Basic Electrocardiography II: CAD and Ischemia

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Slides adapted with permission from those created by:

Naomi Botkin, MD

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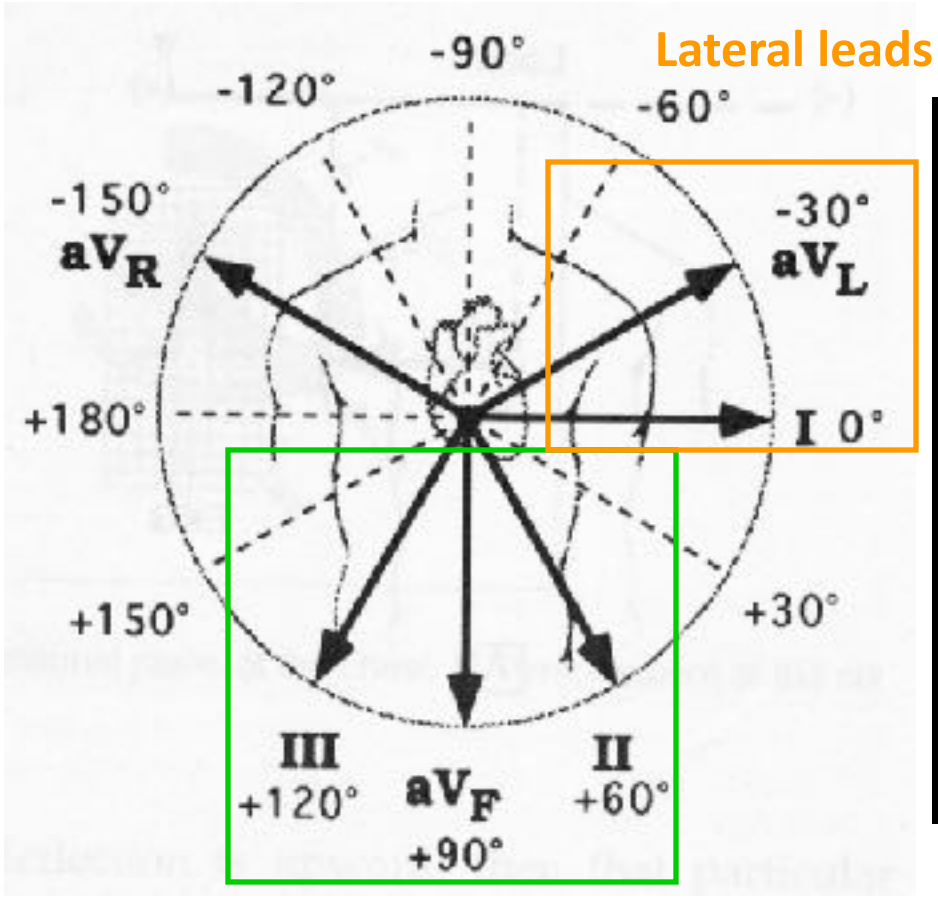
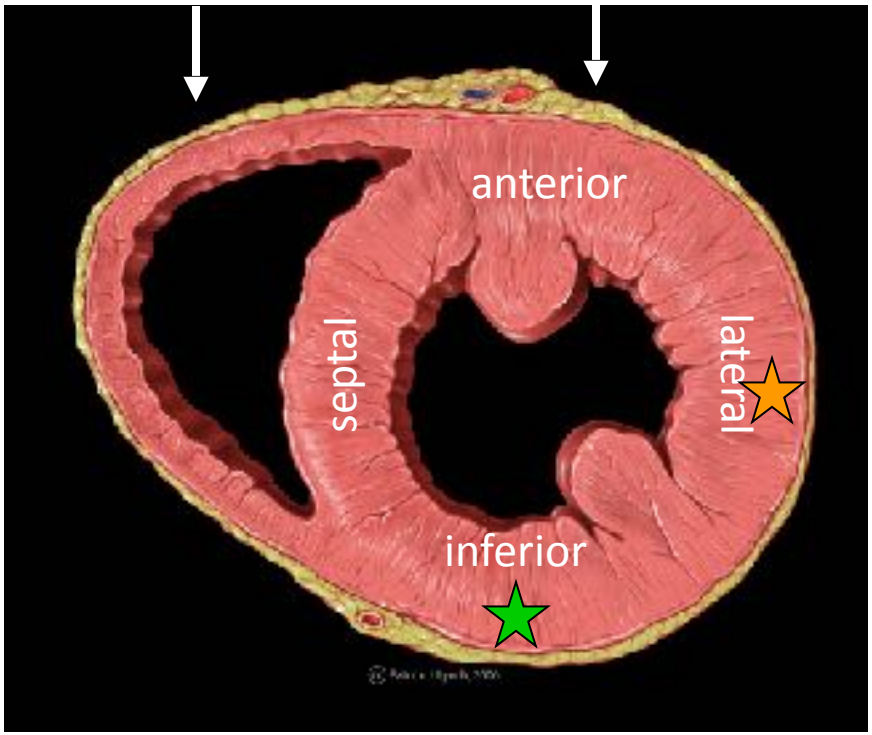
Learning Objectives

- When present on an ECG*, what does coronary artery disease look like?
  - How do you identify acute ischemia, including STEMI, and prior infarct?

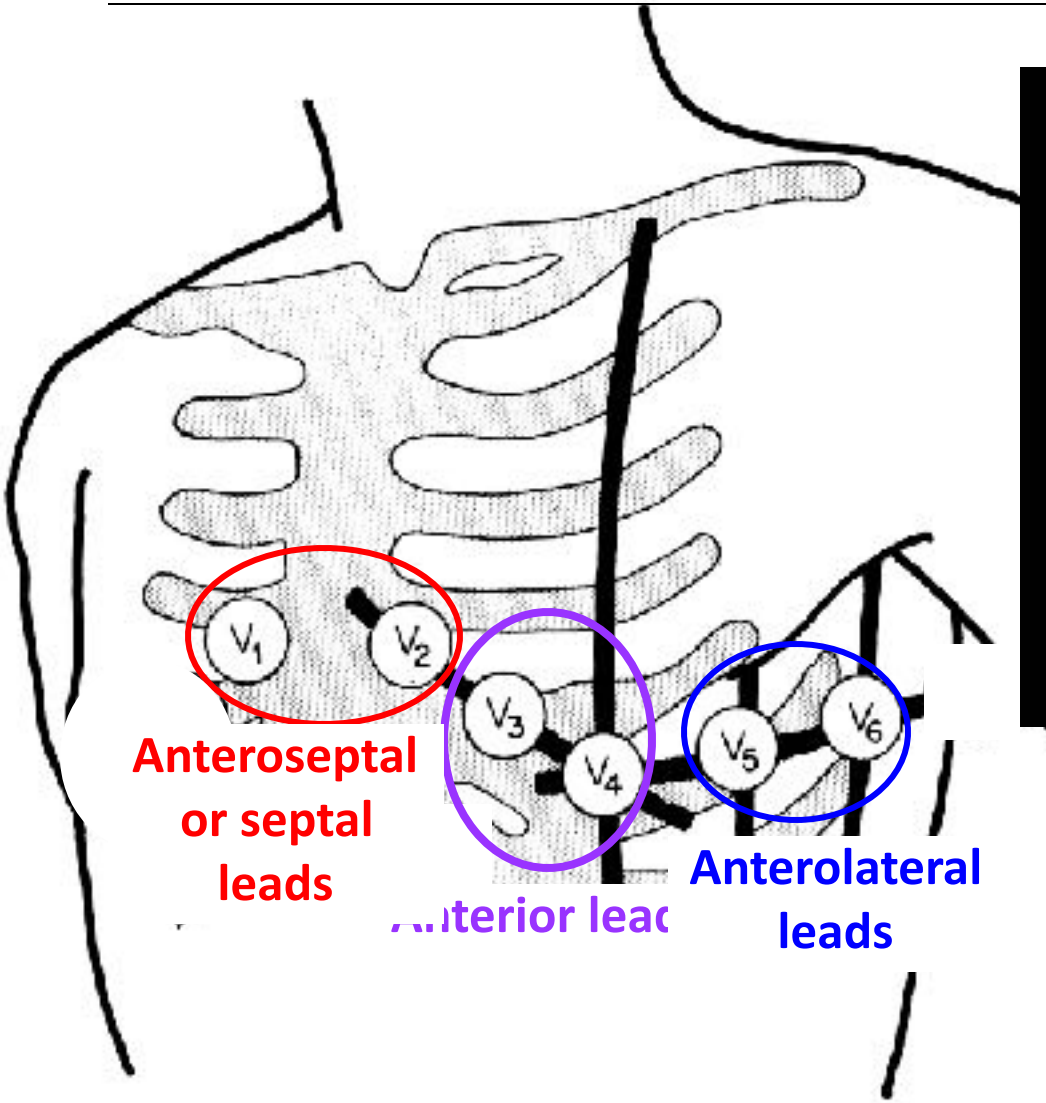
Leads are grouped according to the region of the LV that they "see" best. The limb leads are shown.

