

# 12 LEAD ECG

*Module Four – Hypertrophy*

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# Where are we so far?

- ▣ Module One – The “Starting Point”
- ▣ Module Two – Rate and Rhythm
- ▣ Module Three – Conduction
- ▣ **Module Four – Hypertrophy**
- ▣ Module Five – STEMI Part I
- ▣ Module Six – STEMI Part II
- ▣ Module Seven – Putting it all together
- ▣ Module Eight – Let’s look at some real STEMI’s

# Systematic Approach to Reading a 12 Lead ECG

- ▣ Rate
- ▣ Rhythm
- ▣ Conduction
  - Axis problem/Hemi-Block?
  - Bundle Branch Block?
- ▣ **Hypertrophy**
- ▣ ST/T Wave Changes
  - Ischemia, Injury, and/or Infarction?

# Question?

- ▣ Why do we check to see if the patient has a **left bundle branch block (LBBB)** before looking for ST/T wave changes?

*Because it is a common  
“false positive.”*

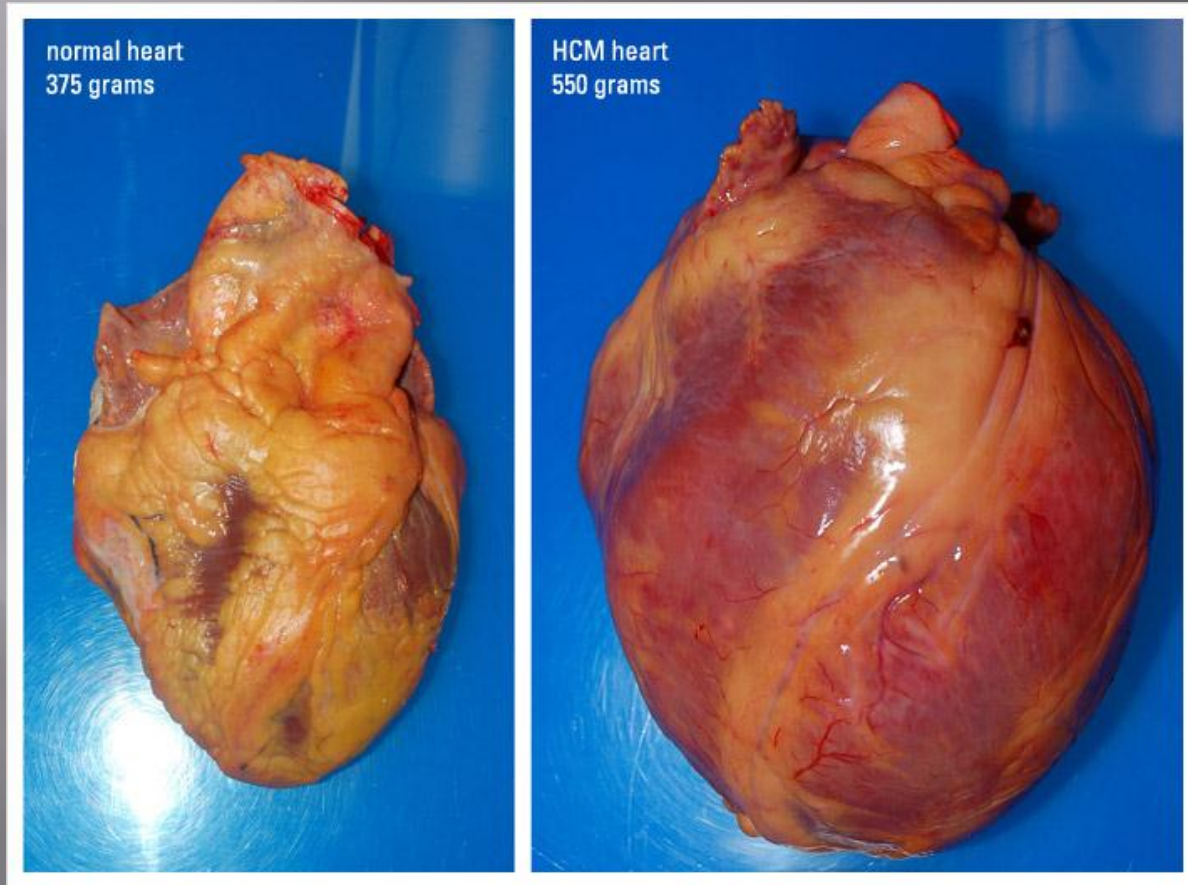
# What does “Hypertrophy” Mean?

