ECG101

Alalshaikh

OBJECTIVES OF THE TALK

- Reviewing the basics of ECG
- Systematic way of reading an ECG
- STEMI mimics

WHAT IS AN ECG

The electrocardiogram (ECG) is a representation of the electrical events of the cardiac cycle.

Each event has a distinctive waveform

the study of waveform can lead to greater insight into a patient's cardiac pathophysiology.

DEPOLARIZATION

Contraction of muscle cell is associated with electrical activity called depolarization

These changes can be seen by electrodes attached to body surface

PACE MAKER OF THE HEART

SA Node - Dominant pacemaker with an intrinsic rate of 60 - 100 beats/minute.

AV Node - Back-up pacemaker with an intrinsic rate of 40 - 60 beats/minute.

Ventricular cells - Back-up pacemaker with an intrinsic rate of 20 - 45 bpm.

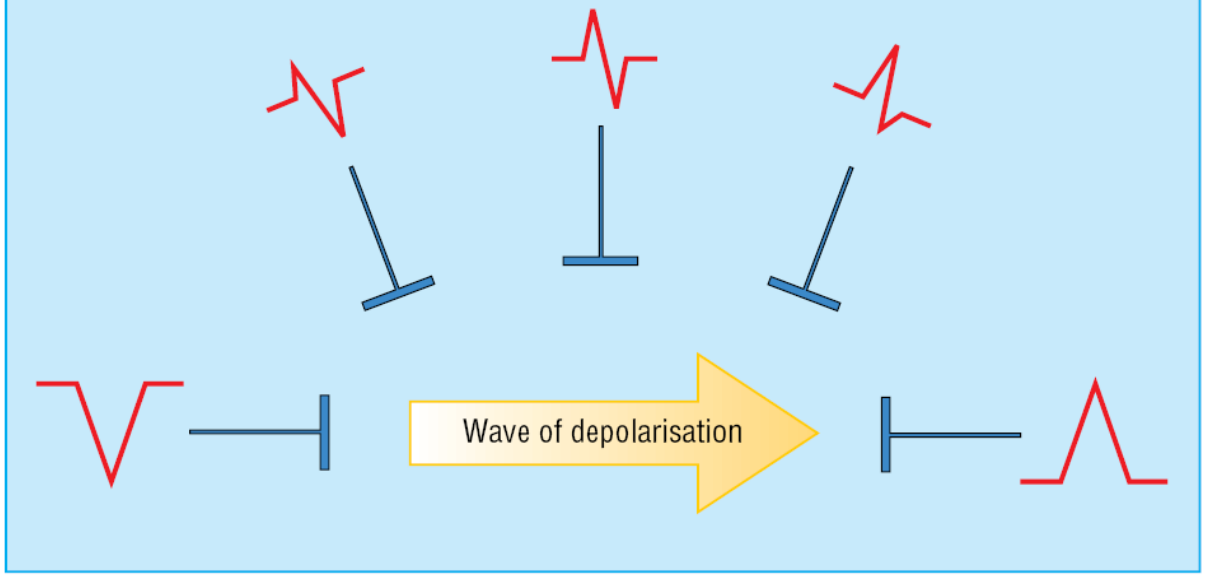
CALIBRATION

- Standard calibration

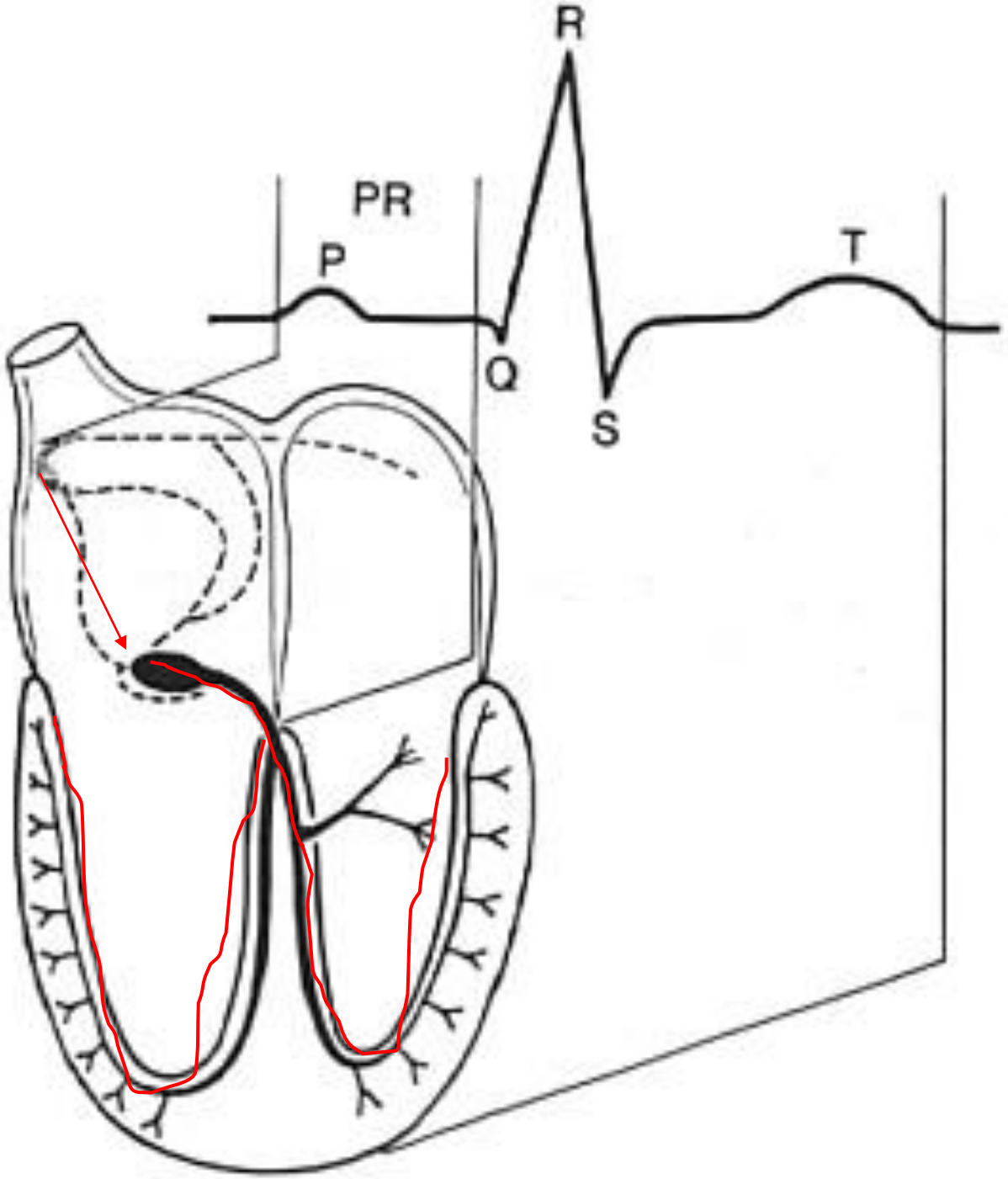
  25 mm/s

  0.1 mV/mm

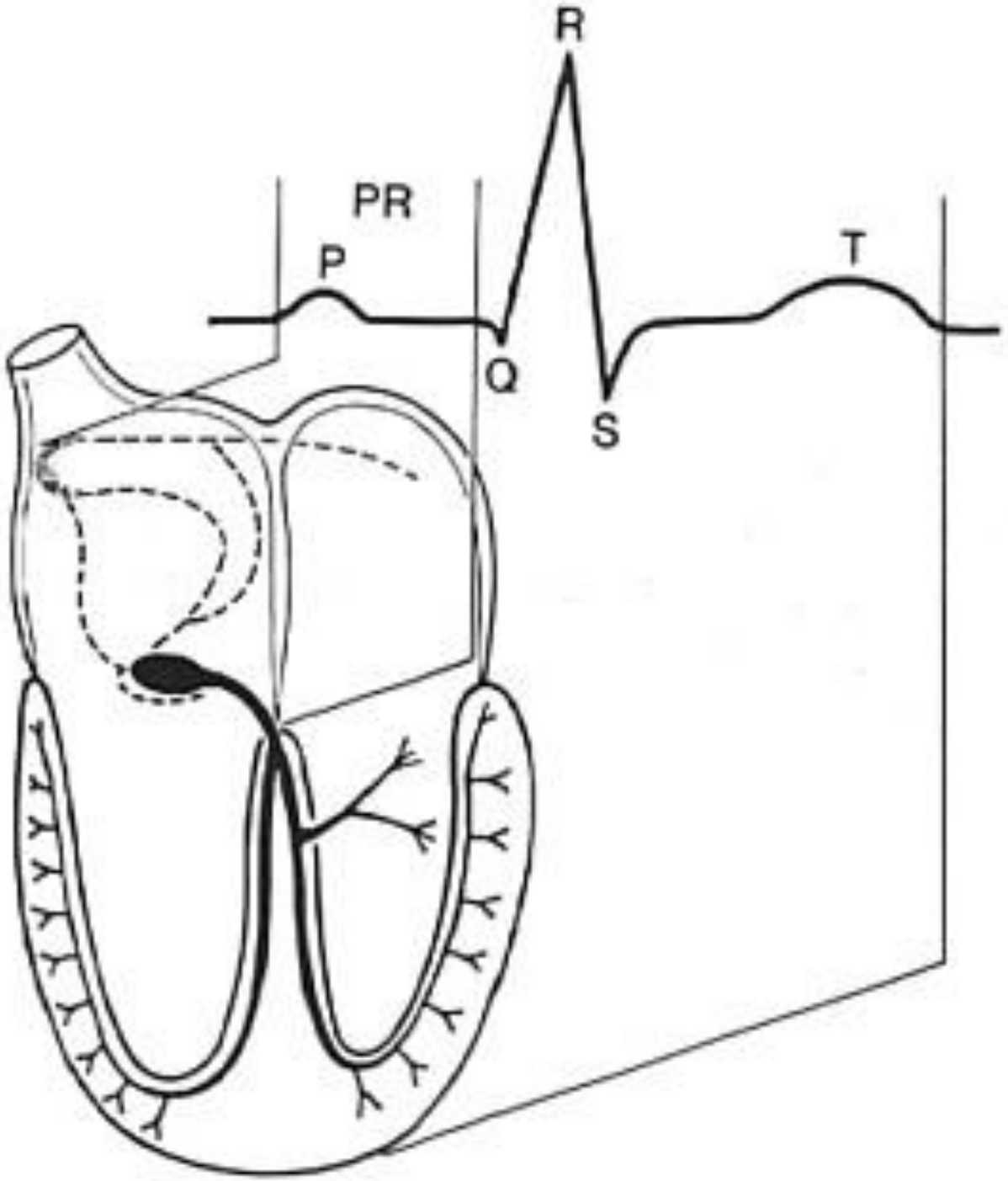
- Electrical impulse that travels towards the electrode produces an upright (“positive”) deflection



Wave of depolarisation. Shape of QRS complex in any lead depends on orientation of that lead to vector of depolarisation



