enzymes

- A blood test, also known as Cardiac Markers, used to "rule out" heart attack
- Most common called Troponin
- Large protein normally only found in the myocardium (heart muscle cells). During an MI, the myocardium dies, releasing the troponin into bloodstream.
- Takes at least 3 hours to be detected, slowly peaks in concentration over 12 hours and lasts in the blood stream for up to a week
- Serial normal troponins over 12 hours, used to "rule out" patients for having had an MI

Stress or Provocative Testing

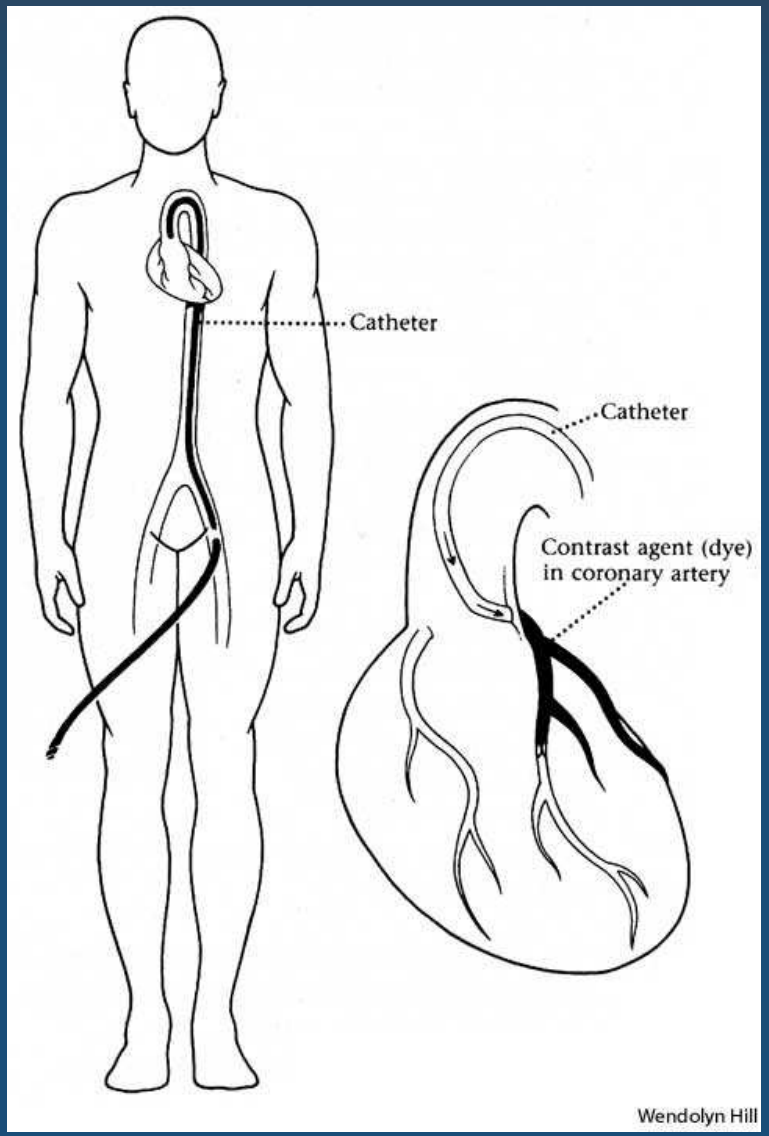
- Used to evaluate for significant CAD/how thickened or patent are the coronary arteries?
- Indirect measurement of lack of blood flow caused by CAD with in heart
- Treadmill (medicines used for those unable to exercise) used to elevate the heart rate which increases demand for blood and oxygen by the heart which causes increased flow through the coronary arteries
- If CAD limits flow then patients develops angina
- Cheaper, less risky, easier to perform that angiography

