

EKG 1,2,3

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Disclosures



Objectives



- Review normal cardiac conduction
- Rhythm review
- How to assess heart rate
- 10 step program to assess an EKG
- Normal EKG review

What questions are we asking?

EKG:

Arteries blocked?

Conduction intact

How big are the walls?

Is there fluid surrounding the heart?

Is the heart lining inflammed?



The heart is like a house.



Plumbing: *Vessels*

Electricity: *Conduction*

Walls: *Muscle*

Doors: *Valves*

LEARNING EKGS



1. What is an EKG?
2. What can it tell you?
3. What are the waves - normals?
4. Heart anatomy and how it corresponds to EKG
5. Four parts of ♥ (we look at electricity)
6. Learn Rhythms
7. What is 12 Lead?
   - What are we looking at
   - Corresponding to ♥
   - Terminology we use
   - Leads
   - Reciprocal / contiguous
8. What normal is
9. 10 Step Approach
10. Carve It UP
11. Patterns
12. STEMI
13. STEMI MIMICS
14. Go deep on axis
15. Then PRACTICE!

It is as easy as this…

P – P wave? PR interval?

Q – QRS – wide? QT interval? Q Wave?

R – Rate? Rhythm? RR interval?

S – ST elevation?

T – T waves (shape, size, position)

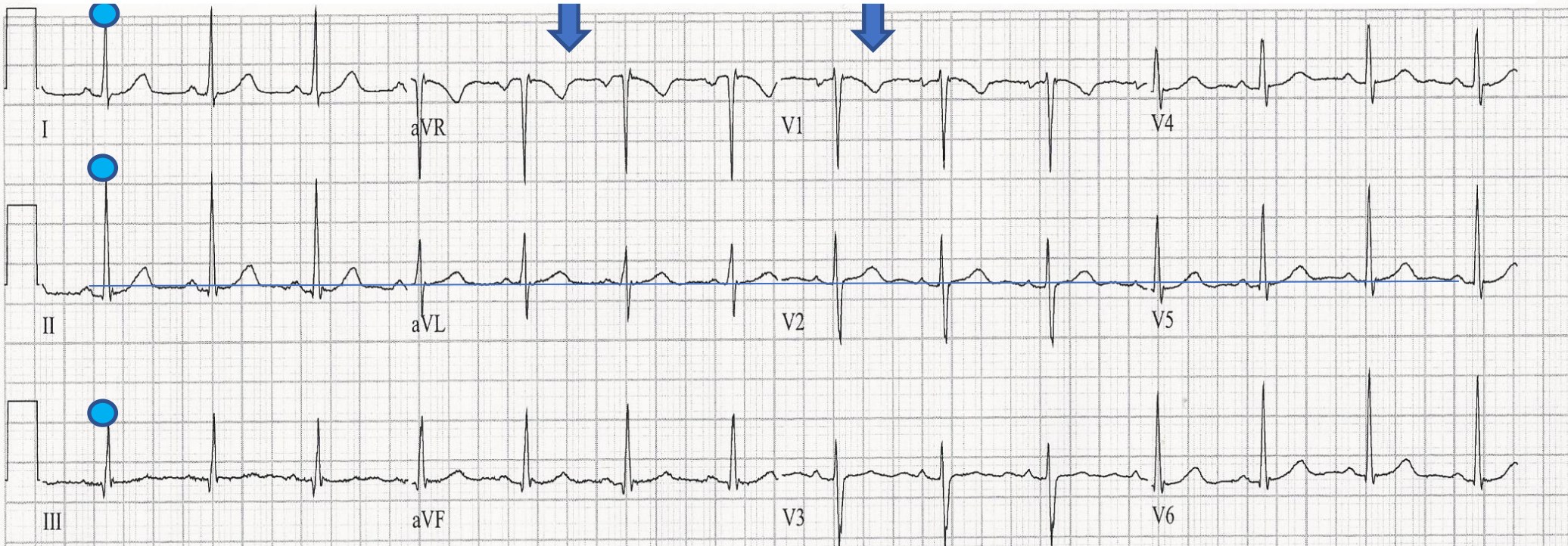
10 Step Approach to Reading EKG

1. Big Sick vs. Little Sick
2. Rate
3. Rhythm
4. Intervals
5. Axis
6. ST Segments
7. Hypertrophy/Voltage
8. T wave analysis- (all waves)
9. Q Waves? Married? Wide?
10. CC based approach

What makes this a normal EKG?

Vent. rate	84	BPM
PR interval	150	ms
QRS duration	76	ms
QT/QTc	378/446	ms
P-R-T axes	38 51	31

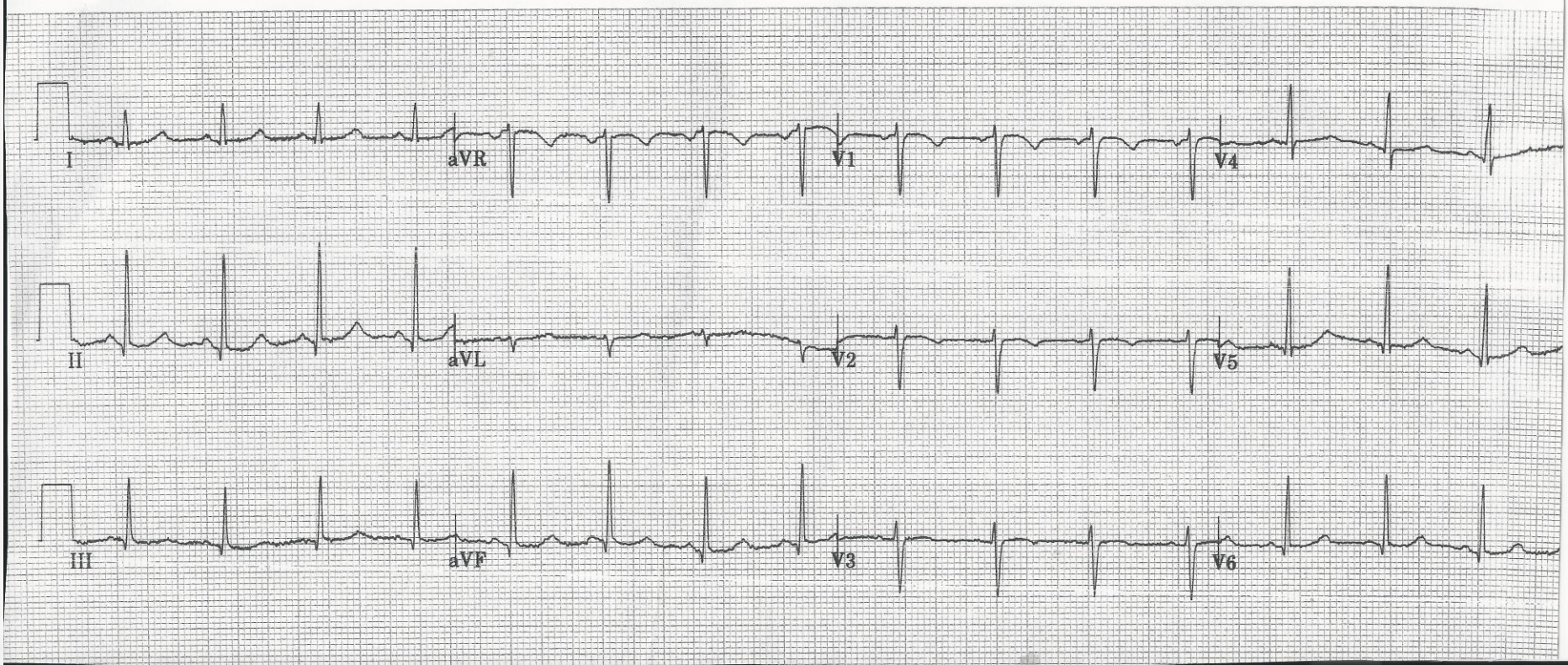
NORMAL SINUS RHYTHM
NORMAL ECG
NO PREVIOUS ECGS AVAILABLE



Is it though?

