Time is Muscle

Recognizing Acute MI

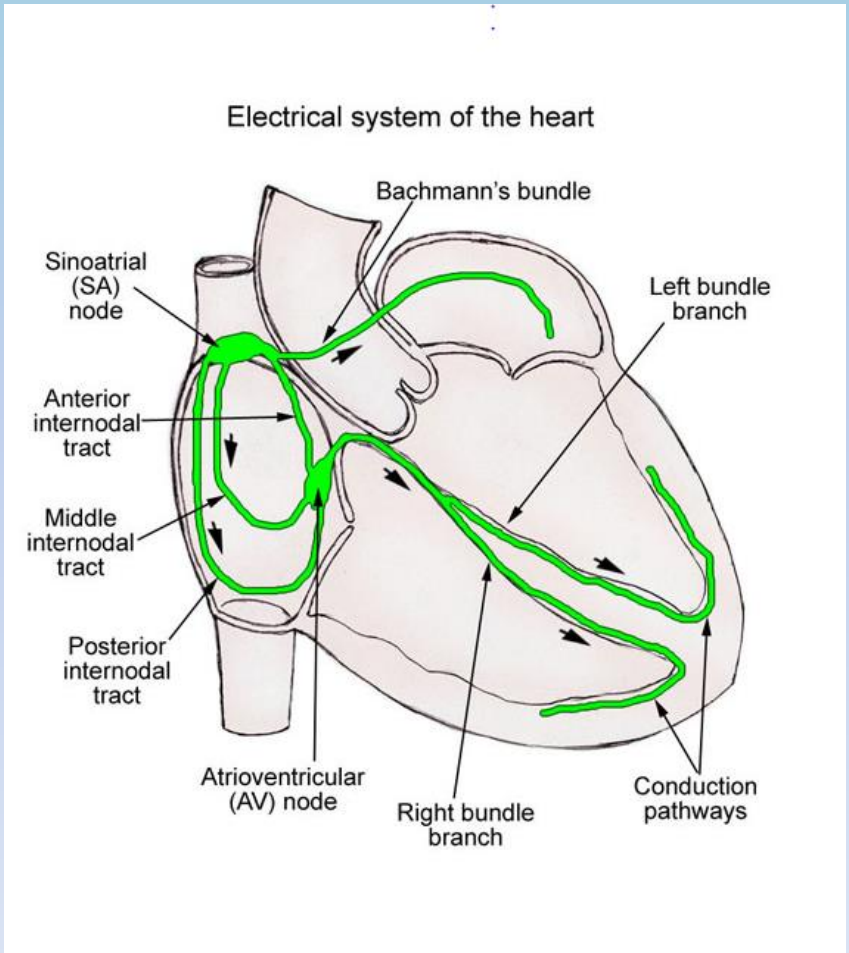
Objectives

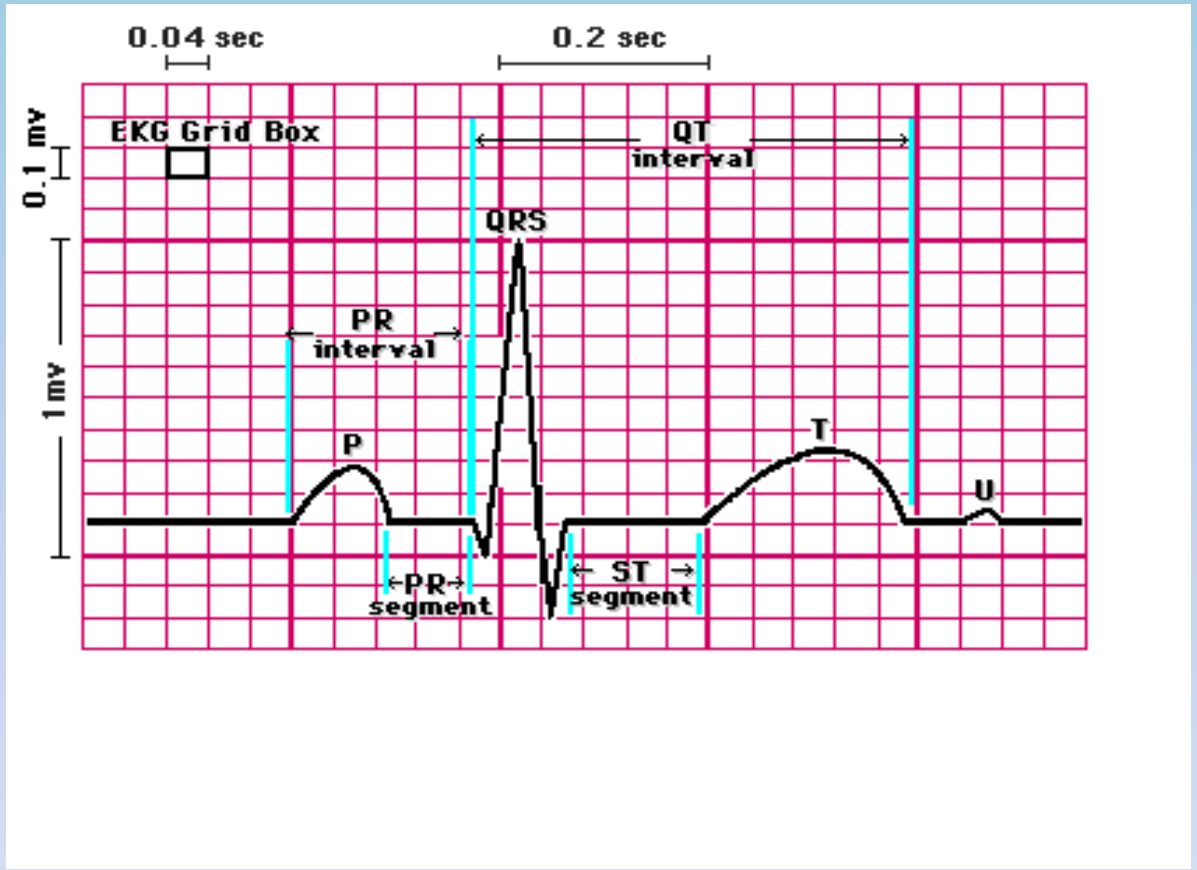
- 1. Review cardiac conduction system
- 2. Review cardiac anatomy
- 3. Recognize ischemia, injury, infarct on EKG
- 4. Differentiate areas of infarct as indicated on EKG
- 5. State treatment for MI's

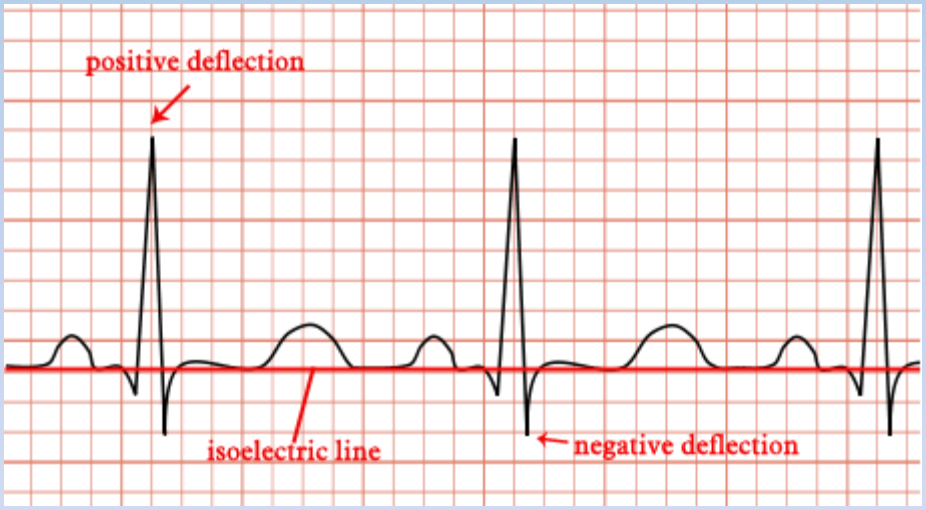
Properties of cardiac cells

- Automaticity
- Excitability
- Conductivity
- Refractoriness
- Contractility

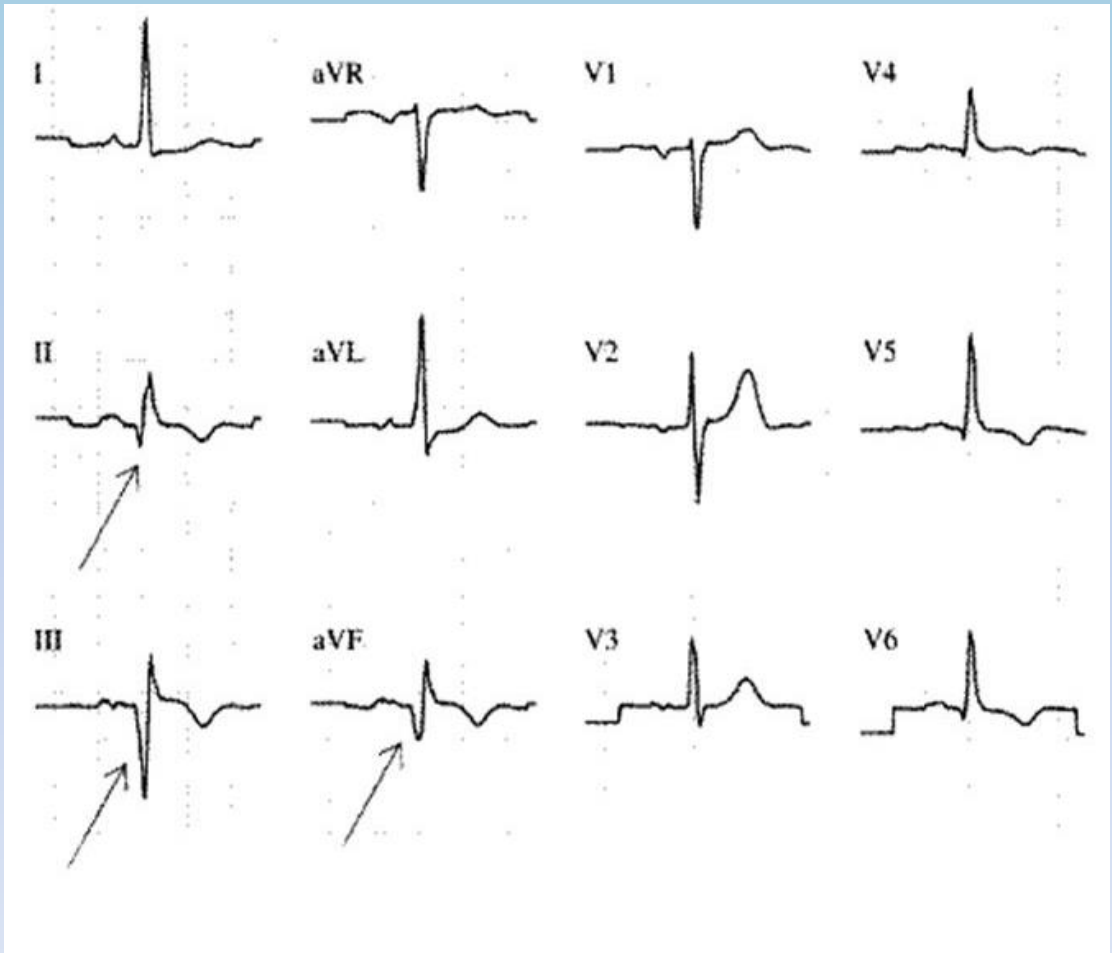
Cardiac Conduction System



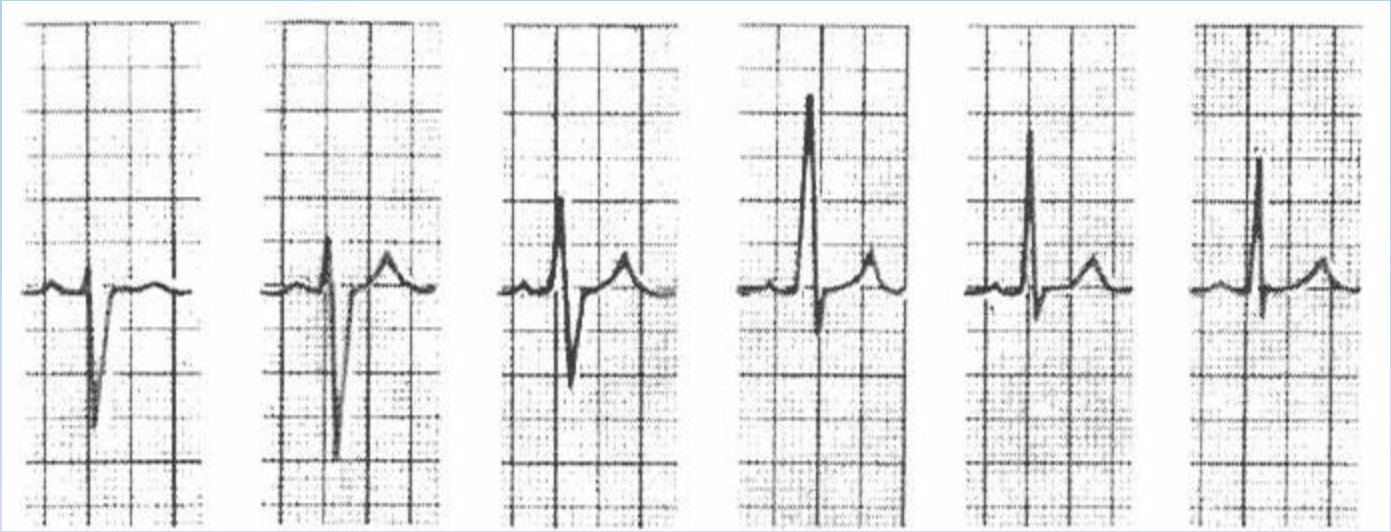

0.04 sec
0.2 sec
EKG Grid Box
0.1 mv
1 mv
QT
interval
QRS
PR
interval
P
T
U
PR
segment
ST
segment


positive deflection
isoelectric line
negative deflection

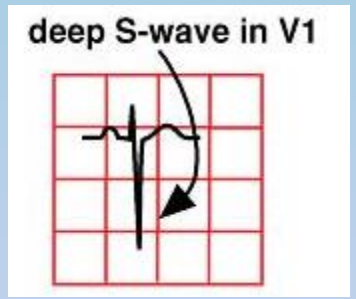
Q wave, 1st negative deflection after P wave



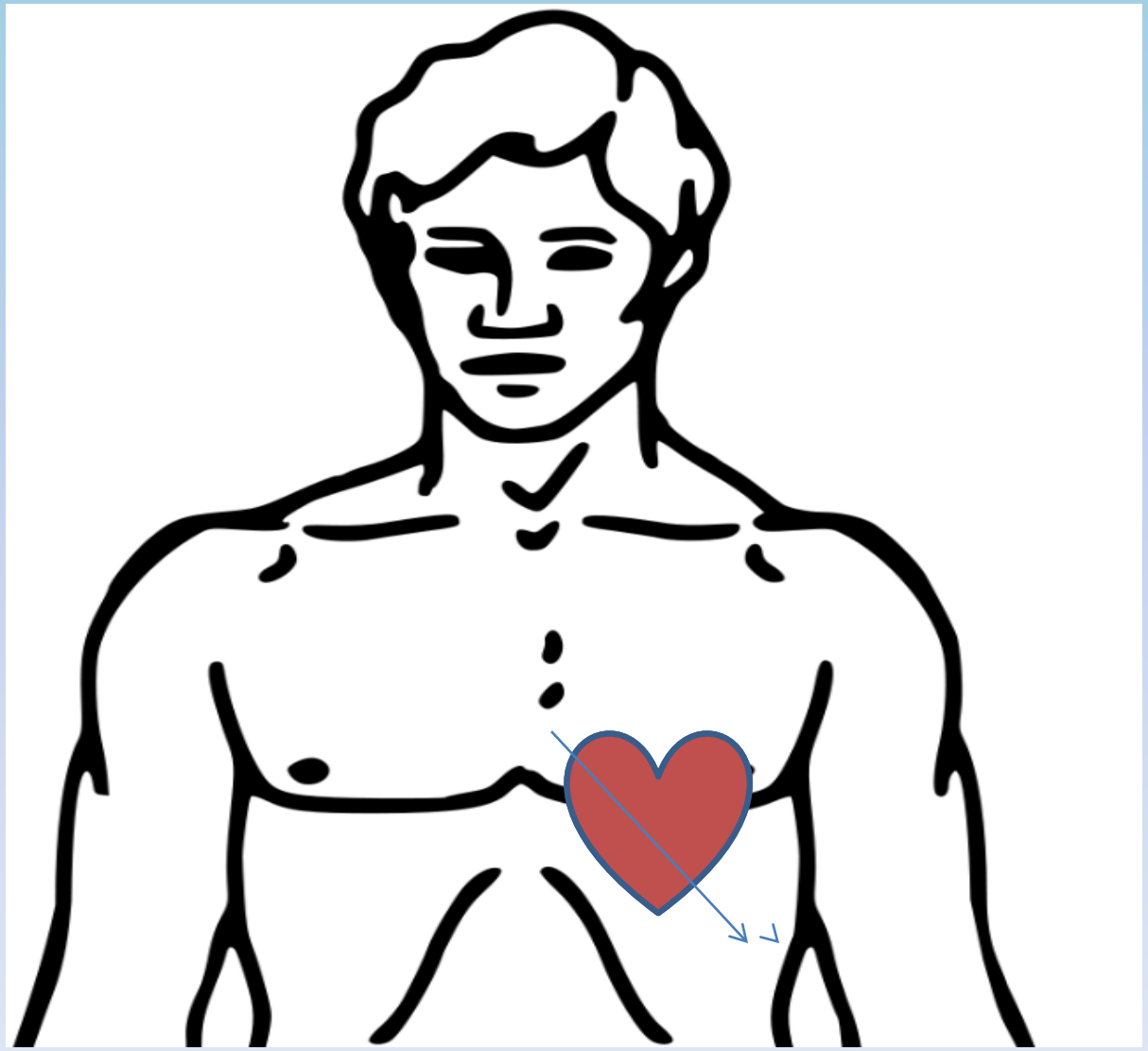
R wave, 1st positive deflection after the P wave

