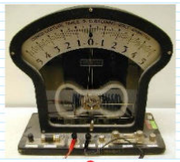
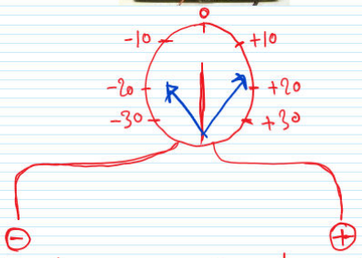
ECG
Sunday, December 2, 2018 1:05 PM

ECG Handnotes

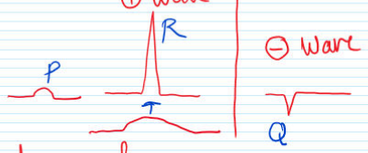
Electrocardio Graphy (ECG)





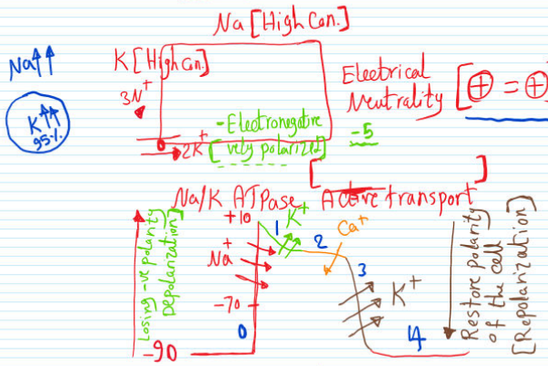
The same The opposite

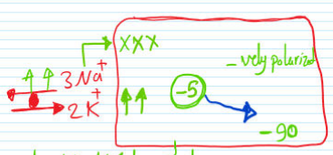
⊕ → ⊕ | ⊕ → ⊖
⊖ → ⊖ | ⊖ → ⊕



-Deflection to ⊖ or ⊕ Depends on the charges of the propagating current.

"Resting state"

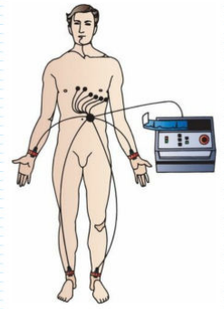




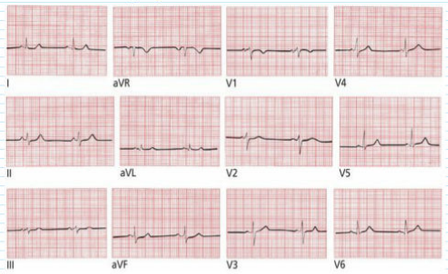
Leaky K channels
Losing ⊕ charge → more -ve Inside the cell

channels
- Leaky
- voltage-gated
- ligand-gated

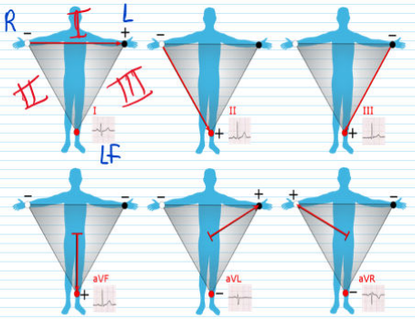
Chemical force = Electrical force
[Conc. Gradient]