Excessive development of an organ or part;  
*specifically*: increase in bulk (as by thickening of muscle fibers) without multiplication of parts

# Normal versus Hypertrophic?



# Normal versus Hypertrophic?



# Most common causes?

- ▣ Uncontrolled hypertension (most common)
- ▣ Valve problems (aortic stenosis)
- ▣ Congenital Heart Disease
- ▣ Cocaine use



# Universal Terminology

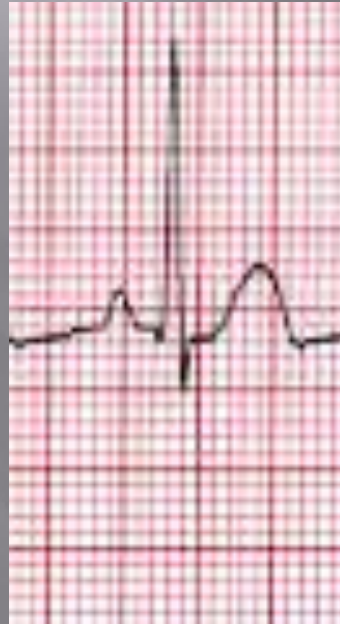
- ▣ Thickened Heart Tissue
  - Atria – Atrial “**enlargement**”
  - Ventricular – Ventricular “**hypertrophy**”

# How does this translate to the ECG?

Normal

Hypertrophy

19mm



26mm



Time

Electricity



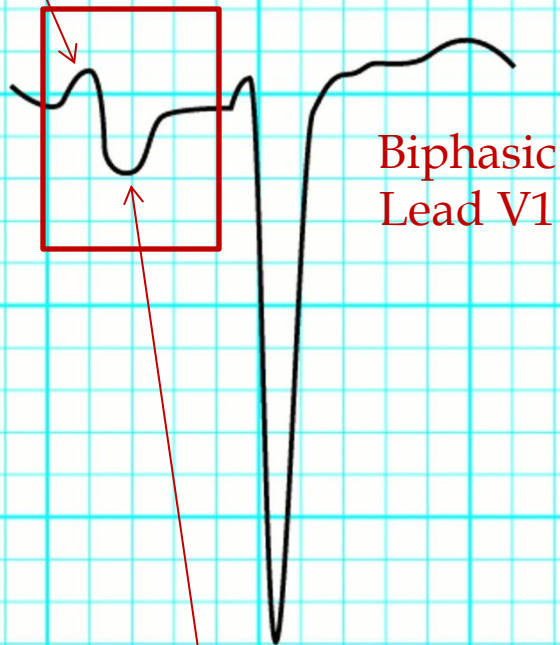
Source: J Clin Hypertens © 2005 Le Jacq Commun

