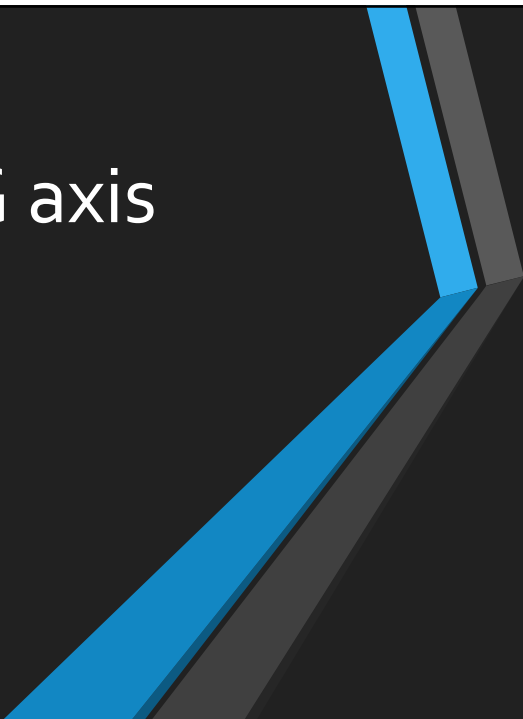


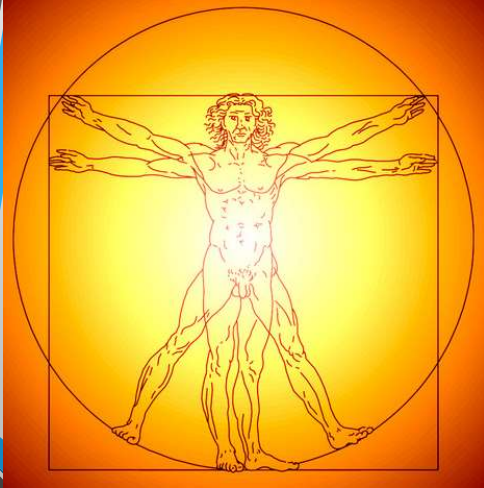
# EKG Review – Axis Deviations and Bundle Branch Blocks

John J. Hagan, M.D.  
2022 NDAPA Fall Conference

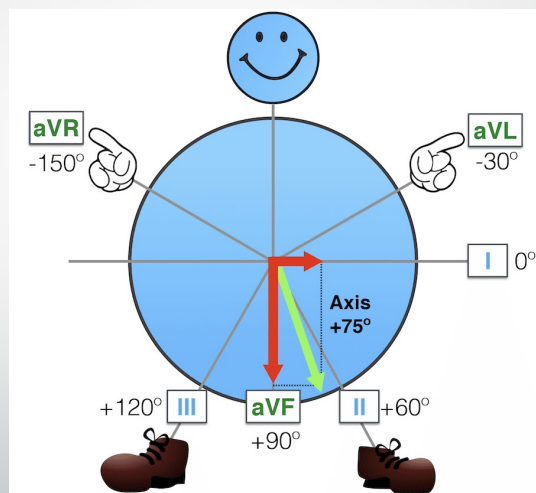
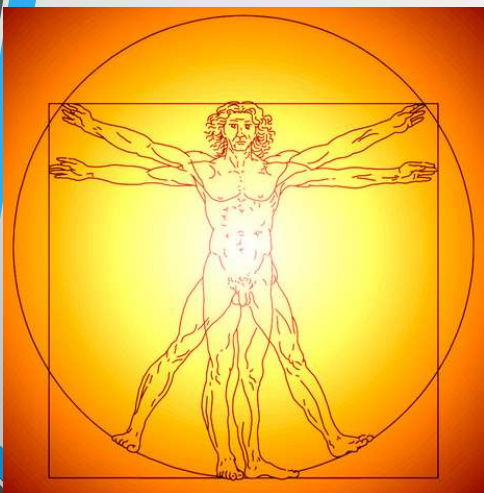


Recognizing EKG axis  
deviation is  
straightforward.

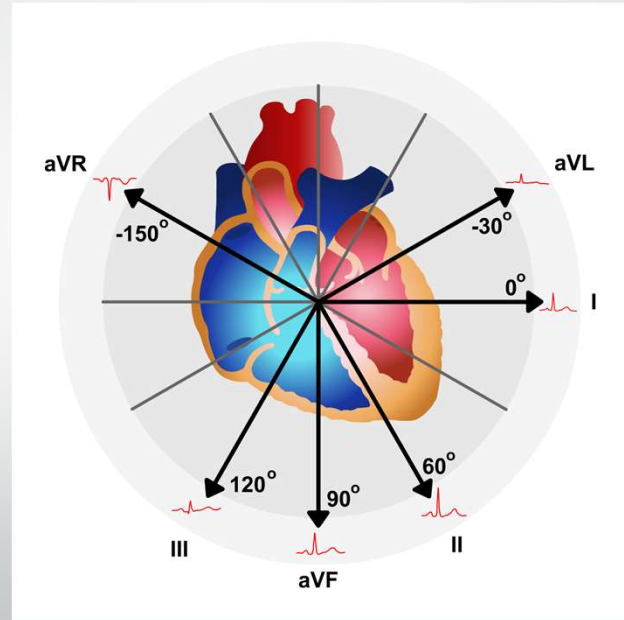
## Da Vinci's Vitruvian Man



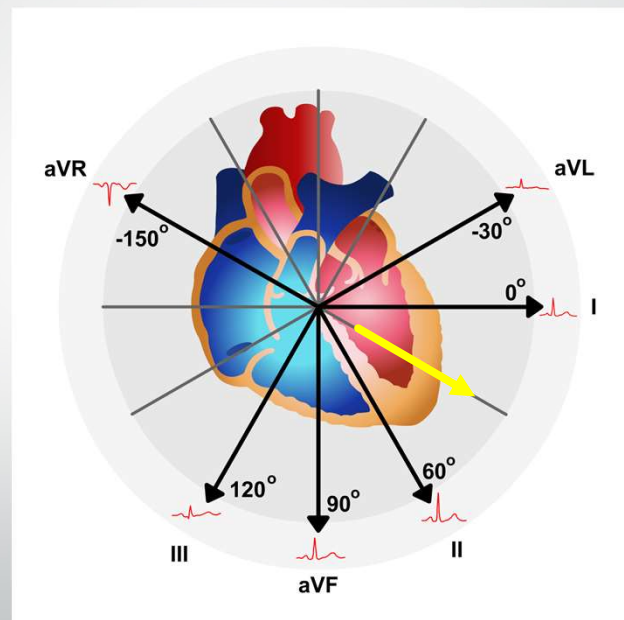
## Let's review the EKG axes.



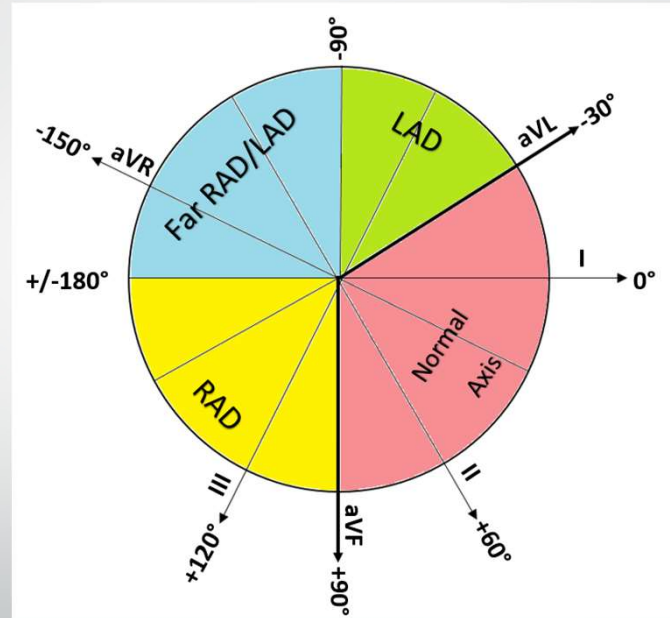
What is a normal axis?



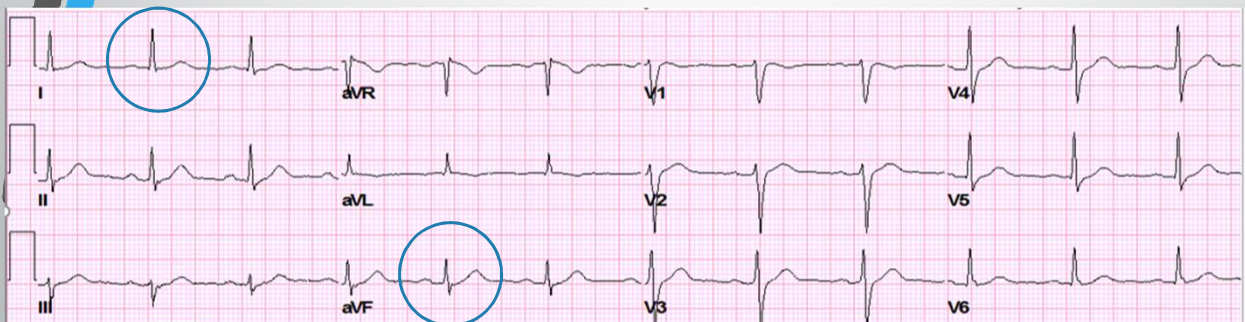
What is a normal axis?



What is a normal axis?



Is this a normal axis?



