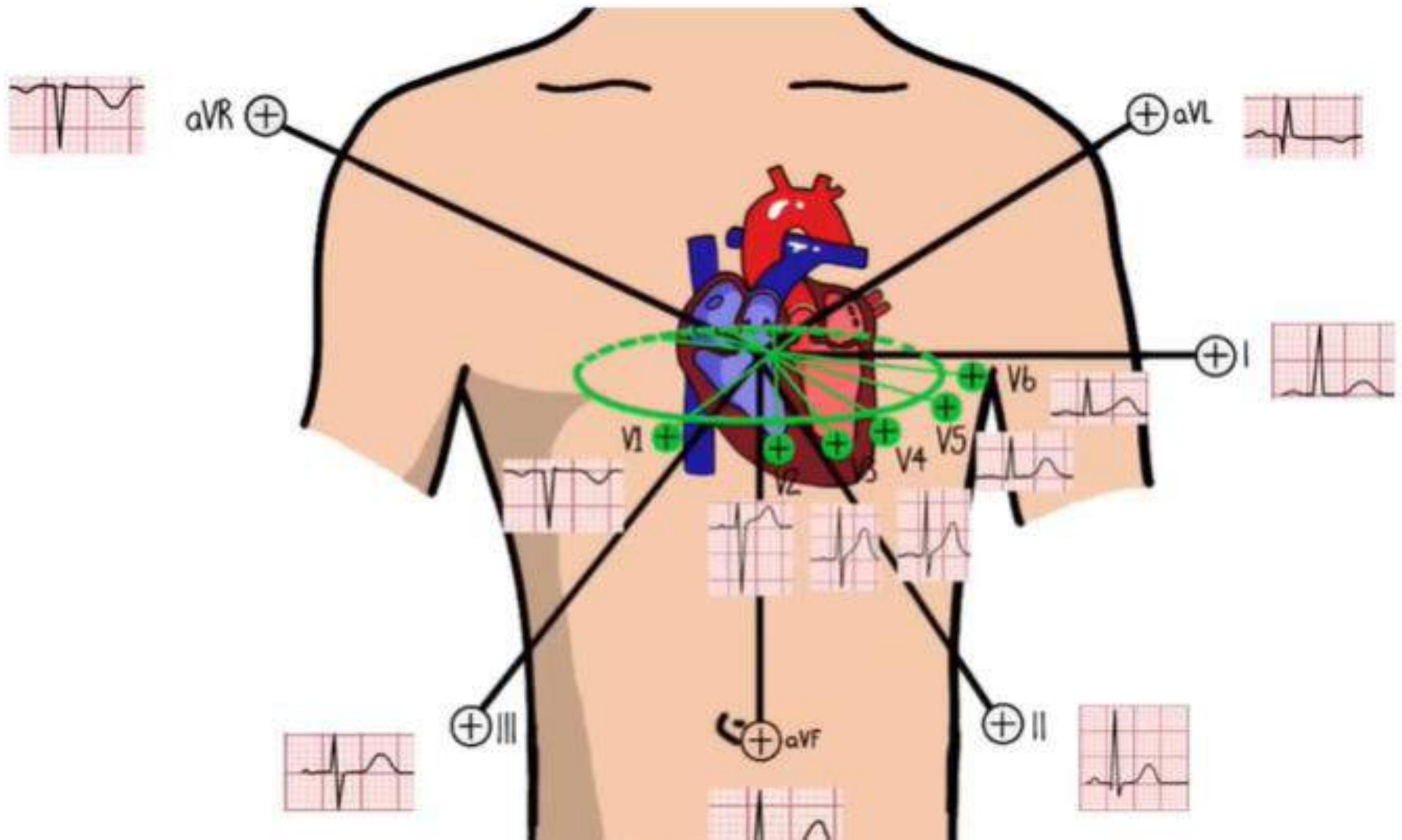
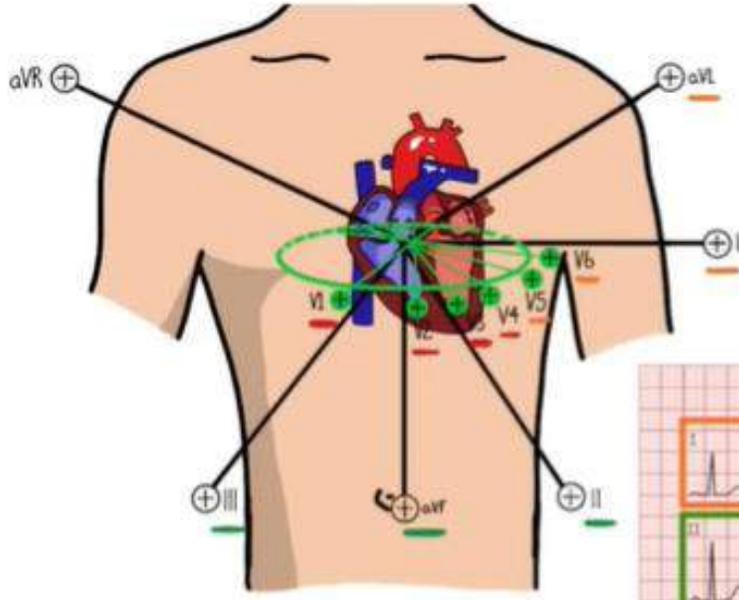


SYSTEMATIC APPROACH OF EKG INTERPRETATION

DR. Arwa Rawashdeh

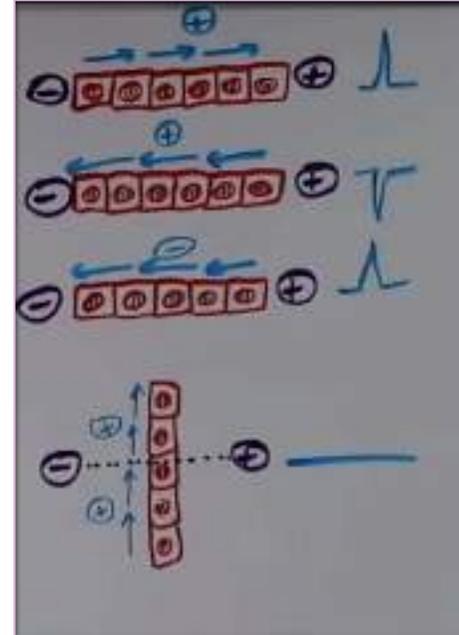
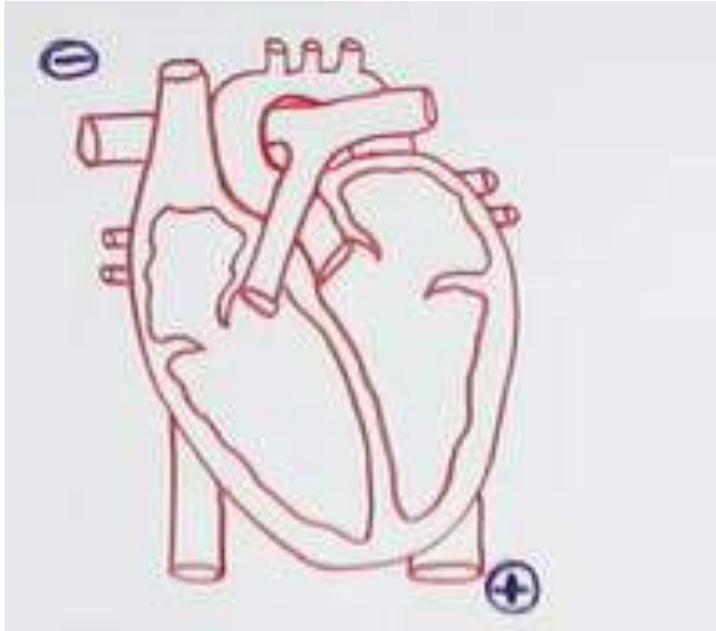




