# EMC 451

## Advanced ECG Interpretation

Unit 10: Recognizing Myocardial Infarction

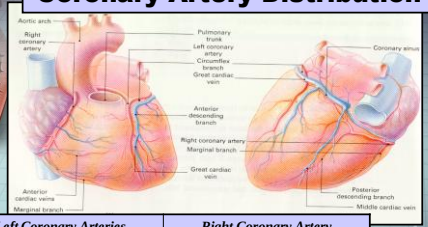


## Unit Objectives

- Upon completion of this unit, you should be able to:
  - Describe the "views" of the heart and the leads that provide that view.
  - Describe the coronary artery anatomy.
  - List the EKG criteria for suspected MI.
  - Describe the evolution of MI and the associated EKG changes.
  - Define reciprocal changes.
  - List the conditions that may mimic MI on the 12 lead EKG.
  - Using the 12 lead EKG, identify and localize myocardial infarction.



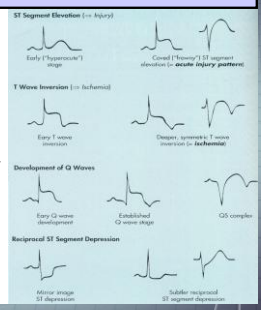
## Coronary Artery Distribution




| *Left Coronary Arteries* | *Right Coronary Artery* |
|---|---|
| Anterior wall of left ventricle | Lateral wall of right ventricle |
| Posterior wall of left ventricle | A portion of the electrical conduction system |
| Lateral wall of left ventricle | Posterior wall of left ventricle |
| Left interventricular septum | Inferior wall of left ventricle |

## EKG Evolution of MI

- Hyperacute phase may precede clinical symptoms. Normal height 5 mm in limb leads and 10 mm in chest leads.
- ST segment elevation indicates injury is *presently* occurring.
- Pathologic Q wave is .04 seconds and/or > 25% height of the R wave, and indicates necrosis. May be reversible if treated promptly and Q waves disappears. Once formed, however, they may never disappear.



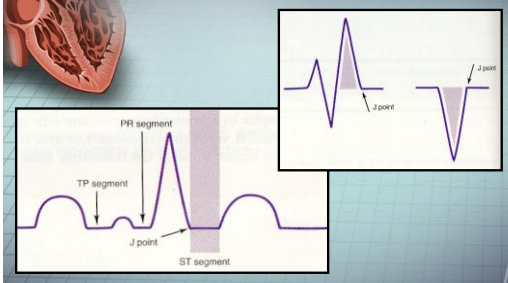



## EKG Criteria for MI

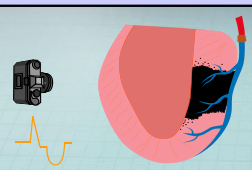
- ST segment elevation in 2 or more anatomically contiguous leads
  - elevation of 2 mm in V2 and V3 and 1 mm in all other leads (men)
  - greater than or equal to 40 years old)
  - elevation of 2.5 mm in leads V2 and V3 and 1 mm in all other leads (men < 40)
  - elevation 2.5 mm in leads V2 and V3 and 1 mm in all other leads (women)
- Precordial leads are contiguous even if the overlap our divisions of the heart (e.g., $V_2$ and $V_3$ septal and anterior)



## Measuring ST Segment Elevation



## Reciprocal Changes



- When a lead "sees" the infarct directly, the ST segment is elevated.
- When a lead views the infarct from the opposite side, the ST segment may be depressed.
- Not all opposing leads must demonstrate ST depression to be considered reciprocal changes.
- Reciprocal changes not necessary to presume MI, but provide strong confirming evidence when present.

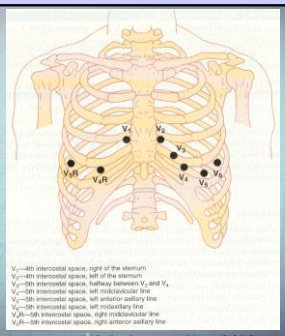


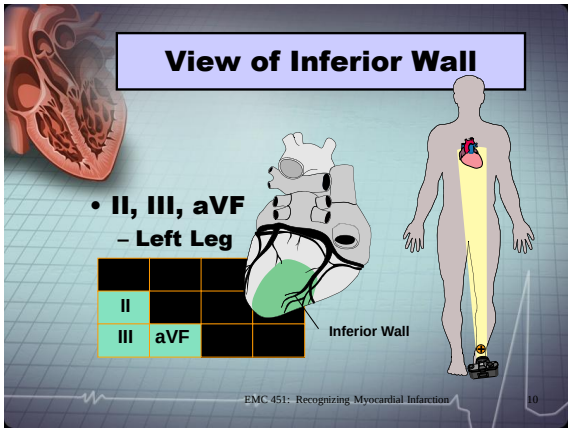
## Conditions that Mimic MI

- LVH
- BBB
- Ventricular beats
- Pericarditis
- Early repolarization
- Usually do not produce reciprocal changes.
- The presence of one of these conditions does not rule out a simultaneous MI.