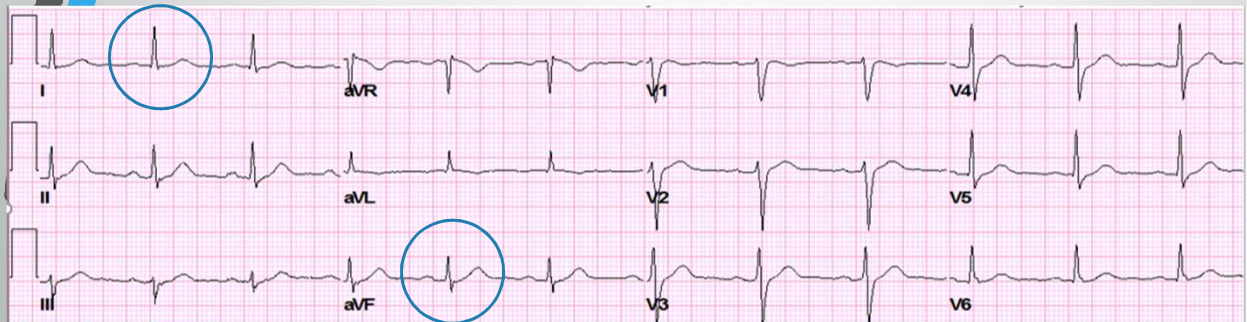
Is this a  
normal axis?



UP in lead I

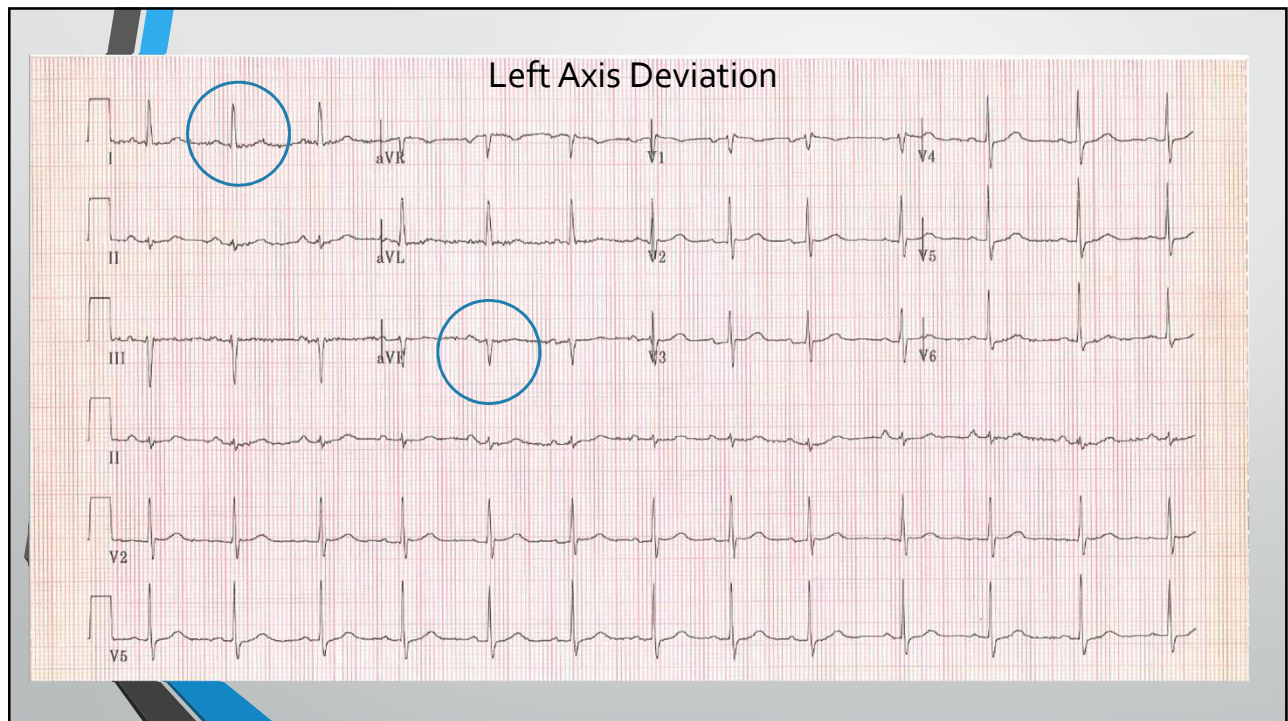
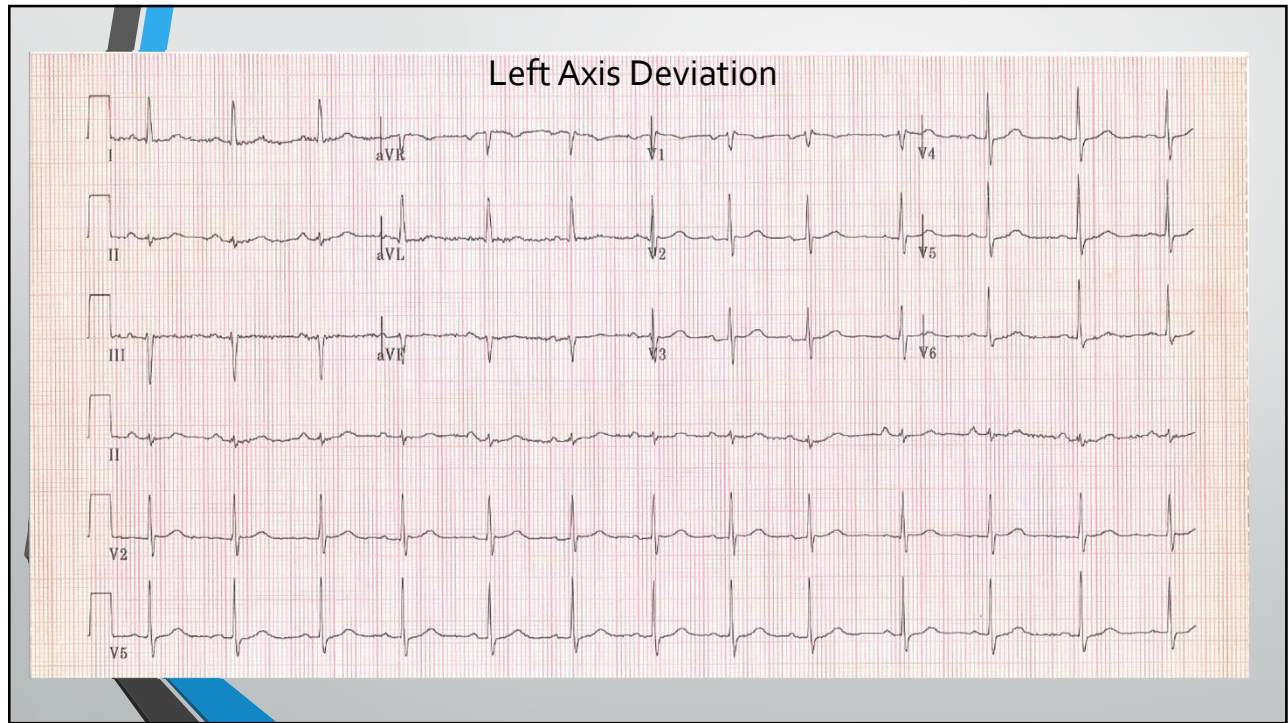


