Western Regional Urgent Care Conference

Killer EKGs Masterclass

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KILLER EKGs

MASTERCLASS

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INSTRUCTOR PROFILE

16 years as a **PA**

Trained at UC Davis FNP/PA Program

Former **Paramedic** 13 years

Author in numerous urgent care journals

National Lecturer at PA/NP Conferences

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DISCLOSURES

Educator at Zoll Life Vest

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OBJECTIVES

- **Why** is reading EKGs high risk
- What are we taught about EKGs AND WHY IT WAS NOT ENOUGH
- What we don't know **will hurt us**
- What you **don't need** to spend so much energy on
- What is even more important than the **EKG**

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OBJECTIVES

- Recognize Dewinters T waves on the ekg and why they are dangerous.
- Identify Wellens T waves and what they mean.
- Describe the 5 findings that will be read as non specific on the ekg and which ones mean there is a coronary artery occlusion.

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TONIGHTS MENU

- EKG Findings YOU must know
- New **guidelines** update
- Why STEMI is not enough
- What the **lawyers** know that you should too

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PINK ELEPHANT IN THE ROOM.

Let's be real.

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WHAT I WAS TAUGHT IN SCHOOL

- Arrhythmias
- "One at a time" Stemi
- Vectors
- The intervals don’t matter
- No guided practice

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I RESPECTFULLY

Disagree

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WHAT ABOUT YOU?

- How many **hours** did you get in school to learn EKG's?

- How long does it really take to be **safe**?

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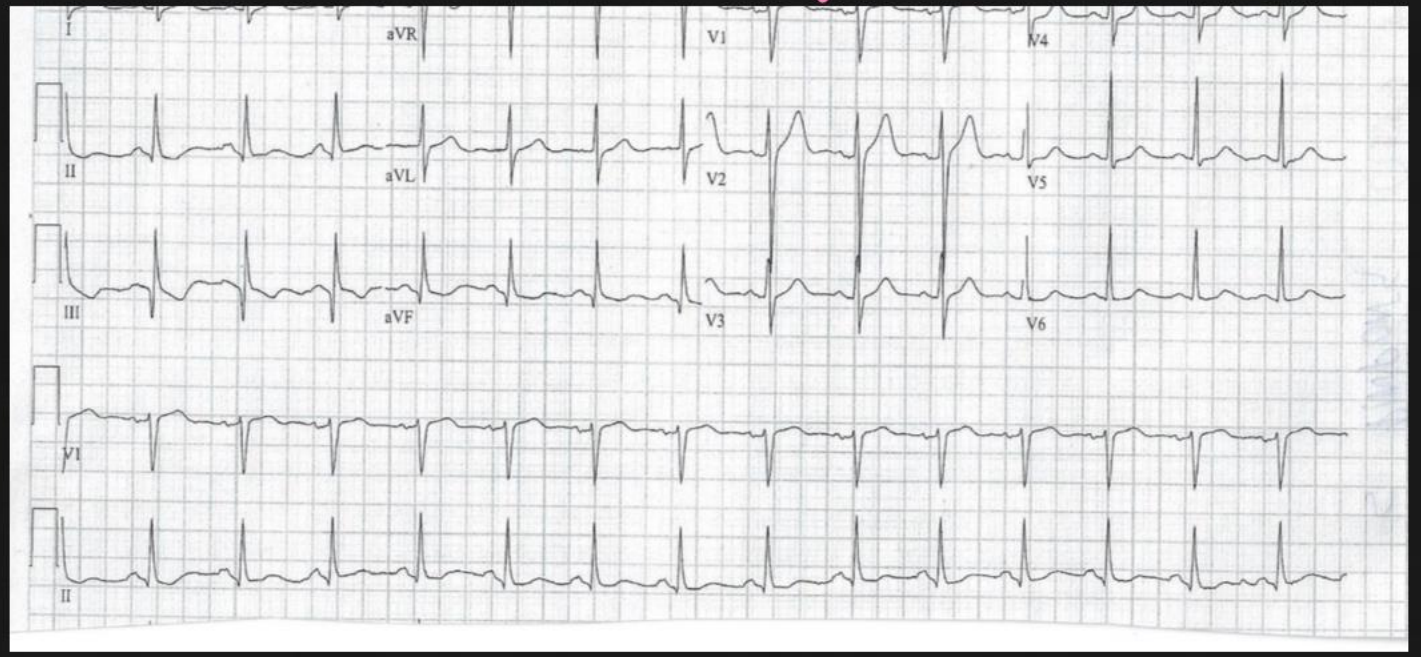
A 3D OBJECT ON A FLAT PIECE OF PAPER.

No wonder we are confused

=



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THE PERFECT STORM

happened...and most of us didn't know it.

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ACC RELEASED A NEW CONSENSUS STATEMENT

Guess who reads these?

Practice Guideline

2022 ACC Expert Consensus Decision Pathway on the Evaluation and Disposition of Acute Chest Pain in the Emergency Department: A Report of the American College of Cardiology Solution Set Oversight Committee

Writing Committee et al. J Am Coll Cardiol. 2022.

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CHEST PAIN

..... is one of the most common reasons for emergency department (ED) visits, accounting for over 7million ED visits annually

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WHAT YOU DON'T KNOW CAN HURT YOU.

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RECOMMENDATION #1

From the ACC

In the absence of ischemic ST-segment elevation, the ECG should be examined for **other changes** that have been associated with coronary artery occlusion when present, these should prompt evaluation for **emergent coronary angiography**.

2022 ECDP on Evaluation and Disposition of Acute Chest Pain in ED

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RECOMMEDATION #2

From the ACC

Emergent consultation for expert over-read should be obtained for ECGs concerning for ACS that **lack clear diagnostic criteria**

Serial ECG's performed over short time intervals in those with a high suspicion for ACS may detect **dynamic** ischemic changes

A posterior ECG should be performed if the initial ECG is non diagnostic but suspicion for a posterior MI is high

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THEY JUST
MADE IT
HARDER...
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ACC

November 2022

FIGURE 2 Initial ECG Assessment

STEMI or STEMI equivalent*	Manage as per 2013 ACCF/AHA STEMI guideline
• Ischemic ST-segment depression or T-wave inversion • ST-segment elevation in aVR with multilead ST-depression • Wellen's Sign	Manage as per 2014 AHA/ACC NSTE-ACS guideline
Other findings concerning for acute ischemia or infarction*	• Emergent cardiology consultation • Perform serial ECGs over short intervals • Emergent echocardiogram
Nonischemic ECG	Enter CDP