# Identifying Hypertrophy...

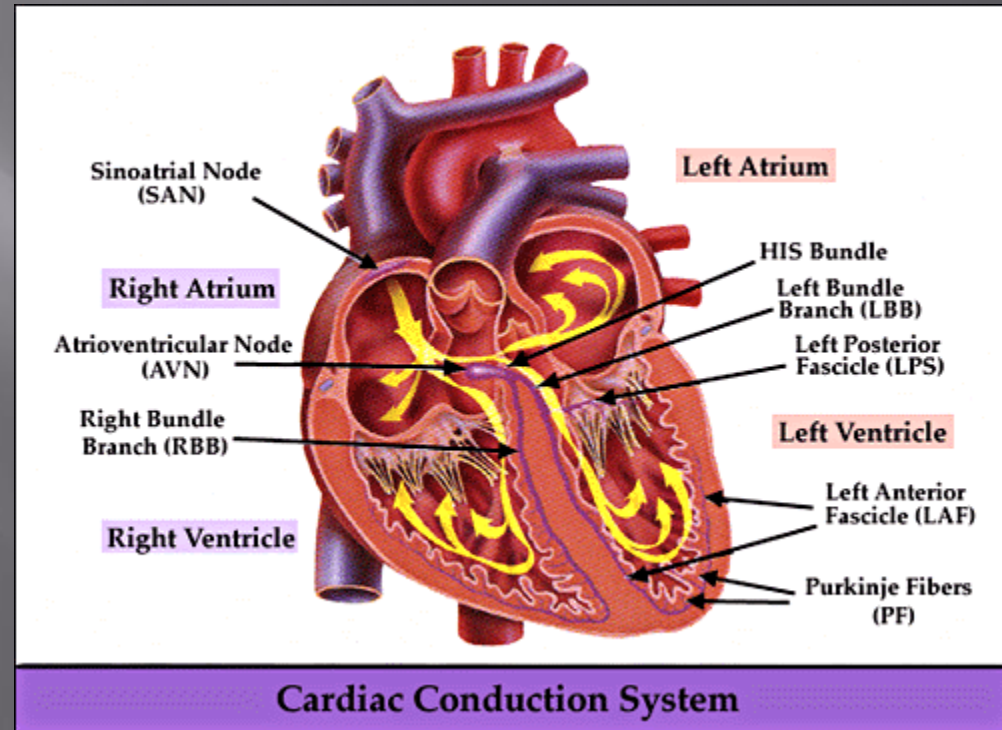
- ▣ Atrial Enlargement
  - Nice to know, but not paramount information
- ▣ Ventricular Hypertrophy
  - Right Ventricular Hypertrophy (RVH)
    - ▣ Often a challenge to identify
    - ▣ Doesn't cause as many problems as LVH
  - **Left Ventricular Hypertrophy (LVH)**
    - ▣ Easiest to identify
    - ▣ Most important to recognize

Right  
Atria

# Atrial Enlargement



Left  
Atria



# Atrial Enlargement



Left Atrial Enlargement is the most common

What is the most common cause of LAE?