CONDUCTION

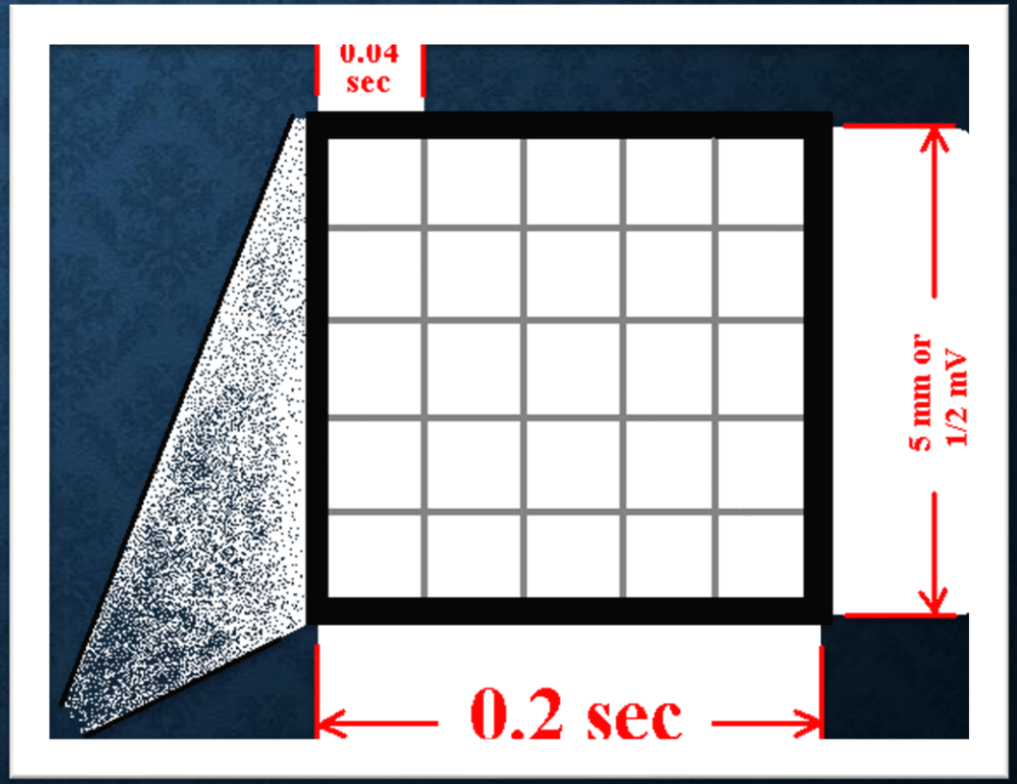


THE PQRST

- P wave – Atrial depolarization
- QRS – Ventricular depolarization
- T wave – Ventricular repolarization

THE ECG PAPER

- Horizontally
  - One small box - 0.04 s
  - One large box - 0.20 s
- Vertically
  - One large box - 0.5 mV

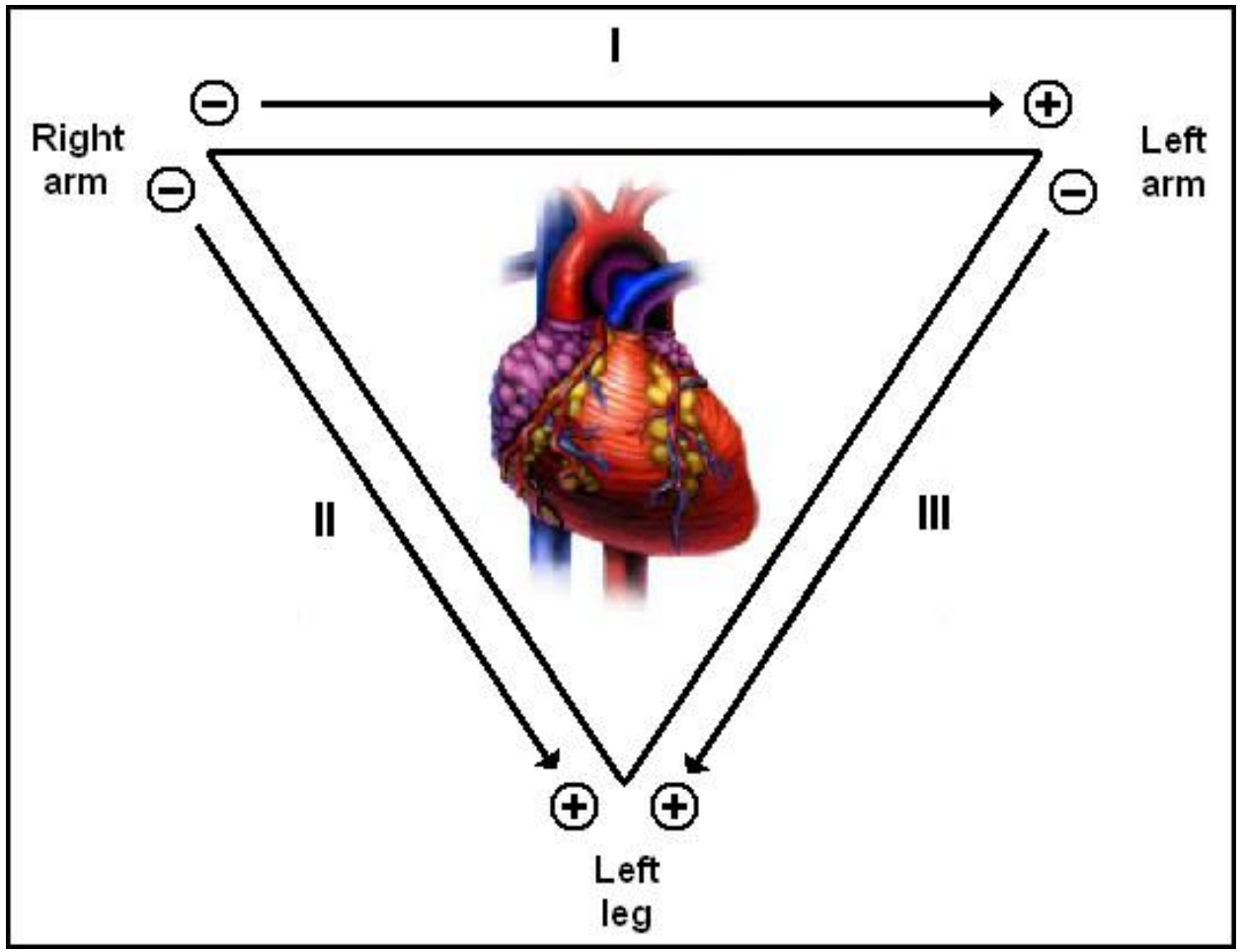


THE ECG LEAD

The standard EKG has 12 leads:

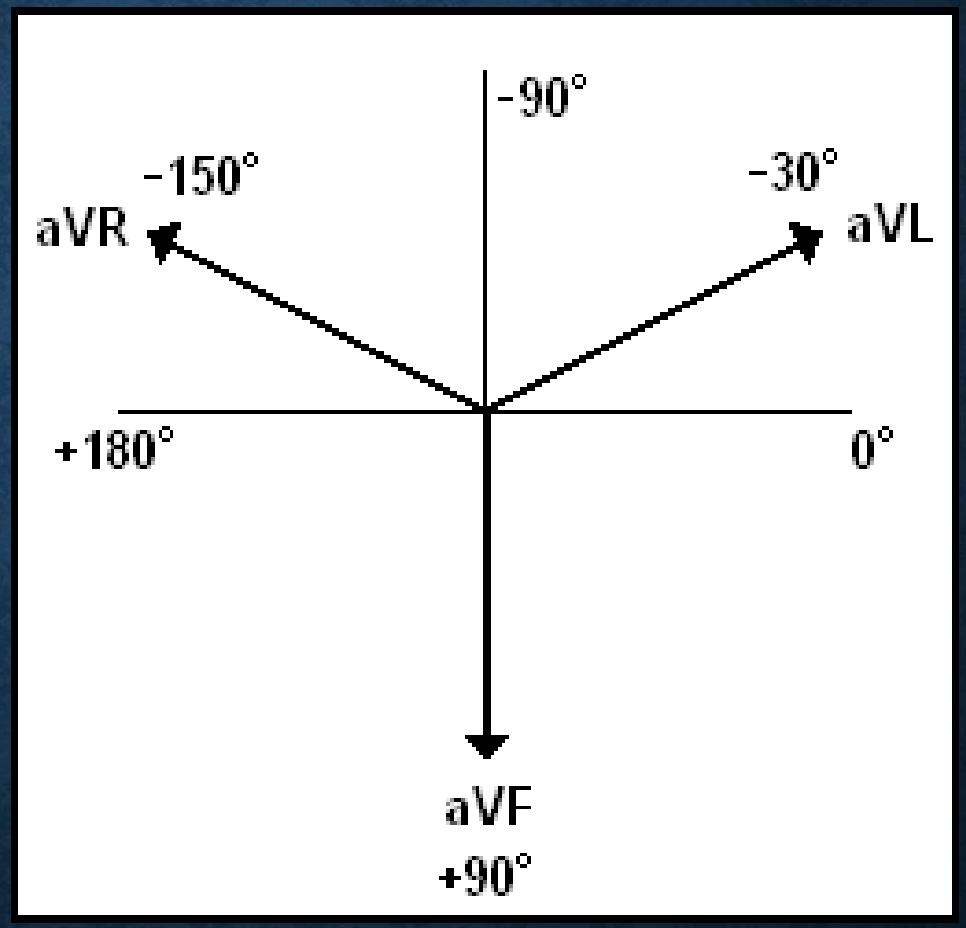
- 3 Standard Limb Leads
- 3 Augmented Limb Leads
- 6 Precordial Leads