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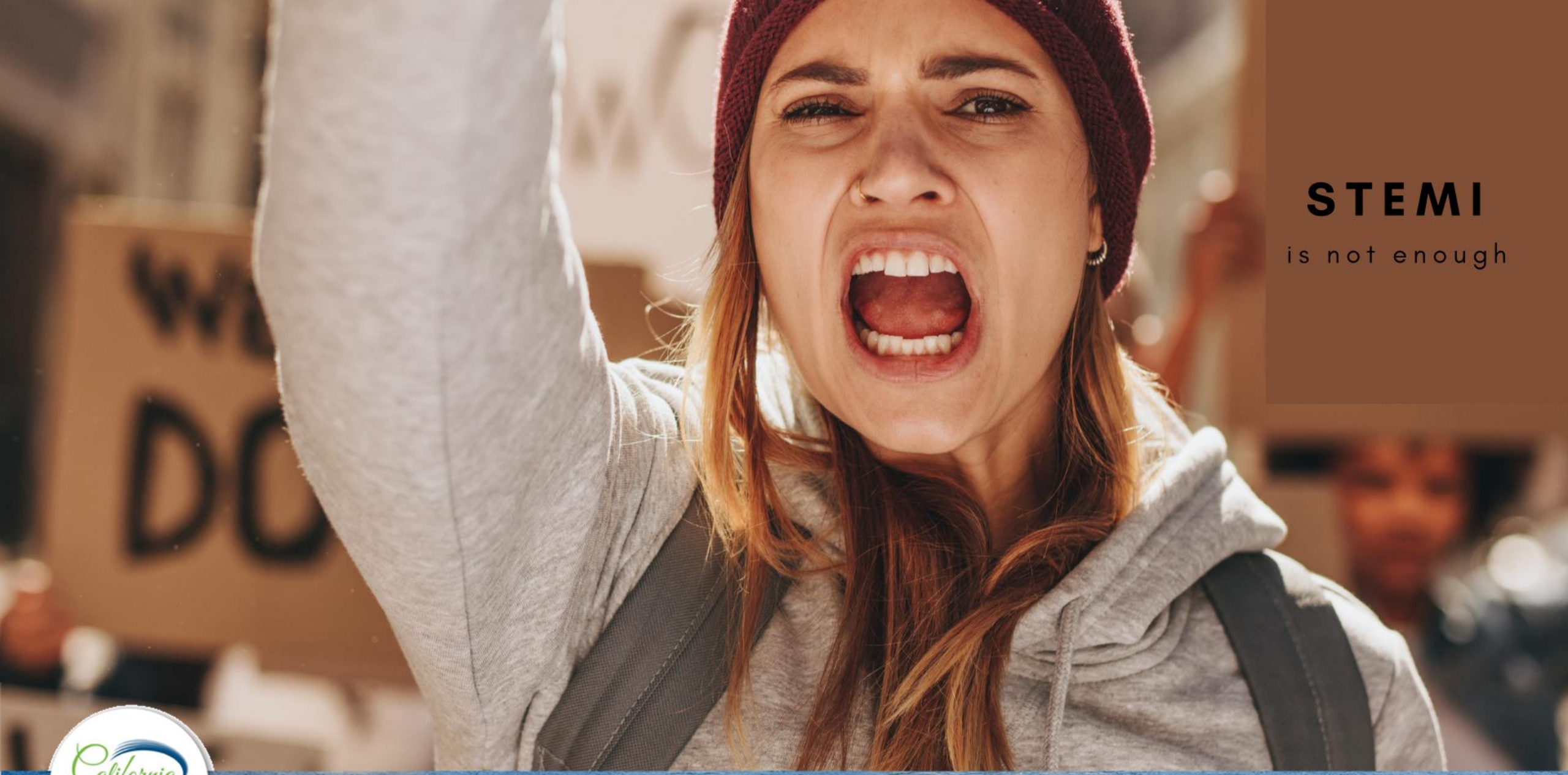

STEMI

is not enough

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THE EARTH WAS FLAT....

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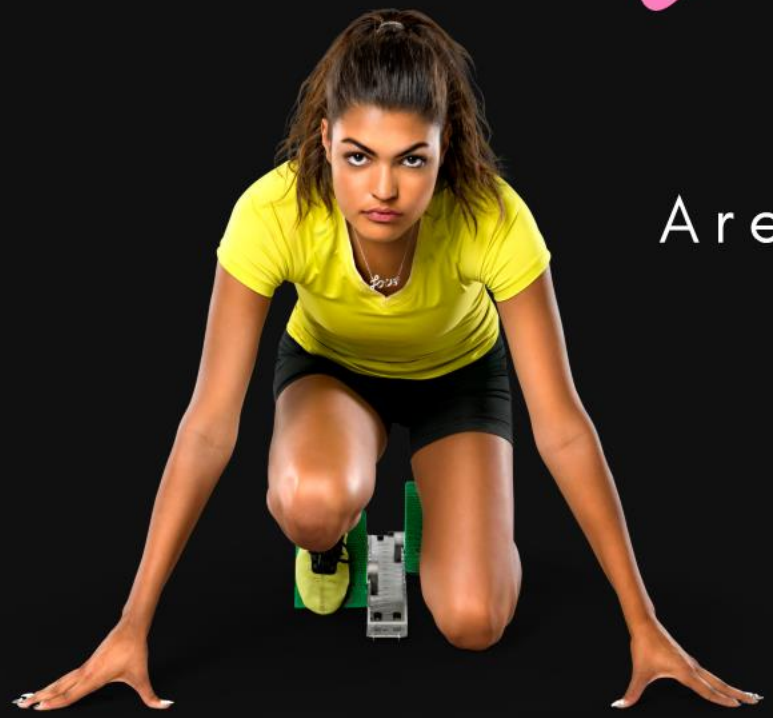
The Big Reveal!



Are you ready?

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THE LIST

TABLE 1 Electrocardiogram Findings Suggestive of Ischemia

FINDING	CRITERIA
STEMI equivalents	
Posterior STEMI	**Criteria:** ■ Horizontal ST-segment depression in V_1-V_3 ■ Dominant R-wave (R/S ratio >1) in V_2 ■ Upright T waves in anterior leads ■ Prominent and broad R-wave (>30 ms) **Confirmed by:** ■ ST-segment elevation of ≤0.5 mm in at least 1 of leads V_7-V_9*
Left bundle branch block or ventricular paced rhythm with Sgarbossa Criteria	A total score ≥3 points is required: ■ Concordant ST-segment elevation ≥1 mm in leads with a positive QRS complex (5 points) ■ Concordant ST-segment depression ≥1 mm in leads V_1-V_3 (3 points) ■ Discordant ST-segment elevation ≥5 mm in leads with a negative QRS complex (2 points) If there is discordant ST-segment elevation ≥5 mm, consider ST/S ratio <−0.25
Left bundle branch block or ventricular paced rhythm with Smith-modified Sgarbossa Criteria	Positive if any of the following are present: ■ Concordant ST-segment elevation of 1 mm in leads with a positive QRS complex ■ Concordant ST-segment depression of 1 mm in V_1-V_3 ■ ST-segment elevation at the J-point, relative to the QRS onset, is at least 1 mm and has an amplitude of at least 25% of the preceding S-wave
De Winter Sign	■ Tall, prominent, symmetrical T waves arising from upsloping ST-segment depression >1 mm at the J-point in the precordial leads ■ 0.5-1 mm ST-segment elevation may be seen in lead aVR
Hyperacute T waves	Broad, asymmetric, peaked T waves may be seen early in STEMI Serial ECGs over very short intervals are useful to assess for progression to STEMI
ECG findings consistent with acute/subacute myocardial ischemia	
aVR ST-segment elevation	Most often caused by diffuse subendocardial ischemia and usually occurs in the setting of significant left main coronary artery or multivessel coronary artery disease ■ ST-segment elevation in aVR ≤1 mm ■ Multilead ST-segment depression in leads I, II, Val, and/or V_4-V_6 ■ Absence of contiguous ST-segment elevation in other leads
ST-segment depression	Horizontal or downsloping ST-segment depression ≥0.5 mm at the J-point in 2 or more contiguous leads is suggestive of myocardial ischemia
Wellen's syndrome	Clinical syndrome characterized by: ■ Biphasic or deeply inverted and symmetric T waves in leads V_2 and V_3 (may extend to V_6) ■ Recent angina ■ Absence of Q waves
Inverted T waves	May be seen in ischemia (subacute) or infarction (may be fixed and associated with Q waves) in continuous leads

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WHO SHOULD GO TO THE ER BUT THE MACHINE WILL NOT HELP YOU.

- Dewinters
- Wellens warning
- AVR
- ST depression in v2, v3
- Posterior MI

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BACK TO BASICS

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T WAVE

Why you also need to fall in love

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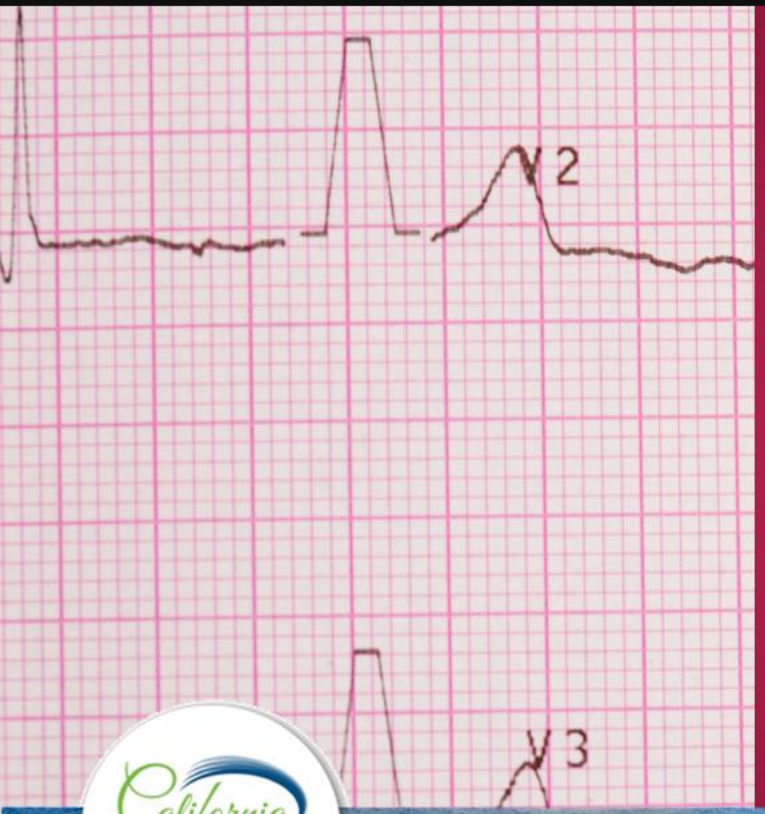
WHEN YOU LOVE SOMEONE....