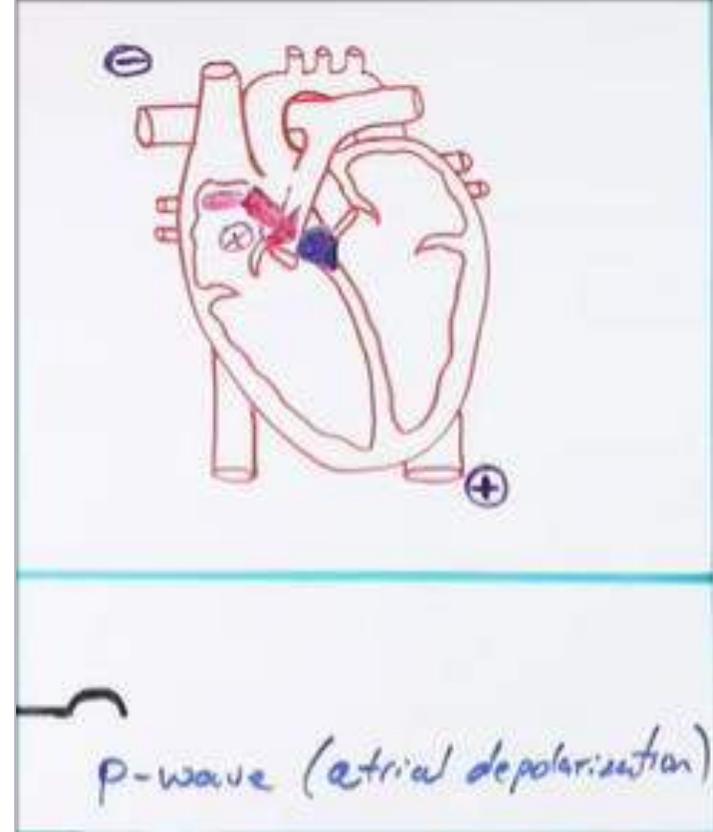
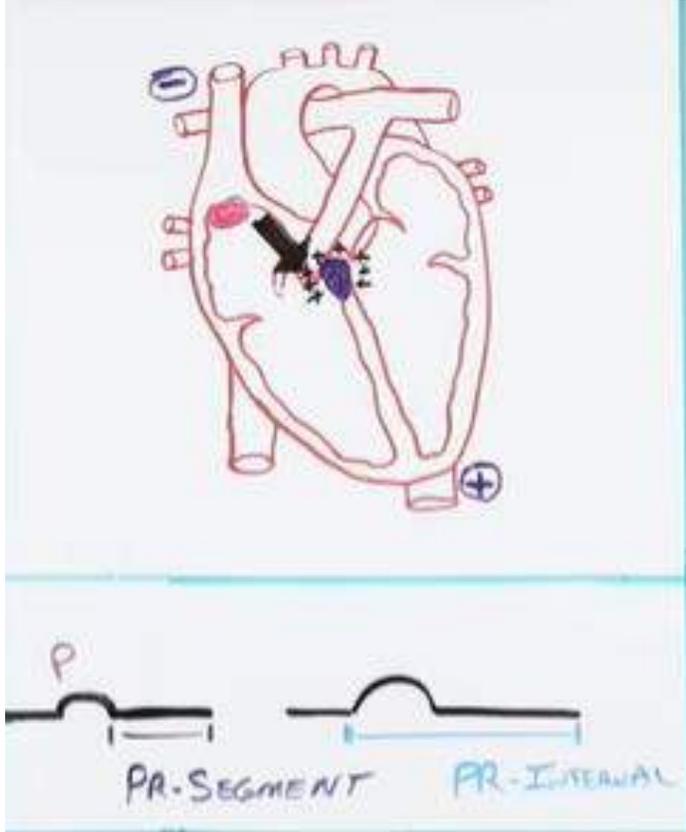