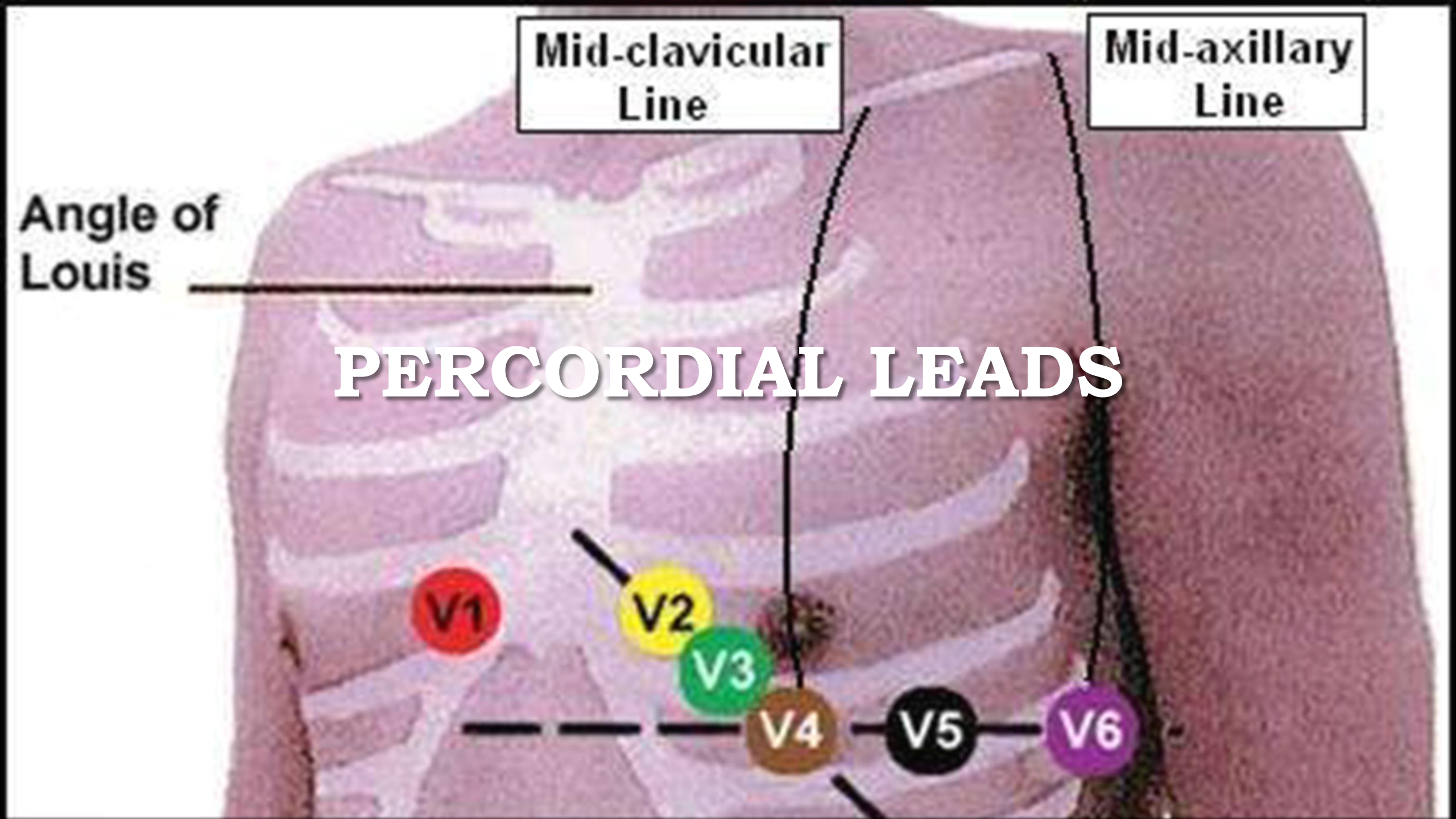
ELECTRODES VS LEADS



LIMP LEADS

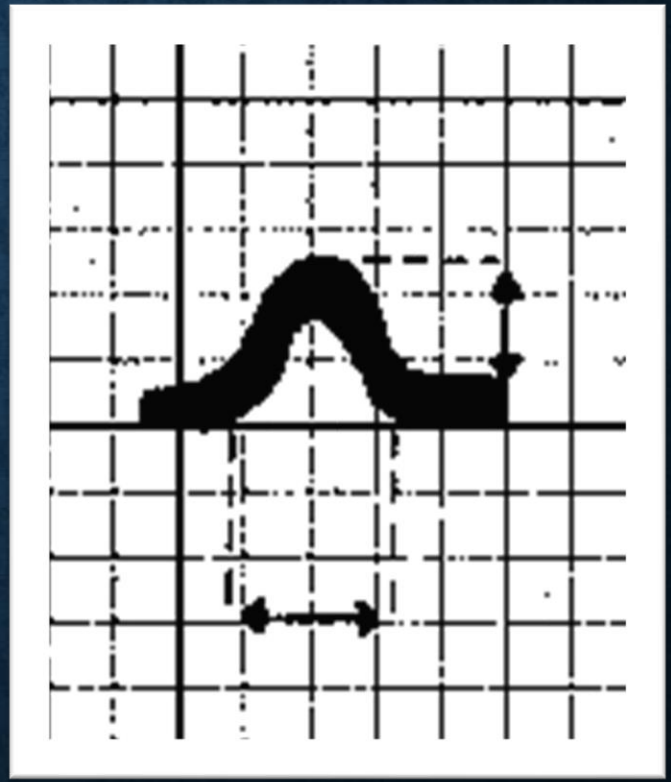
AUGMENTED LIMP LEADS

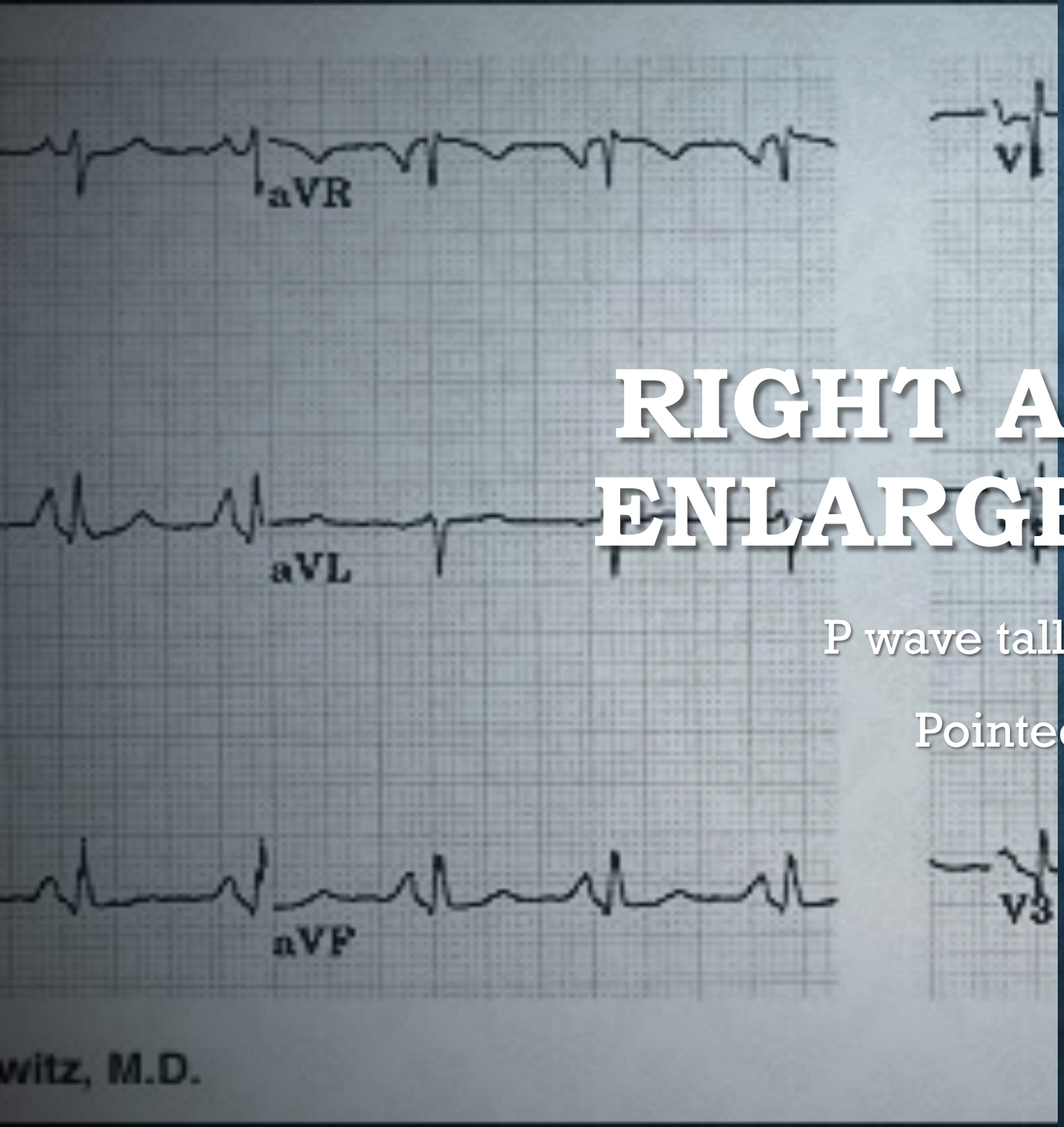



Mid-clavicular Line
Mid-axillary Line
Angle of Louis
PERCORDIAL LEADS
V1
V2
V3
V4
V5
V6

P WAVE

- Always positive in lead I and II
- Always negative in lead aVR
- < 3 small squares in duration
- < 2.5 small squares in amplitude
- Commonly biphasic in lead V1
- Best seen in leads II

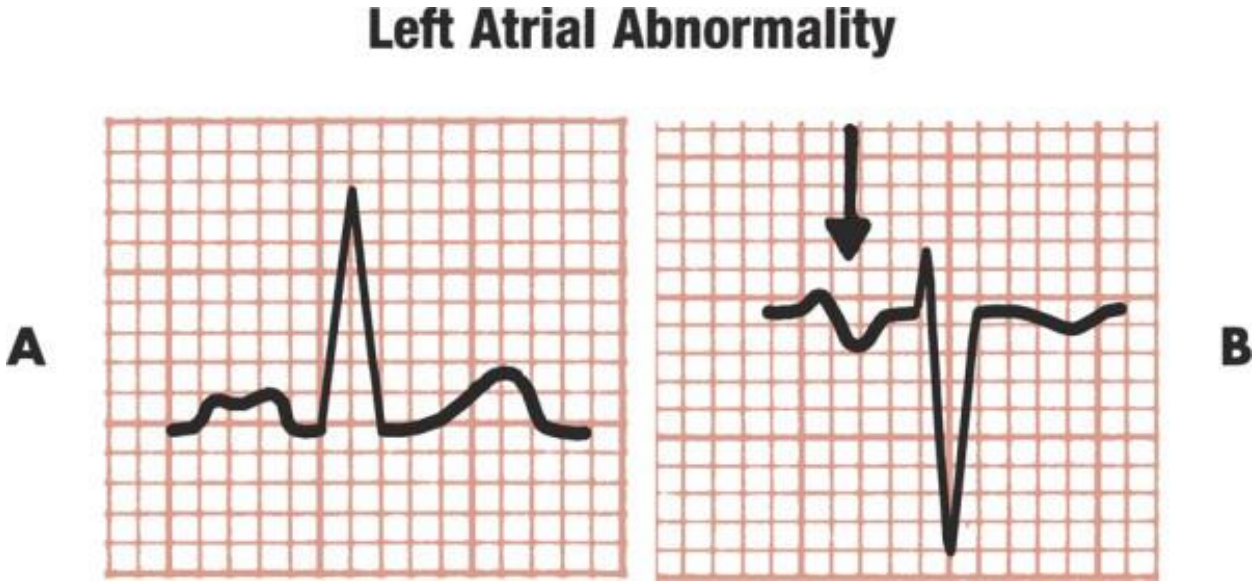




RIGHT ATRIAL ENLARGEMENT

P wave tall >2.5

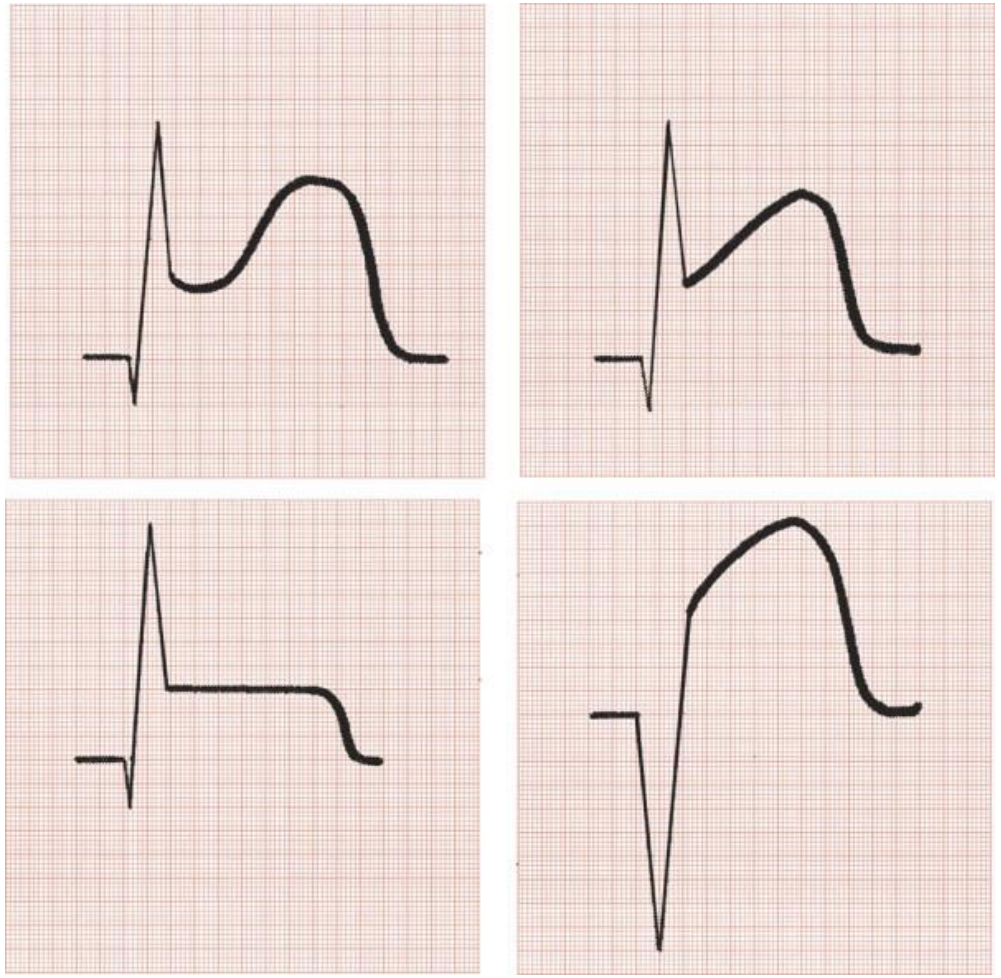
Pointed



LEFT ATRIAL ENLARGEMENT

ST SEGMENT

- ST Segment is flat (isoelectric)
- Elevation or depression of ST segment by 1 mm or more
- “J” (Junction) point is the point between QRS and ST segment



ST SEGMENT IN AMI

9 STEPS TO FOLLOW

1. Rhythm
2. Rate
3. Axis
4. P wave
5. PR interval
6. QRS complex
7. Q wave
8. ST segment changes
9. T wave changes

RHYTHM

Is every P wave followed by QRS complex?