Stress or Provocative Testing



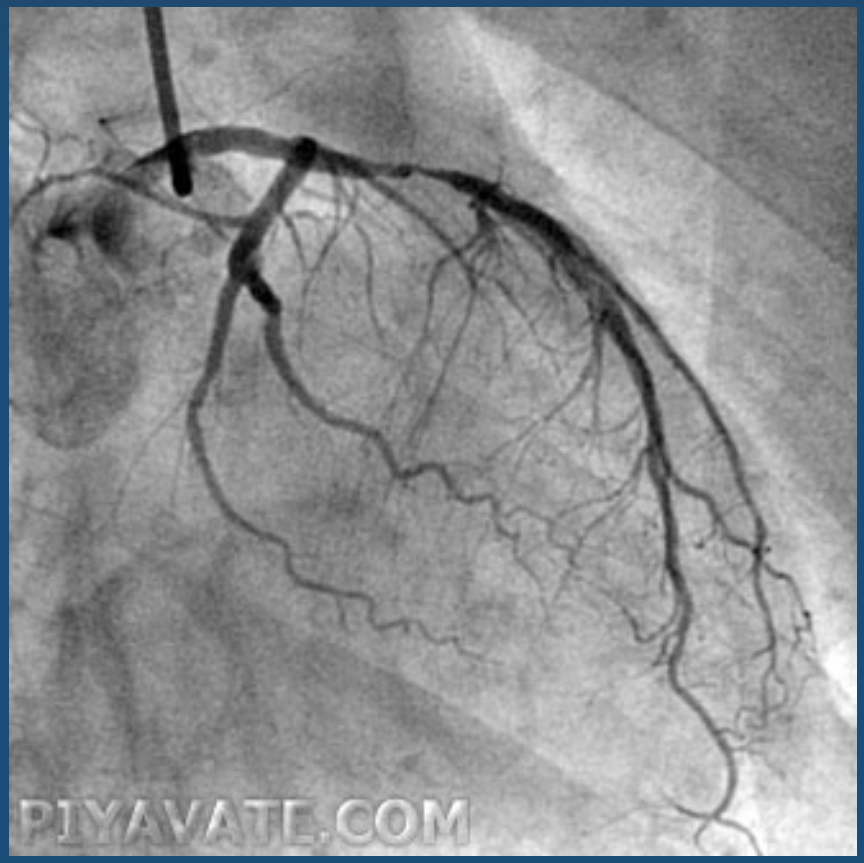
- Stress EKG - least common
- Stress Echocardiogram
- Nuclear Stress test - most common. Uses cardiolyte which is nuclear dye

Coronary Angiogram



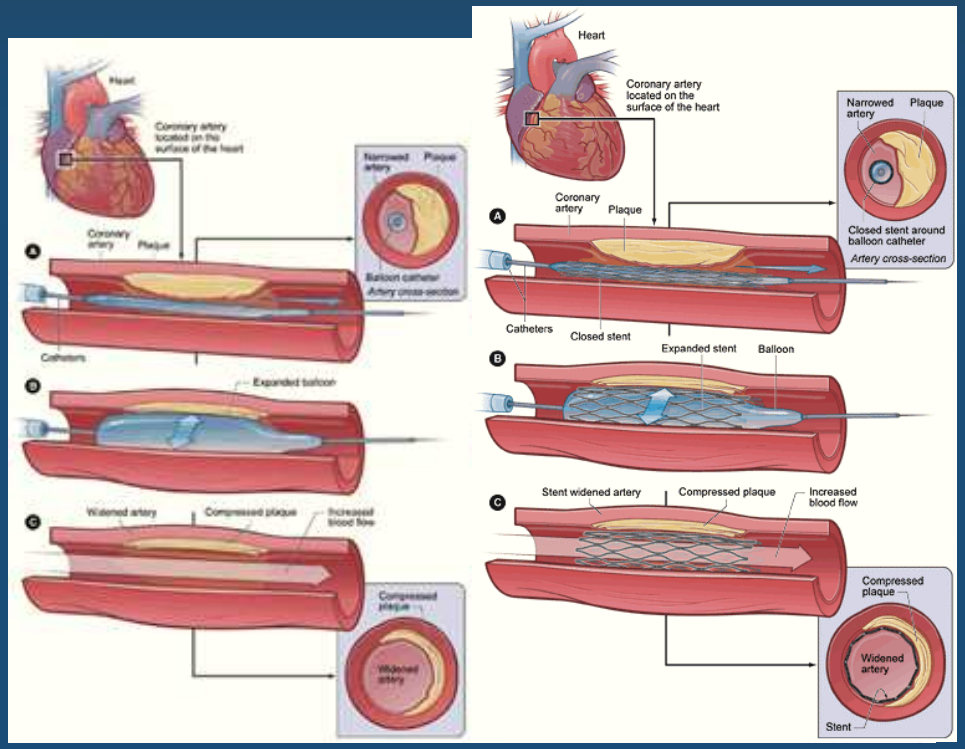
- Used in patients who are diagnosed with MI or have abnormal Stress test
- Contrast injected under fluoroscopy
- Not surgery
- Only pain is felt in groin at sight of catheter insertion.