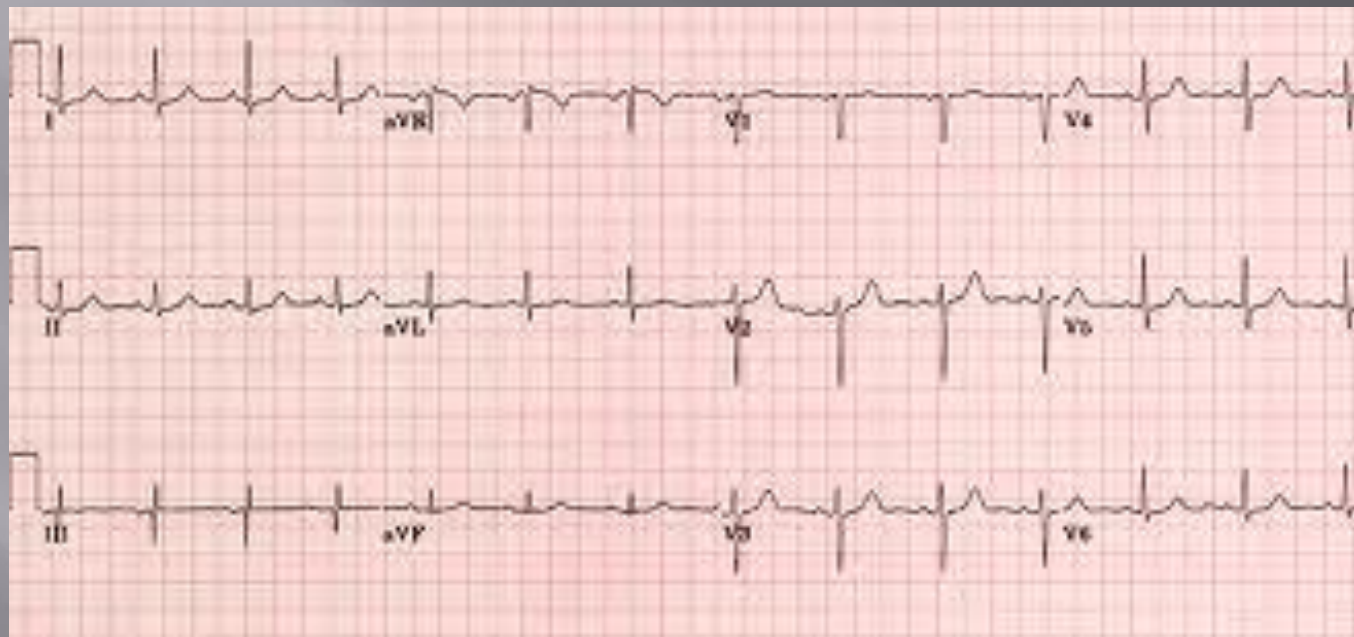
**Left Ventricular Hypertrophy**

# Right Ventricular Hypertrophy

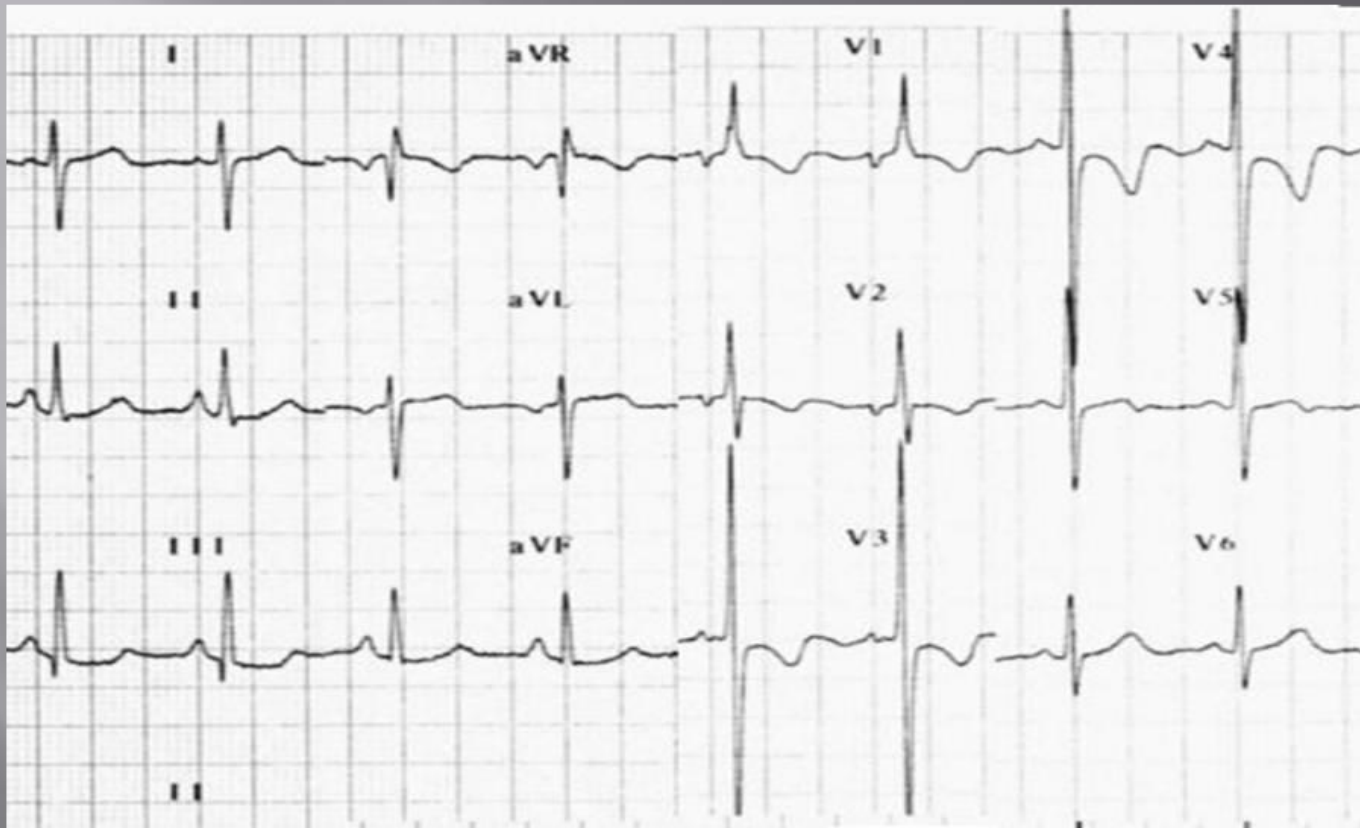
- ▣ Challenging to identify
- ▣ Generally not something we need to be concerned about
- ▣ Characterized by an irregular R Wave progression in the chest leads
- ▣ **May lead to irregular ST/T Wave changes**