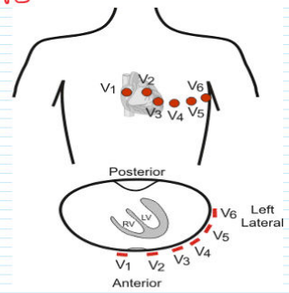


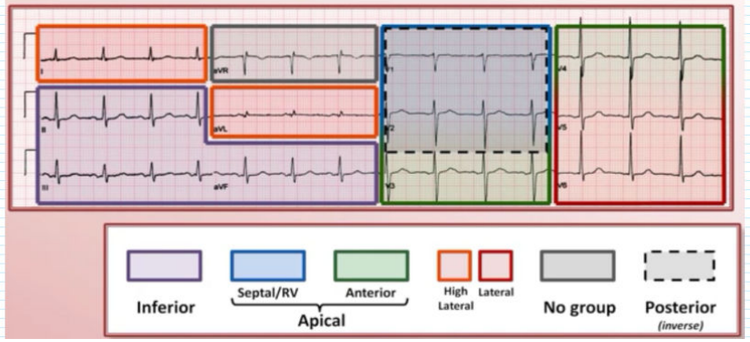
Bi uni chest



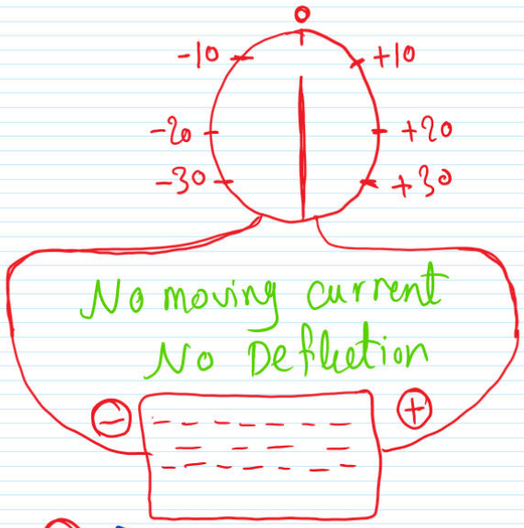
Diff. of voltage Between 2 Electrodes







1 At Resting state: (II)

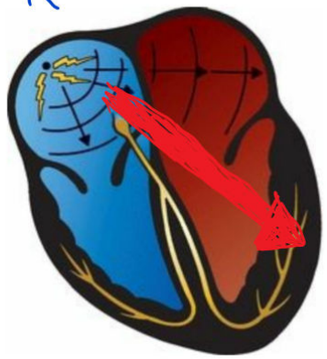


2- Atrial Depolarization: ⊖ R

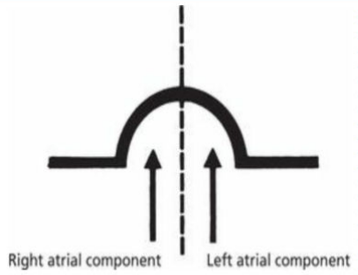
⊕ ⟶ ⊕

↓

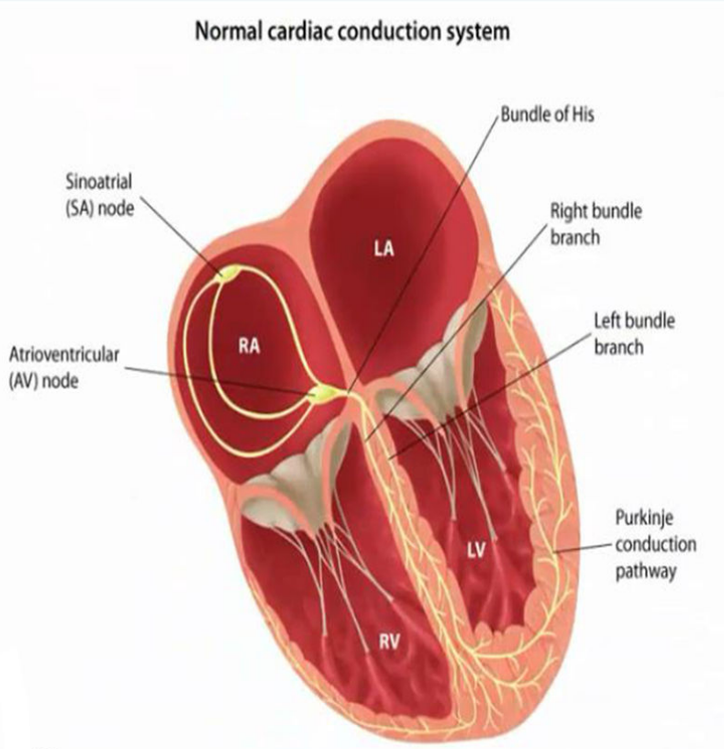
positive Deflection



⊕ Lf



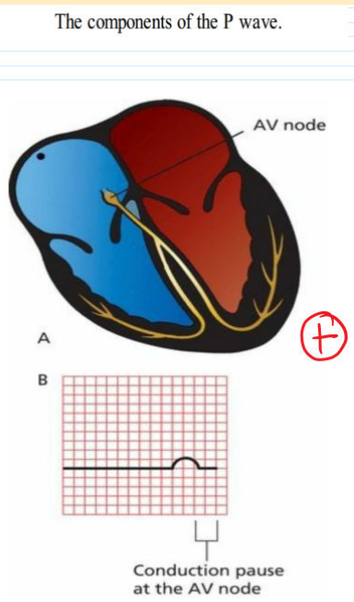
The components of the P wave.



