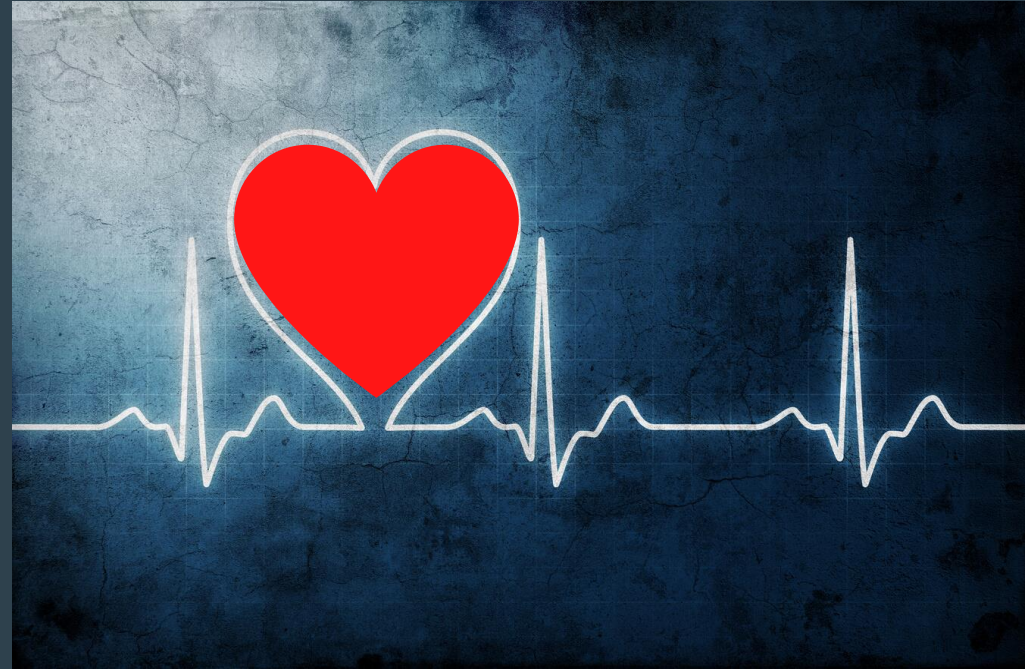


# ACS Workshop



Jennifer Carlquist

# Disclosures



**TACOS.**

-I like them.

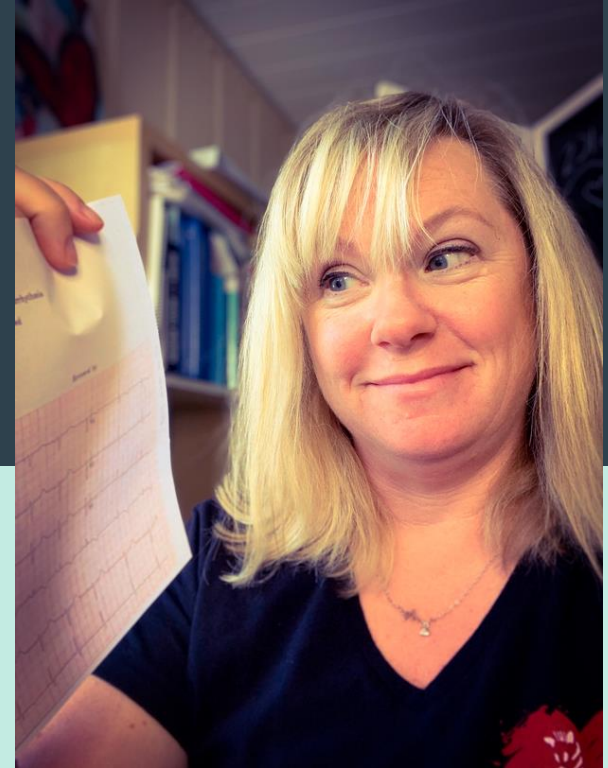
# Objectives

REVIEW **STEMI** DEFINITION

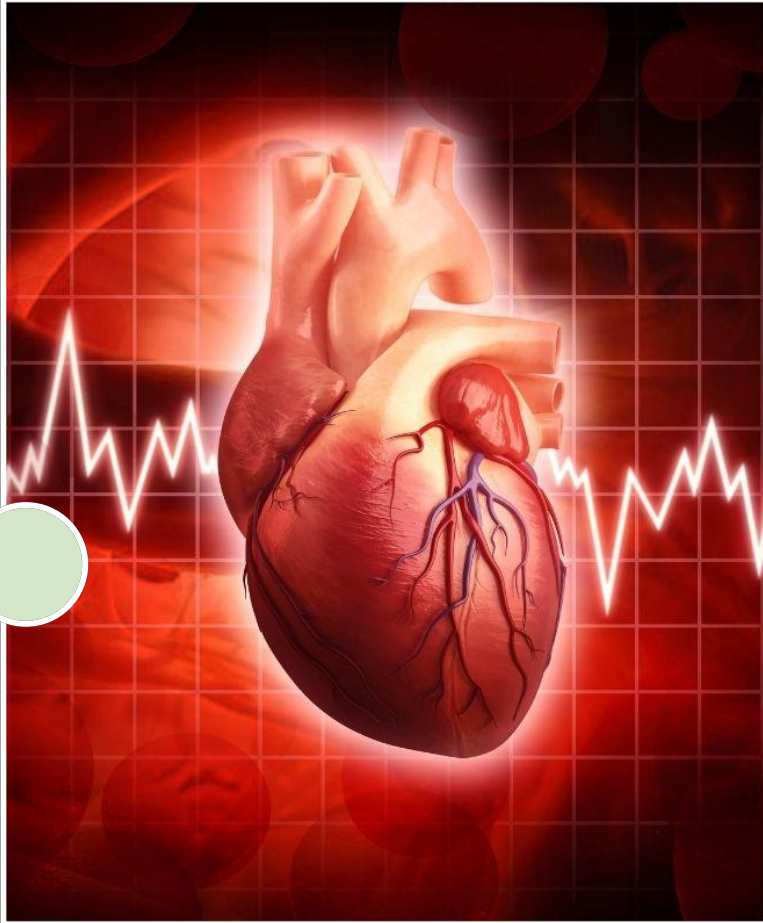
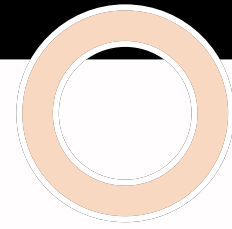
REVIEW ACTUAL **CASES**

REVIEW DIFFERENT **ACS** PRESENTATIONS

DISCUSS MANAGEMENT



# Flavors of heart disease



**ANGINA**

**UNSTABLE ANGINA**

**NSTEMI**

**STEMI**





# How can you sort it out?

Definitions:

## **ANGINA?**

Exertional, lasts less than 5 minutes, gets better with rest.

## **UNSTABLE ANGINA?**

Occurs even at rest

Longer than 30 minutes or longer, may not disappear with

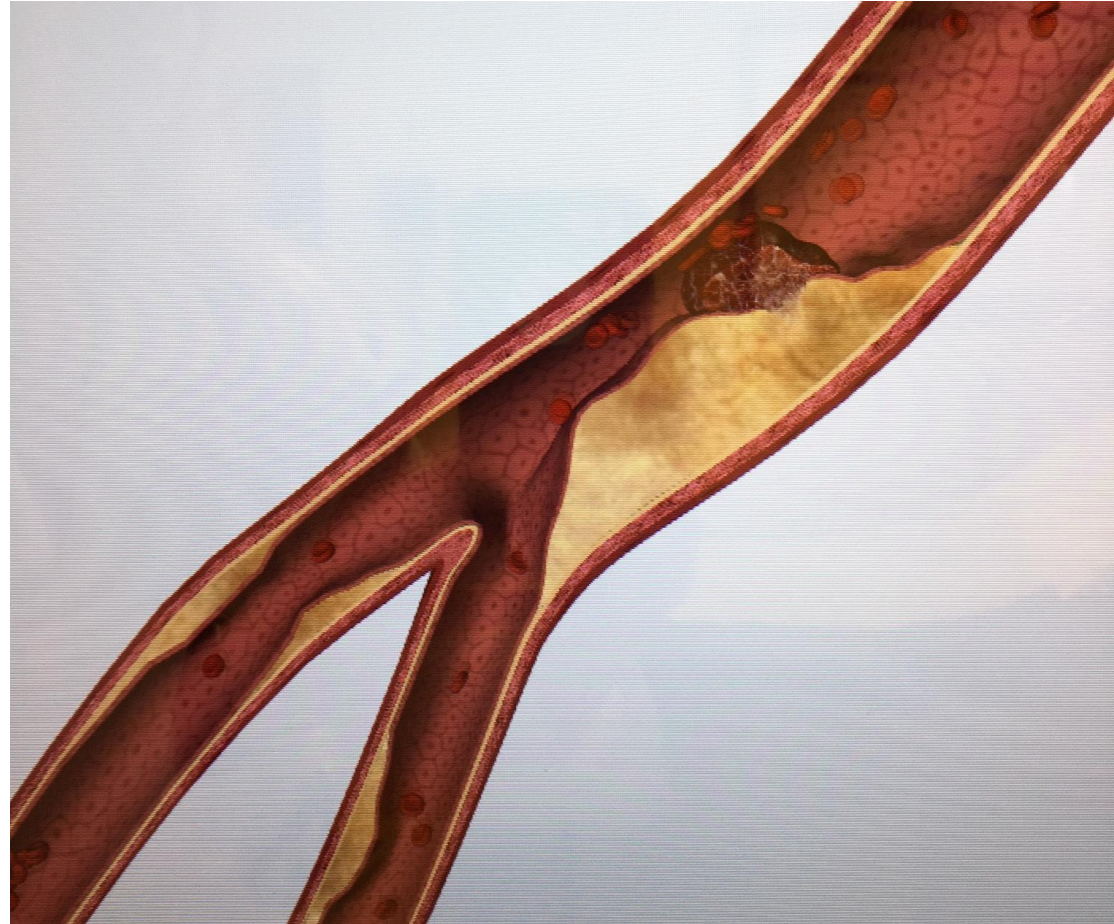
Nitro may not help angina

## **STEMI?**

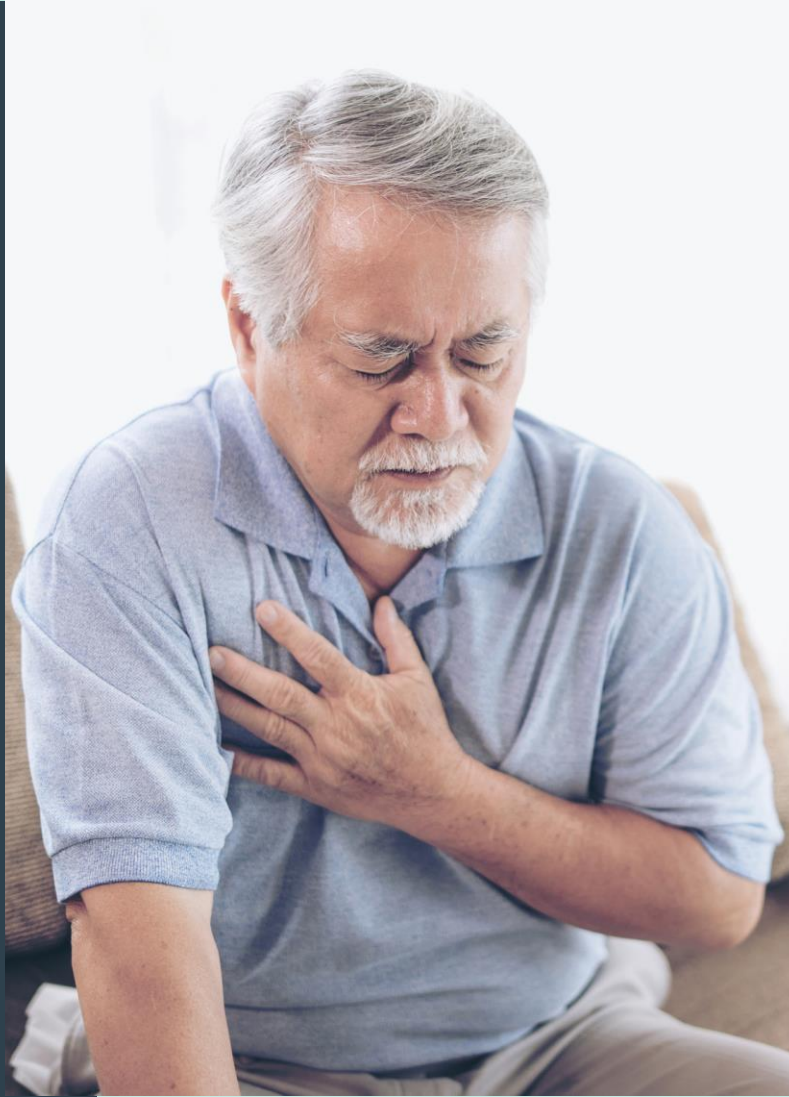
ST elevation plus biomarkers increased

# CAD is a continuum

- Angina
- Unstable Angina
- Ischemia
- NSTEMI
- **STEMI**



# Ischemia on film



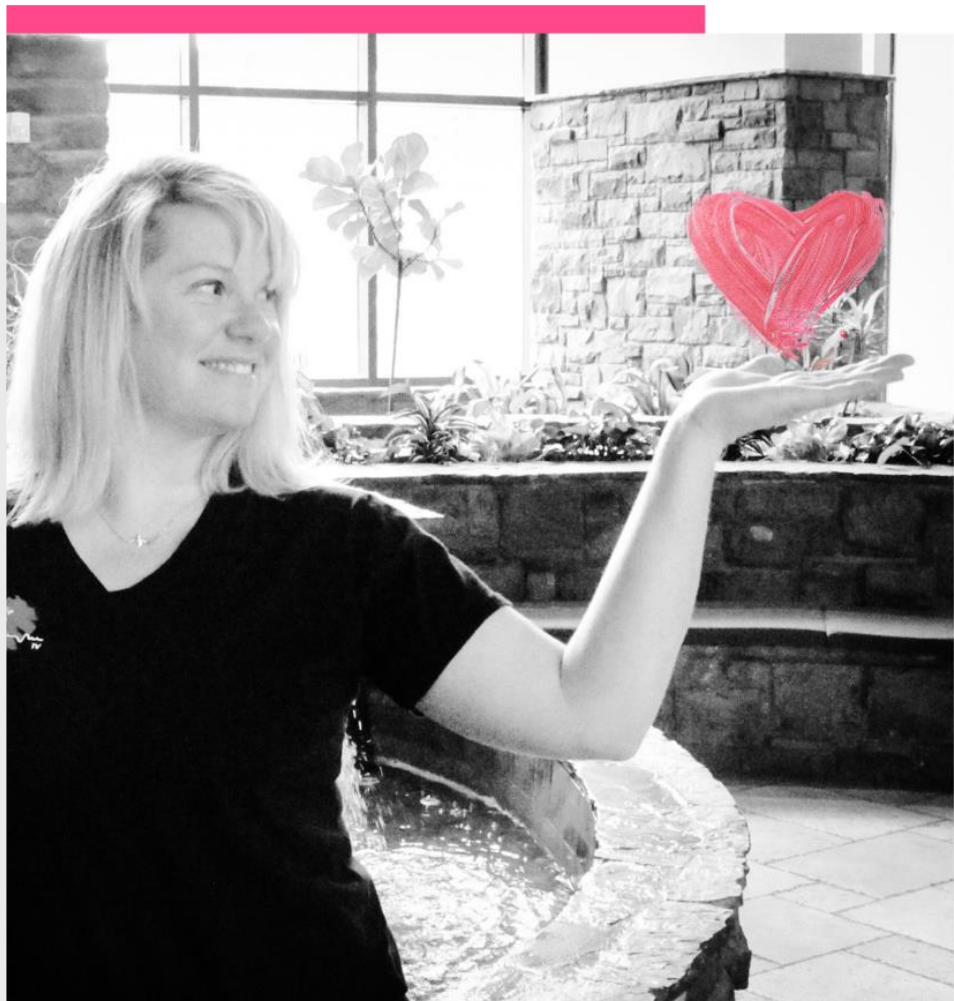
- ~50% OF PEOPLE **NORMAL**
- T WAVE OR ST SEGMENT CHANGE (DEPRESSED, ELEVATED, FLIPPED)
- NSSTW
- NEW BBB



