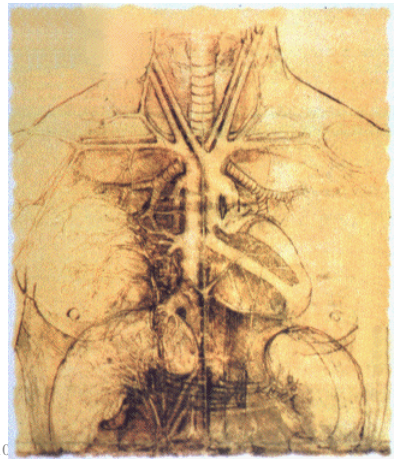
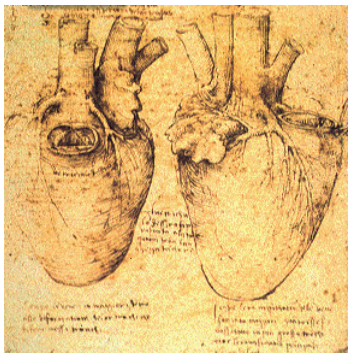
The Heart and Heart Disease

Illustration of the heart by Leonardo DaVinci



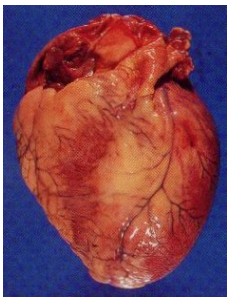


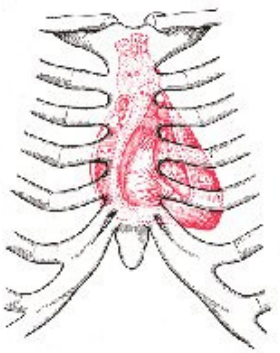
heart-surgeon.com/ history.html

I. Location, Size and Position of the Heart

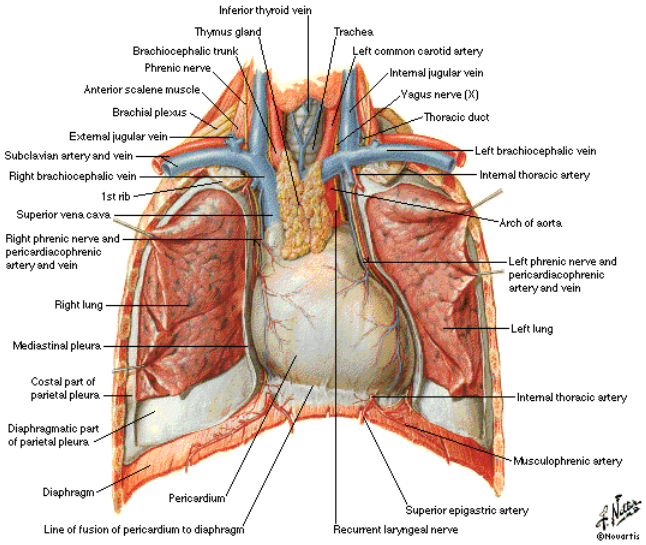
A. Triangular organ located

1. _____ of mass to the left of the body midline and _____ to the right.
2. Apex is on
3. Shape and size





Heart in Situ



B. Cardiopulmonary Resuscitation (CPR): heart lies between sternum in front and thoracic vertebrae behind.

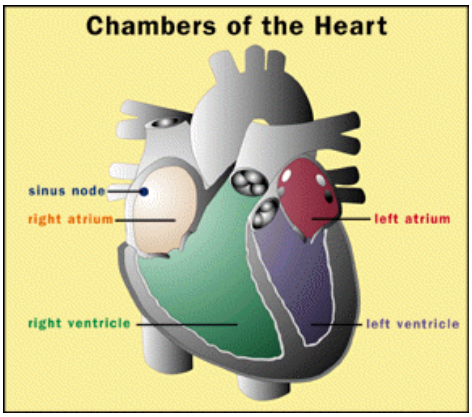
1. Compression of the heart between the sternum and vertebrae can