Does P wave have normal morphology?

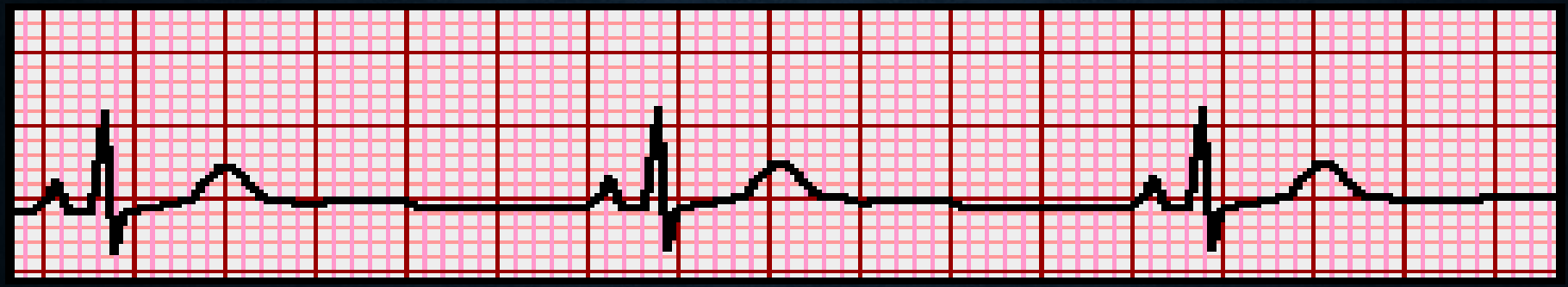
RATE

300-150-100-75-60-50 rule!

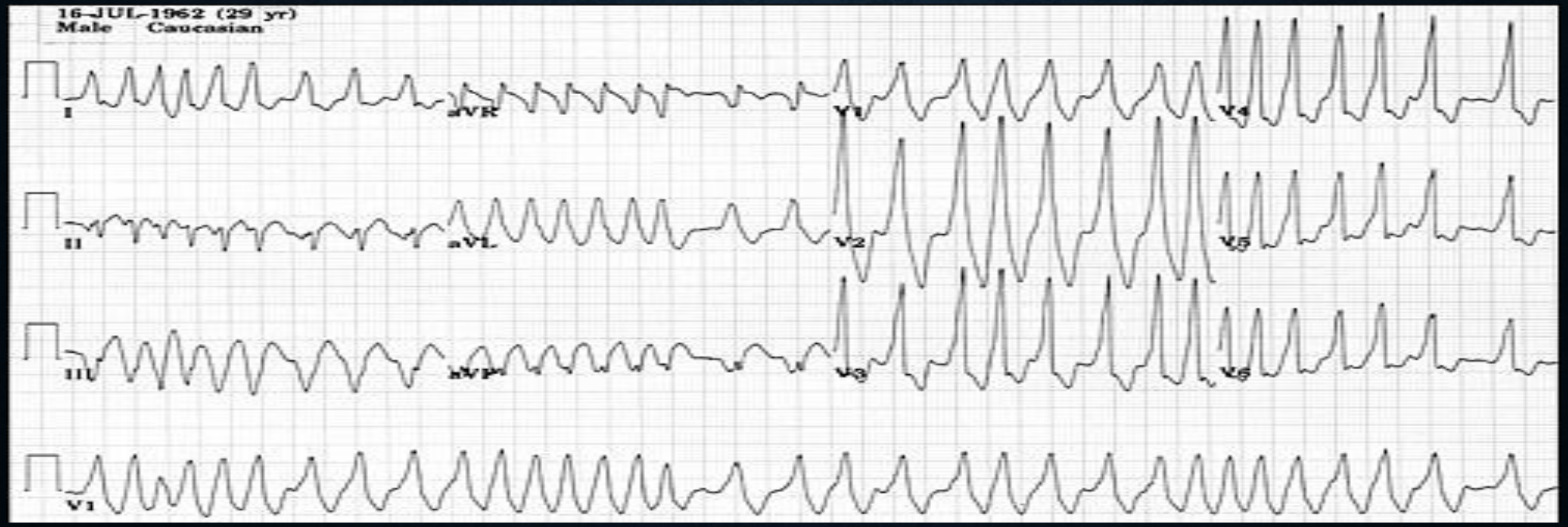
300/ R-R interval

R wave # X 6

WHAT'S THE HEART RATE?



WHAT'S THE HEART RATE?



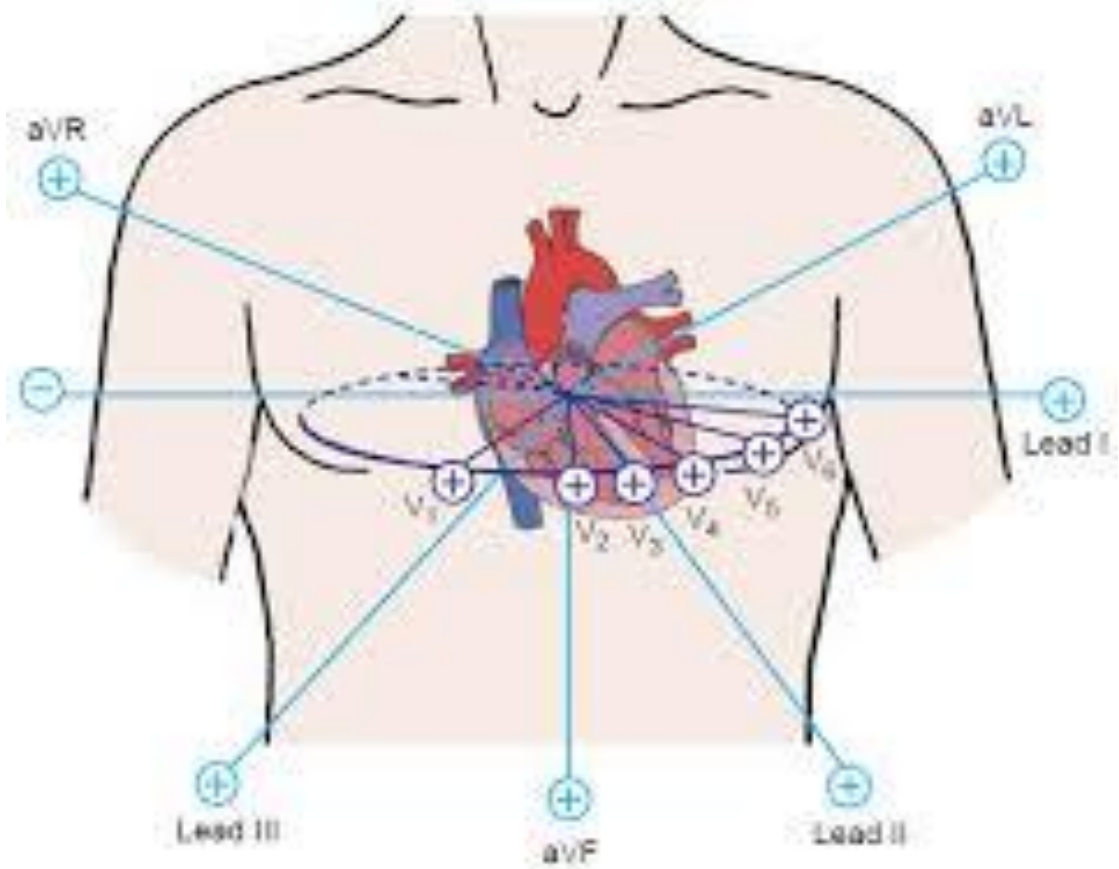
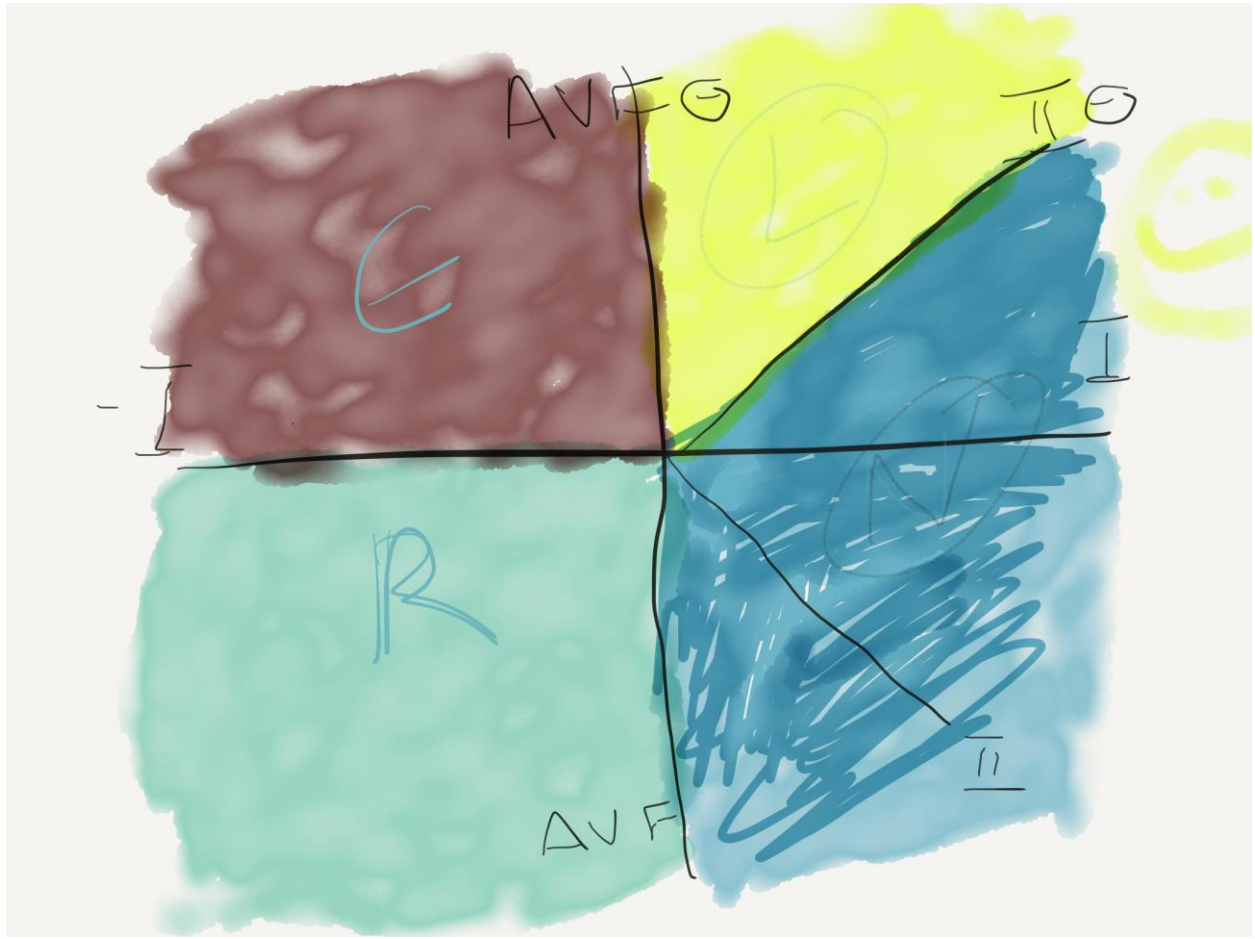
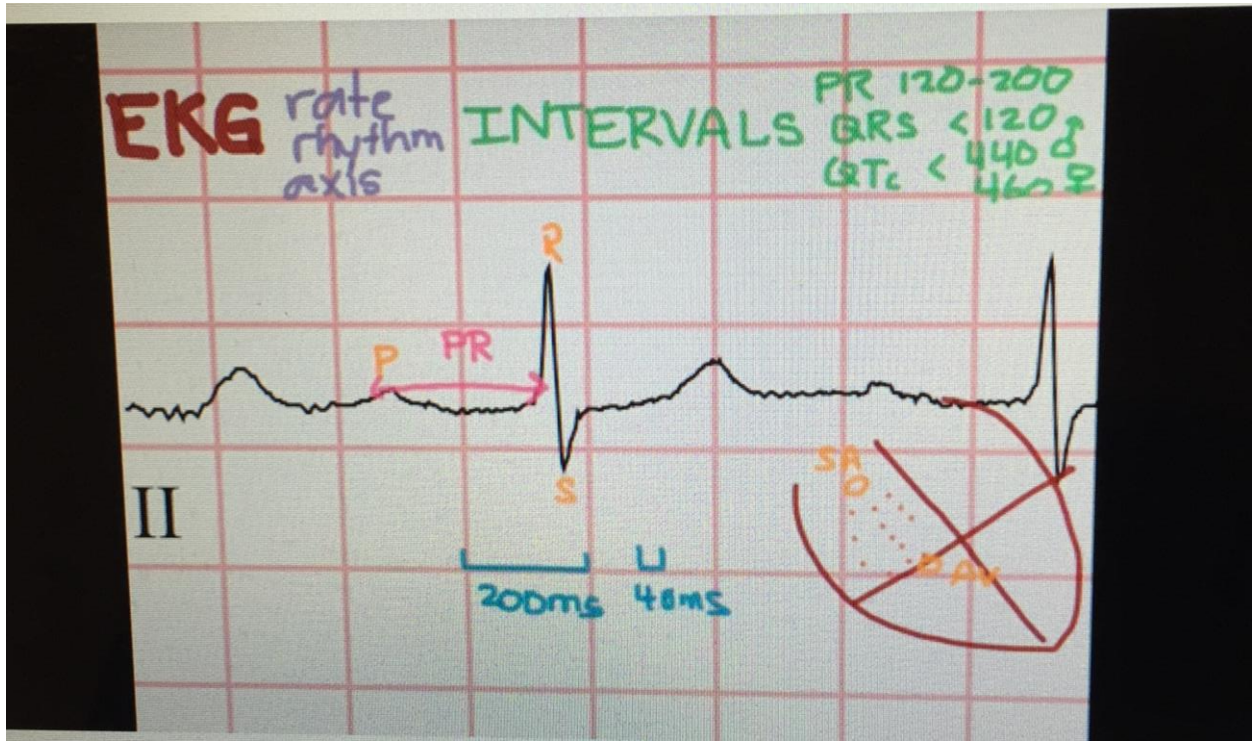


