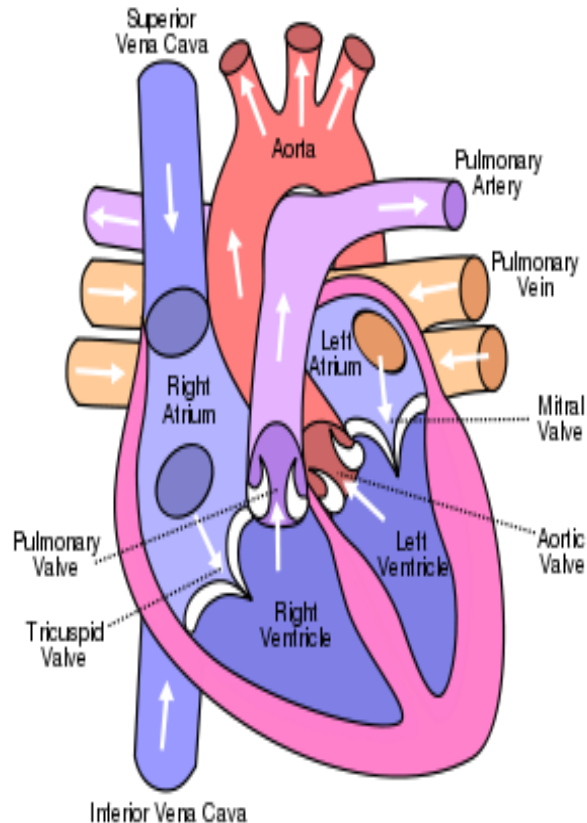
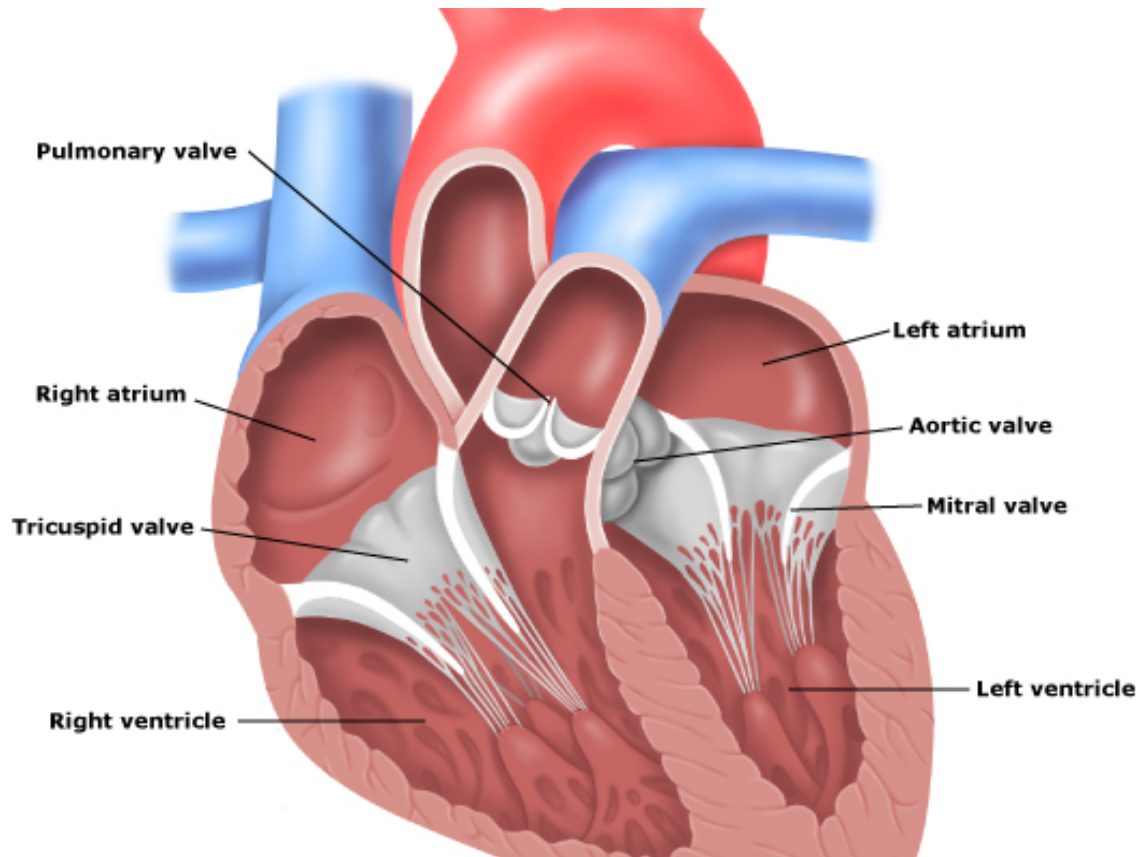