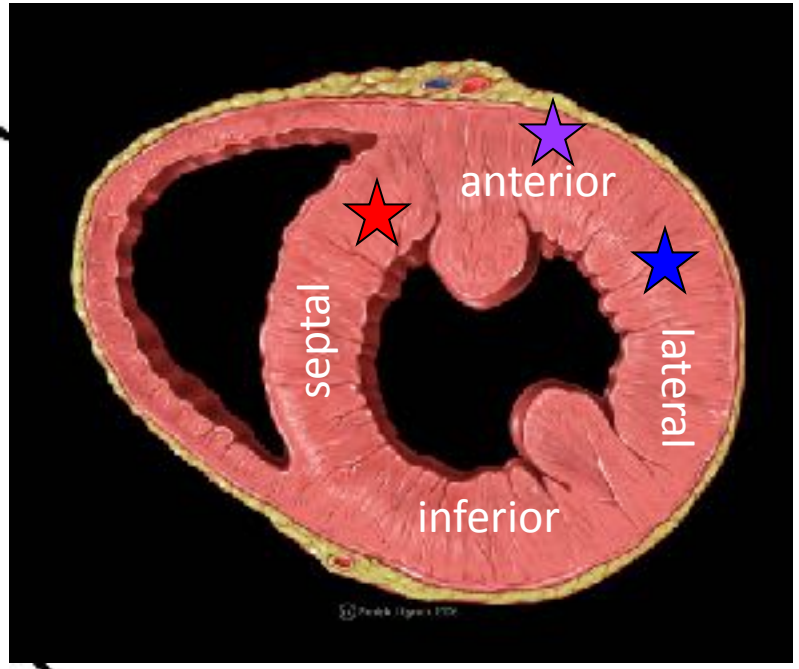


Cross section of ventricles

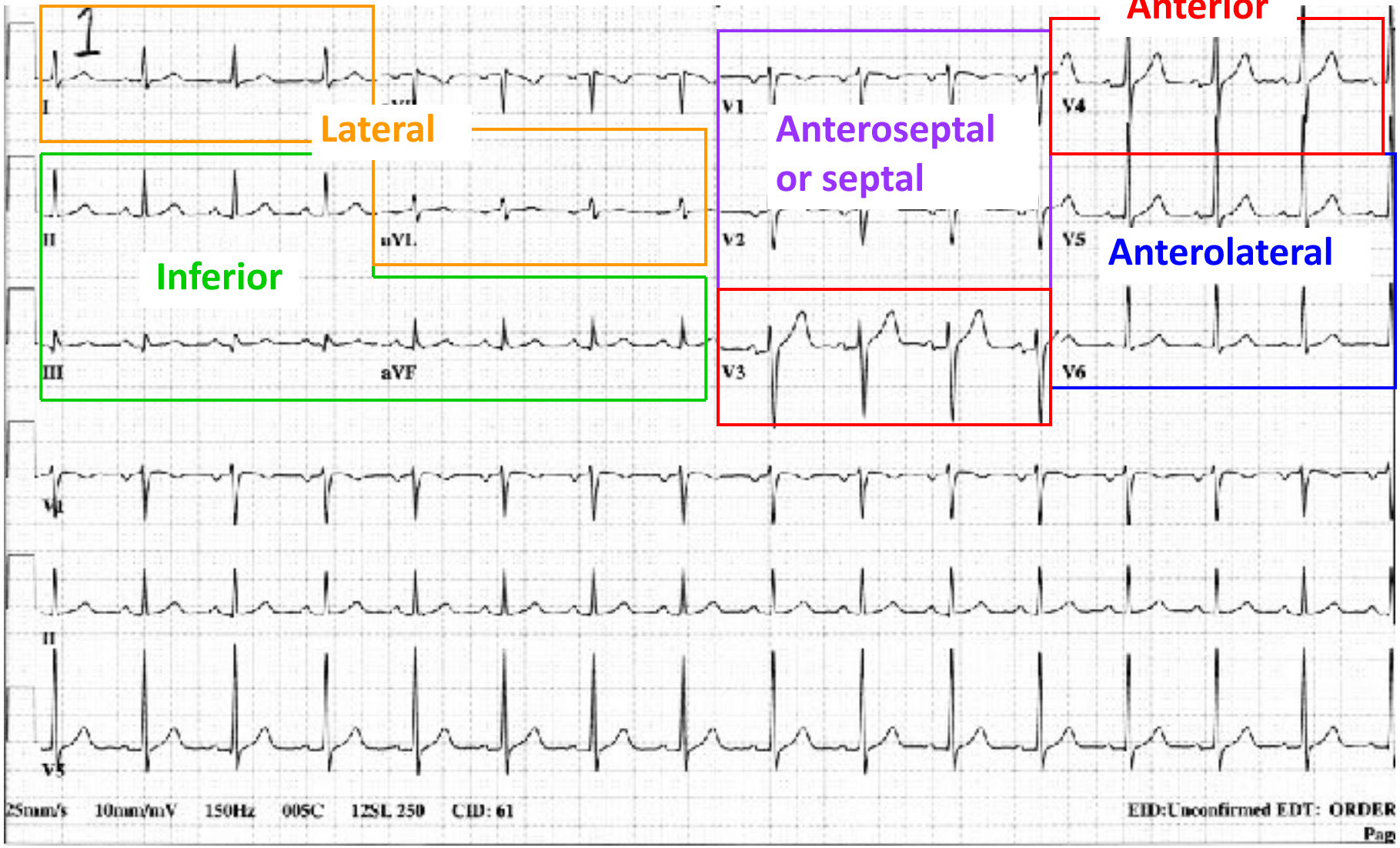


Precordial leads detect septal and anterior activity.

