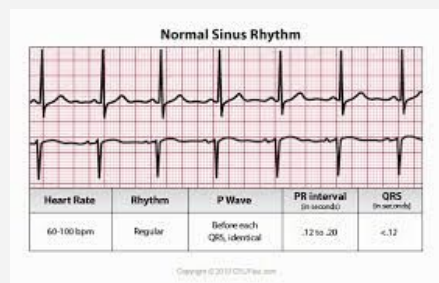


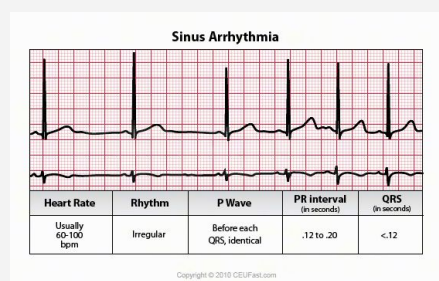
## Normal Rhythms

Normal Sinus Rhythm Sinus Arrhythmia

### Normal Sinus Rhythm



### Sinus Arrhythmia



Inc. prevalence w/ younger age  
Rhythm based on breathing, r/t changes in intrathoracic pressure:  
- Inspiration = HR inc. / Expiration = HR dec.

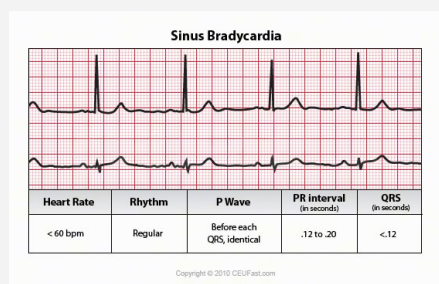
## Irregular Rhythms

Sinus Bradycardia Sinus Tachycardia

Premature Atrial Contractions (PAC)

Arrhythmias r/t changes in CO & perfusion

## Sinus Bradycardia

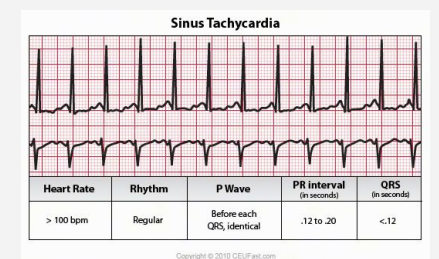


**Low HR = give atropine!** - epi, pacemaker (temporary/permanent)

Usually no symptoms, not treated unless symptoms present - AMS, cyanosis, extreme syncope/fatigued, hypotensive, SOB

Treated by treating cause - can occur after:  
vagal nerve stimulation, beta-blockers, digoxin, inferior wall MI (back of heart), hyperkalemia, hypothyroid, falls asleep

## Sinus Tachycardia

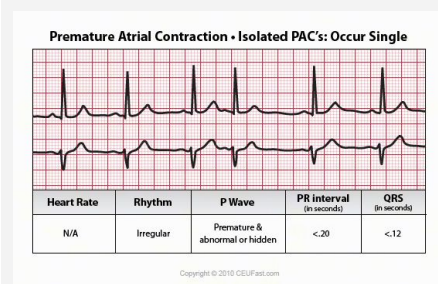


Heart beats too fast to allow to fill  
PR interval may be smaller depending on rate

**Causes:** anxiety, hypovolemia, infection, fever, caffeine, pain, HF, hyperkalemia, nitro & epi

**Only treat if necessary - treat underlying cause!** - beta-blocker or CCB if necessary, bear down, O2, digoxin, calm environment, relax/meditate

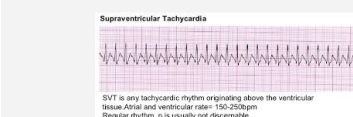
## Premature Atrial Contractions (PAC)



Beat not coming from SA node (ectopic focus)

Not usually treated, told to dec. cause - treated if more frequent/several consecutive  
**Causes:** MI, stretching of cardiac muscle, alcohol, smoking, HF & pericarditis, meds, irritability of cardiac muscle

## Supraventricular Tachycardia (SVT)



P-waves = buried in T-waves, hard to see  
PR interval = usually not possible to measure