# **Your Coronary Event**

## **Part 1**

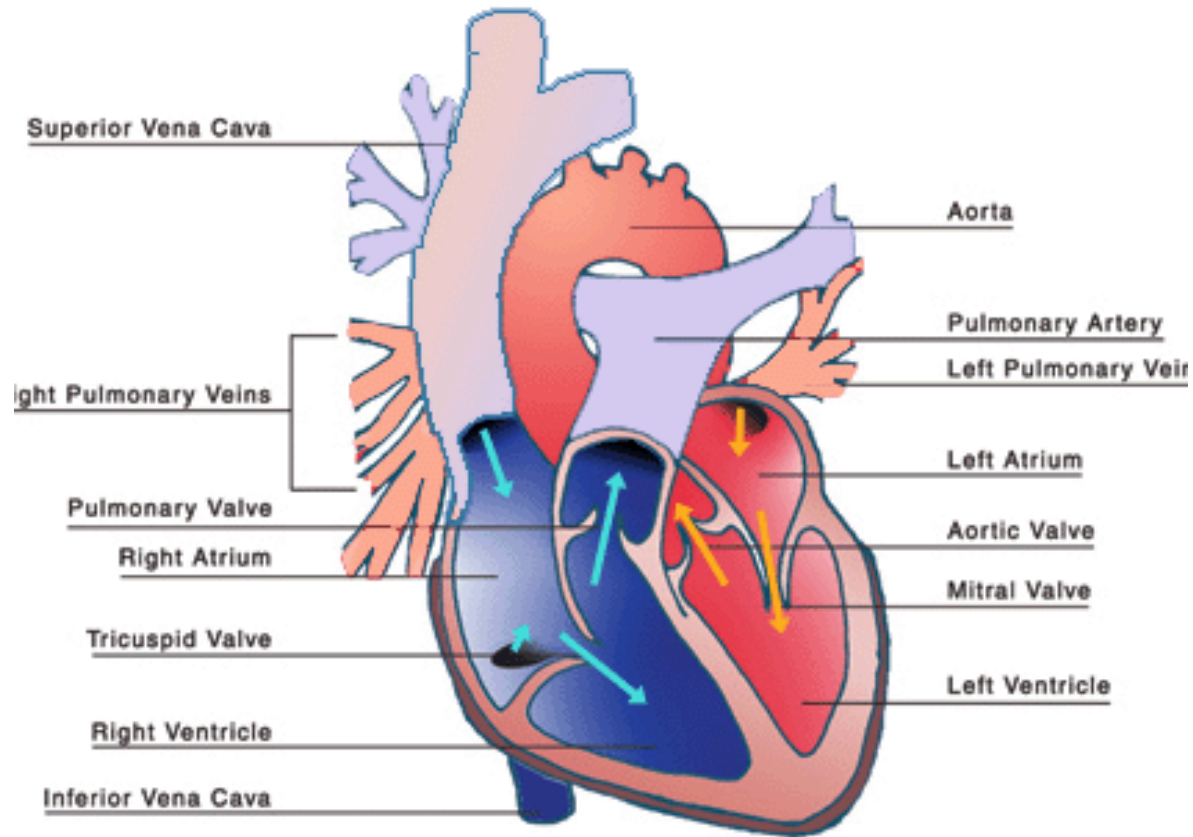
- The heart is a muscular organ about the size of a fist. It lies in the center of the chest, slightly to the left and is protected by the breast bone (sternum). The heart pumps blood, oxygen, and nutrients to all parts of the body, including to the heart muscle itself. The heart muscle's oxygen needs increase with exercise.