2. If combined with

intergate.sdmesa.sdccd.cc.ca.us/.../ home.htm

II. Anatomy of the Heart

A. Heart Chambers



www.fda.gov/fdac/features/ 1997/397_hart.html

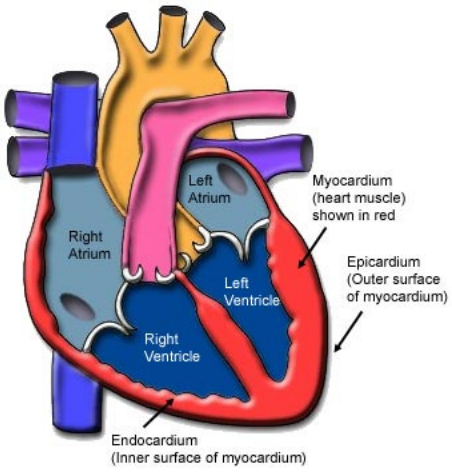
1. Two upper chambers are called

2. Two lower chambers are called

3. Wall of each heart chamber is composed of

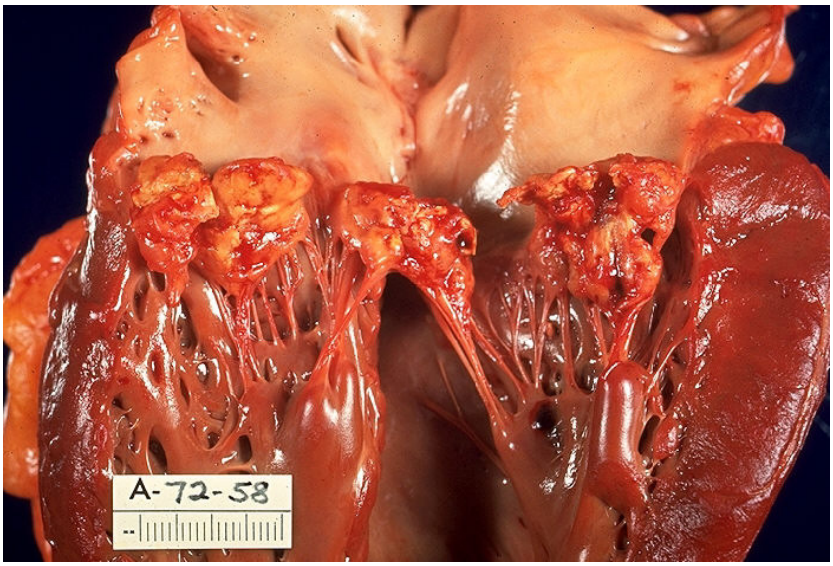
4. Endocardium: Smooth inner

   a. Inflammation of the



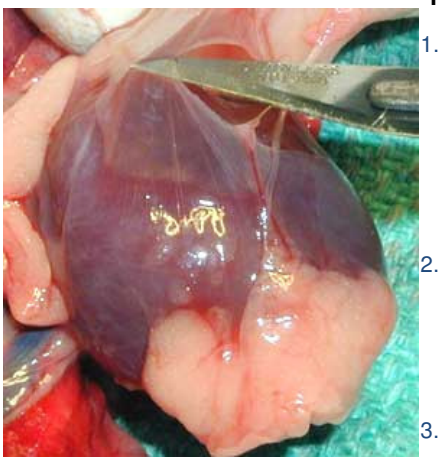
www.tmc.edu/thi/ myocard.html

Endocarditis



www.med.sc.edu:85/ghaffar/ hemo-card.jpg

B. The Pericardium and Pericarditis



1. The covering of the heart consisting of

2. Visceral pericardium or epicardium: The _____ layer of the pericardium.

3. Parietal pericardium: The _____ layer of pericardium.
   a. Two pericardial layers slip against each other without friction.

