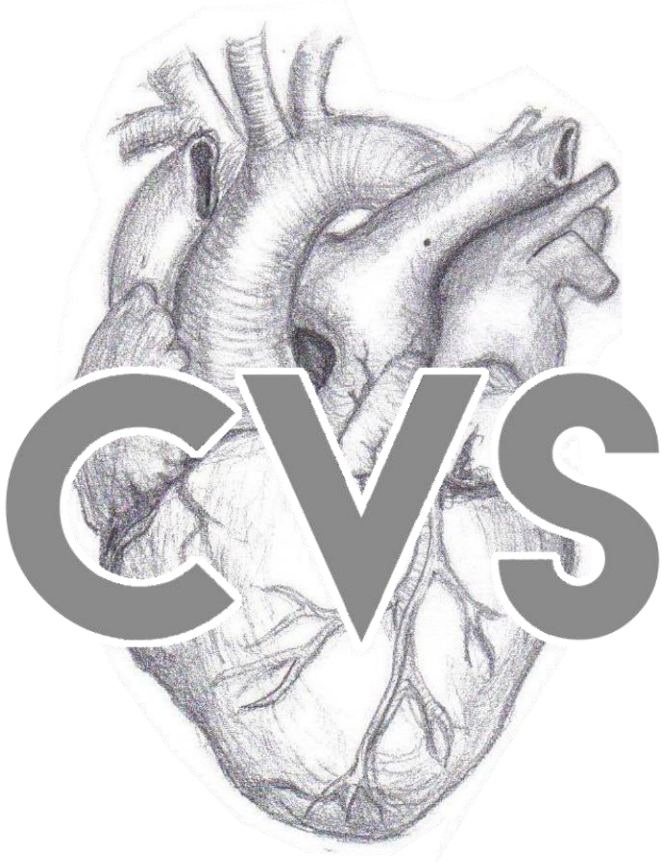


CVS

PHYSIOLOGY

☑ Sheet ○ Slide ○ Handout

Number

Lab 2.

Subject

ECG reading.

Done By

Sara Zayadneh.

Corrected by

.....

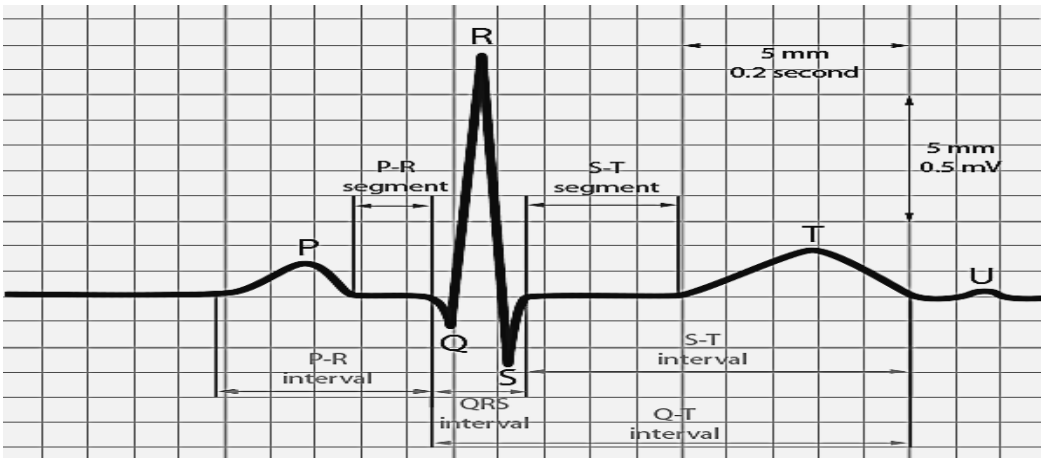
Doctor

.....

Date: 00/00/2016

Price:

- The first thing before reading ECG you should check for the following:
  -ID, date, time.
  -Rhythm (regular\irregular).
  -Rate.
  -Axis (deviation).
  -Waves, intervals, segments.



- Normal sinus rhythm:
  1-Regular R-R intervals (card method) → the distance between each successive 2 Rs is equal.
  2-Every QRS complex is preceded by a P wave.
  3-Normal P-R intervals→ the most important one, start for the beginning of P to the beginning of QRS, normally equals (3-5) small squares, if the P-R interval was abnormal that will affect the R-R intervals.

Note

The easiest lead to determine the rhythm and rate is bipolar limb lead #2.

==========

- Heart rate:
  HR= beats \ min.
  Normal HR 60 – 100 beat\min.
  Remember: each large square = 5 small squares.
  HOW to calculate ?
  -If the heart rate was regular, take the distance between any two Rs→ the distance is taken either by # of large squares or # of small squares.

-If the distance including only large squares without any small square, then count the large squares, and use the following equation:

HR= 300/ no. Of large squares within R-R interval

If the distance including both large and small squares, then count the small squares, and use the following the equation:

HR= 1500/ no. Of small squares within R-R interval

ملاحظة: الرقم ٣٠٠ جاي من تحويل المربع الكبير لدقيقة، والرقم ١٥٠٠ جاي من تحويل المربع الصغير لدقيقة. (بس جملة معترضة يعني) :) .

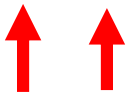
Examples:

1)) If the R-R interval was 3 large squares, then → 300\3= 100 beat\ min.
2)) If the R-R interval was 3 large squares and 2 small squares, then count the small squares→
→(3*5 +2)= 17 small sq.
→1500\17 =88.2 beat\ min.
3)) If the R-R interval was 4 large squares and a small square, then count the small squares→
→(4*5 +1) = 21 small sq.
→1500\21 = 71.4.

==========

- Axis:
  is the directional resultant of ventricular depolarization, either normal, left or right deviated, strongly affected by myocardium hypertrophy.
  WE LOOK AT **LIMB** LEADS ONLY.
  →the easiest is to take limb leads 1 + 2.
  →rule of thumb, you note the deflection of QRS (+ deflection → thumb up, - deflection → thumb down).