## Chambers of Heart

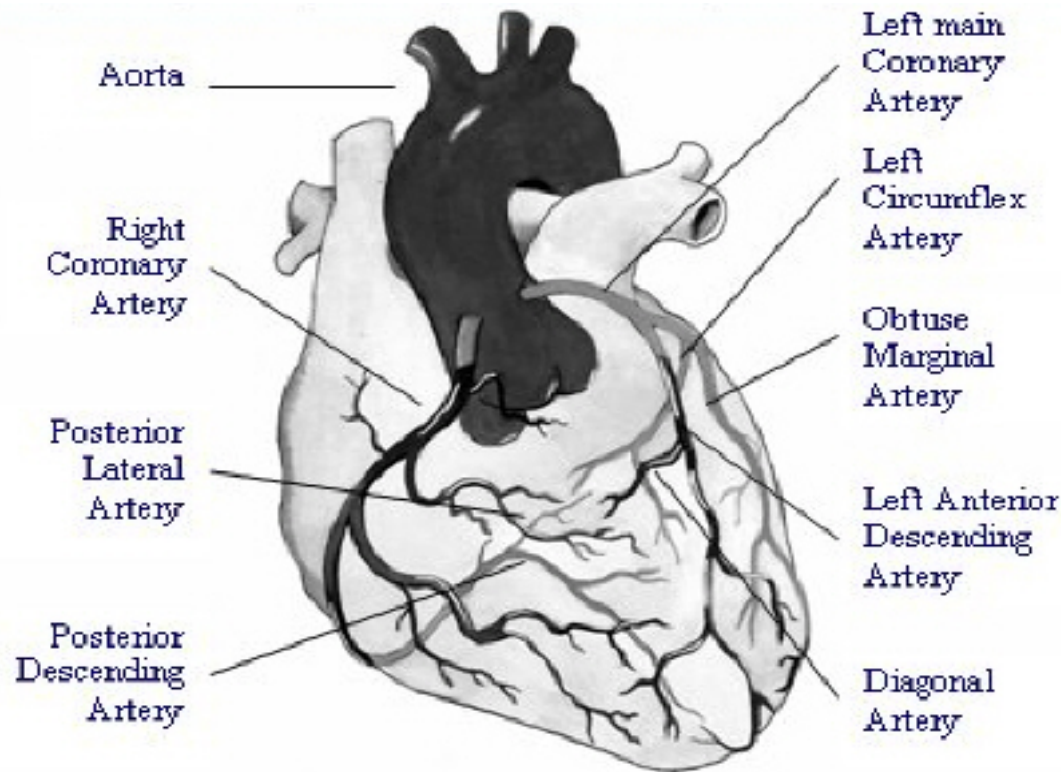
The heart is divided into four chambers. Two upper chambers (**atria**) receive blood from the veins. Two lower chambers (**ventricles**) pump blood out of the heart. Four valves in the heart act as one-way doors to direct blood flow. A wall (**septum**) divides the heart into a right and left side.



## Blood Flow Through the Heart

Unxygenated blood returns from the organs of the body and enters the right side of the heart through the right atrium.

Right atrium → Tricuspid valve → Right ventricle → Pulmonary valve → Pulmonary artery → Lungs (where oxygen is picked up and carbon dioxide, a waste product) is breathed out → Oxygenated blood is brought by the Pulmonary vein → Left atrium through the Mitral valve → Left ventricle → through the Aortic valve → Aorta (the bodies main blood vessel) to the body.



## Coronary Artery Anatomy

For the heart muscle to work, it needs oxygen and nutrients, which are delivered through the coronary (heart) arteries. There are two main coronary arteries that encircle the heart and take blood into heart muscle.

1. Right Coronary Artery (RCA) delivers blood to right side and back of heart.
2. Left Main Coronary Artery (LCA) splits into the Circumflex Artery (CFX) and the Left Anterior Descending (LAD) artery which supply blood to the left side and middle of heart.