specialized Myocardium

3] Av conduction:

very low Amplitude
[silent AP]
↓
Isoelectric



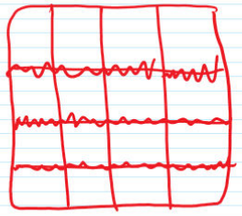
Specialized Myocardium

1- Number of cells
2- Number of GJ

Av node
[slowest conduction]

↑ number of cells
↓ GP

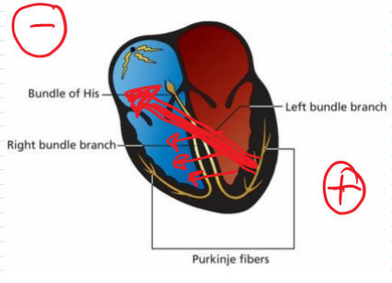
purkinje fibres
[fastest Conduction]



↓ Number of cells
↑ GP

4- septal Depolarization: lf → Rt

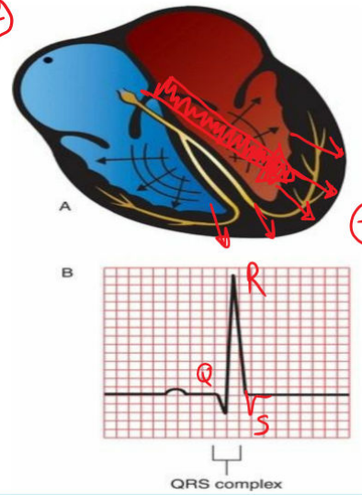
⊕ ⟶ ⊖
↓
Negative Deflection



⑤ Myocardial Depolarization:

subendocardium ⟶ Epicardium

⊕ ⟶ ⊕
↓
positive Deflection



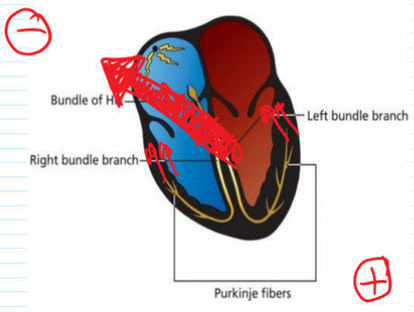
⊛ Higher Amplitude
[larger Ms Mass]
⊛ Narrow [Na channels]

⑥ Basal Depolarization:

⊕ ⟶ ⊖

↓

-ve Deflection



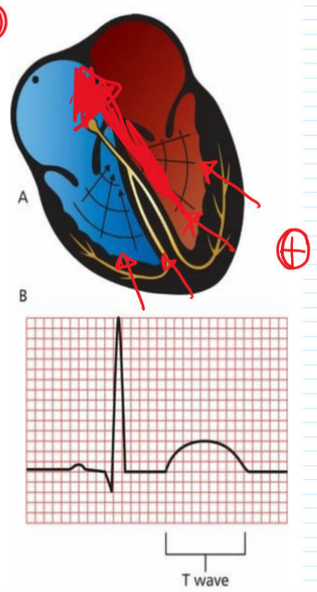
⑦ Ventricular Repolarization:

→ The last part to be Depolarized will be the first part to be Repolarized.

⊖ ⟶ ⊖

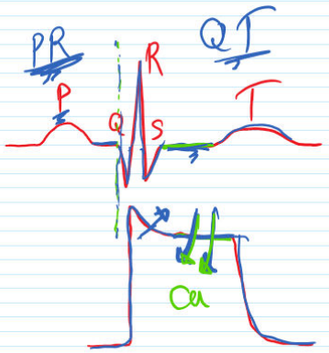
↓

-ve Deflection



⊛ Wide & Broad
[K channels are slow]

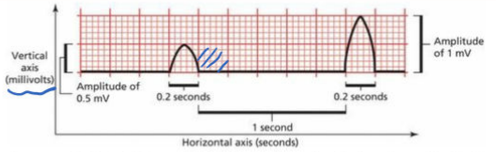
⊛ Atrial Repolarization is masked by ventricular Depolarization.



