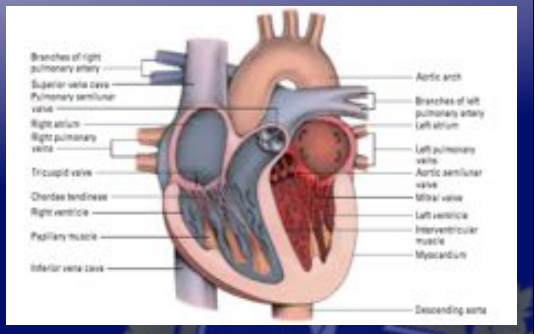
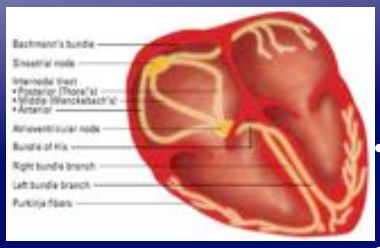
BASIC ECG INTERPRETATION

The Heart

- Purpose
  - Pumps Blood
- Basic Anatomy
  - 4 Chambers
  - 4 Valves
  - 2 Sides

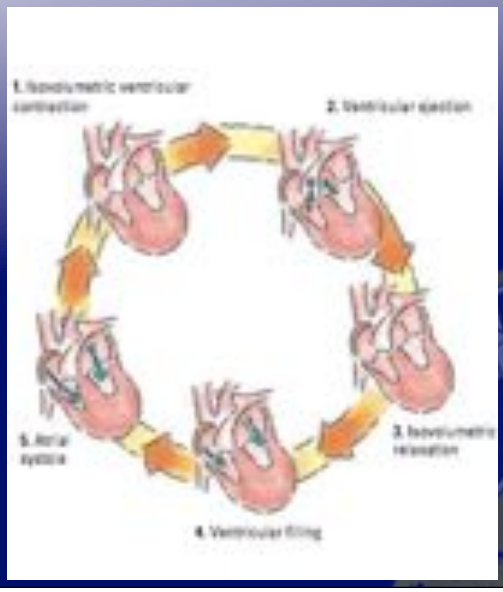


Cardiac Conductive System



- Sinoatrial Node (SA)
  - Pacemaker
- AV Node
  - Delaying impulses to keep ventricles from contracting too quickly
  - Allows time for ventricles to fill
- Bundle of His
  - Resumes the rapid conduction to the ventricles
- Purkinje Fibres
  - Assist in depolarization and contraction

Cardiac Cycle

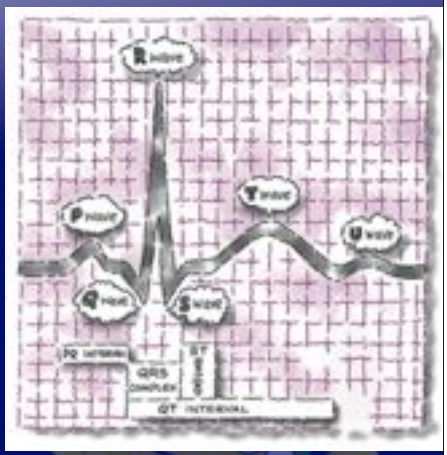


The ECG

- An ECG measures the hearts electrical activity
- 3 Lead
  - Gives a general monitoring of multiple regions of the heart
- 12 Lead
  - Leads can look at specific areas of the heart (Inferior, lateral, septal and anterior)

Components of the Waves

- A complex of five waves occur in anECG
- P, Q,R,S,T
- ECG tracings represent the conduction of electrical impulses from the atria to the ventricles

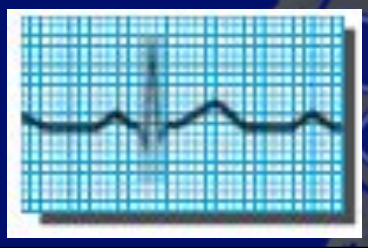


The "P" Wave

- Represents "depolarization" (contraction) of the atria
- Conduction of an electrical impulse through the atria
- Location – before the "QRS" complex
- Amplitude – 2-3mm high
- Duration – 0.06-0.12 seconds
- Usually rounded and upright