Normal coronary artery



Atherosclerosis



Atherosclerosis with blood clot

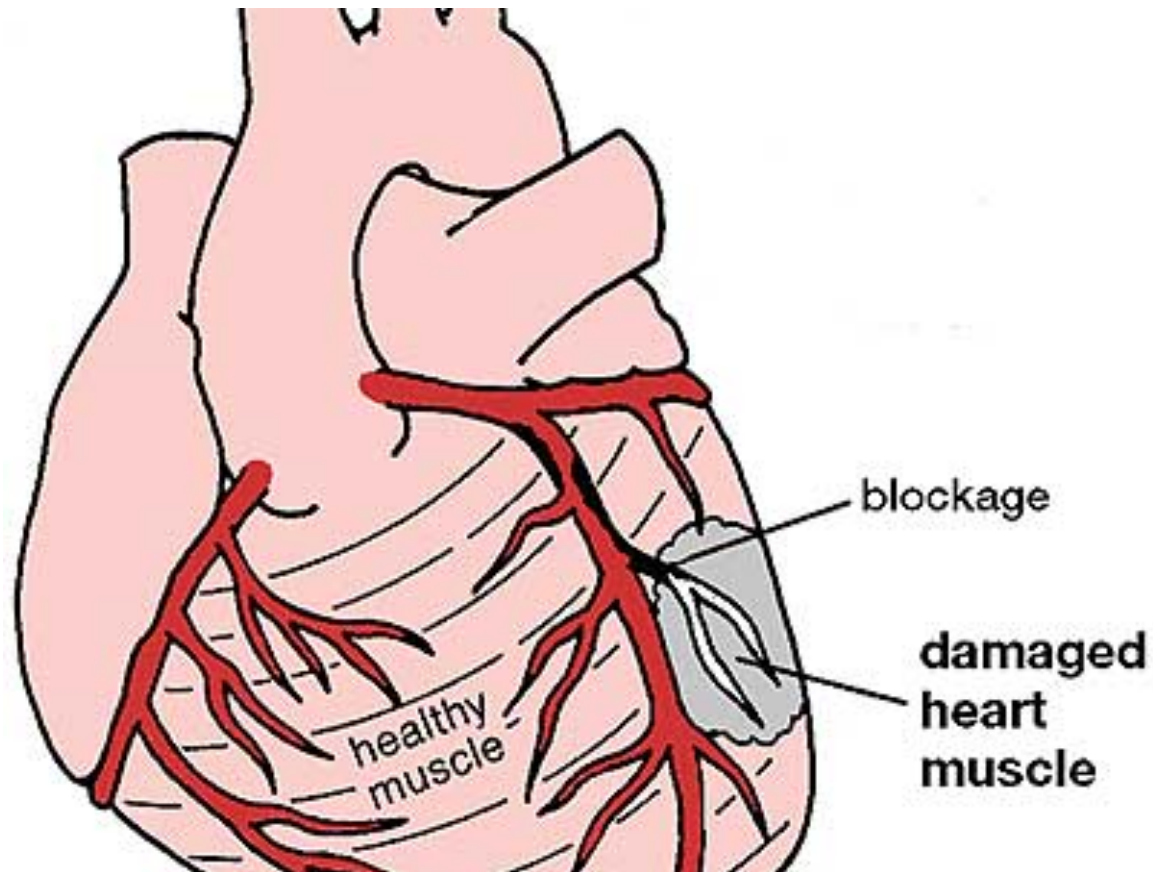


Coronary spasm



## **CAD = Coronary Artery Disease/Narrowing of Blood Flow**

CAD is caused by the build-up of fatty substances such as cholesterol, that collect along the lining of the coronary arteries, in a process known as atherosclerosis. This is referred to as a "plaque," "lesion," "blockage," or "stenosis." Arteries can be blocked by atherosclerosis, blood clot, both, or narrowing by a spasm. Any of these eventually block the flow of blood. CAD results in an inadequate supply of oxygen to heart muscle.



## Heart Attack

Because the coronary arteries supply oxygen rich blood to the heart, untreated blockage can be very serious and can lead to a heart attack, known as a myocardial infarction. This can damage heart muscle.