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		

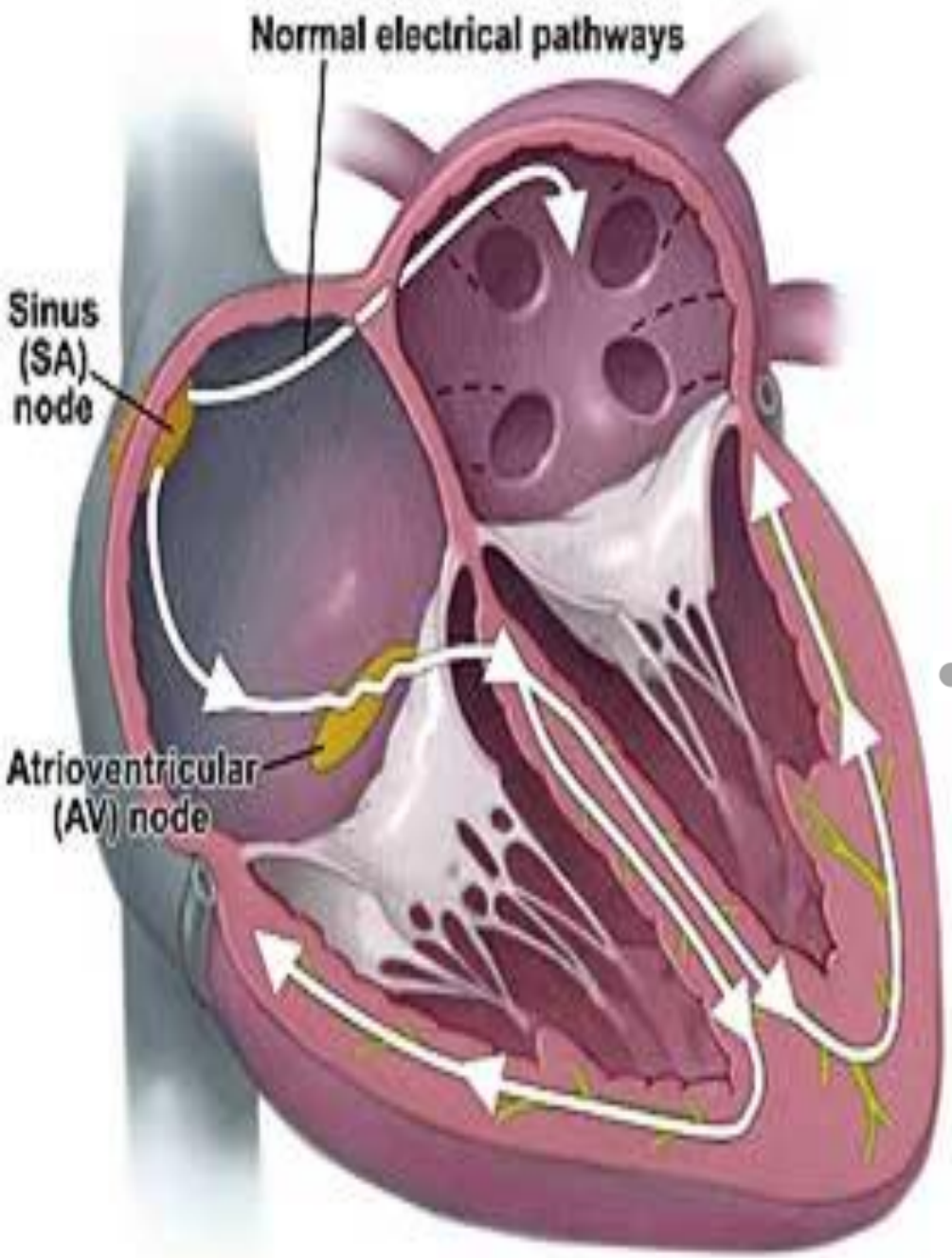
Time: 17
Reviewed by



Back to Basics

Rhythm Review





Normal conduction

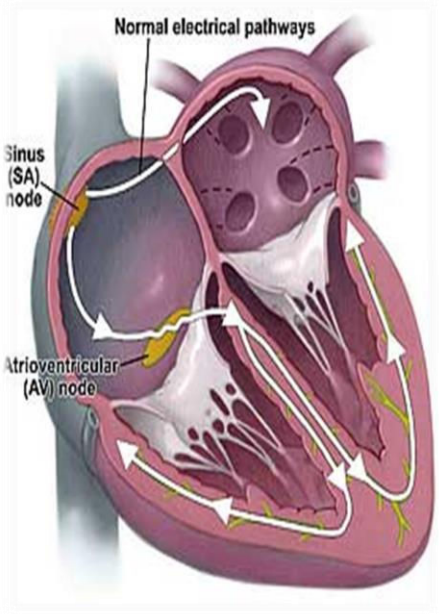
You have to know what normal is to know what abnormal is. . . . . .

- Introducing…. NSR.
- When the president is in charge.



When the president goes on vacation…









You need 1 "man" in charge

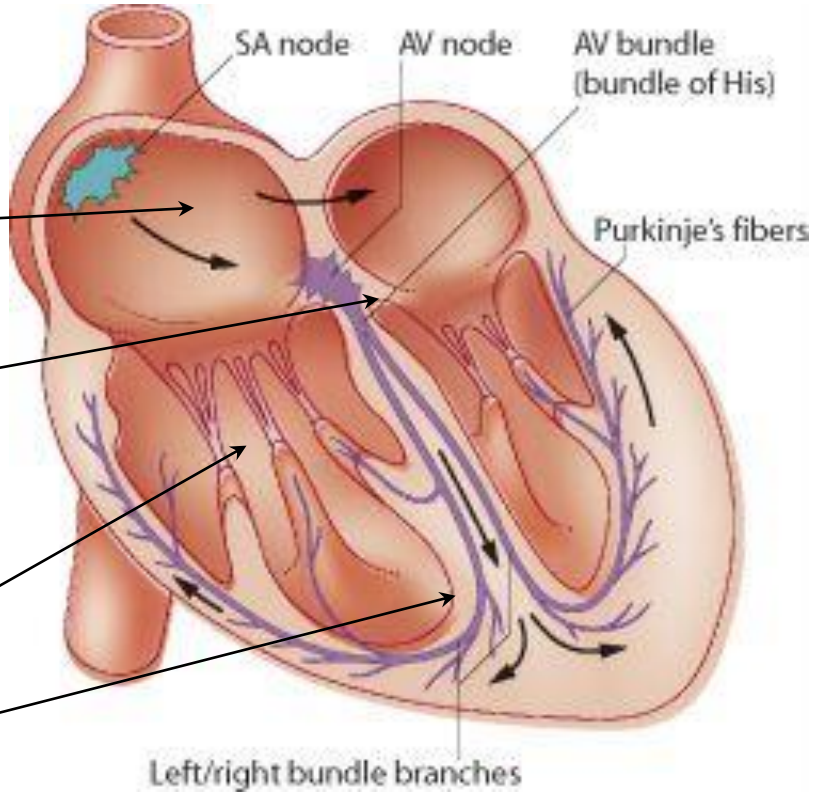


60-100

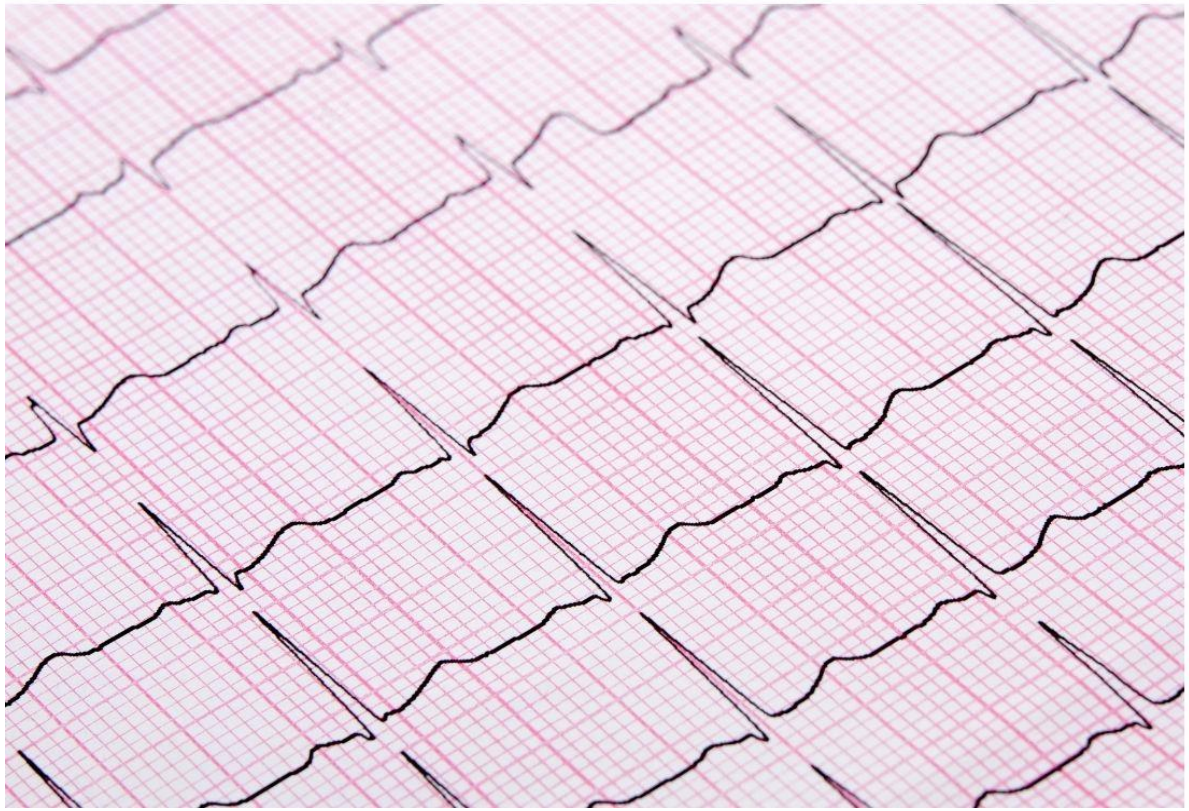
40-60

20-40

0-20



3 questions to answer...



NARROW VS WIDE

SVT vs VT

FAST VS SLOW

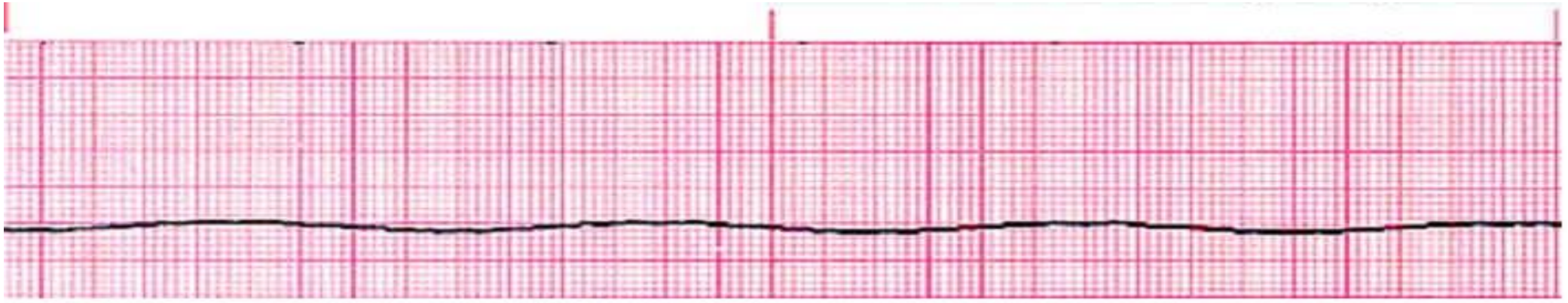
DO we need to intervene RIGHT now?