# What is considered a STEMI?

- ▶ 2 or more contiguous leads have ST elevation +  
Measured at the J joint...
- ▶ **> 1mm** (1 small box) of ST elevation (except V2/V3)
- ▶ V2/V3 → **≥ 2mm** (men > 40 yo), **≥ 2.5mm** (men < 40 yo)  
→ **≥ 1.5mm** for women
- Reciprocal changes!
- REMEMBER → New or presumed new LBBB = MI





# CASE

#1



71 Y/O M

# Chest pain

**P** - *Lifted a heavy box*

**Q** - *"Like my last MI"*

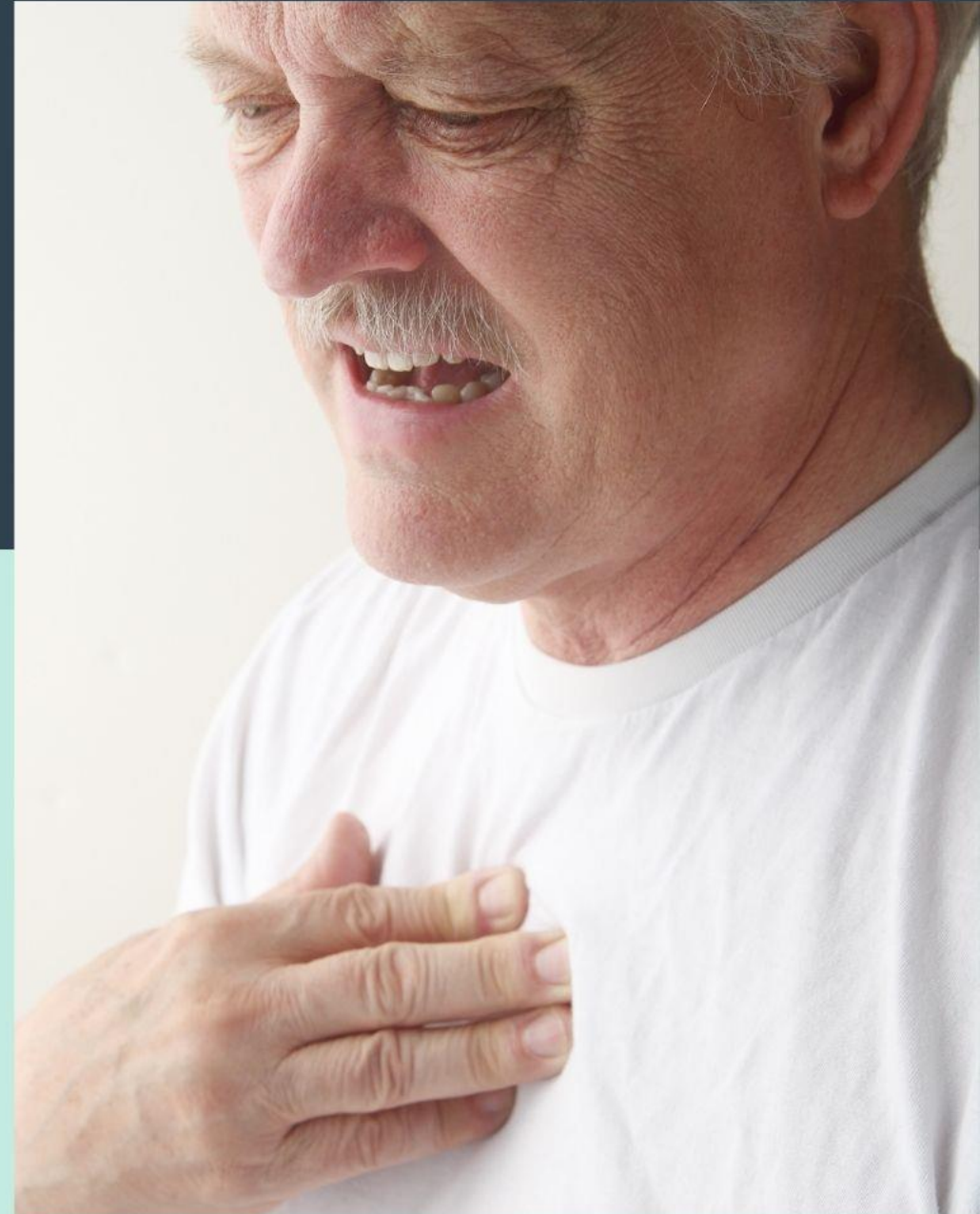
**R** - *Jaw, back, left arm*

**S** - *7/10*

**T** - *3 days worse this morning*

**PMHx:** HTN, DM, cardiac stents

*Lightheaded*



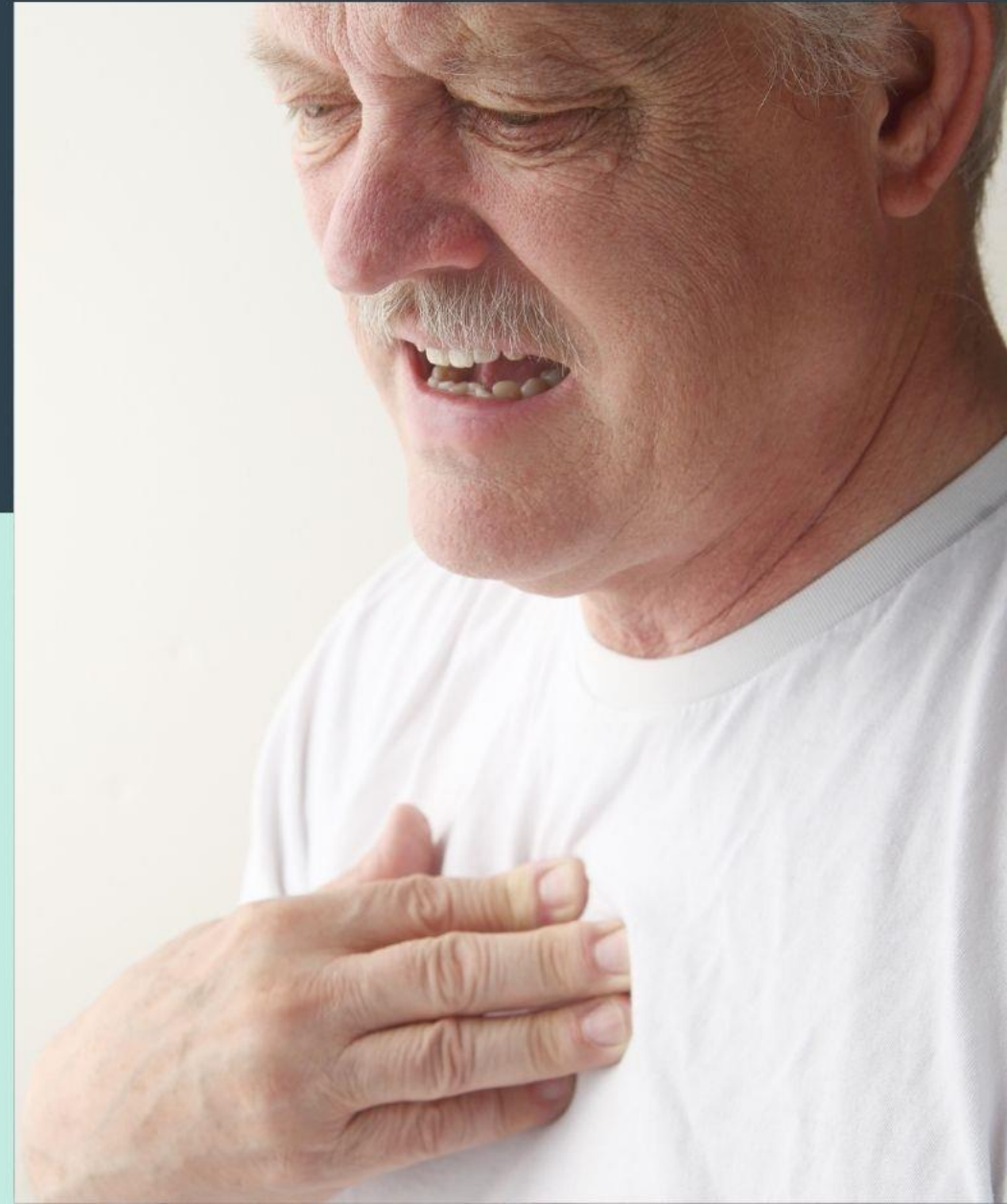
# More on him

**VS:** 68/40, HR: 40 RR: 20 O2 sat 95%

## **Labs:**

**TC:** 108 **Tri:** 100 **HDL:** 22 **LDL:** 25

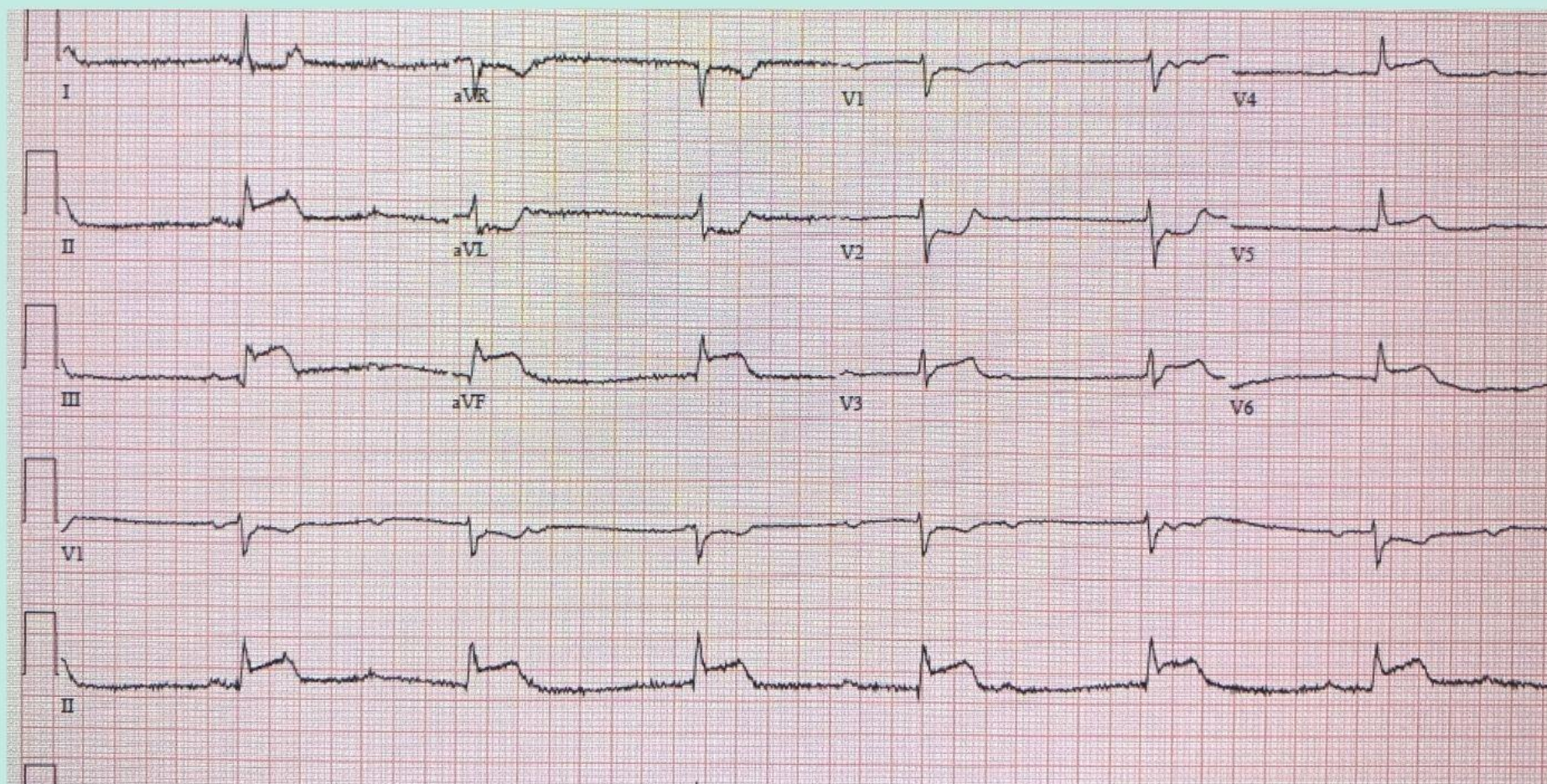
**Trop:** 6.058







# His EKG





# DO YOU AGREE?

JUNCTIONAL BRADYCARDIA  
INFERIOR INFARCT ACUTE  
LATERAL INJURY PATTERN  
**\*\* \*\* ACUTE MI / STEMI \*\* \*\***

Consider right ventricular involvement in acute  
inferior infarct





# His Echo



Left ventricular chamber size is mildly dilated.

There is mild concentric left ventricular hypertrophy.

Ejection fraction is visually estimated at 20-25%, severely globally decreased.

Indeterminate diastolic function.

Normal left atrial size.

Normal right ventricular size and function.

Normal right atrial size.

Cardiac valves are structurally normal. Trace TR noted.

The pericardium is normal.