Coronary Angiogram



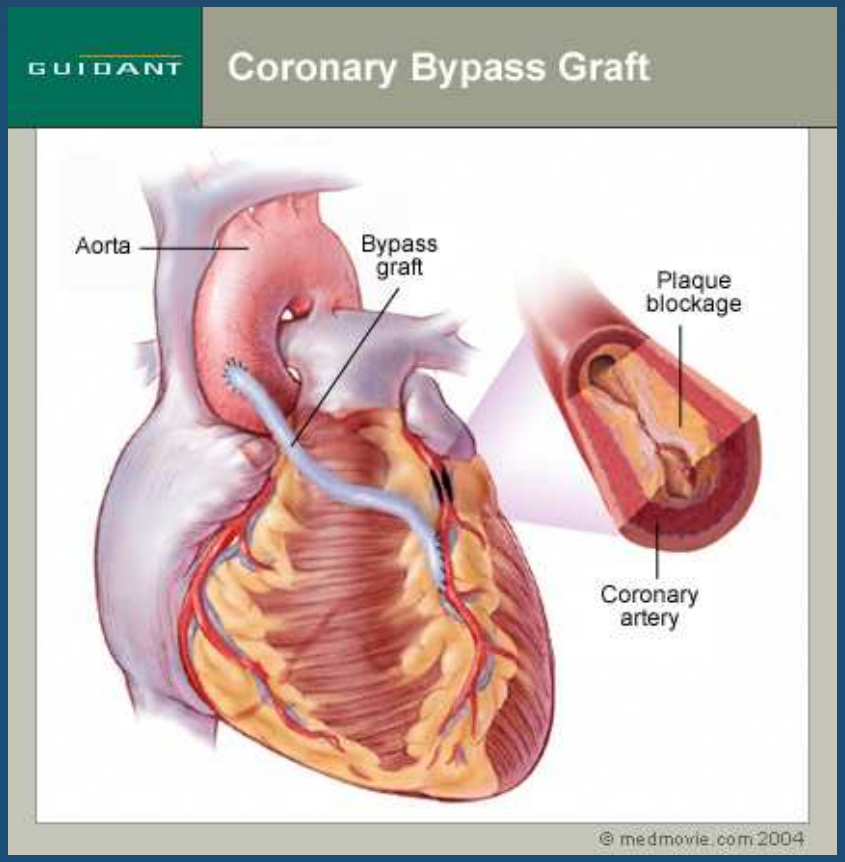
- Able to determine exactly which coronary artery is blocked (MI) or narrowed (abnormal stress test)
- Allows for treatment of balloon angioplasty
- Stent placement
- Clot evacuation

Stent vs Balloon Angioplasty



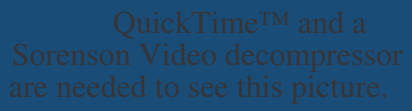
- Both techniques performed during coronary angiogram
- Both restore blood flow through narrowed coronary artery.

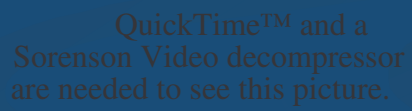
C.A.B.G



- Coronary Artery Bypass Grafting is open heart surgery where a vein is removed from the thigh and sewn from the aorta to the coronary artery bypassing the clot
- Used in severe CAD

Echocardiogram





Echocardiogram

- Images based on sound waves.
- Safe and painless
- Gives detailed information of how well the heart is contracting. Wall motion abnormality (WMA) is an area that isn't contracting normally, as in scar tissue from previous MI.

Echocardiogram

QuickTime™ and a Sorenson Video decompressor are needed to see this picture.

- Left ventricular hypertrophy (LVH) also diagnosed on echocardiogram. Thickening of heart muscle in reaction to years of untreated high blood pressure.
- Also able diagnose congenital heart disease.