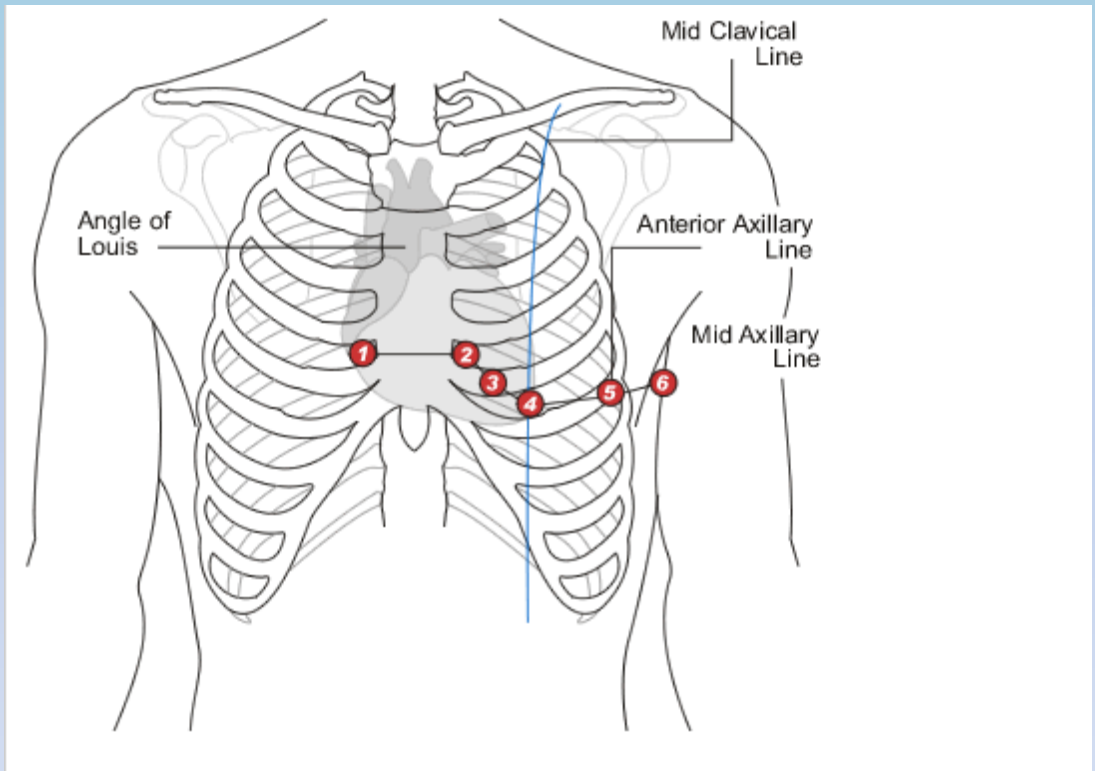


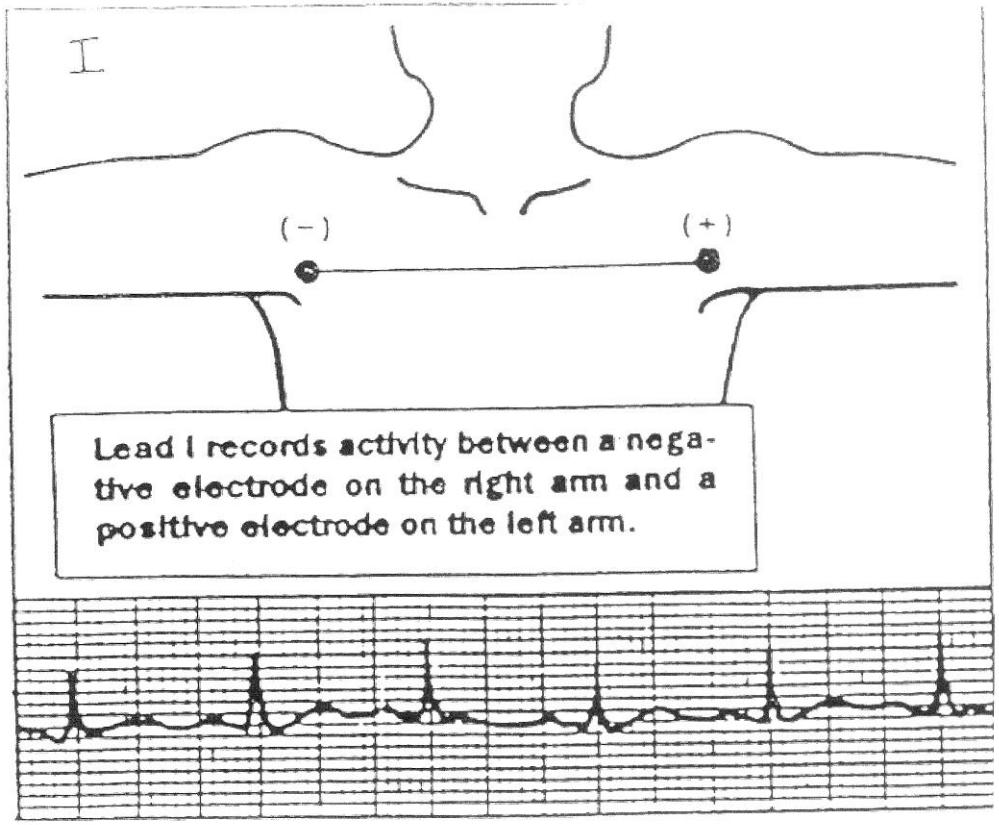
S wave, 1st negative deflection after positive deflection

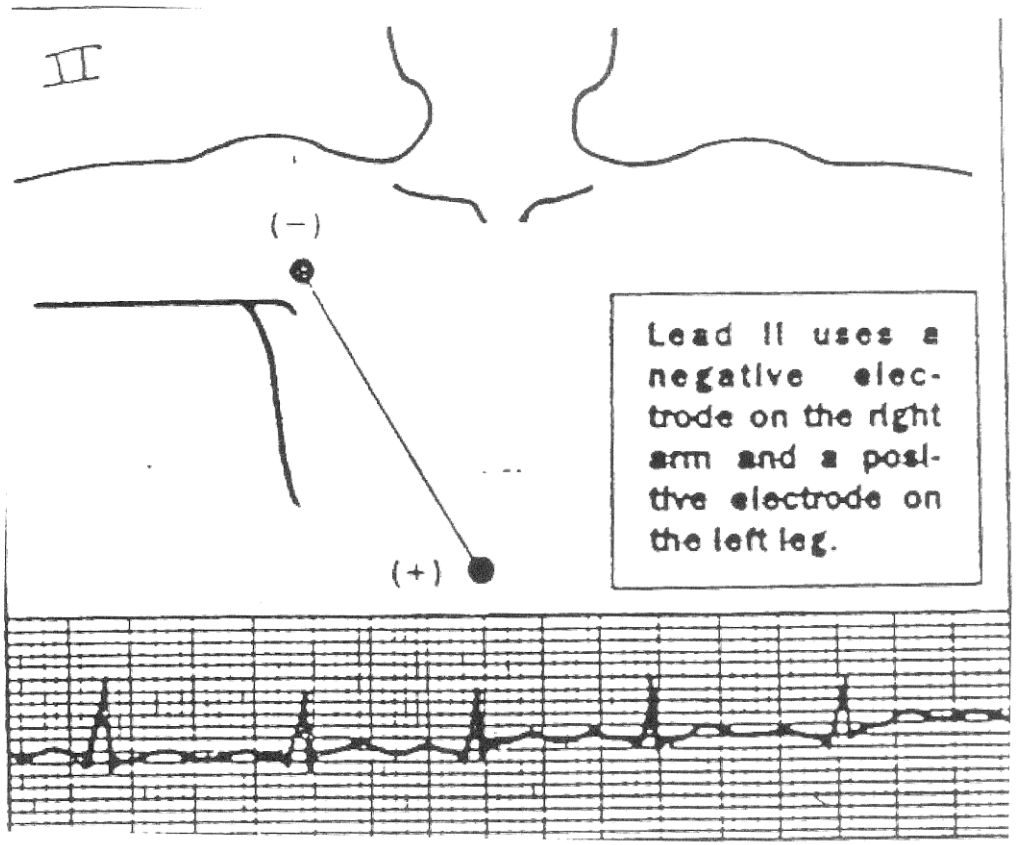


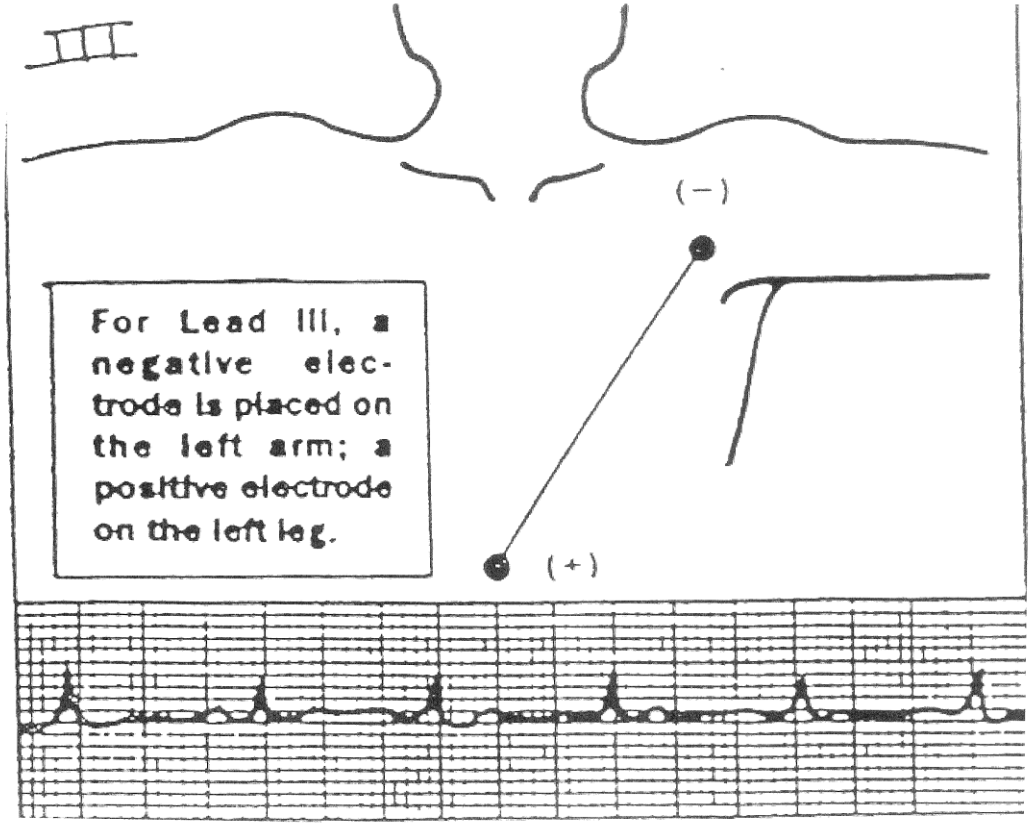
Electrical forces of heart

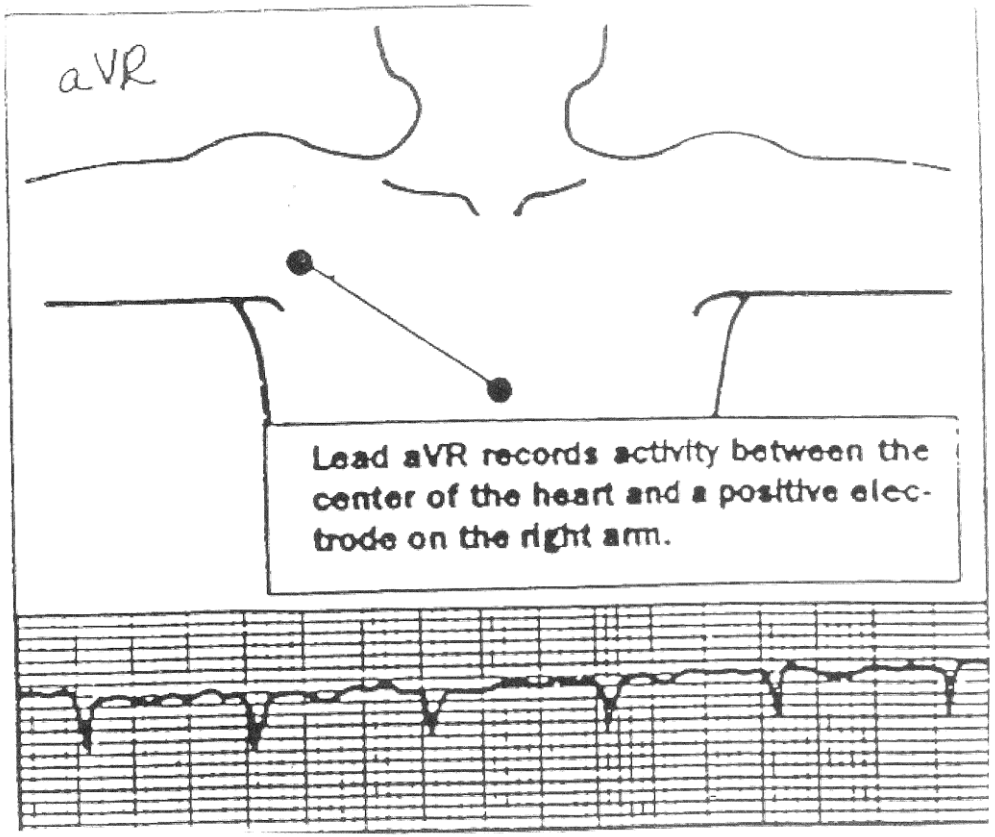


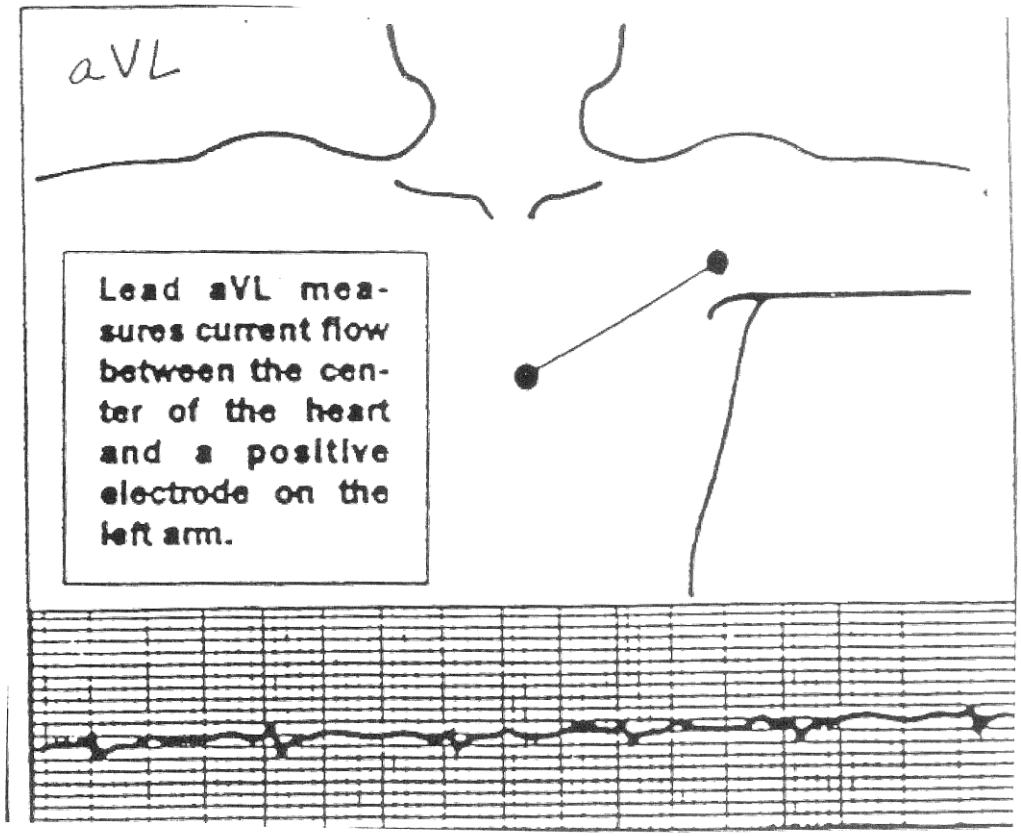

Mid Clavical Line
Angle of Louis
Anterior Axillary Line
Mid Axillary Line
1
2
3
4
5
6