- Normally:
  The QRS deflection of both lead 1 + 2 are + , so, two thumb up.
  ** imagine that the head of arrows represent the direction of the thumb, then:

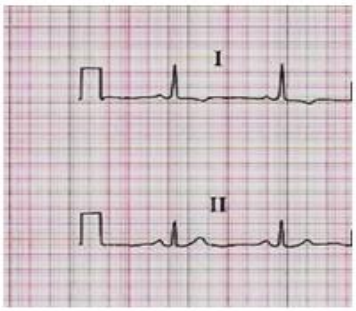


- Right axis deviation:
  QRS deflection of lead 1 is - , while + for lead 2.

Riting each other→
Right

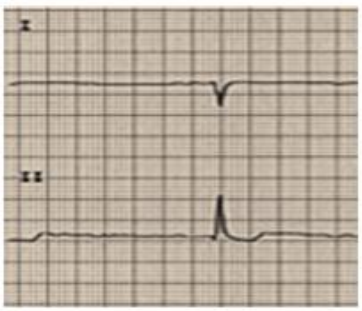
- Left axis deviation:
  QRS deflection of lead 1 is + , while - for lead 2.

Lefting each other →
Left.



A-Normal axis (I and II) +ve

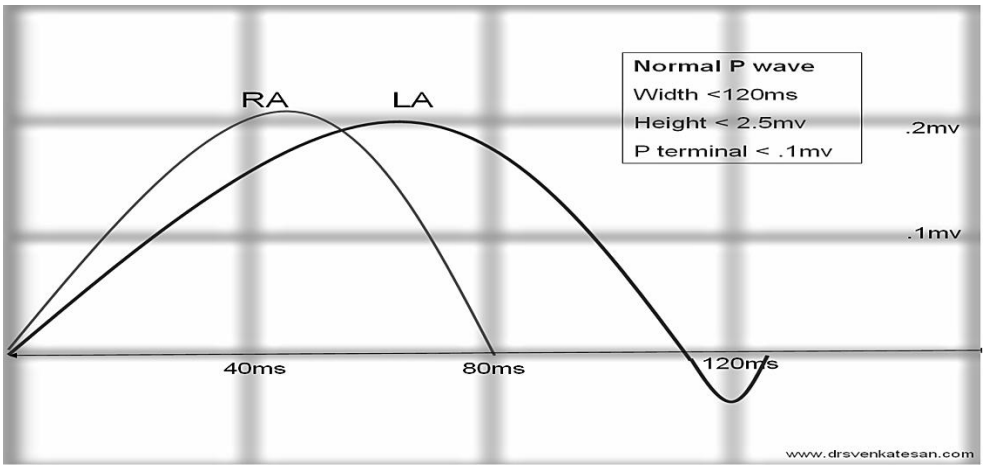
B- LAD (I +ve and II –ve)



C- RAD (I -ve and II +ve)

Normal P wave:

P wave represents the atrial depolarization, the length and width **collectively** should not exceed 3 small squares, normal shape →dome , smooth.



Normal P-R interval:

3 – 5 small squares لا أقلّ ولا أكثر

**less than 3 small sq → no AV delay, AV is not functional, so the current will pass through fast accessory pathway.

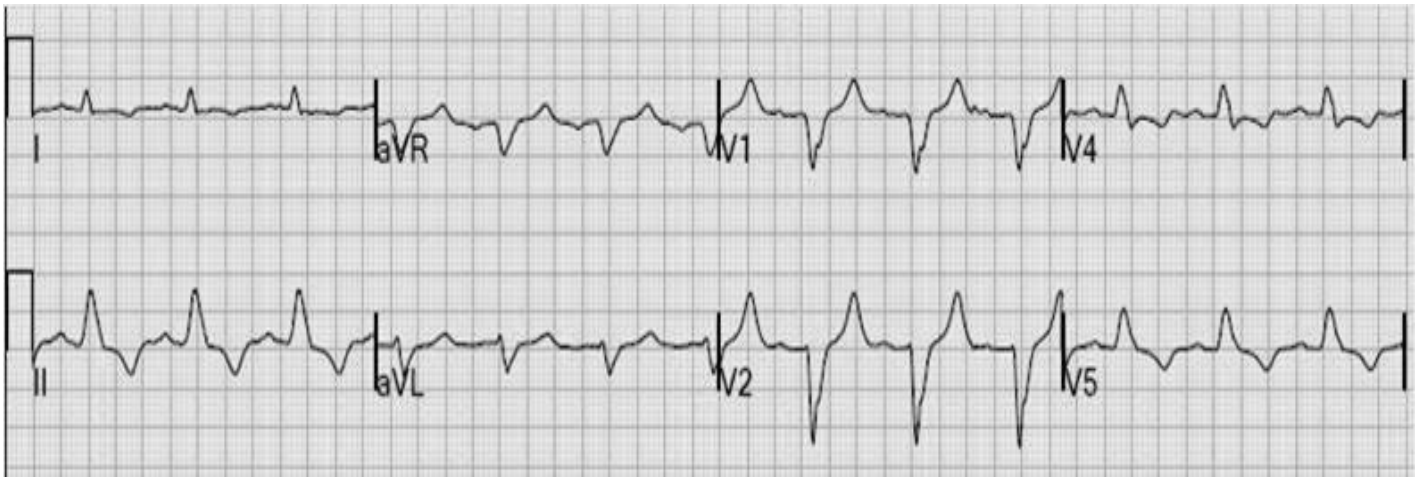
**more than 5 small sq → more AV delay, AV block.

Normal QRS complex:

width < 3 small sq.

→if the shape or width was abnormal → ventricular abnormality.