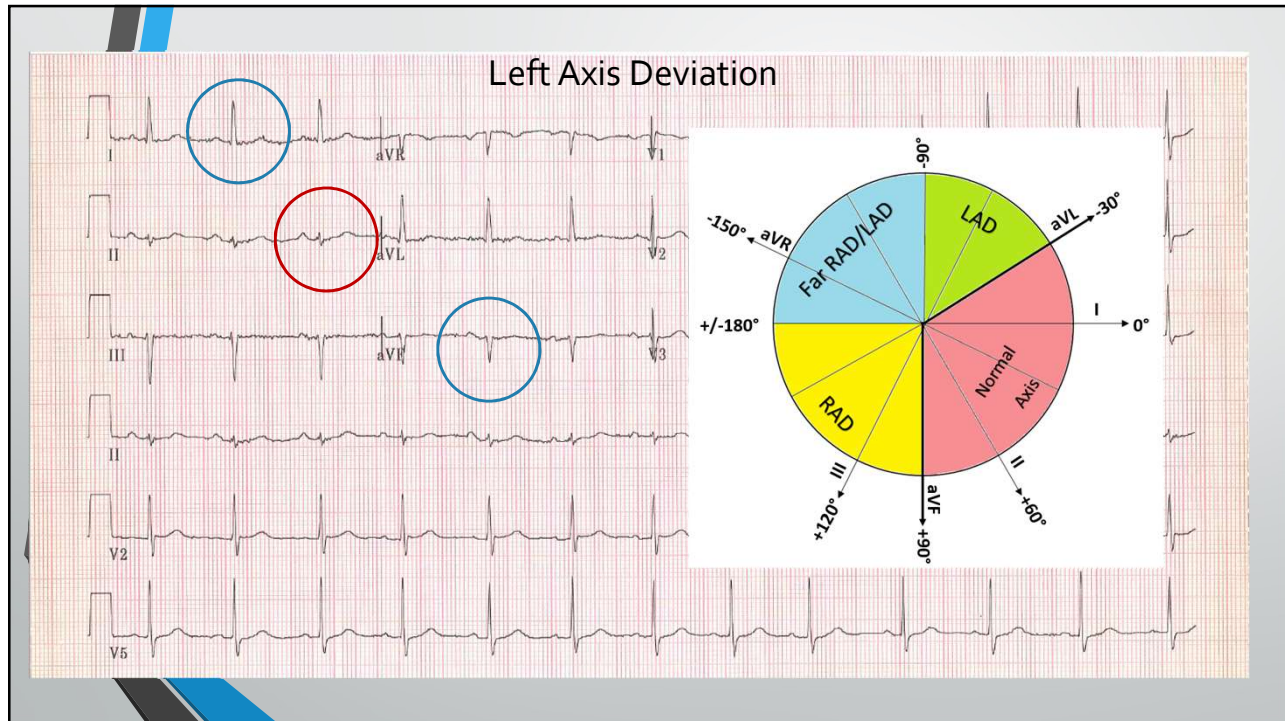
UP in lead aVF



## Recognizing left axis deviation.

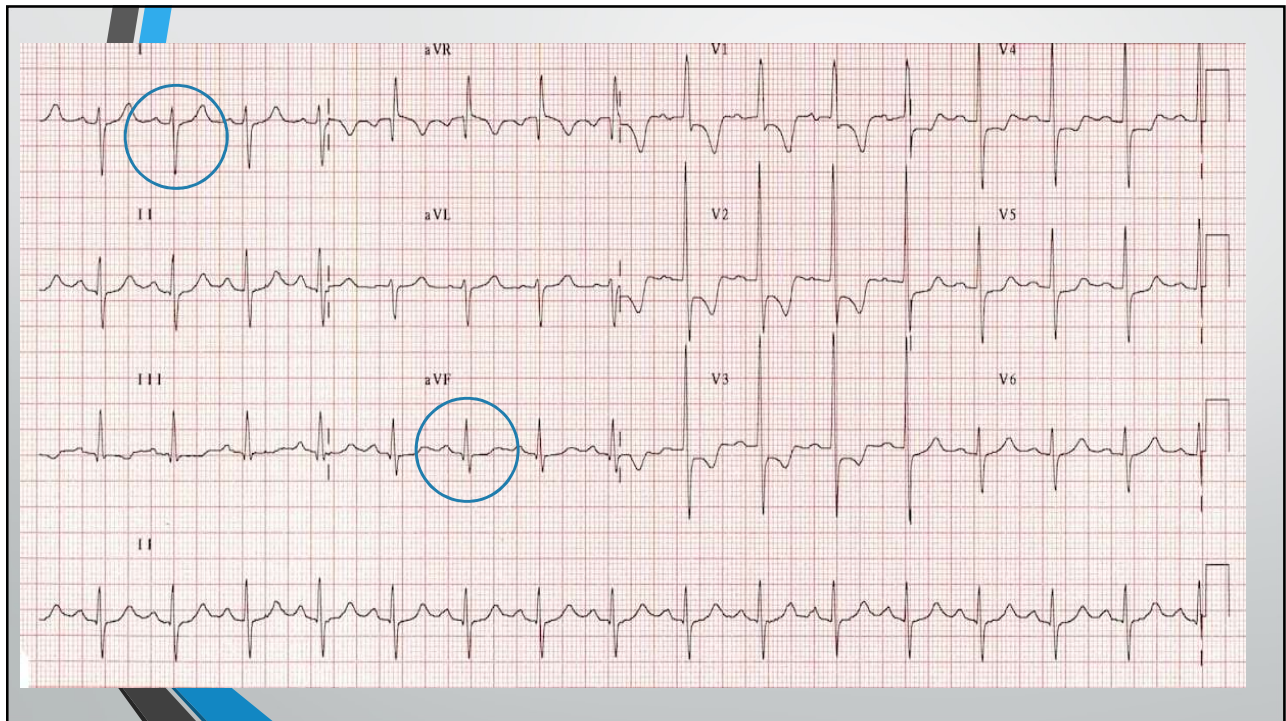
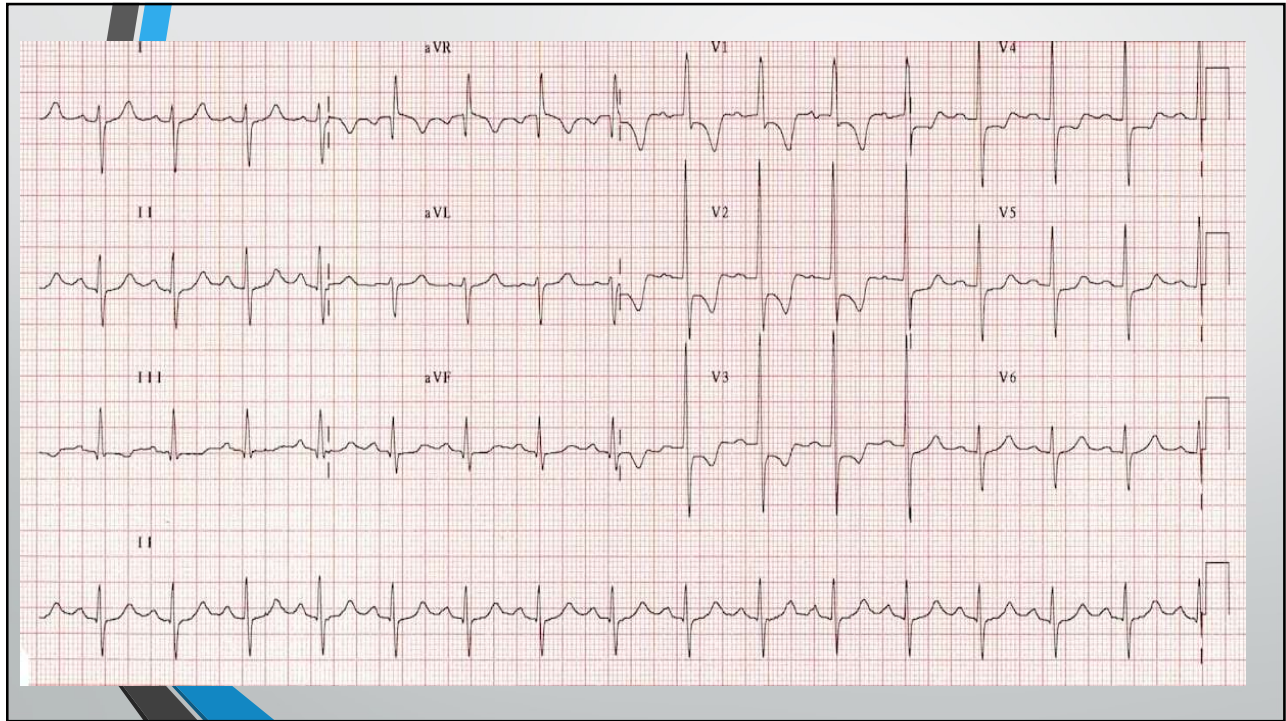
- Axis is up and to the left in LAD
- **Positive** in lead I (UP)
- **Negative** in aVF (DOWN)
- Isoelectric or **NEGATIVE** in lead II – “The tie breaker”