- ▣ = LATERAL
- ▣ = INFERIOR
- ▣ = SEPTUM / ANTERIOR





POSITIVE, NEGATIVE AND ISOELECTRIC DEFLECTION

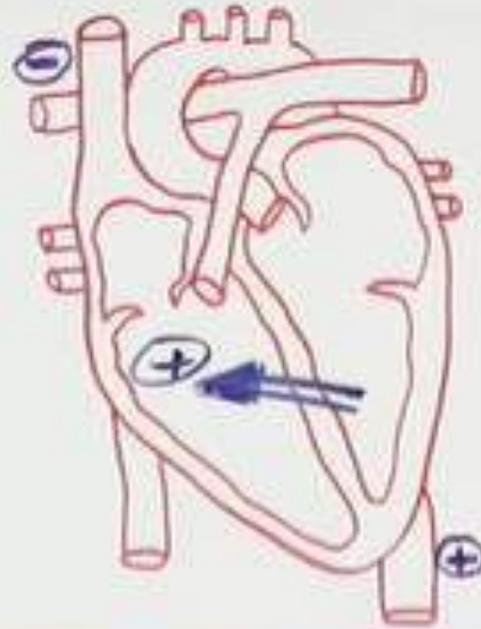




P-wave



Q-wave

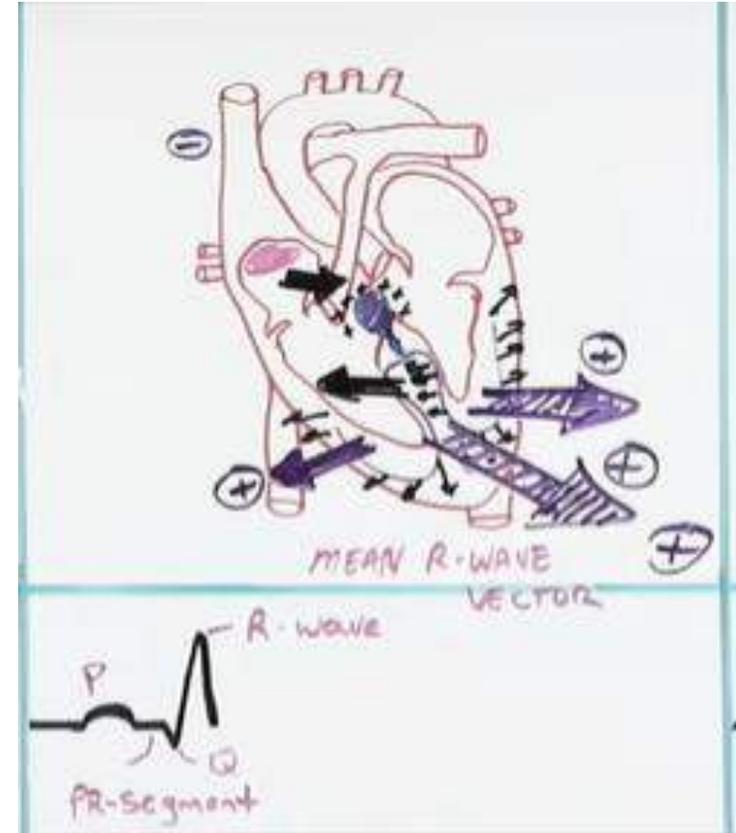
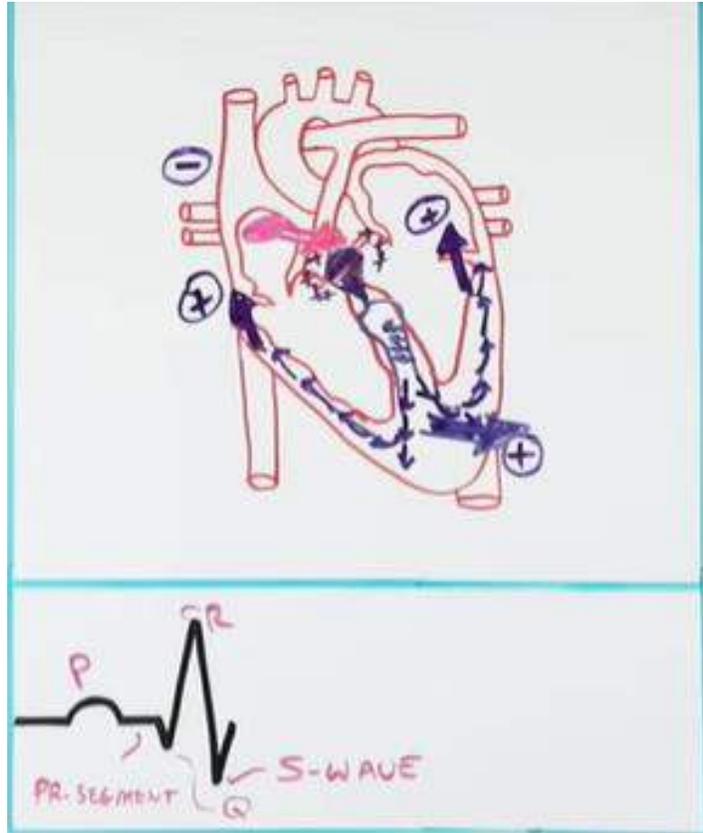


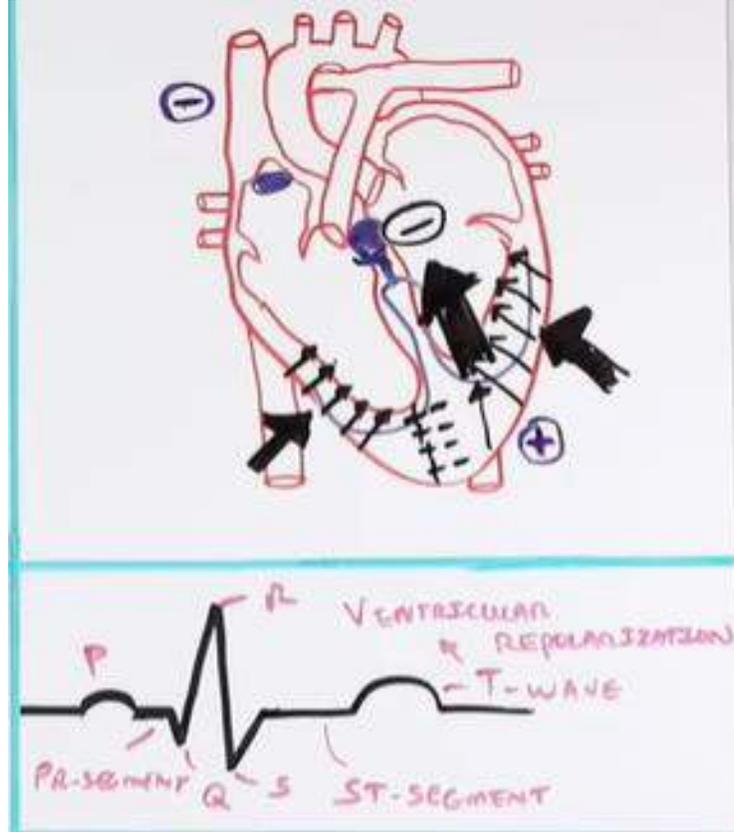
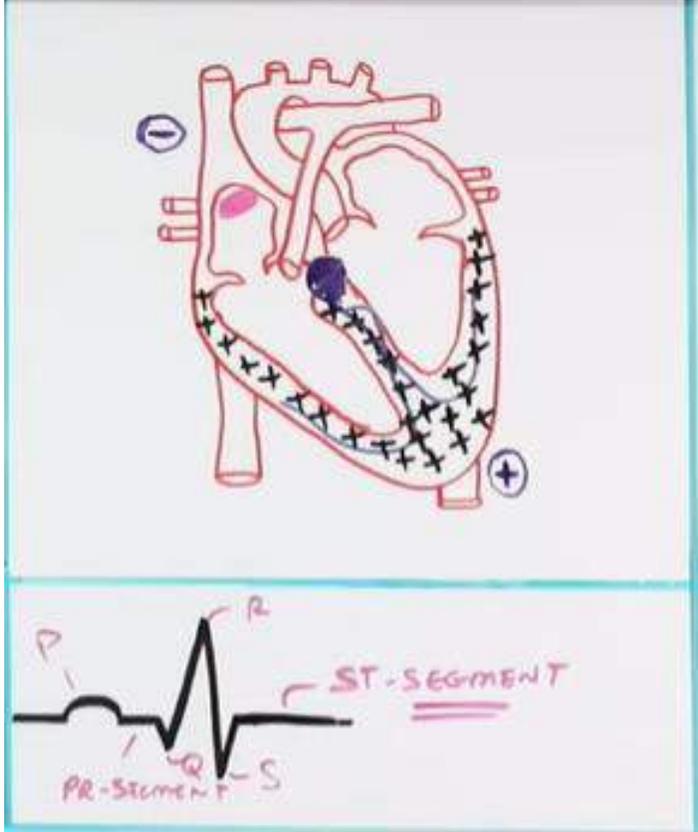
Q-WAVE