→we don't care about the length of QRS complex; since it depends on the calibration.



Normal QT:

ventricular depolarization and repolarization.

form the beginning of Q to the end of T.

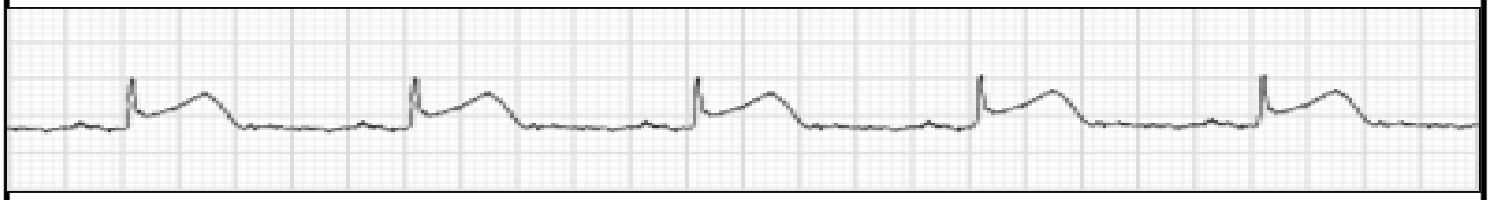
→ **corrected QT interval = QT /sq root (R-R)**

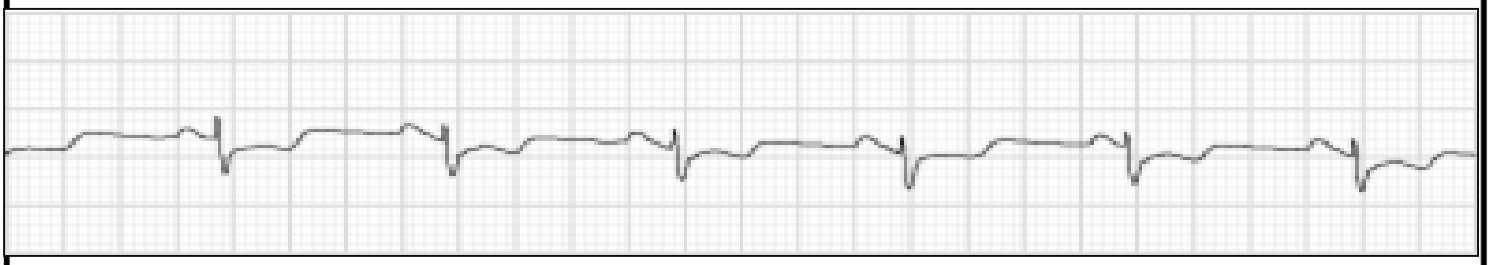
<=0.44 s.

OR

< 50% of R-R interval.

- **Normal ST segment:**
  isoelectric (in comparison to the *next* T –P segment).
  →If it is elevated→ acute MI or pericarditis.
  →If it is depressed→ ischemia (old ischemia).





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T wave:

ventricular repolarization, its length should not exceed 10 small sq.

Normally inverted in aVR, V1, v2 +/- v3, III.

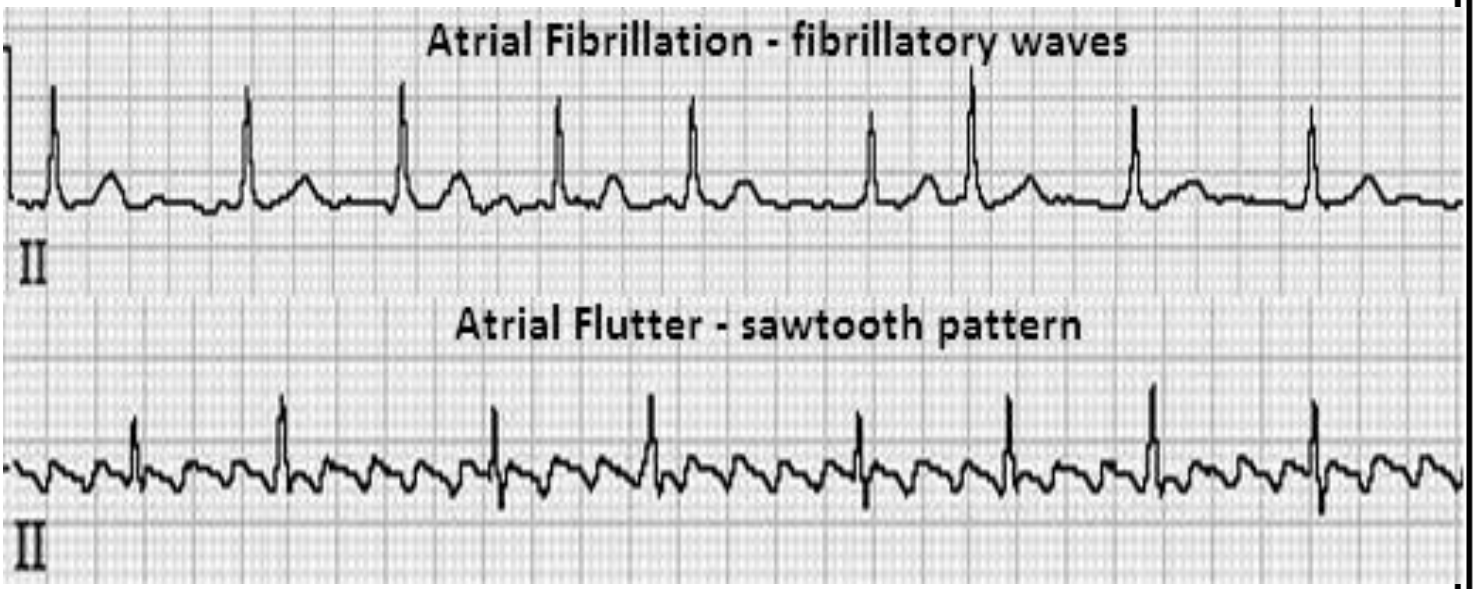
==========

-How to calculate Heart Rate in irregular rhythm?
Count the Rs in 30 large squares then multiply by 10.