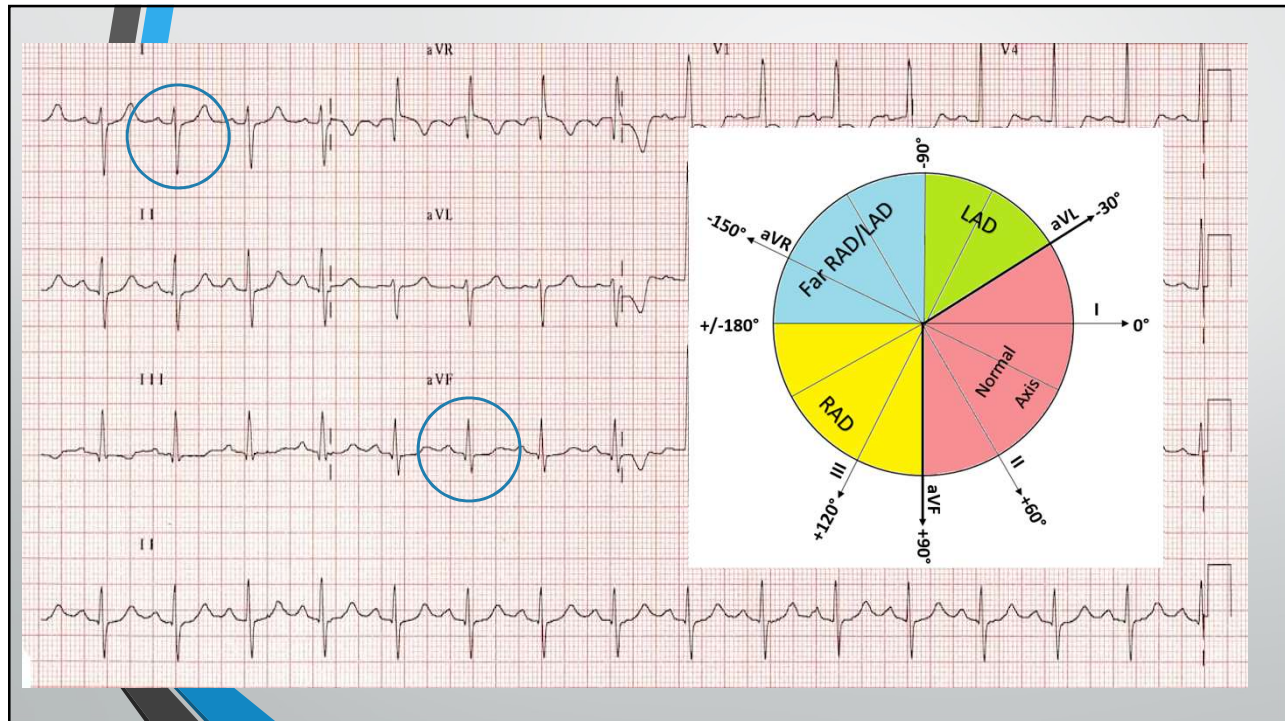


## Recognizing right axis deviation.

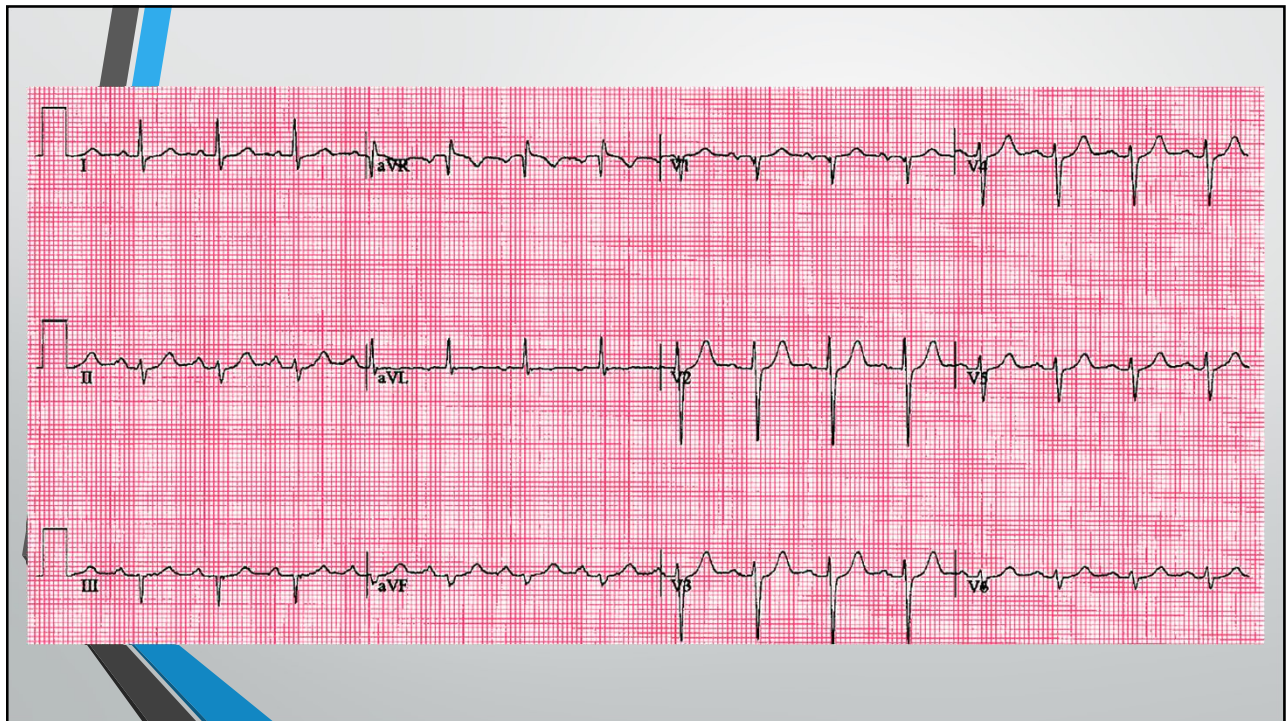
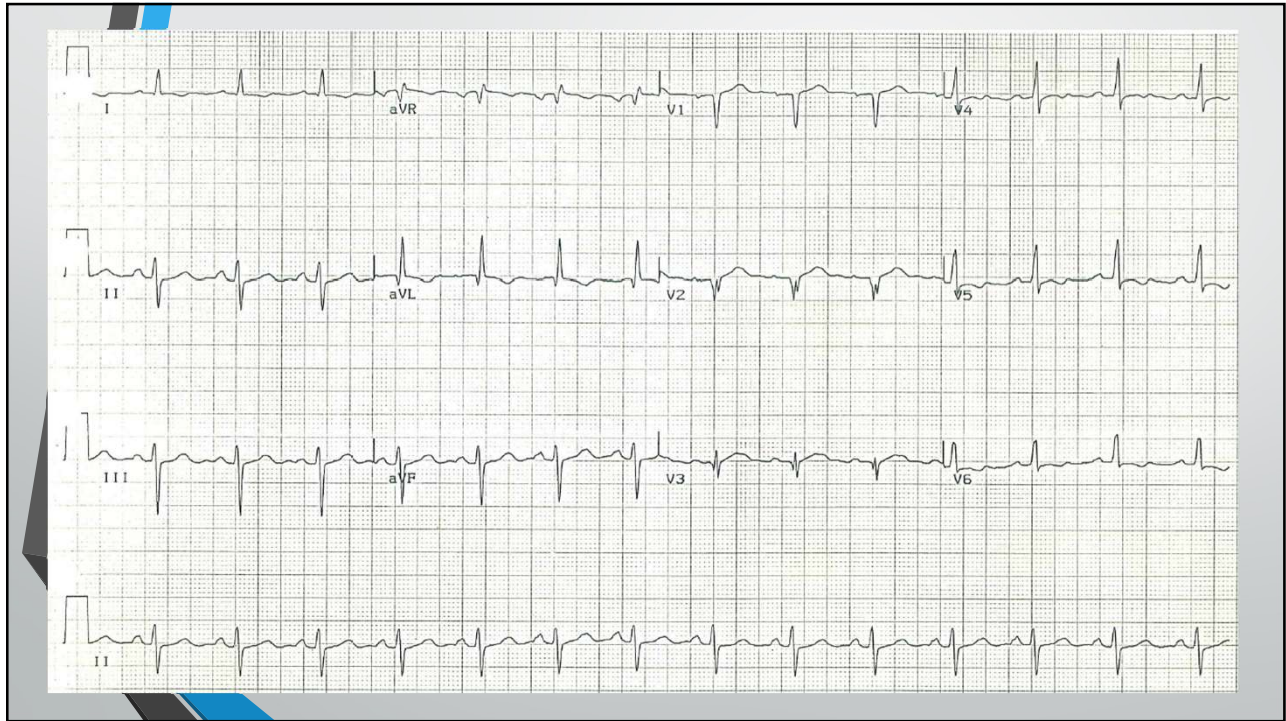
- Axis > 90 degrees
- Lead I is more negative than positive
- Most often, aVF is positive