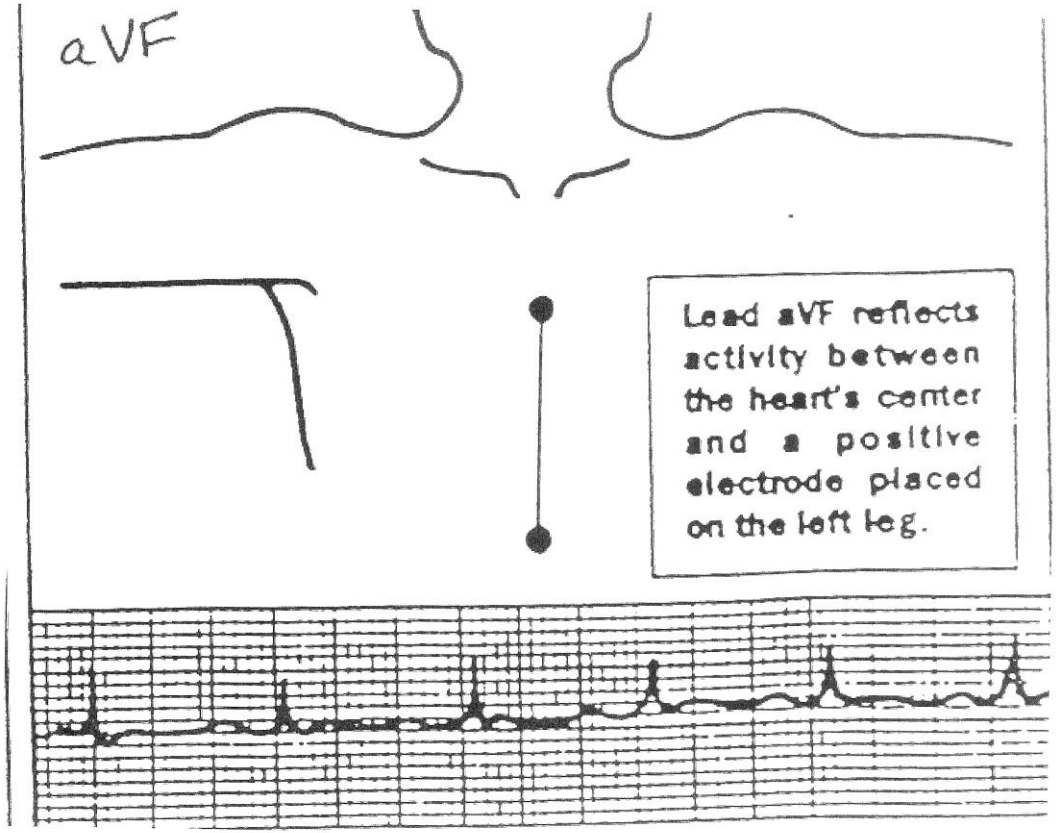

I
(−)
(+)
Lead I records activity between a negative electrode on the right arm and a positive electrode on the left arm.

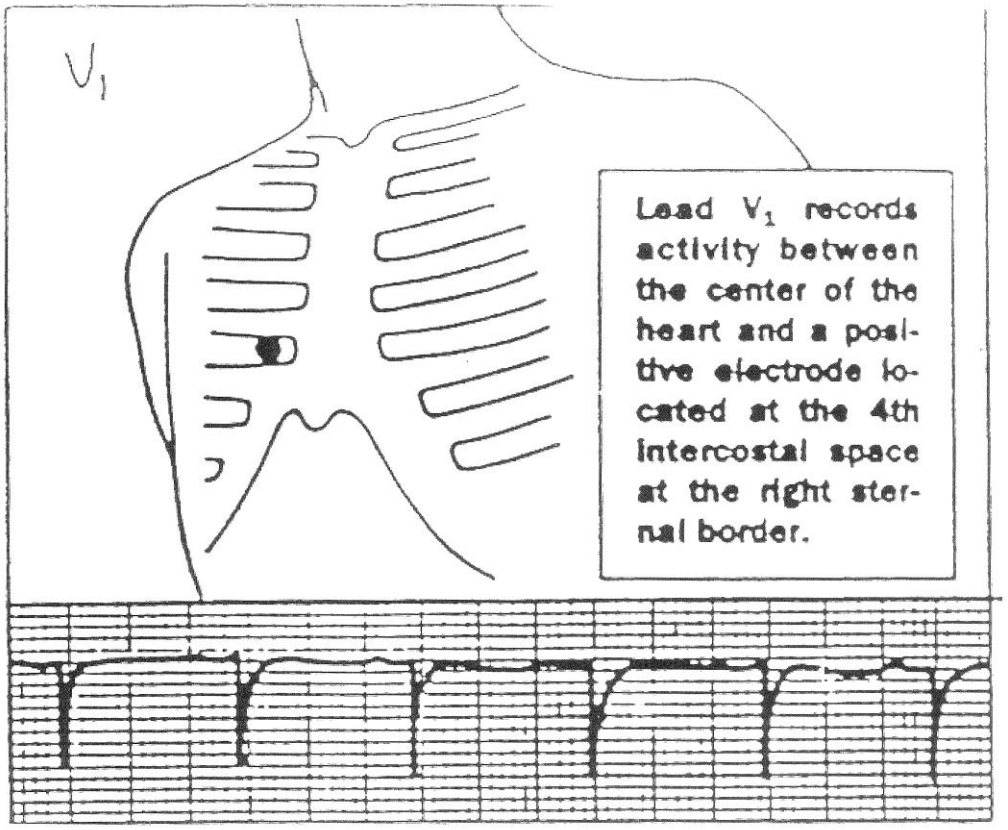

II
(−)
(+)
Lead II uses a negative electrode on the right arm and a positive electrode on the left leg.

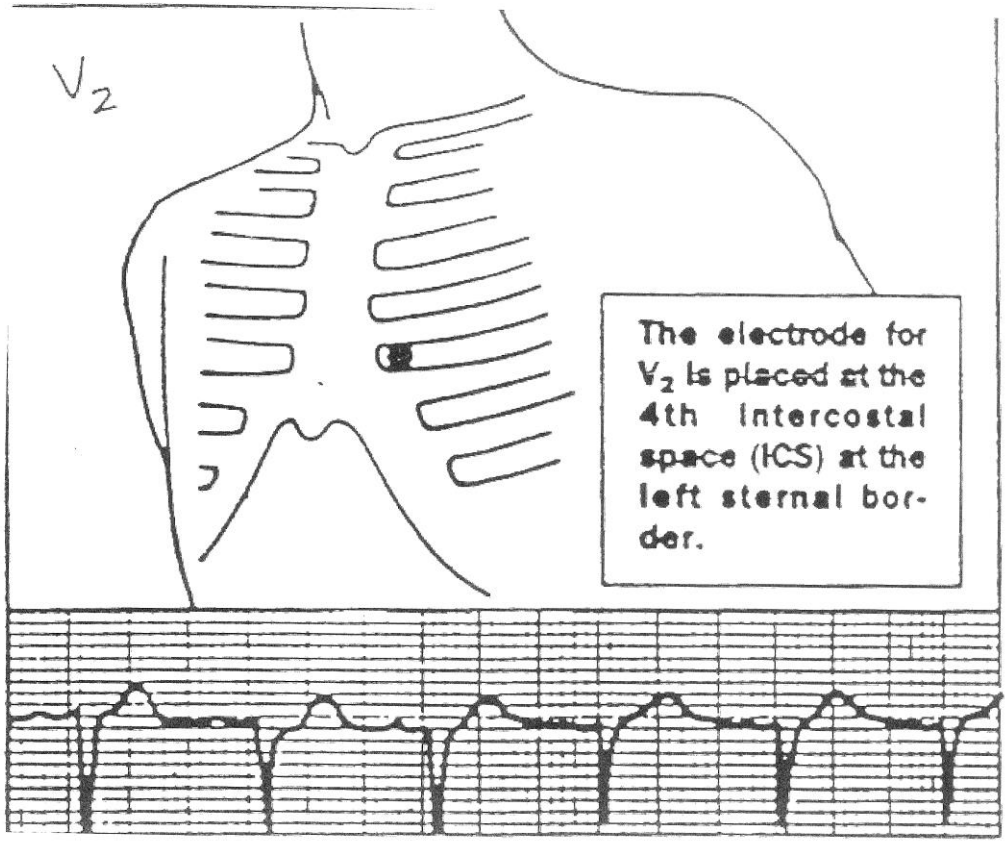

III
(−)
For Lead III, a negative electrode is placed on the left arm; a positive electrode on the left leg.
(+)

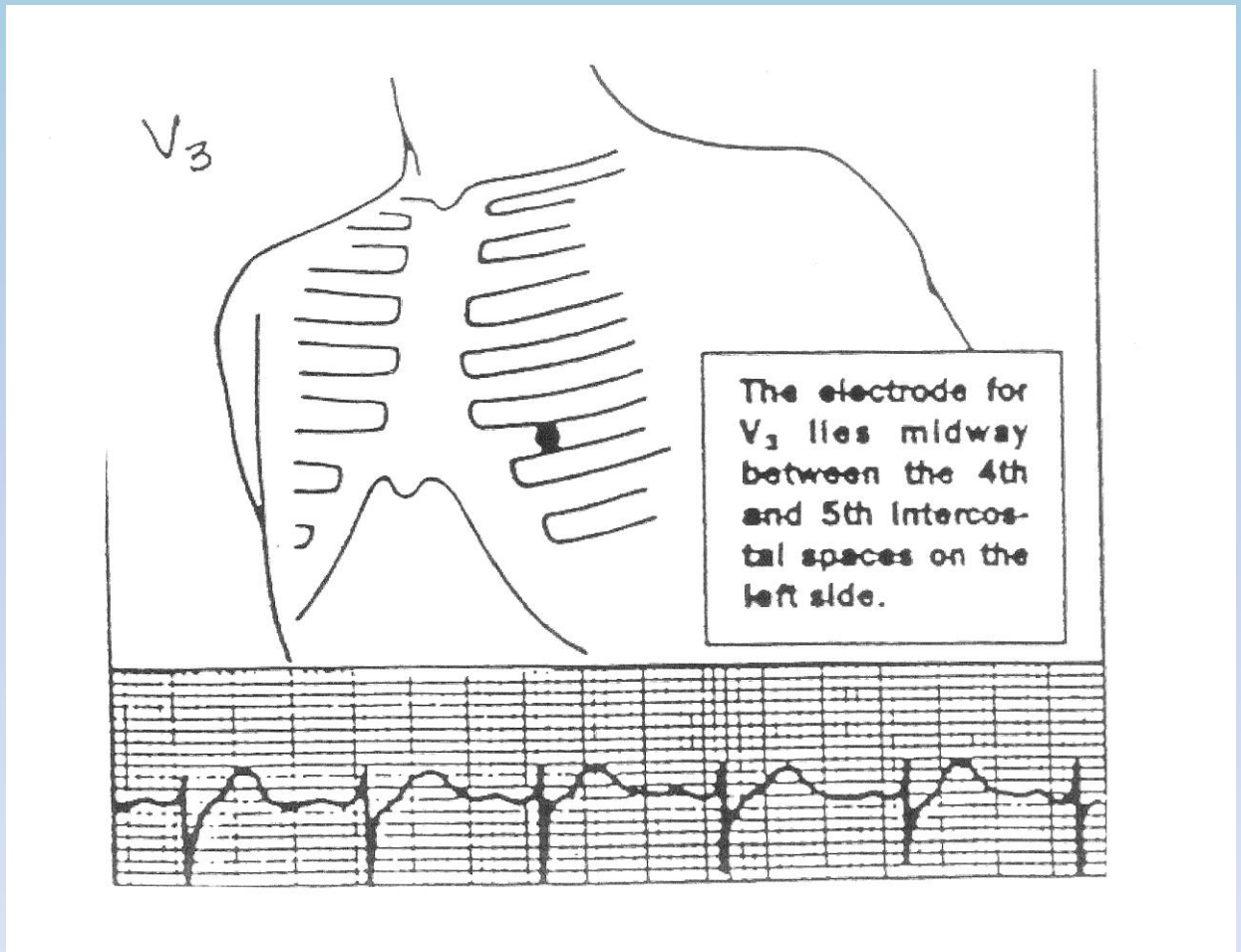

aVR
Lead aVR records activity between the center of the heart and a positive electrode on the right arm.

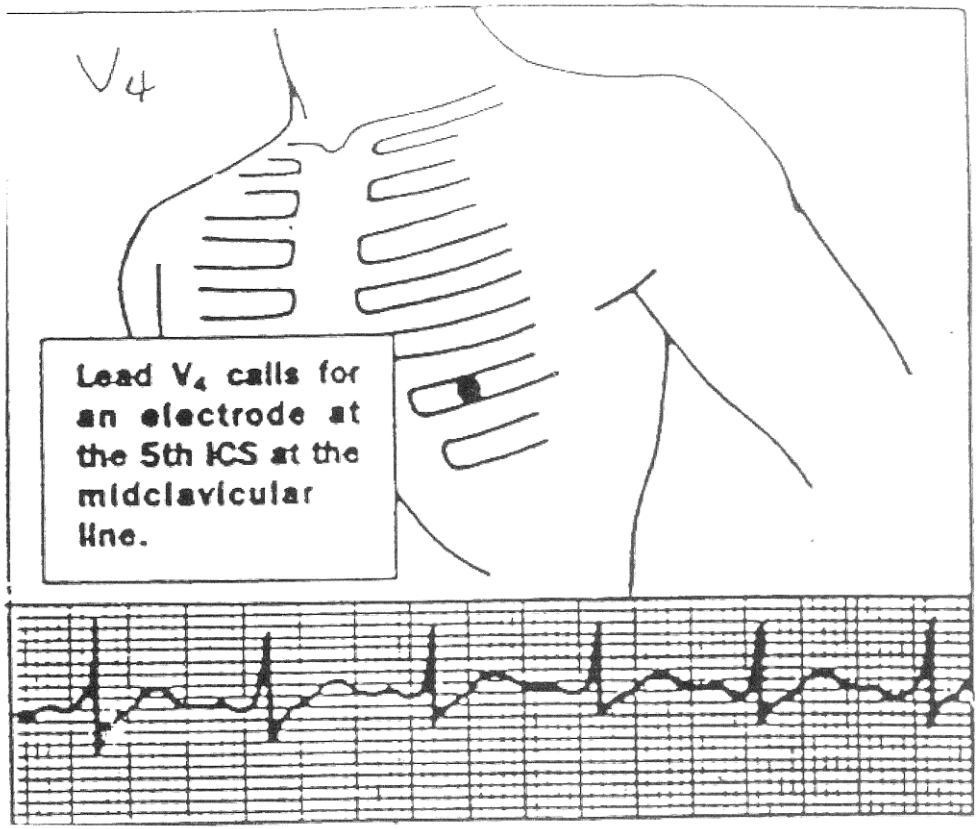

aVL
Lead aVL measures current flow between the center of the heart and a positive electrode on the left arm.