You learn everything there is to know about them.



RULES

Not pointy.
Not too big.

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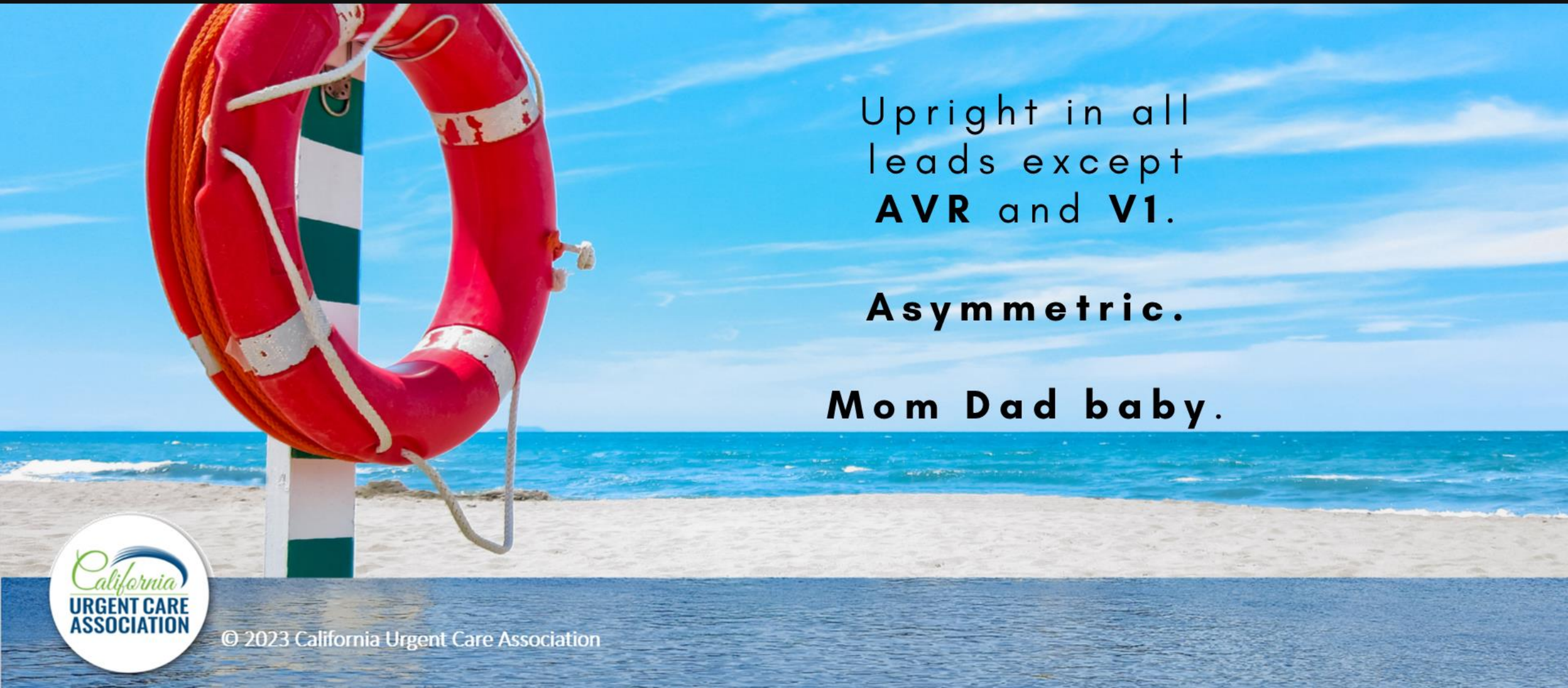
T WAVE RULES

That save my life everyday.



Upright in all leads except **AVR** and **V1**.

Asymmetric.

Mom Dad baby.

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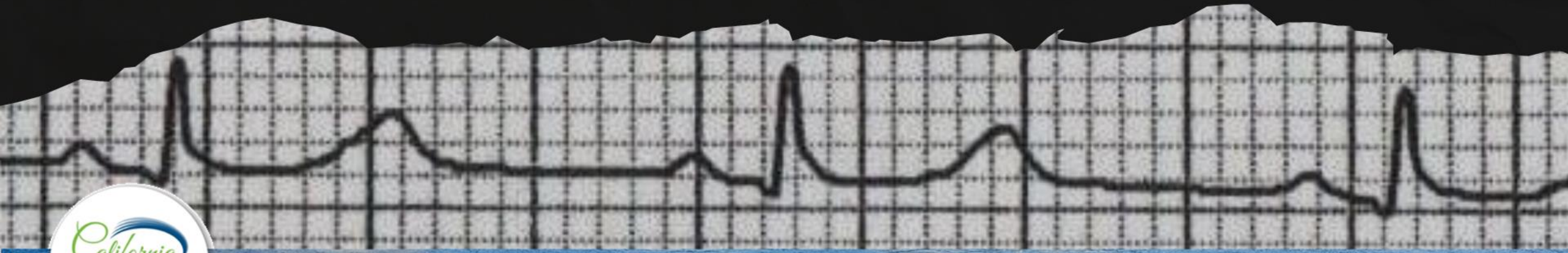
WHAT DO YOU KNOW ABOUT Q WAVES

- OLD MI
- Is there anything else that is important?
- How do you know if it is even Important?



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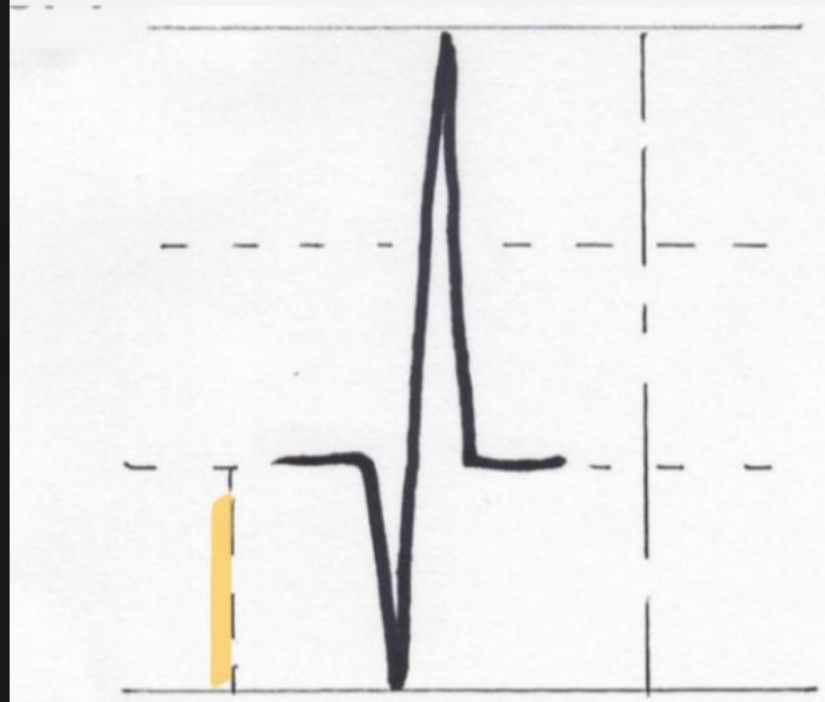
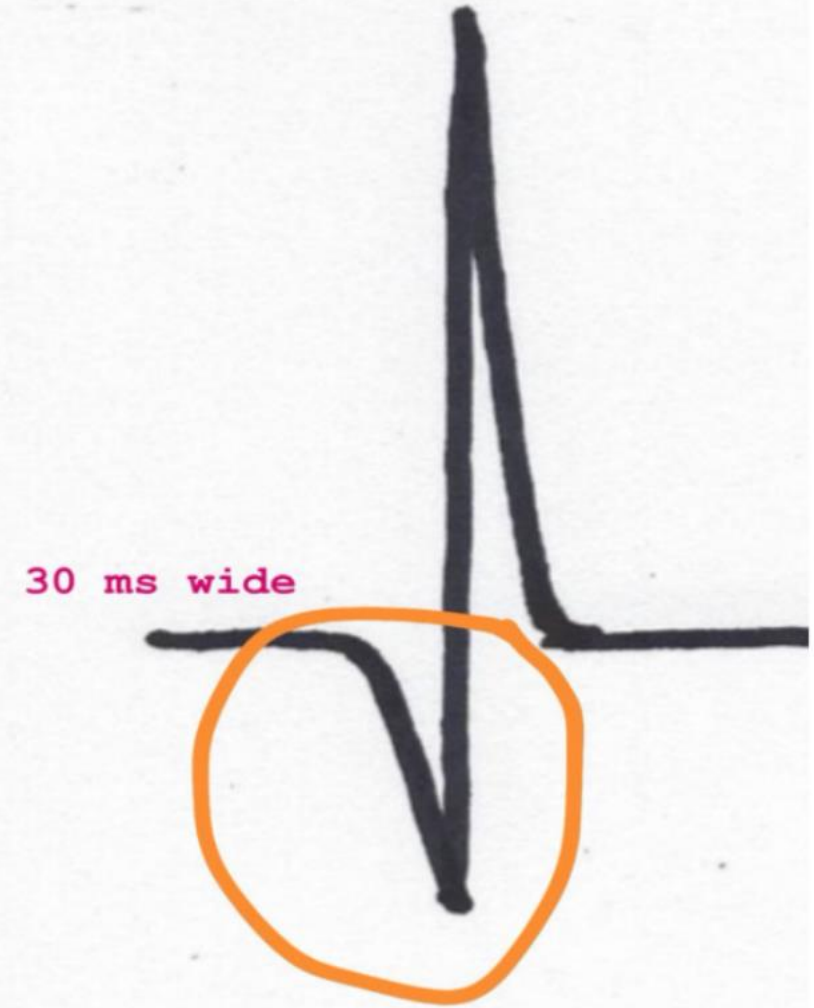
Q WAVE