REGULAR VS IRREGULAR

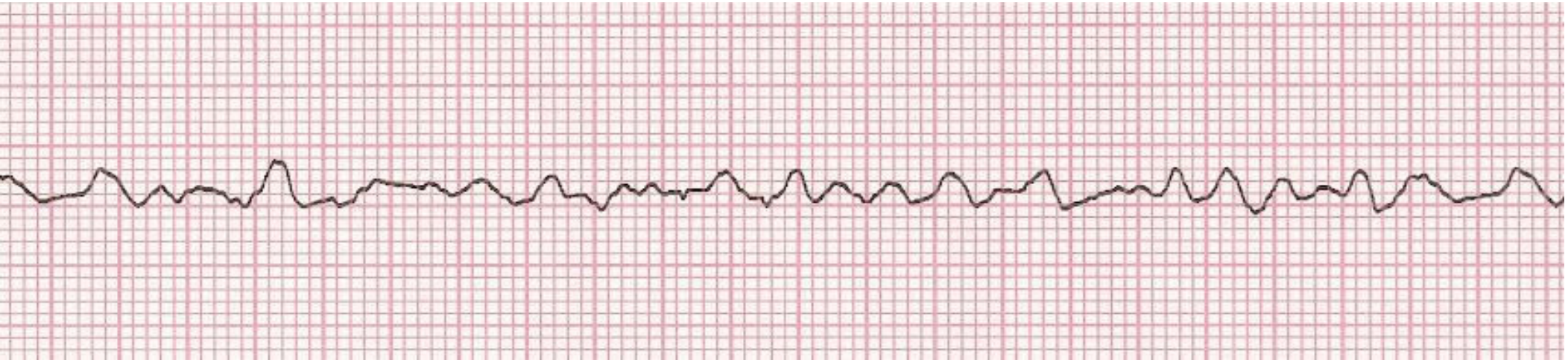
Sinus vs afib

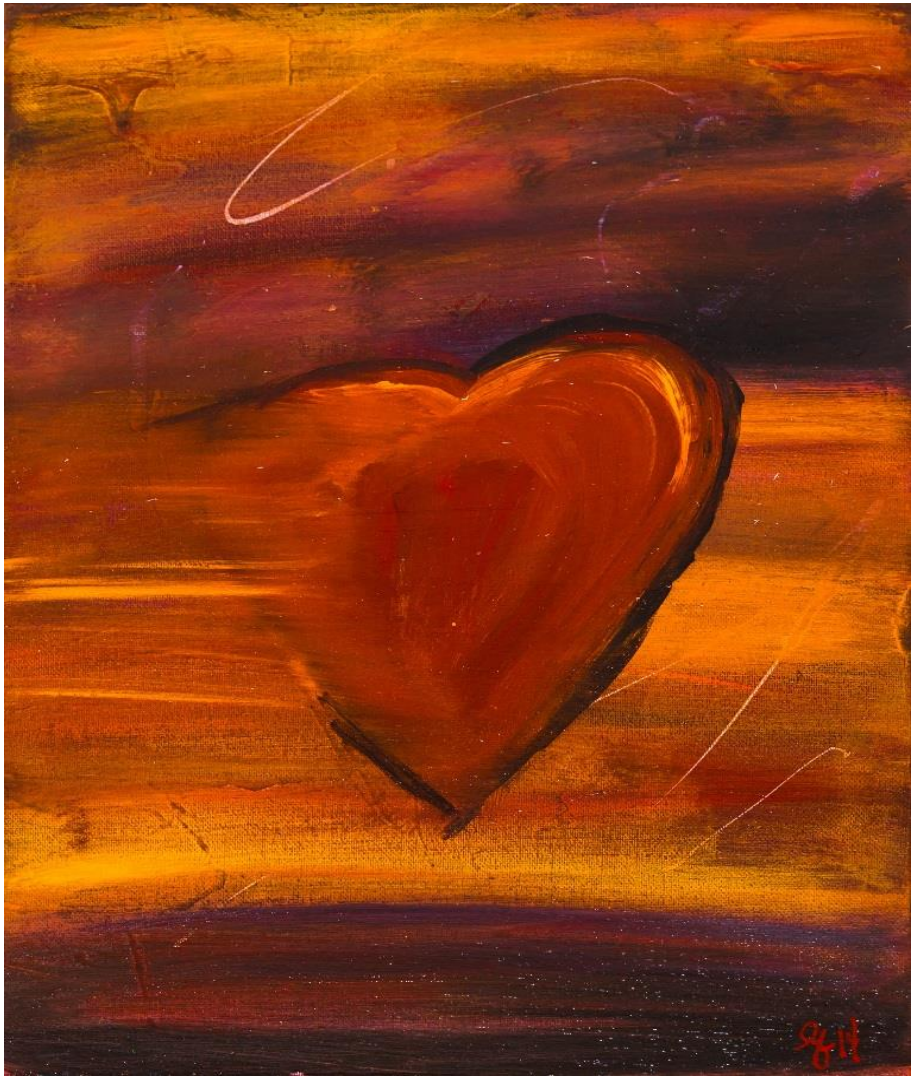
Pop Quiz

Name that tune…

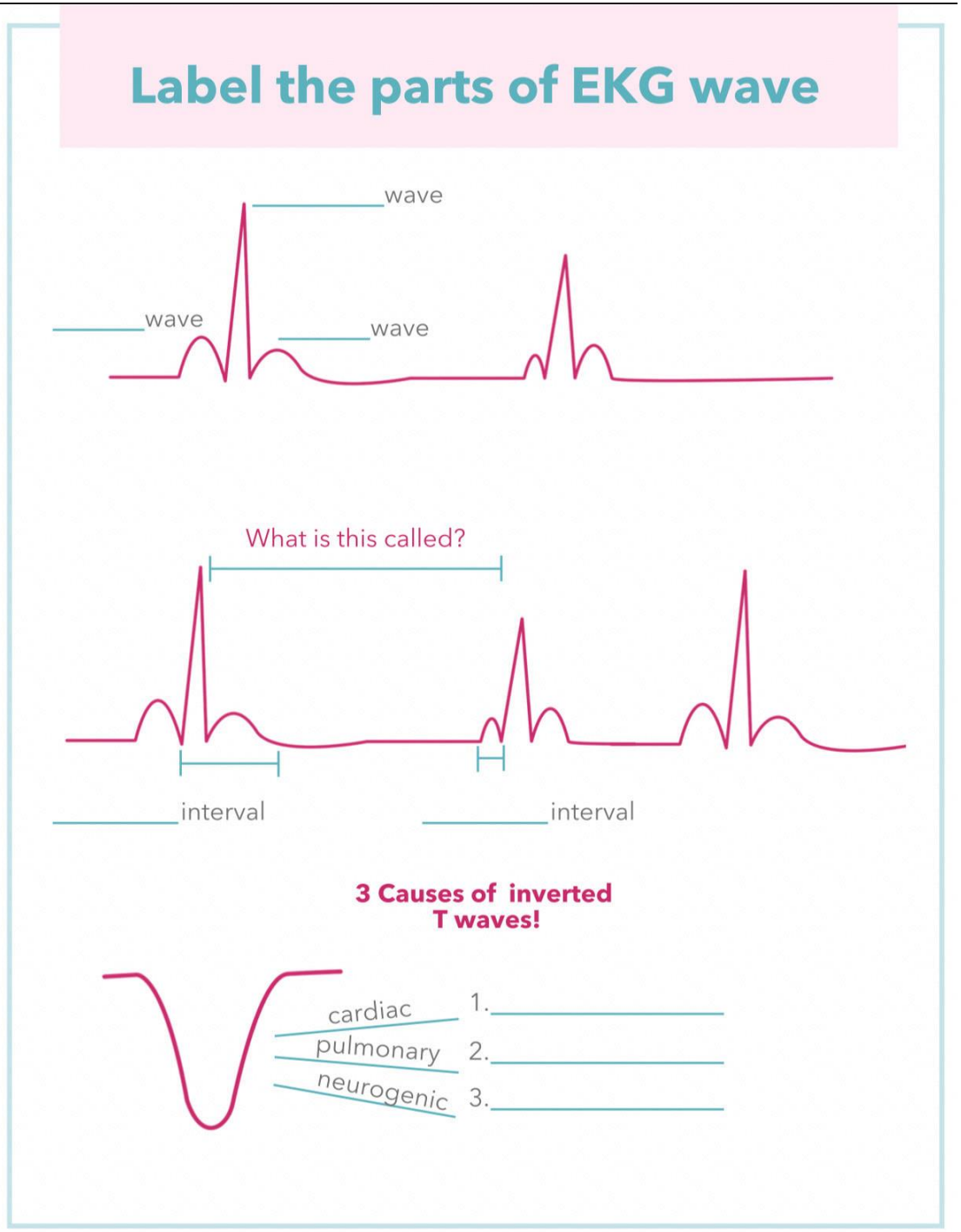


When everyone tries to *overthrow* the government





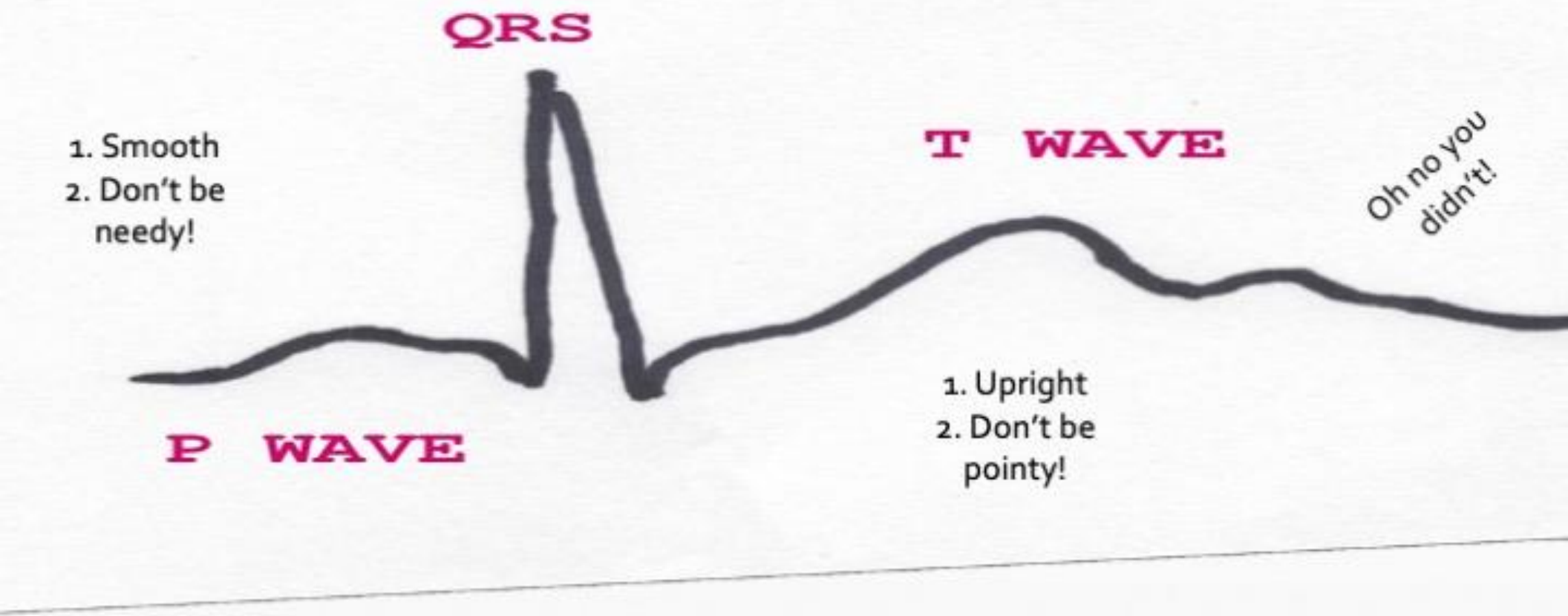
The Waves

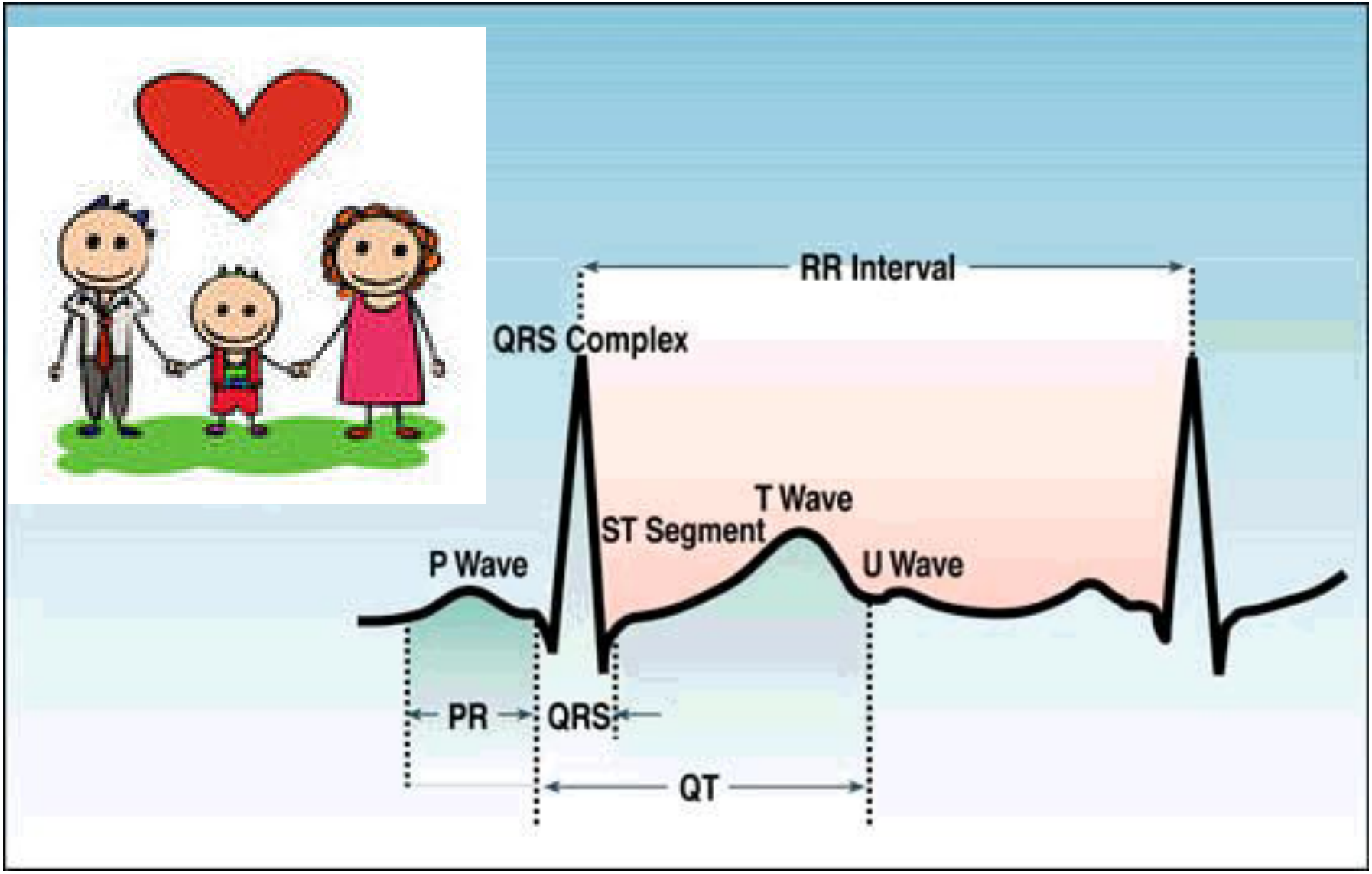


Recap

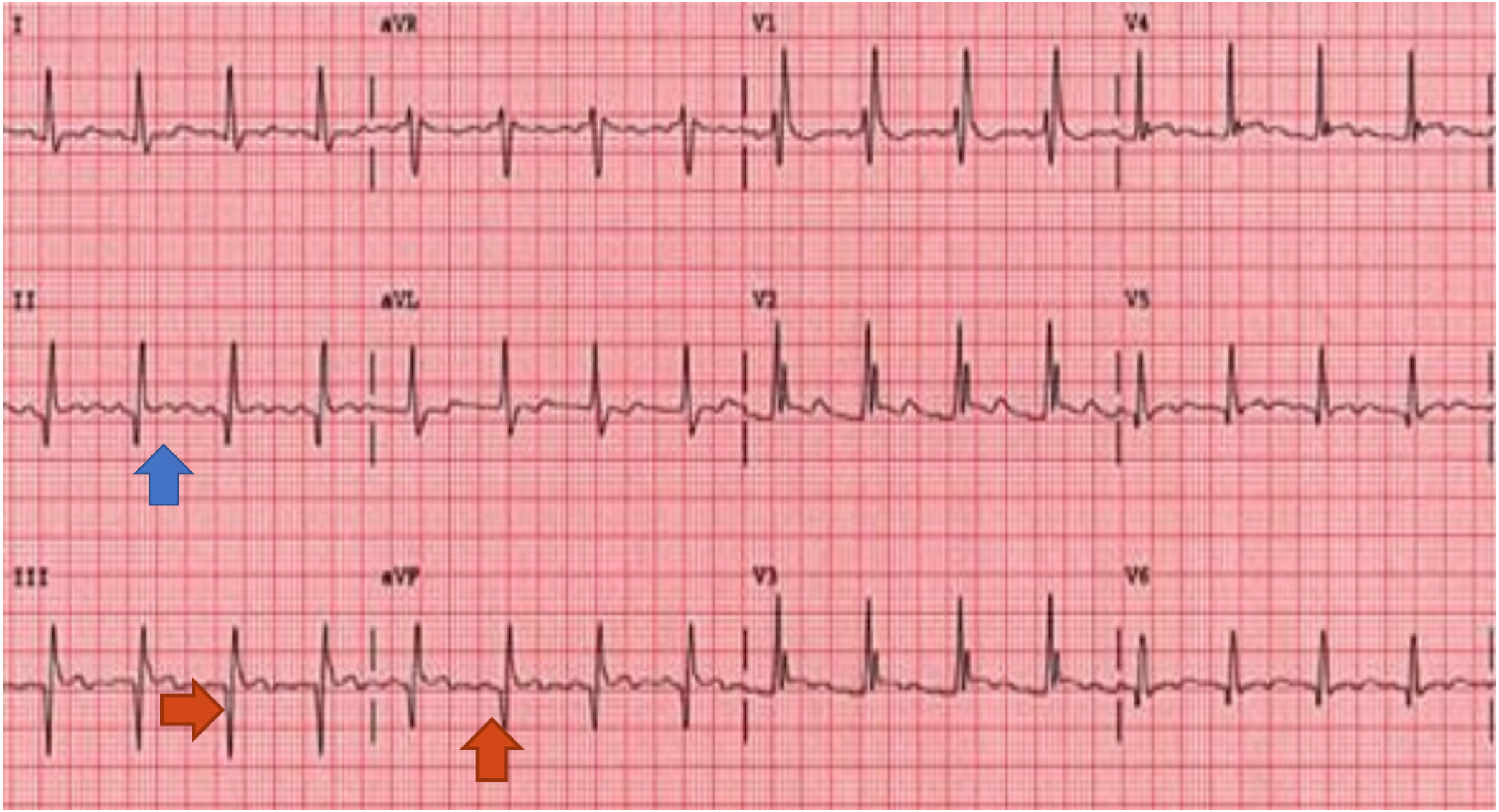