FIGURE 17-32 ▲ Electrocardiographic views of the heart.

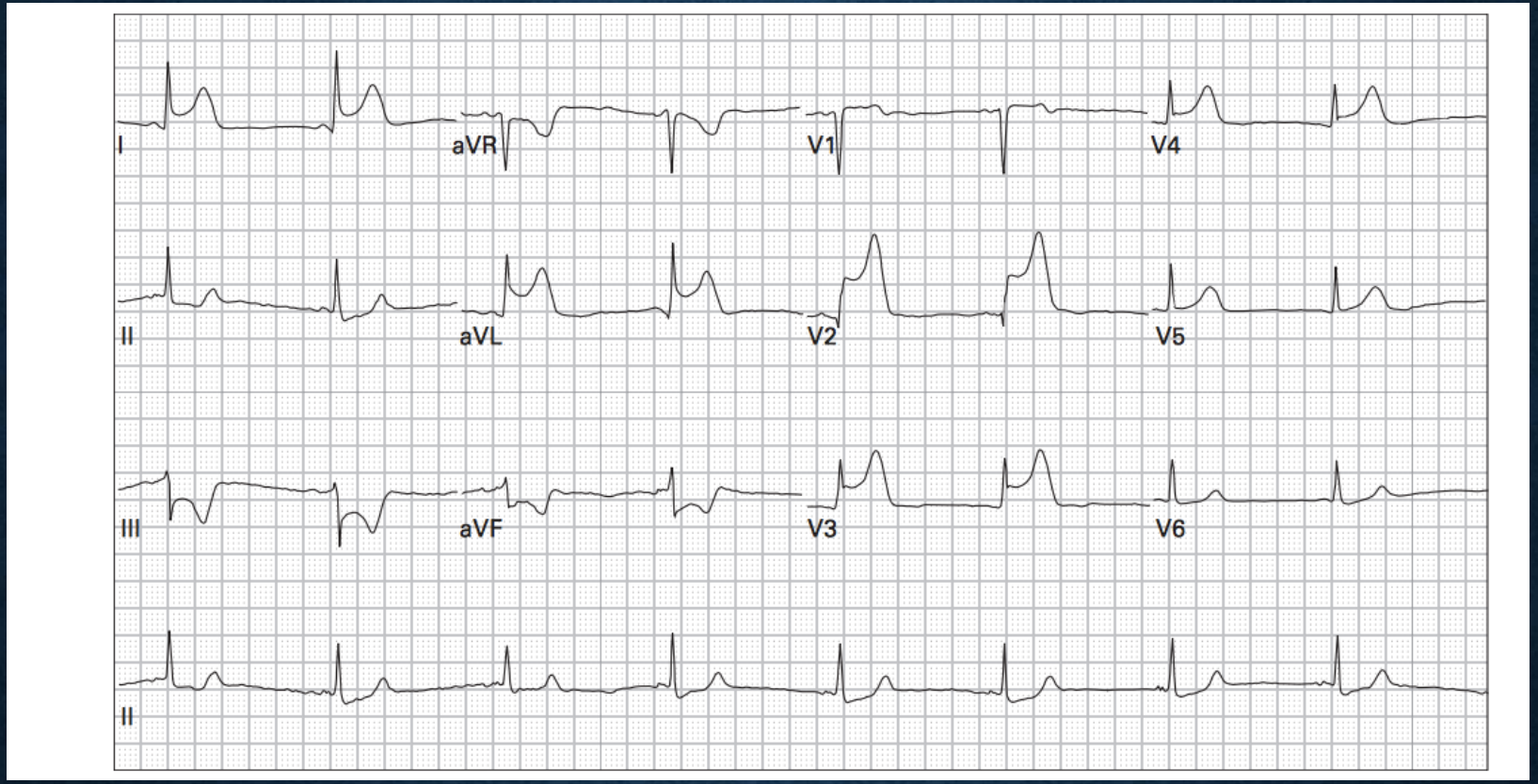
AXIS



AXIS

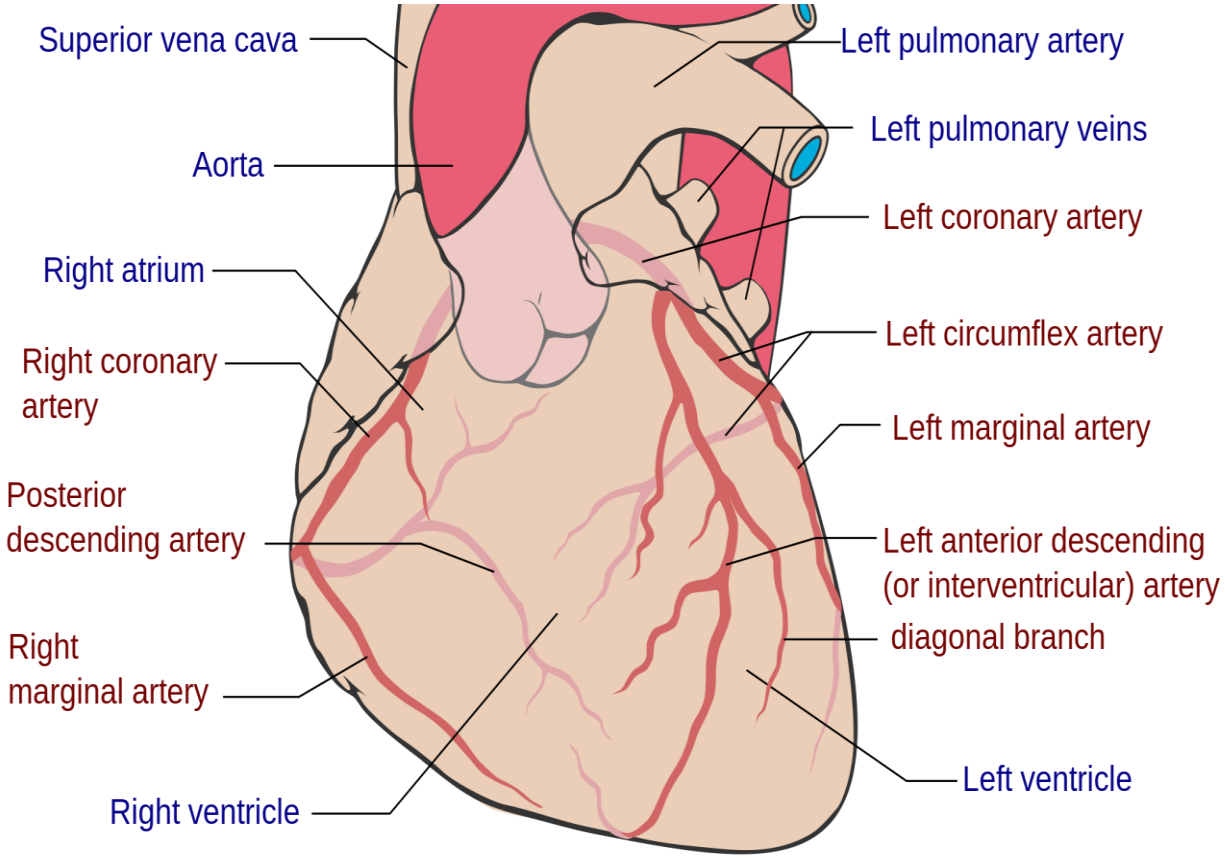

EKG
rate
rhythm
axis
INTERVALS
PR 120-200
QRS < 120
QTc < 440 ♂
460 ♀
R
P
PR
S
II
200ms
48ms
SA
AV