QRS = normal (0.06-0.10) but may be wide if abnormally conducted through ventricles

**Person symptomatic**

Perfusion and CO affected

**Treat with adenosine & flush w/ 20 mL NSS**

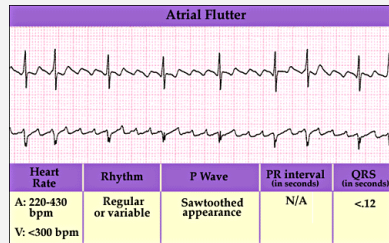
➔ heart restarts

**Causes:** anxiety, caffeine, amphetamines, irritability of atrial muscle

## More Rhythm Disorders

Atrial Flutter      Atrial Fibrillation

### Atrial Flutter



#### Saw-toothed appearance

Ectopic pacemaker

**Causes:** *pulmonary emboli, CHF, pericarditis, cardiac ischemia*

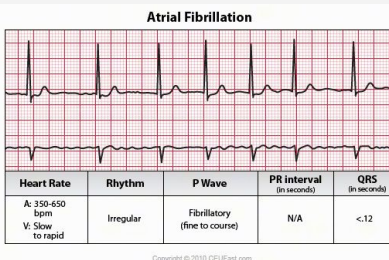
Can walk around if low rate

**Want to control rate** - digoxin, CCB, anti-arrhythmics; override pacing to fix rhythm, ablation therapy

May see ratio of beats to QRS's

*Similar shape = coming from same site*

### Atrial Fibrillation



**Biggest concern** = blood pooling → clots (a fib → NSR = clots → stroke/PE)

Dec. CO < 30%

*Not effective beats, rapid & chaotic*

**Causes:** MI, CHF, *cardiomyopathy* (anything that causes heart to expand)

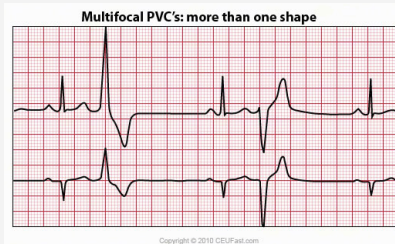
## Ventricular Rhythms

Premature Ventricular Contractions (PVC)

Ventricular Tachycardia

Ventricular Fibrillation

### Premature Ventricular Contractions (PVC)



**Unifocal:** 1 ectopic site on ventricle

**Multifocal:** 1+ site on ventricle - more dangerous!

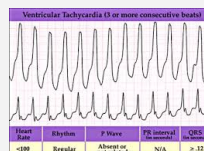
**Inc w/...** age, *ischemia, CHF, hypokalemia, acidosis, hypomagnesemia, stress, caffeine, nicotine*

**Symptoms:** palpitations

*Runs of PVCs → V-tach*

**May not treat** if limited number

### Ventricular Tachycardia



Usually w/ significant heart disease (CHF, MI)

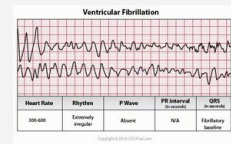
**Causes:** *anything that inc. automaticity of heart*

**Symptoms:** r/t dec. CO

**Treatment:** anti-arrhythmics (amiodarone, lidocaine, cardizem); beta-blockers (control rate); betapace (controls rate & rhythm); cardiovert (ICD)

**If not treated** → V-fib

## Ventricular Fibrillation



Ventricles quivering

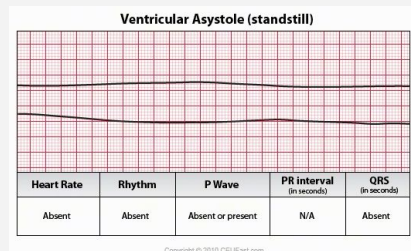
*O<sub>2</sub> demand is through the roof → ischemia*