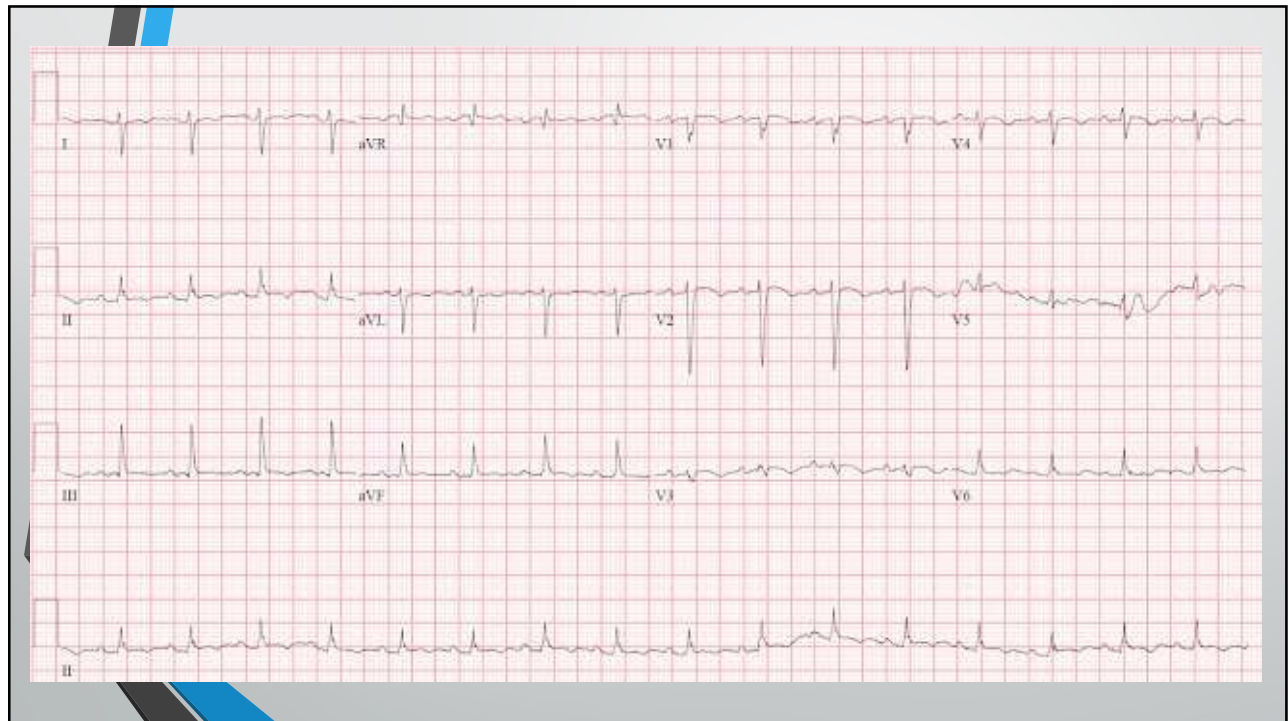
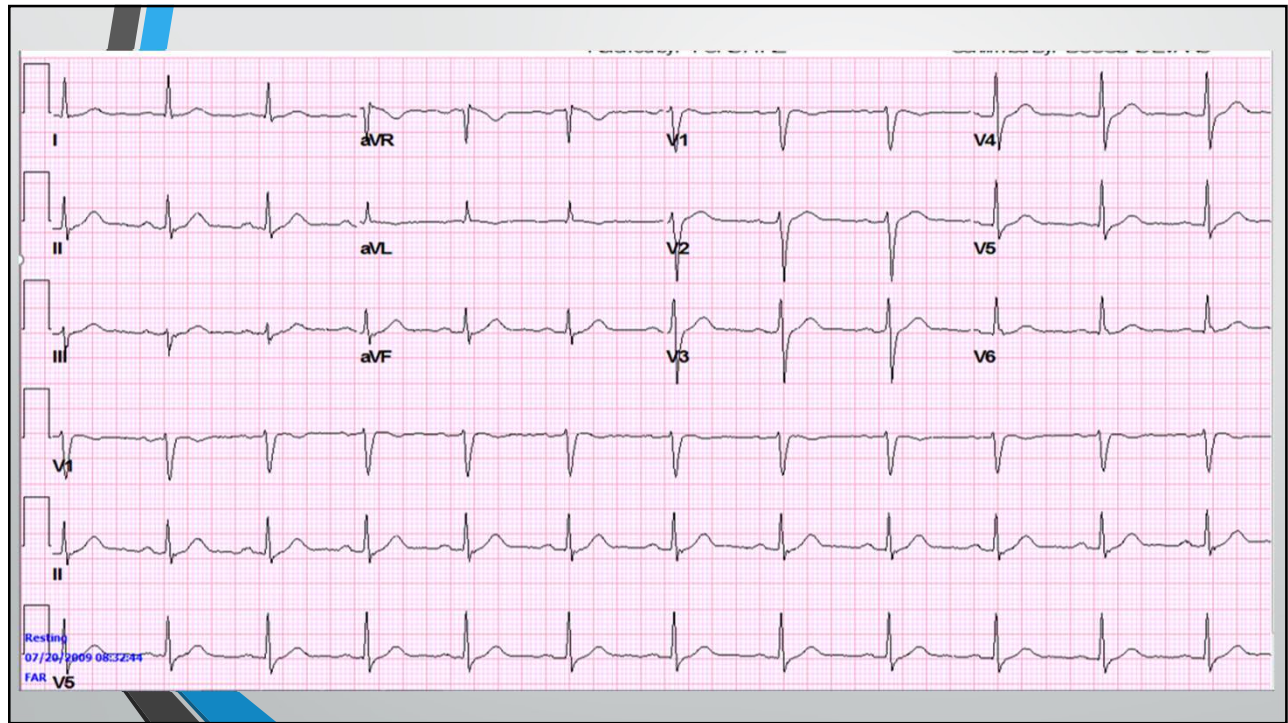


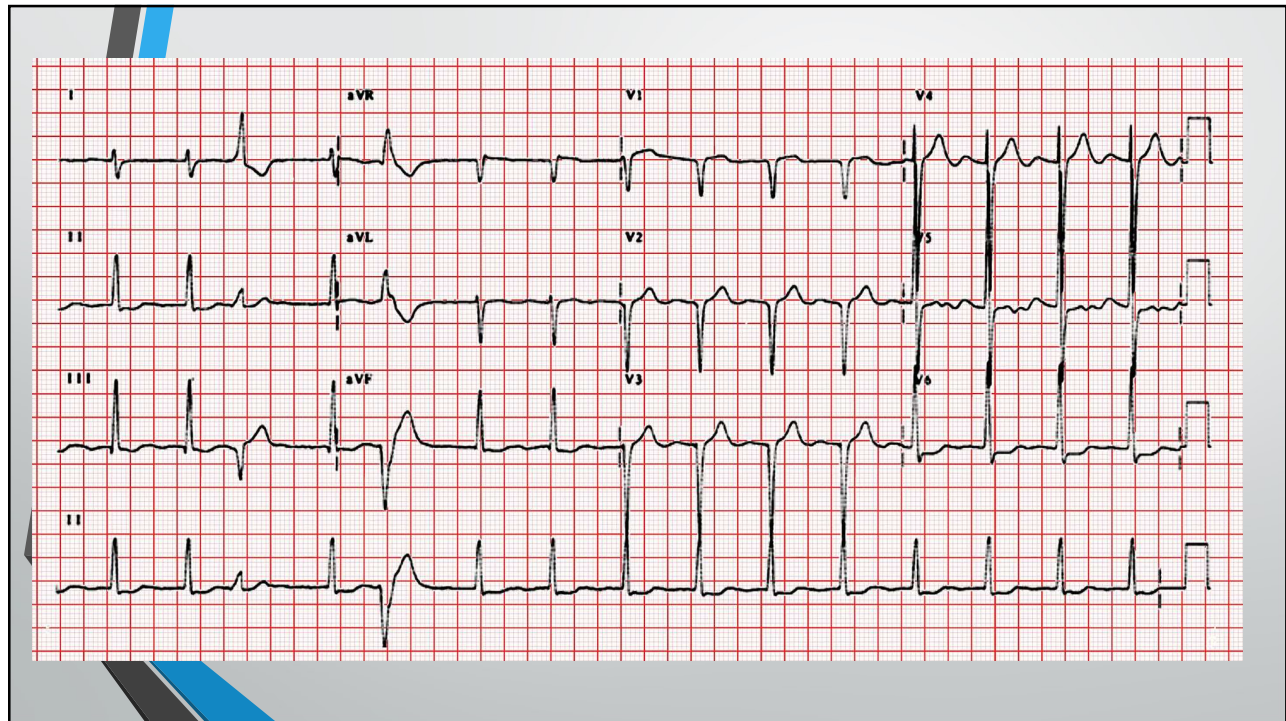




Read 'em and weep!



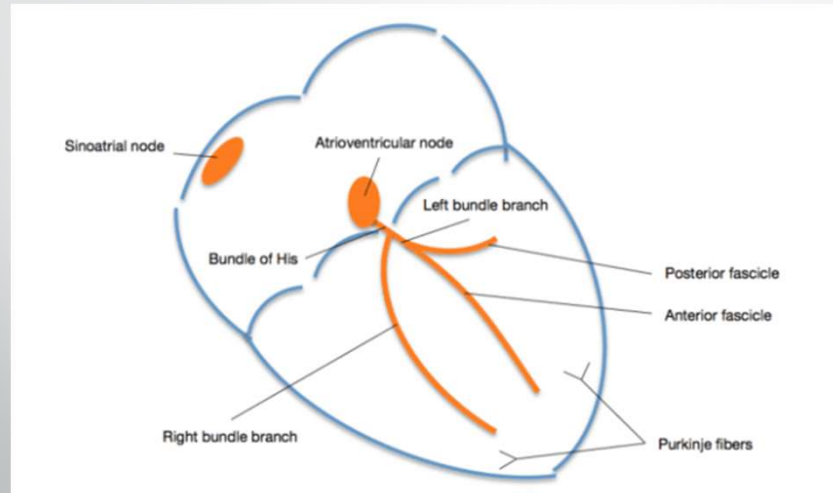




Identifying  
bundle  
branch  
blocks is a  
two step  
process.

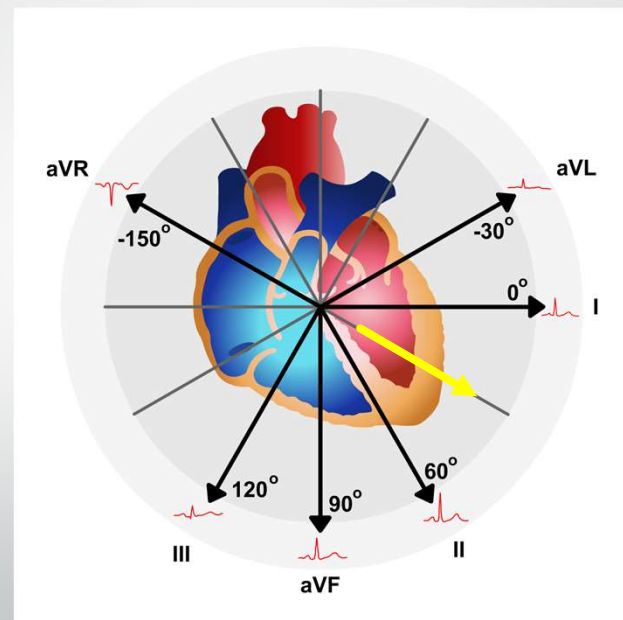
- Determine QRS Duration
- Inspect lead V<sub>1</sub> to distinguish RBBB from LBBB
- That's all!

Lets look at the bundles in the conducting system.