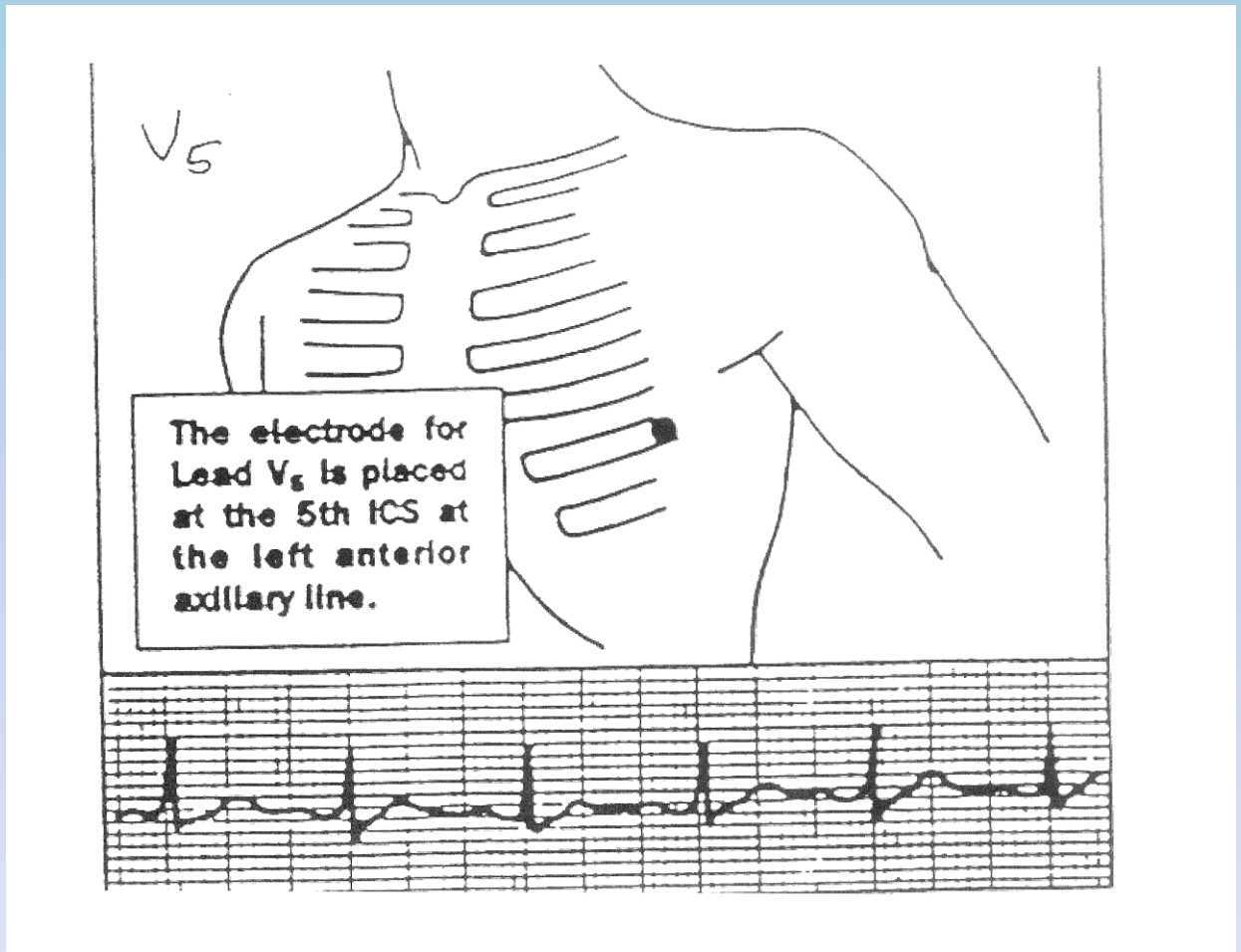

aVF
Lead aVF reflects activity between the heart's center and a positive electrode placed on the left leg.

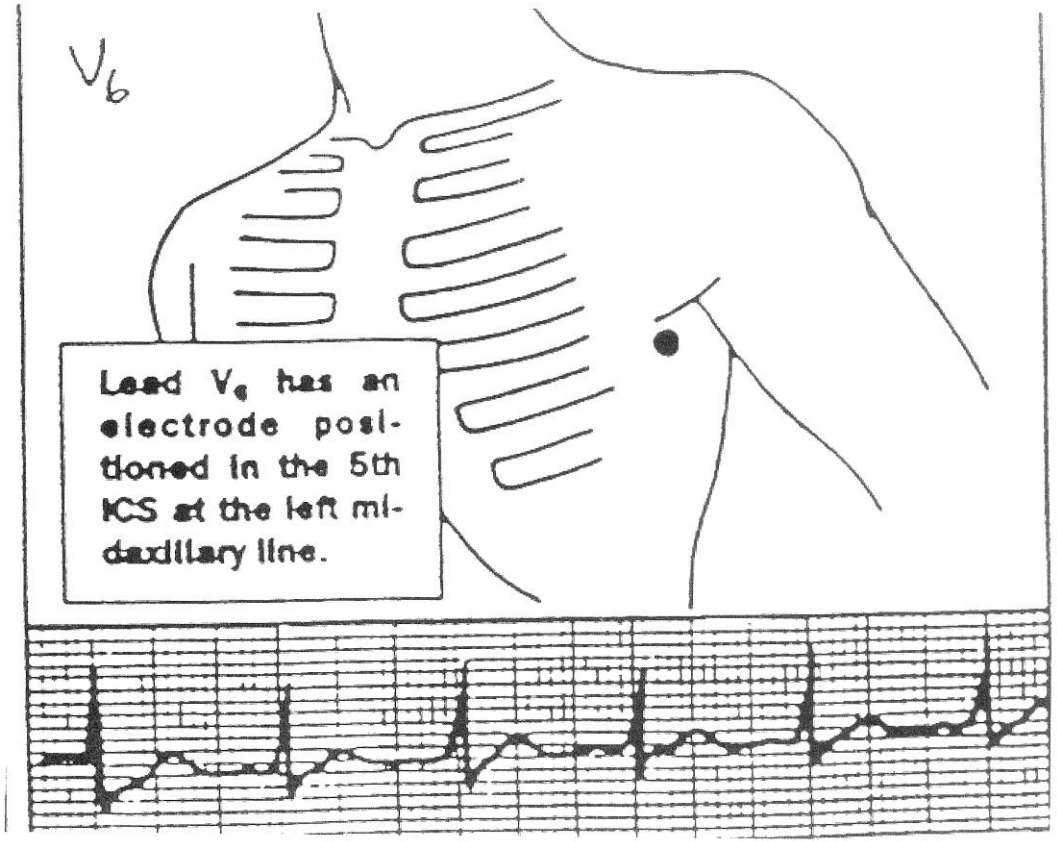

V1
Lead V1 records activity between the center of the heart and a positive electrode located at the 4th intercostal space at the right sternal border.


V2
The electrode for V2 is placed at the 4th intercostal space (ICS) at the left sternal border.

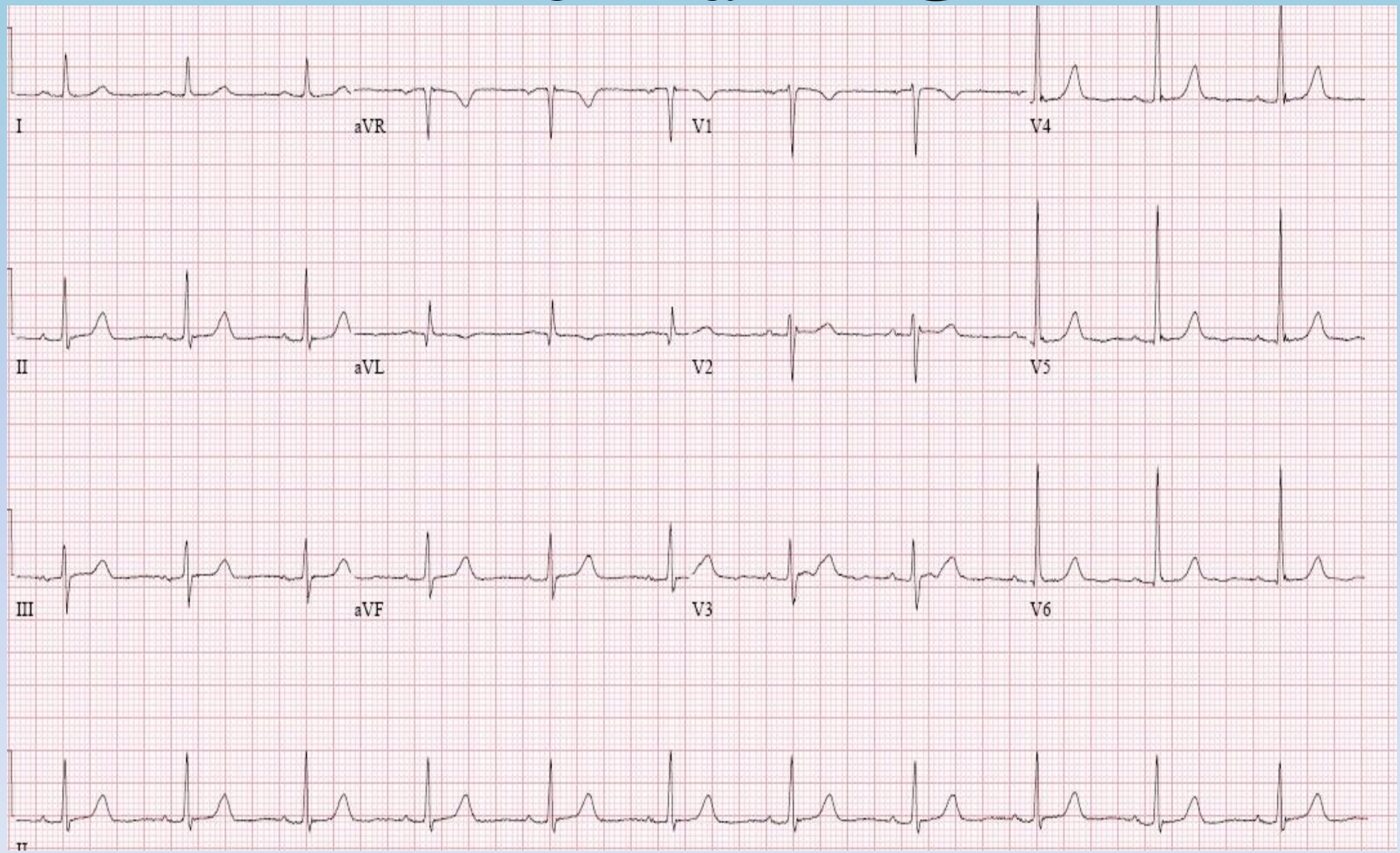

V3
The electrode for V3 lies midway between the 4th and 5th intercostal spaces on the left side.

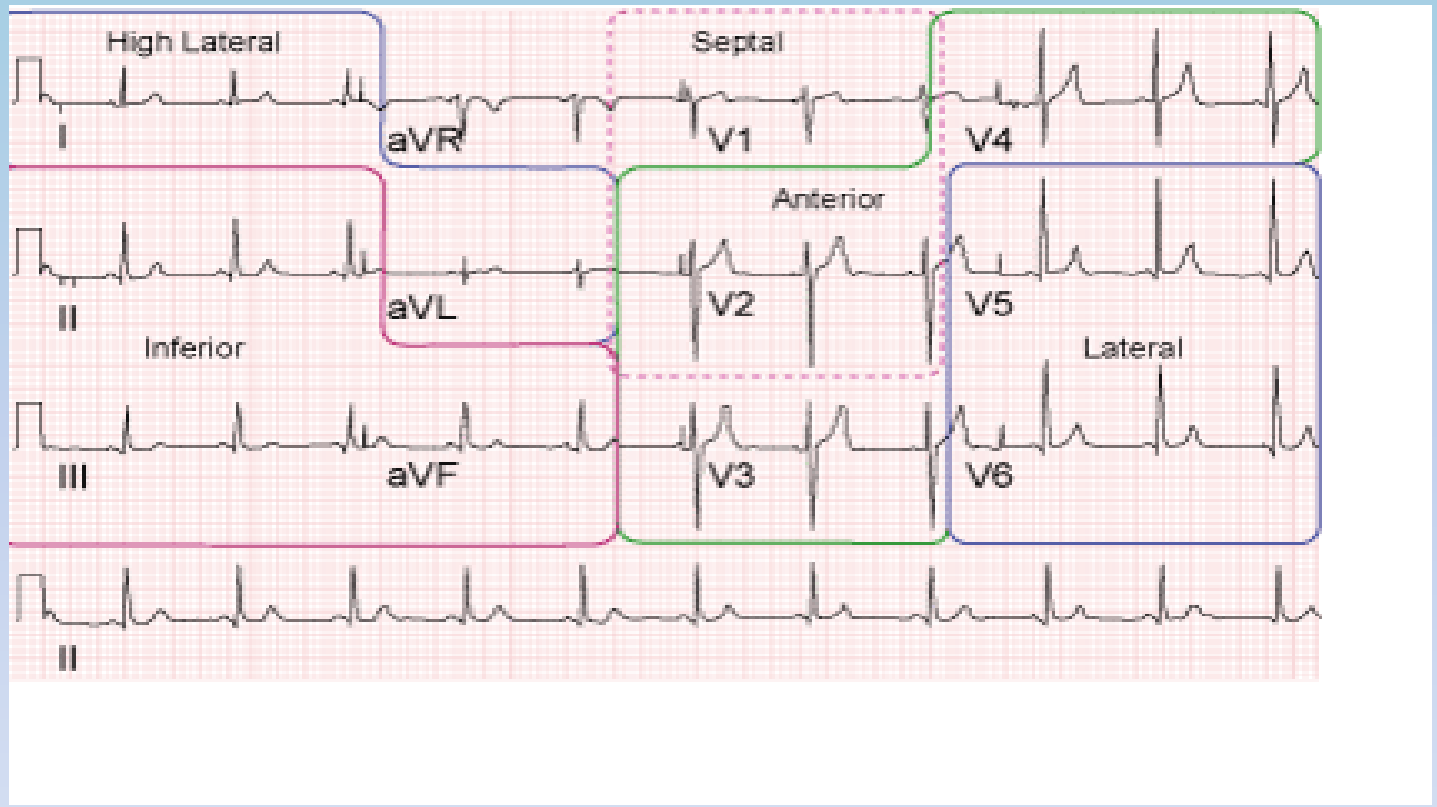

V4
Lead V4 calls for an electrode at the 5th ICS at the midclavicular line.