1/3 height of R wave

Pathologic Q Waves



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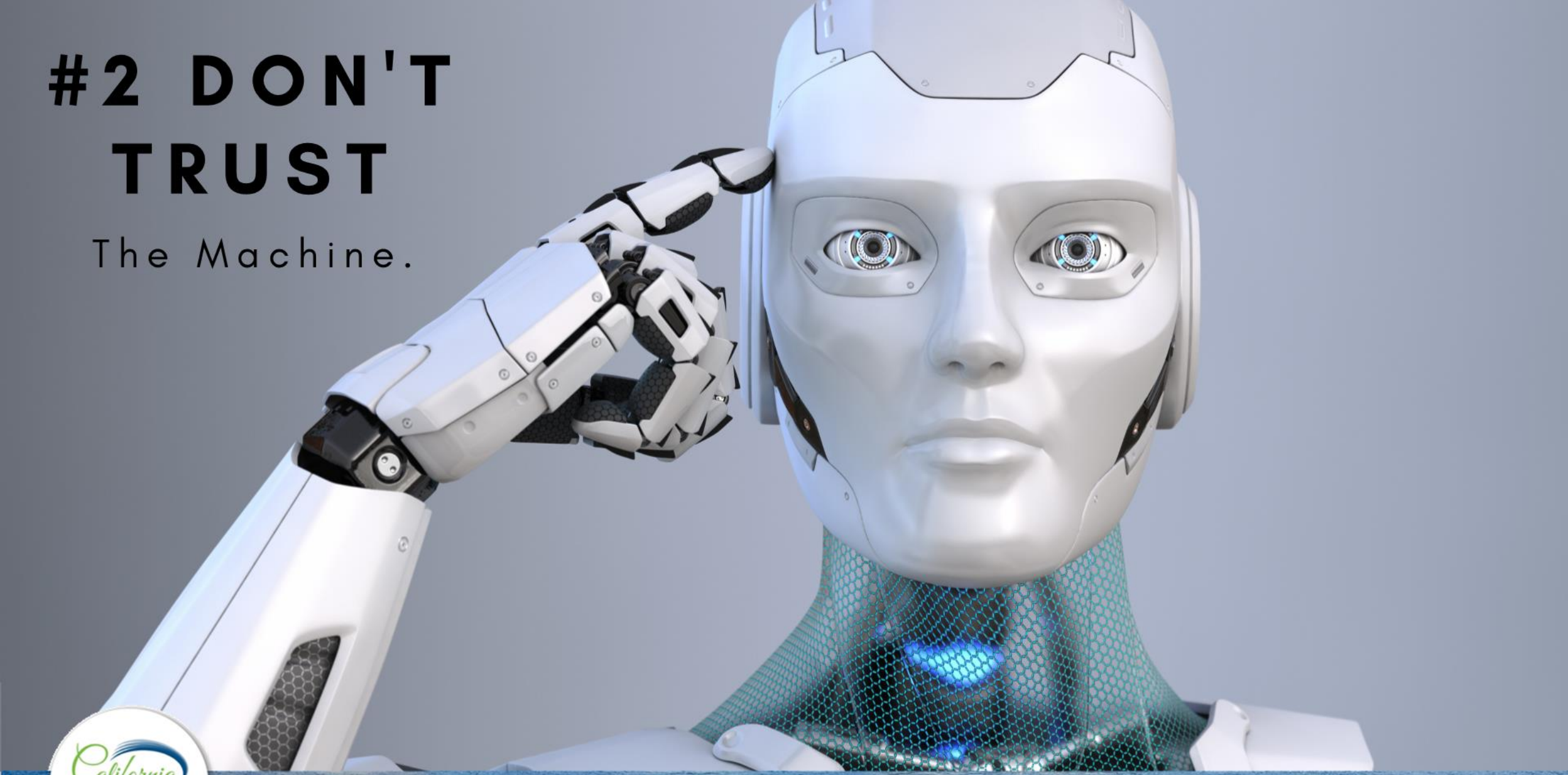
#2 DON'T TRUST

The Machine.



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ACCURACY OF MACHINE SOFTWARE

Interpretation

Journal of the American College of Cardiology
Volume 70, Issue 9, 29 August 2017, Pages 1183-1192

The Present and Future

Review Topic of the Week

Computer-Interpreted Electrocardiograms: Benefits and Limitations

Jürg Schläpfer MD [a] ... Hein J. Wellens MD [b]

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Automated systems have been developed to diagnose acute STEMI and tested in the emergency department or in the pre-hospital phase to speed up diagnosis and accelerate early reperfusion. These algorithms demonstrate wide variations in false positive (overdiagnosis in 0% to 42%) and false negative results (underdiagnosis in 22% to 42%) (25). Those discrepancies were illustrated by Garvey et al. (26), who recently showed the varying accuracy of 3 different available STEMI diagnostic algorithms to identify the location of the culprit coronary artery lesion. In these studies, different ECG machines with various algorithms were tested in patient groups with a different prevalence of STEMI. Also, CIE diagnoses were compared with interpretations from heterogeneous sources: cardiologists, emergency physicians, World Health Organization criteria, discharge diagnosis of STEMI, or catheterization laboratory findings (25). Because of its high false negative results in the identification of STEMI, it is not recommended that CIE be used as the sole means to activate the cardiac catheterization laboratory. It should always be used in conjunction with physicians, r nurses trained to recognize STEMI (25).

TAKE HOME

Points

42% False **positives**

22%-42% False **negatives**

Don't Trust It!