Abnormal Rhythm

To determine if it is an atrial abnormal rhythm or a ventricular abnormal rhythm:
→ if there is normal QRS complexes→atrial.
→if there is abnormal QRS complexes →ventricular.

Atrial rhythm:
1)) Atrial fibrillation:
- irregular irregular rhythm (baseline).
2)) Atrial flutter:
- sawtooth pattern baseline زي سنان المنشار
- irregular regular baseline.



To calculate the heart rate:
Count the Rs in 30 large squares then multiply by 10.
8 * 10 = 80 beat \ min.

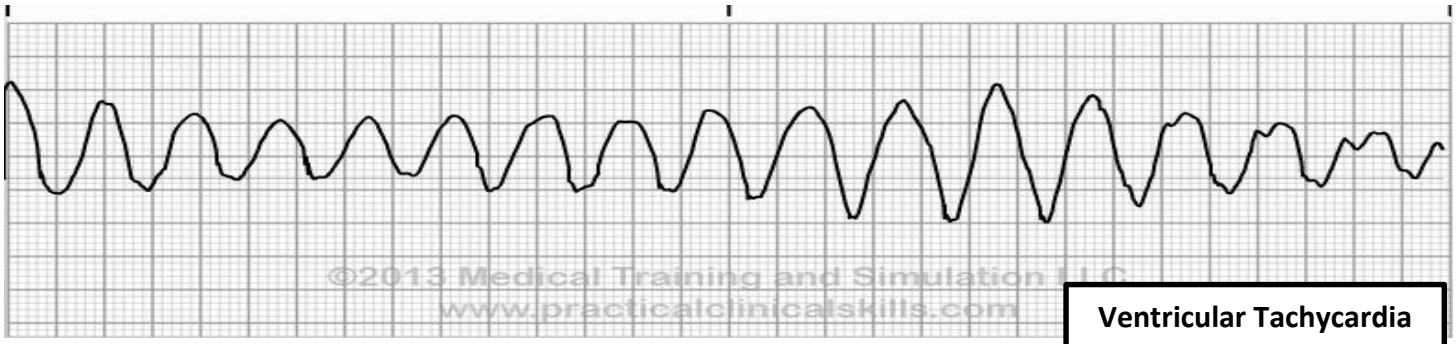
Ventricular rhythm:

No QRS complexes.

1)) Ventricular tachycardia → regular shape.

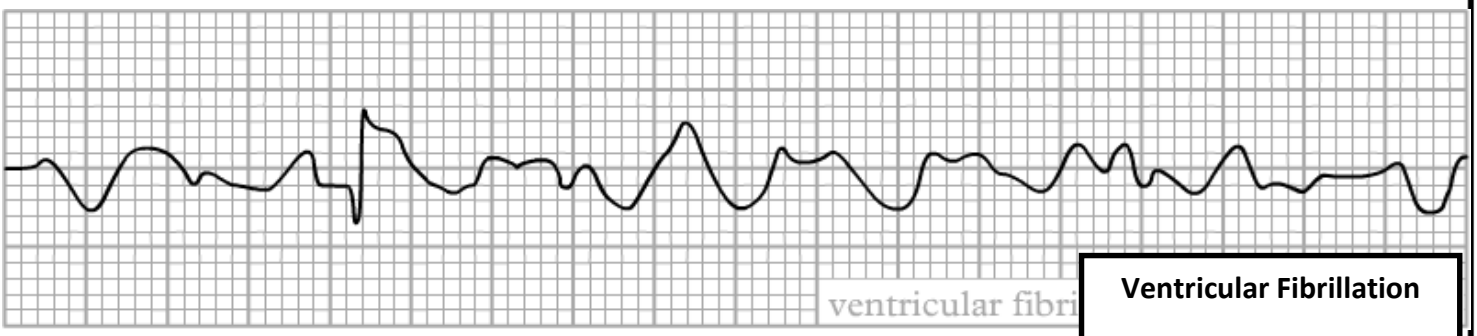
2)) Ventricular fibrillation→ زي خاربيش الولاد الصغار

- no baseline\ no up \ no down.
- the patient is almost dying.
- we cannot calculate theHR.



Ventricular Tachycardia

HR= 15 *10 = 150 beat\ min.



Ventricular Fibrillation

We cannot calculate the HR.

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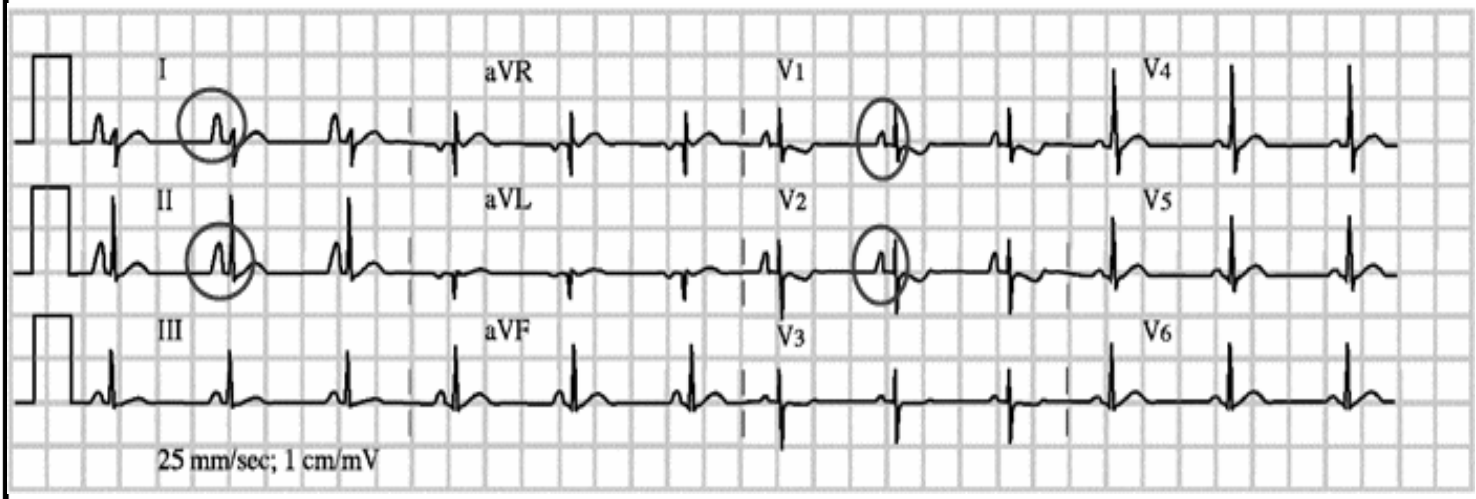
P –wave / Abnormal Morphology