## The aorta is normal in size.



# CASE

#2

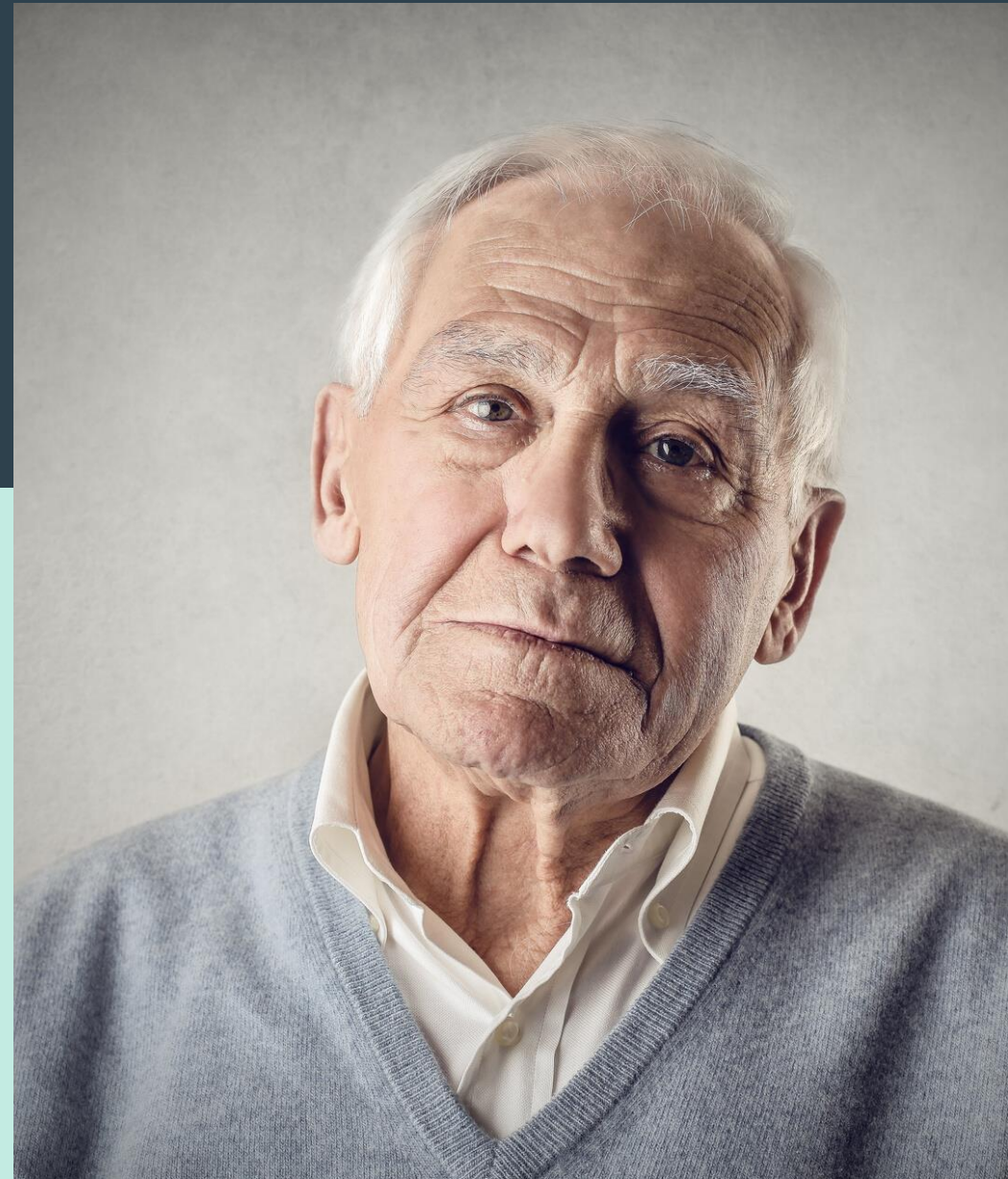




71 Y/O MALE

# "I feel shaky"

**Pmhx:** HTN (Normal BP 120)  
DM (My sugars have been high),  
Previous stent RCA  
HLD on Atorvastatin  
**Meds:** ASA, Lisinopril, Lipitor,  
metoprolol  
**VS:** 72/40, HR 46, RR 12





# "Feels like my last MI"

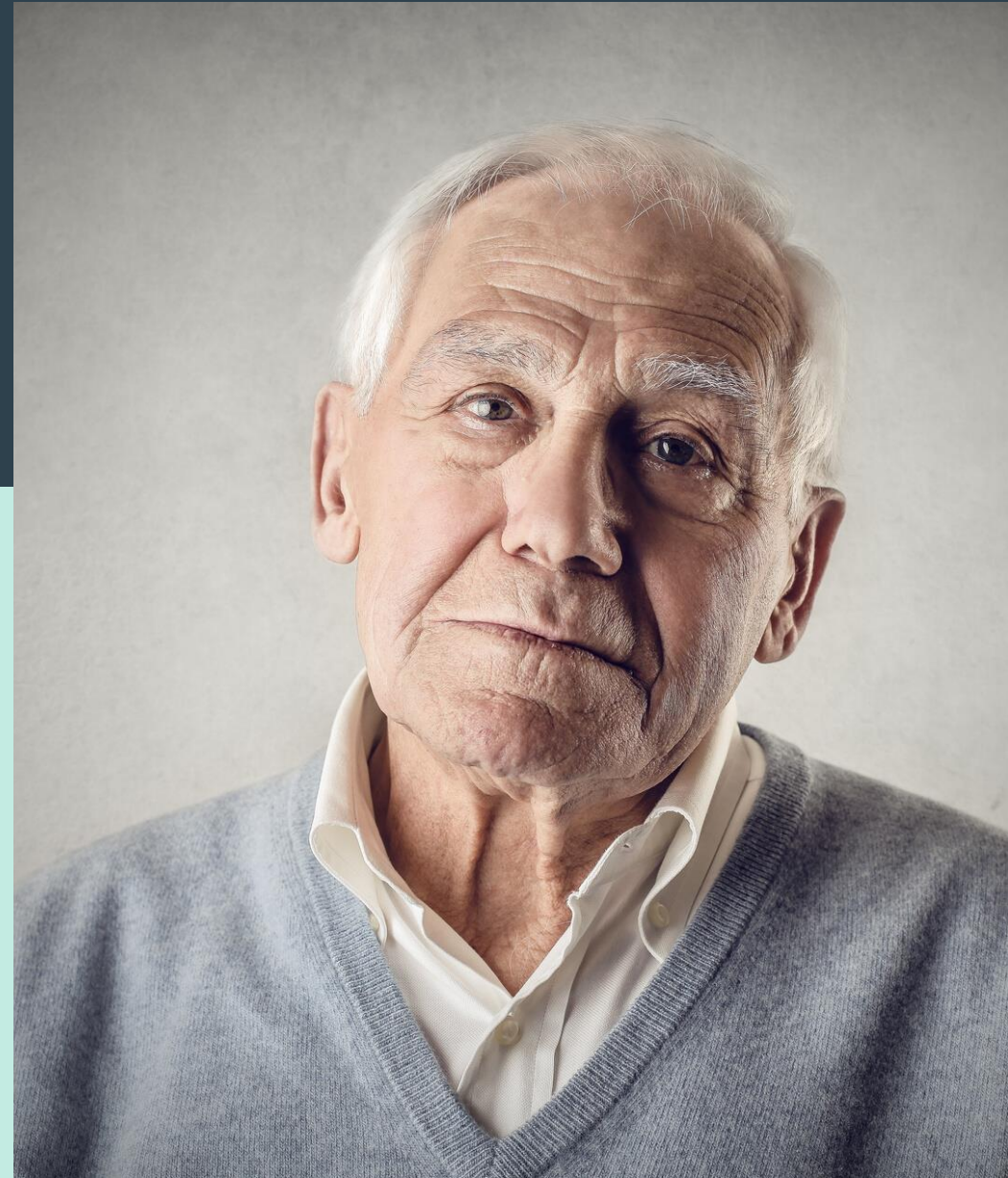
*P - Going up stairs*

*Q - "Discomfort"*

*R - Jaw, back, upper arm*

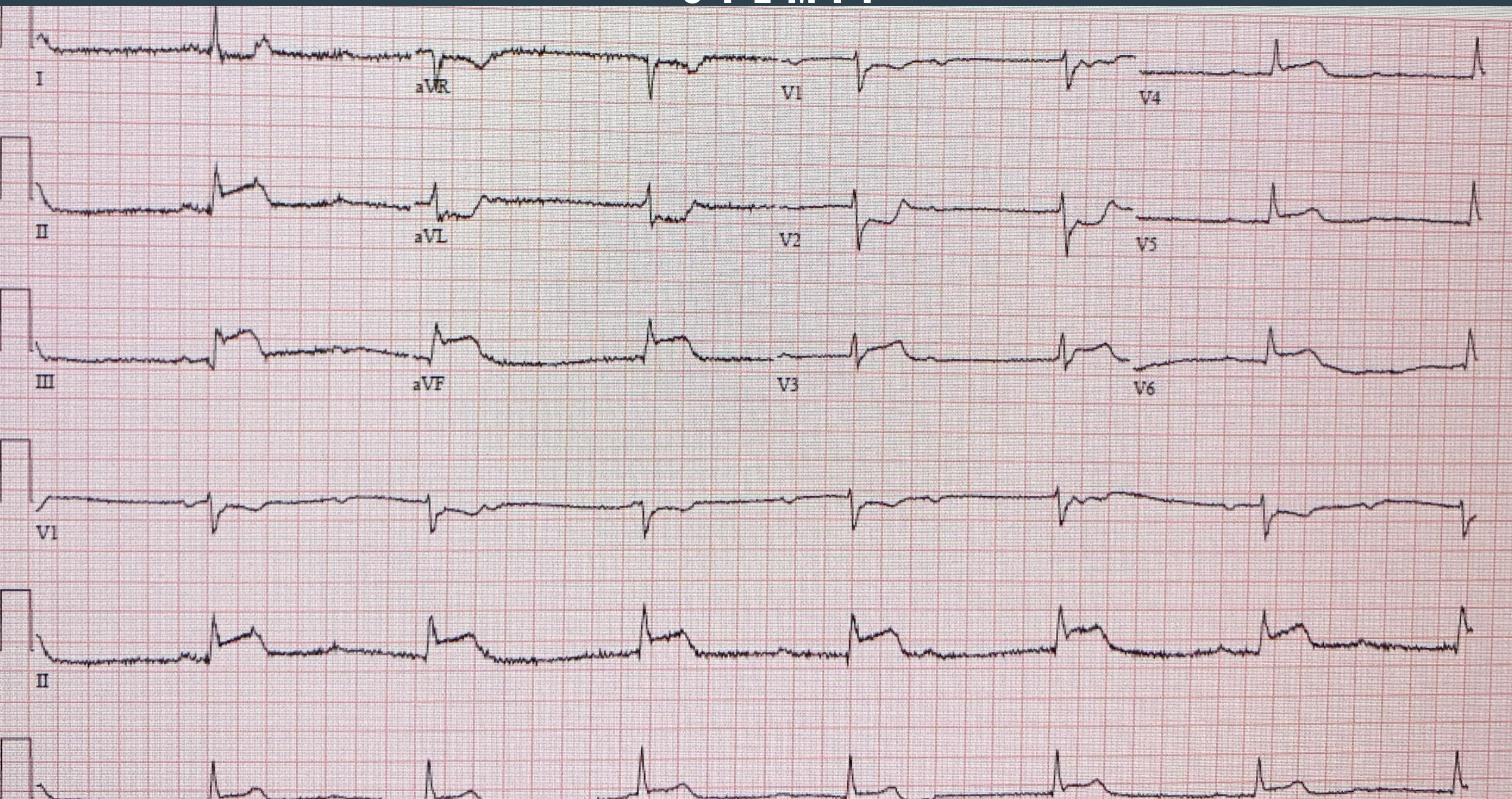
*S - 7/10*

*T - A few days got worse today*





# STEMI?





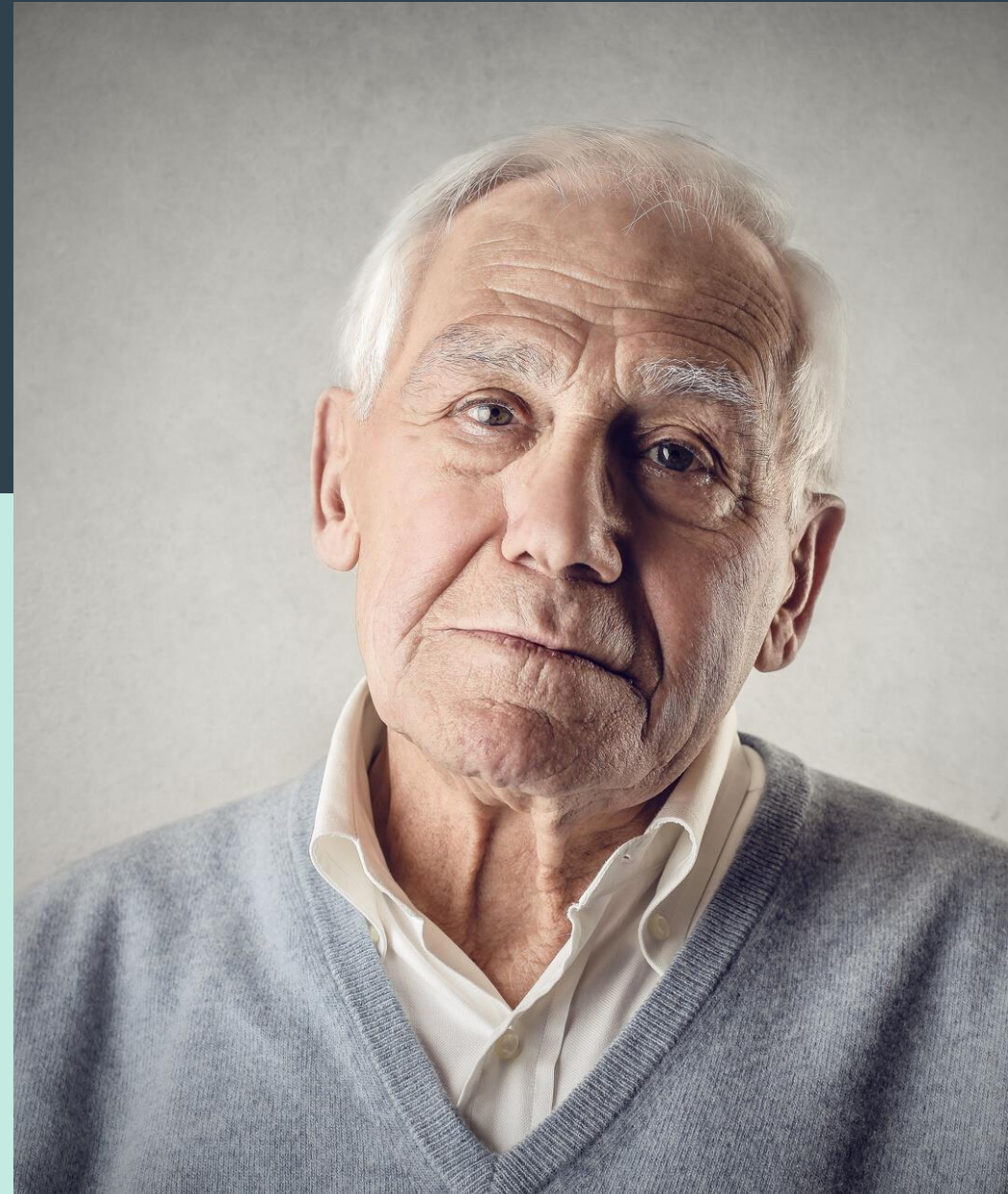
# Cath Report

**Circ:** Prox CX: Mid subsection 40%

**LAD:** Normal.

**Prox RCA:** Distal subsection. **100%** stenosis

**LMCA:** Normal.





# CASE

#3



54 y/o male with chest pain



# 54 y/o M who has chest pain

- *P – unprovoked*
- *Q- pressure*
- *R – Left arm, jaw, neck, head*
- *S – 8/10. Dyspnea, diaphoresis at home*
- *T – Intermittent for four days*