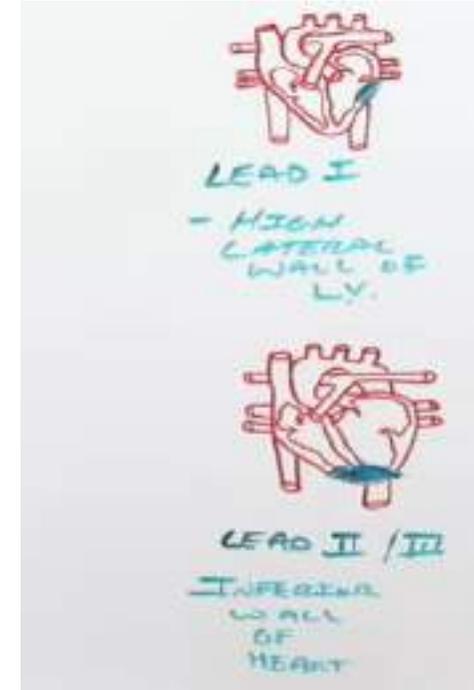
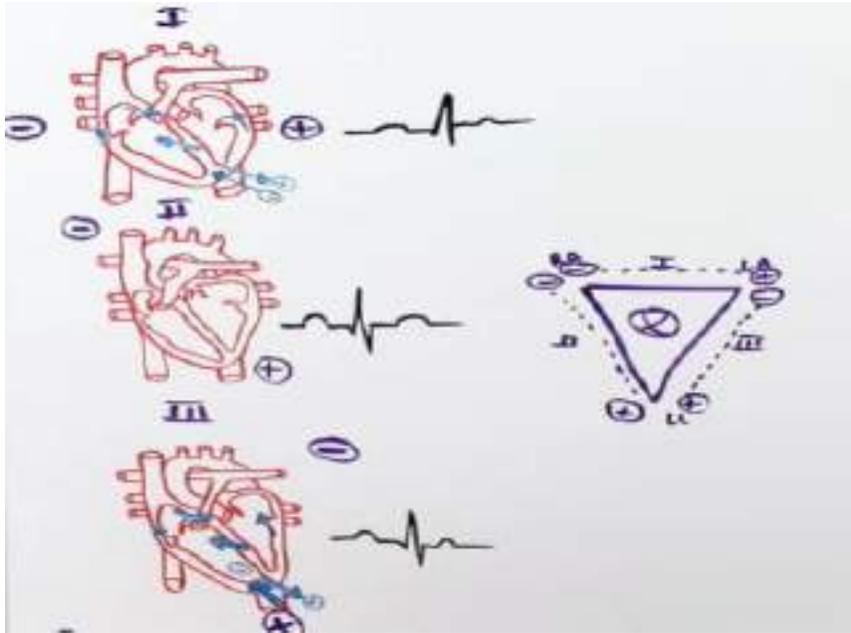
↳ SEPTAL

DEPOLARIZATION

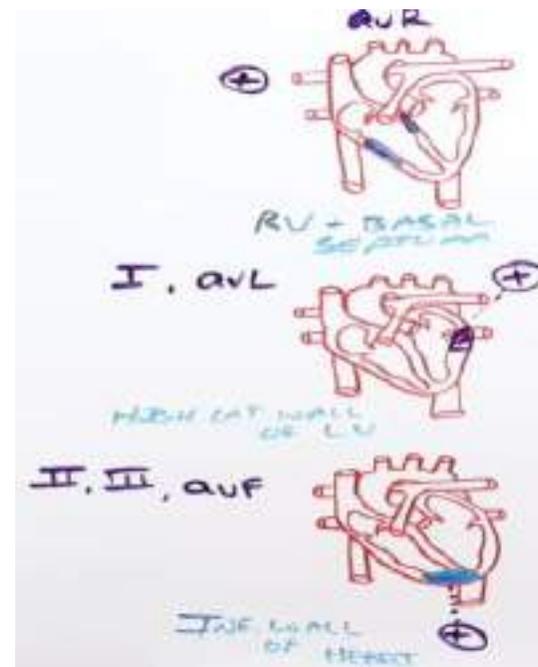
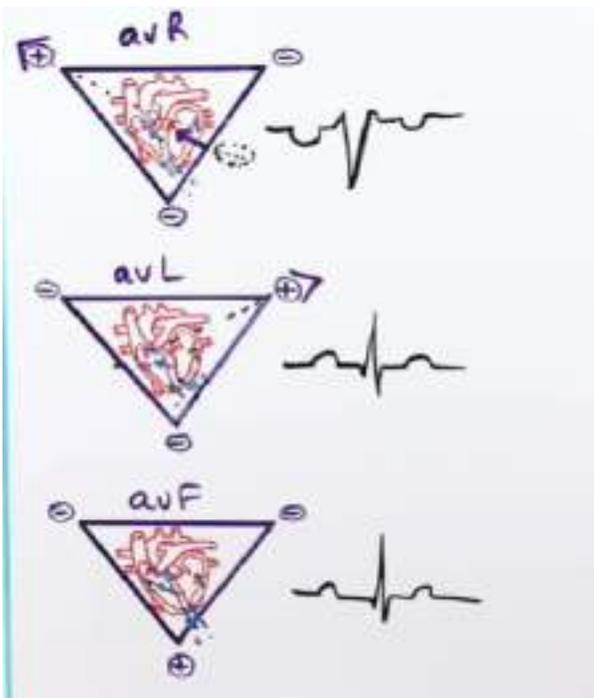