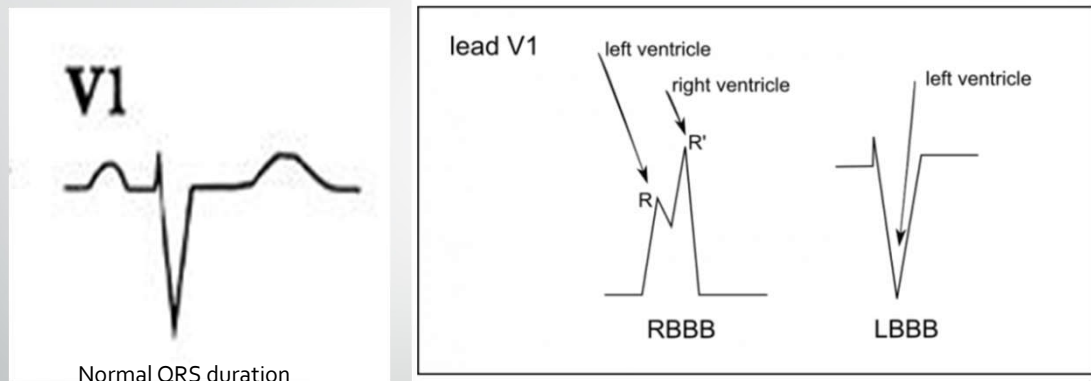
Remember how to interpret positive and negative waves

- R wave - upward – means signal is headed **TOWARD** the lead
- S wave – downward – means signal is headed **AWAY** from the lead



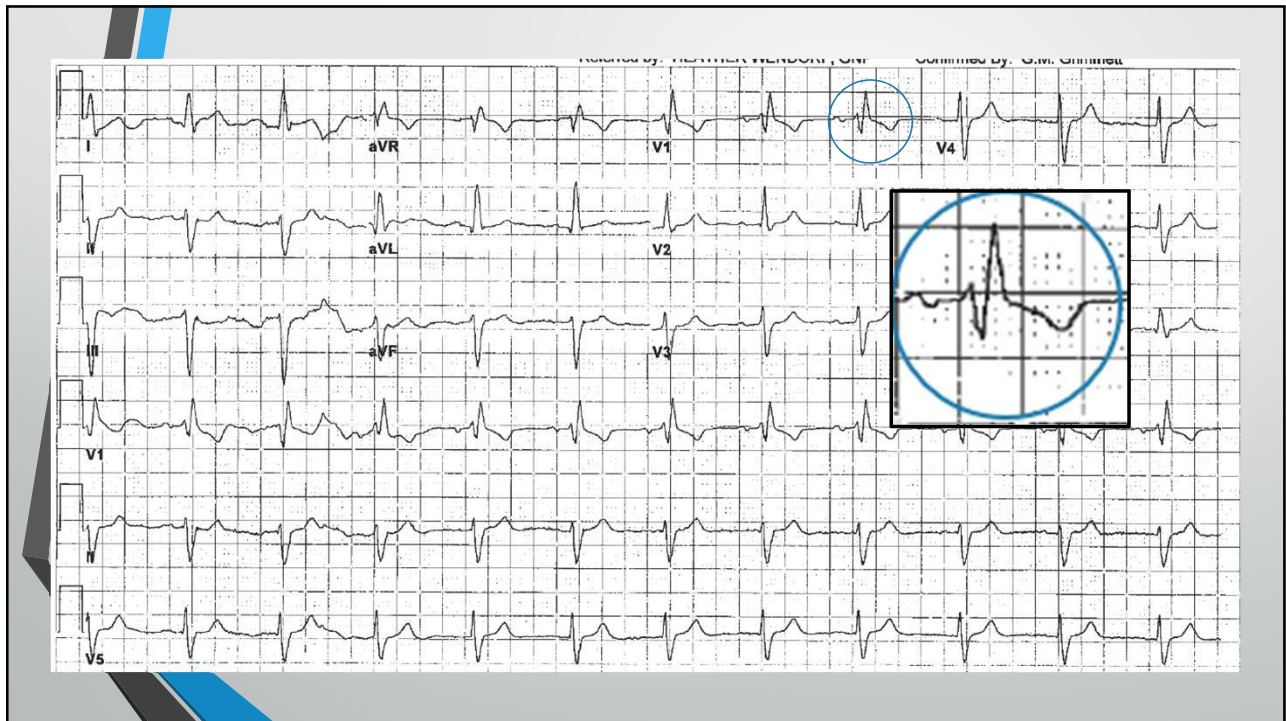
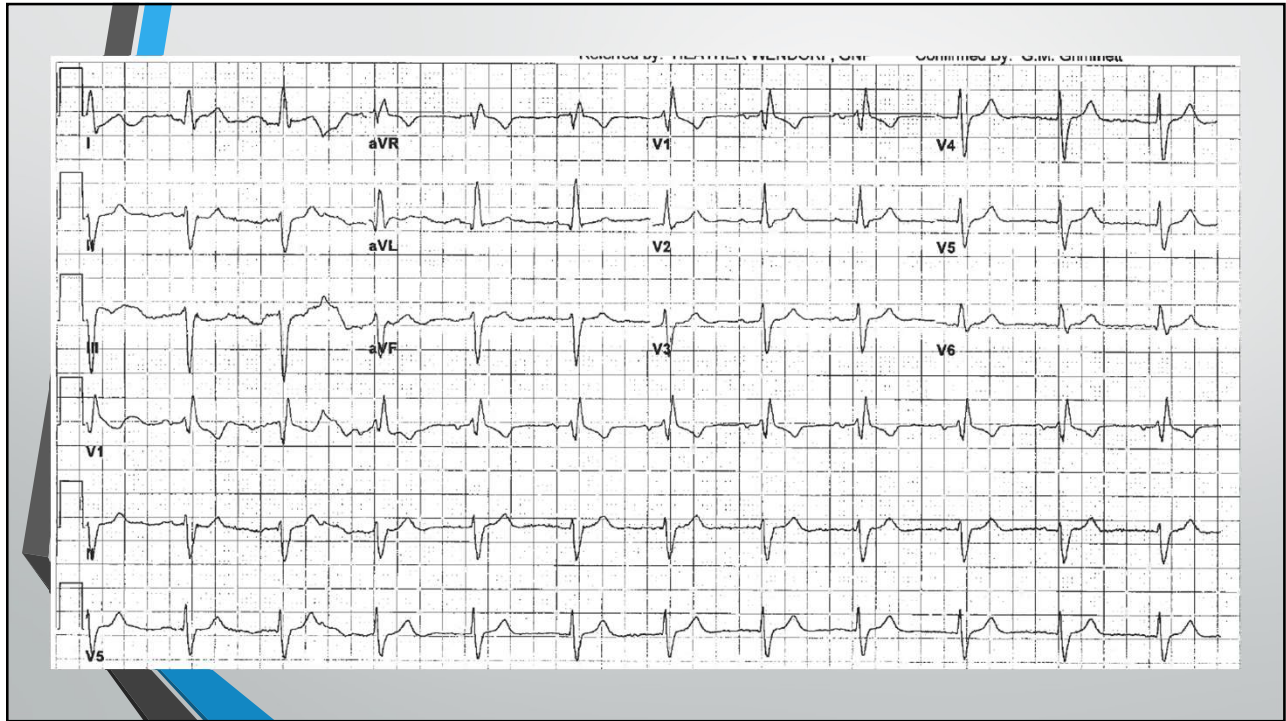


## Interpreting lead V1 in a wide QRS to distinguish LBBB from RBBB

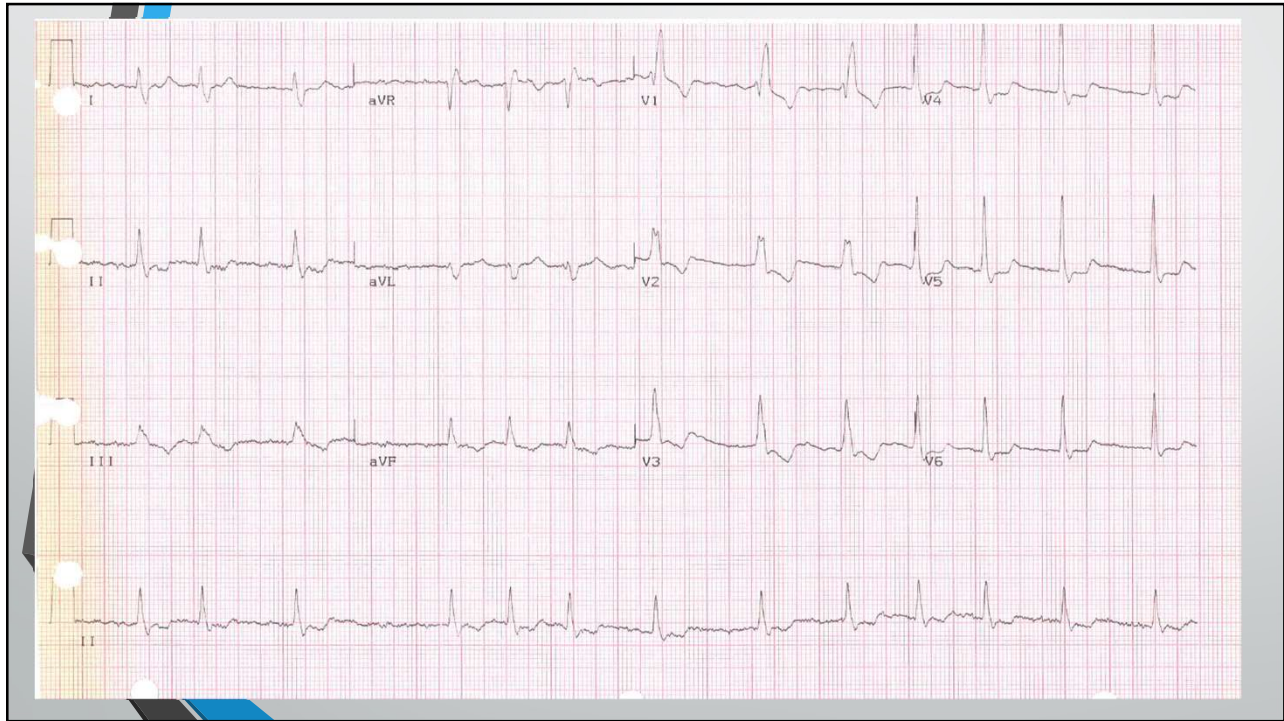


## Right Bundle Branch Block - RBBB

- QRS duration greater than 120 ms (3 boxes)
- The terminal wave in V1 is **POSITIVE** – heading toward the lead
- rsR 'Bunny ear' pattern in the anterior precordial leads (V1-V3)
- Slurred S wave in V5, V6. Also seen in I and aVL.