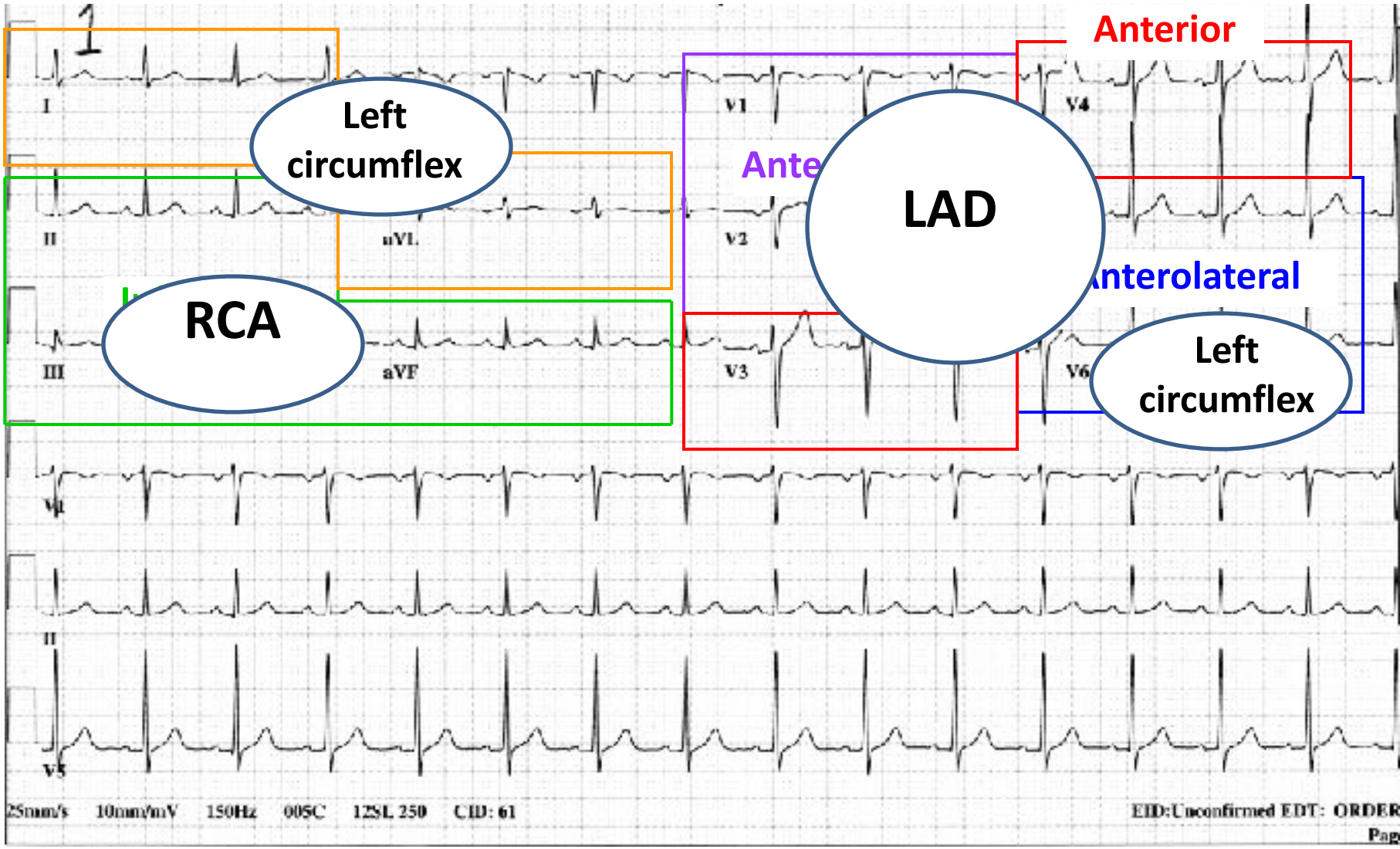




Typical Layout of Leads



Corresponding blood supply



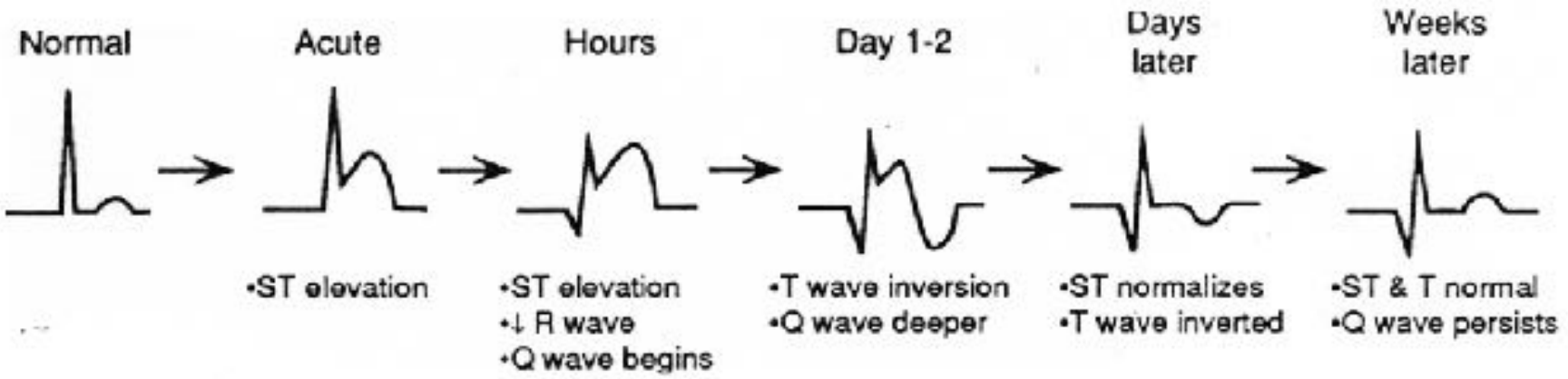
ECG Evidence of Ischemia

- ST segment may be elevated or depressed in ischemia.
  - Elevated = STEMI. Localizes injury.
  - Depressed = other ischemia (NSTEMI, UA). Does not localize injury.
- Pathologic Q waves localize old (more than one day) infarct.

Evolution of myocardial infarction on ECG

"acute infarct", also known as "injury pattern"

"prior infarct"



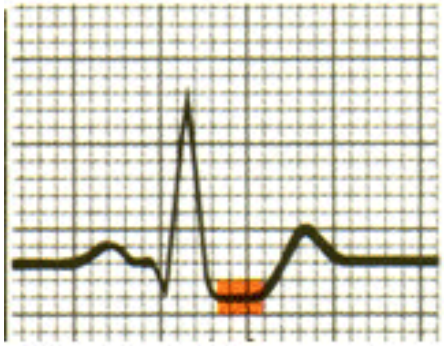
("pathological" Q wave)

Note: Normal EKGs sometimes have tiny Q waves in some leads. <u>Pathological</u> Q waves are deeper and wider than normal.

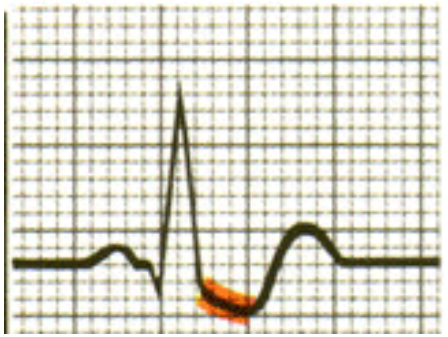
Note: ST elevation can sometimes persist for weeks or even become permanent due to aneurysm formation.

More about ischemic changes…

- Contour of ST depression can be important (horizontal or downsloping most concerning).
- Other findings can also be seen and will be covered in 3rd year. These include peaked or inverted T waves or abnormal R waves.