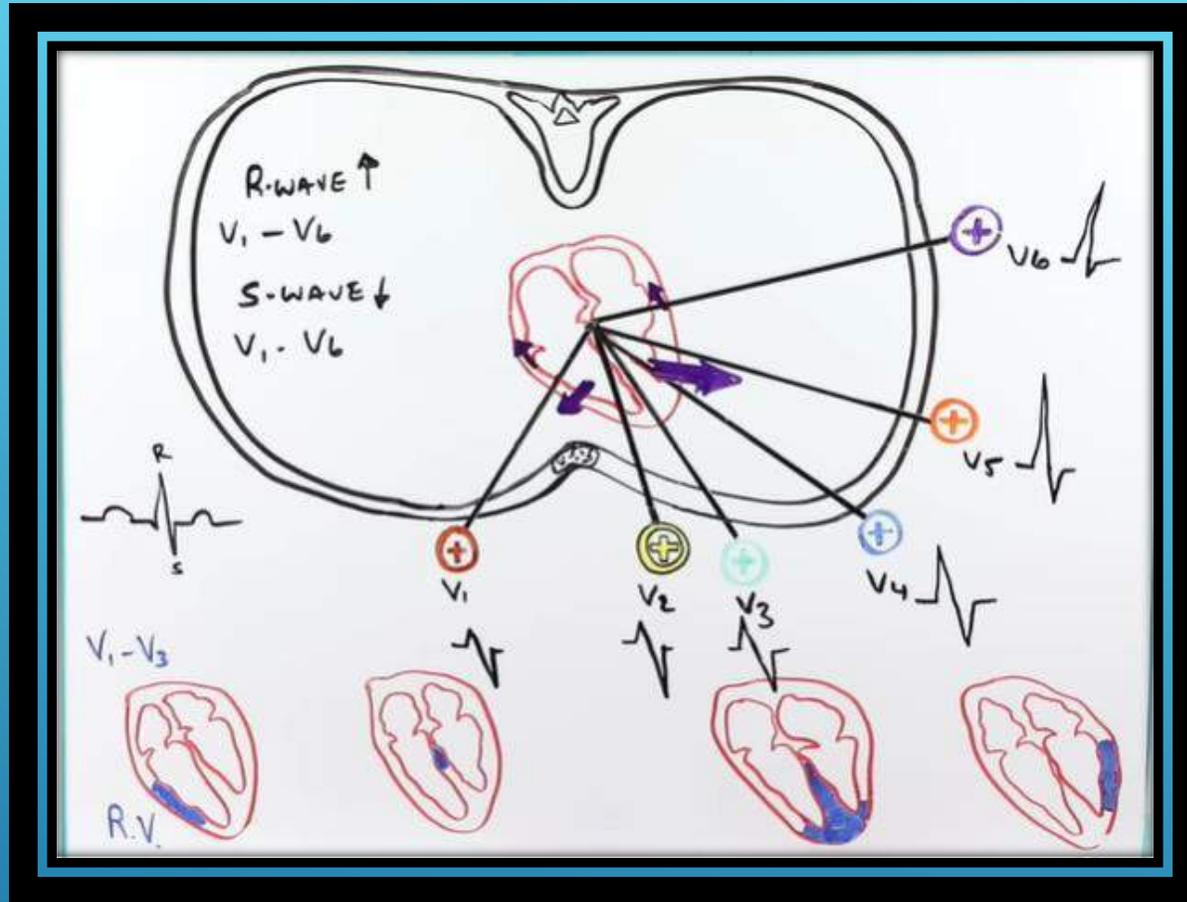




LEAD I , II , III



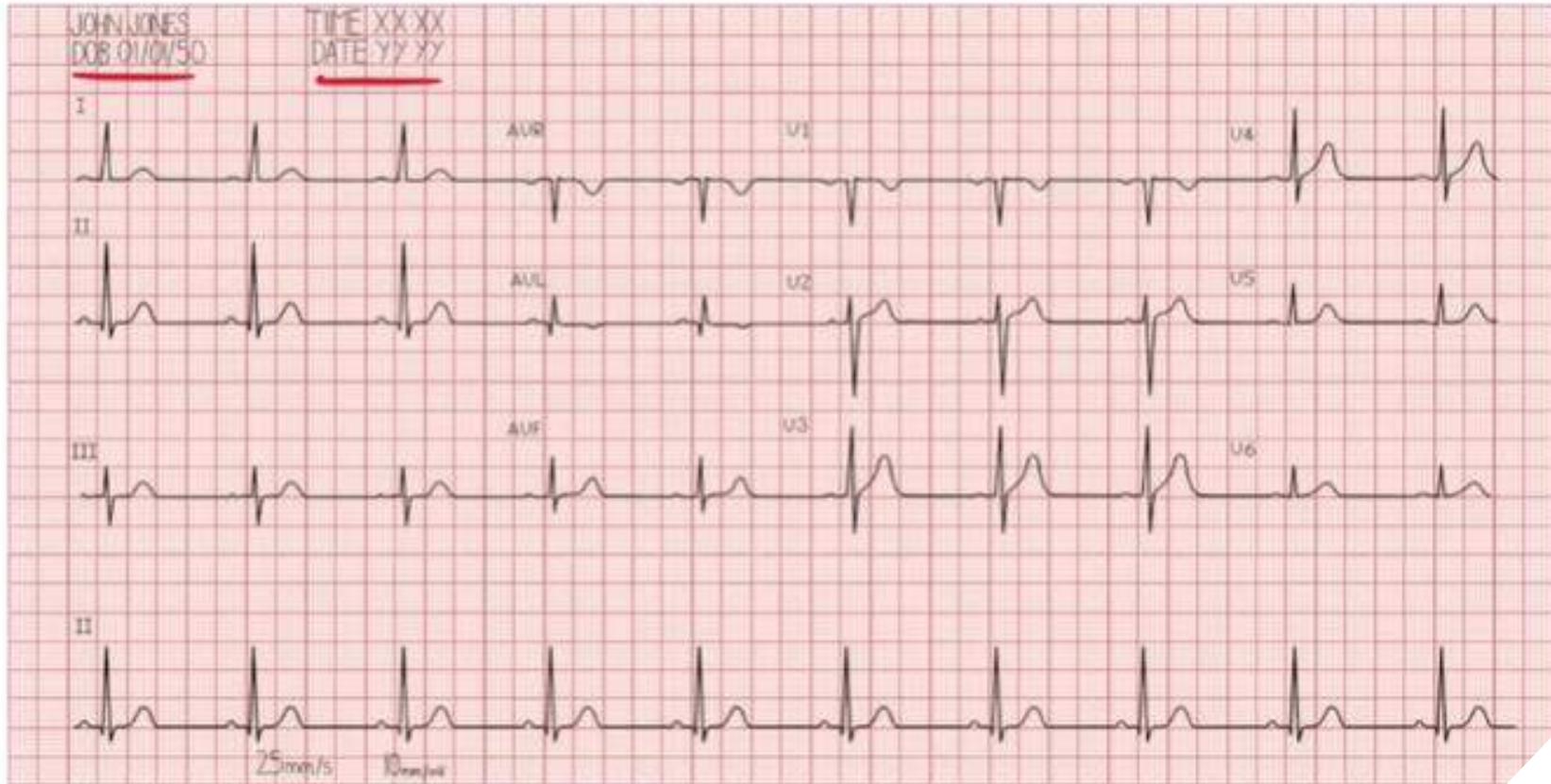
AUGMENTED UNIPOLAR LEADS



PRECORDIAL LEADS

1) DETAILS AND SETTINGS

- PATIENT
- DATE / TIME
- ↳ ? SERIES
- CALIBRATION
- ↳ 25mm/s
- 10mm/mV
- STANDARD

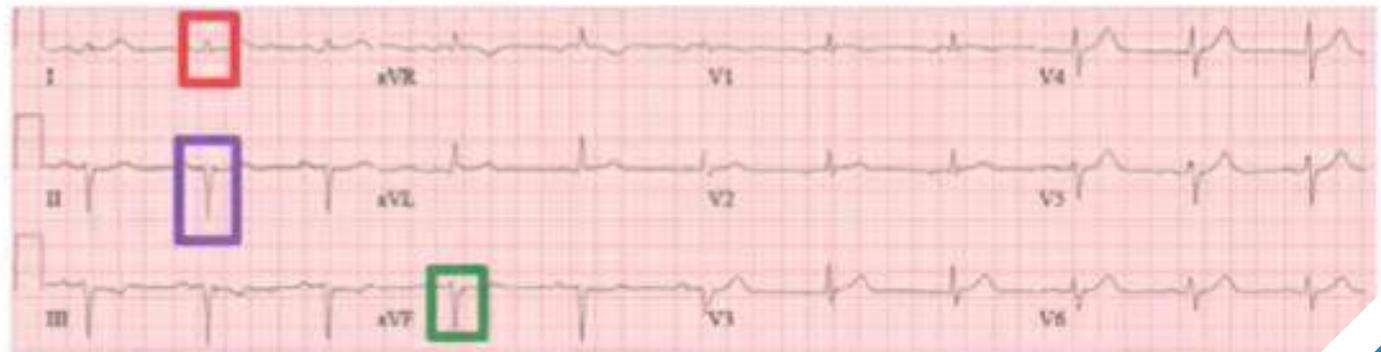
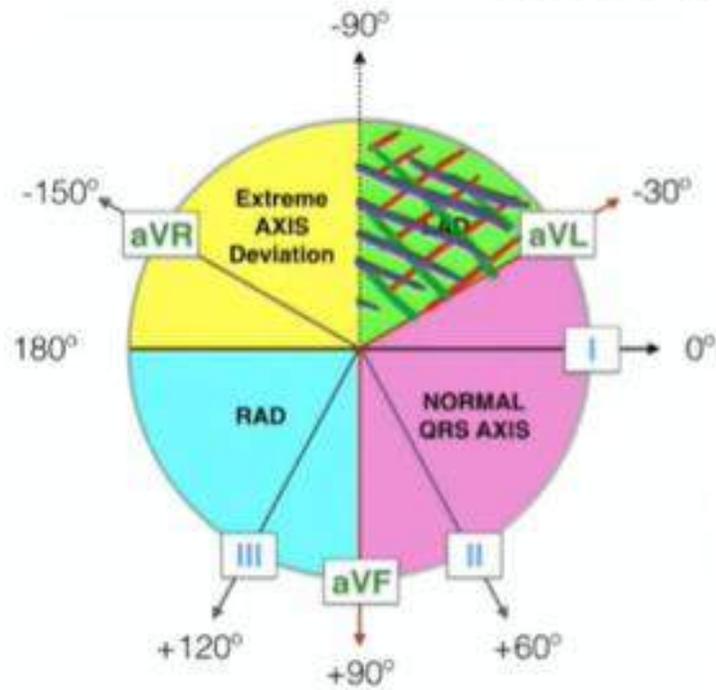


1) DETAILS

2) AXIS - QUADRANT METHOD (I + aVF)

a. NORMAL IF BOTH POSITIVE c. EXTREME IF BOTH \ominus

b. RAD IF I \oplus AND aVF \ominus d. LAD IF I \oplus , aVF \ominus
AND II \ominus



1) DETAILS

2) AXIS

3) RATE