# Normal Polarity



# Right Ventricular Hypertrophy



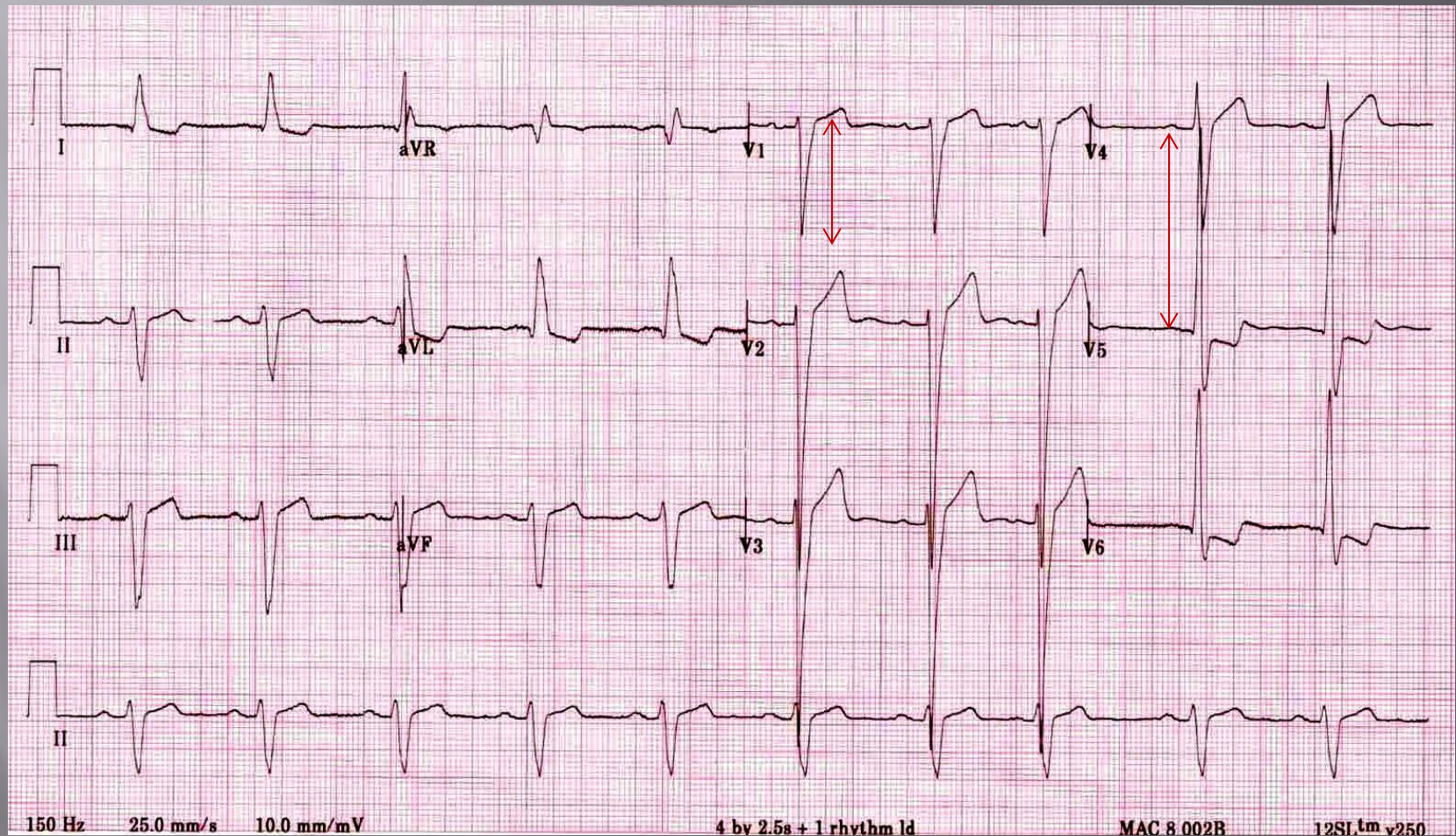
Right Ventricular Hypertrophy



# Left Ventricular Hypertrophy

- ▣ Absolute Criteria
  - Lead V1 (S Wave) + lead V5 (R Wave) = greater than 35mm?
- ▣ Subjective Criteria
  - ▣ “Really big” QRS Complexes in V5 and V6
- ▣ **Can create ST/T Wave changes that look like STEMI's.**

# Left Ventricular Hypertrophy



V1 is 22mm + V5 is 35mm = 57mm

What is this called?