## Lead Placement and "Views"




View of Inferior Wall
• II, III, aVF
– Left Leg
II
III
aVF
Inferior Wall
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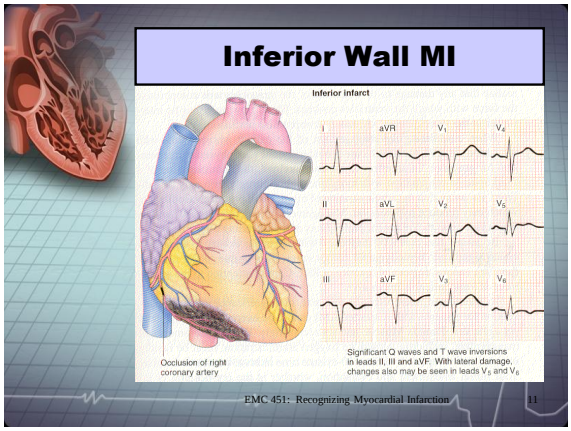
Inferior Wall MI
Inferior infarct
Occlusion of right coronary artery
Significant Q waves and T wave inversions in leads II, III and aVF. With lateral damage, changes also may be seen in leads V5 and V6
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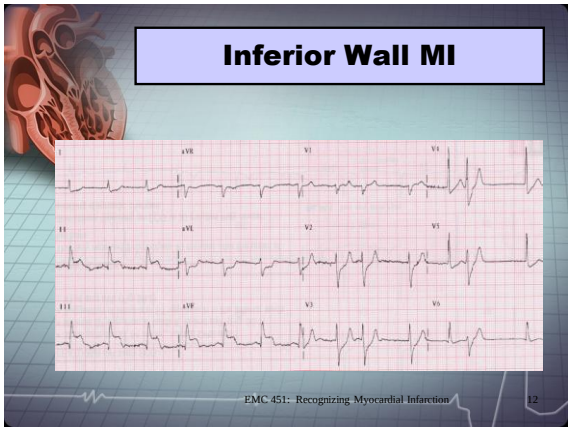
Inferior Wall MI
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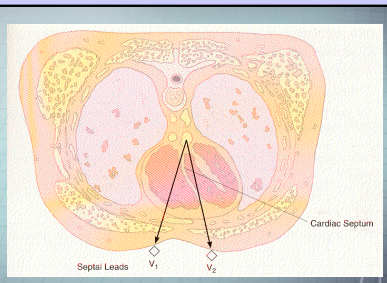
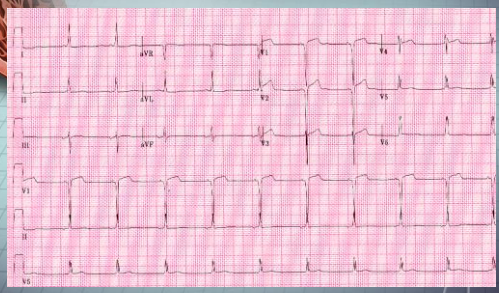
## View of the Septum