- P
- QRS
- ST segment
- T
- Q waves

1. Not too tall
2. Not too wide

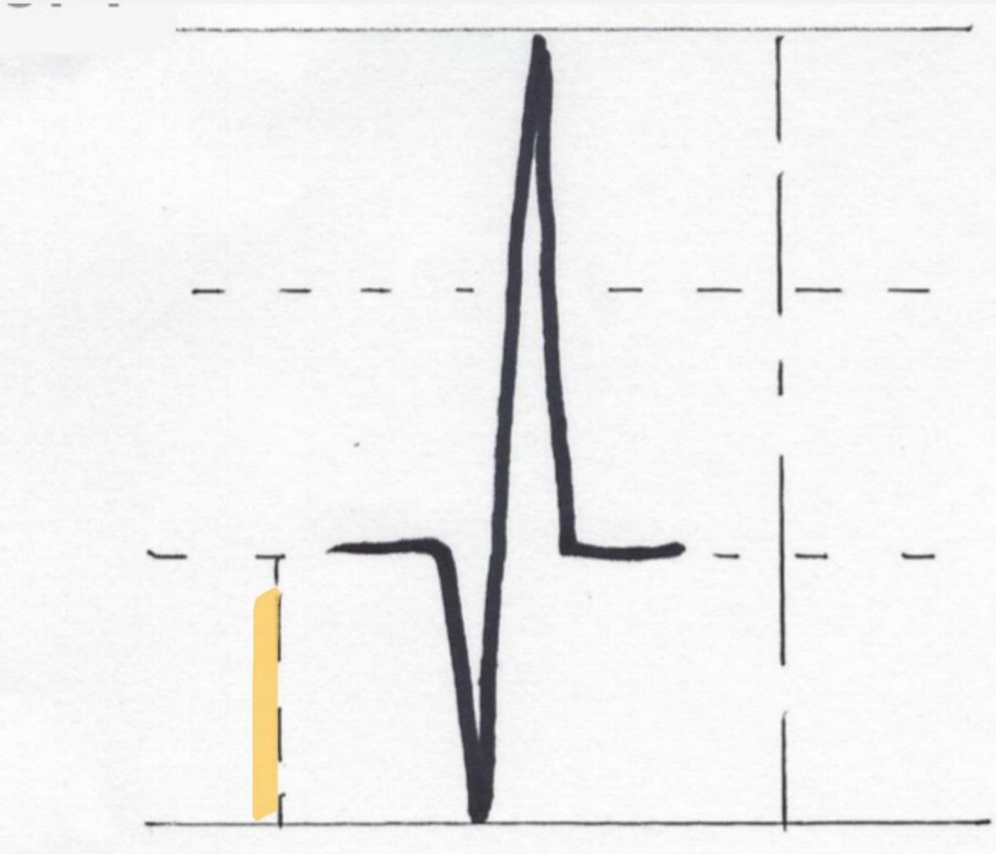



RR Interval
QRS Complex
T Wave
ST Segment
P Wave
U Wave
PR
QRS
QT

Pathologic Q waves

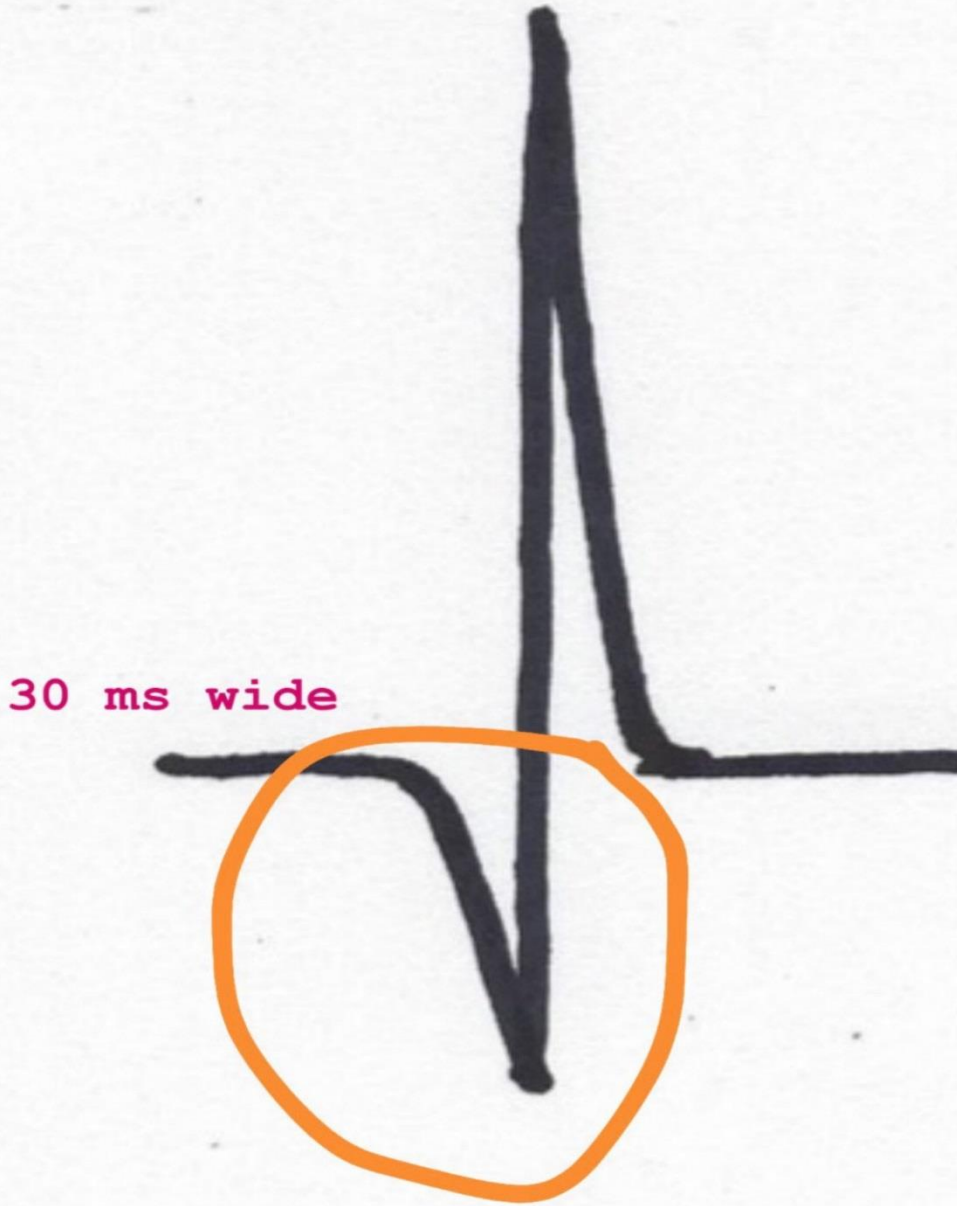


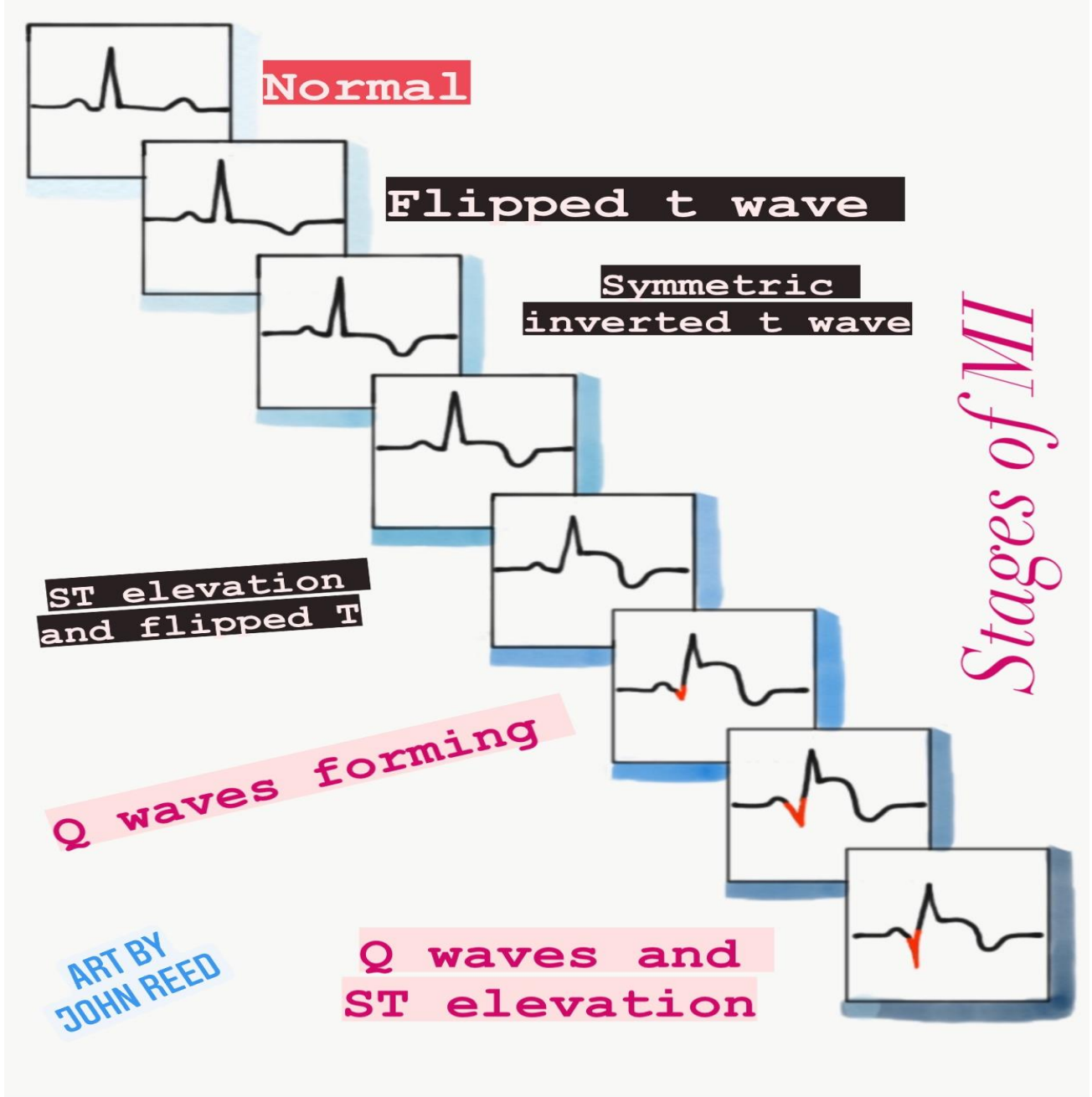
Q WAVE

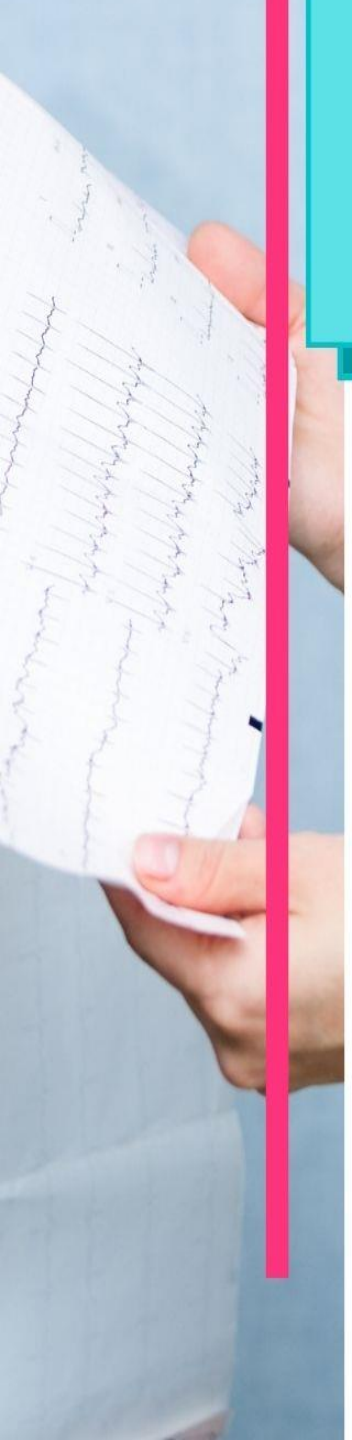


¼ of the R wave