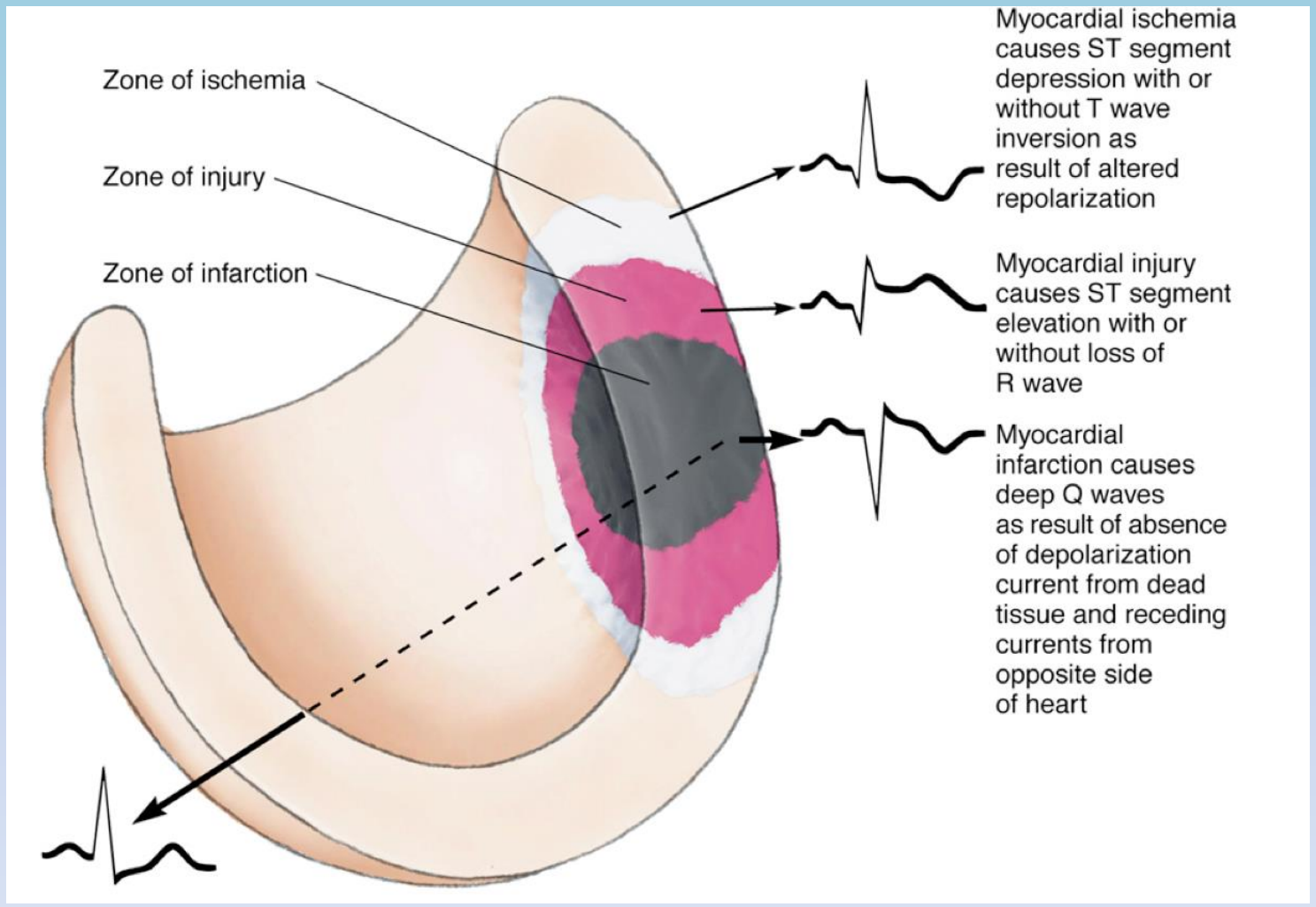

V5
The electrode for Lead V5 is placed at the 5th ICS at the left anterior axillary line.

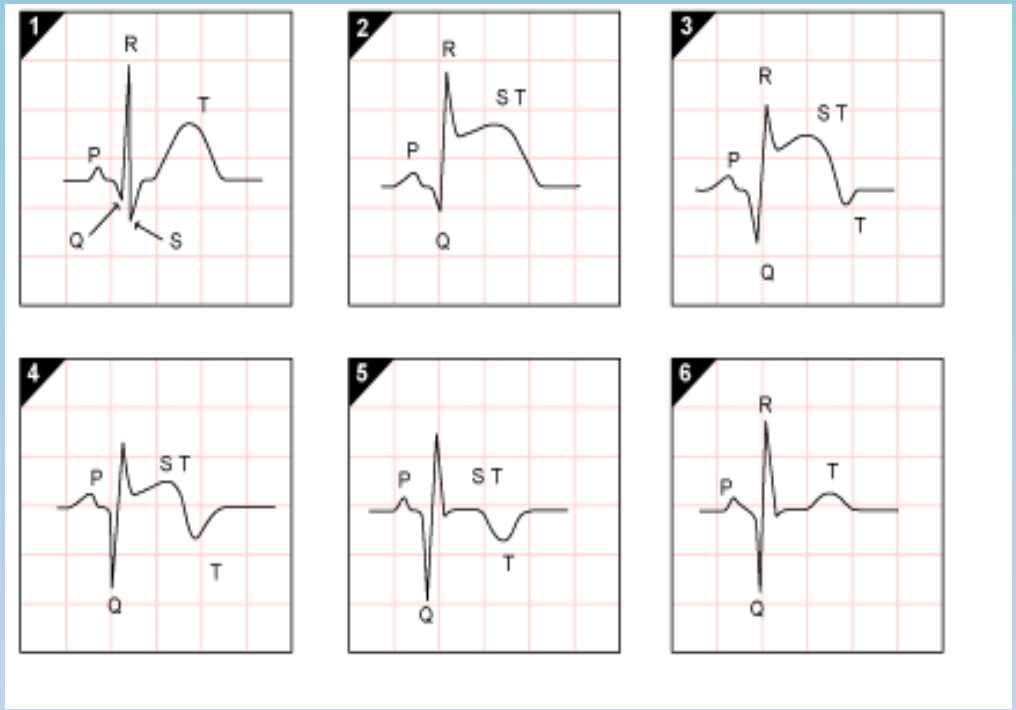

V6
Lead V6 has an electrode positioned in the 5th ICS at the left midaxillary line.

Normal EKG




High Lateral
Septal
I
aVR
V1
V4
Anterior
II
aVL
V2
V5
Inferior
Lateral
III
aVF
V3
V6
II


Zone of ischemia
Zone of injury
Zone of infarction
Myocardial ischemia causes ST segment depression with or without T wave inversion as result of altered repolarization
Myocardial injury causes ST segment elevation with or without loss of R wave
Myocardial infarction causes deep Q waves as result of absence of depolarization current from dead tissue and receding currents from opposite side of heart

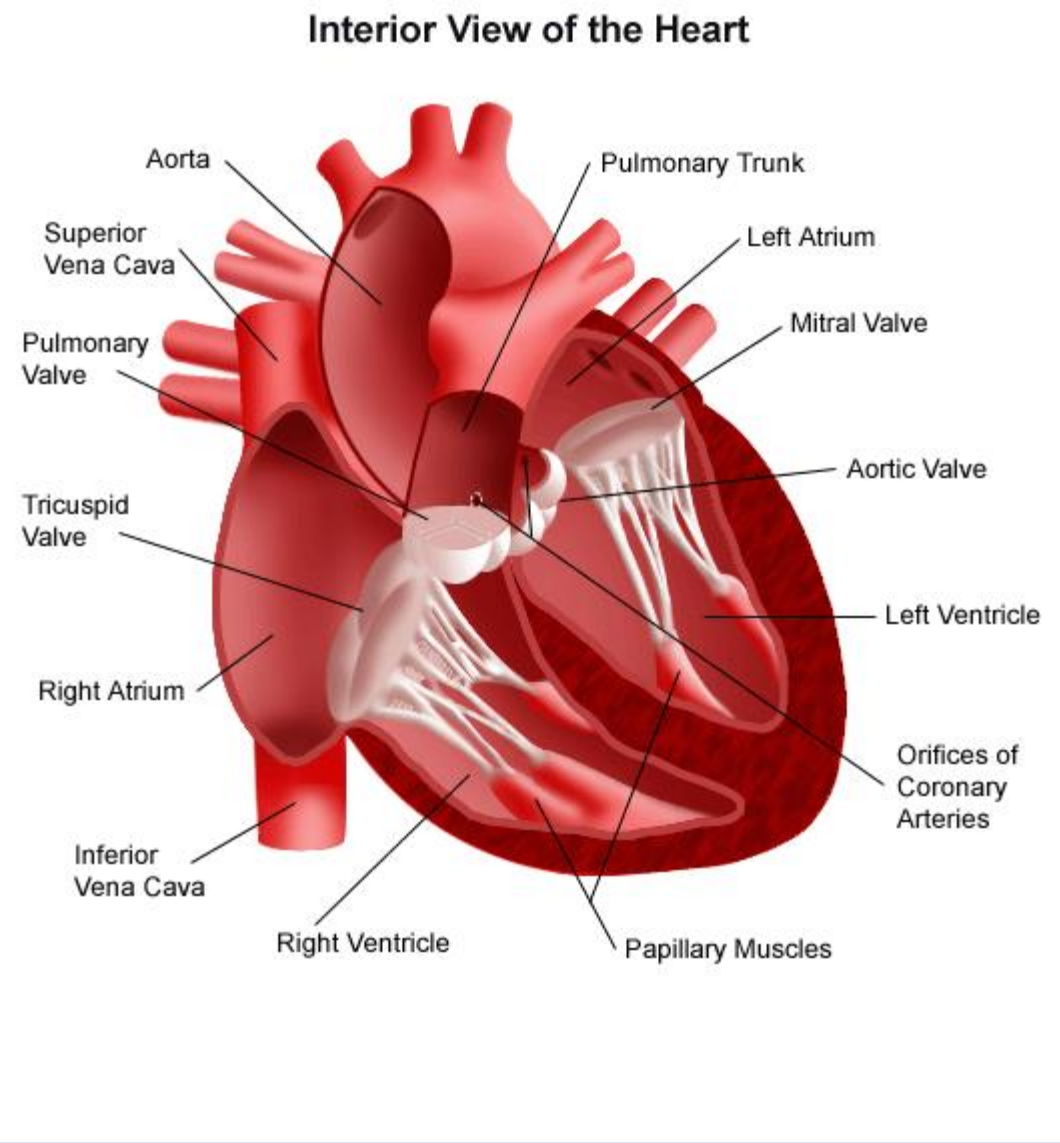


1.Baseline 2. Hours following obstruction 3. Hours to days

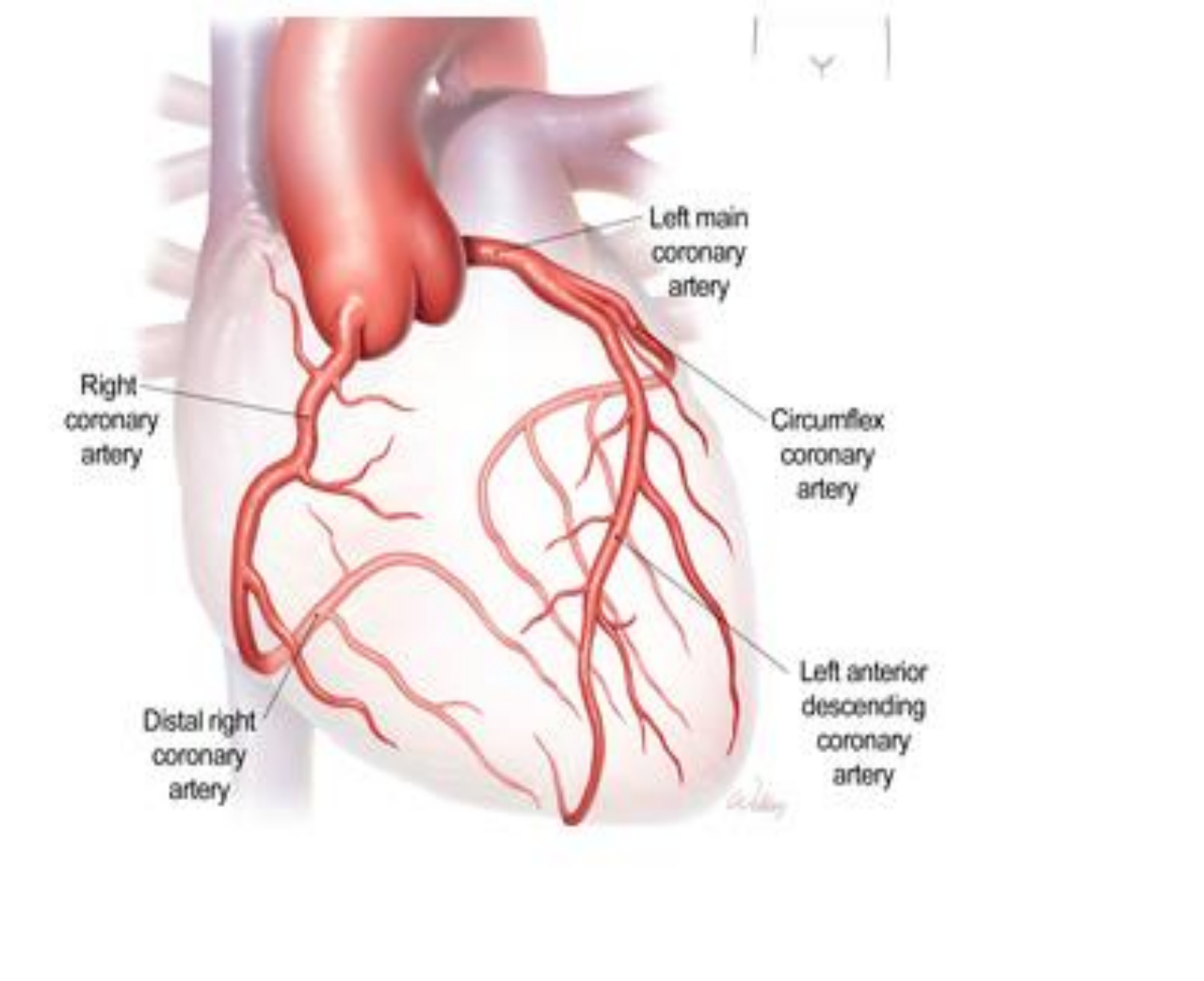
4. Days 5.Days to weeks 6. Weeks to months

EVOLUTIONARY CHANGES FOLLOWING BLOOD FLOW OBSTRUCTION

Cardiac cycle



Coronary Arteries



Right Coronary Artery RCA

Supplies blood to:

- Inferior wall of the left ventricle
- Right ventricle
- Posterior left ventricle in 80-90% of people
- AV node in 90% of people
- SA node in 55% of people
- 1/3 of ventricular septum

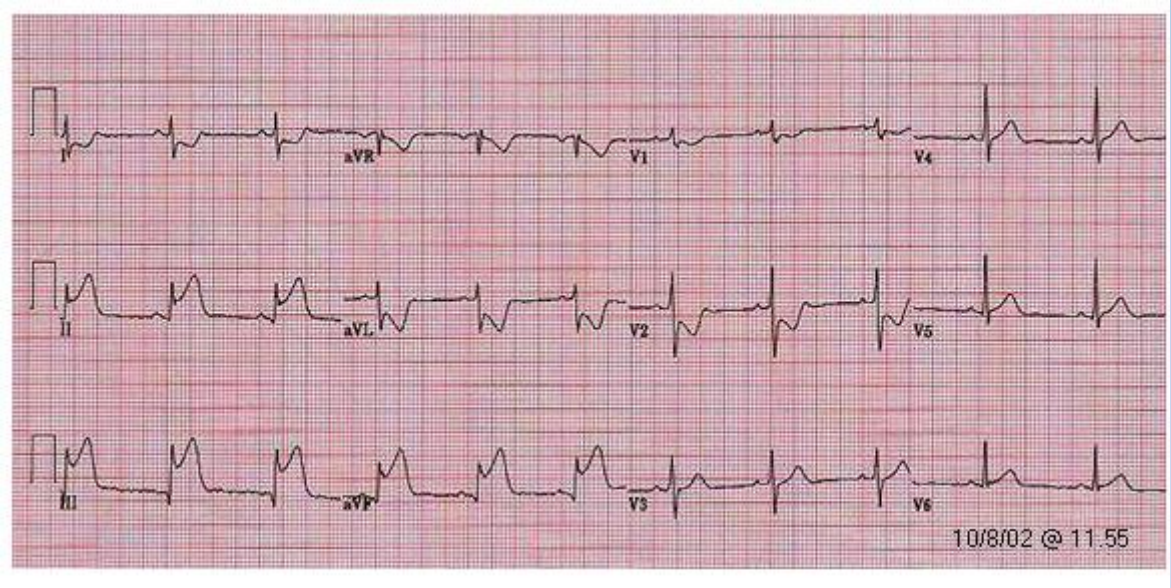
Complications anticipated with inferior MI

- Heart block—usually transient
- Bradycardias
- Hypotension and right heart failure if RV involvement

EKG changes seen:

- Inferior MI—Leads II, III, AVF
- Posterior MI—Opposite V2, V3
- Right ventricle– Right-sided chest leads

Inferior MI EKG changes



Reciprocal Changes

- Seen as ST depression in leads opposite an infarct

- Inferior MI—reciprocal changes anteriorly or laterally
- Anterior MI—reciprocal changes inferiorly