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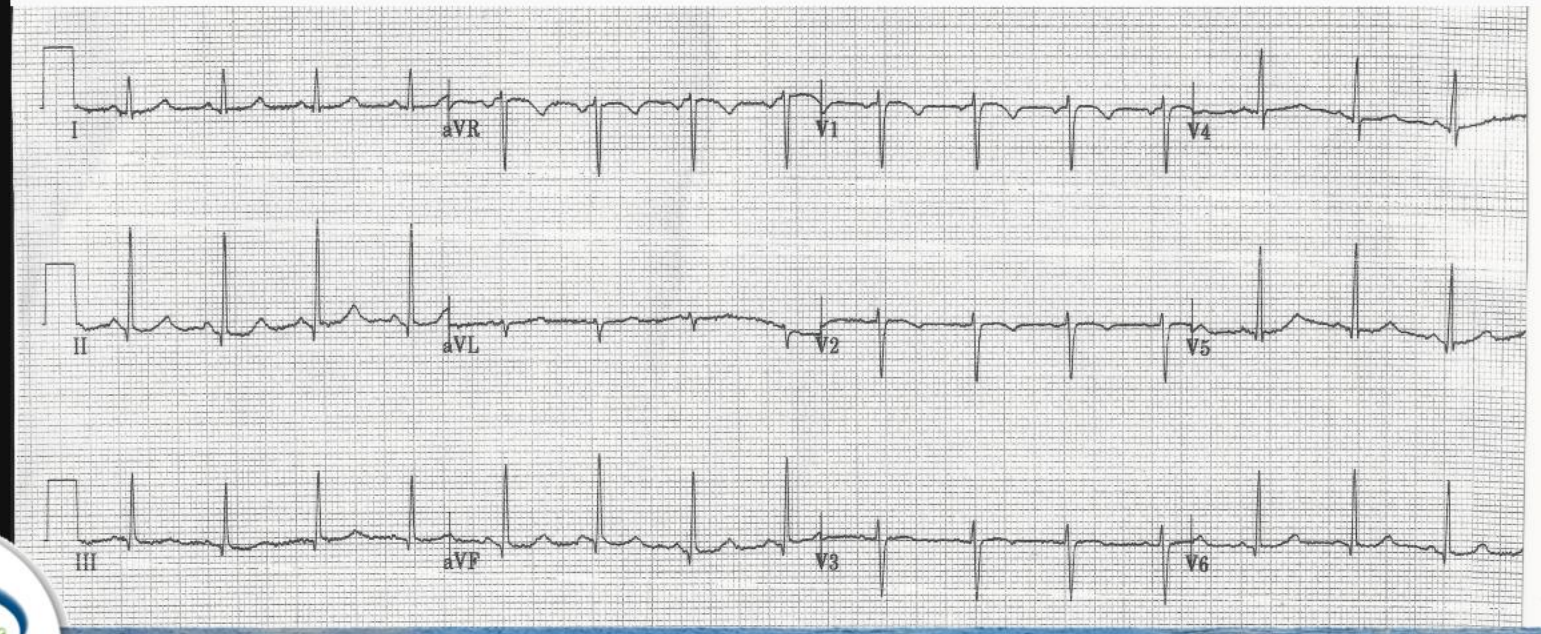
Vent. rate	94 bpm	Normal sinus rhythm
PR interval	116 ms	Normal ECG
QRS duration	78 ms	
QT/QTc	366/457 ms	
P-R-T axes	46 66 35	

Hope



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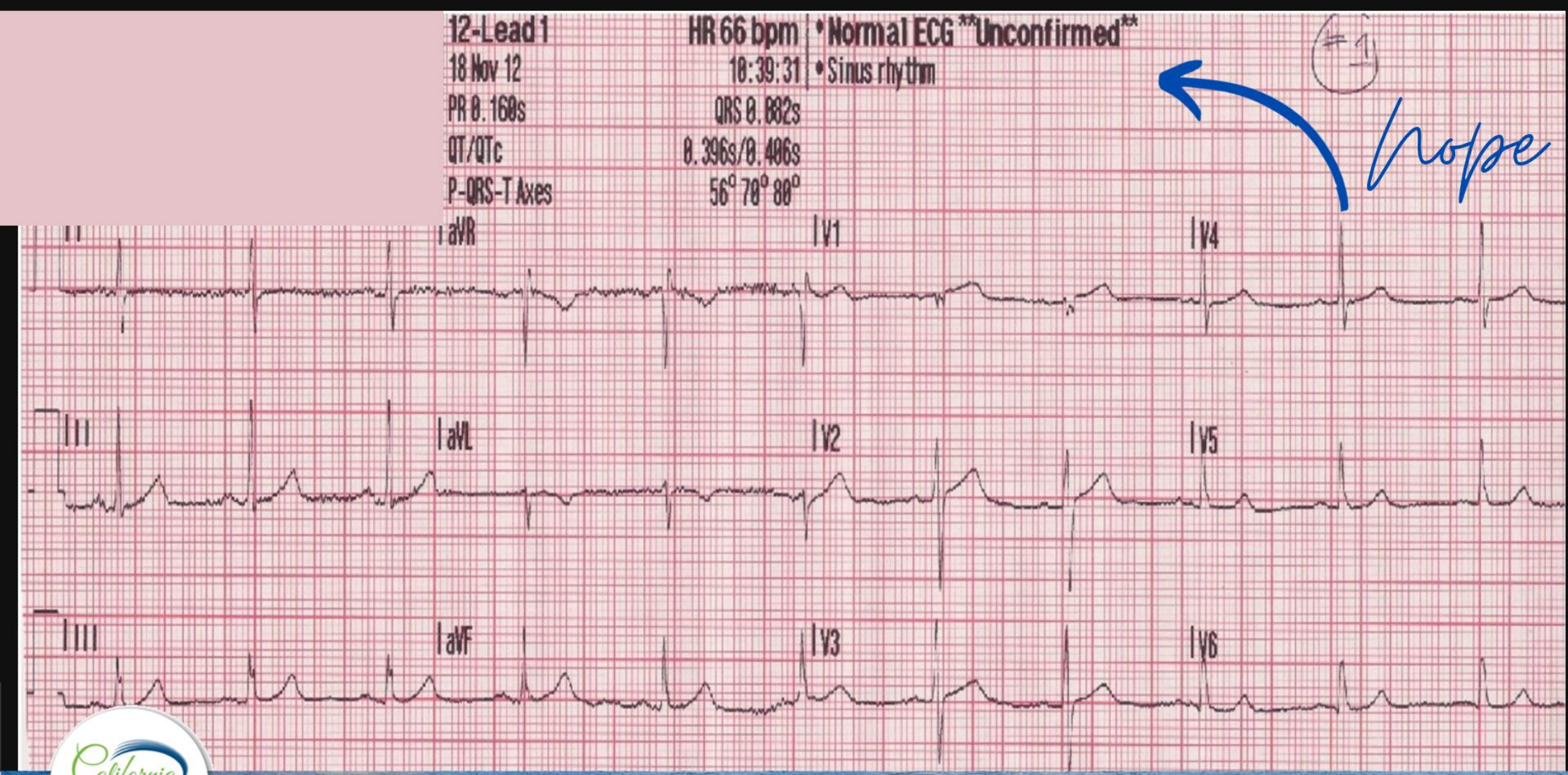

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CHEST PAIN

x 3 days

Hx: HTN, HLD, DM
SH: Ex smoker, works as an accountant

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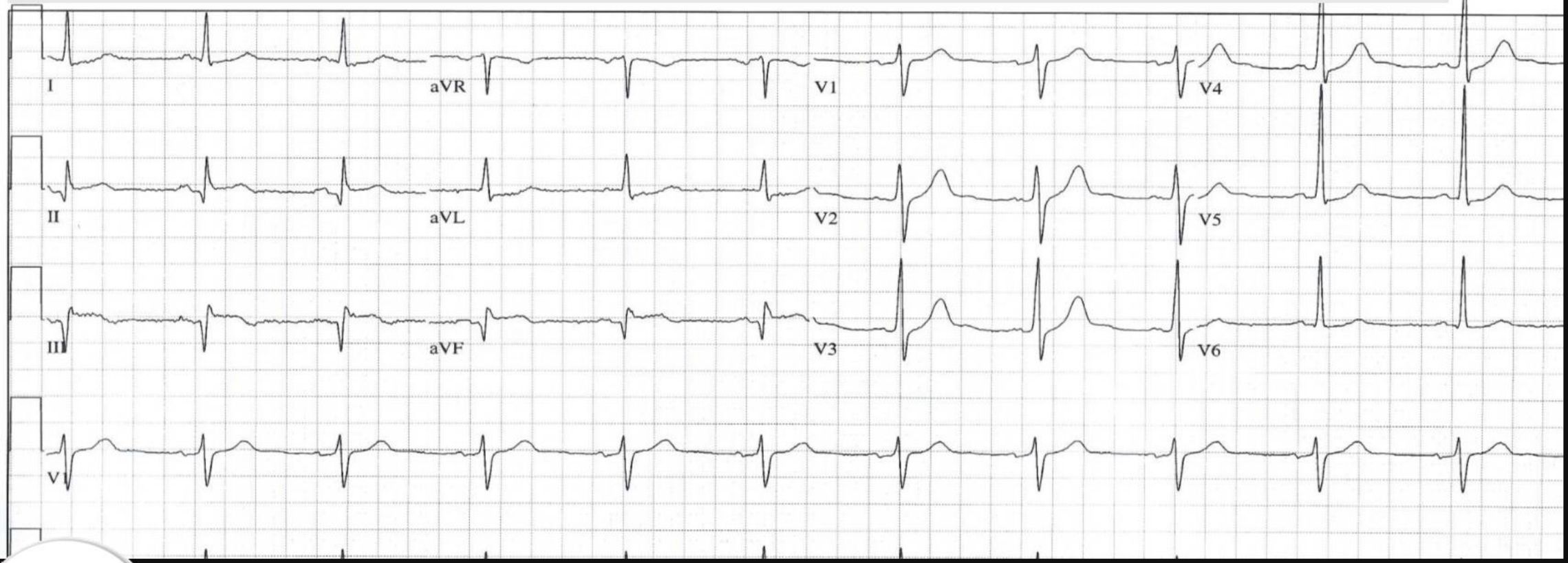