Pathologic Q Waves

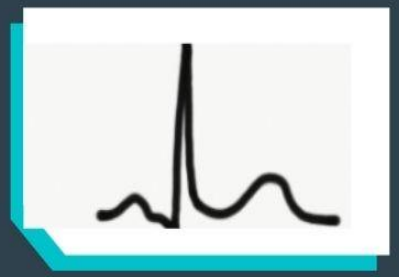


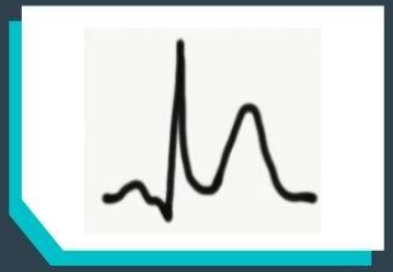

Normal
Flipped t wave
Symmetric inverted t wave
ST elevation and flipped T
Q waves forming
Q waves and ST elevation
Stages of MI
ART BY JOHN REED



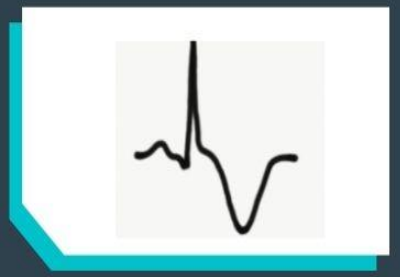
T WAVE JAIL

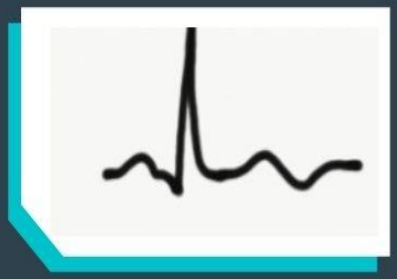
Can you name them?