Horizontal

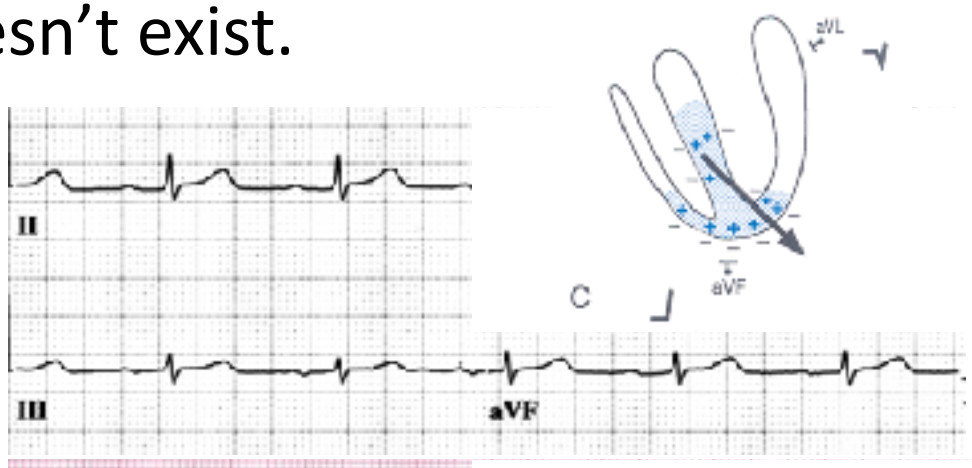


Downsloping

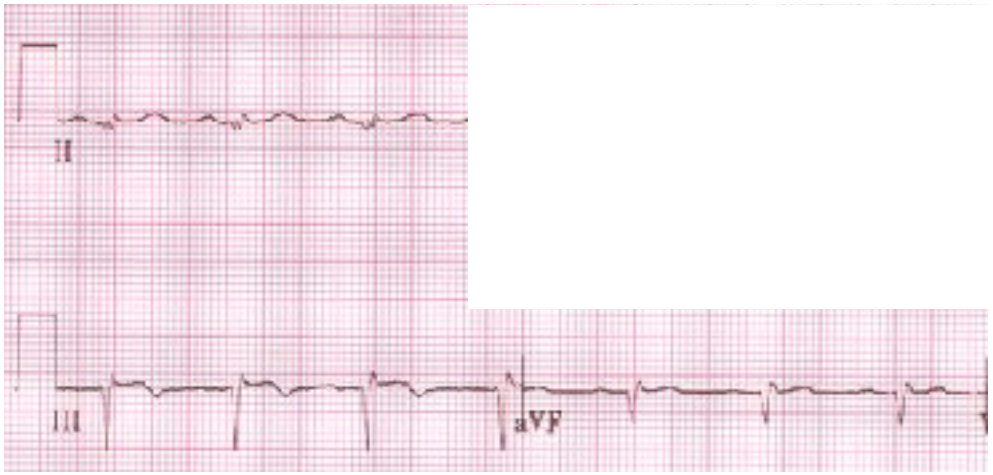
Why does a prior infarct give you pathological Q waves?

- Infarcted tissue is <u>electrically silent</u>. It's as if that part of the heart doesn't exist.