Intervals = Waves + segments

Atrioventricular conduction

full cardiac cycle



Both waves are one large square in duration (0.2 seconds), but the second wave is twice the voltage of the first (1 mV compared with 0.5 mV). The flat segment connecting the two waves is five large squares (5 × 0.2 seconds = 1 second) in duration.

300 LS/min

300 LS / 60 s

$1s = \frac{60}{300} = \frac{1}{5} = ,2s$

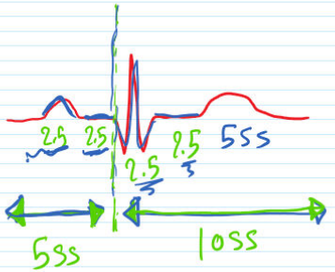
1s = 5 ss

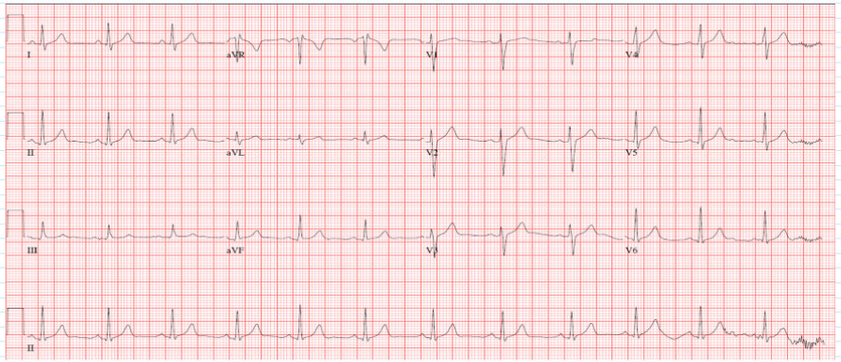
$ss = \frac{,2}{5} = ,04s$

Each ss = ,1 mV

Each 1s = ,5 mV

2 1s = 1 mV





I] Rythm:

*Normal sinus Rythm:

A-HR 60-90

60 <100

Bradycardia tachycardia

B-Regular [origin of impulse is S.A node]

- P wave is followed by QRS [each atrial Activity is followed by ventricular Activity]

D-Normal conduction system

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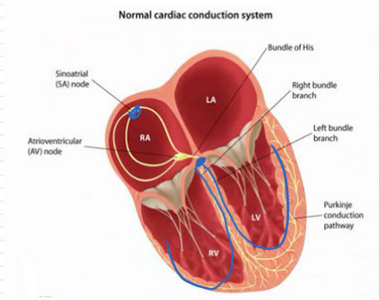


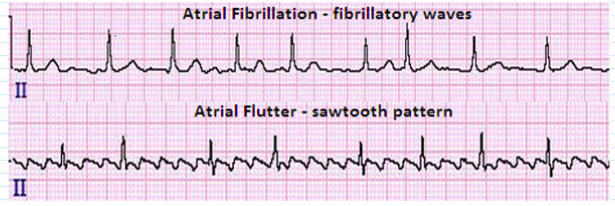
Rythm

Regular

Irregular → Regular

Irregular

Distance Between 2 successive R



$\frac{300}{4} = 75$ B/min

Axis of the heart

Lead I & Lead VII

Left → Leaves [LVH & L

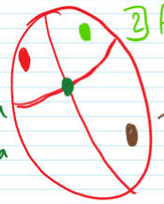
Axis of the heart

Lead I & Lead III

Left → Leaves [LVH & LBBB]

Right → Reach [RVH & RBBB]

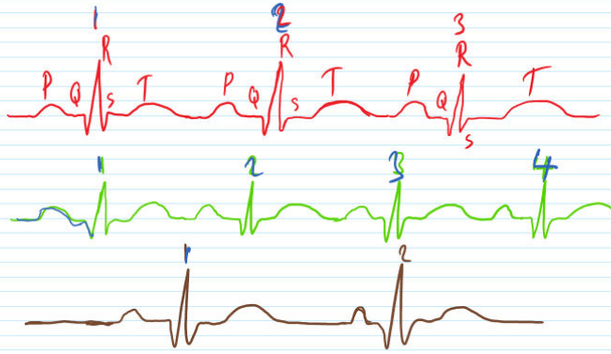
Arrythmia



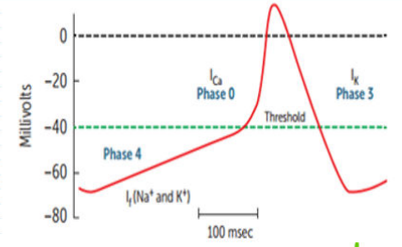
1] sinus Arrythmia
2] Atrial Arrythmia
3] Nodal Arrythmia [Junctional Arrythmia
4] ventricular Arrythmia