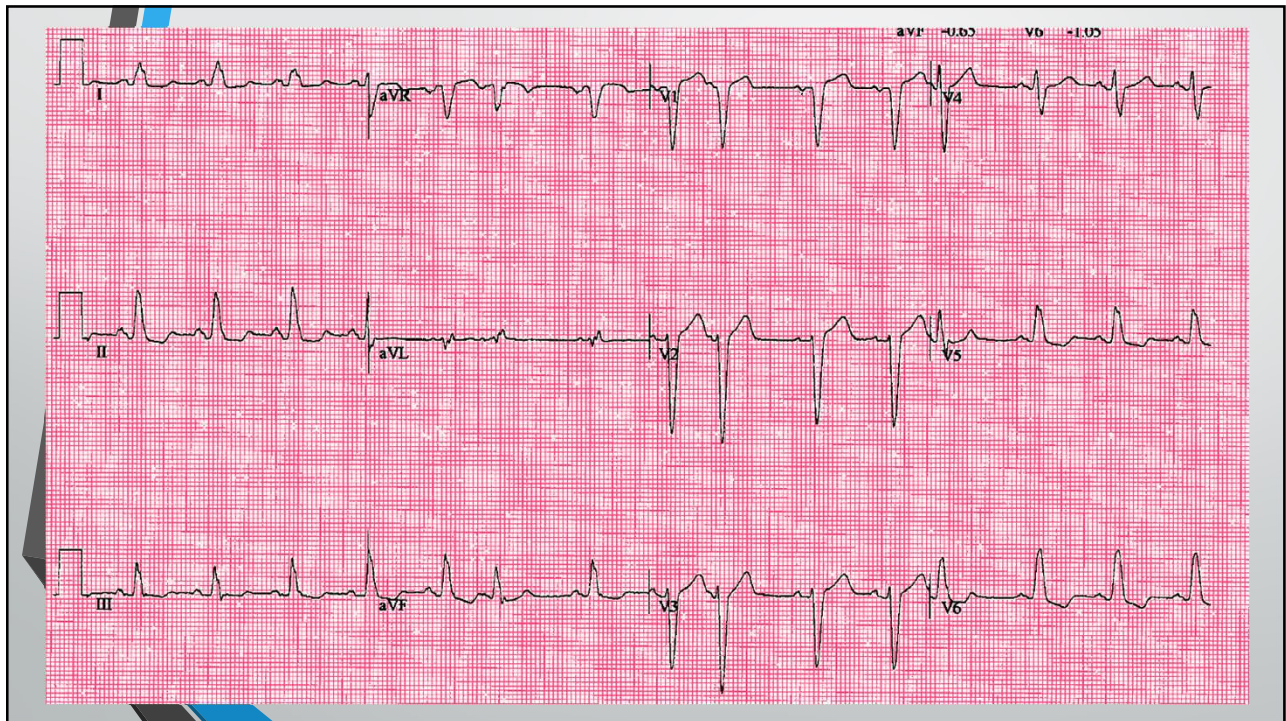
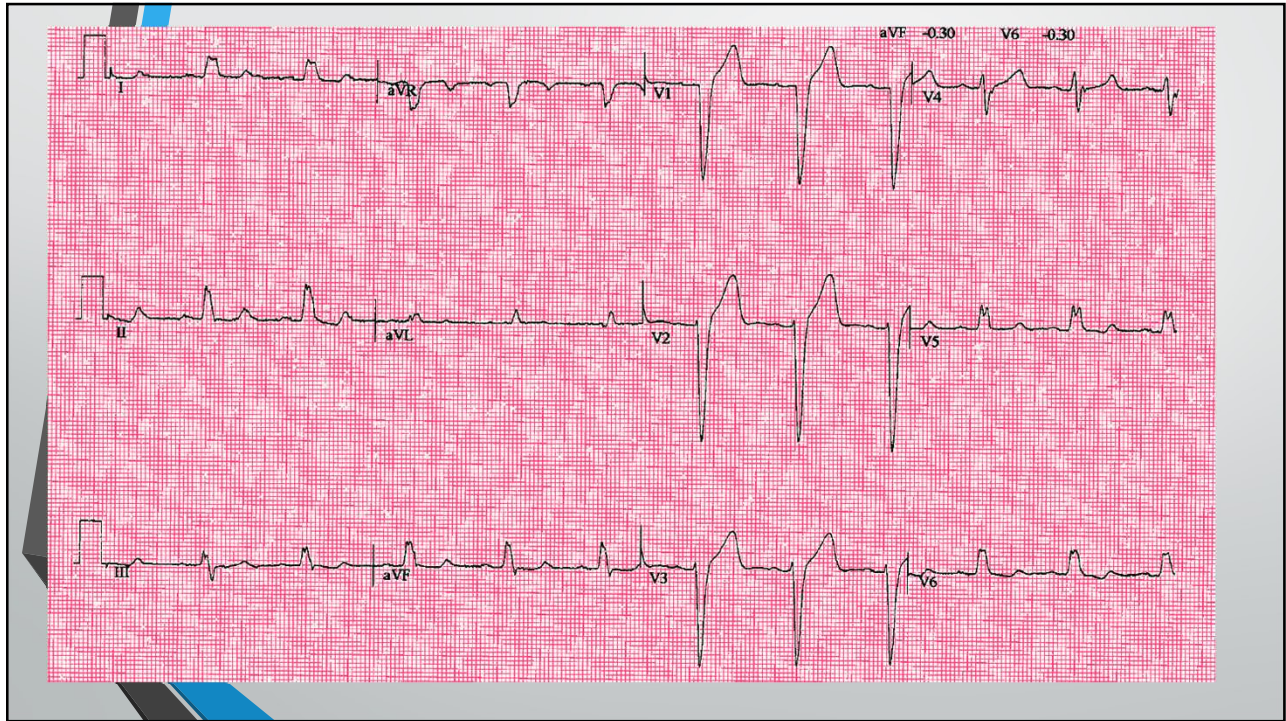






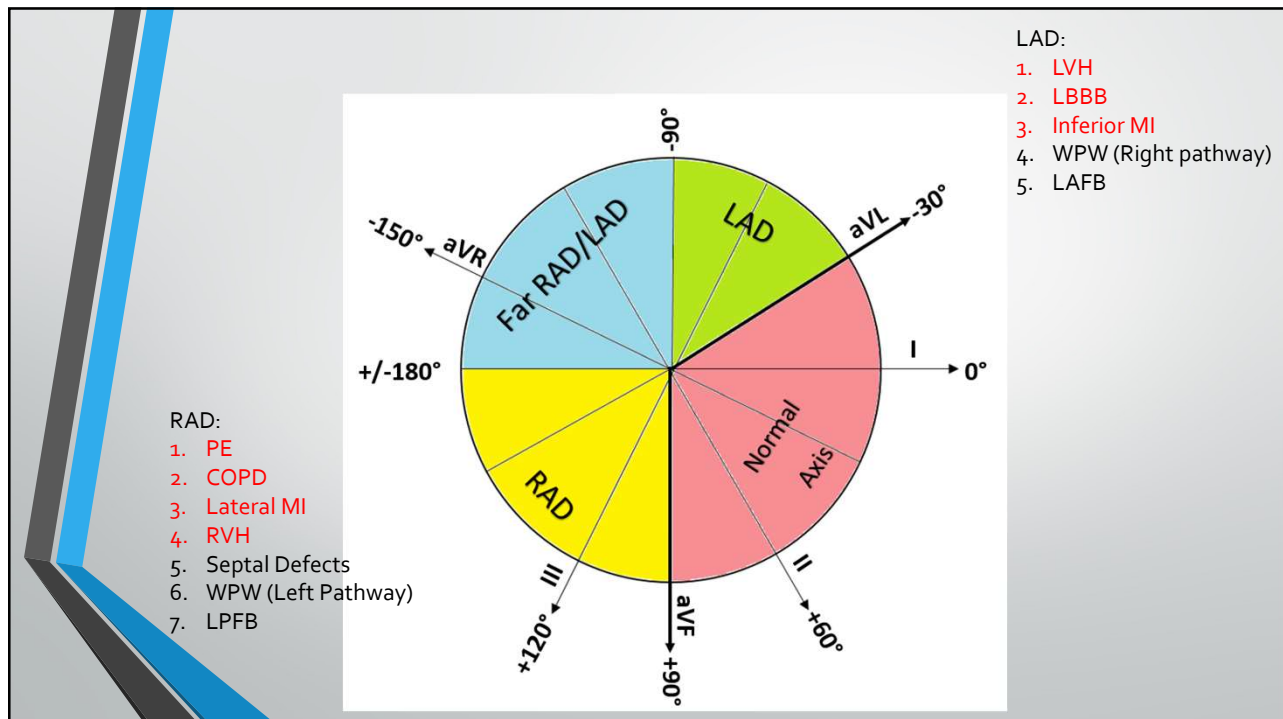
## LBBB

- QRS duration greater than 120 ms (3 boxes)
- The terminal wave in V1 is **NEGATIVE** – heading AWAY from the lead
- Broad monomorphic pattern in the anterior precordial leads (V1-V3)
- Broad monomorphic R waves V5, V6. Also seen in I and aVL.