# 54 y/o M who has chest pain

- PMH: None
- Meds: None
- SH: Lives with girlfriend, wife lives in Mexico. Drives a tractor
- Hasn't seen a doctor in 20 years +
- Former smoker, drinks 12 beers a day

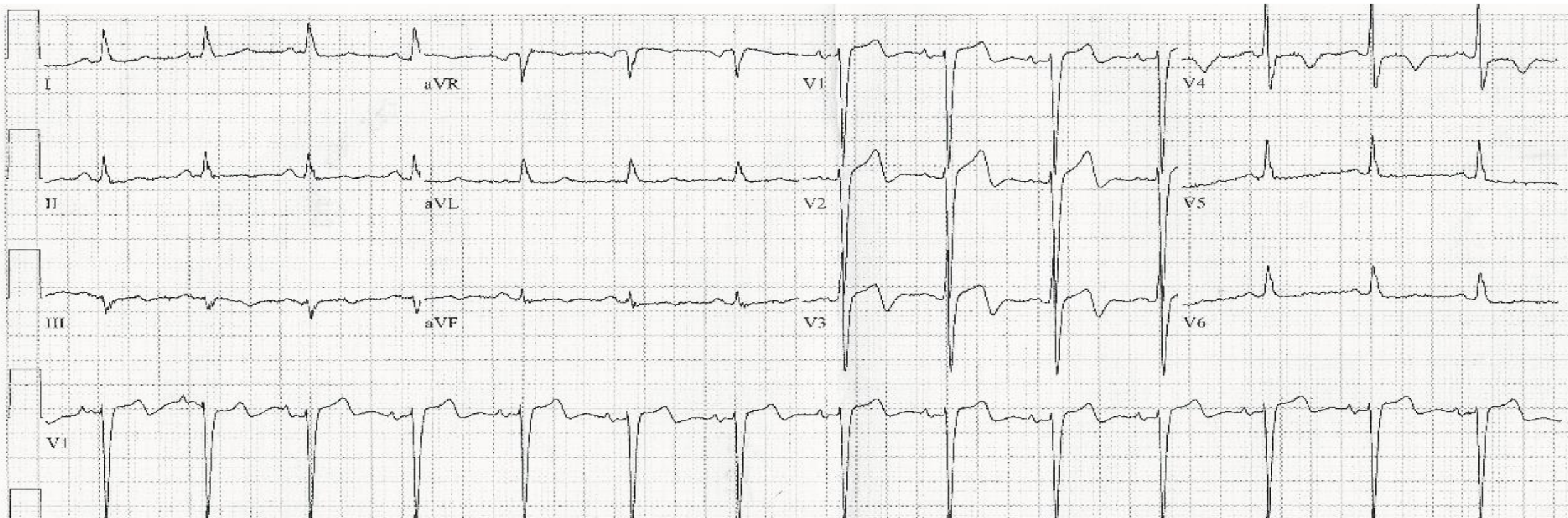




# 75% stenosis on LAD

Vent. rate	86	BPM
PR interval	140	ms
QRS duration	100	ms
QT/QTc	410/490	ms
P-R-T axis	56 9	-26

NORMAL SINUS RHYTHM  
T WAVE ABNORMALITY, CONSIDER ANTERIOR ISCHEMIA  
PROLONGED QT  
ABNORMAL ECG  
NO PREVIOUS ECGS AVAILABLE







# CASE

#4



70 y/o male with neck pain

# "My neck hurts"

**70:** Y/O M  
**PMHX:** NONE

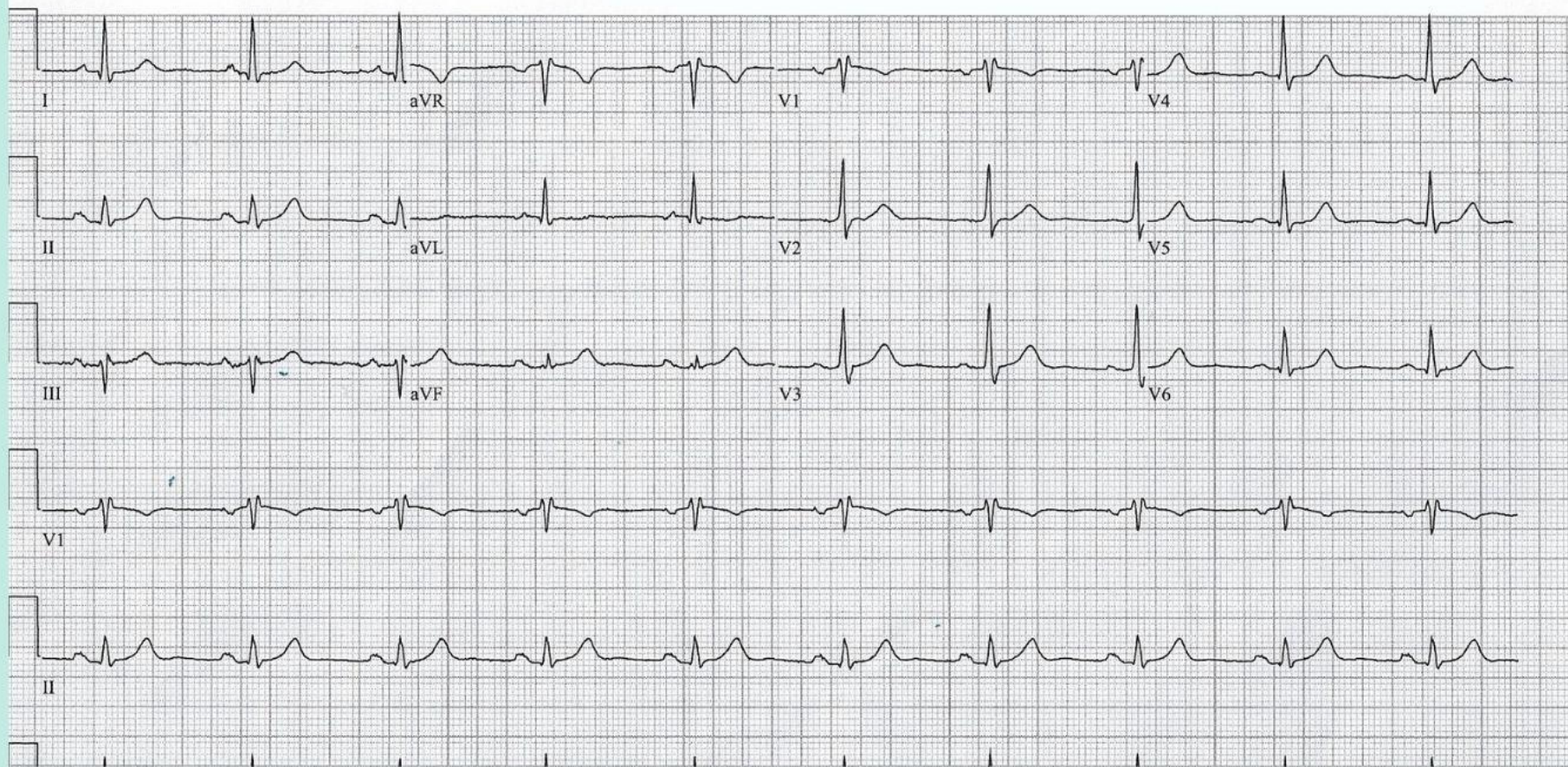




# "His EKG"

PR interval 174 ms  
QRS duration 106 ms  
QT/QTc 438/438 ms  
P-R-T axes 54 0 61

INCOMPLETE RIGHT BUNDLE BRANCH BLOCK  
BORDERLINE ECG  
NO PREVIOUS ECGS AVAILABLE







# CASE

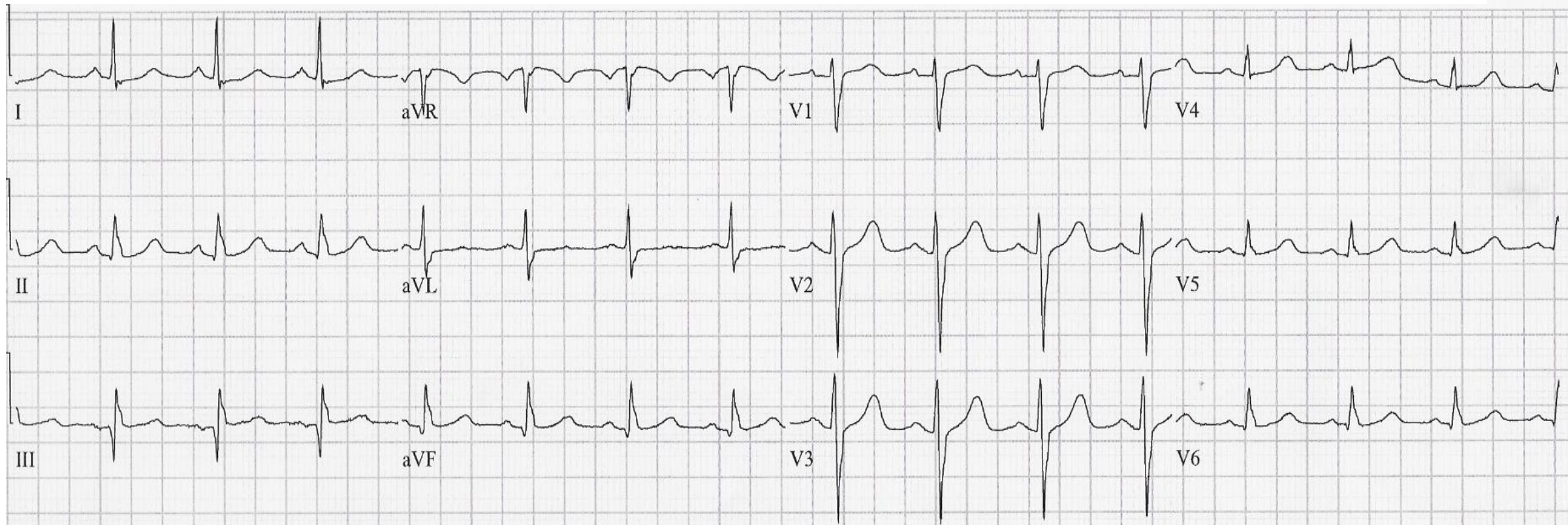
#5



24 y/o female with chest pain

Vent. rate 90 BPM  
PR interval 154 ms  
QRS duration 88 ms  
QT/QTc 382/467 ms  
P-R-T axes 25 32 67

NORMAL SINUS RHYTHM  
CANNOT EXCLUDE INFERIOR INFARCT (CITED ON OR BEFORE 1  
AB NORMAL ECG  
WHEN COMPARED WITH ECG OF   
QT HAS LENGTHENED



*Why*

*did you get an EKG on that  
24 year old?*



# "They didn't listen to me!"

- BIB ems – unresponsive – **BG 30** – dextrose IV  
On dialysis, diabetic, htn, anemia

•

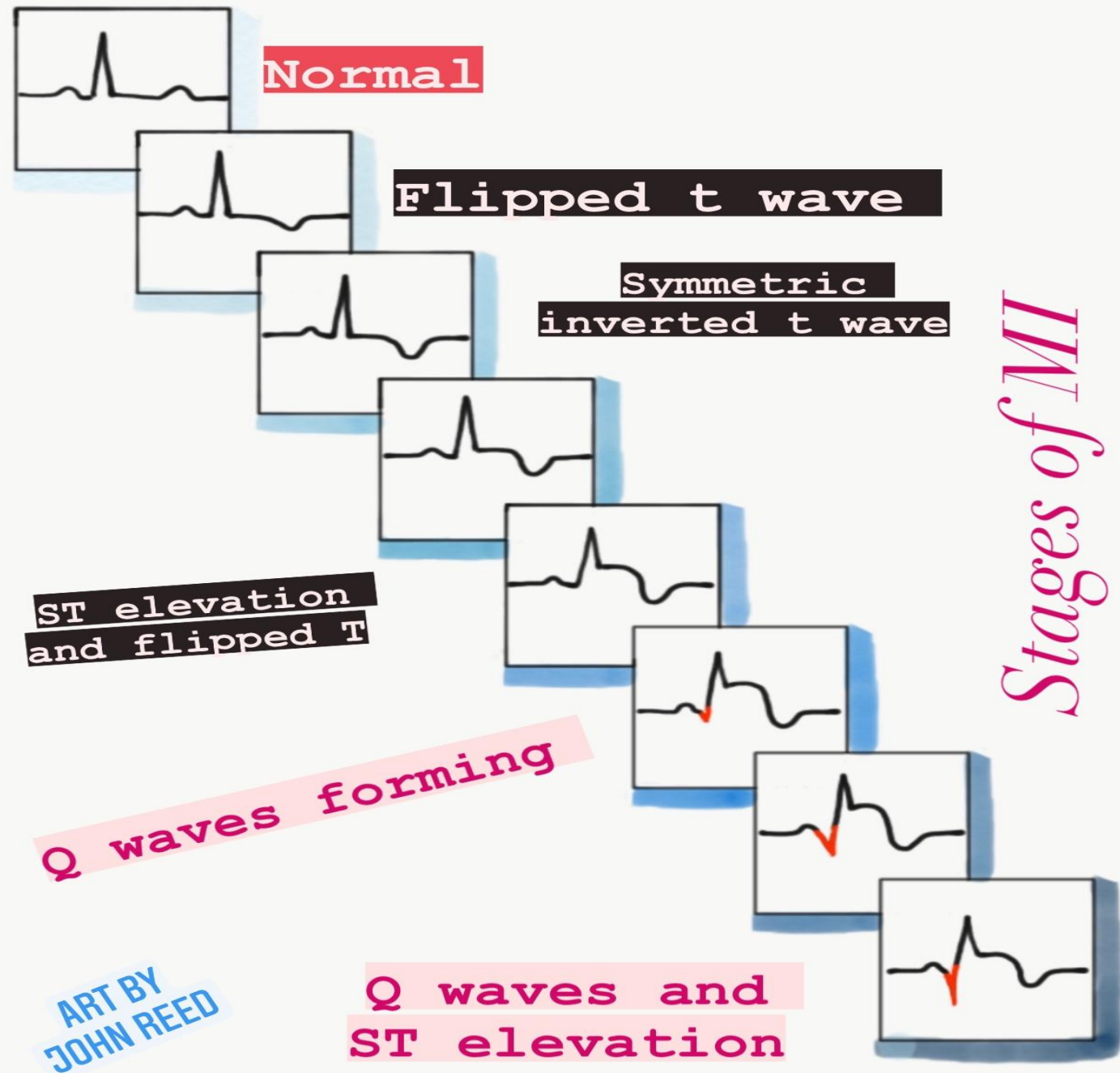
Cath report:

Prox LAD: 95% - stent

Circ: 95% - stent



# Q Waves







# CASE

#6



63 y/o male with chest pain, cough

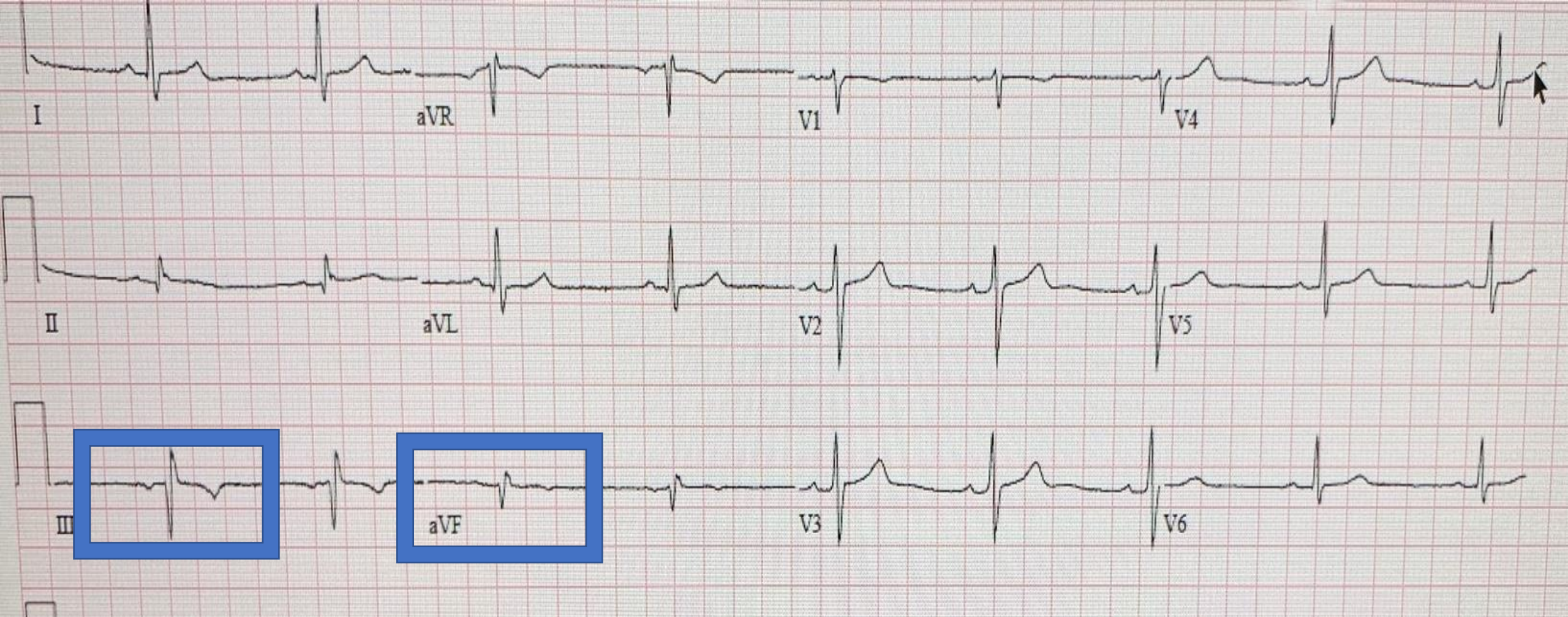


63 y/o M with chest pain  
when I cough x 10 d

---

63-year-old male  
presenting to the  
emergency room sent by  
his primary care PA for  
chest pain for the last 10  
days. Patient's pain is  
only present when he  
exerts himself moderately  
or when he has a very  
"strong" cough.






1. **1/3** the height of the R wave
2. Wide
3. Deep
4. In a pattern





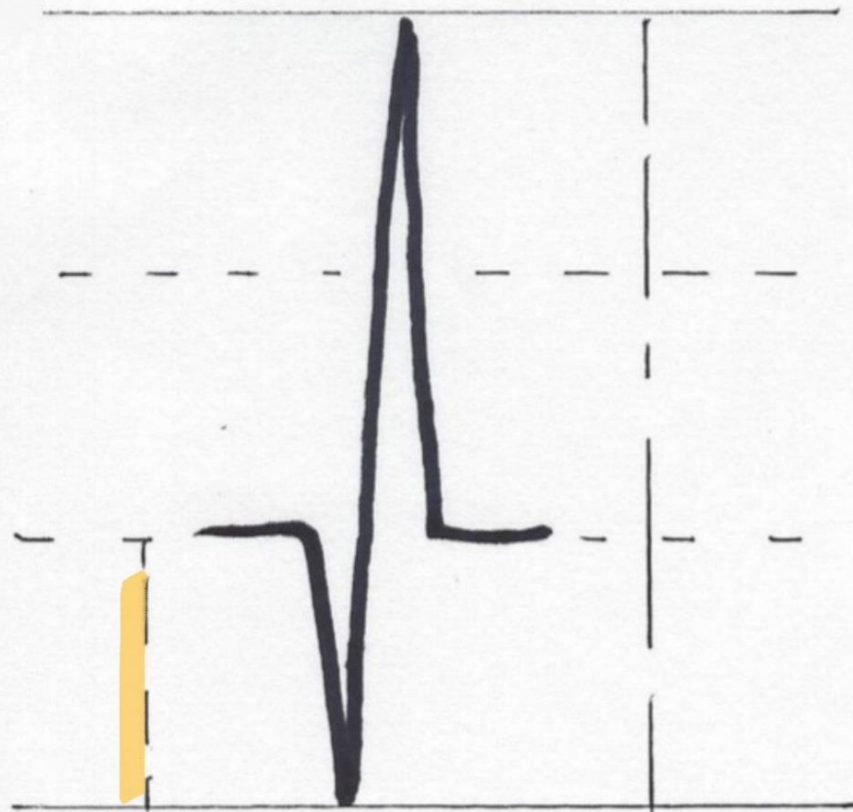
## HIS LABS

- Total cholesterol: **149**
  - Triglycerides: **189**
  - LDL: **74**
  - HDL **37**
  - TSH: Normal
  - Hemoglobin A1c 6.6
  - Troponin  
**0.057 - 0.059 - 0.045**  
**-0.027**
- 



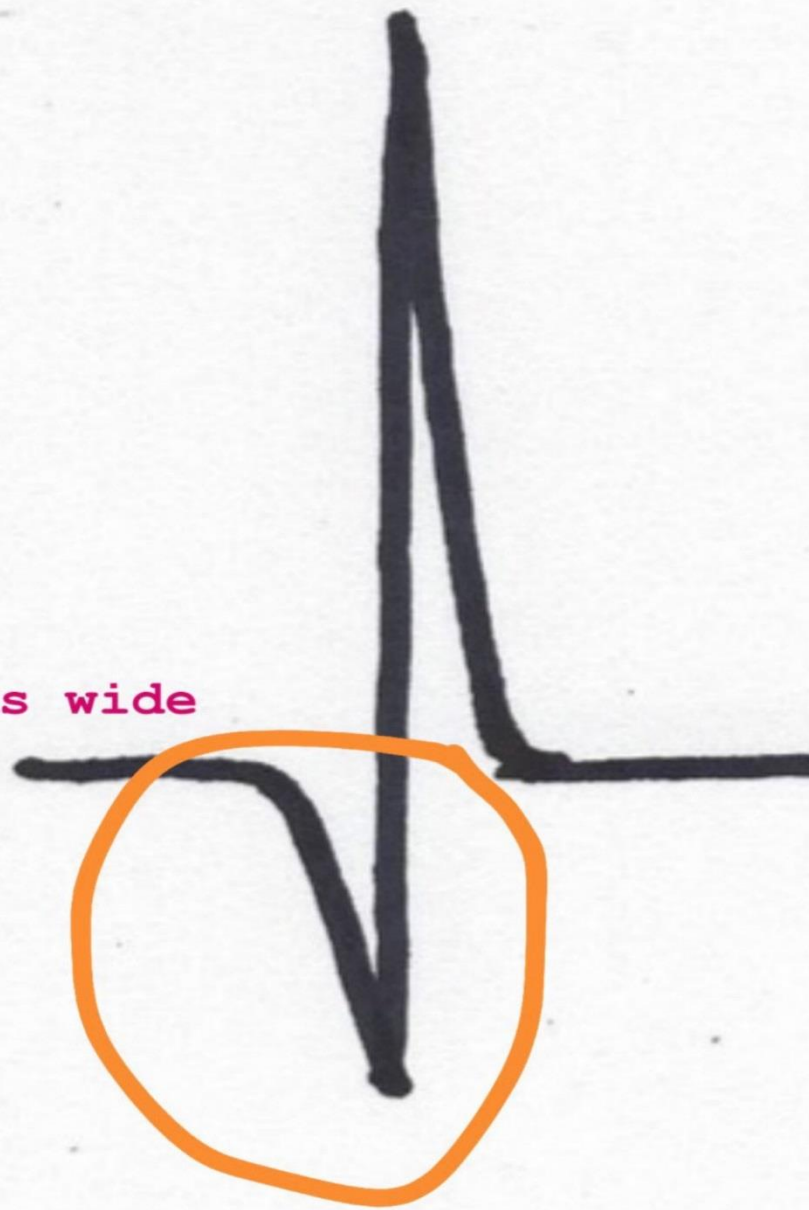
# Q WAVE

## Pathologic Q Waves



1/3 height of R wave

30 ms wide



# Lexiscan Stress Test

CLINICAL FINDINGS: **CP during infusion**

## IMPRESSION:

- 1. Abnormal myocardial perfusion study. Moderate sized, severe **inferior Ischemia in the RCA territory.**
- 2. Inferior hypokinesis. Normal LV size without transient ischemic dilatation.
- 3. Scan significance: suggestive of a(n) intermediate risk for hard cardiac events. EF 58%





# CASE

#7

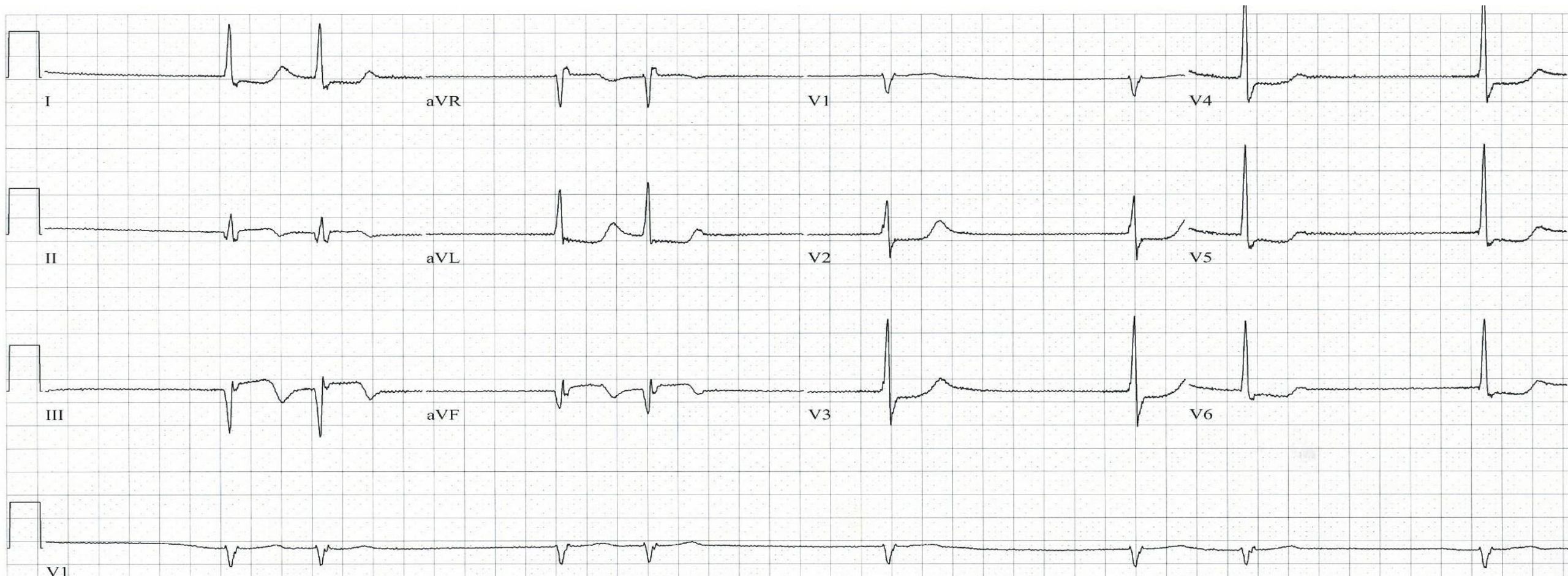


56 y/o M with chest pain

# 56 year old male "Chest pain"

Vent. rate	51	BPM
PR interval	*	ms
QRS duration	94	ms
QT/QTc	470/433	ms
P-R-T axes	* -15	75

\*\*\* Critical Test Result: STEMI  
Most Likely WITH PREMATURE JUNCTIONAL COMPLEXES  
Also Consider ATRIAL FIBRILLATION WITH SLOW VENTRICULAR RESPONSE  
INFERIOR-POSTERIOR INFARCT (CITED ON OR BEFORE 10-OCT-2016) with recurrent ST  
elevation and reciprocal ST depression  
\*\*\* ACUTE MI / STEMI \*\*\*





- Most important question to ask him: \_\_\_\_\_

"He was really sweaty and pale  
so I made him come in..."

"He passed out  
earlier..."



- P – “I was arguing with my wife”
- Q – “Feels like an elephant is sitting on my chest”
- R – “ To my left arm, but I do construction, it always hurts”
- S – “My wife made me come but it does hurt...”
- T – 30 minutes prior to arrival

- HX: Stent in 2013, hyperlipidemia, hypertension, obese
- SH: “ A few beers to unwind” “I smoke with the guys”
- FH: Mom – CHF, stroke Dad: MI, CVA



# His meds



**DM, HTN, CHF, Hyperlipidemia**

# Differentials



- **P - PERICARDITIS**
- **A - AMI**
- **P - PNEUMOTHORAX**
- **P - PNEUMONIA**
- **A - ANEURYSM**

**HE'S FAKING IT TO GET OUT OF  
GOING TO WORK?**



# How much do we worry?



Syncopal last night

- Left sided chest pain, previous stent
- HX: HTN, Hyperlipidemia
- VS: 98%, 50, 18, 114/91
- Trop **12.3** - 7.9
- Glucose 173
- 
- VS: RR 20, pulse ox 99% RA, HR 54, BP 90/60

He's admitted...