1] sinus Arrythmia:

- sinus tachycardia
  - ↑ Automaticity of SA node
  - HR > 100
- sinus Bradycardia
  - HR < 60

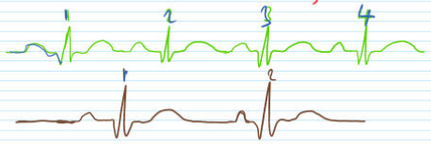


↑ Automaticity [fever, coffe, Hyperthyroidism]
↓ Automaticity



≥3 Diff p wave Morphology
>100
Multifocal Atrial tachycardia

Avoid BB
COPD



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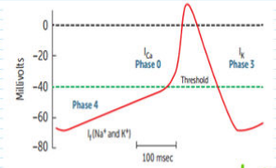
↓ Automaticity



≥3 Diff P wave Morphology >100

Multifocal Atrial tachycardia

Avoid BB

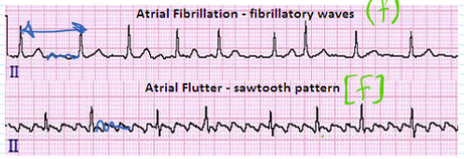
COPD

2) Atrial Arrythmia:

Irritant focus

- Multifocal Atrial tachy
- Atrial flutter [Regular]
- Atrial fibrillation [Irregular]

Absent P waves



4) ventricular Arrythmia:

Ischemia

↓

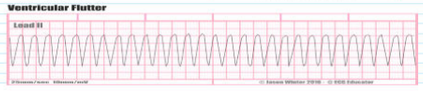
Loading with ions

↓

Generate AP

- ventricular premature Beat
- ventricular tachycardia
- ventricular flutter
- ventricular fibrillation

Monomorphic

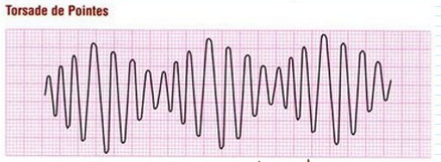


Abnormal conductive pathway [Wide QRS with Abnormal Morphology]

No Retrograde conduction in A.v node

Electrolytes Imbalance [Hypokalemia & Hypomangensemia]

Vs



↑QT → polymorphic ventricular tachycardia

Torsades de pointes

twisting of points

Heart Rate

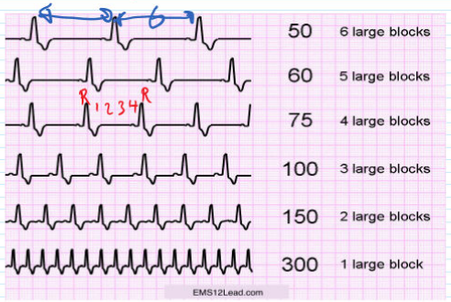
- Bradycardia
  - >60
- tachycardia
  - >100

300LS/min

1500SS/min

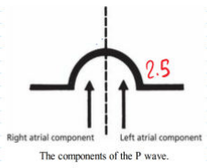
$HR = \frac{300}{4} = 75$

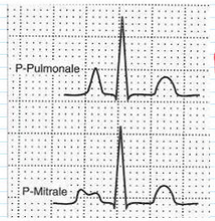
*If Rythm is irregular calculate number of QRs in 30LS then X10