4. Pericarditis: Inflammation

   a. Causes:

   b. The visceral and parietal pericardium rub together giving

   c. If blood fills between the layers effusion may develop and compress the heart causing:

C. Heart Action
   1. Systole:
   2. Diastole:

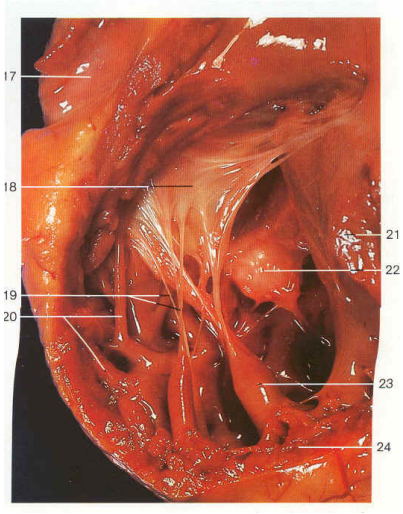
D. Heart Valves and Valve Disorders
   1. Two
      a. Tricuspid:

      b. Bicuspid (Mitral):

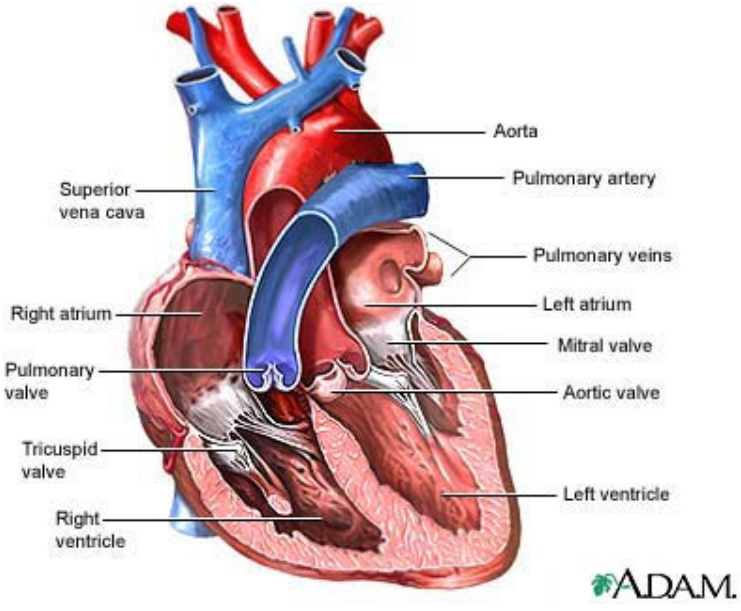
      c. Chordae tendineae:

      d. Papillary muscles: Mounds of cardiac tissue in the ventricle that pull on the

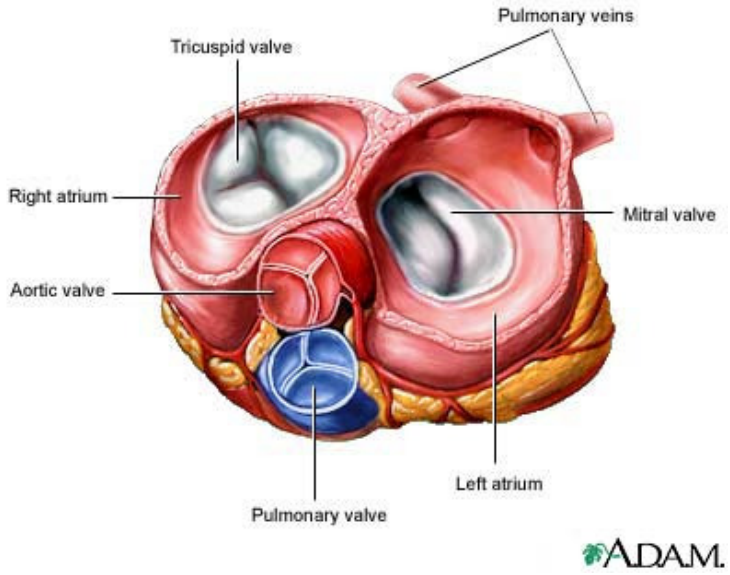
2. Two Semilunar Valves
   a. Pulmonary Semilunar: At the beginning of the
   b. Aortic Semilunar: At the beginning of the