- Nurse calls: His HR is low
- Nurse calls: He is in AF
- Nurse calls: His sats are 76 when he sleeps and he stops breathing



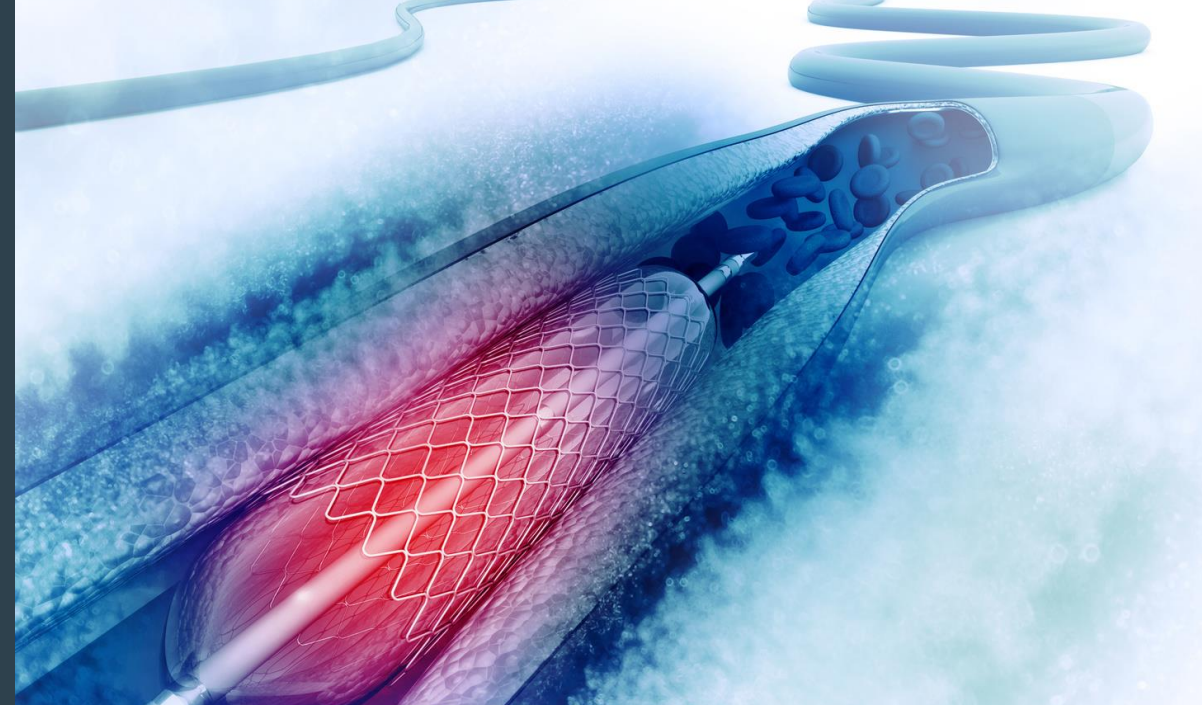
# What does he need?



- *Echo showed EF of 37% - What is normal?*
- *Had temp pacer placed – why did he need it?*
- *Had angiogram: LAD: 100%, LCX: 99%, RCA: 100%*

# STEMI

- 1. S/P PCI, DES RCA
- 2. Hyperlipidemia - uncontrolled
- 3. Probable sleep apnea
- ---
- Follow up with cardiology
- Cardiac rehab
- 30 Day heart tune up
- BP log





# Cardiac Happy Meal

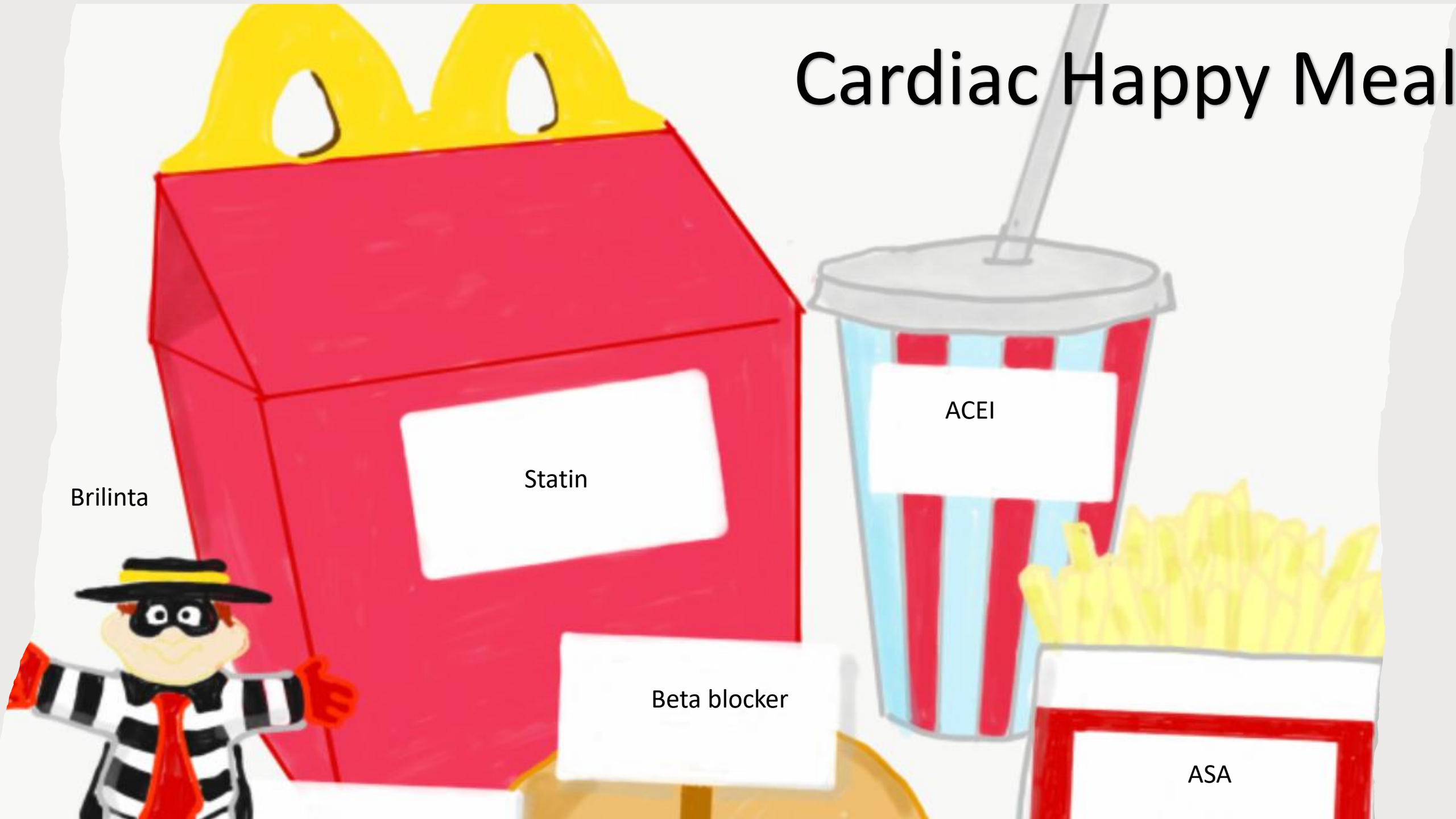
Brilinta

Statin

ACEI

Beta blocker

ASA



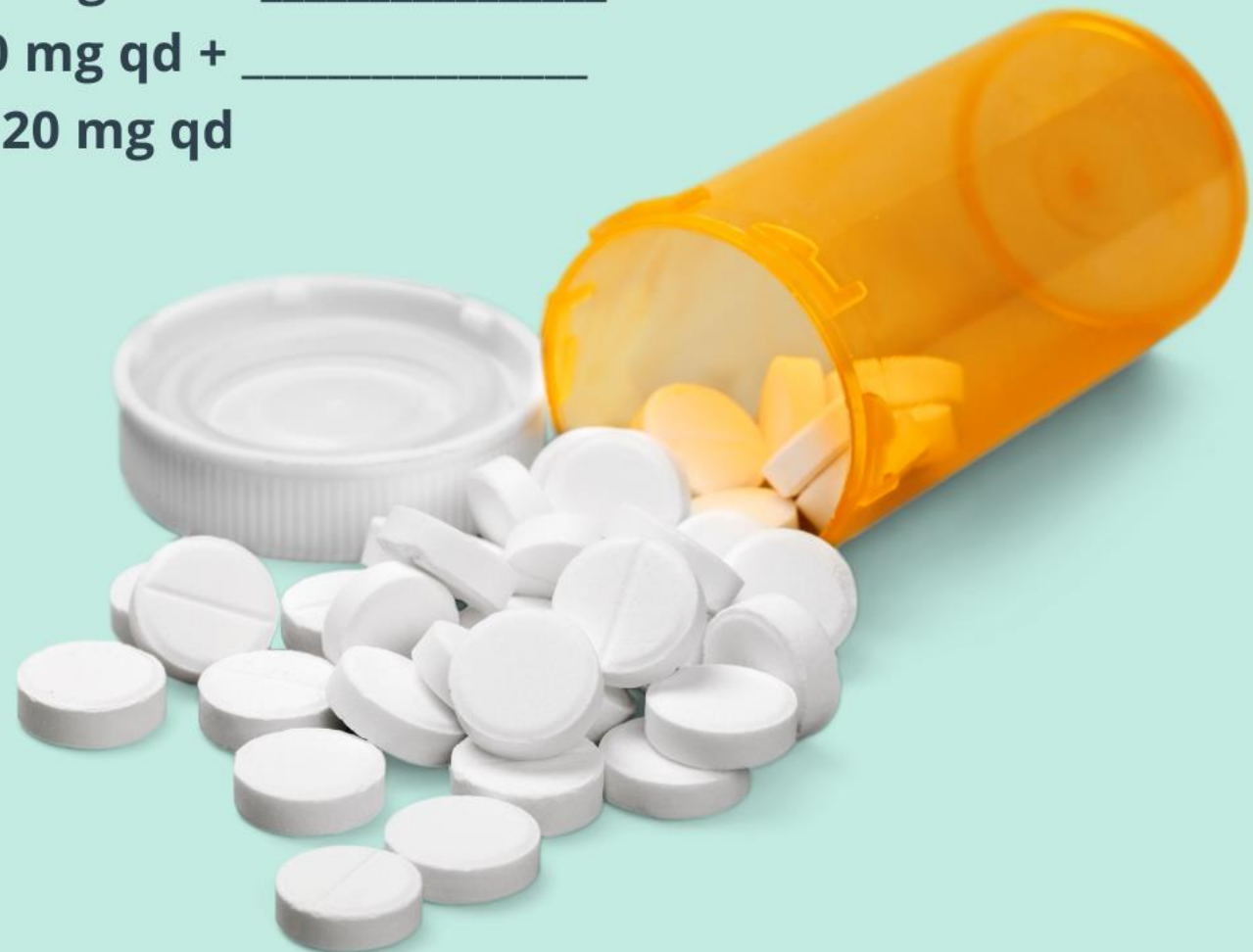
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# Cardiac Happy Meal

---

## WHAT'S MISSING?

- Coreg 6.25 mg bid
- Brilinta 90 mg bid + \_\_\_\_\_
- Crestor 40 mg qd + \_\_\_\_\_
- Lisinopril 20 mg qd







The Happy Meal:  
Not so **happy**?

- “I feel dizzy now”
- “I don’t want to be on all these medications”
- Phase II Cardiac Rehab

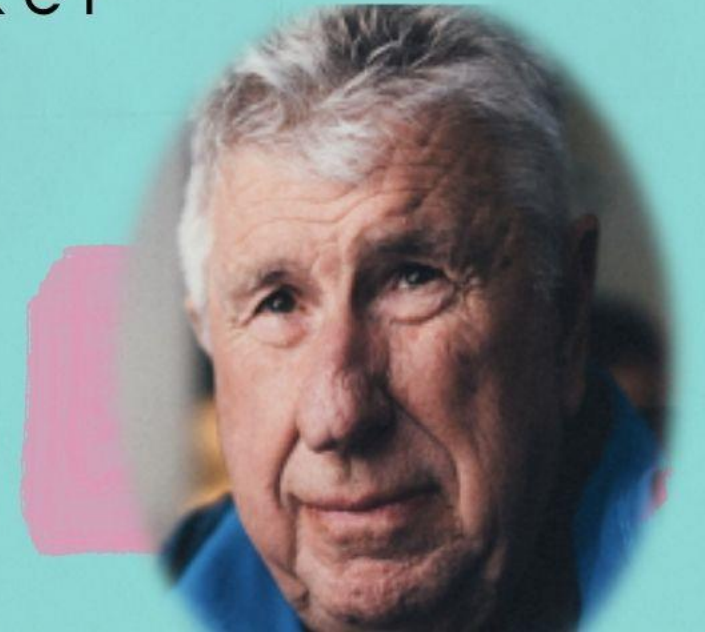
"I have chest pain"