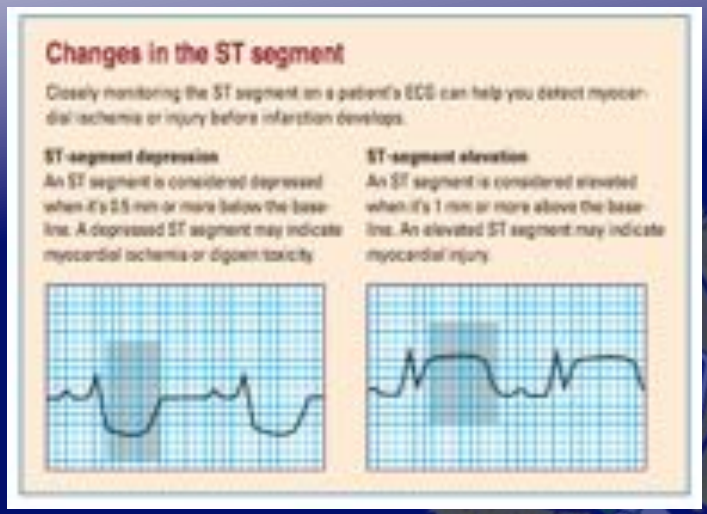
The "QRS Complex"

- Follows the P wave and represents depolarization of the ventricles
- When the ventricles depolarize they contract
- This is what produces the pulse



The "ST" Segment

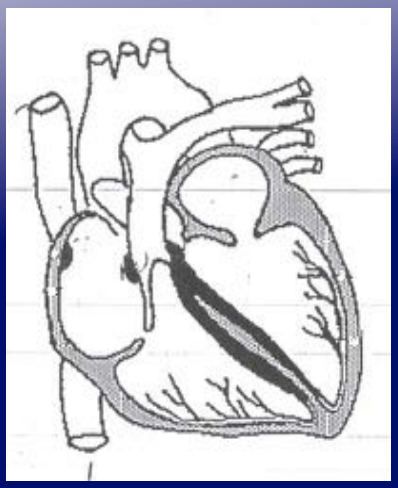
- This represents the end of the ventricular contraction or "depolarization" and beginning of ventricular recovery or "repolarization"
- Normal ST
  - Extends from the S wave to the beginning of the T wave

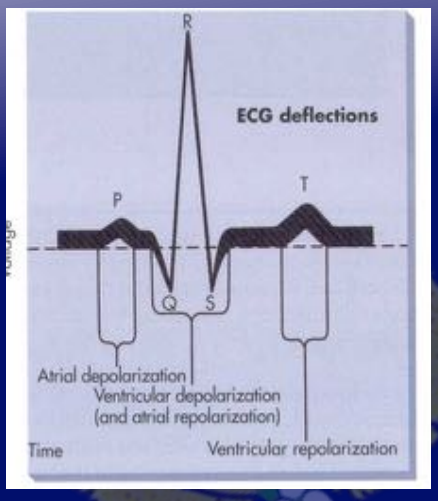


The "T" Wave

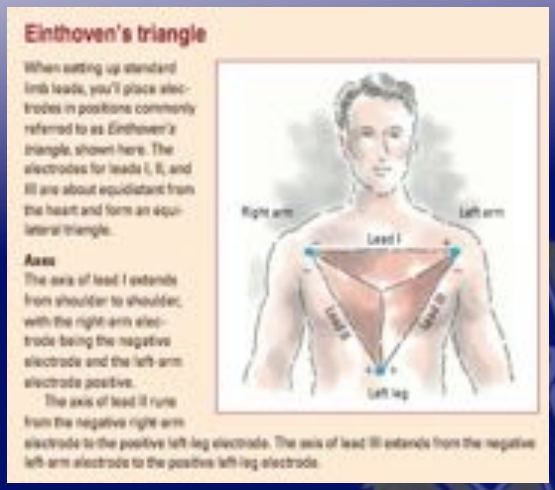
- Ventricular recovery or repolarization
- Location – follows the S wave
- Typically round and smooth

Putting It Together





Applying the 3-Lead ECG

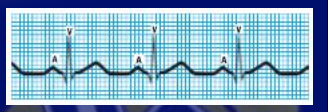


8 Steps to Assessing the ECG

- Step 1: Determine the Rhythm
- Step 2: Determine the Rate
- Step 3: Evaluate the P Wave
- Step 4: Evaluate the PR Interval
- Step 5: Determine the Duration of the QRS Complex
- Step 6: Evaluate the T waves
- Step 7: Determine the duration of the QT Interval
- Step 7: Evaluate other components

Step 1: Rhythm

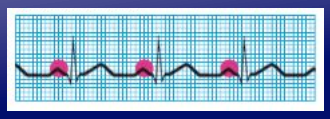
- Atrial Rhythm
  - Measure P-P intervals
  - Use a paper mark the P waves and compare a few of them
  - If they are consistent is a regular atrial rhythm, if they are inconsistent it's an irregular one!
- Ventricular Rhythm
  - Same thing just measure from the "R" wave and compare the R-R intervals



Step 2: Rate

- Typically done for you electronically
- Measure the "R-R" Intervals
- Print a 6 second strip
- Measure based on 3 second increments (or 15 large boxes) so count the # of P waves and multiply by 10 and you have an estimate.