Chordae Tendineae

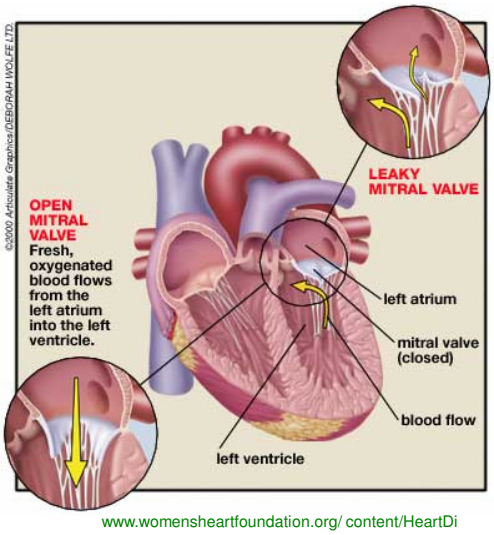


http://www.nlm.nih.gov/medlineplus/ency/imagepages/18092.htm



http://www.nlm.nih.gov/medlineplus/ency/imagepages/18092.htm

3. Incompetent Valves:



www.womensheartfoundation.org/ content/HeartDi

Stenosed Valves: Narrower than normal,

Rheumatic Heart Disease: Cardiac damage resulting from a

Mitral Valve Prolapse (MVP): Incompetence of mitral valve because its

III. Heart Sounds

A. Two distinct heart sounds in every heartbeat or cycle –

B. Lubb sound is caused by the

C. Dupp sound is caused by the

D. Heart murmurs:

"Joyce, write this down in Mr. Cutler's file: 'thump ... thump-thump ... thumpety-thump ... boink.'"

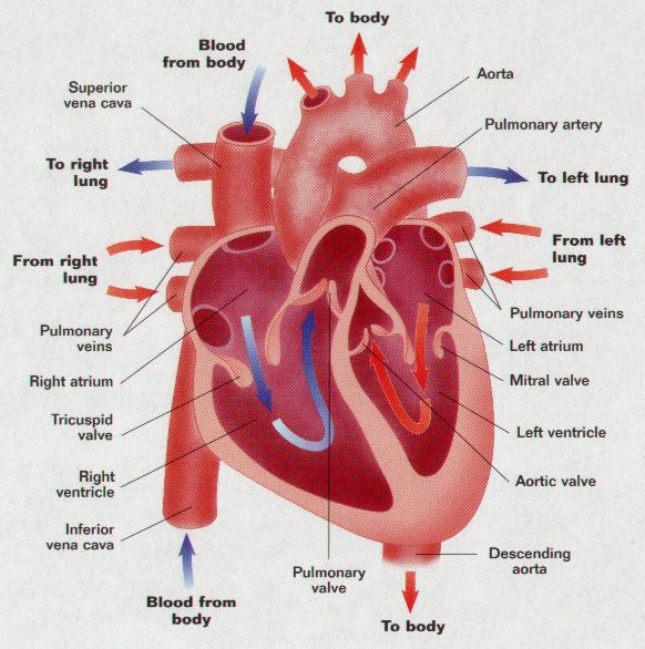
www.pharmacy.umaryland.edu/.../ courses.htm

IV. Blood Flow Through the Heart

A. Heart acts as two separate pumps – the right atrium and ventricle (deoxygenated) performing different functions from the left atrium and ventricle (oxygenated).