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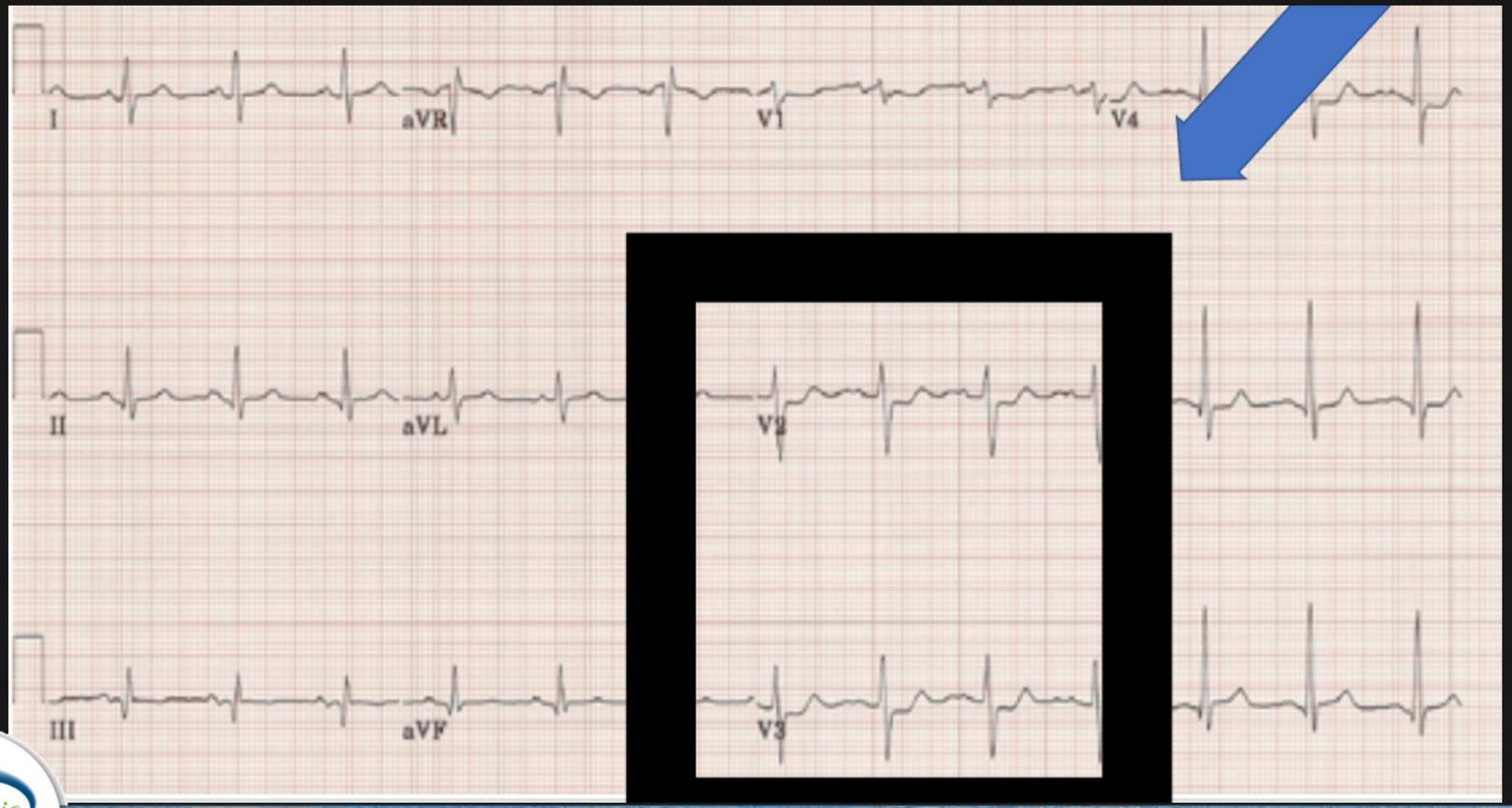
50 Y/O MALE WITH "INDIGESTION"



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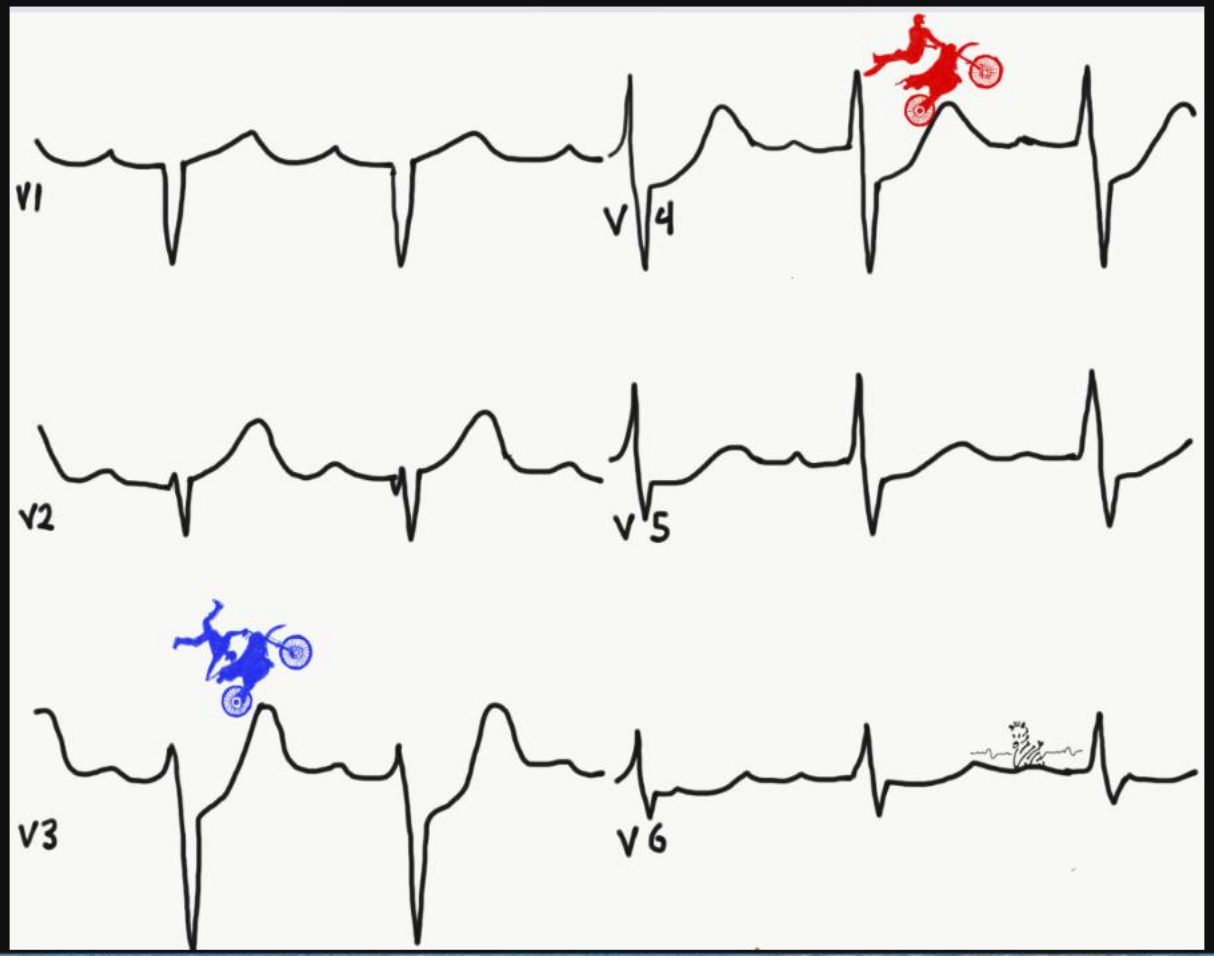
DEWINTERS