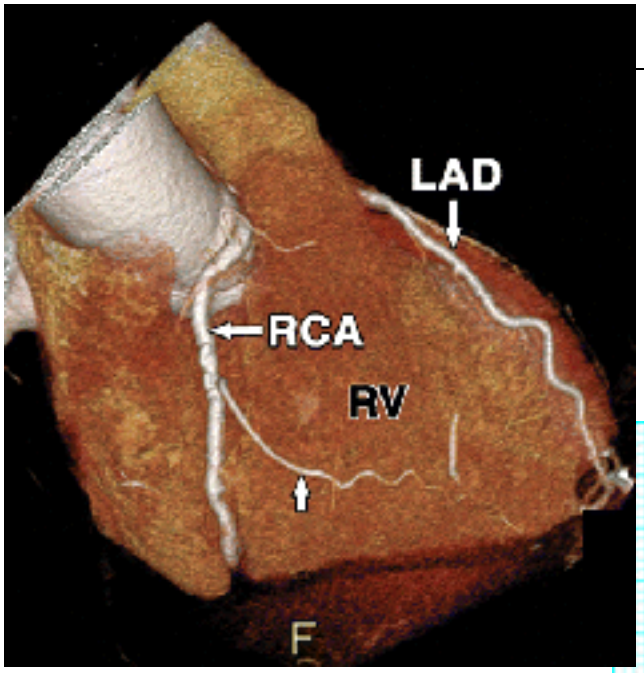
Normal QRS in inferior leads

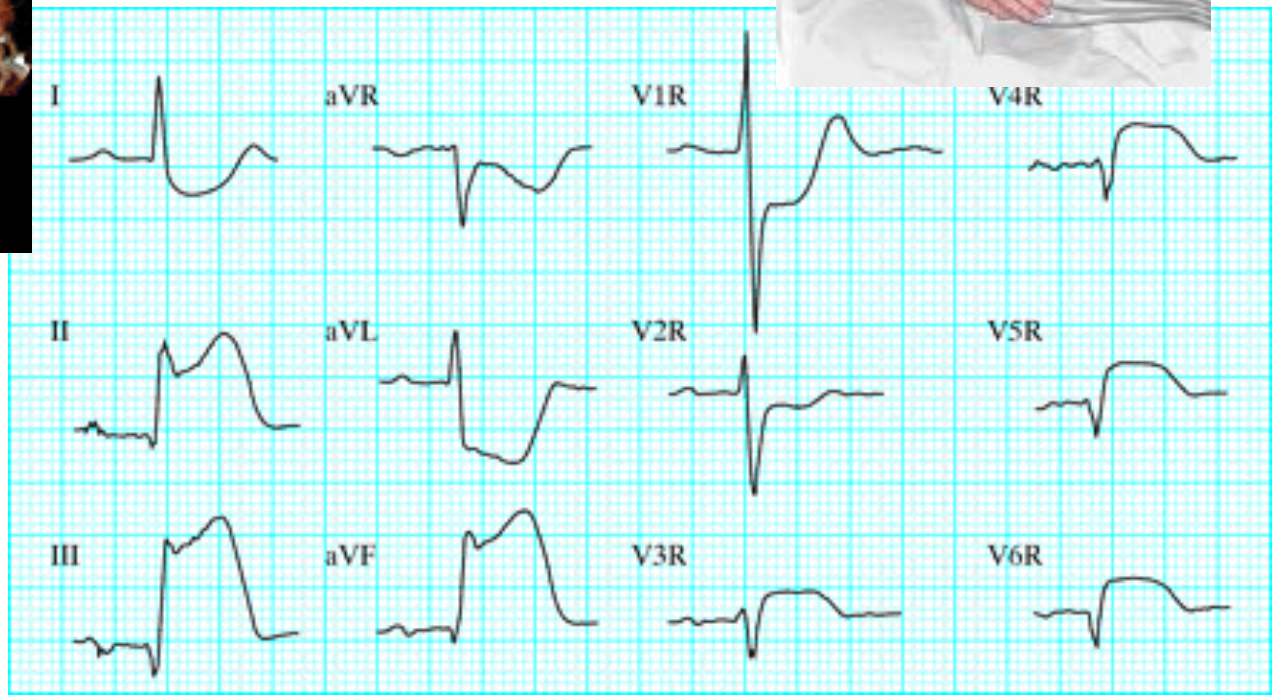


Abnormal QRS with pathologic Q waves



Right sided leads: looking for RV involvement



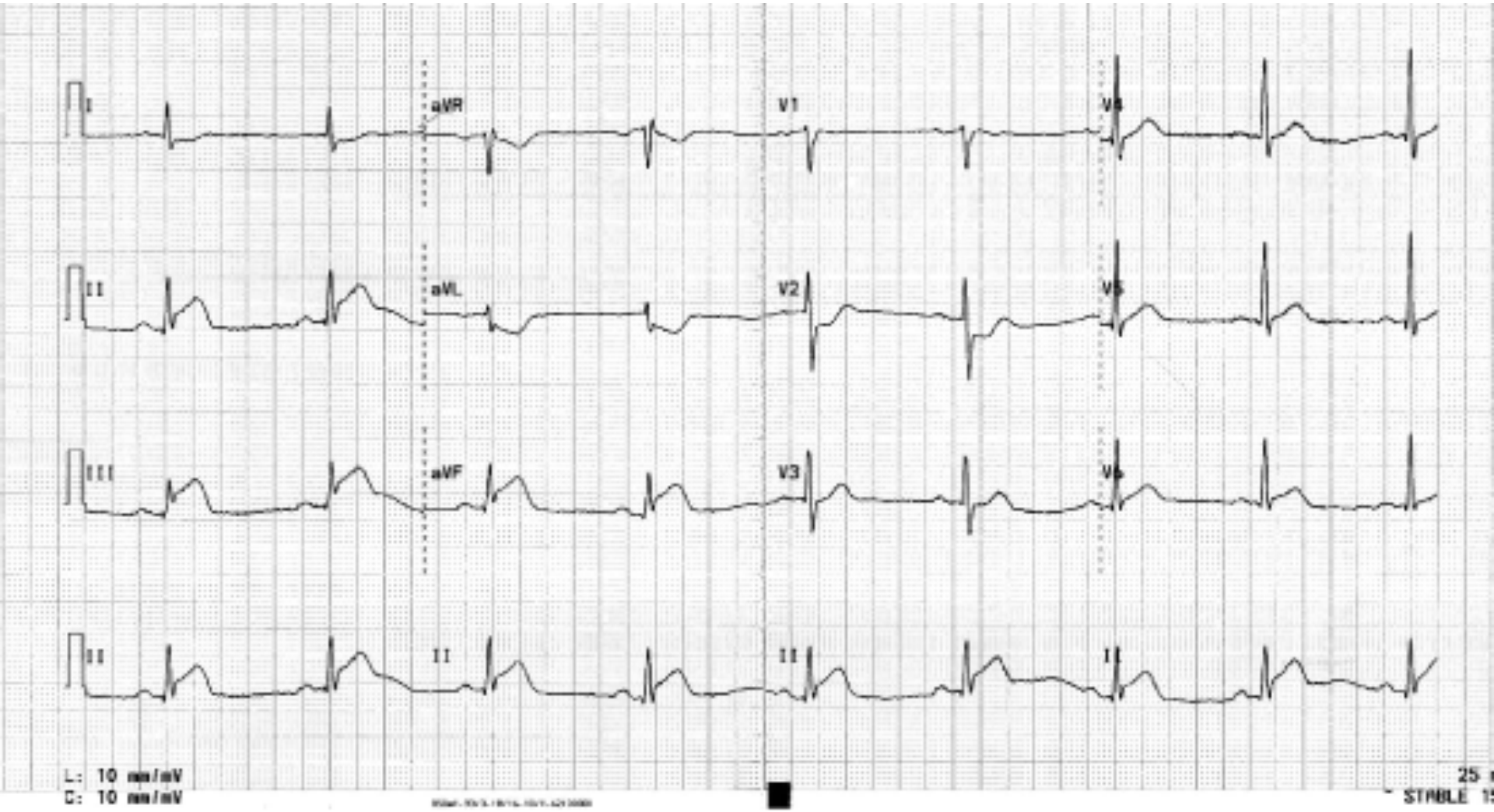


Practice ECG Questions

1. **Which leads look abnormal? What's wrong with them?**

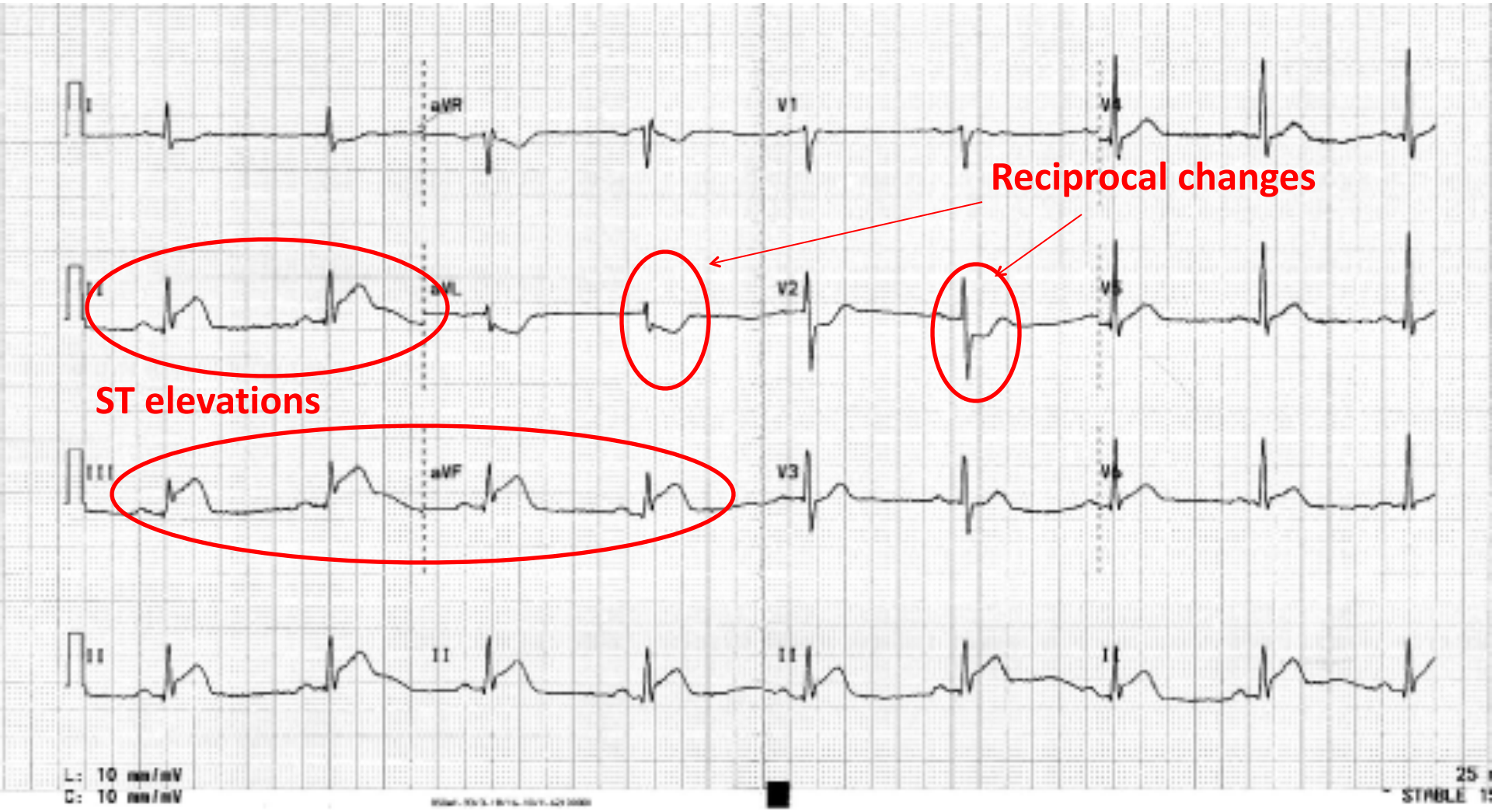
2. **Is this ischemia or prior infarct?**

3. **Which vessel is involved?**



1. ST elevation in II, III, aVF and V6 as well as ST depression in aVL and V2.
2. Acute ischemia (STEMI). (ST elevation trumps ST depression!)
3. Right coronary artery.