# 67 Y/O M STUTTERING CHEST PAIN

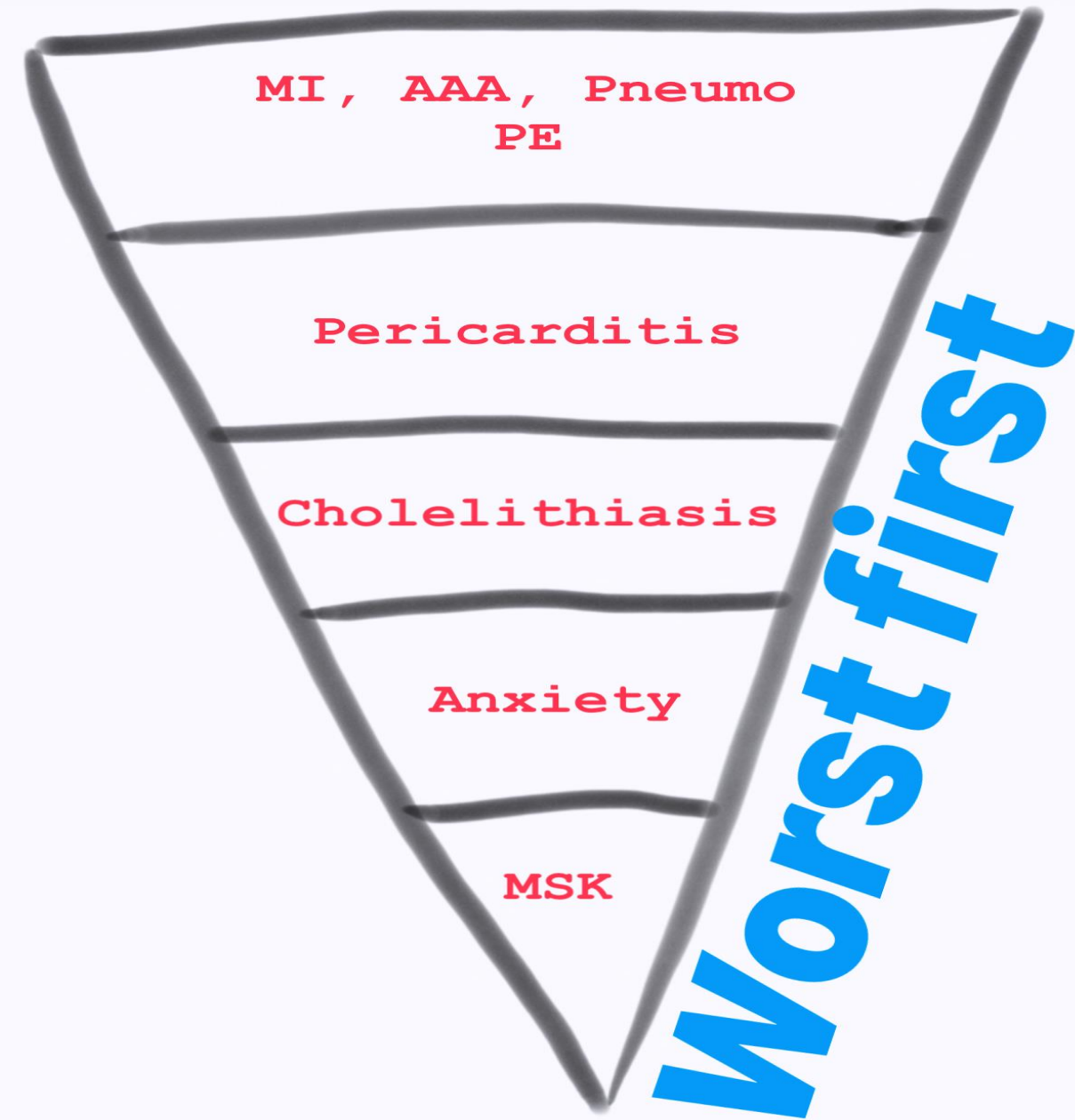
- Chest pain for 4 months
- Drives to the ER
- **VS:** 172/90, HR 109, RR 18, T 98.5
- **HX:** None
- **SH:** Still works, is active. Nonsmoker





# What are the chest pain differentials?

- ACS
- AAA
- PE
- Pericarditis
- MSK
- GERD/Gastritis



Gender: Male

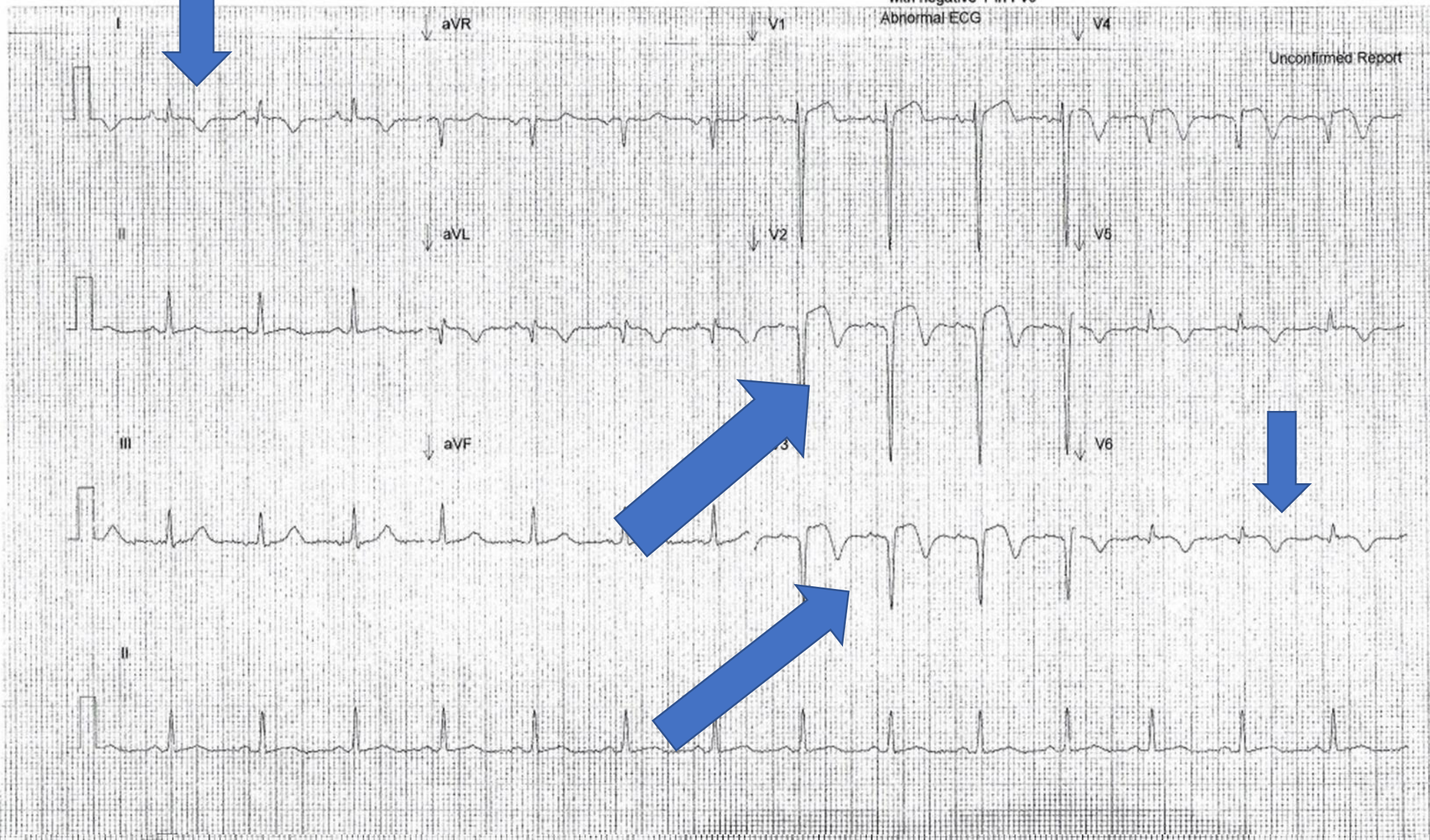
Comments:

P/PR: 108/148 ms  
QRS: 94 ms  
QT/QTc: 400/481 ms  
P/QRS/T Axis: 26/67/124 deg  
Heart Rate: 87 BPM

extensive anterior infarct  
QS in V2 V3 V4  
25 < Q < 35 ms in V6  
Q/R > 1/3 in V6  
marked extensive precordial and high-lateral repolarization disturbance,  
consider infarct of recent occurrence  
large negative T in aVL V2 V3 V4 V6  
with negative T in I V5

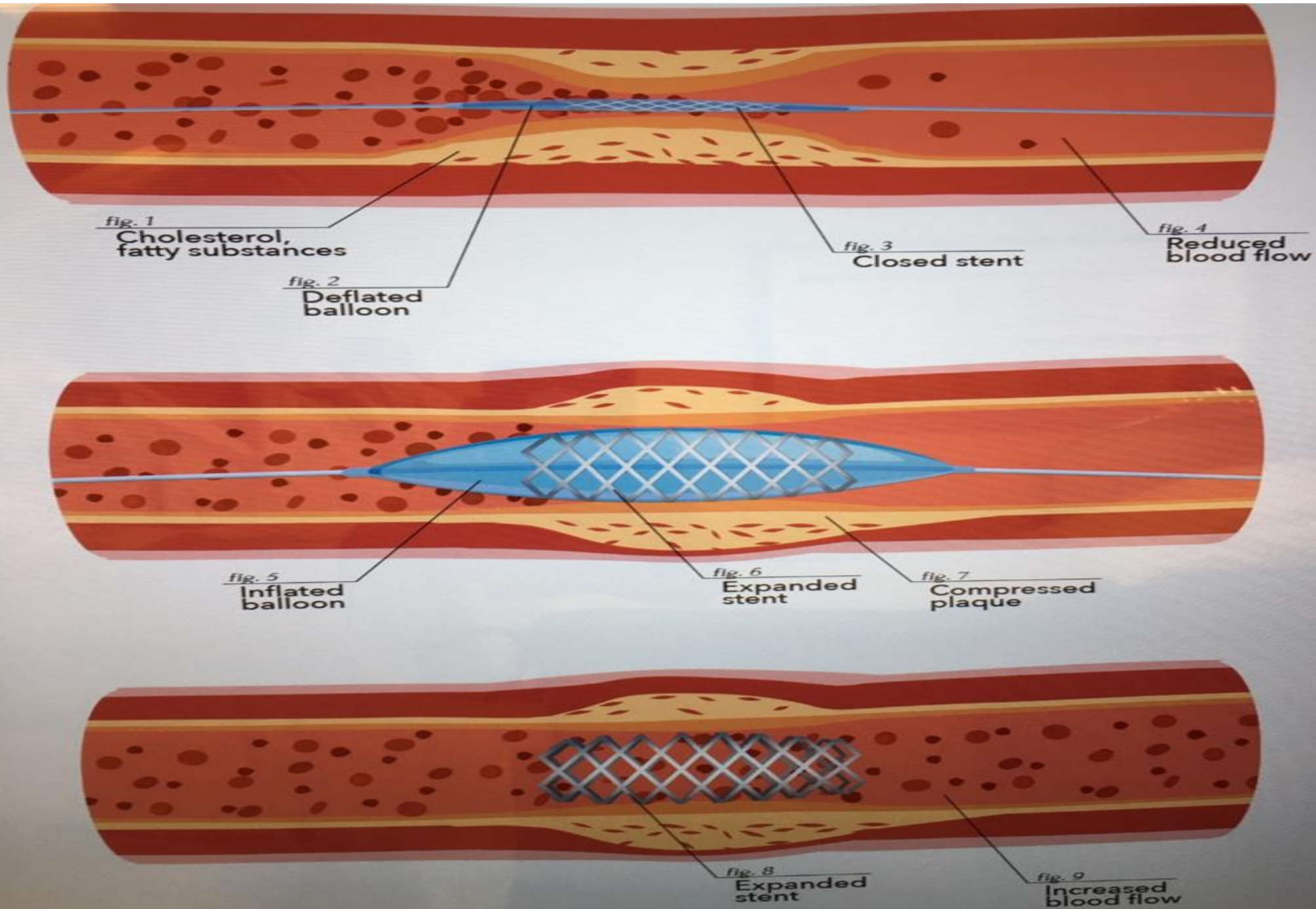
Abnormal ECG

Unconfirmed Report





# Can we stent it?



# *Indications for CABG*

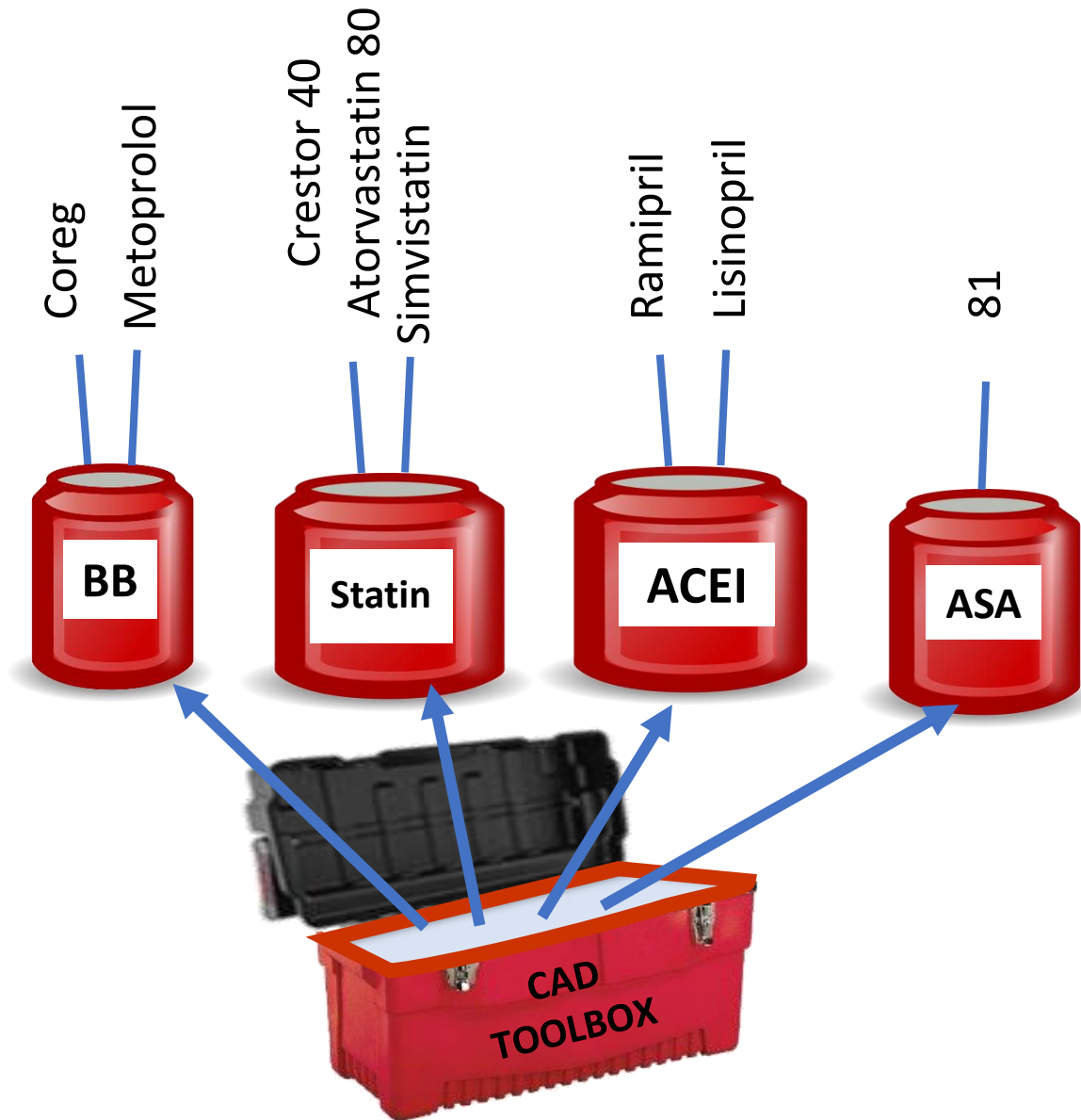


- CABG is the preferred treatment for:
  1. Left main coronary artery with low EF
  2. Triple Vessel Disease  
LAD,LCX and RCA
  3. Diffuse disease not amenable to treatment with a PCI

The 2005 ACC/AHA guidelines:

Also high-risk patients: severe ventricular dysfunction (i.e. low ejection fraction)