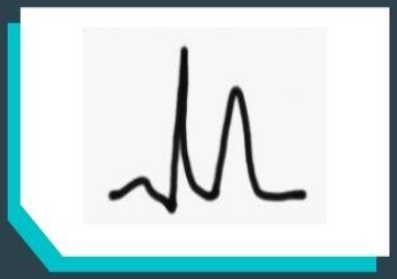


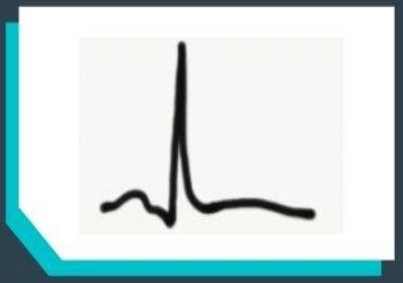




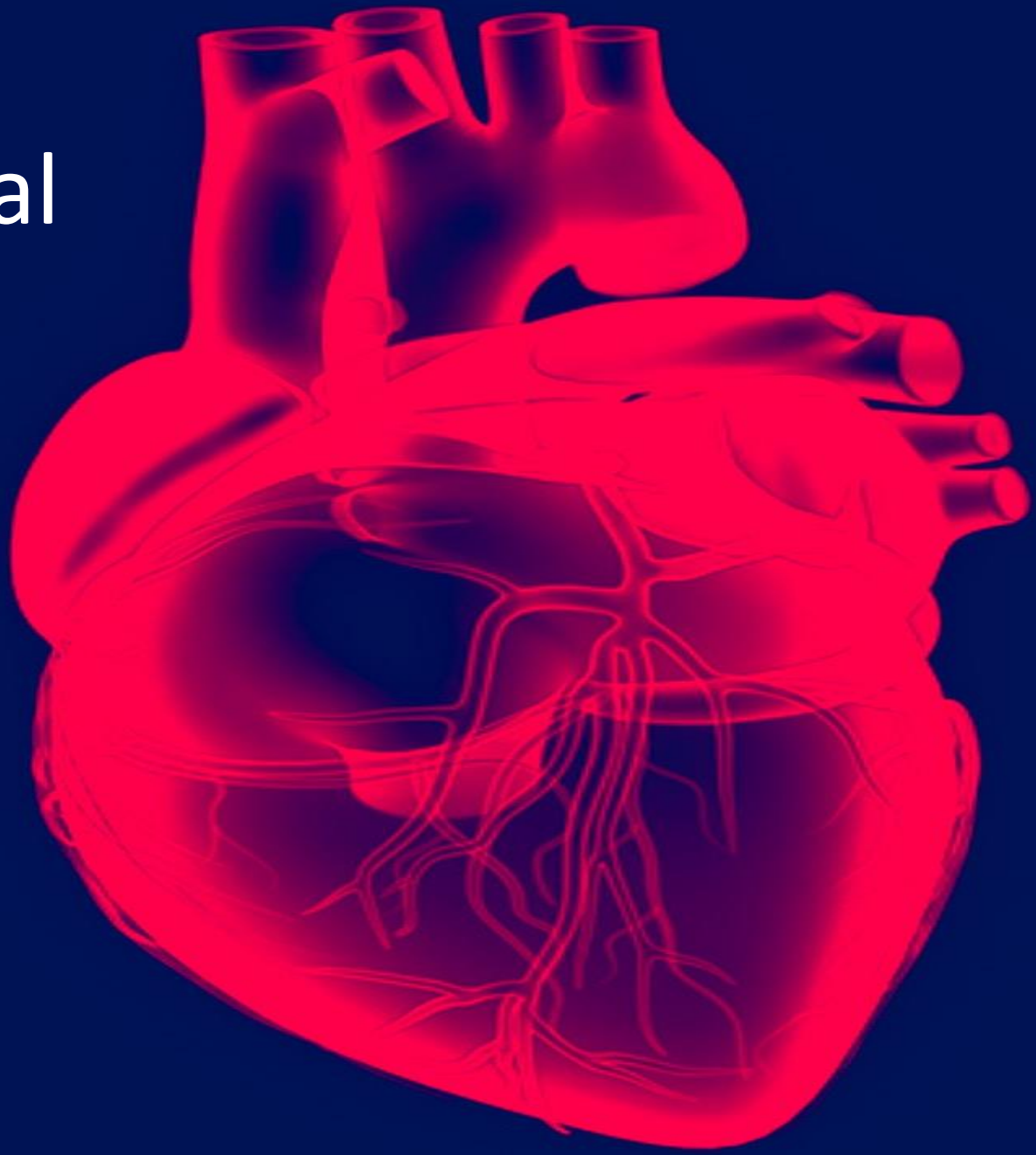








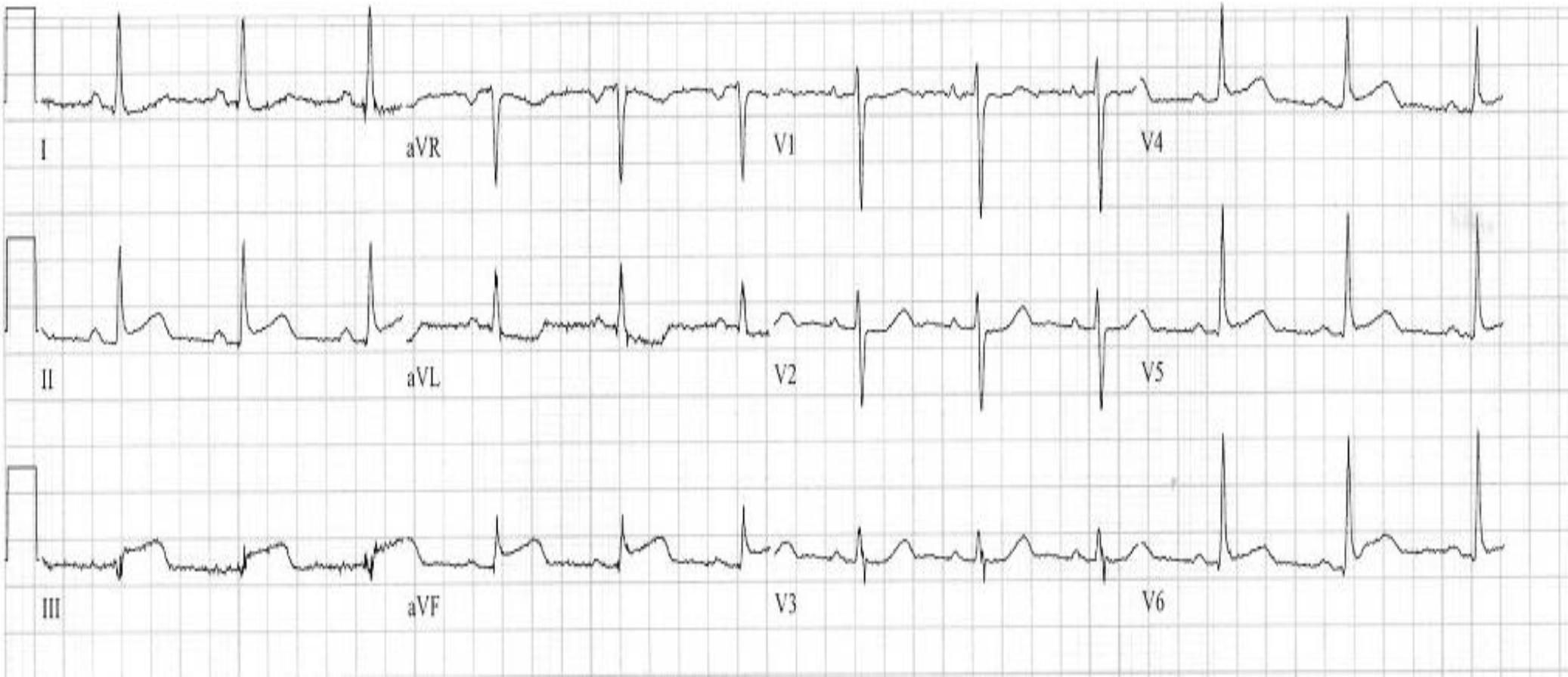
The Normal EKG



Vent. rate	71	BPM
PR interval	164	ms
QRS duration	88	ms
QT/QTc	426/462	ms
P-R-T axes	27 31	83

*** Critical Test Result: STEMI
NORMAL SINUS RHYTHM
ST ELEVATION CONSIDER INFERIOR INJURY OR ACUTE INFARCT
** ** ACUTE MI / STEMI ** **
Consider right ventricular involvement in acute inferior infarct

1. Big sick or little sick?



STOP!!!!!!