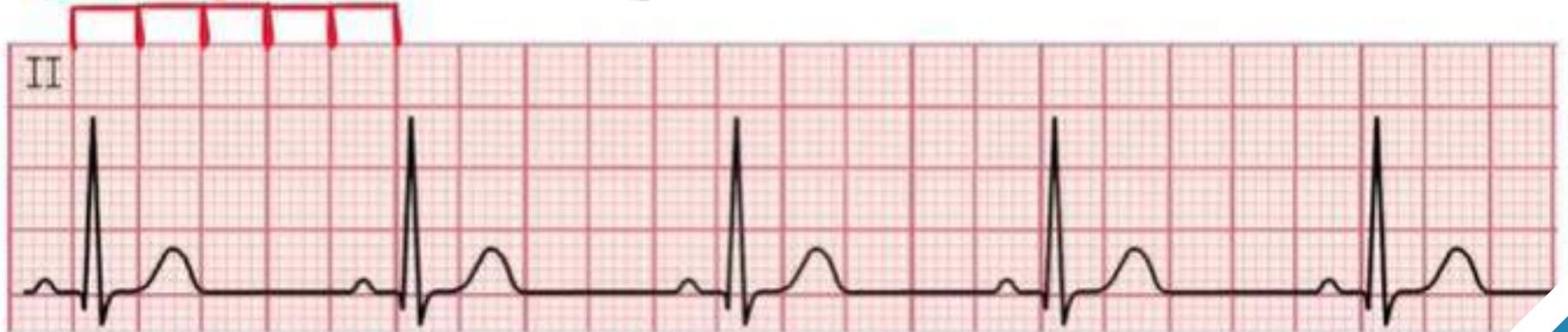
SHORTCUT:

300 (NUMBER OF LARGE SQUARES IN 1 MINUTE)

LARGE SQUARES BETWEEN BEATS = HEART RATE

e.g. $\frac{300}{5} = 60 \text{ BPM.}$

$200\text{ms} \times 5 = 1\text{s}$



(SMALL SQUARE)

• ON 25mm/s $1\text{mm} = 40\text{ms}$

THEREFORE $5\text{mm} = 200\text{ms}$

(LARGE SQUARE)

1) DETAILS

2) AXIS

3) RATE

IF IRREGULAR: NUMBER OF BEATS IN 10s \times 6
= NUMBER OF BEATS IN 60s

BRADYCARDIA
(< 60 BPM)



TACHYCARDIA
(> 100 BPM)



1) DETAILS

2) AXIS

3) RATE

4) RHYTHM

• P-WAVE - ATRIAL DEPOLARIZATION

NORMAL FEATURES:

- POSITIVE IN LEAD II

- DURATION $< 120\text{ms}$

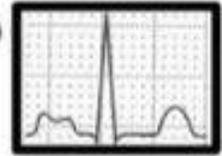
- AMPLITUDE $\leq 2.5\text{mm}$

- FOLLOWED BY
QRS COMPLEX

DILATED LEFT ATRIUM

(P MITRALE)

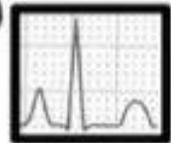
$> 120\text{ms}$



DILATED RIGHT ATRIUM

(P PULMONALE)

$> 2.5\text{mm}$



ABSENT P-WAVES: e.g. ATRIAL FIBRILLATION

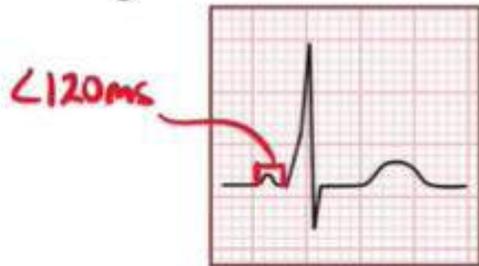


- 1) DETAILS
- 2) AXIS
- 3) RATE

4) RHYTHM

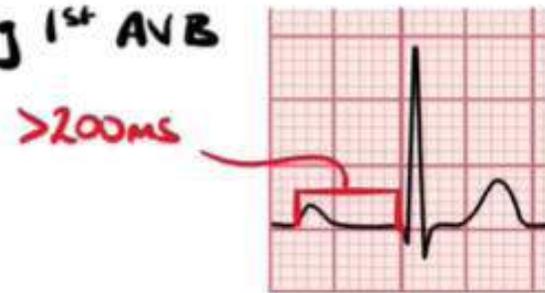
- P-WAVE - ATRIAL DEPOLARIZATION
- PR INTERVAL - TIME BETWEEN ATRIAL DEPOLARIZATION + VENTRICULAR DEPOLARIZATION
 - ↳ NORMALLY 120-200ms

SHORTENED:
($<120\text{ms}$)
e.g WPW



VARIABLE:
e.g 2nd AVB

PROLONGED: ($>200\text{ms}$)
SLOWER CONDUCTION
BETWEEN ATRIA + VENTRICLES
e.g 1st AVB



- 1) DETAILS
- 2) AXIS
- 3) RATE

4) RHYTHM

- VARIABLE R-R INTERVAL = IRREGULAR

IRREGULARLY IRREGULAR

(NO CLEAR PATTERN)

↳ e.g. ATRIAL FIBRILLATION

REGULARLY
IRREGULAR

↳ e.g.

TYPE I 2nd
DEGREE AV
BLOCK



R-R INTERVAL NOT CONSTANT

- 1) DETAILS
- 2) AXIS
- 3) RATE
- 4) RHYTHM

5) MORPHOLOGY

- QRS COMPLEX - VENTRICULAR DEPOLARIZATION

- ↳ PATHOLOGICAL Q WAVES: a) $\geq 25\%$ QRS / $> 2\text{mm}$

- b) $> 40\text{ms}$

- c) IF IN $V_1 - V_3$

- ↳ R WAVE PROGRESSION:

R WAVE SHOULD BECOME GREATER THAN S WAVE

$\sim V_3/V_4$

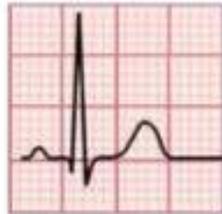
- 1) DETAILS
- 2) AXIS
- 3) RATE
- 4) RHYTHM

5) MORPHOLOGY

- QRS COMPLEX - VENTRICULAR DEPOLARIZATION

NARROW / NORMAL
 $< 100\text{ms}$

- SUPRAVENTRICULAR ORIGIN



WIDENED
 $> 100\text{ms}$ ($> 120\text{ms}$ FOR
BLOCK OR
VENTRICULAR
ORIGIN)

- VENTRICULAR ORIGIN
OR CONDUCTION DELAY
BETWEEN VENTRICLES
(e.g. BUNDLE BRANCH BLOCKS)



* CONDUCTION IS SLOWER THROUGH MYOCARDIUM THAN *
CONDUCTION SYSTEM

- 1) DETAILS
- 2) AXIS
- 3) RATE
- 4) RHYTHM

5) MORPHOLOGY

- QRS COMPLEX - VENTRICULAR DEPOLARIZATION

↳ R WAVE PROGRESSION:

R WAVE SHOULD BECOME GREATER THAN S WAVE

~ V3/V4



- 1) DETAILS
- 2) AXIS
- 3) RATE
- 4) RHYTHM

5) MORPHOLOGY

- **ST SEGMENT** - INTERVAL BETWEEN VENTRICULAR DEPOLARIZATION AND REPOLARIZATION

ELEVATION:

($>1\text{mm}$ OR $>2\text{mm}$ V_1 OR V_2)