⊕  
If stent

- Plavix \$
- Effient \$\$
- Brilinta \$\$

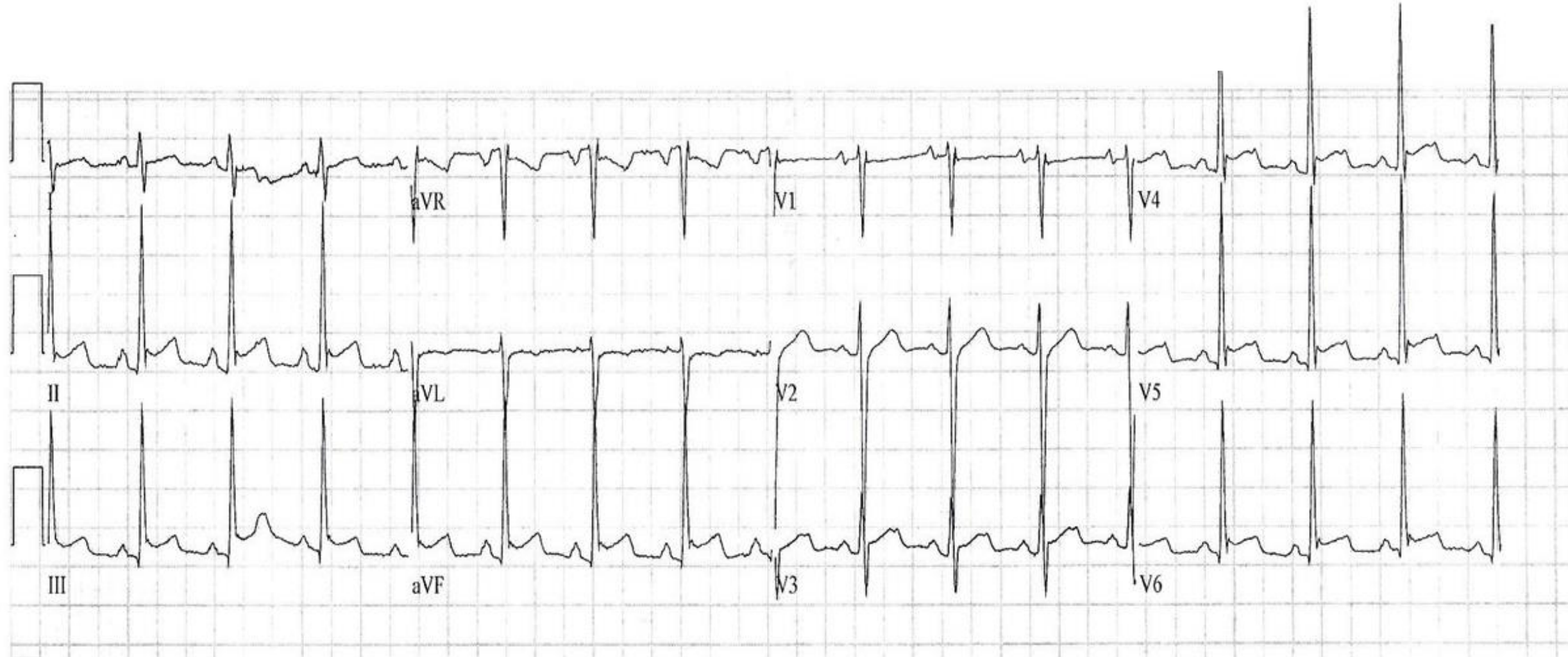
# MI Complications

- **Dressler's syndrome (Pericarditis)**
- **CHF**
- **Arrhythmia**
- **Left ventricular Aneurysm**
- **LV Thrombus**



Vent. rate 97 BPM  
PR interval 134 ms  
QRS duration 82 ms  
QT/QTc 344/436 ms  
P-R-T axes 62 85 66

\*\*\* Critical Test Result: STEMI  
NORMAL SINUS RHYTHM  
RIGHT ATRIAL ENLARGEMENT  
ST ELEVATION CONSIDER INFEROLATERAL INJURY OR ACUTE INFARCT  
\*\*\* ACUTE MI / STEMI \*\*\*  
ABNORMAL ECG



**Thank you!**



*Jennifer Carlquist*



"I feel weak"





# What are the “weak” differentials?

- ACS
- Anemia/GI bleed
- Hypothyroidism
- Hypovolemia
- Over medicated
- UTI
- Dehydrated/malnourished

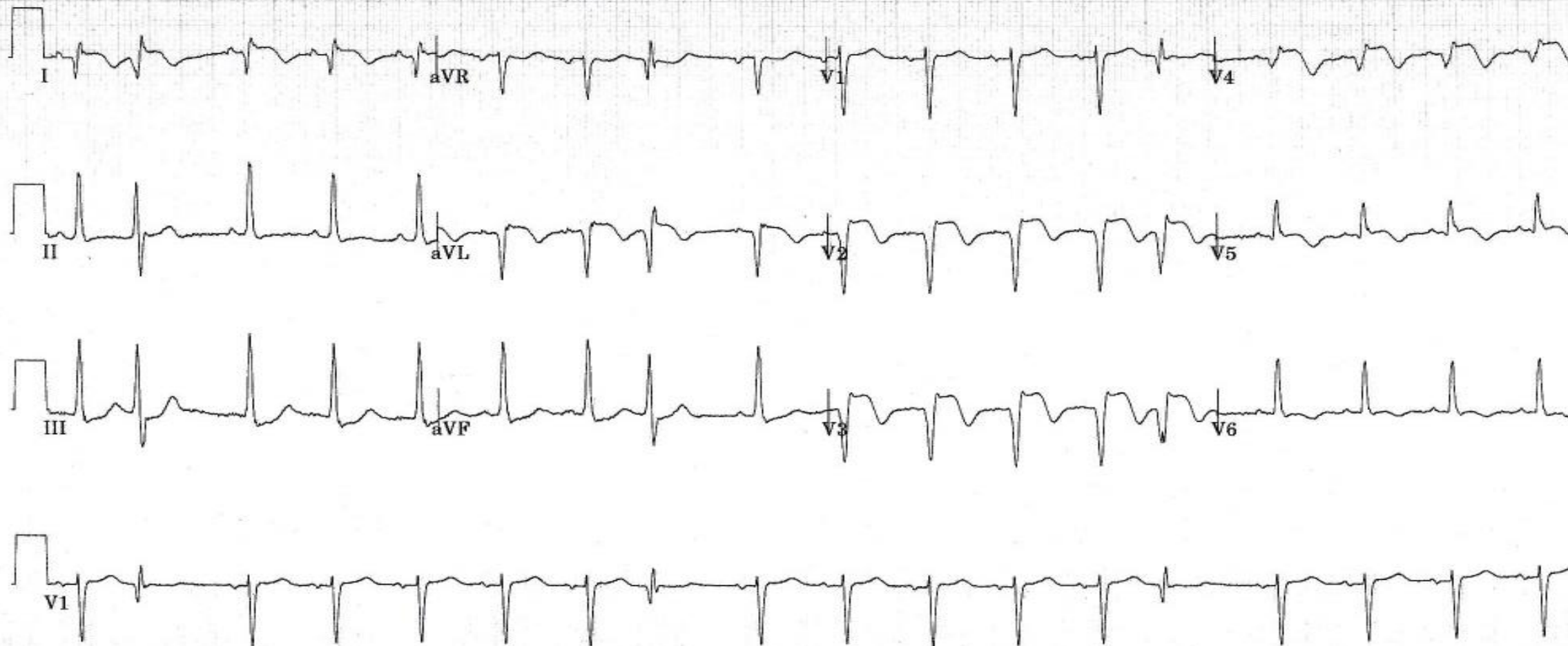
Vent. rate 109 bpm  
PR interval 132 ms  
QRS duration 94 ms  
QT/QTc 372/500 ms  
P-R-T axes 43 94 156

\*\*\* Critical Test Result: STEMI  
Sinus tachycardia with premature supraventricular complexes  
Anterolateral infarct, possibly acute  
\*\* \*\* ACUTE MI / STEMI \*\* \*\*  
Abnormal ECG

7

Referred by: ERMD

Unconfirmed



# What do we order on him?

- Troponin q 2 x 3
- CBC
- CMP
- INR
- EKG
- CXR
- Bilateral blood pressures

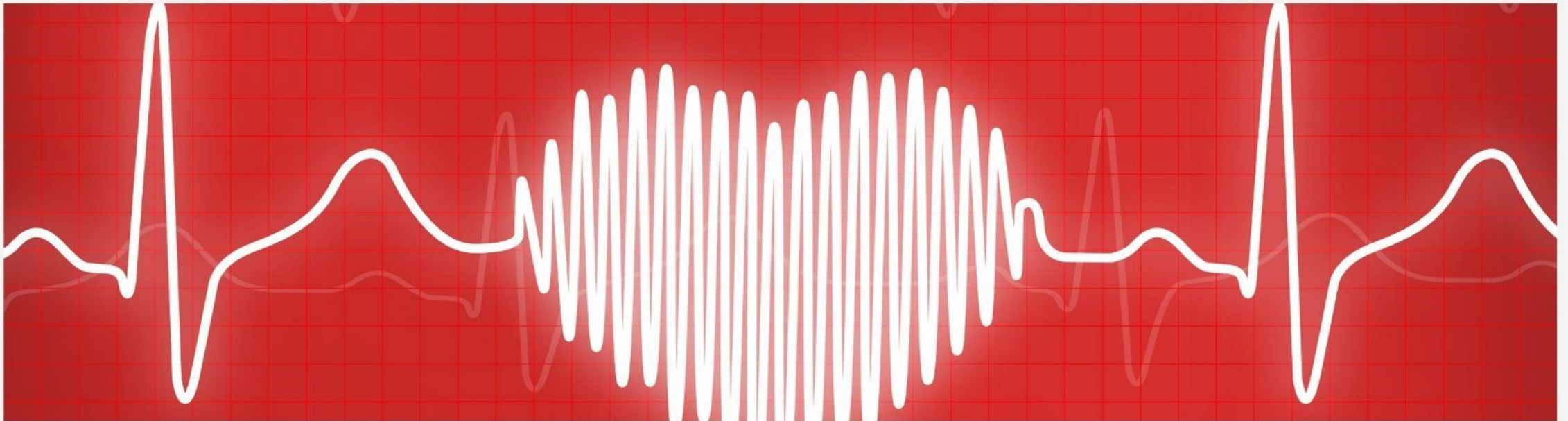


# The labs

- **Myoglobin:** Sensitive/not specific
  - Rises in 2-3 hours/peaks in 3-6 hours
  - Doubling over 90 minutes highly predictive of AMI

- **Troponin:**
  - Rises in 3-5 hours/peaks in 12 hours
  - Closest to ideal

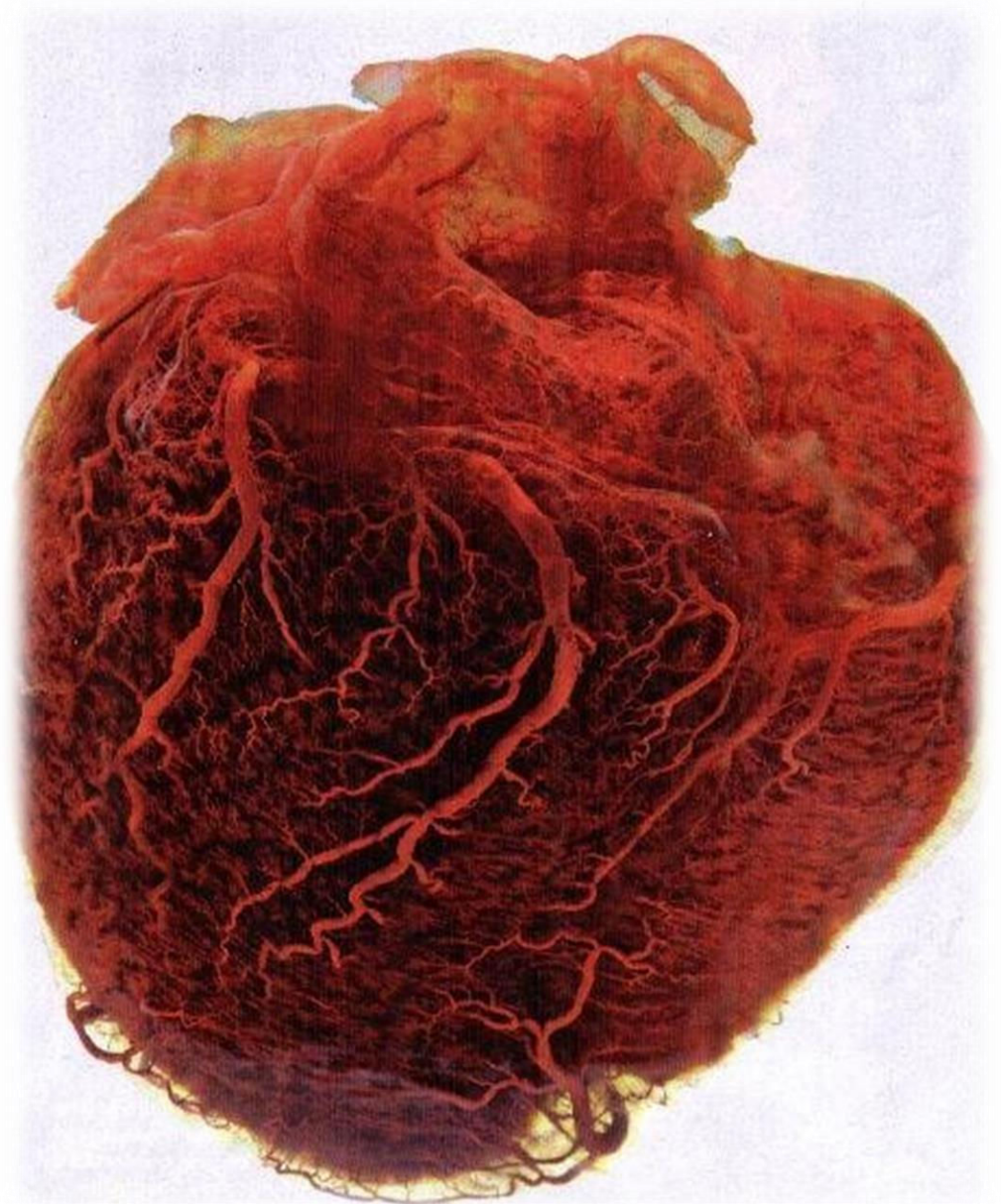
# Cath Report



15% EF 100% OCCLUDED LAD CIRC 60%

# Refractory Angina

- Ranexa
- Imdur
- Amlodipine





Vent. rate 109 bpm  
PR interval 132 ms  
QRS duration 94 ms  
QT/QTc 372/500 ms  
P-R-T axes 43 94 156

\*\*\* Critical Test Result: STEMI  
Sinus tachycardia with premature supraventricular complexes  
Anterolateral infarct, possibly acute  
\*\*\* ACUTE MI / STEMI \*\*\*  
Abnormal ECG

Prolonged QT

TRUE

Referred by: ERMD

Unconfirmed