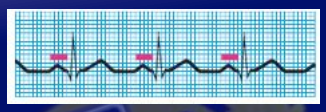
Step 3: Elevate the P Wave



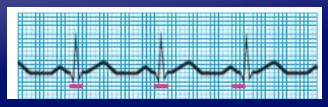
- Are they present?
- Are they normally configured?
- Similar size and shape?
- Is there one for every QRS complex?

Step 4: Determine Duration of the QR Interval

- Start at the P wave and the start of the QRS Complex
- Count the # of squares and multiply by 0.04
- Is the duration 0.12-0.20?
- Is it consistent



Step 5: Determine the duration of the QRS Complex



- Measure from end of PR to the end of the S
- Count the squares and multiply it by 0.04
- Is it normal? 0.06-0.10 seconds?
- Are the QRS complexes the same size and shape?
- Is there one after every P wave?

Step 6: Look at the T Waves

- T waves should be there!
- Are they all normal height
- Are they all consistent
- Are the deflected the same way as the QRS complex

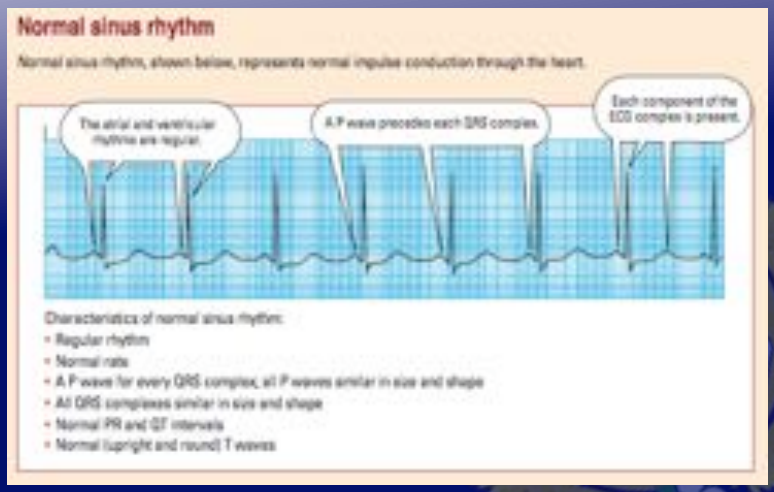
Step 7: Determine the duration of the QT interval

- Count the # of square at the beginning of the QRS complex to the end of the T Wave
- Multiply this by 0.04
- Should be between 0.36-0.44 seconds

Step 8: Look for other stuff

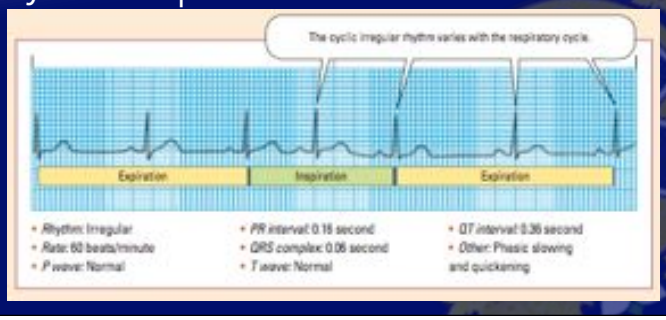
- ST Segment abnormalities
- Etc.

Normal Sinus



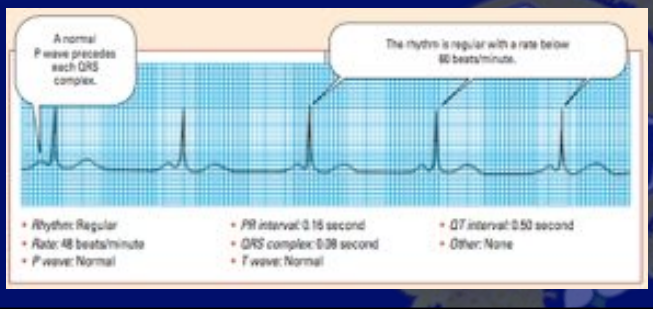
Sinus Arrhythmia

- SA node firing irregularly
- Rate is normal, rhythm is irregular and corresponds with respiratory cycle.
- Usually asymptomatic, and treatment is usually not required.