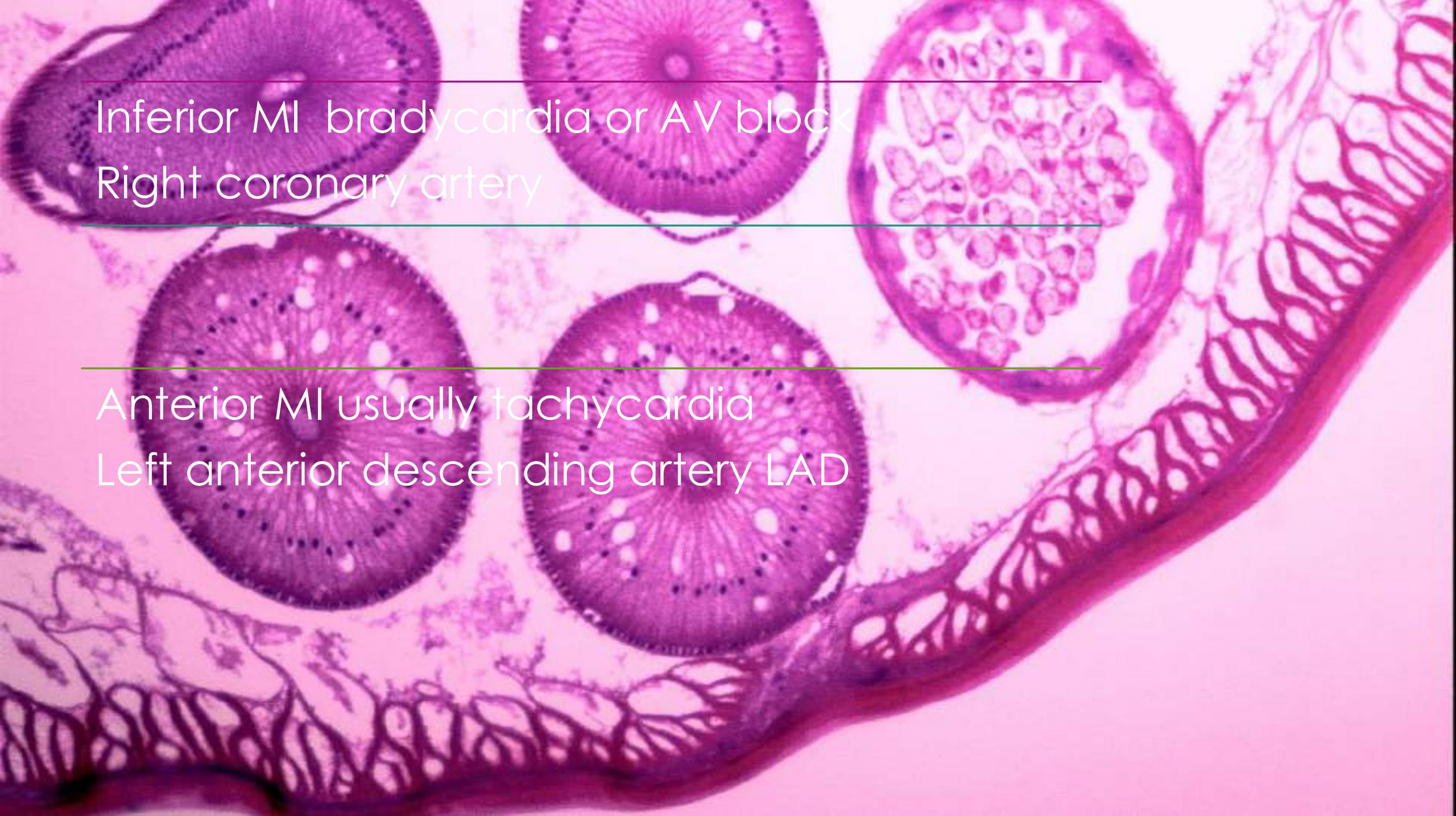
- STEMI
- PERICARDITIS

DEPRESSION IS ALSO
ABNORMAL

* ST SEGMENT IN BBB
REQUIRES ADDITIONAL
CRITERIA *



- ST ELEVATION I, aVL, V_1 - V_6
- RECIPROCAL ST DEPRESSION III, aVF



Inferior MI bradycardia or AV block
Right coronary artery

Anterior MI usually tachycardia
Left anterior descending artery LAD

1) DETAILS

2) AXIS

3) RATE

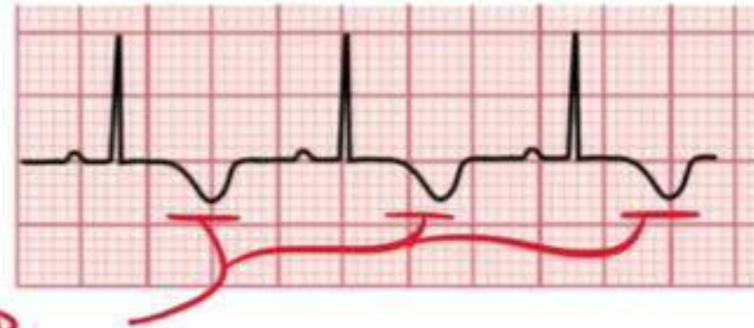
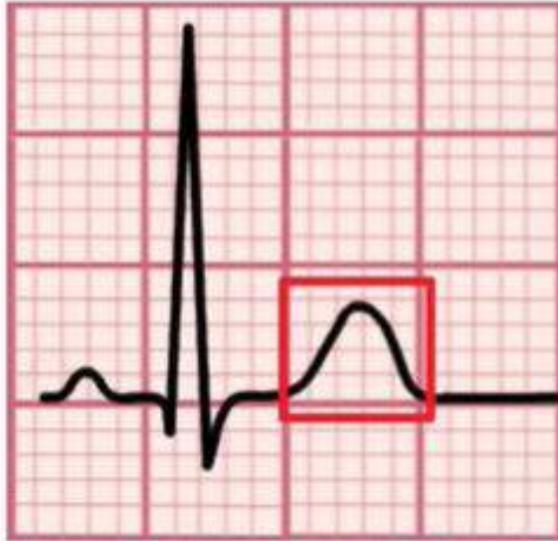
4) RHYTHM

5) MORPHOLOGY

• **T-WAVE** - VENTRICULAR REPOLARIZATION

↳ TALL, FLAT, INVERTED

NORMAL IN
V₁, aVR, III



INVERTED
T WAVES

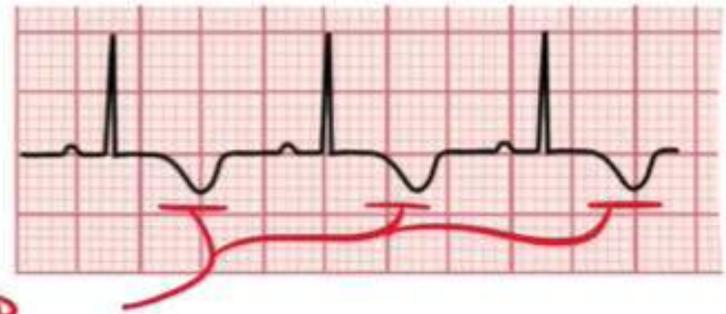
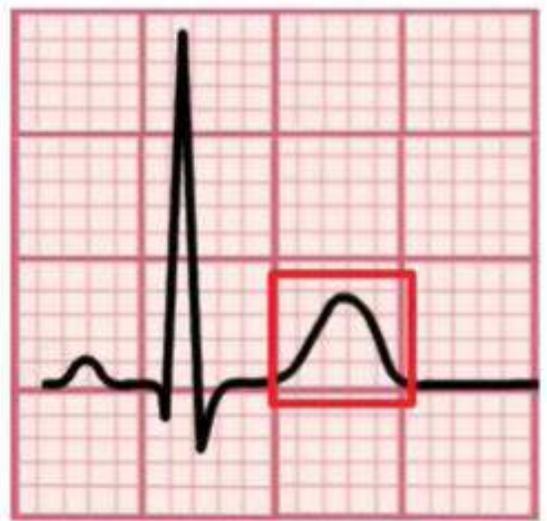
- 1) DETAILS
- 2) AXIS
- 3) RATE
- 4) RHYTHM

5) MORPHOLOGY

• **T-WAVE** - VENTRICULAR REPOLARIZATION

↳ TALL, FLAT, INVERTED

↳ BIPHASIC } ISCHEMIA
OR HYPOKALEMIA



INVERTED
T WAVES