T Waves



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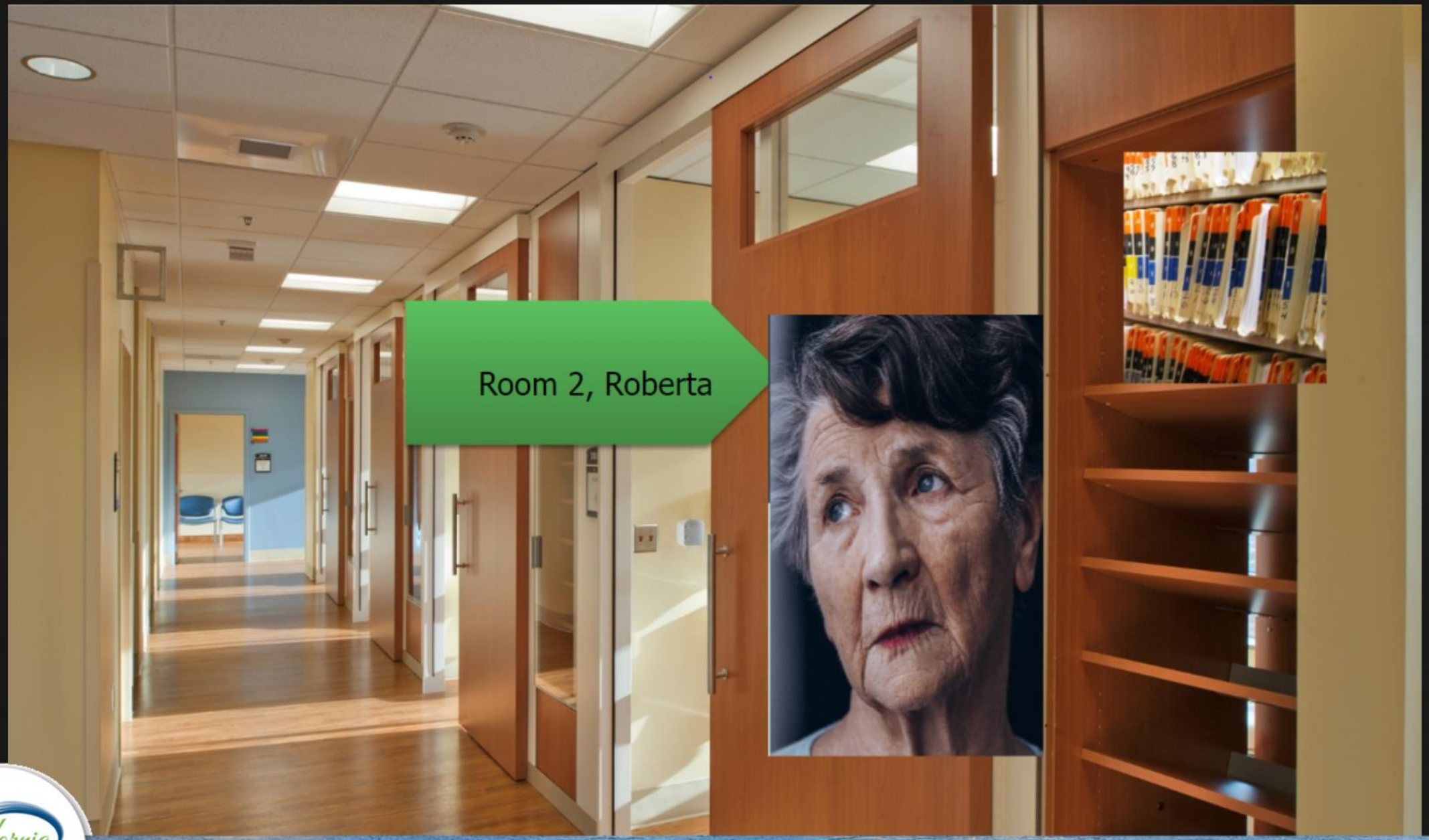

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“ROBERTA”

“CHEST PAIN”

Status:

”I feel weak”

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89 Y/O FEMALE

"CHEST PAIN"

Feels dizzy with dyspnea, feels unwell

Pmhx: *DM, HTN*

Meds: *Lisinopril, ASA, Metformin*

VS: 118/90 (post meds), was 170/110

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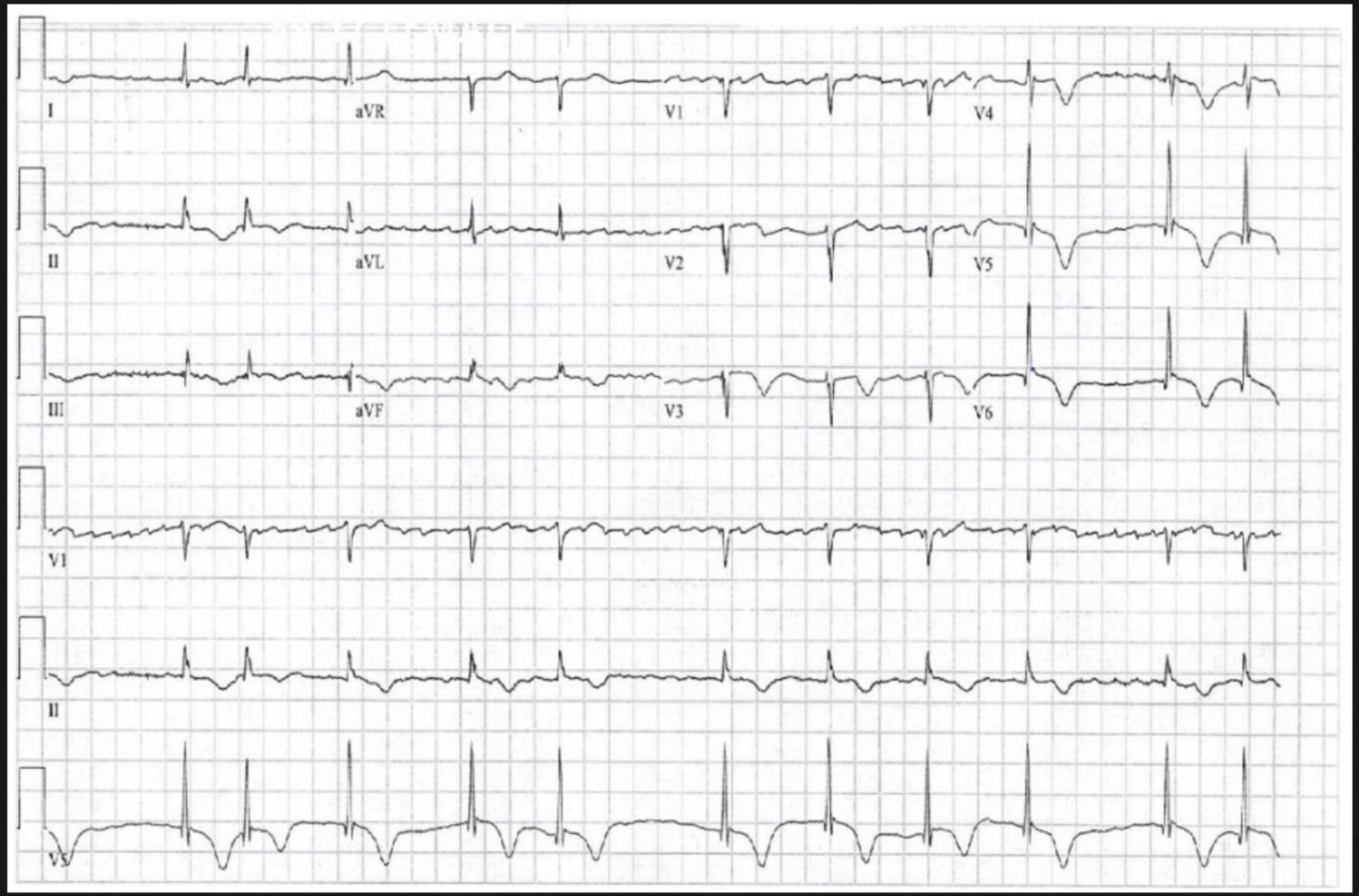