STEMI Accustion - YES OR NO



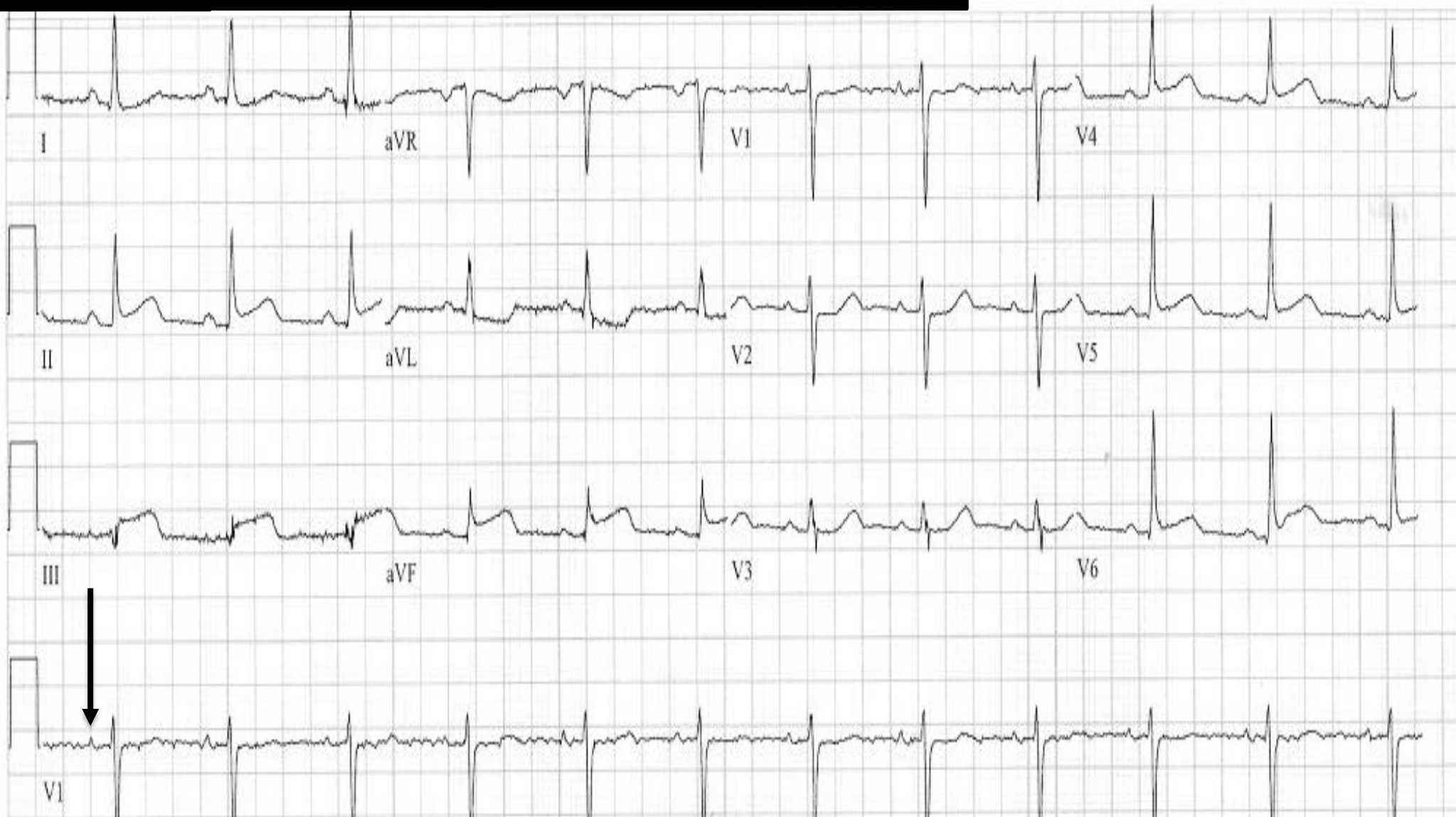
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2. Rate (60-100)



3. Rhythm (Reg v Irr? Fast v. slow, Narrow v. wide)



These numbers……MATTER

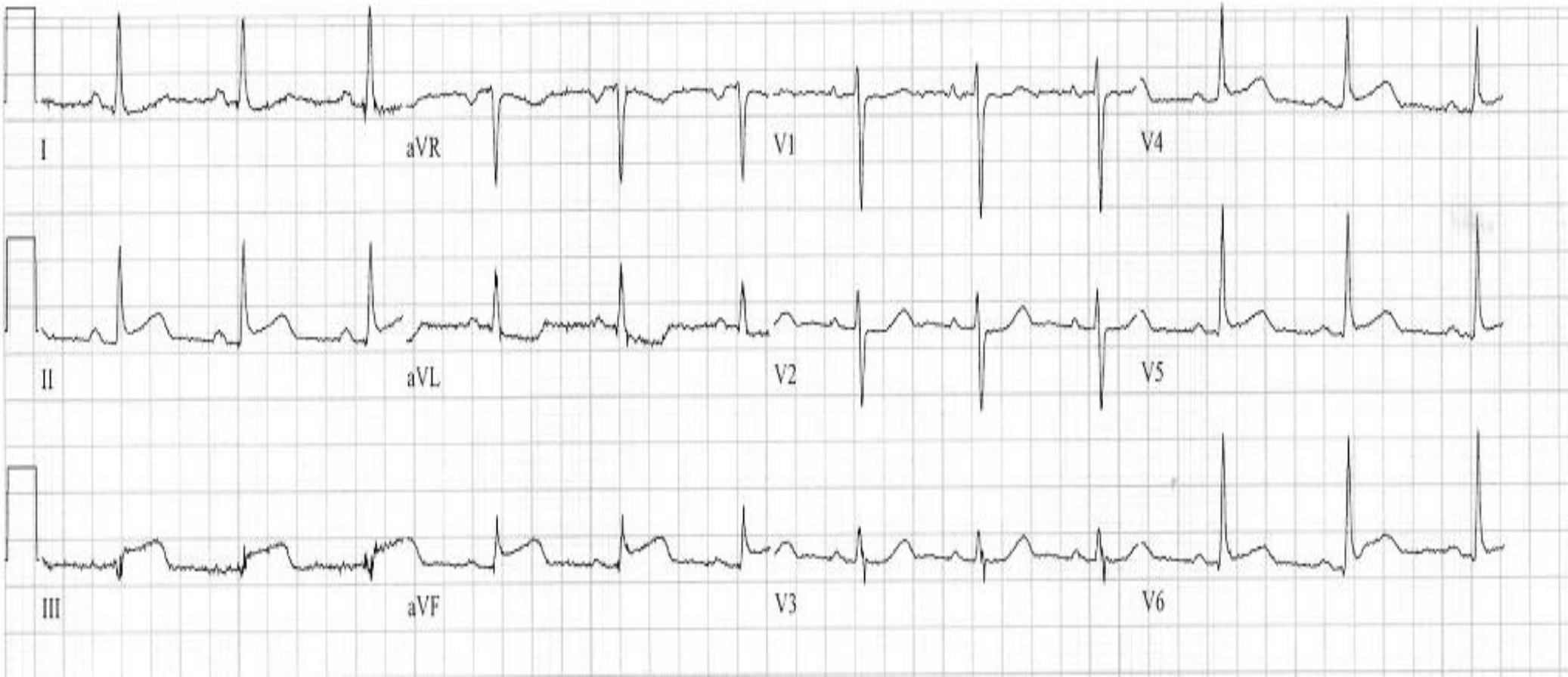
- **PR Interval - .12 - .20 (120 ms – 200 ms)**
- **QRS Complex - below .12 (120 ms)**
- **QT Interval – below 460 ms**

A normal QRS should be no longer than ___ boxes

Vent. rate	71	BPM
PR interval	164	ms
QRS duration	88	ms
QT/QTc	426/462	ms
P-R-T axes	27 31	83

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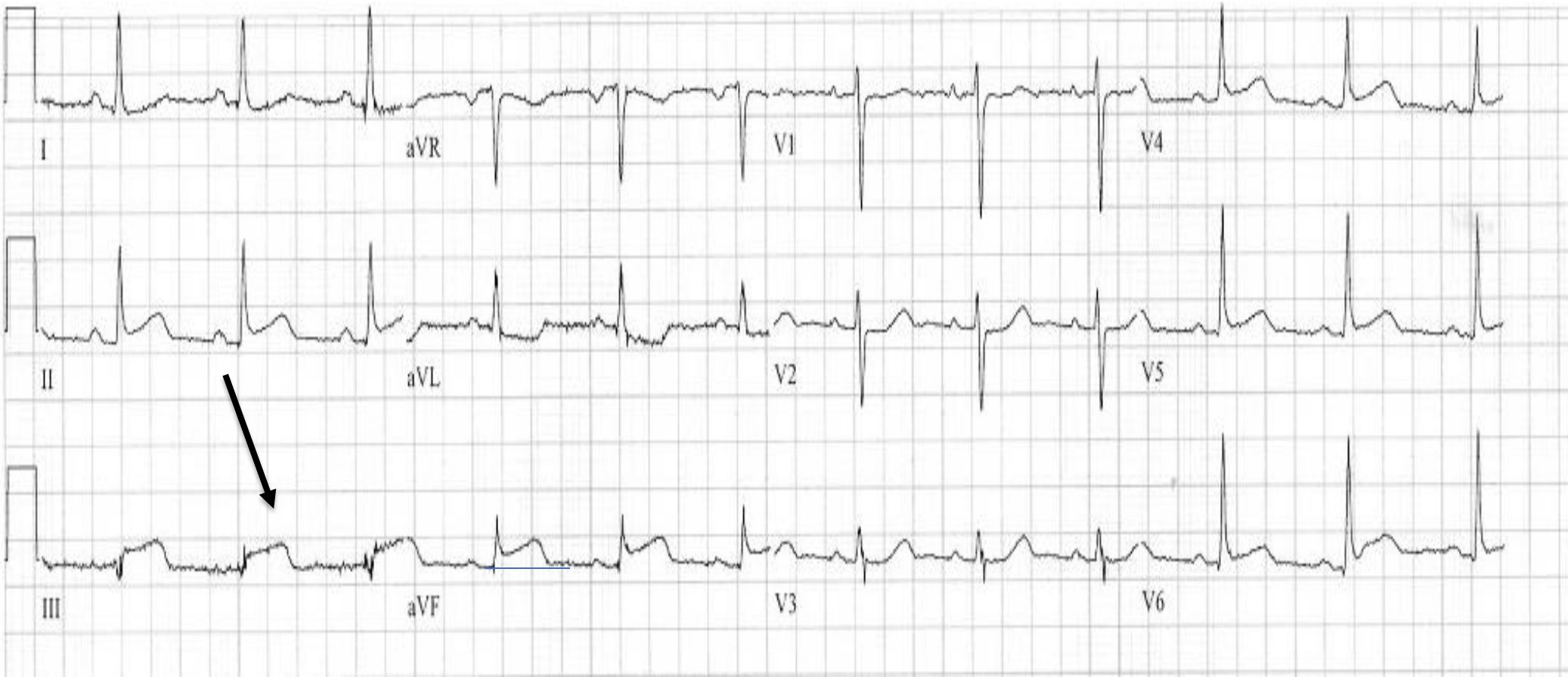
4. Intervals.