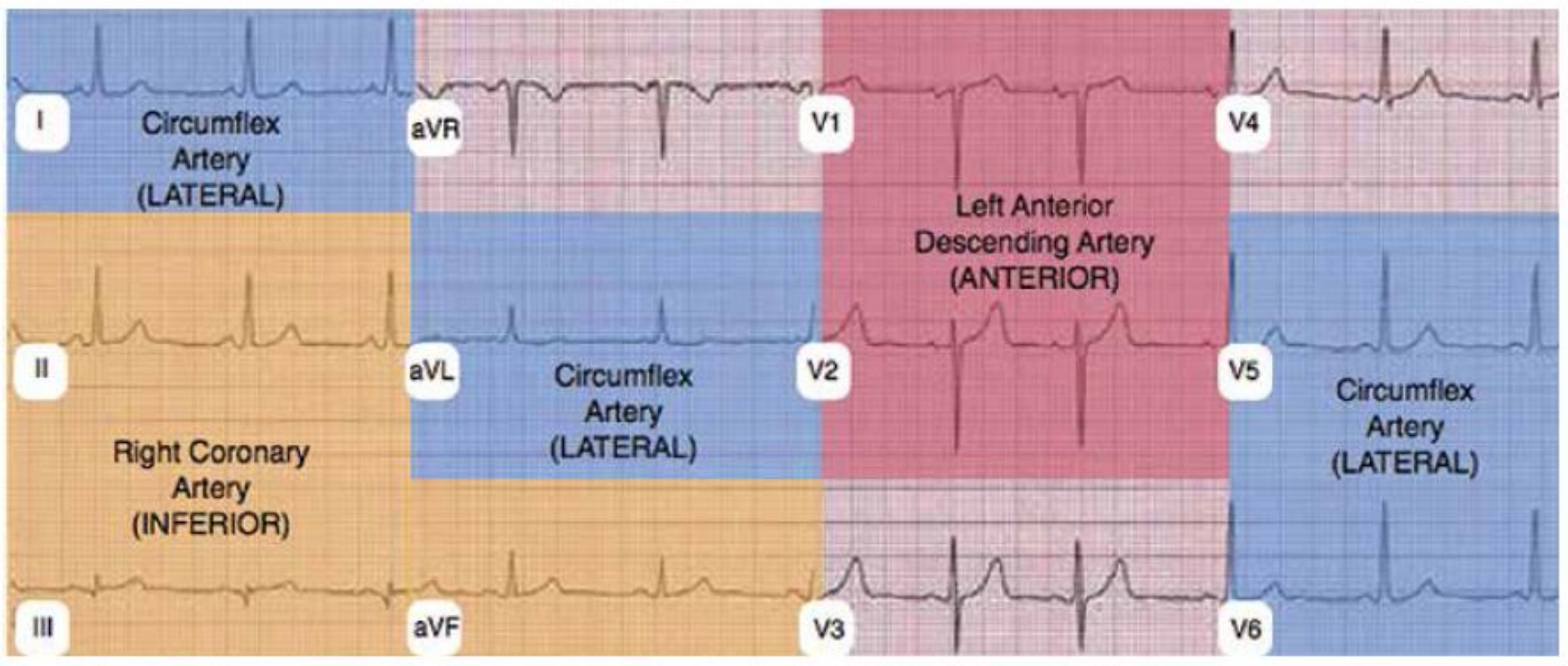
INTERVALS



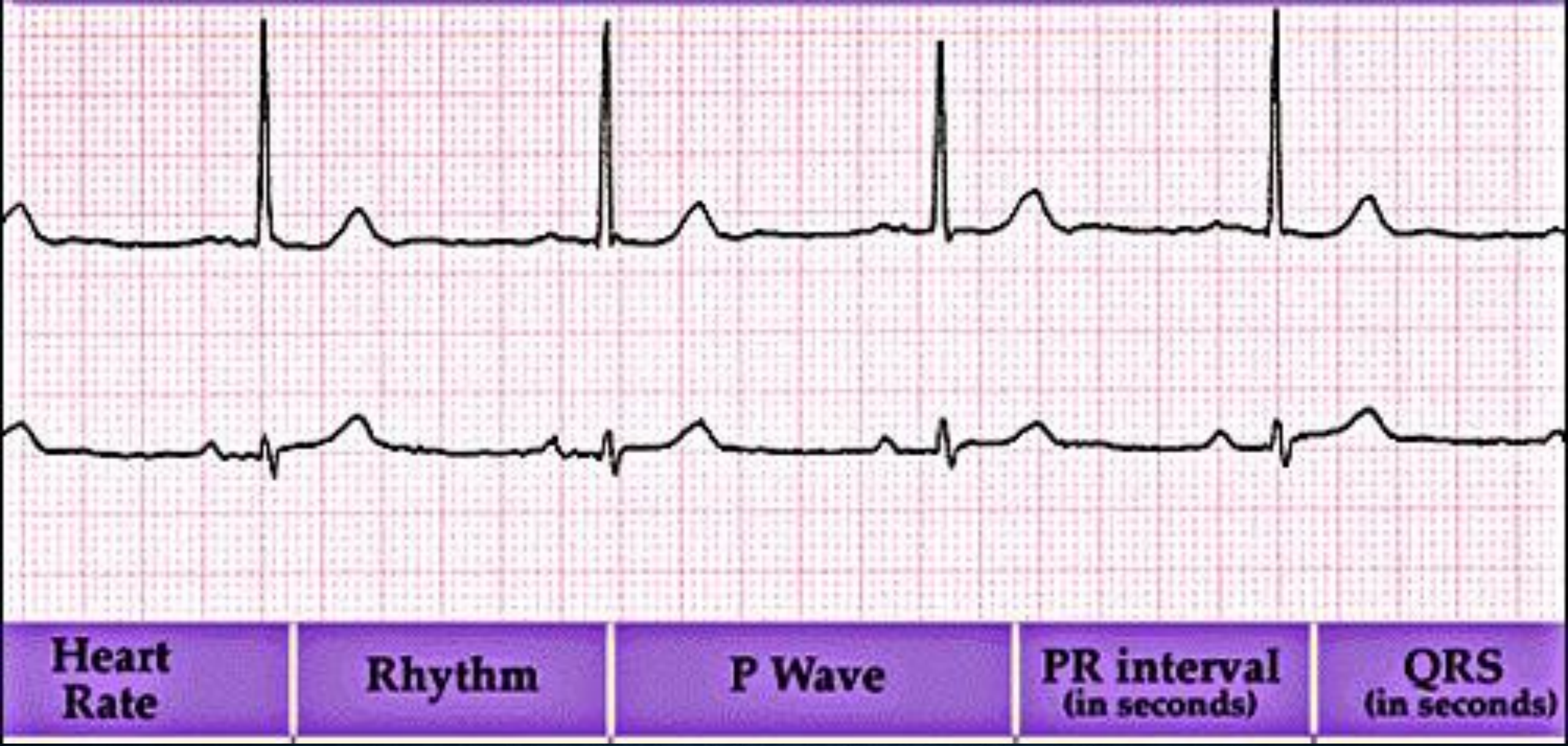
LETS HAVE FUN WITH SOME CASES!