A myocardial infarction (MI) is the medical term for a heart attack. “Myocardia” refers to heart muscle. “Infarction” causes permanent damage to a portion of the heart and results from a lack of oxygen and blood to an area of the heart. Heart attacks are one of the most common illnesses that affect women and men of all age groups. Heart attacks are the leading cause of death in the United States.



# Angina vs. Heart Attack/MI

- **Angina** is a temporary pain or tightness that may start in the chest and will sometimes spread to other parts of your upper body. It may start suddenly and last only a few minutes or longer. Angina will be relieved either by resting or taking a nitroglycerine.
- **Heart Attack/MI** – When blood flow to the heart muscle is slowed or stopped for 15 to 30 minutes or longer, there is damage to the heart muscle. A heart attack **will not be relieved** by rest or sublingual nitroglycerine, usually.

# Signals of a Heart Attack

- Most people do not realize that they have heart disease. Everyone will experience **different** symptoms with each heart attack. The first sign that something may be wrong could be an episode of angina, or even a heart attack.
- **Signals:**
- A fullness or pain in the center of the chest behind breastbone. These symptoms may extend to your jaw, neck, arms, or shoulder blades.
- A sensation in the chest that may be felt as choking, numbness, squeezing or pressure, crushing or heaviness.
- Symptoms also include heartburn, nausea, vomiting, excessive sweating, fatigue, shortness of breath or palpitations.

# Locations of Infarcts

**Inferior Infarct** – inferior wall is supplied by right coronary artery

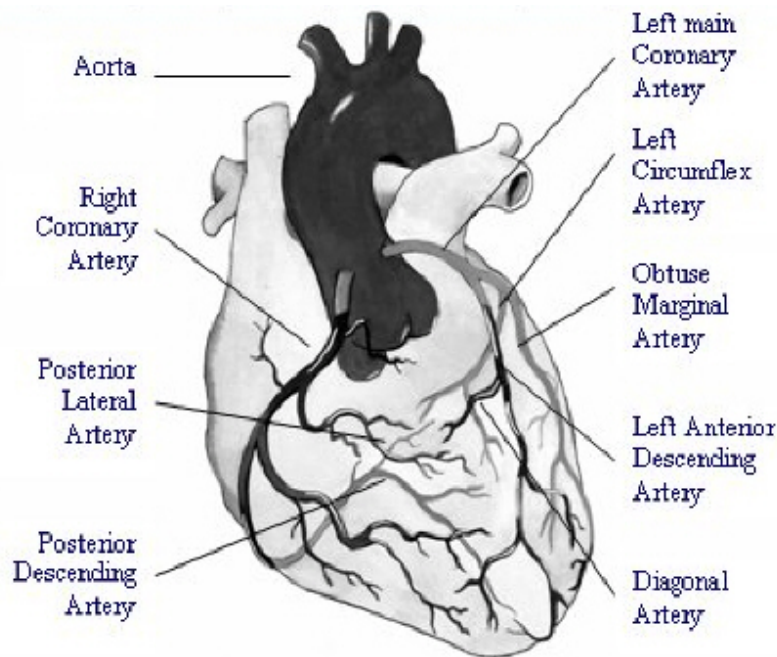
**Posterior Infarct** - depends on which coronary artery supplies the posterior wall:

RCA – 80% of population

Circumflex – 20% of population

**Anterior Infarct** – Occlusion of left anterior descending artery

**Lateral Infarct** – Occlusion of left circumflex artery



The heart begins to heal during the first several weeks after a heart attack. It heals in two main ways: 1) by forming scar tissue and 2) by expanding the smaller blood vessels within 2-3 hours, to supply surrounding tissues. These are called “collateral blood vessels.” In 2-3 weeks those arteries will be large enough to bring more blood to the surrounding tissues.

# Zones of Infarcts

- **Ischemic** – damaged but salvageable.
- **Injury** – severe oxygen deprivation, tissue salvageable, mechanical dysfunction (not good contractility and elastic function is decreased).
- **Necrotic** – damage is irreversible. Treatment is aimed at restoring circulation to ischemic and injury zone to limit size of infarction.