B. See separate handout for sequence of blood flow through the heart.

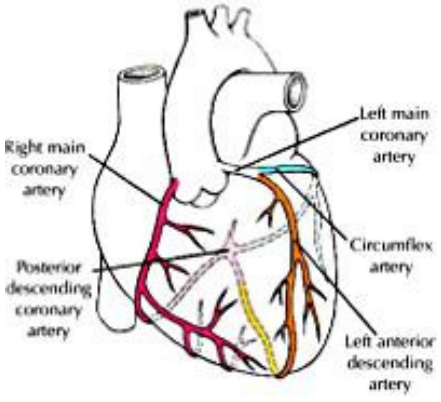
SEE HEART BLOOD FLOW ANIMATION



V. Coronary Circulation and Coronary Heart Disease

A. Blood, which supplies oxygen and nutrients to the myocardium of the heart, flows from the aorta through

B. Cardiac veins: Run parallel to the arteries and drain



www.cardiologist.uk.com/ images/heart.jpg

C. Blockage of blood flow through the coronary arteries can cause

D. Atherosclerosis: "Hardening of the arteries."

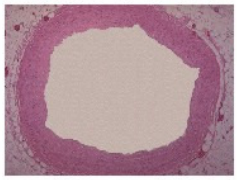
E.

a. This can partially or totally block coronary blood flow.
b. Causes:

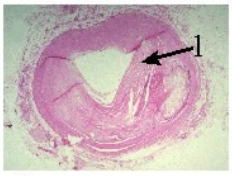
F. Angina pectoris: Chest pain caused by

G. Coronary Bypass Surgery: Treatment due to restricted coronary blood flow.

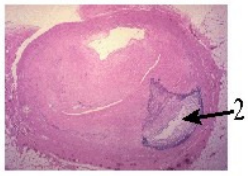
Coronary Artery Disease



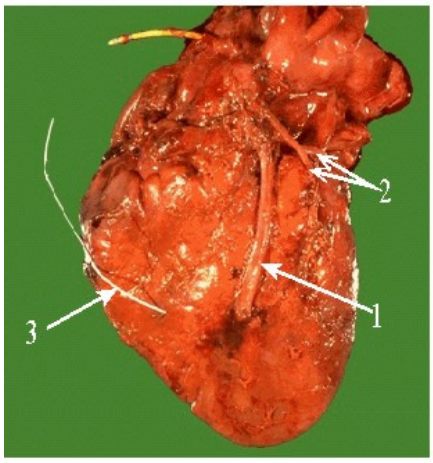
A normal coronary artery, unaffected by atherosclerosis. Note the clear open lumen, smooth endothelium, and normal dense tunica media.



This coronary artery has narrowing of the lumen due to build up of atherosclerotic plaque **(1)**. Severe narrowing can lead to angina, ischemia, and infarction. Disruption of the endothelium can also trigger thrombosis formation.



There is a severe degree of narrowing in this coronary artery. It is "complex" in that there is a large area of calcification **(2)** on the lower right, which appears bluish on this H&E stain. Complex atheroma have calcification, thrombosis, or hemorrhage, which would make coronary angioplasty difficult.



This patient underwent coronary artery bypass grafting with autogenous ('derived from oneself', the saphenous vein) vein grafts. The largest of these **(1)** runs down the center of the heart to anastomose distally with the left anterior descending artery (anterior interventricular). Another graft **(2)** extends in a "Y" fashion just to the right of this to branches of the circumflex artery. A white temporary pacing wire **(3)** extends from the mid left surface.