Determining which patients require further action depends on EKG findings and context.

- What condition have you diagnosed on EKG?
- Is this a new finding?
- Does your patient have known heart disease?
- Does your patient have symptoms?



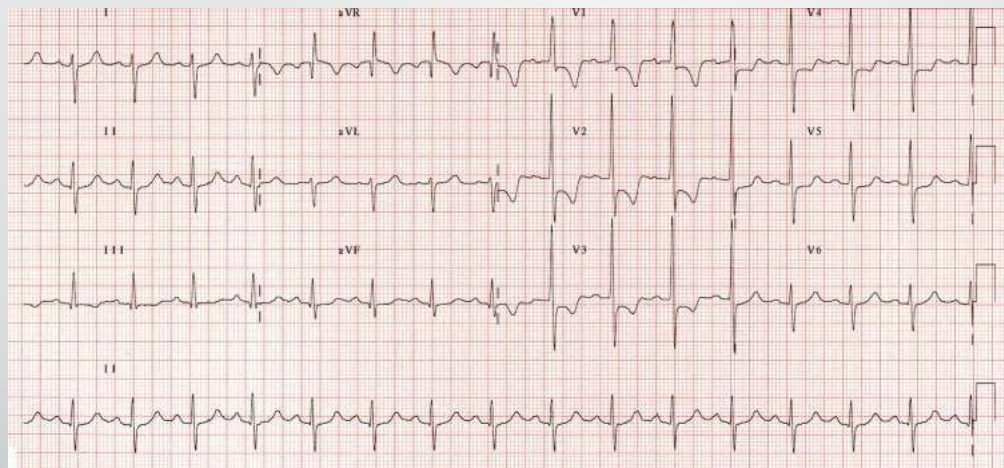
## RAD: Right Ventricular Hypertrophy

Criteria:

1. RAD  $> 110^\circ$
2. Dominant R wave in V<sub>1</sub> ( $> 7$  mm tall or R/S ratio  $> 1$ ).
3. Dominant S wave in V<sub>5</sub> or V<sub>6</sub> ( $> 7$  mm deep or R/S ratio  $< 1$ ).
4. *QRS duration  $< 120$  ms (i.e. changes not due to RBBB).*

*Clinical Pearl:*

*Do not diagnose in presence of RBBB*



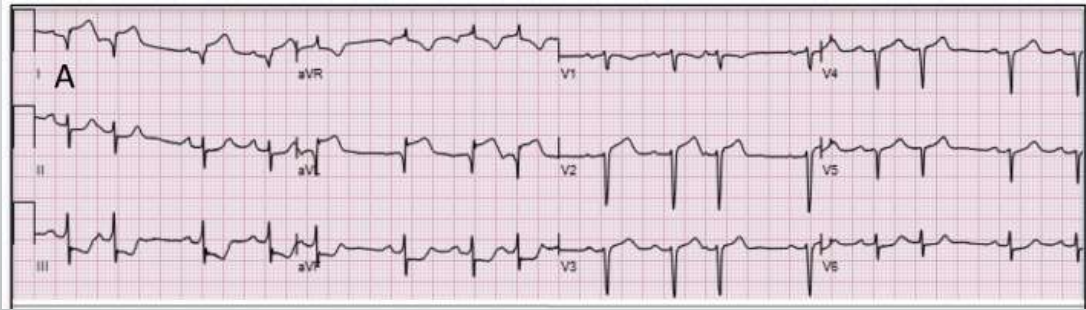
Right axis deviation ( $+150$  degrees).

Dominant R wave in V<sub>1</sub> ( $> 7$  mm tall; R/S ratio  $> 1$ )

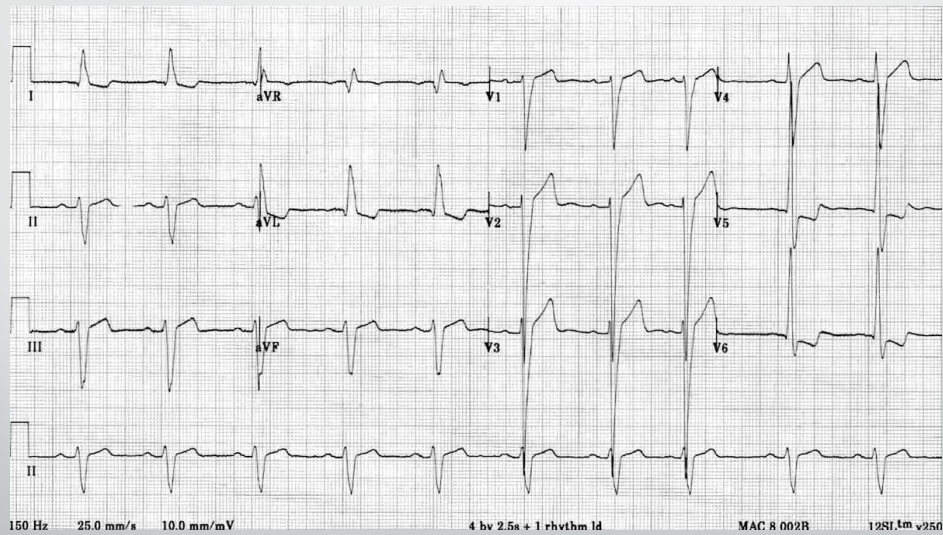
Dominant S wave in V<sub>6</sub> ( $> 7$  mm deep; R/S ratio  $< 1$ ).

Right ventricular strain pattern with ST depression and T-wave inversion in V<sub>1-4</sub>.

## RAD: Lateral MI

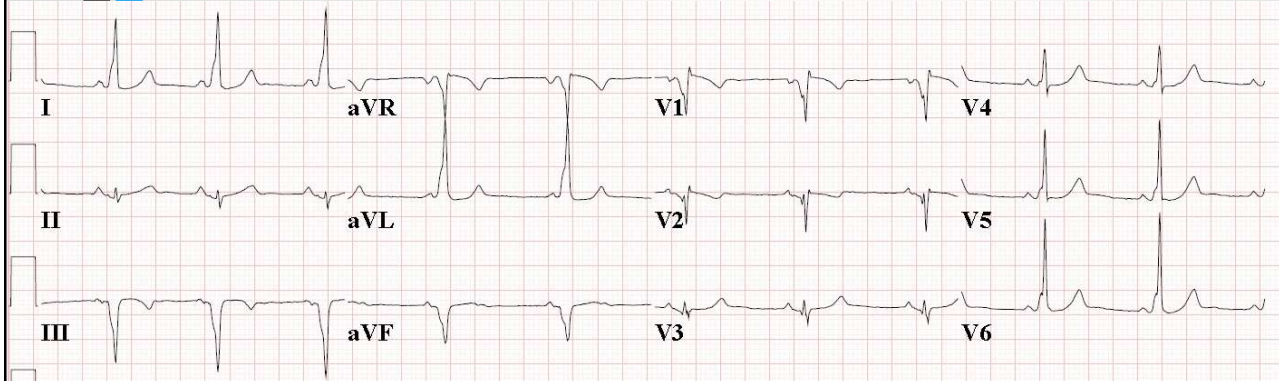


## LAD: Left Ventricular Hypertrophy

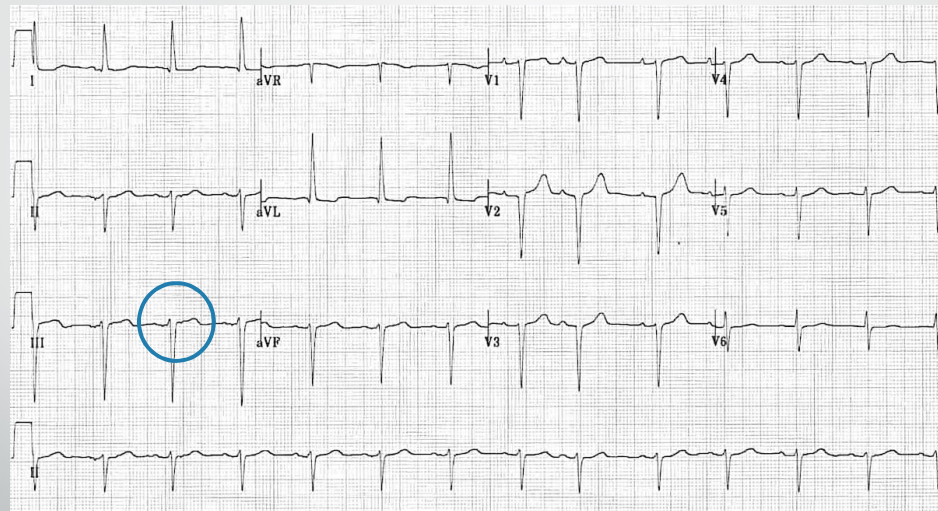


Apply voltage criteria!

## LAD: Old Inferior MI



## LAD: Left Anterior Fascicular Block



These are NOT Q waves!

# READ 'EM AND WEEP!