- ST elevation is always your first priority
- Don’t let reciprocal changes throw you off your initial assessment

Left Anterior Descending LAD

Supplies blood to:

- Anterior wall of the left ventricle
- Right and left bundle branches
- Apex
- 2/3 of the ventricular septum

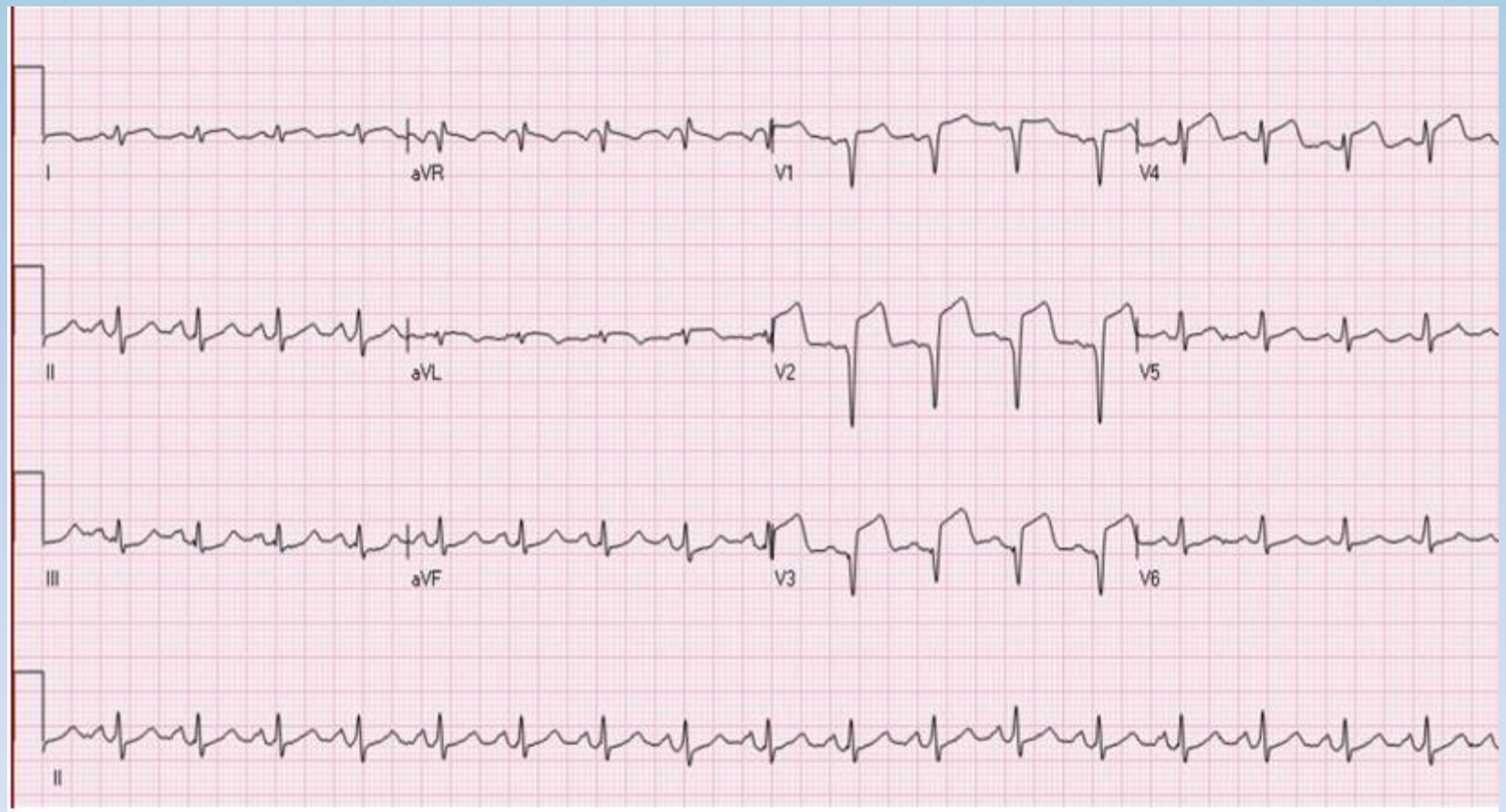
Complications anticipated with anterior MI

- Left heart failure
- Ventricular arrhythmias
- New bundle branch blocks
- Heart blocks—usually permanent
- Aneurysm
- Ventricular septal defects

EKG changes seen in:

Anterior MI, leads V1-V4

Anterior MI



Circumflex

Supplies blood to:

- Lateral wall of left ventricle
- Left atrium
- Posterior left ventricle in 10-20% of people

Complications anticipated with lateral MI:

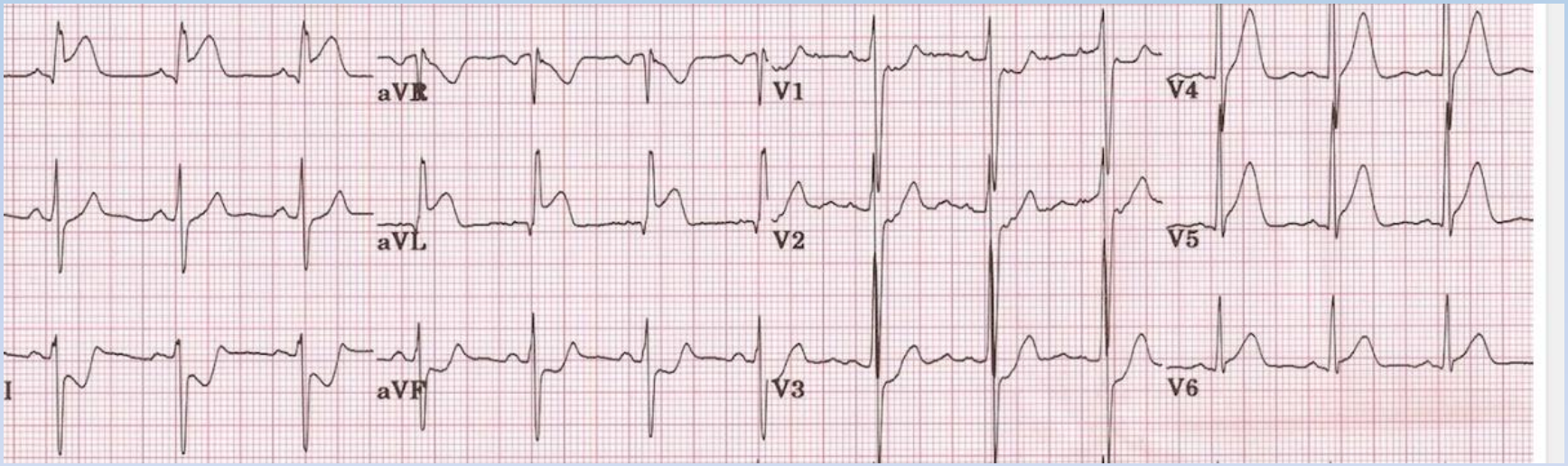
None if seen alone

Most often seen with anterior or inferior MI's

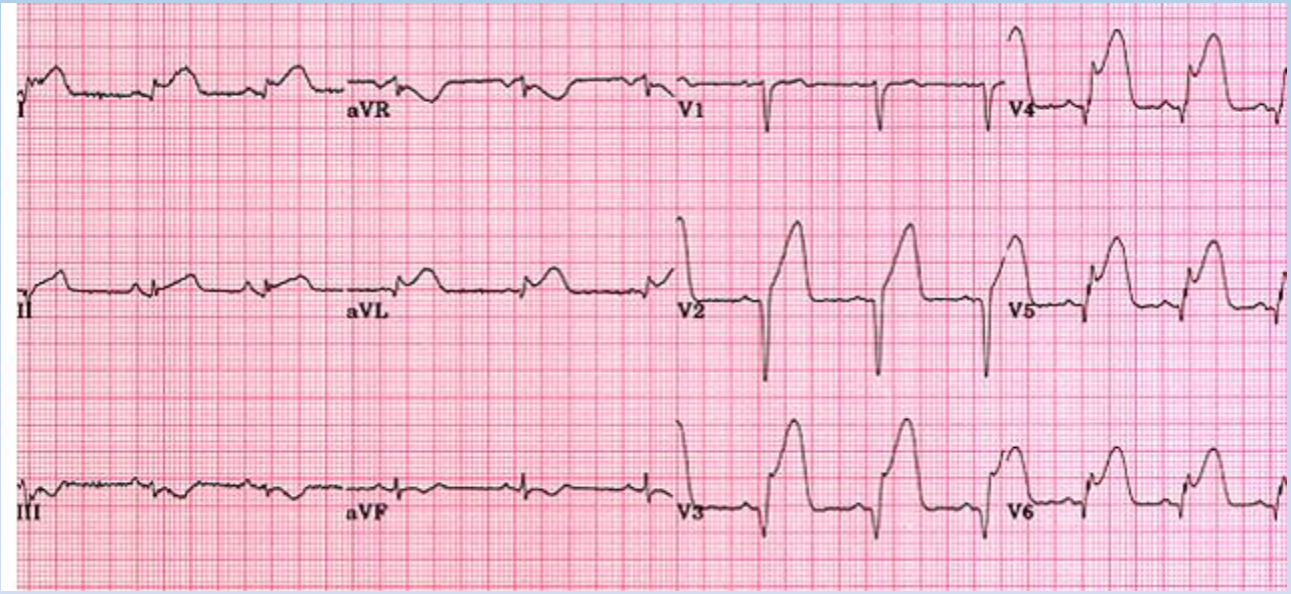
EKG changes seen in Lateral MI

I, AVL, V5, V6

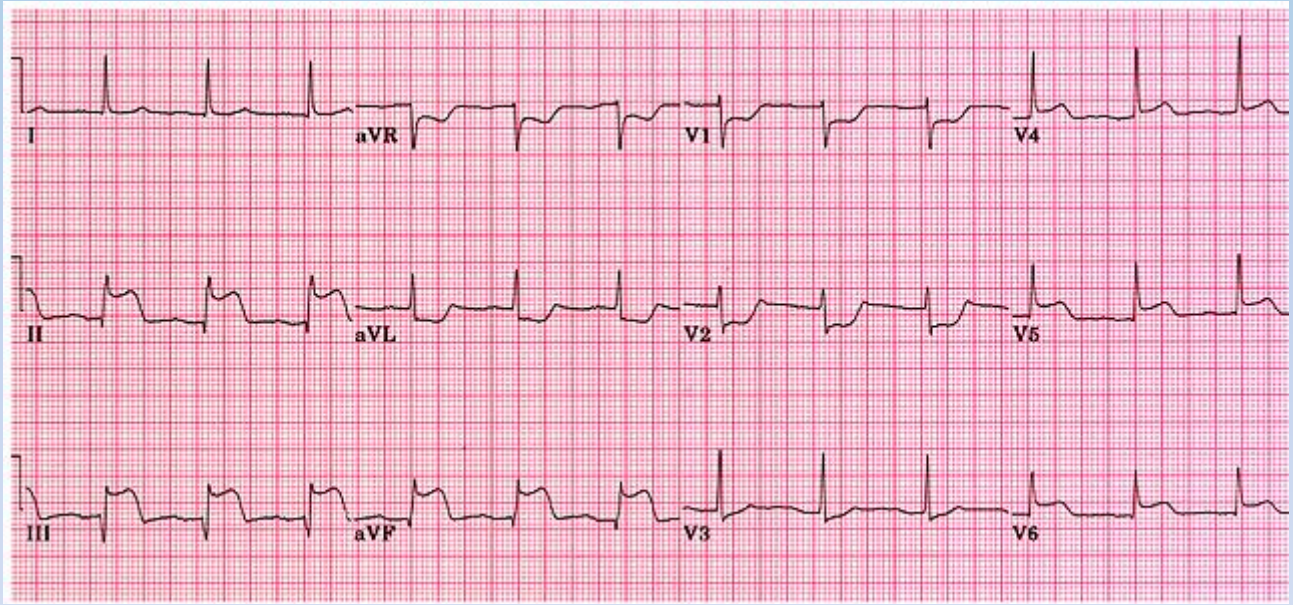
Lateral MI



Anterior-lateral MI



Inferior-Lateral MI



STEMI

- Diagnosis of MI is made
- Labs sent
- 2 large bore IV's
- Crash cart near and ready to go
- Screening completed
- Patient education
- pCXR

TNK for STEMI

Patient Name_____ Date of Birth_____

ABSOLUTE CONTRAINDICATIONS

Yes	No	
		History of ICH
		Known structural cerebral casculat lesion (AVM)
		Known intracranial neoplasm
		Ischemic stroke within 3 months (except within 3 hours)
		Suspected aortic dissection
		Active bleeding diathesis (excluding menses)
		Significant closed head injury for trauma within 3 months

RELATIVE CONTRAINDICATION

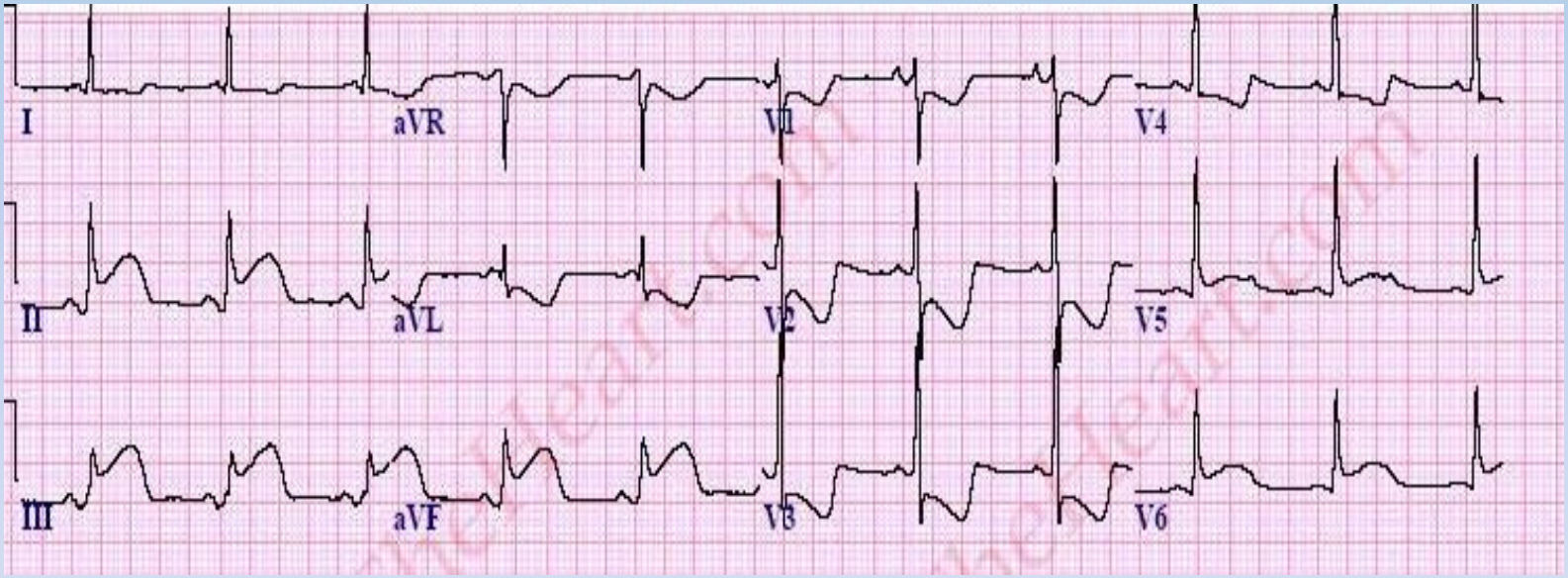
Yes	No	
		History of severe, uncontrolled hypertension
		SBP > 180 mmHg or DBP > 100 mmHg on presentation
		Traumatic or prolonged CPR
		Major surgery within 3 weeks
		Recent internal bleeding within 2-4 weeks
		Noncompressible vascular punctures
		Pregnancy
		Active peptic ulcer
		Concurrent use of anticoagulants