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“CHEST PAIN”

- *Left ventricular distal-apical akinesis.*
- *Normal left ventricular chamber size with normal systolic function with EF 32%*
- *Moderate concentric left ventricular hypertrophy*
- *Normal right ventricular chamber size with normal systolic function*
- *Mildly dilated left atrium and normal sized right atrium*
- *Moderate mitral regurgitation*
- *Right ventricular systolic pressure of 32 mmHg consistent with normal pulmonary artery pressure*

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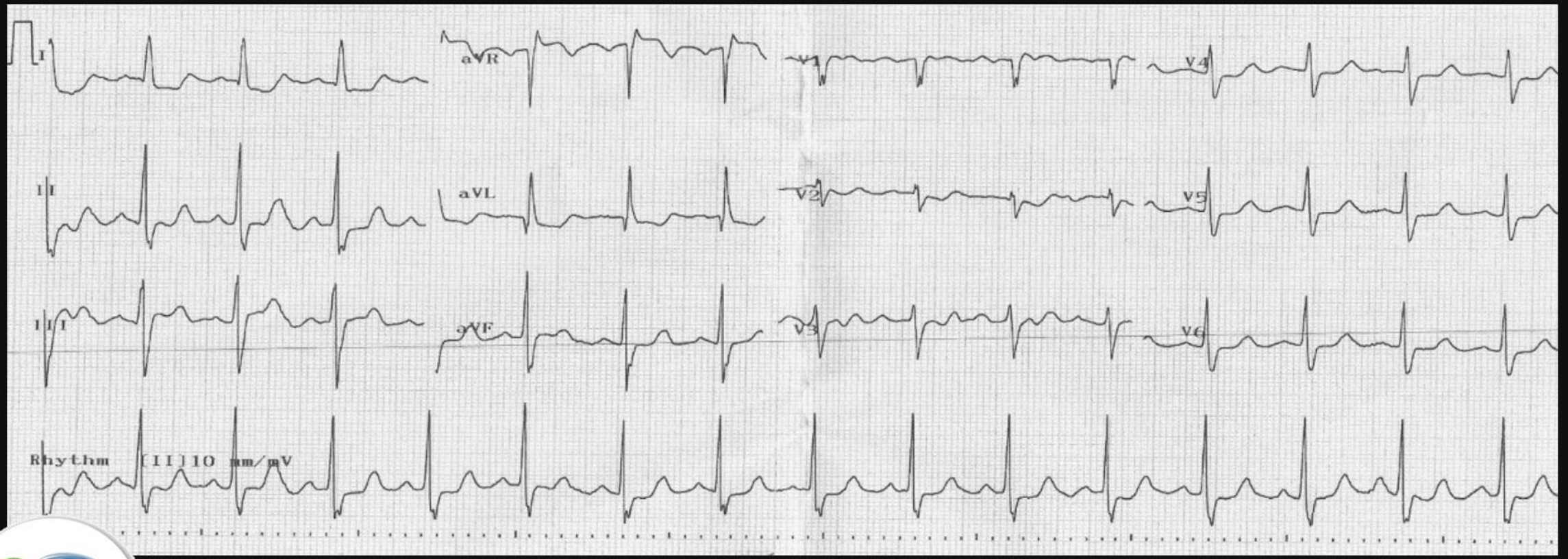
78 Y/O MALE WHO HAD SHOULDER PAIN

Is it just arthritis?



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CHEST PAIN

3 days

Worse today....

Pmhx: HTN
HLD
DM
Has 1 kidney

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PALPITATIONS

x 3 days

"I feel like I am going to pass out"

Pmhx: HTN
HLD
DM

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P- WALKING
Q- PRESSURE
R- NECK
S- 6/10
T- 3 DAYS

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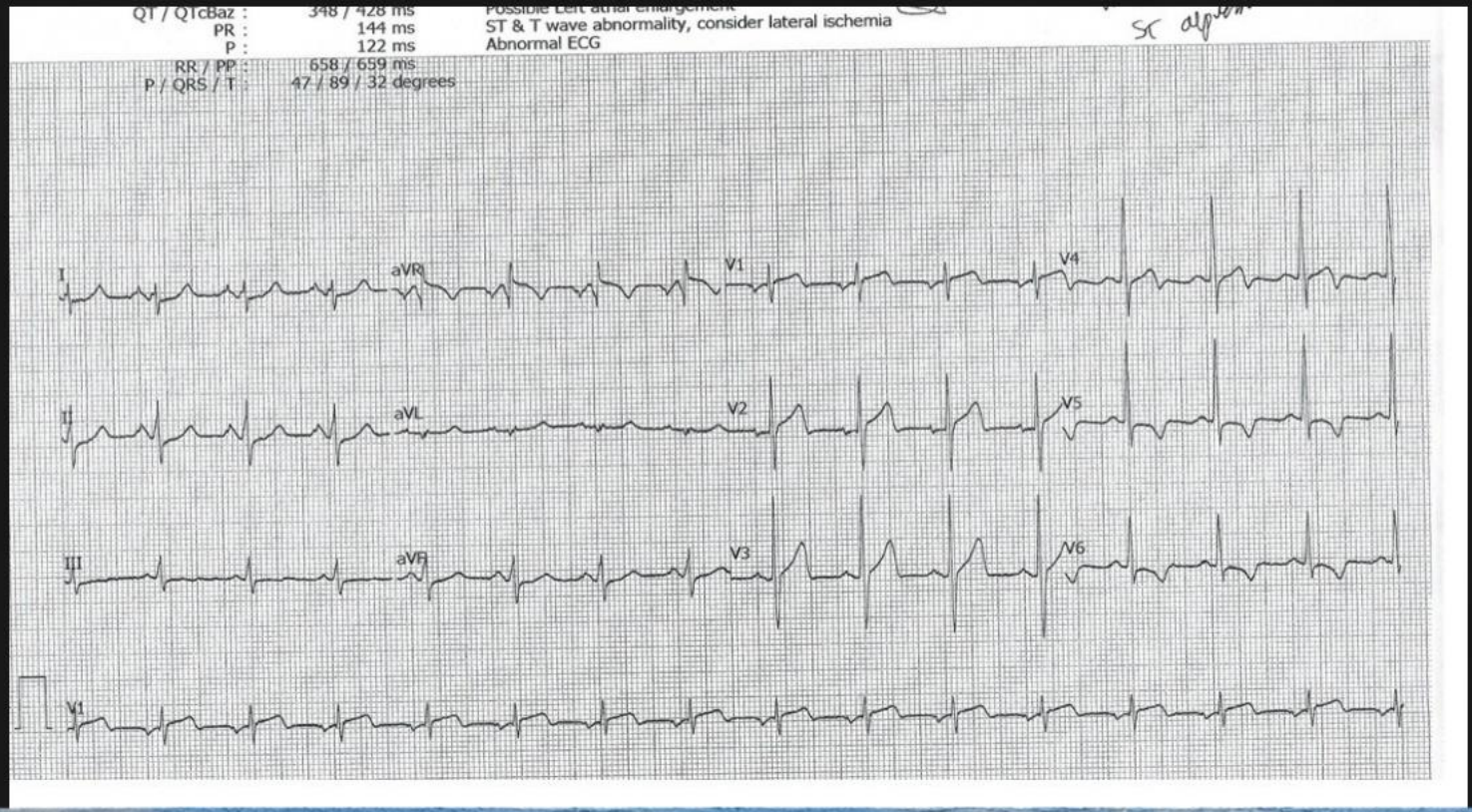
THIS PATIENT HAD A STEMI 5 MINUTES LATER.



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THIS PATIENT NEEDED TWO STENTS. SHE WAS 24.

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FINAL
THOUGHTS

RECAP

- Don't Trust The Machine Read

2. Don't Miss the 2 STEMI Mimics But...

3. The new Paradigm is so much more than STEMI

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SERIOUSLY....

How can i learn more?

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IF I CAN'T TRUST THE MACHINE....

Who can I trust?

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THANK YOU!

jen@conqueringcardiology.com

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