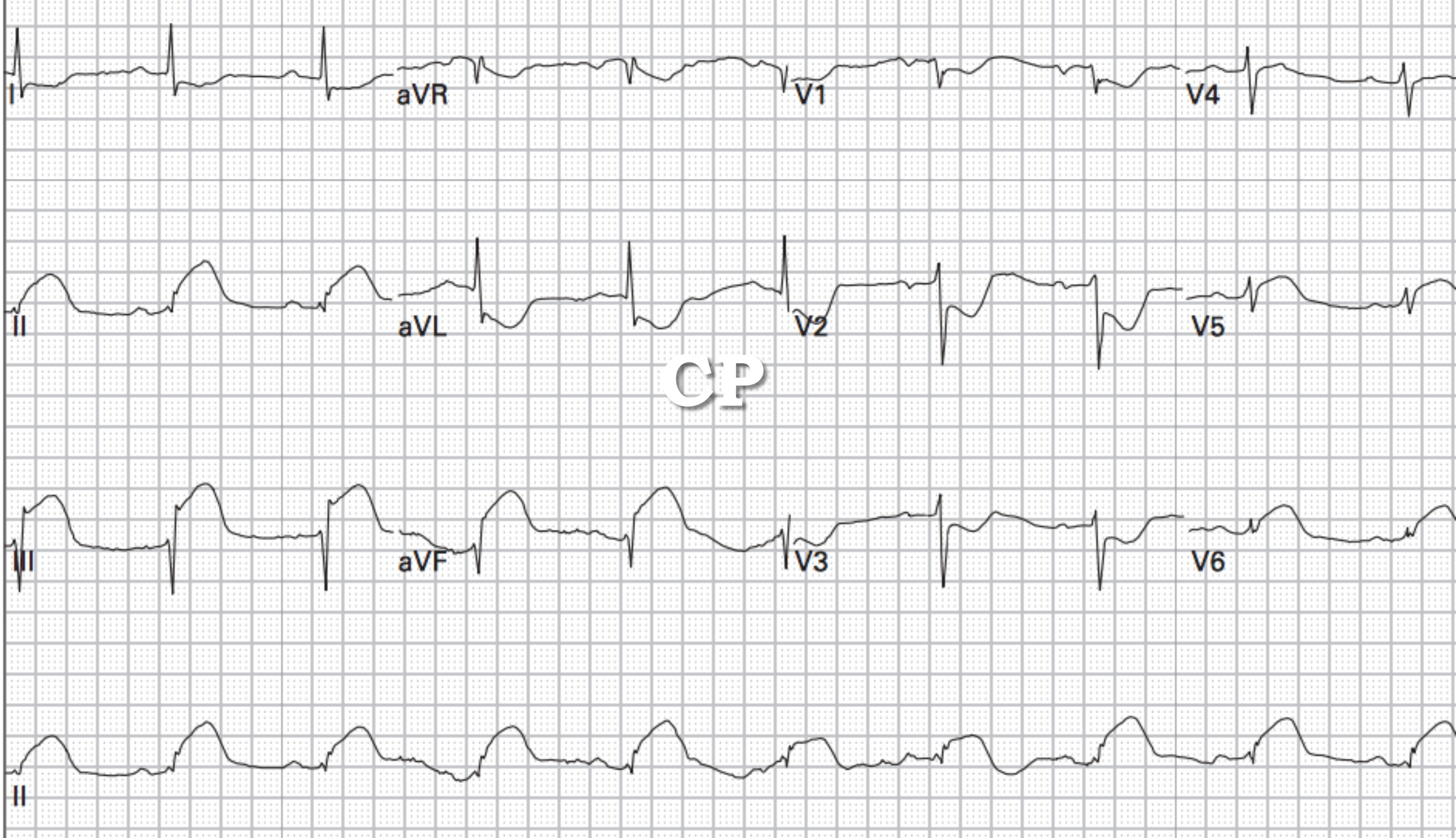
ANATOMY

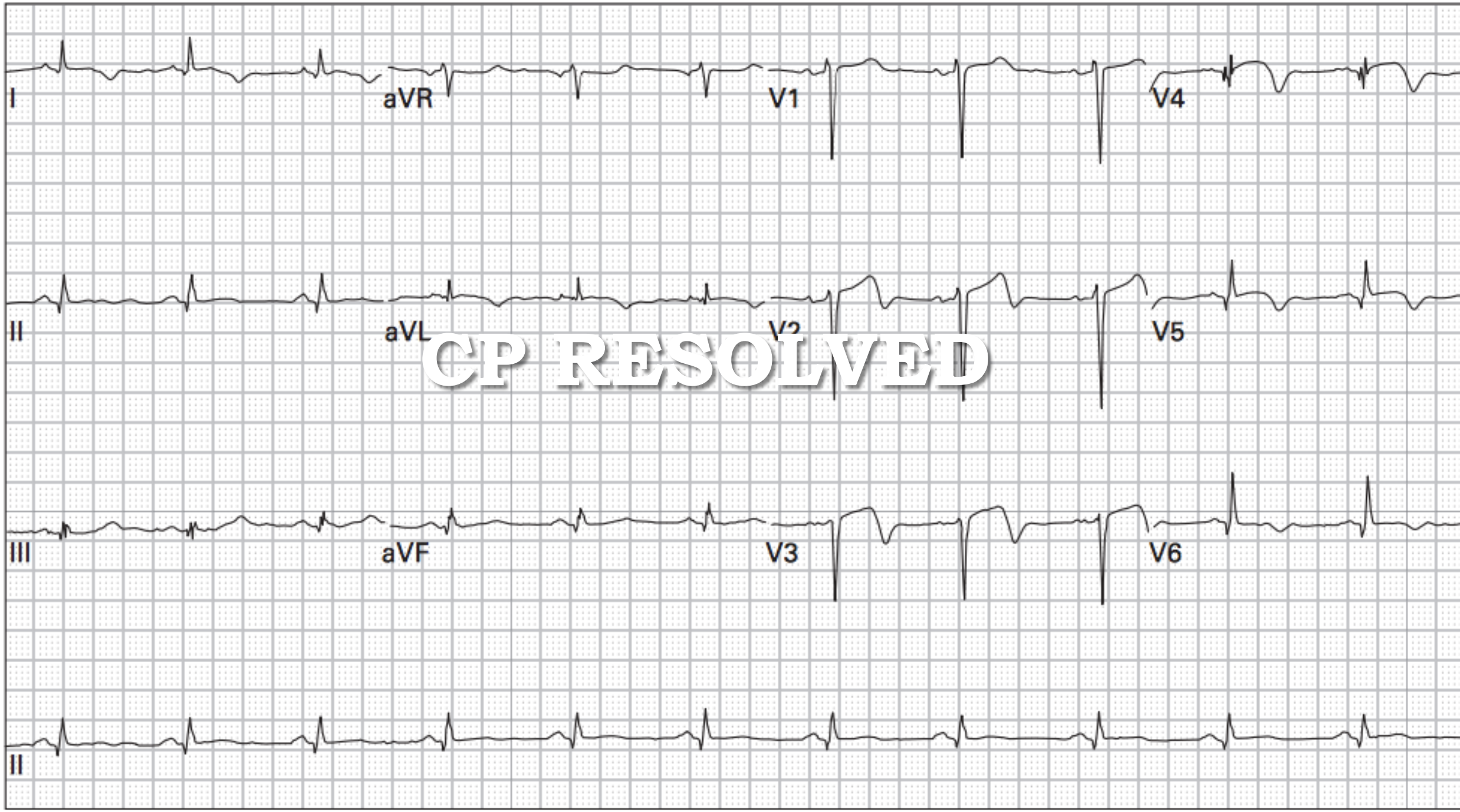

Superior vena cava
Aorta
Right atrium
Right coronary artery
Posterior descending artery
Right marginal artery
Right ventricle
Left pulmonary artery
Left pulmonary veins
Left coronary artery
Left circumflex artery
Left marginal artery
Left anterior descending (or interventricular) artery
diagonal branch
Left ventricle



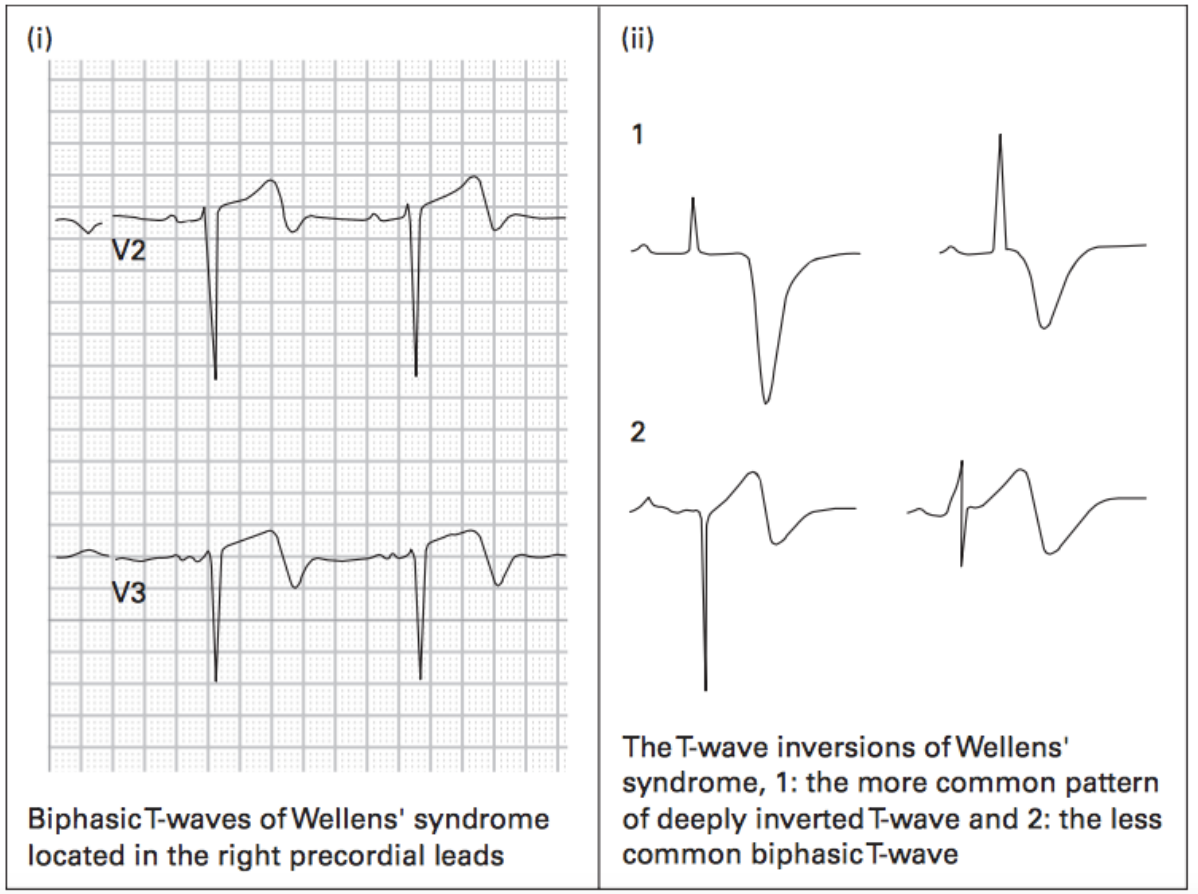
TERRITORIES


Heart Rate
Rhythm
P Wave
PR interval (in seconds)
QRS (in seconds)