**normal P wave is less than 3 small sq, if more than that:

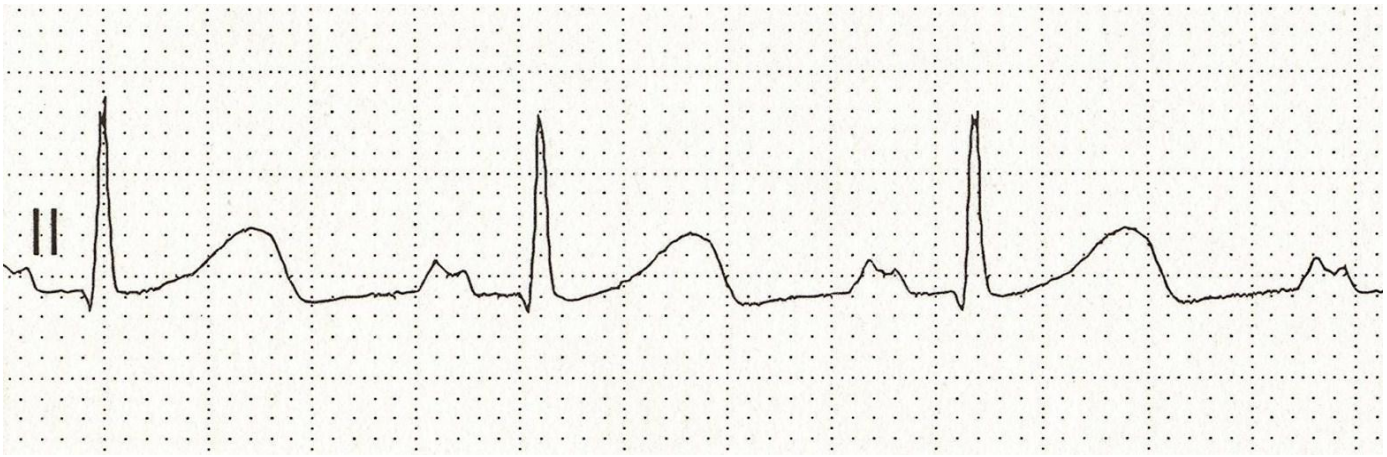
→normal shape→RA hypertrophy→ P pulmonale.

→M – like shape→LA hypertrophy→ P mitral.

1- P Pulmonale (Peaked P wave in RA hypertrophy).



2- P Mitrale (Bifid P wave in LA hypertrophy).



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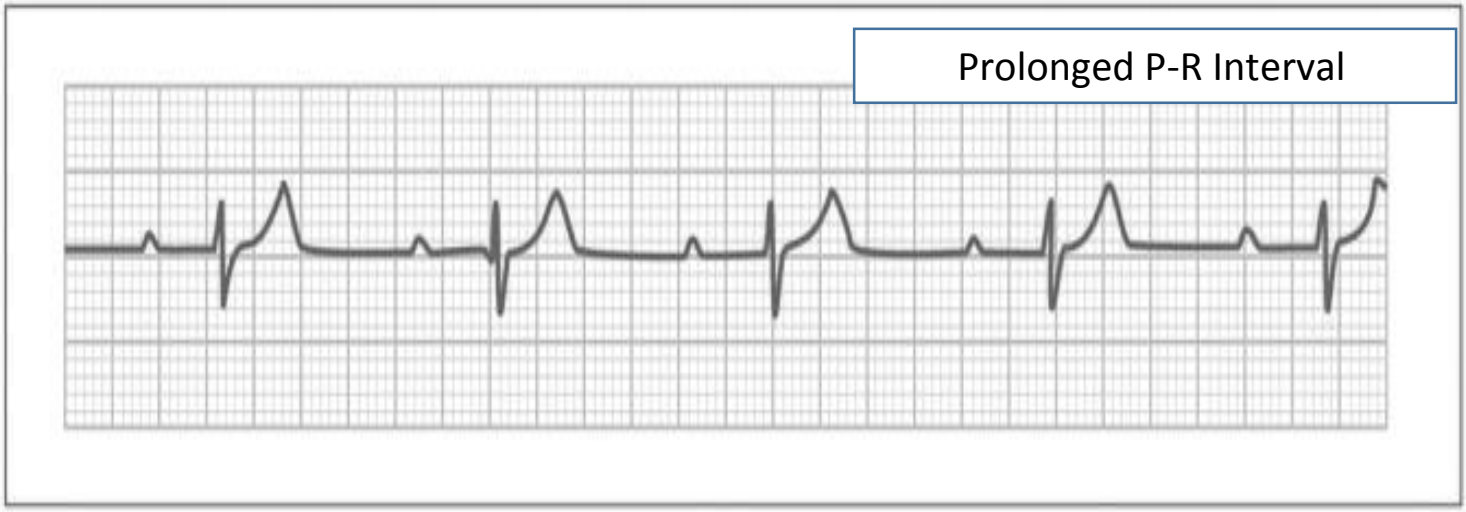
Normal P-R interval:

3 – 5 small squares لا أقلّ ولا أكثر

**less than 3 small sq → no AV delay, AV is not functional, so the current will pass through fast accessory pathway (WPW).