Strain Pattern

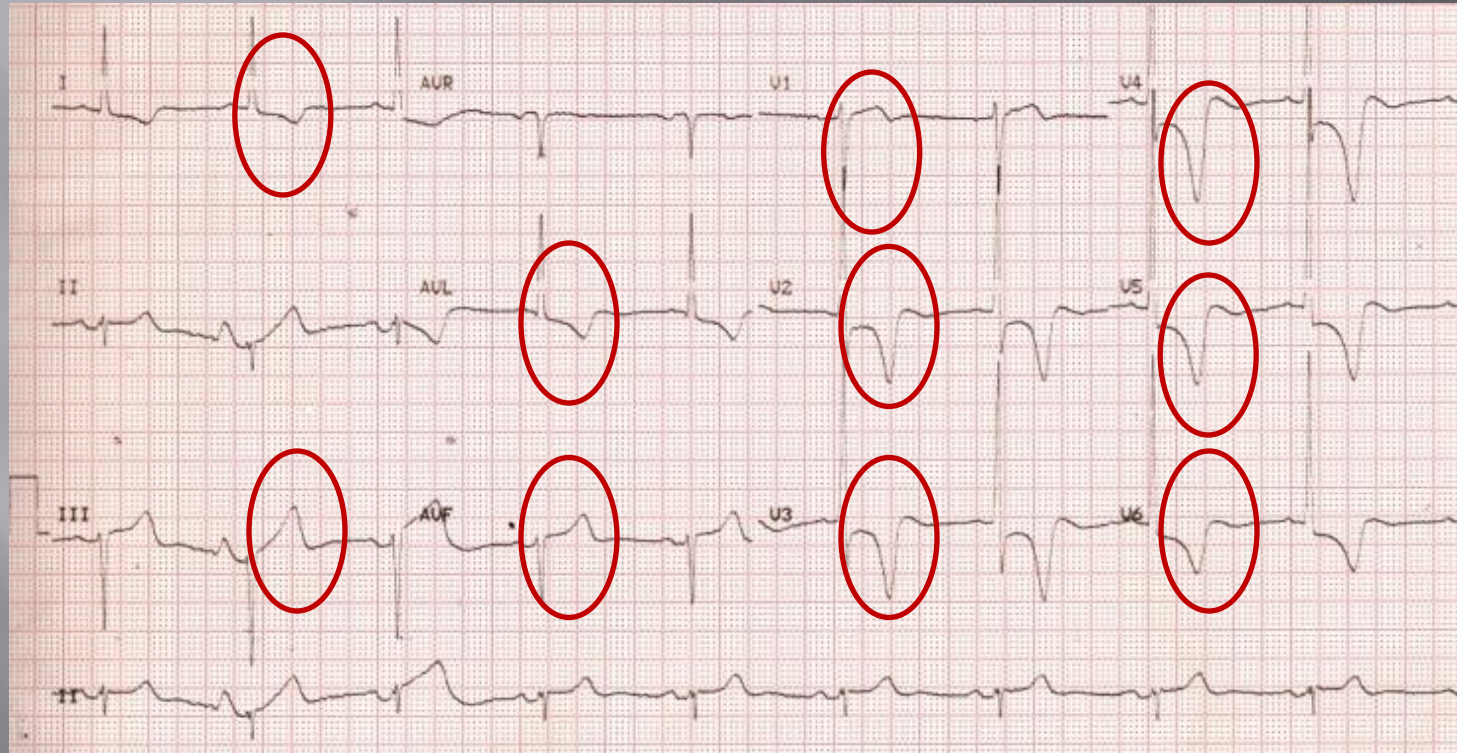




# A Look at Strain Patterns...

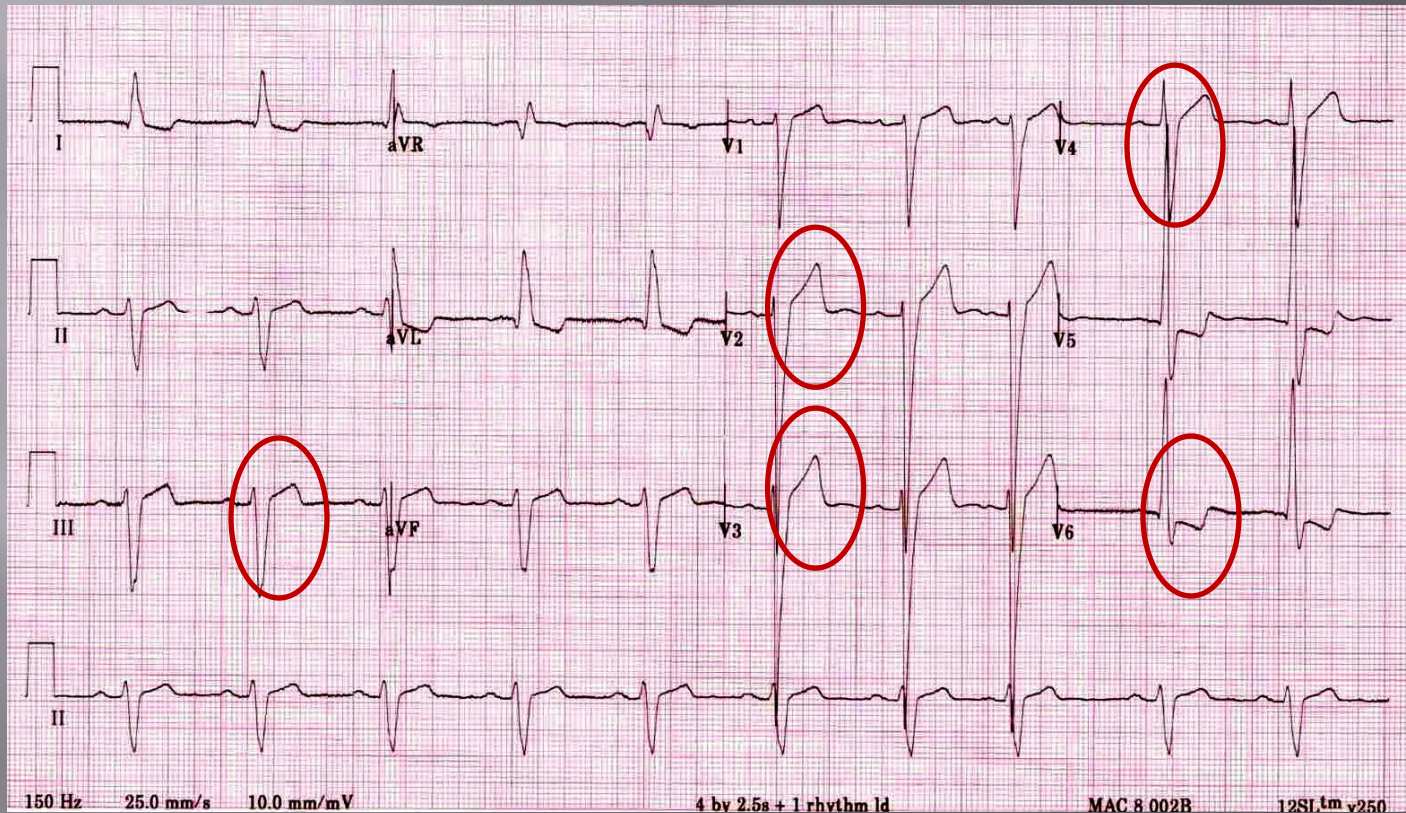
- ▣ If the heart “strains” to depolarize, eventually, it will “strain” to repolarize.
- ▣ Not all strain patterns look the same.
- ▣ Common cause of “false positives.”

# A Look at Strain Patterns...





# A Look at Strain Patterns...



# A Look at Strain Patterns...



Could this be an MI?

What does this patient look like? What is their complaint?

# Question?

- ▣ Why do we check to see if the patient has **ventricular hypertrophy** before looking for ST/T wave changes?

*Because it is a common  
“false positive.”*



# Summary

- ▣ Hypertrophy, in particularly LVH, can cause “strain patterns” that lead to ST/T wave changes.
- ▣ Look at the big picture...
  - Why was a 12 lead performed?
  - Does it make sense?

Questions?