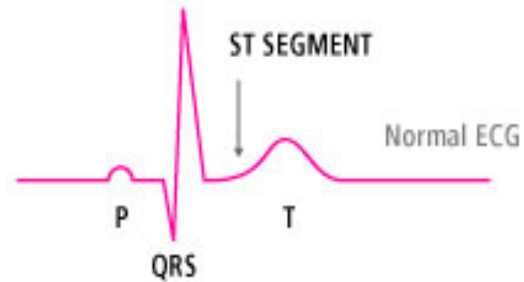
# Diagnosing a Heart Attack

- EKG – records electrical activity and waves of heart. The waves correspond to contraction and relaxation pattern of different parts of heart. Each wave pattern is labeled with a letter.

**ST wave elevation** is a strong indicator of a heart attack along with symptoms. This suggests a blocked heart artery and full thickness heart muscle damage.

**Non ST elevation or ST depression** heart attacks generally show less injury to heart muscle.

# EKG Pictures



- Blood Tests

1. Troponin – proteins released into bloodstream by the heart muscle cells that become damaged. Shows up in blood 3-6 hours after heart damage. Peaks at 20 hours. If elevated in blood, is a good indicator that person has had a heart attack. This test is more specific to heart muscle.

2. CPK (creatine phosphokinase) – enzymes found in heart, brain, and skeletal muscle. If elevated in bloodstream, means there has been injury to either the heart, brain, or muscle tissue. This test is not specific to only heart muscle. Levels increase 3-6 hours after a heart attack and peak at 12-24 hours after.

**\*\* If both troponin and CPKs are elevated, it is a good indicator that a heart attack has occurred.**



# Understanding Cardiac Testing

- Chest X-ray
- 12 Lead EKG
- Echocardiogram
- Exercise Tolerance Test
- Cardiolite Stress Test

# Chest X-ray

- The chest x-ray visualizes the shape of the heart, its chambers and vessels. It can also detect if there is fluid accumulating in the lungs and the placement of a pacemaker or internal defibrillator.

# 12 Lead EKG

- An EKG records the electrical impulses moving through the heart muscle. This test can tell the doctor if your heartbeat is regular or irregular, too slow or too fast, or if you are having a heart attack.

# Echocardiogram

- The echocardiogram is an ultrasound using sound waves to look at your heart's size and how the chambers and valves are working. It reveals how well the heart is pumping. It measures an ejection fraction (EF) which is a percentage of blood that is pumped out of the heart with each beat. Normal EF is 55-70%

# Exercise Tolerance Test

- The exercise tolerance test uses exercise or medications to increase the work of the heart. For cardiac rehab, it is used as a guide to write your exercise prescription and sets your target heart rate range. During this test, your EKG pattern is monitored for any changes. Changes may indicate a lack of blood and oxygen to the heart. This may indicate the need for an angiogram.

# Cardiolite Treadmill or Stress Test

- A cardiolite treadmill is often ordered rather than a regular treadmill. This is determined by your doctor.
- While exercising, a radioactive dye is injected into the bloodstream and your EKG is continuously monitored. The dye moves through the heart chambers and muscle. A nuclear camera records the heart images and the doctor is able to see which areas of the heart are receiving too little blood and oxygen. It can also determine if any areas of the heart have been damaged from a heart attack.

- Sources/Pictures taken from:
- 
- [www.drsvenkatesan.wordpress.com](http://www.drsvenkatesan.wordpress.com)
- [www.emedicinehealth.com](http://www.emedicinehealth.com)
- [www.heart-diseaseandprevention.com](http://www.heart-diseaseandprevention.com)
- [www.heartstroketayside.org.uk](http://www.heartstroketayside.org.uk)
- [www.heartsurgeons.com](http://www.heartsurgeons.com)
- [www.mayoclinic.com](http://www.mayoclinic.com)
- [www.medscape.com](http://www.medscape.com)
- [www.news4u.com](http://www.news4u.com)
- [www.nsh.nsw.gov.au](http://www.nsh.nsw.gov.au)
- [www.thrombosisadvisor.com](http://www.thrombosisadvisor.com)
- [www.uptodate.com](http://www.uptodate.com)
- [www.wikipedia.com](http://www.wikipedia.com)