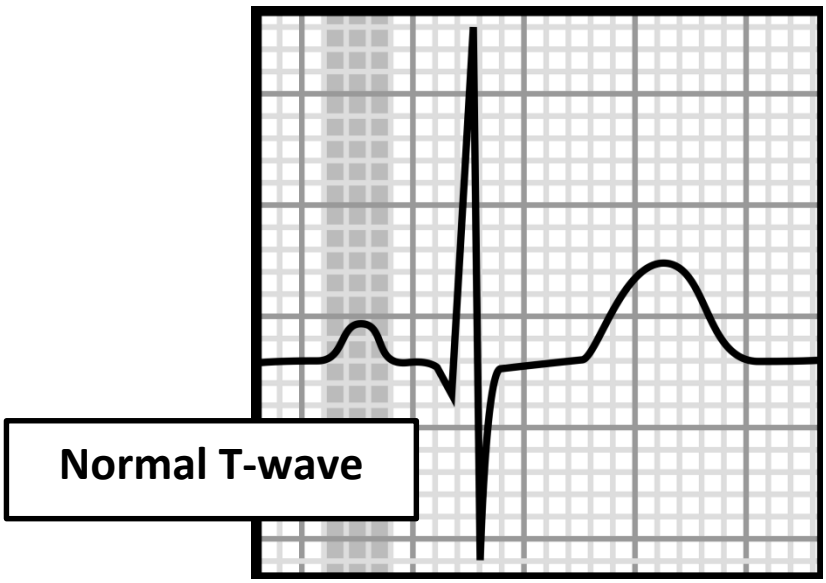
* more than 5 small sq → more AV delay, AV block.



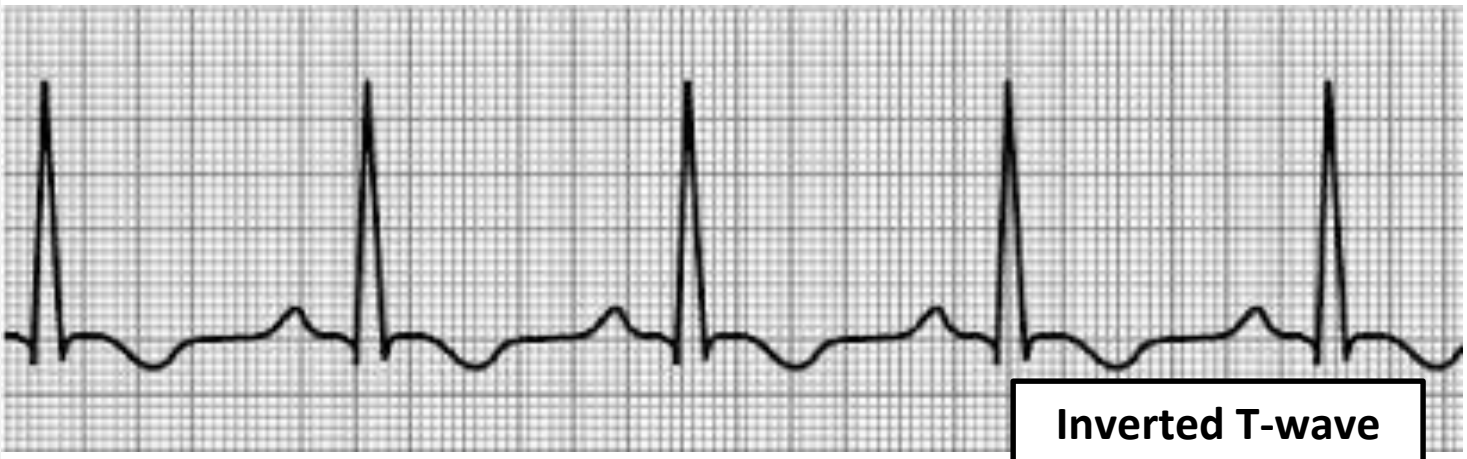
T wave:

ventricular repolarization, its length should not exceed 10 small sq.
Normally inverted in aVR, V1, v2 +/- v3, III.

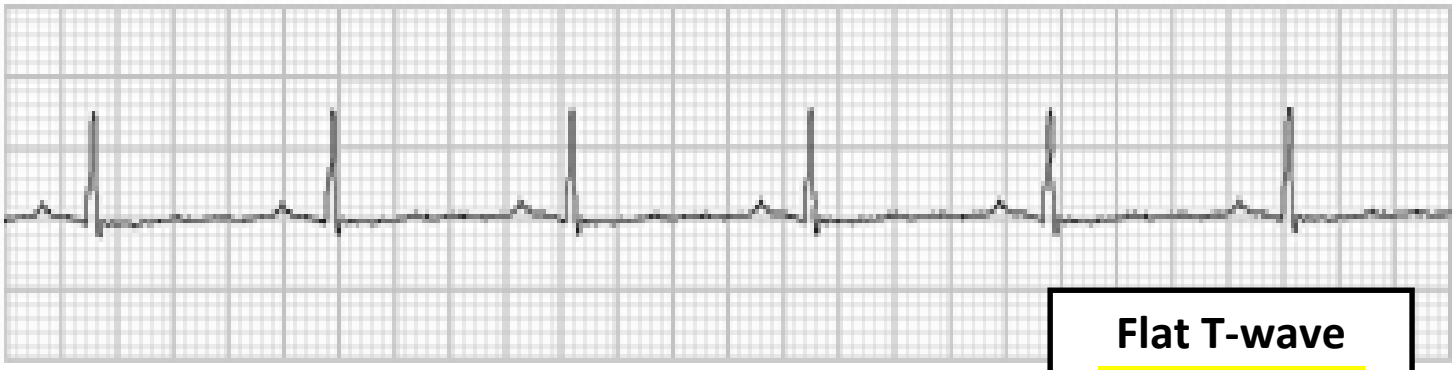
T wave conditions:
1-Normal T wave
2- Inverted
3- Hyper acute (MI)
4- Peaked (hyperkalemia)
5- Flat (hypokalemia)