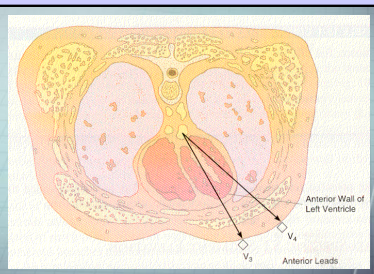



## Septal MI

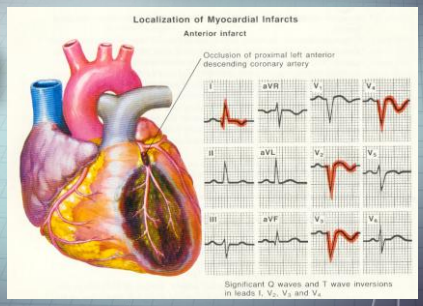




## View of the Anterior Wall

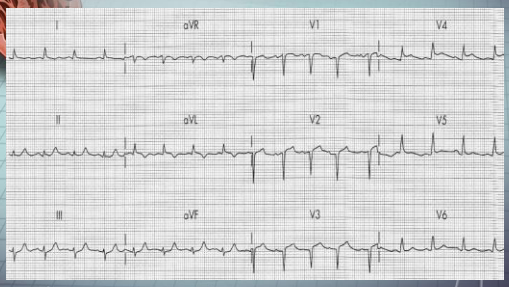


## Anterior Wall MI



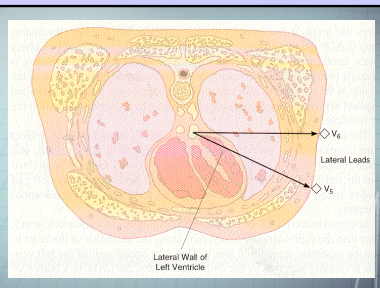



## Anterior Wall MI

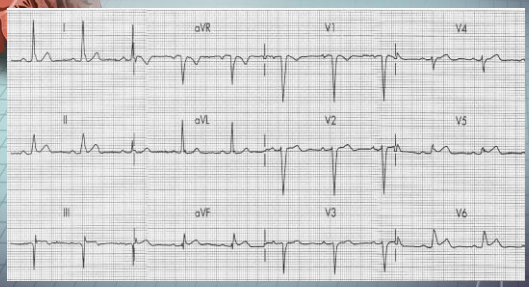





## View of the Lateral Wall

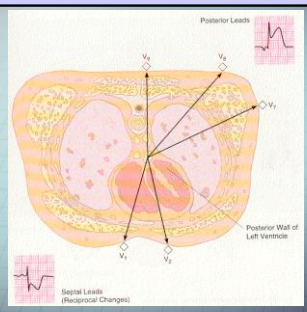


## Lateral MI



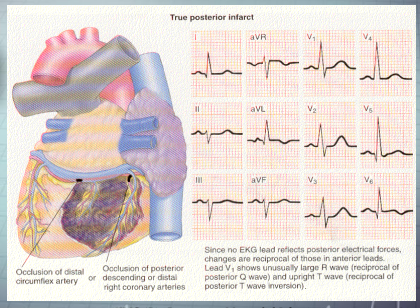



## View of the Posterior Wall

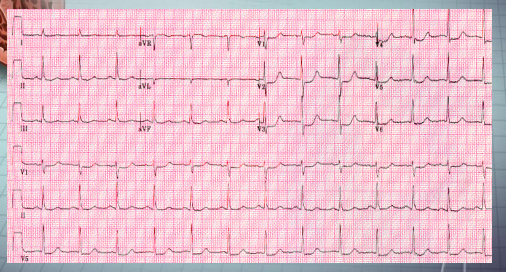





## Posterior Wall MI

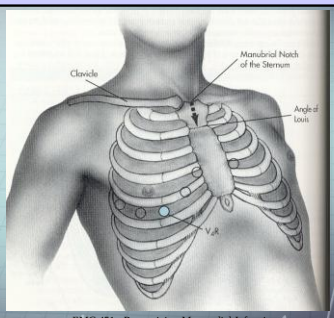


## Posterior MI



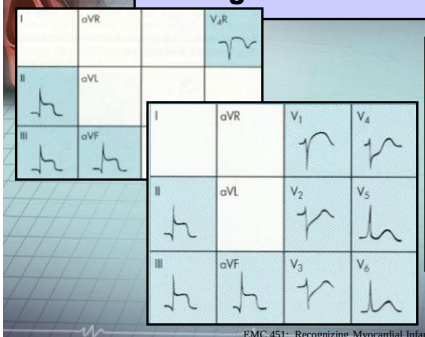


## View of Right Ventricle





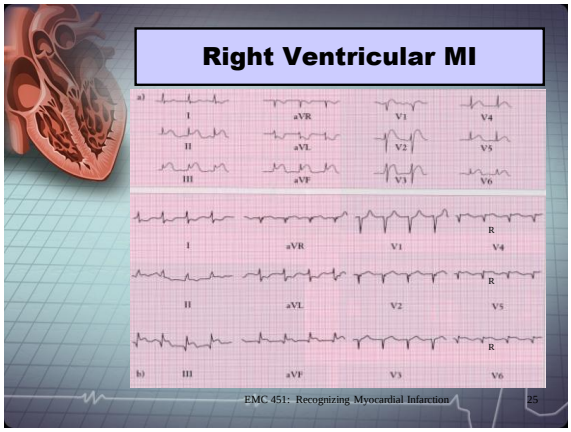

## Right Ventricular MI




ST elevation in V4R

Evidence of inferior MI

ST elevation in V1


Right Ventricular MI
a)
I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
R
I
aVR
V1
V4
R
II
aVL
V2
V5
R
b)
III
aVF
V3
V6
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