1



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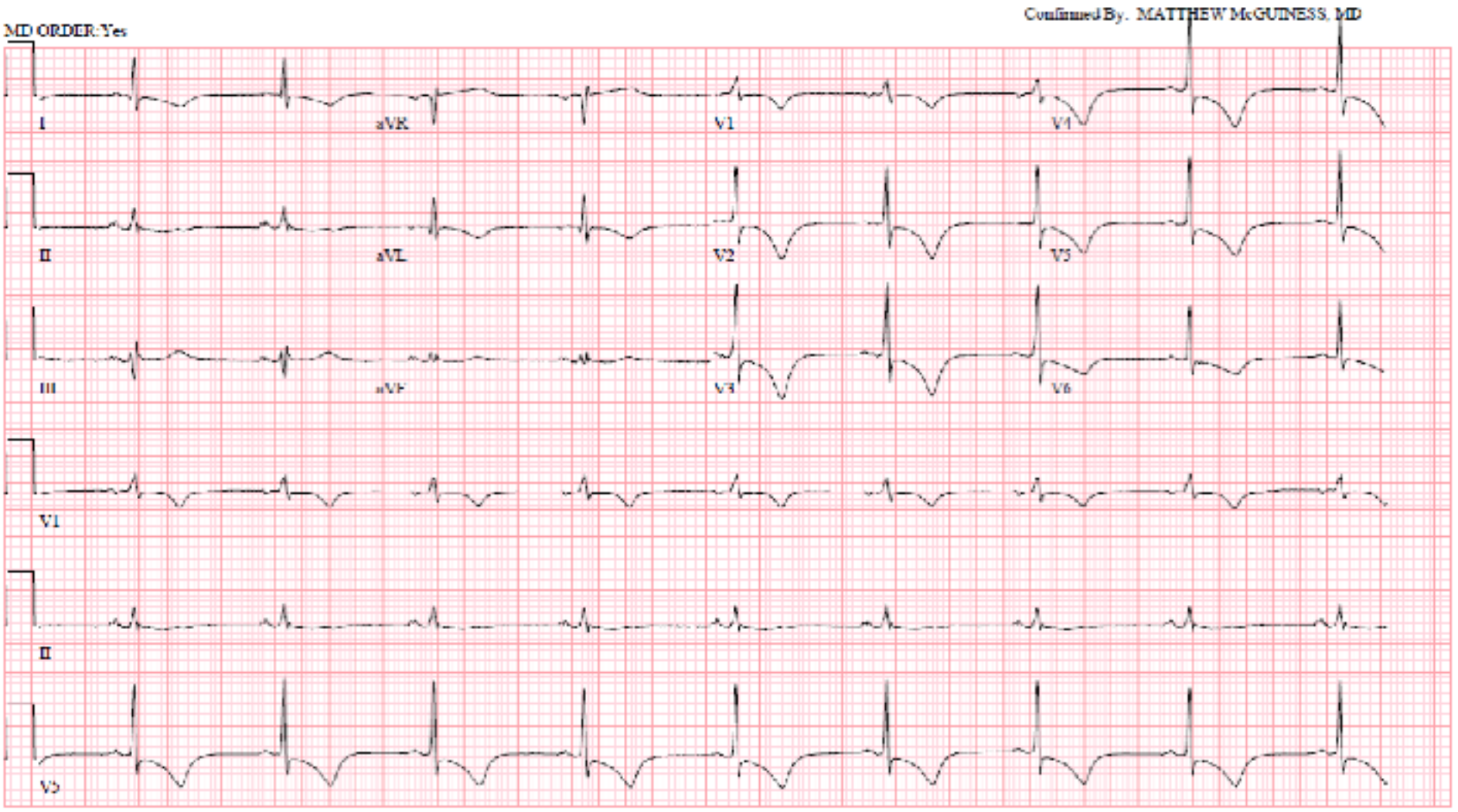
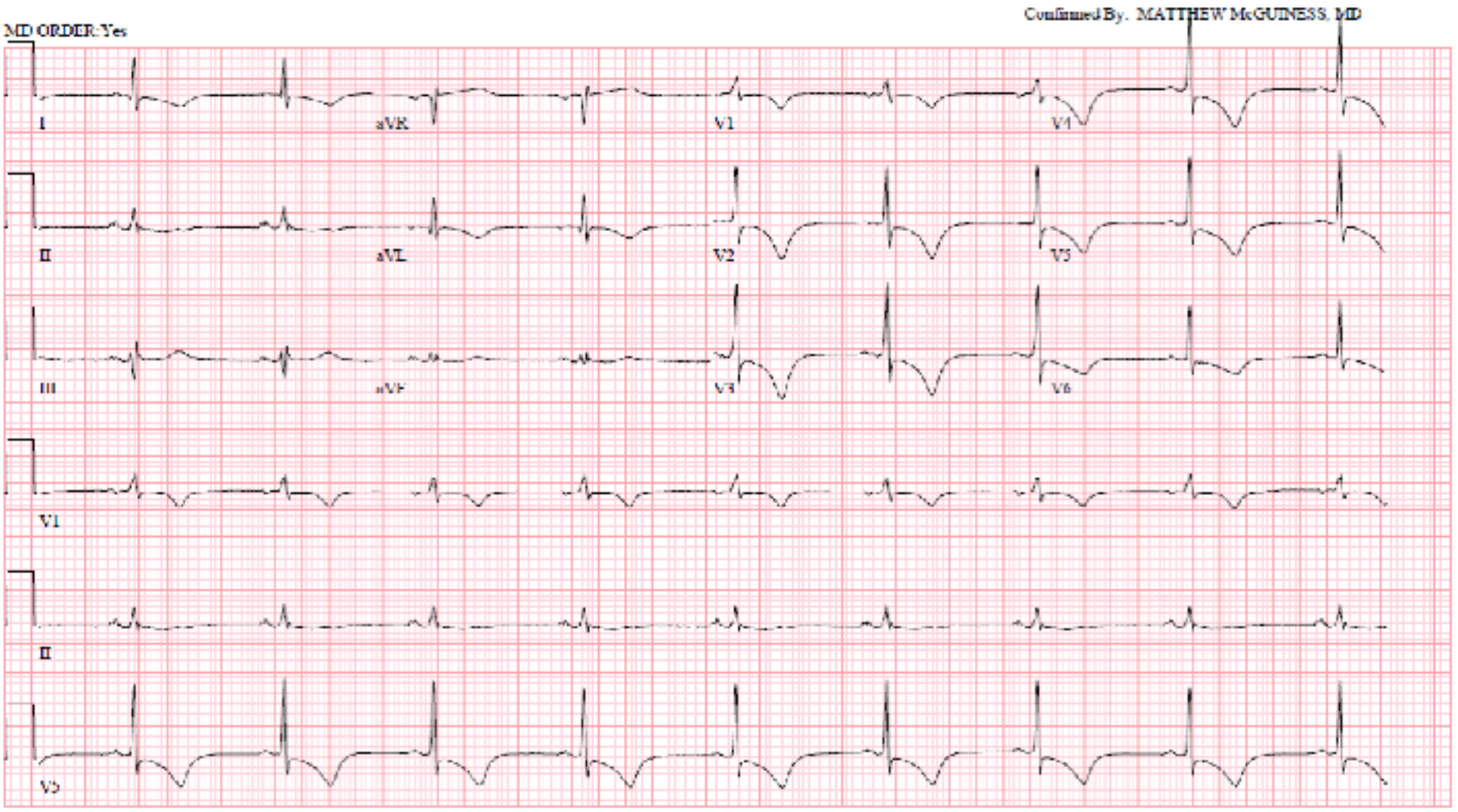