VI. Cardiac Cycle

A. Heart beat is regular and rhythmic.
   1. Cardiac Cycle: Each complete heart beat.

B. Each cycle –
   1. Divided into

C. Stroke volume: Volume of blood ejected from

D. Cardiac output: Amount of blood that

VII. Conduction System of the Heart

A. Normal Structure and Function

1. Functional syncytium:

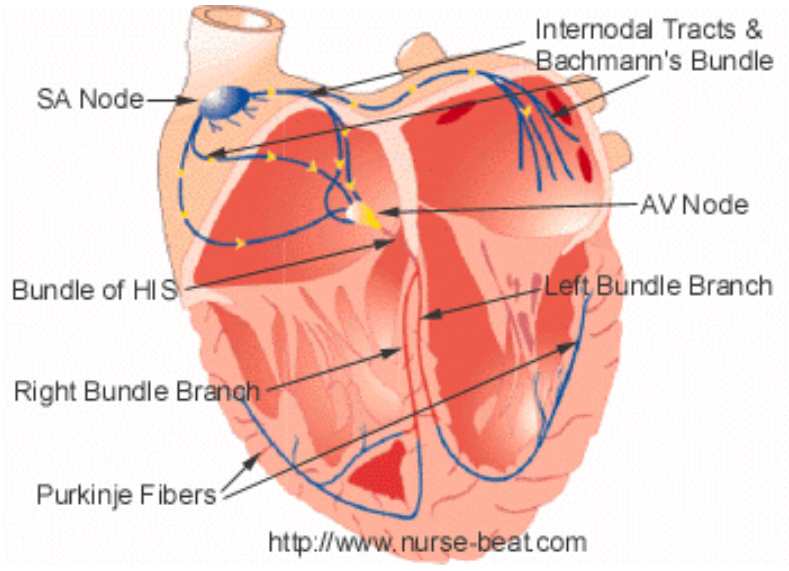
   a. In atria called
   b. In ventricle called

2. SA Node (sinoatrial):

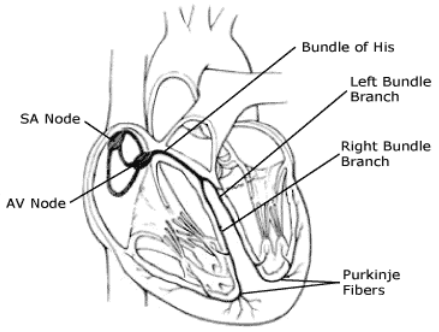
3. AV Node (atrioventricular):

4. AV Bundle (bundle of His):

5. Purkinje fibers:



Cardiac Conduction System



Impulses start in the hearts pacemaker, the SA node. It then spreads throughout the atria and causes them to contract (atrial syncytium). The impulse then moves to the AV node, then to the bundle of His and Purkinje fibers to the ventricles. This causes the ventricles to contract (ventricular syncytium).