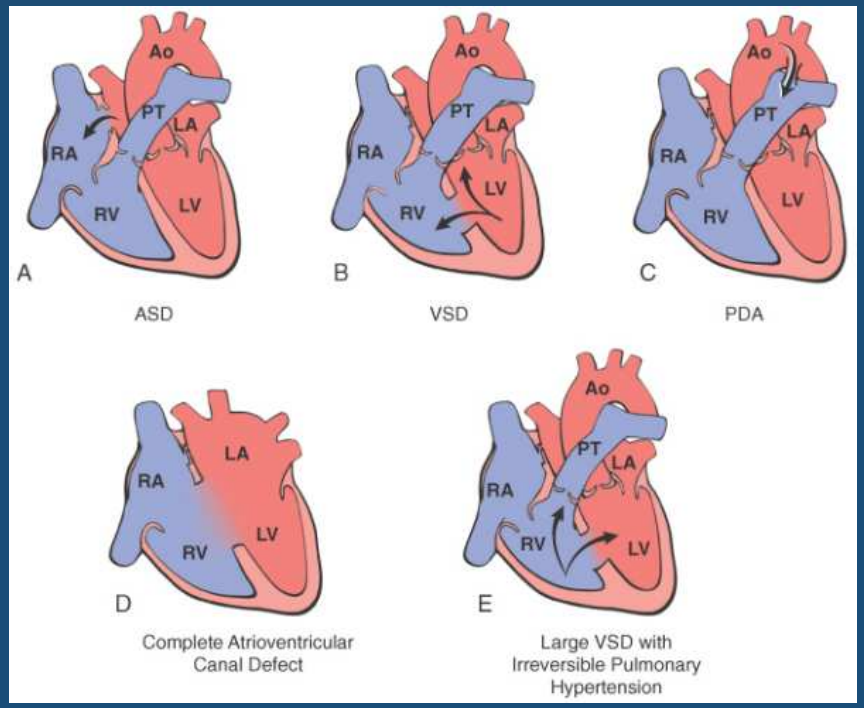
Congenital Heart Disease

- Patient born with malformation or defect of the heart.
- Range of severity from fetal death to asymptomatic in adulthood.
- Murmur, which is the sound heard as blood rushes through a structural abnormality, is often the first sign of a congenital heart problem.

Echocardiogram

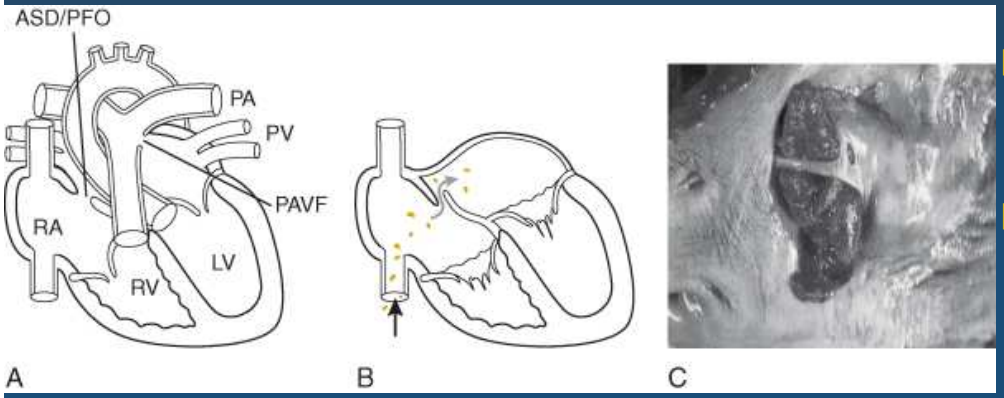
- Aids in diagnosis of congestive heart failure (CHF) which is the loss of contractility leading to fluid accumulating on the lungs and abdomen
- Ejection fraction (EF) is the percentage the Left ventricle empties during contraction
- The lower the EF, the worst the CHF