1. ST depressions in I, aVL, V2-V6.
2. Ischemia.
3. Culprit vessel cannot be determined.



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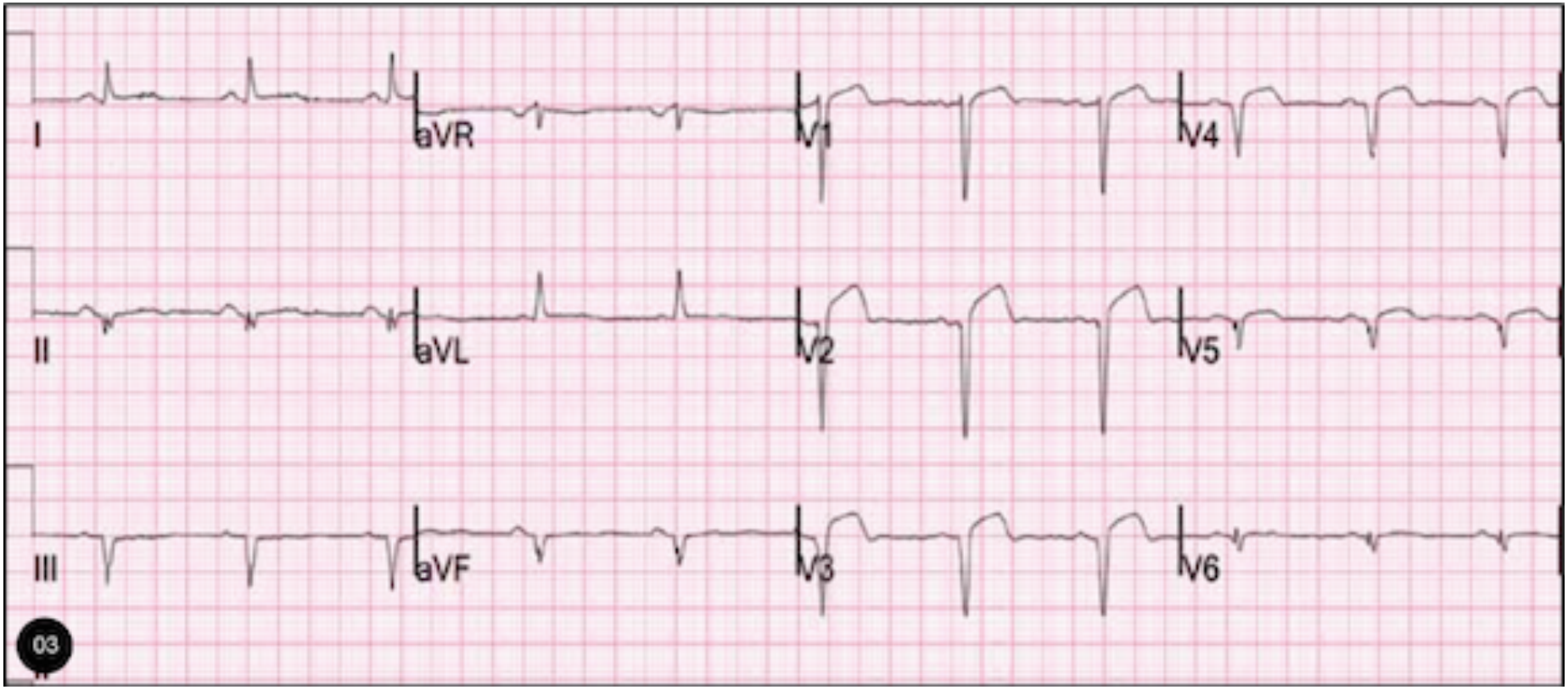
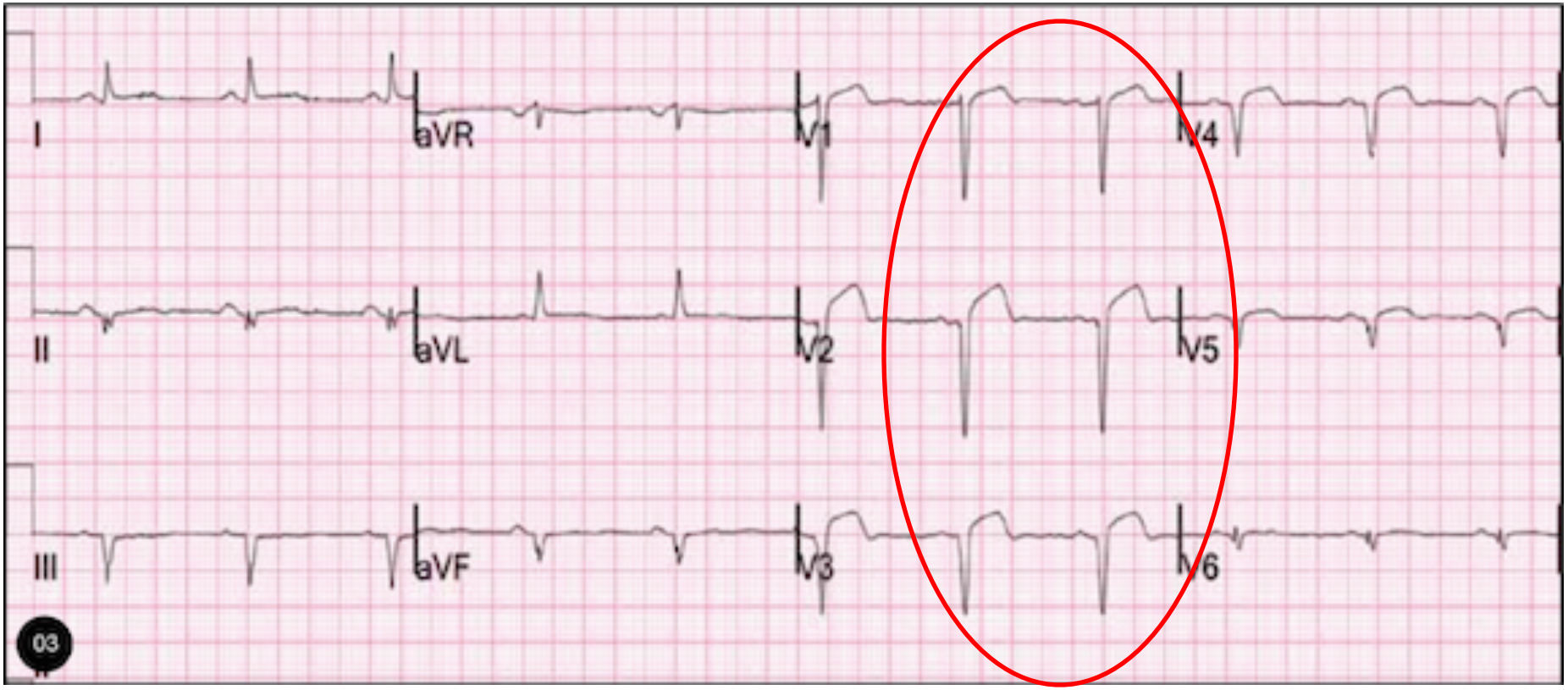