B. Electrocardiograph:

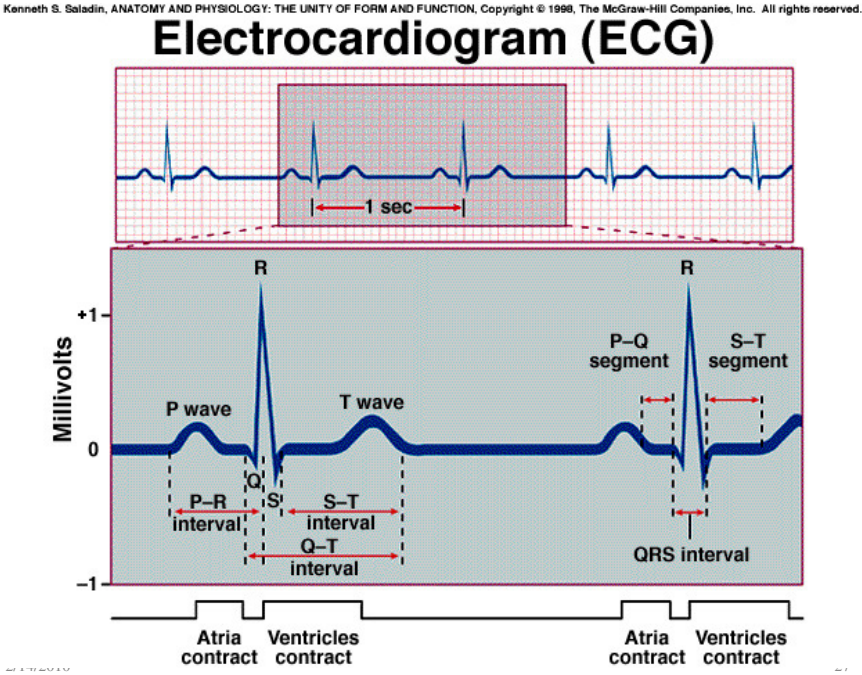
C. Electrocardiogram (ECG or EKG): The

1. Three waves: P wave, QRS complex, T wave.
2. Depolarization: Triggers
3. Repolarization: Just before the

D. P wave:

E. QRS complex:

F. T wave:

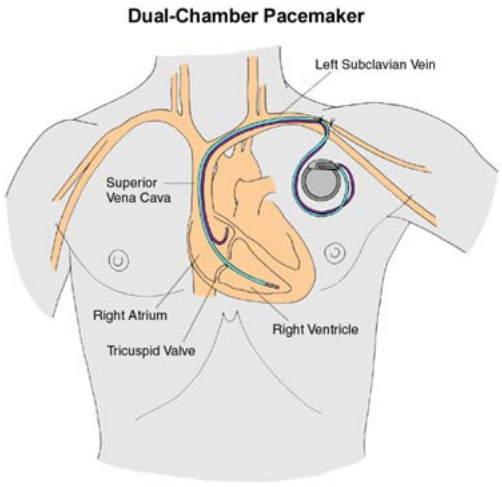


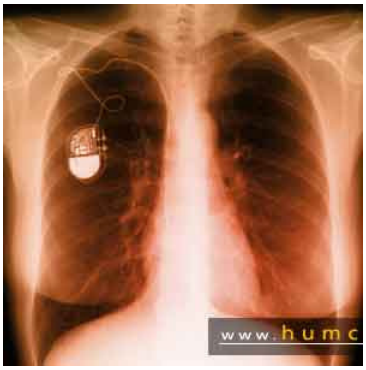
G. Cardiac dysrhythmia:

1. Heart Block: Conduction of impulses is
   a. Complete heart block: Impaired AV node conduction, producing complete dissociation of

   b. Can be treated by implanting an

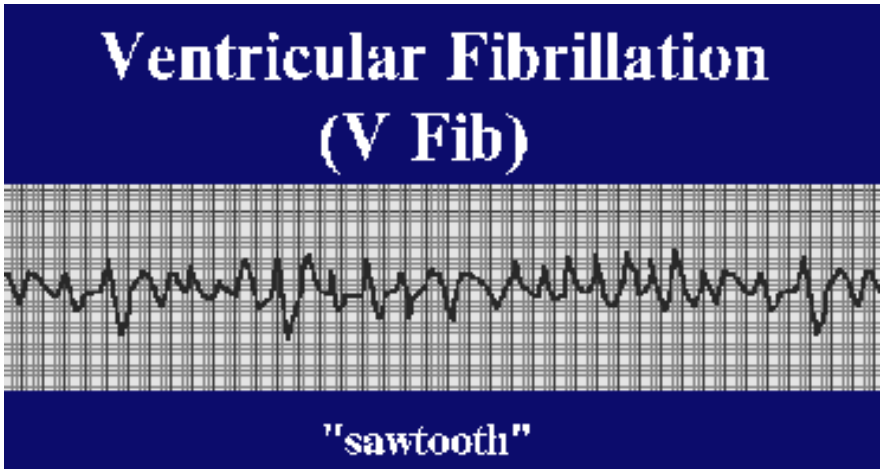
Pacemaker





2. Bradycardia:
3. Tachycardia:
4. Sinus dysrhythmia:
5. Premature contractions: Contractions that occur
6. Fibrillation: Condition in which cardiac muscle fibers are

EKG of Ventricular Fibrillation



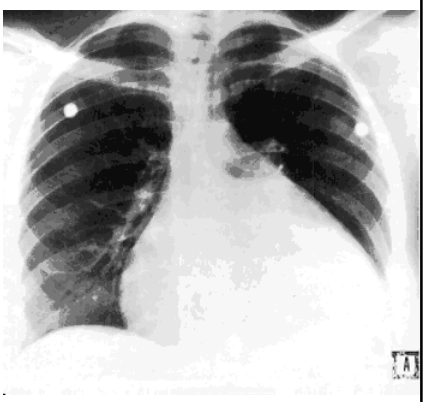
IX Heart Failure

A. Heart Failure:

B. Right-sided Heart Failure: Failure of the right side of the heart to pump blood.

1. Cor pulmonale: When right sided heart failure is caused by

C. <u>Left-sided Heart Failure</u>:



1. Inability of the left ventricle to pump effectively.

D. Patients may need a

E. Famous artificial heart –