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

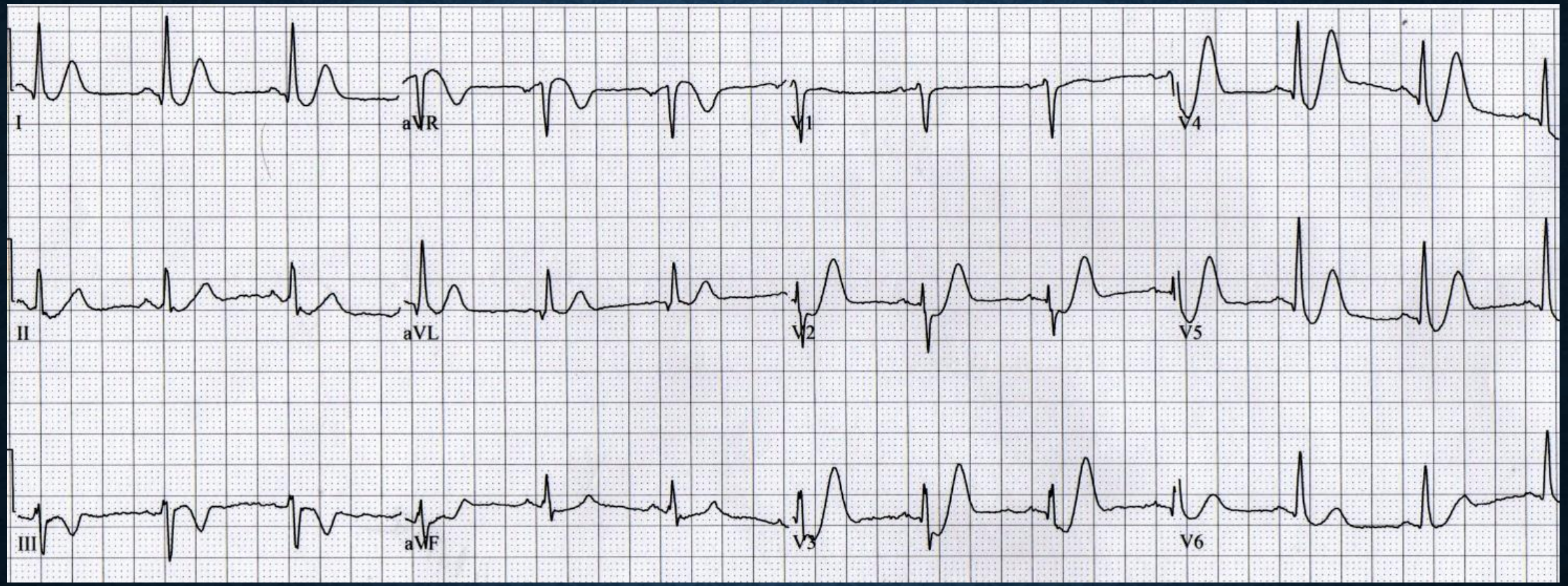

I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II
CP RESOLVED

WELLESNS' SYNDROME

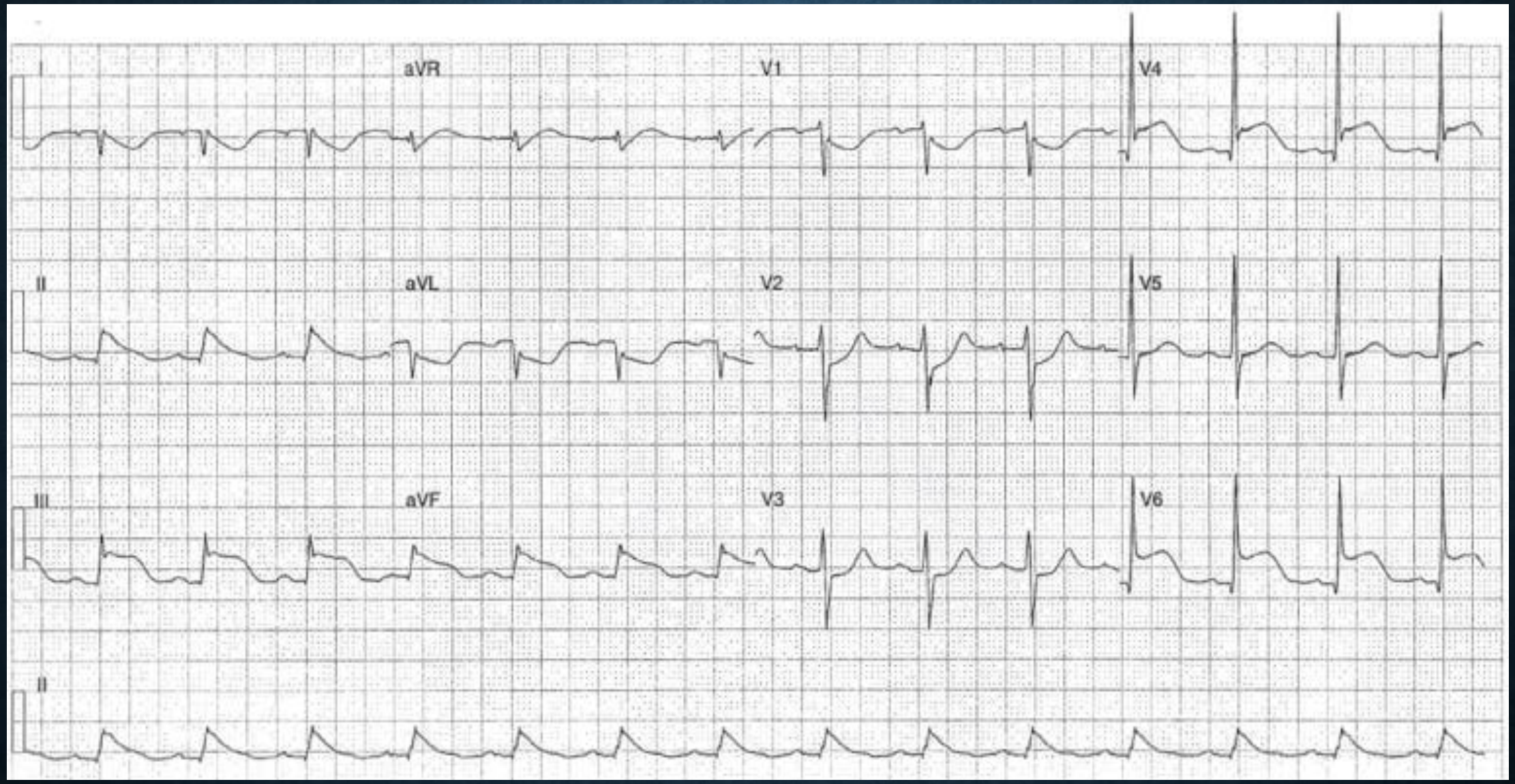


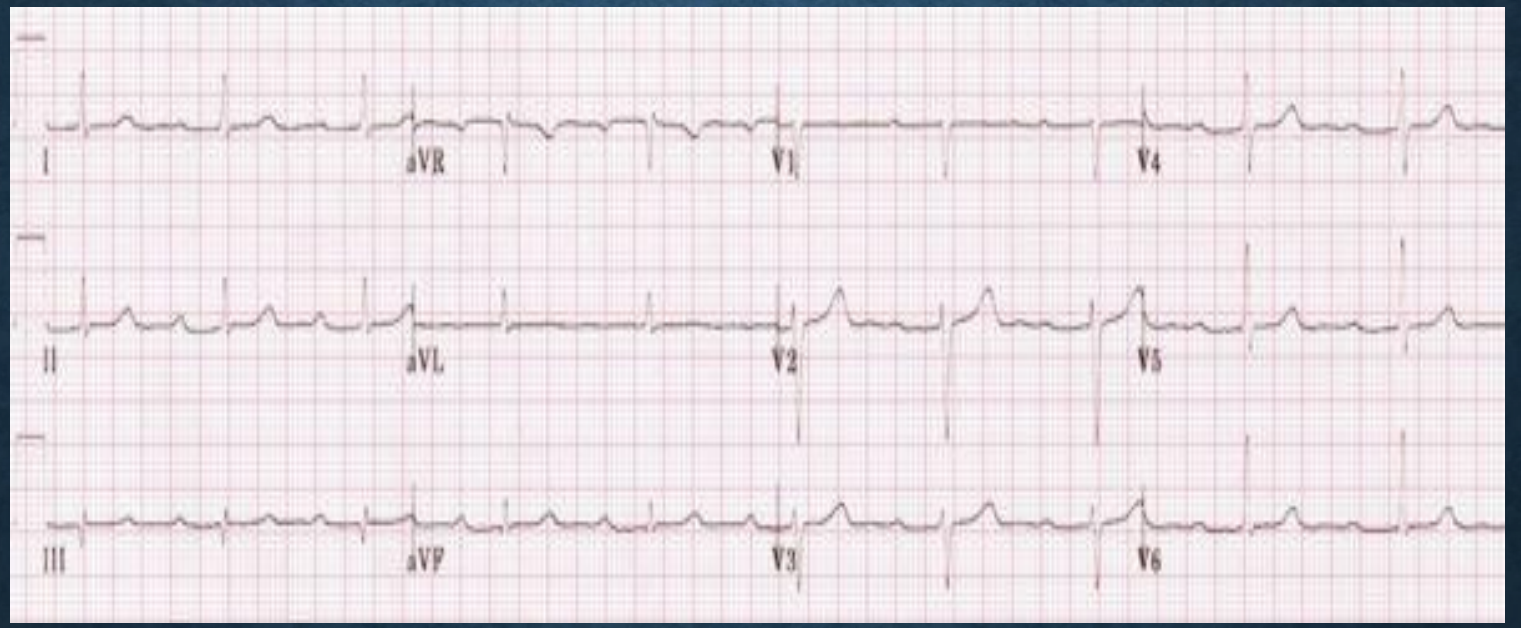
Biphasic T-waves of Wellens' syndrome located in the right precordial leads

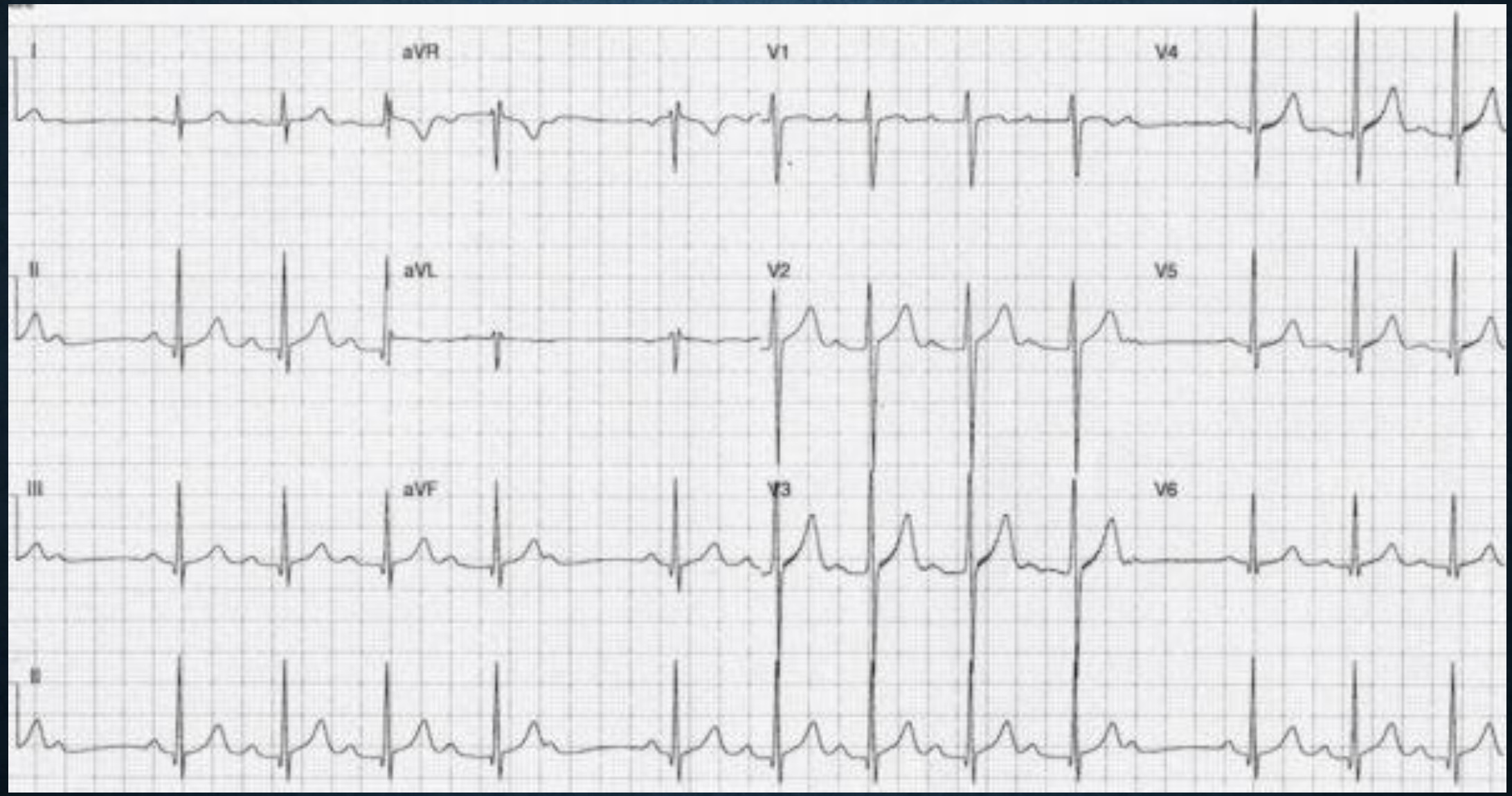
The T-wave inversions of Wellens' syndrome, 1: the more common pattern of deeply inverted T-wave and 2: the less common biphasic T-wave

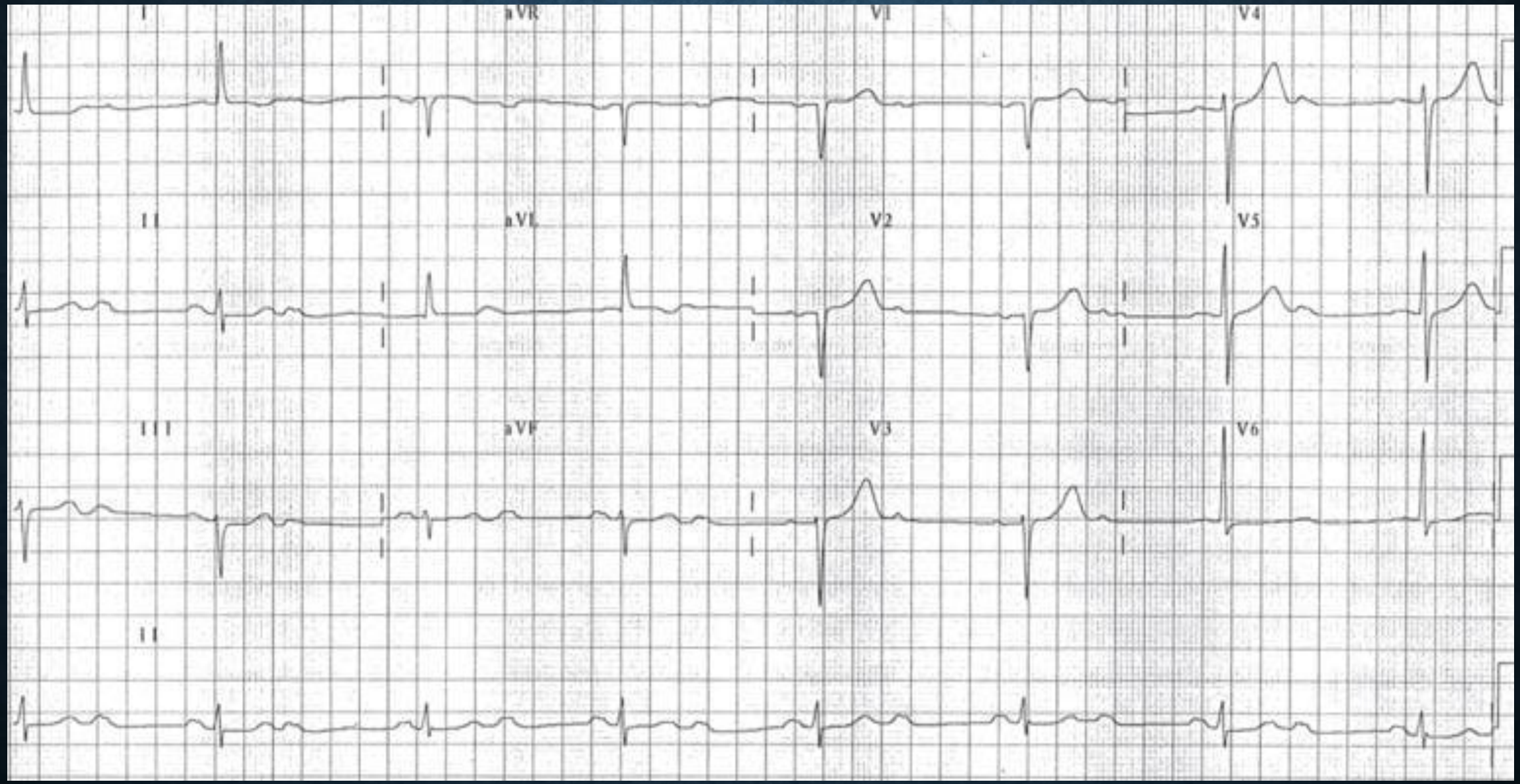


CP


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


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


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


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


II
0:02:00

SOME EXTRA RESOURCES

- https://www.youtube.com/channel/UCalrHCvCKSmX3749treueeg\
- A 1st book on ECG 2014, Ken Grauer
- https://litfl.com/
- http://hqmeded-ecg.blogspot.com/

THANK YOU HOPE YOU HAD FUN!