**Treatment:** defibrillate

**Causes:** CAD, MI, CHF, *hypokalemia, hypomagnesemia*

**Pt is often...** *unconscious, no pulses, no BP, acidotic, may seize*

## Asystole



**Cannot shock** → CPR & epi

Occurs w/ myocardial hypoxia

## Atrioventricular (AV) Blocks

First Degree

Second Degree

Third Degree

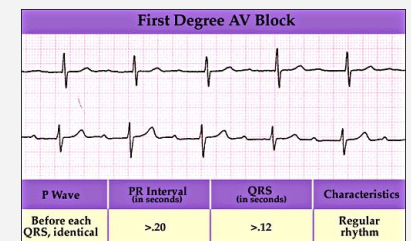
Bundle Branch

### Diagnosis: EKG

*Asymptomatic unless HR is too low*

**Treatment** (w/ slow HR): *O<sub>2</sub>, atropine, pacemaker*

### First Degree AV Block

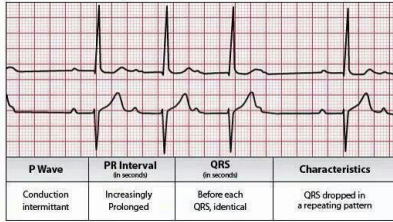


**Causes:** *ischemia, MI*

**Not usually treated**

## Second Degree AV Block

Second Degree AV Block - Mobitz (Wenckebach)



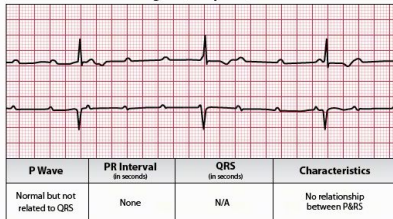
**Causes:** MI, digoxin, Lyme's disease

**Symptoms:** usually none unless HR is too low

**Treatment:** atropine, pacemaker

## Third Degree (Complete) AV Block

Third Degree (complete) AV Block

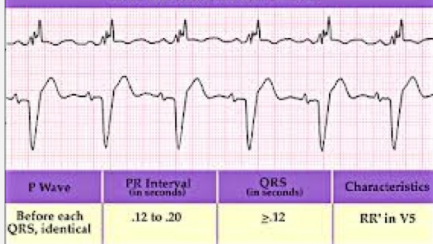


**Causes:** ischemia, CAD, MI

**Treatment:** pacemaker

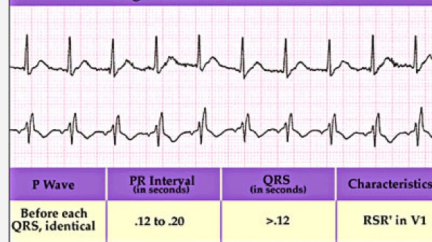
## Left Bundle Branch Block

Left Bundle Branch Block



## Right Bundle Branch Block

Right Bundle Branch Block

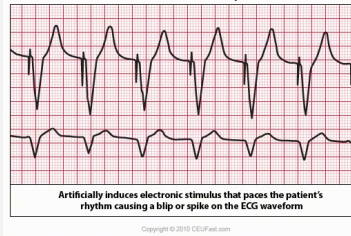


## Analysis

Dec. CO      Tissue Perfusion

## Pacemaker Spikes

Electronic Pacemaker Spikes



## Pharmacological Interventions

Anti-Arrhythmics      Beta-Blockers

Calcium Channel Blockers

## Implantable Cardioverter Defibrillator (ICD)

### What is it?

An internal defibrillator

### Who are candidates?

Pts who have survived an episode of sudden cardiac arrest  
Documented life-threatening dysrhythmias

Uncomfortable, not necessarily painful

## Defibrillation vs. Cardioversion

**Defibrillation:** shock heart in emergency

**Cardioversion:** sync w/ heart, want normal rhythm

- Want to medicate beforehand

- Fibrillate in middle → shock & defib.

## External Defibrillator Vests



Worn 24/7 except showers

## Ablation Therapy

Want to go in & stop abnormal beats

**3 Types** - all cause destruction to area of heart causing problem

- Chemical
- Mechanical (cut, lasers)
- Radiofrequency

Used w/ electrophysiology/conduction problems

## Evaluation of Treatment

Improved CO      Improved tissue perfusion

Improved EKG