Atrial Septal Defect



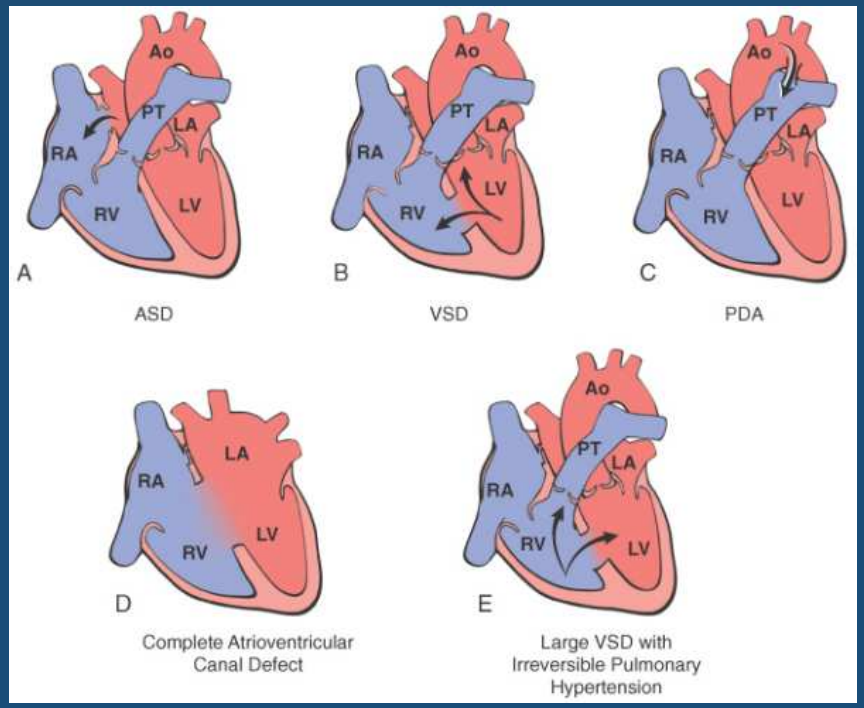
- ASD very common and occurs in female twice as often as males.
- 87 % of ASDs close without intervention
- Nonsurgical closure using a catheter-delivered closure device has become a preferred method
- Considered acyanotic or Left to Right shunt - oxygenated blood is shunted from Left side to Right side and mixes with deoxygenated blood

Patent Foramen Ovale



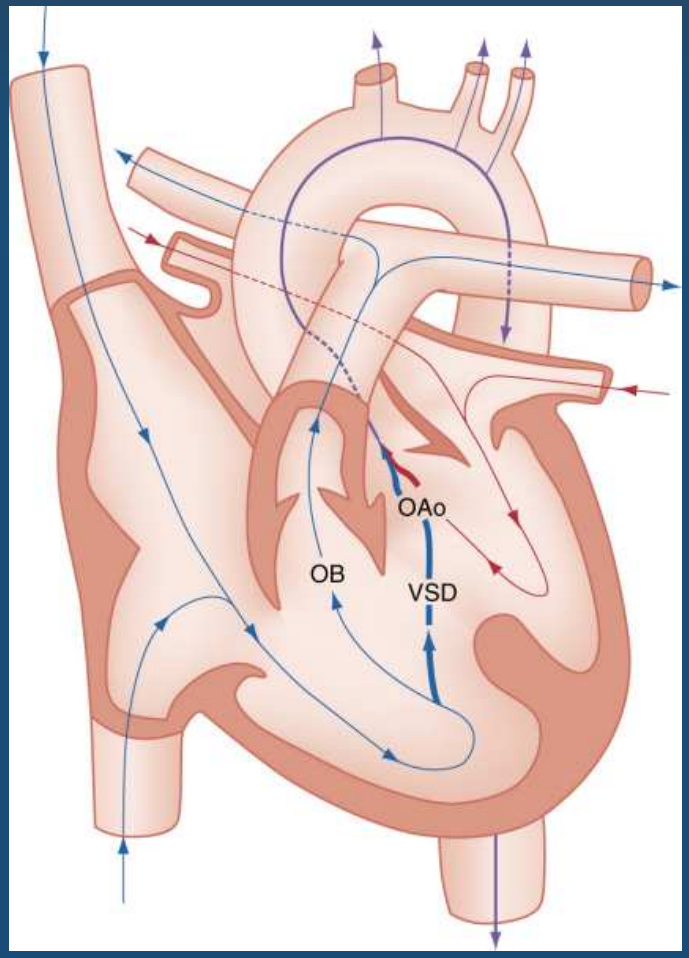
- PFO is a common type of ASD
- Normally the foramen ovale is open during normal fetal circulation and closes as the baby leaves the uterus and takes its first breath.
- Remains open in 25% of adults and puts them at risk for embolic (traveling blood clot) stroke

Ventricular Septal Defect



- VSD the most common type of congenital heart disease.
- Usually requires surgical closure
- Leads to CHF in children if untreated

Tetralogy of Fallot



- Most common type of cyanotic congenital heart disease
- Detected much earlier in life because children have much more symptoms since deoxygenated blood from right ventricle mixes with oxygenated blood with left ventricle before being sent out to body