P Wave

- present
  - Normal
  - Abnormal

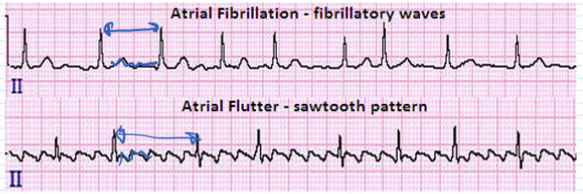


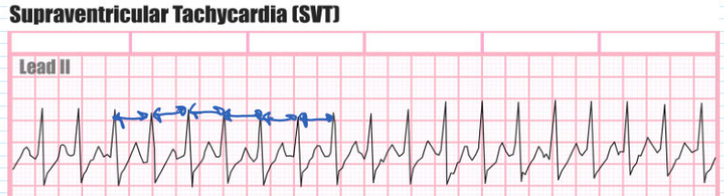


Rt Atrial Enlargment

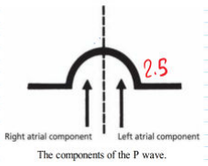
If Atrial Enlargment

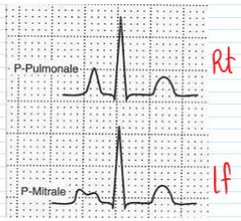
- Absent
  - Irregular Rythm [Atrial fibrillation]
  - Regular Rythm
    - Atrial flutter
    - supraventricular tachycardia





P Wave

- present
  - Normal
  - Abnormal
    - 

The components of the P wave.
    - 

Rt Atrial Enlargment
lf Atrial Enlargment
- Absent
  - Irregular Rythm [Atrial fibrillation]
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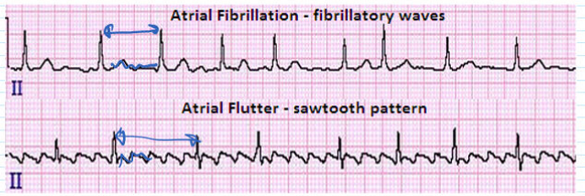
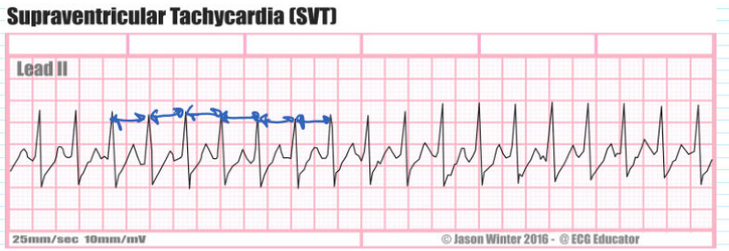
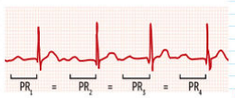
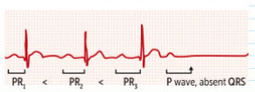
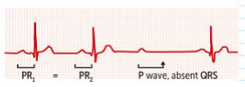


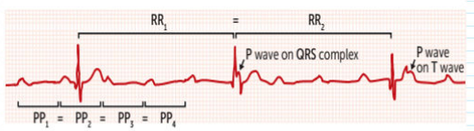


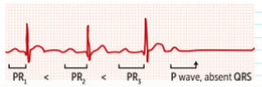
PR Interval 5ss = 1LS

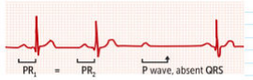
- ✱ prolonged PR Interval > 5ss
- Av Block
  - 1st Degree
    - fixed
    - 

  - 2nd Degree
    - Mobitz type I [Wenkbach]
      - progressive
      -
      - Missed QRS
      - 

    - Mobitz type II
      - fixed
      - 

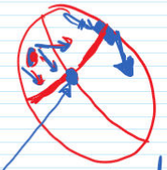
  - 3rd Degree [complete]
    - Atrio-ventricular Dissociation
    - 





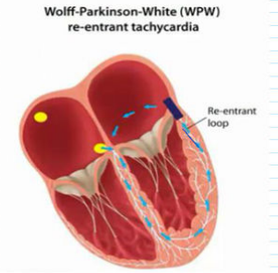
⊛ shortening of PR Interval < 3ss

- WPW [preexitation synd.] [Bundle of Kent]
  Abnormal connection
  Between Atria & ventricle
  [fast conduction]



Av node [slow conduction]

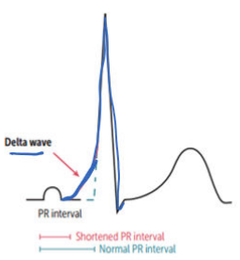
supraventricular tachycardia



BB
CCB
Digoxin

Get Worse

* WPW pattern:
1- Delta wave
2- shortening of PR interval
3- Wide QRS.