1. V1 to V6 (anterior) and II, III and aVF (inferior) demonstrate pathologic Q waves.

2. Prior infarct.

3. At least LAD. Inferior blood supply (typically right coronary artery) could be affected as well.

3

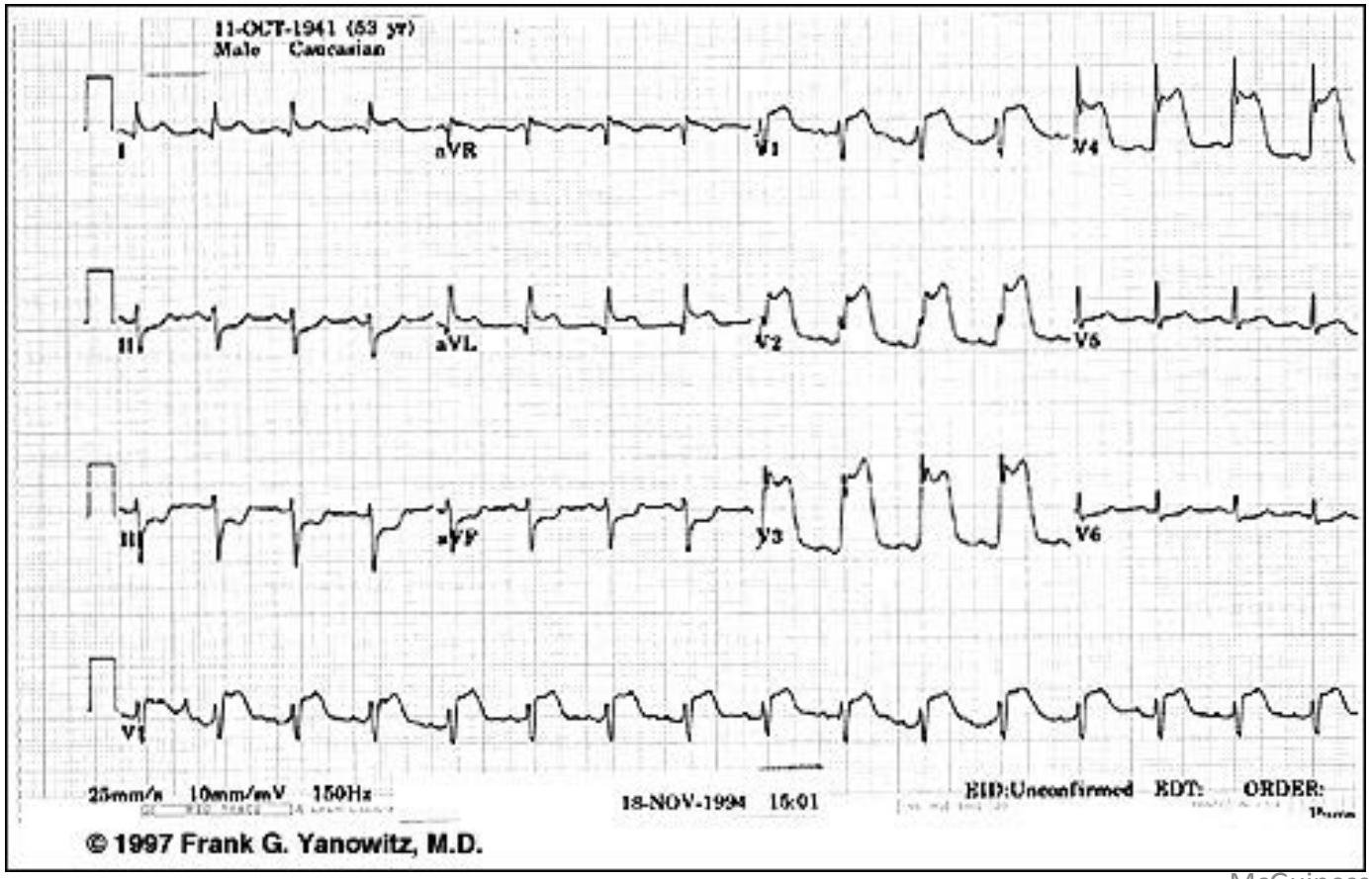


The EKG below was probably performed on a patient who: **4**

A. Had a myocardial infarction in the LAD territory two weeks ago.

B. Is experiencing myocardial ischemia in the RCA territory.

C. Has a new occlusion of the LAD.

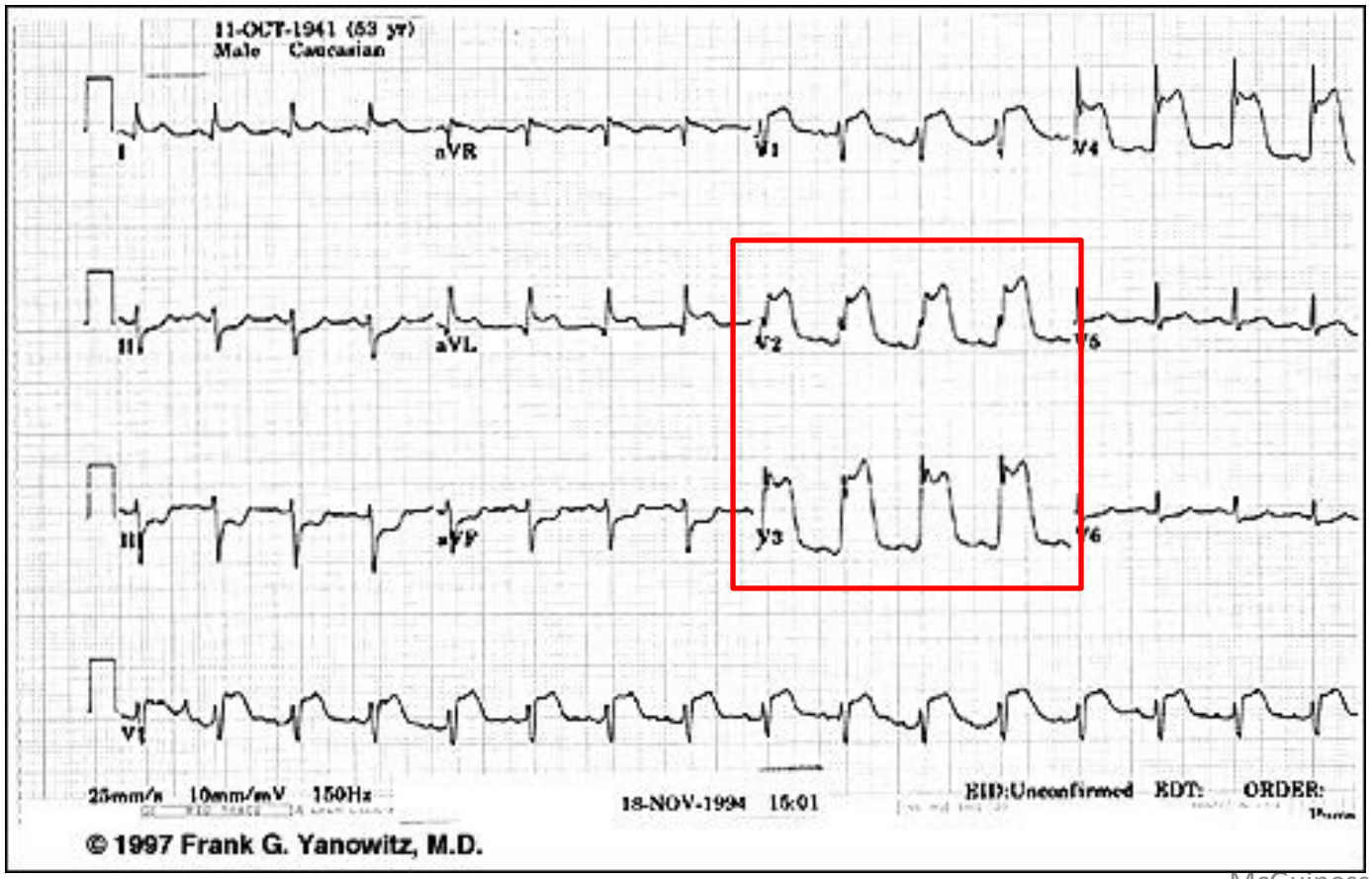


The EKG below was probably performed on a patient who: **4**

A. Had a myocardial infarction in the LAD territory two weeks ago.

B. Is experiencing myocardial ischemia in the RCA territory.

C. Has a new occlusion of the LAD. (ST elevation, no Q waves)



Questions?