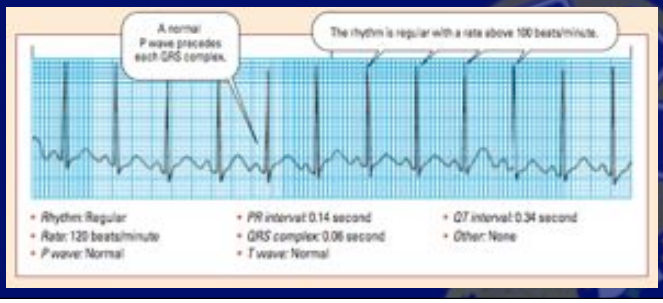
Sinus Bradycardia

- Heart Rate <60BPM
- "No Symptoms?, No Problem"
- "Symptoms? Problem!"
  - May have underlying heart disease and can lead to V-Tach, V-Fib.



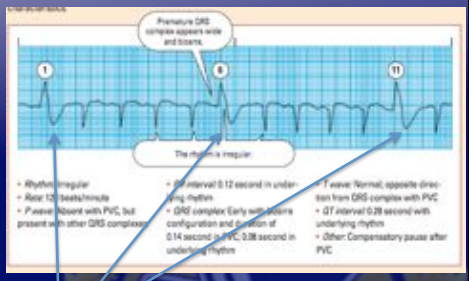
Sinus Tachycardia

- Heart rate >100BPM (>160 with exercise)
- Puts strain on the heart as demand for oxygen increases
- Rhythm is normal
- Need to slow it down!



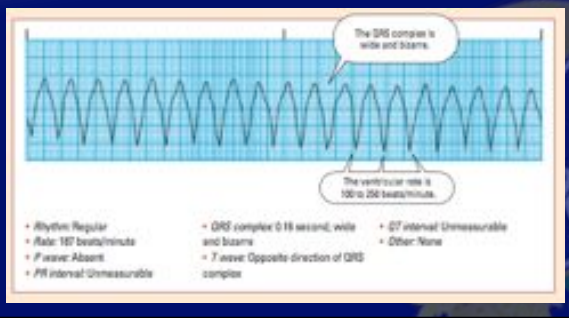
PVC's

- A beat that may occur in healthy people
- Happens alone, if happens twice its called "bigeminy" and three times beside each other is "trigeminy"
- Can lead to serious arrhythmias, especially in people with sick hearts



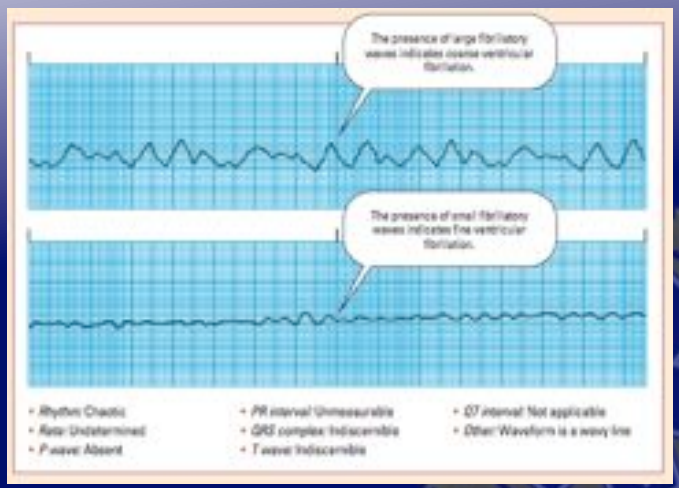
Ventricular Tachycardia

- Ventricular rate is >100BPM
- Treatment depends on are they conscious or dead…
- Usually needs to be defibrillated



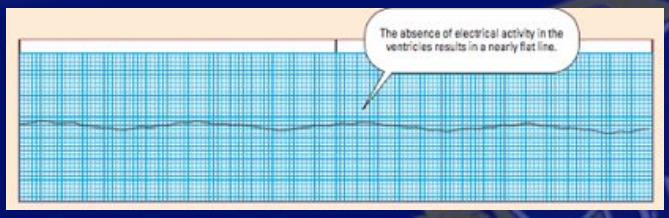
V-Fib

- "CODE BLUE"
- Chaotic activity of the electricity in the ventricles – no cardiac output!
- START CPR AND DEFIB!