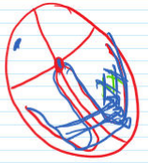


⊛ QRS

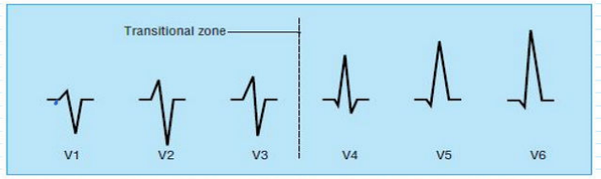
- BBB
- ventricular Hypertrophy

> 3ss [wide QRS]

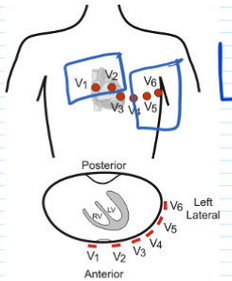
- ventricular Arrythmia
- BBB



Rt chest Leads



Typical change in morphology of QRS complex from leads V1 to V6



Lt chest Leads

*Reversal of Normal Morphology: R

RBBB [Wide QRS, RSR]

RVH

BBB

RBBB

Wide QRS

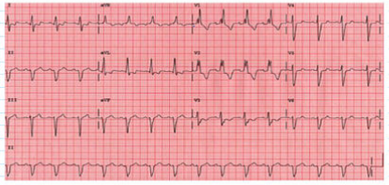
RSR in V_1, V_2

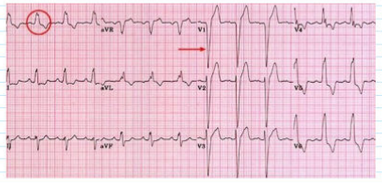
LBBB

Wide QRS

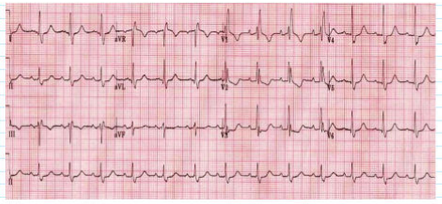
RSR in V_5, V_6

Right Bundle Branch Block (RBBB).