Normal T-wave



Inverted T-wave
V5 \ V6\ lead 2
*****ischemia.**

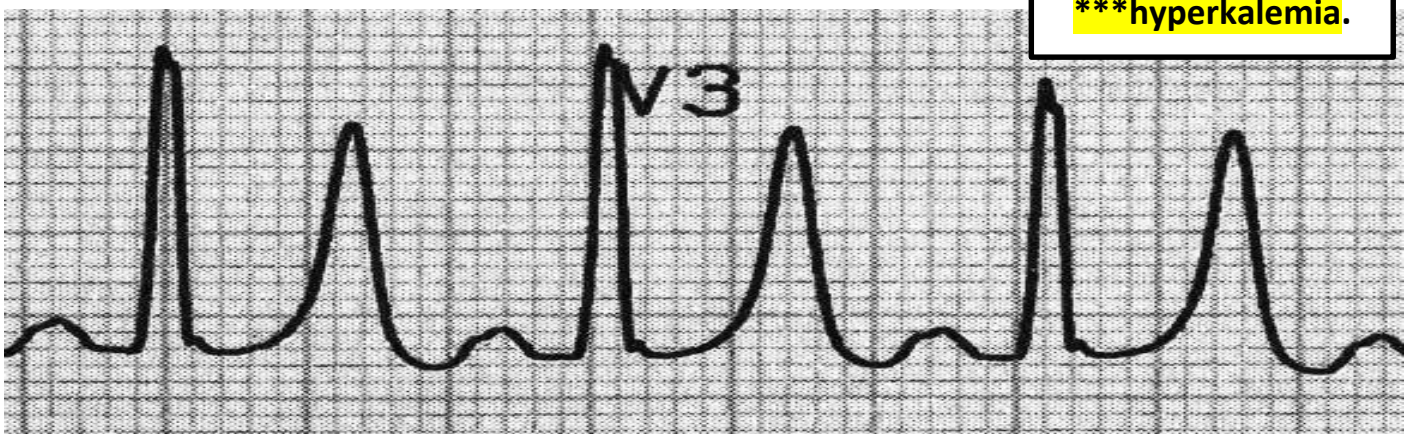


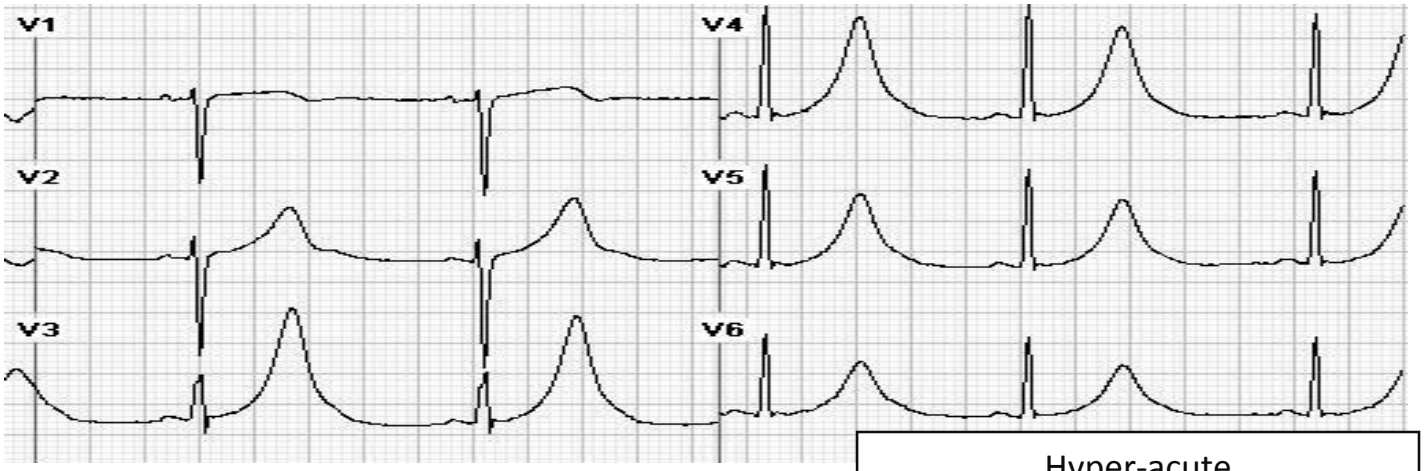
Flat T-wave
*****hypokalemia.**

***if T wave exceeds 10 small sq:
→peaked→narrow base.
→hyper- acute→wide base.

Peaked T-wave

***hyperkalemia.**





Hyper-acute

MI

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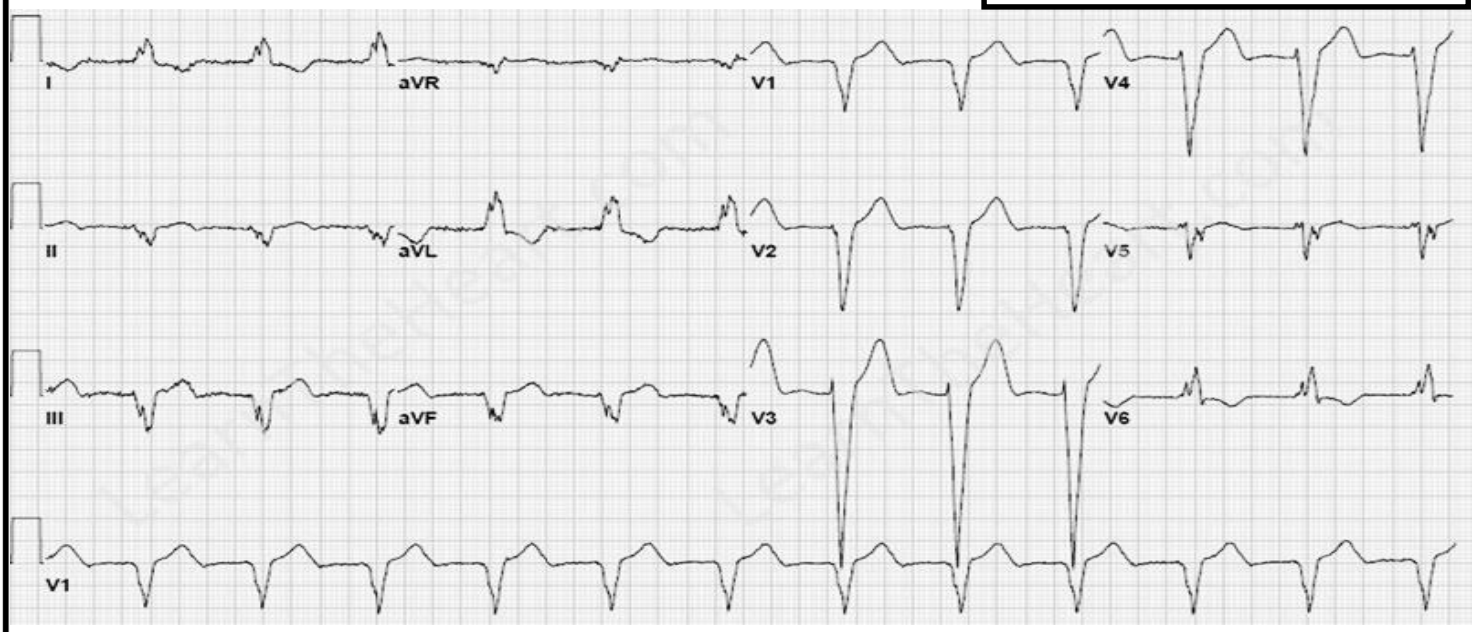
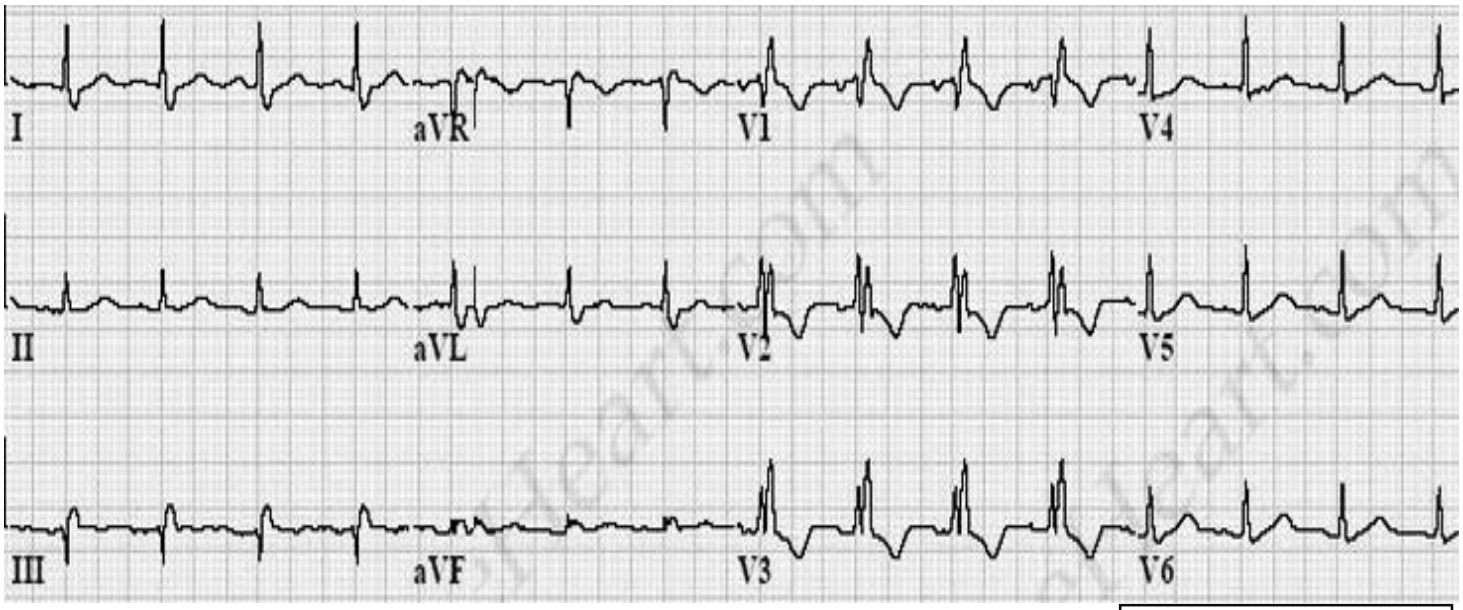
Atrioventricular rhythm:

- (Conduction Blocks).
-Heart Block (3rd degrees).
-Bundle Branch Block

→looking for QRS complex→M – shaped.
***if M – shaped QRS complexes were on the right side chest leads (V1\V2\V3) >>> right bundle branch block.
*** if M – shaped QRS complexes were on the left side chest leads (V4\V5\V6)>>> left bundle branch block.

LBBB


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
V1


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6

RBBB