Asystole

- No electrical activity
- No cardiac output
- Dead!

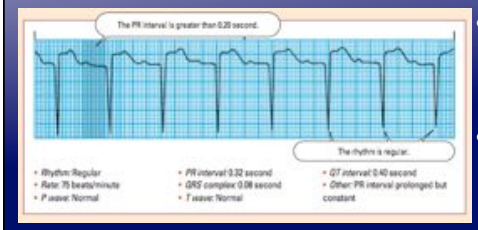


AV Blocks

- Interruptions in the impulses between the atria and ventricles
- Delays conduction
- Can be caused by a number of underlying heart conditions, drugs, and anomalies

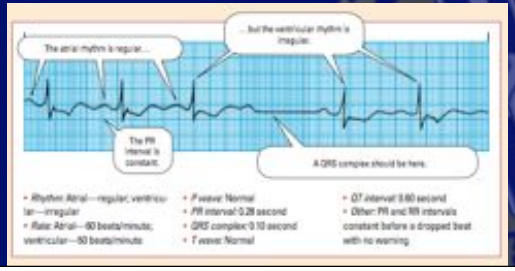
1st degree block

- Impulses delayed during conduction through the AV node
- Conduction does occur, just takes longer then normal.
- Can be normal, or can be caused by heart muscle weakness, infection or changes in the heart.
- Also caused by medications



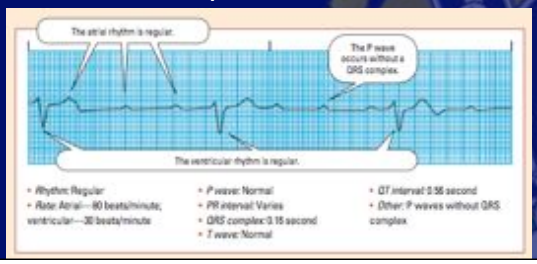
2nd Degree AV Block

- Looks like a "skipped beat"
- Likely cause – anterior wall MI, degenerative changes, or coronary artery disease
- Problem @ the bundles

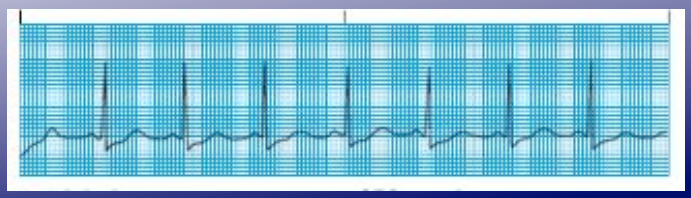


3rd Degree Block

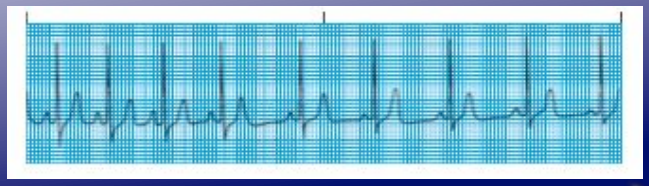
- Complete heart block
- Impulses cannot be fired to the ventricles
- Usually caused by coronary artery disease, MI's, drugs, etc.
- Needs medical Help!



Exercise



- Does this strip have a normal atrial rhythm?
- Does this strip have a normal ventricular rhythm?
- Normal Rate?
- All components present?
- What's your Interpretation?



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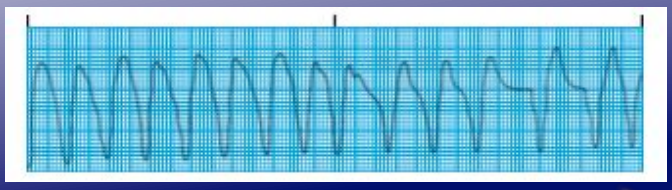

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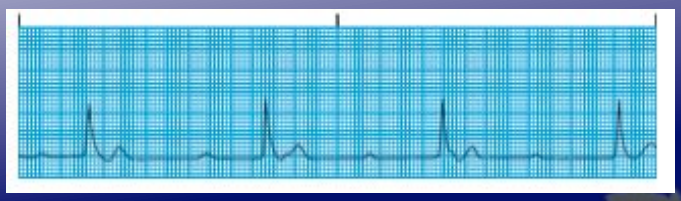

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To Wrap it up!

- Basic 3 Lead ECGs do tell us a lot
- There is more then this that they tell us, they also can tell us atrial issues, but they usually don't kill people so not critical for the field
- A 12 Lead tells us a heck of a lot more but the 3 lead can still save lives!