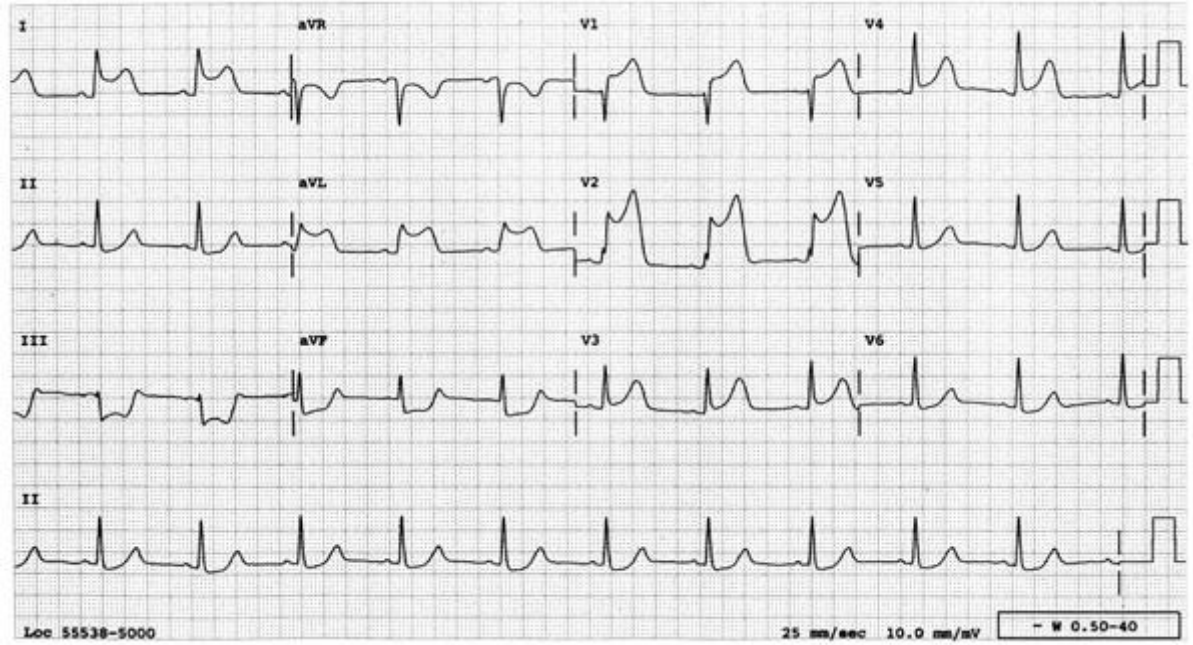
DOSING

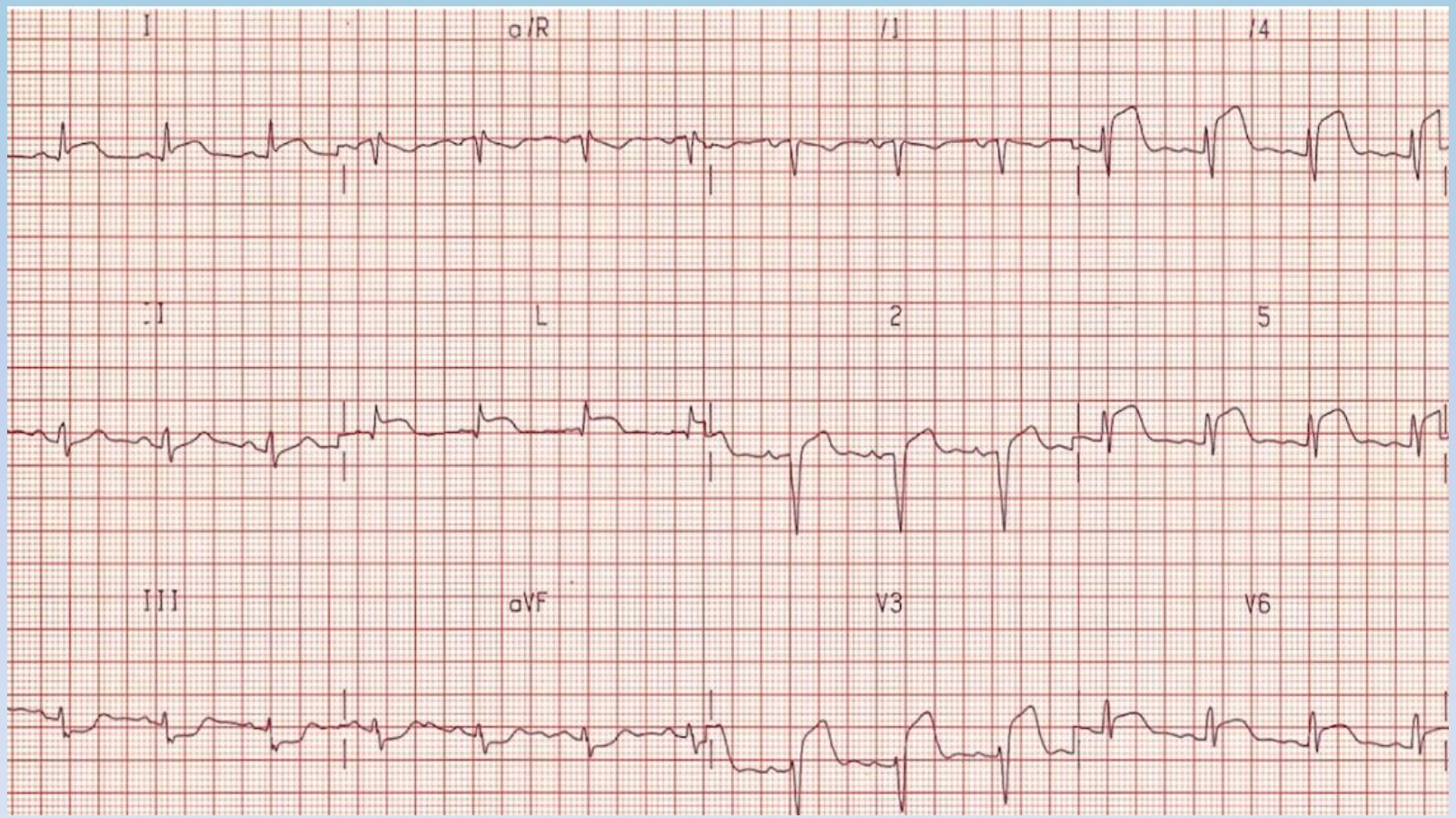
Yes	No	
		< 60 kg = 30 mg
		60-69 kg = 35 mg
		70-79 kg = 40 mg
		80-89 kg = 45 mg
		Greater than or equal to 90 kg = 50 mg

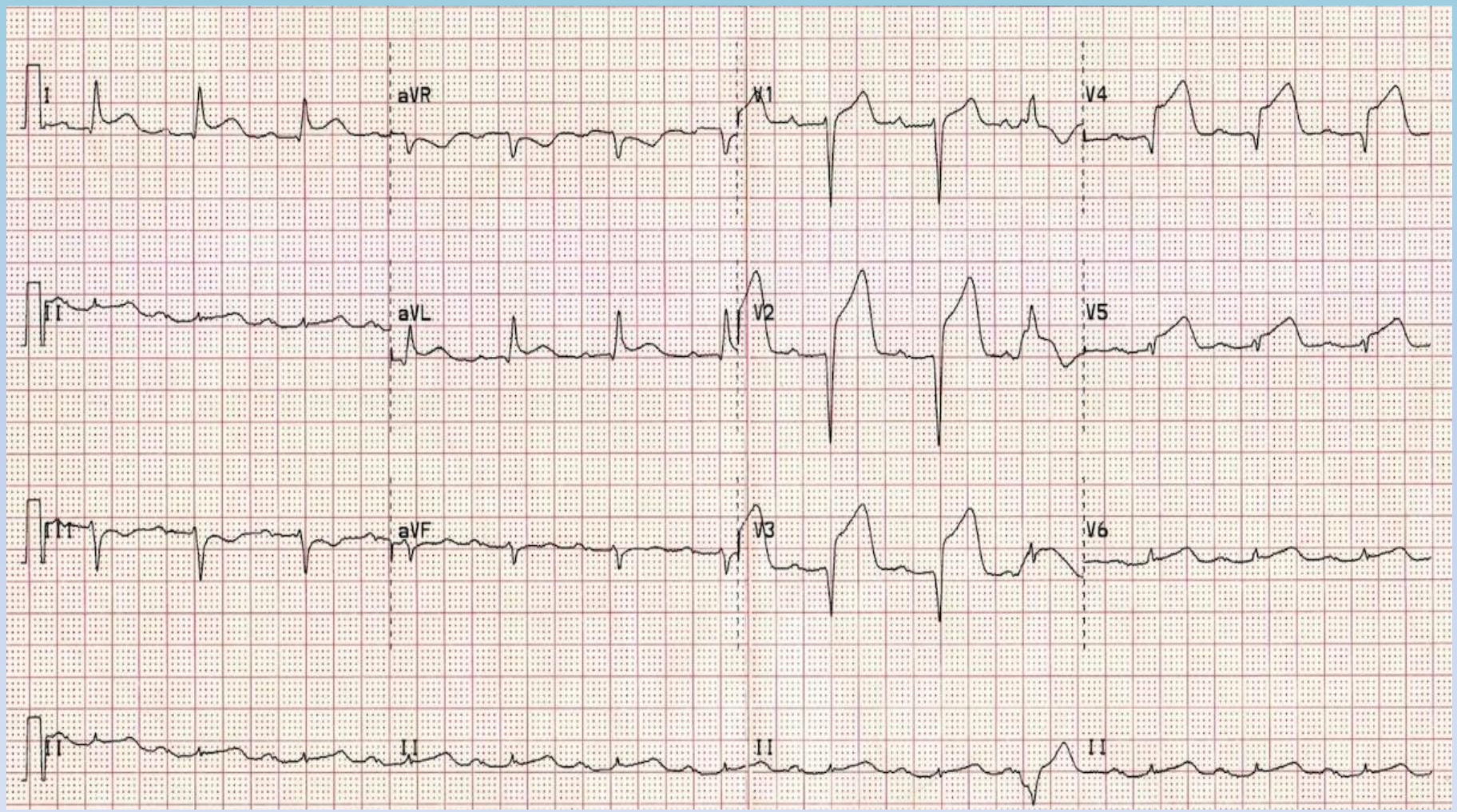
Tenecteplase for you Ticker

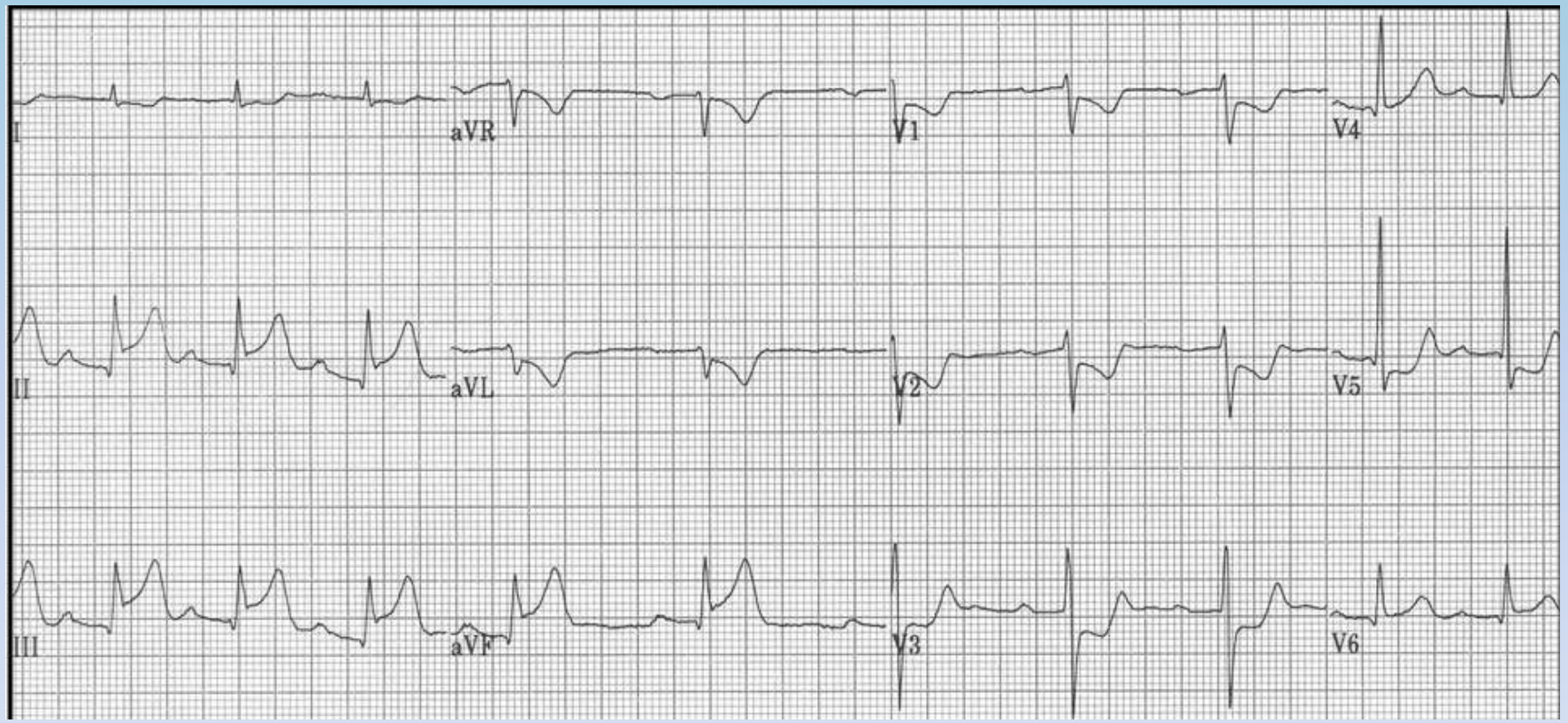
- Prepare for admission or transport
- Anticipate complications!!
- Reassess frequently