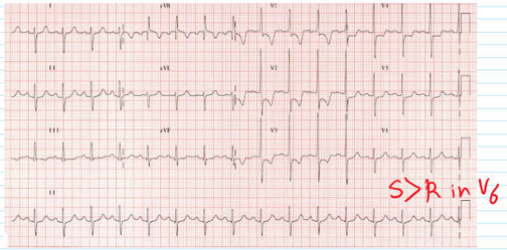
LBBB



ventricular Hypertrophy

RvH

R>S in v_1



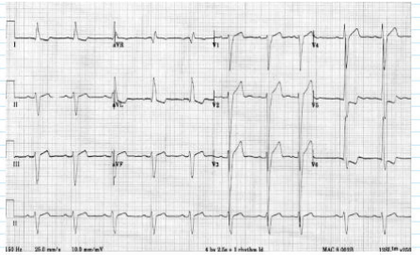
LvH

Exagerated S, R

S in v_1 > 25 mm

R in v_6 > 25 mm

> 35 mm



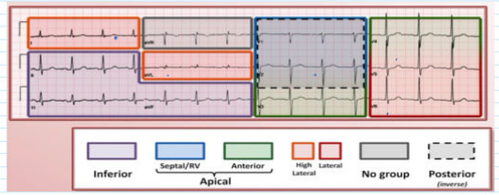
Left Leaves

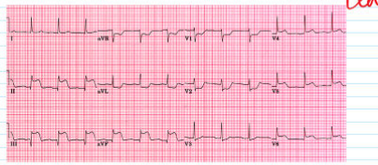
Right Reaches

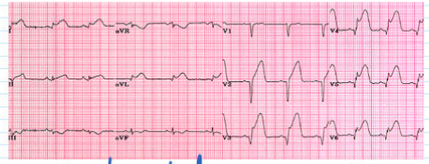
ST segment

Elevation

STEMI







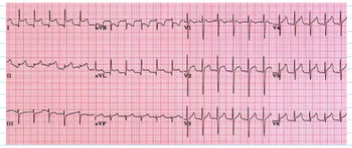
Anterolateral MI

Diffuse ST Elevation

↓

pericarditis

sharp-stapping pain with Relief after leaning forward



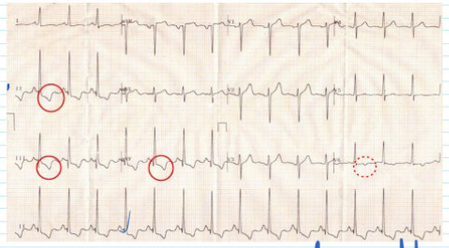
prinzmental Angina

ST Depression

Subendocardial Ischemia/Infarction

Ischemia >70%

Normal cardiac Enzymes



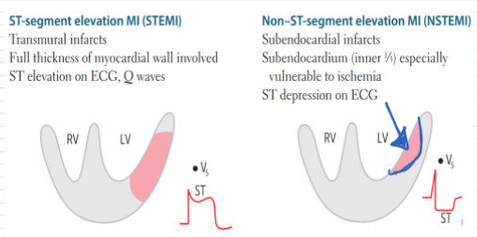
Int Wall Ischemia

NSTEMI

↑ Cardiac Enzymes

SITE	FACING	RECIPROCAL
INFERIOR	II, III, aVF	I, aVL
HIGH LATERAL	I, aVL	II, III, aVF
ANTERIOR	V1, V2, V3, V4	NONE
POSTERIOR	NONE	V1, V2, V3, V4

EMS12Lead.com

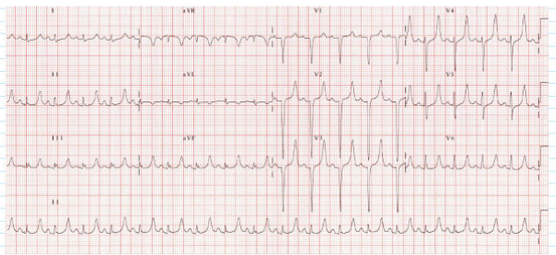


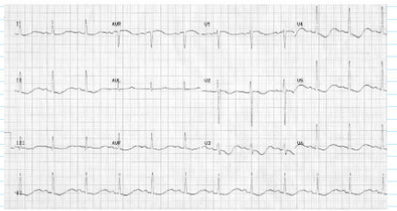
QT interval $\propto \frac{1}{\text{serum Ca}}$

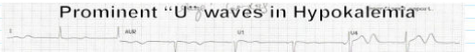
- prolonged
  - ↓ Ca
  - Drugs
  - Congenital Long QT interval
    - Jervil Lang Nielson syndrome
      - AR
      - Deafness
    - Romano ward syndrome
      - AD
      - No Deafness
- shortened
  - ↑ Ca

T Wave $\propto$ K

- peaked T Wave >1LS
  - [Hyperacute T Wave]
- flat or inverted

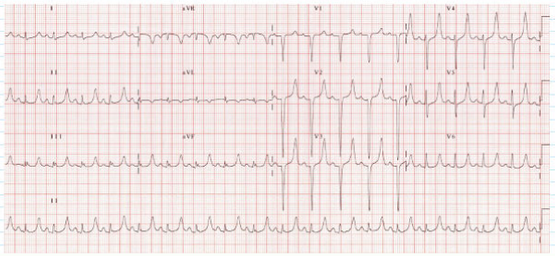




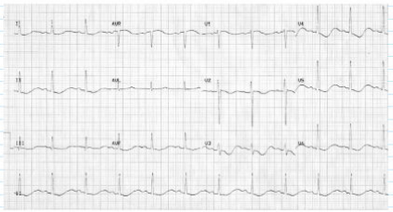


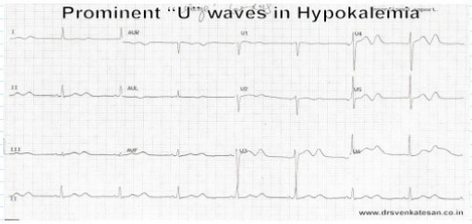
T Wave & K

- peaked T Wave >1LS [Hyperacute T Wave]



- flat or inverted





Not shockable Rythm

Asystole

PEA

No pulsation

pulseless Electrical Activity

[Electrico Mechanical Dissociation]

Cardiac tamponade

Cardiac Tampad

Asystole

No pulsation

pulseless Electrical Activity

[Electrico Mechanical Dissociation]

Cardiac tamponade

Cardiac Tampad

Cardioversion

Synchronized

in sync

QRS

R T Wave

→ Worse

V. tach

Defibrillator

unsynchronized

V. tach

X pulses

V. fib.