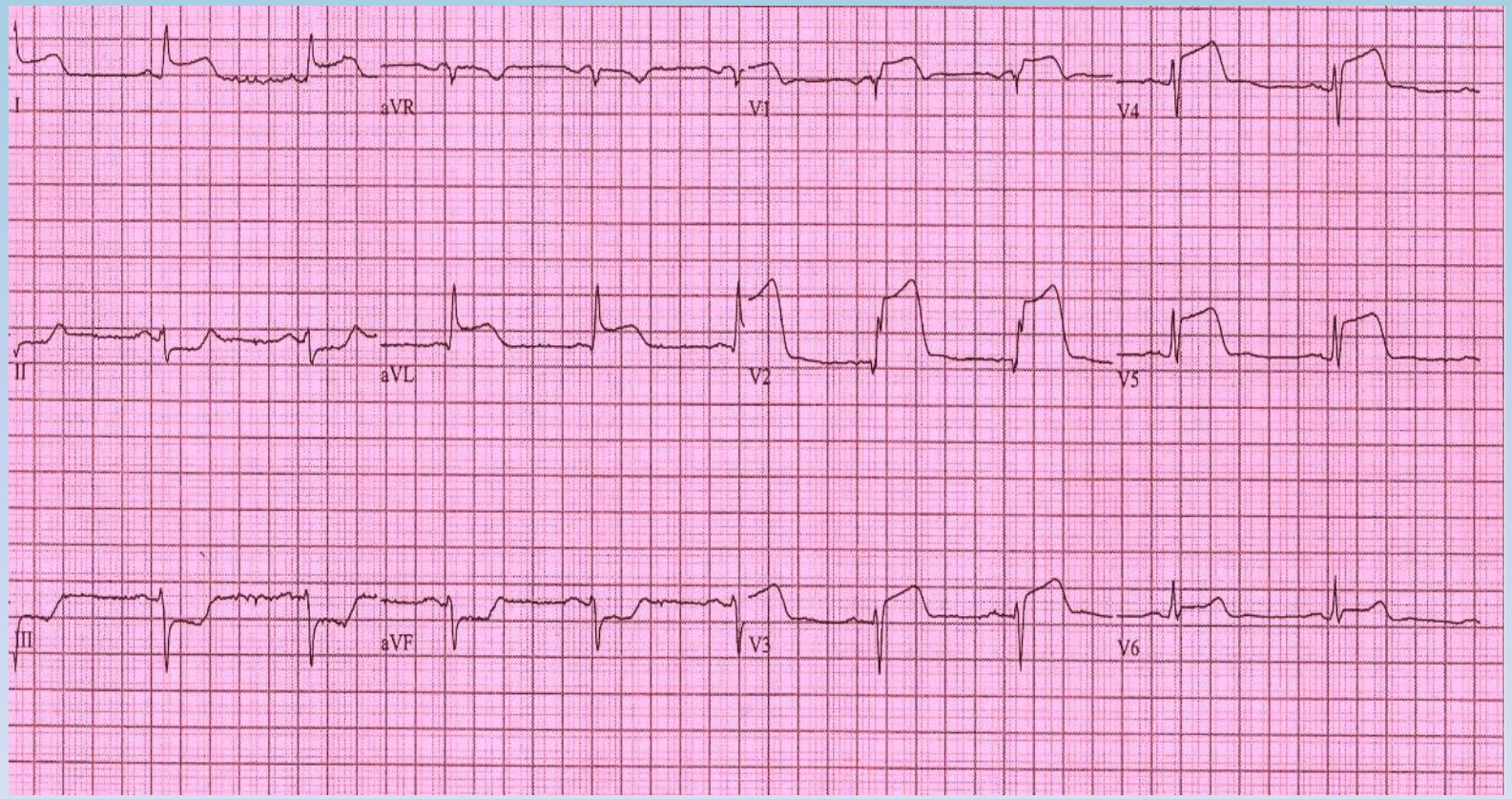

I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6

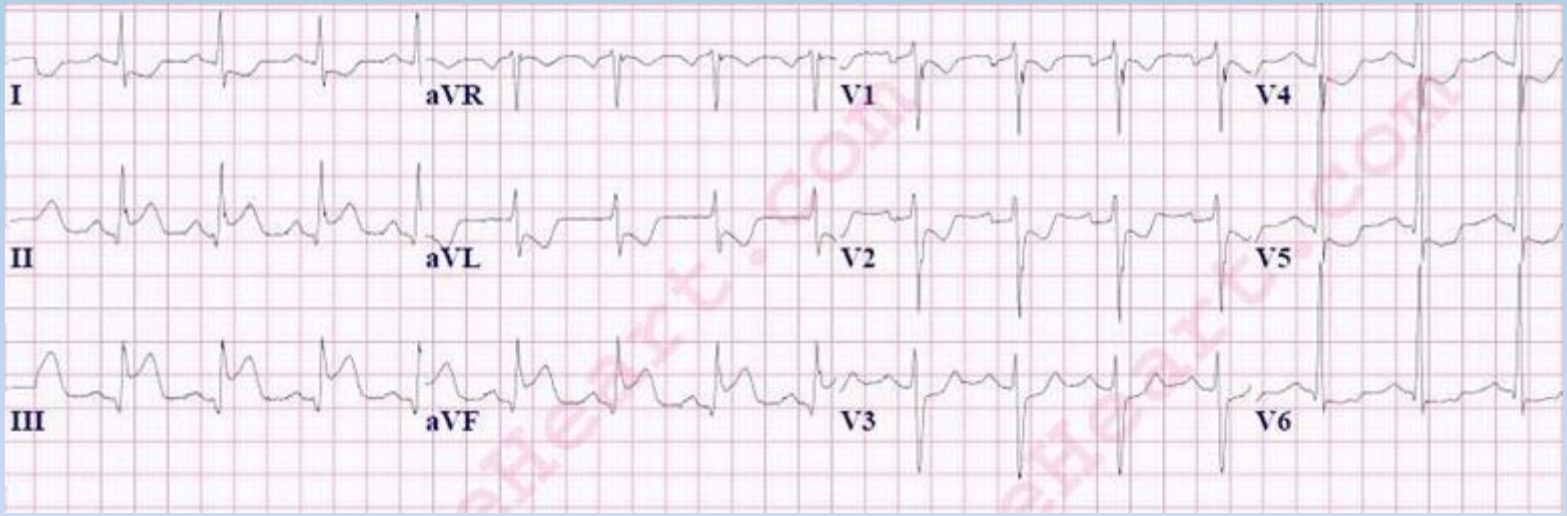

I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II
Loc 55538-5000
25 mm/sec 10.0 mm/mV
~ W 0.50-40

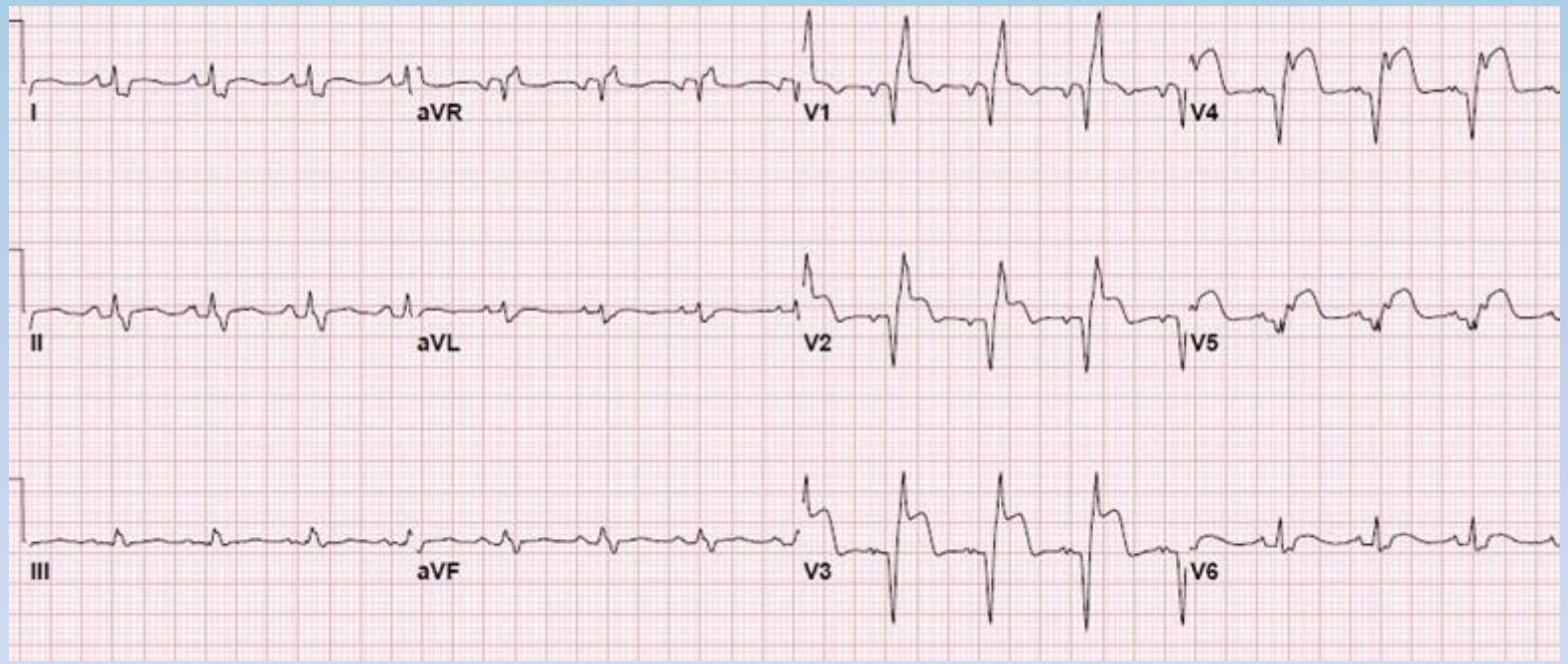

I
aVR
V1
V4
II
L
2
5
III
aVF
V3
V6


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

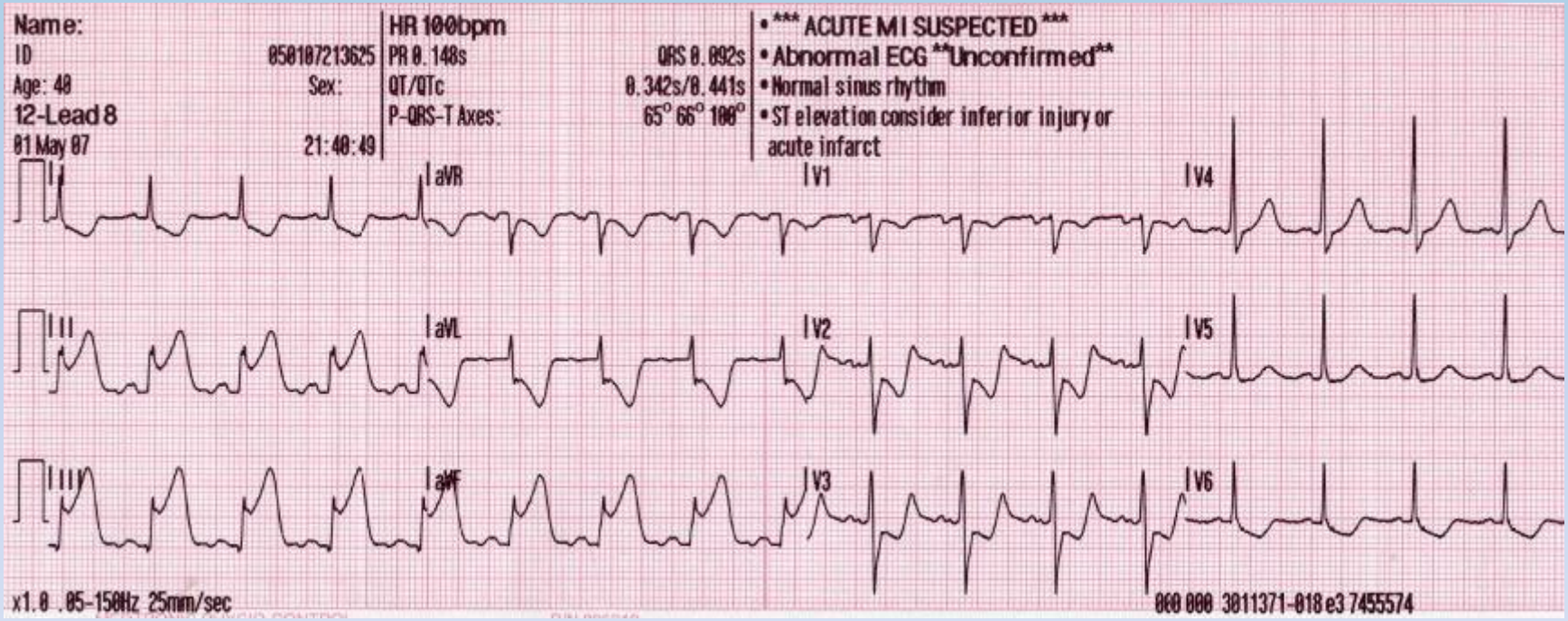

I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6


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


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

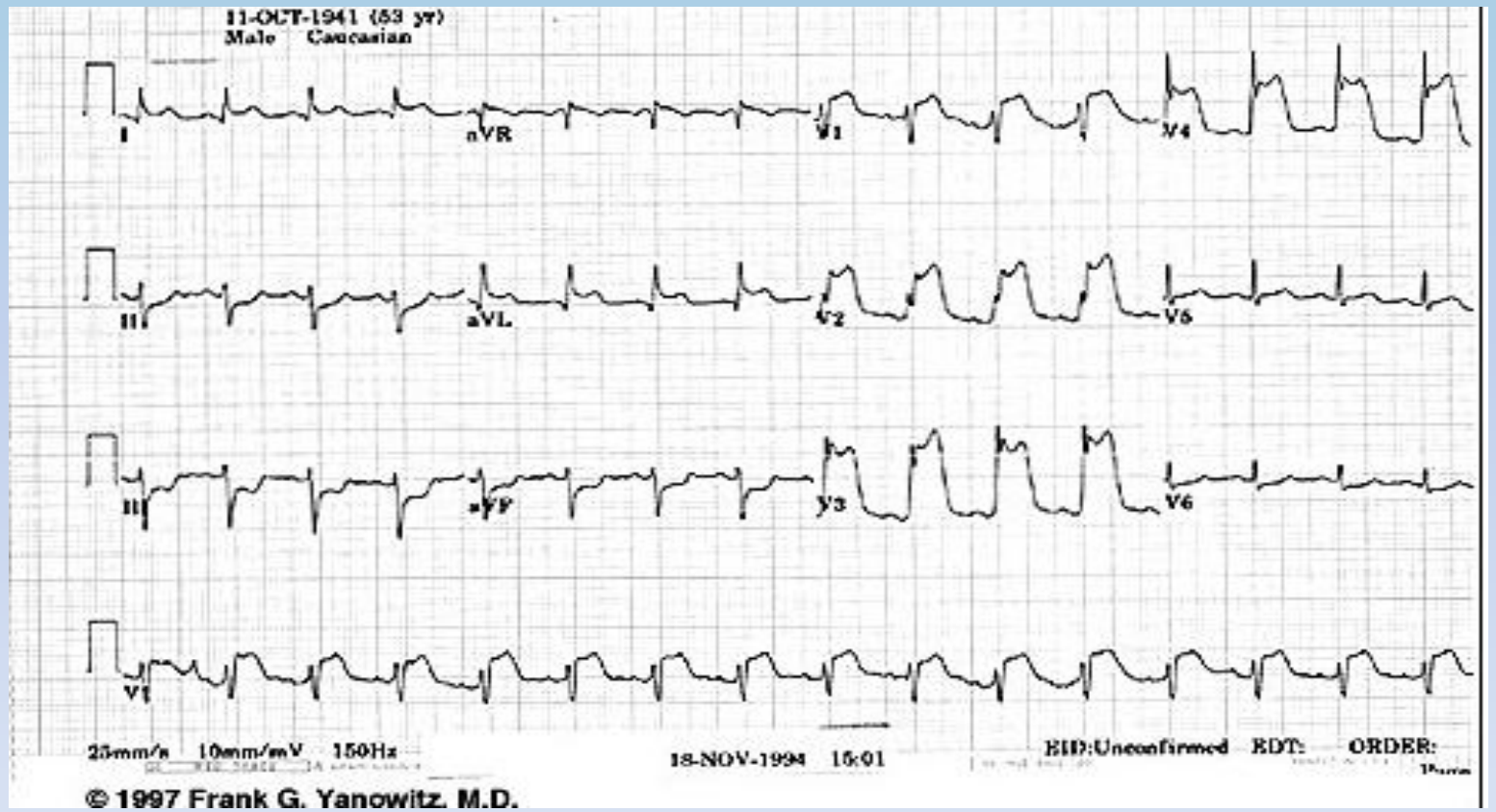

I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6

- 52 y/o male arrives to the waiting room w c/o left chest pain, radiates to left arm, vomited x 1. Walks in but then falls to his knees. Placed in wc, back to room. Pale diaphoretic. BP 140/90, HR 54. EKG completed, ASA given.
- IV started, SL NTG given, bp 82/42, hr 44


Name:
ID 050107213625
Age: 48 Sex:
12-Lead 8
01 May 07 21:48:49
HR 100bpm
PR 0.148s QRS 0.092s
QT/QTc 0.342s/0.441s
P-QRS-T Axes: 65° 66° 100°
• *** ACUTE MI SUSPECTED ***
• Abnormal ECG **Unconfirmed**
• Normal sinus rhythm
• ST elevation consider inferior injury or acute infarct
I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
x1.0 .05-150Hz 25mm/sec
000 000 3011371-018 e3 7455574

- What type of MI is the patient having?
- The physician orders IV lopressor, IV NTG and Morphine 4mg IV. Which of these therapies would you institute first?
- What symptoms do you anticipate?

- 62 y/o female arrives per POV to local hospital. Started having vague bilateral arm pain today, feeling SOB, you hear crackles and note NVD. BP 180/106, HR 110 rr 30, Sat 91%
- You obtain IV access and an EKG and see this….


11-OCT-1941 (53 yr)
Male Caucasian
I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
V1
25mm/s 10mm/mV 150Hz
18-NOV-1994 15:01
BID:Unconfirmed EDT: ORDER:
© 1997 Frank G. Yanowitz, M.D.

- What type of MI is this patient having?
- What symptoms do you anticipate the pt having?
- What drugs would you plan on needing?

Post test

- 1. What leads on the EKG indicate are used to diagnose Inferior MI?
- A. I, AVL, V5, V6
- B. II, III, AVF
- C. V1-V4
- D. II, III, AVR

- Which patient would you anticipate needing large amounts of fluid?
- A. Anterior MI
- B. Lateral MI
- C. Inferior MI
- D. Anterior/Lateral MI

- The following preload reducers may help a patient in CHF w anterior MI.
- A. NTG, morphine
- B. Morphine, heparin
- C. NTG, dopamine
- D. ASA, morphine