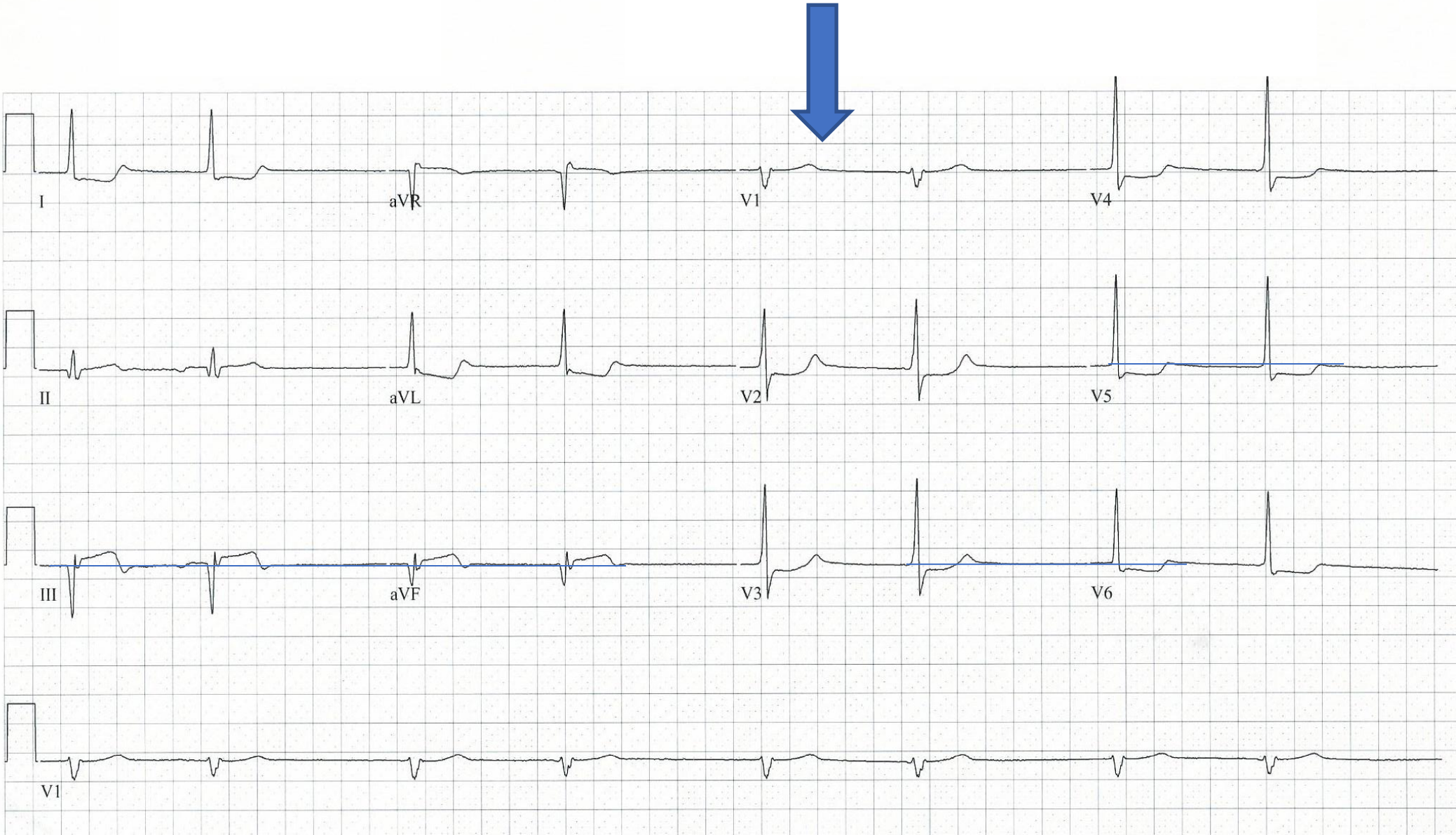
Vent. rate	71	BPM
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NORMAL SINUS RHYTHM
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Consider right ventricular involvement in acute inferior infarct

5. ST Segments



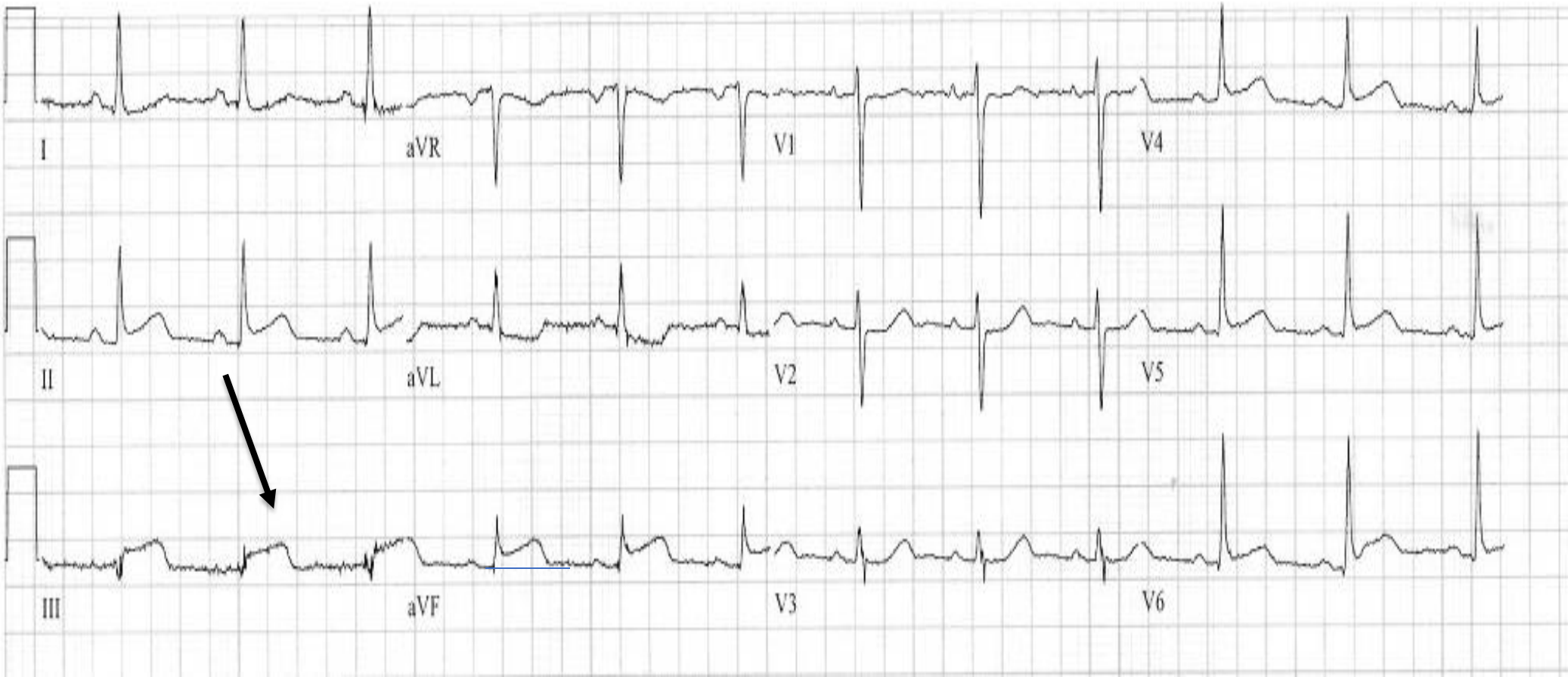
Vent. rate	49	BPM	JUNCTIONAL RHYTHM
PR interval	*	ms	INFERIOR-POSTERIOR INFARCT (CITED ON OR BEFORE 10-OCT-2016)
QRS duration	106	ms	MARKED ST ABNORMALITY, POSSIBLE LATERAL SUBENDOCARDIAL INJURY
QT/QTc	482/435	ms	ABNORMAL ECG
P-R-T axes	* -16	122	



Vent. rate	71	BPM
PR interval	164	ms
QRS duration	88	ms
QT/QTc	426/462	ms
P-R-T axes	27 31	83

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NORMAL SINUS RHYTHM
ST ELEVATION CONSIDER INFERIOR INJURY OR ACUTE INFARCT
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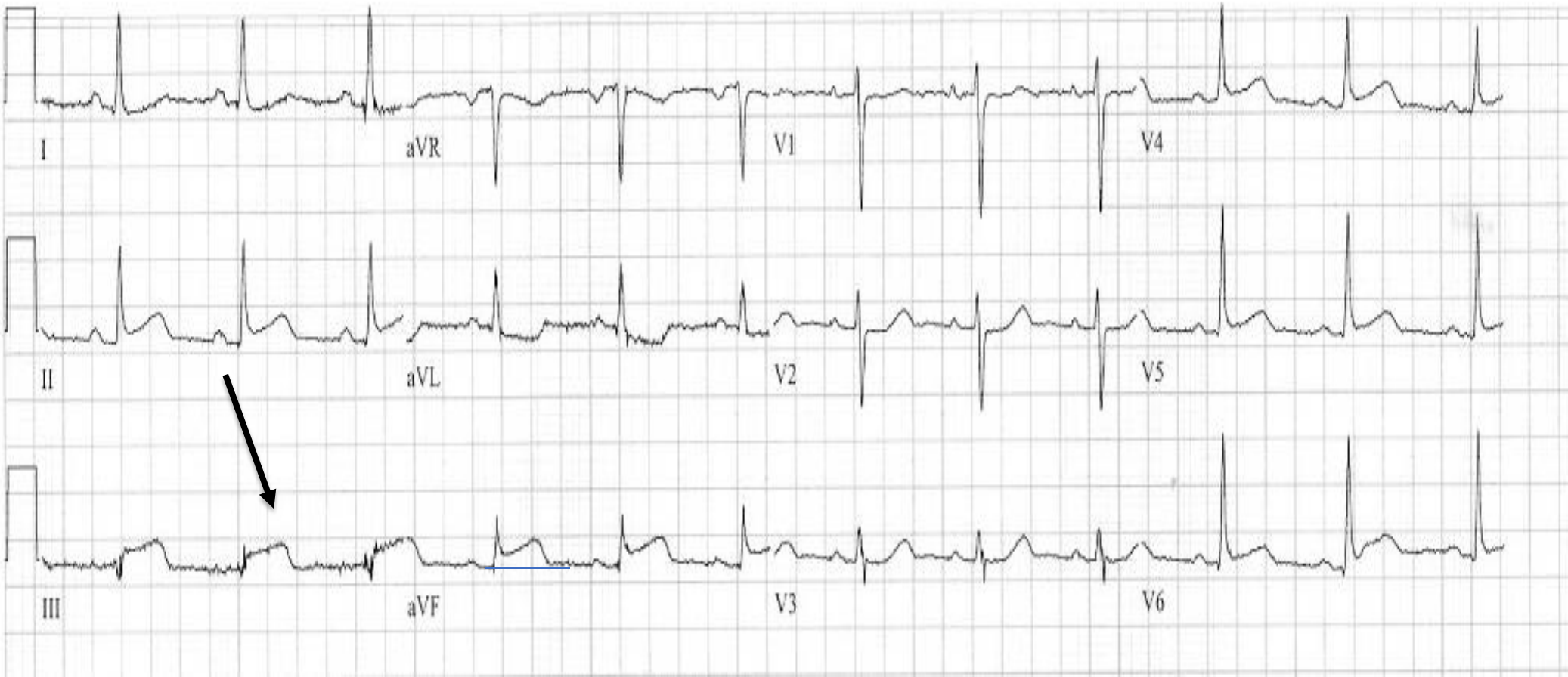
6. Q waves. P/QRS Married?



Vent. rate	71	BPM
PR interval	164	ms
QRS duration	88	ms
QT/QTc	426/462	ms
P-R-T axes	27 31	83

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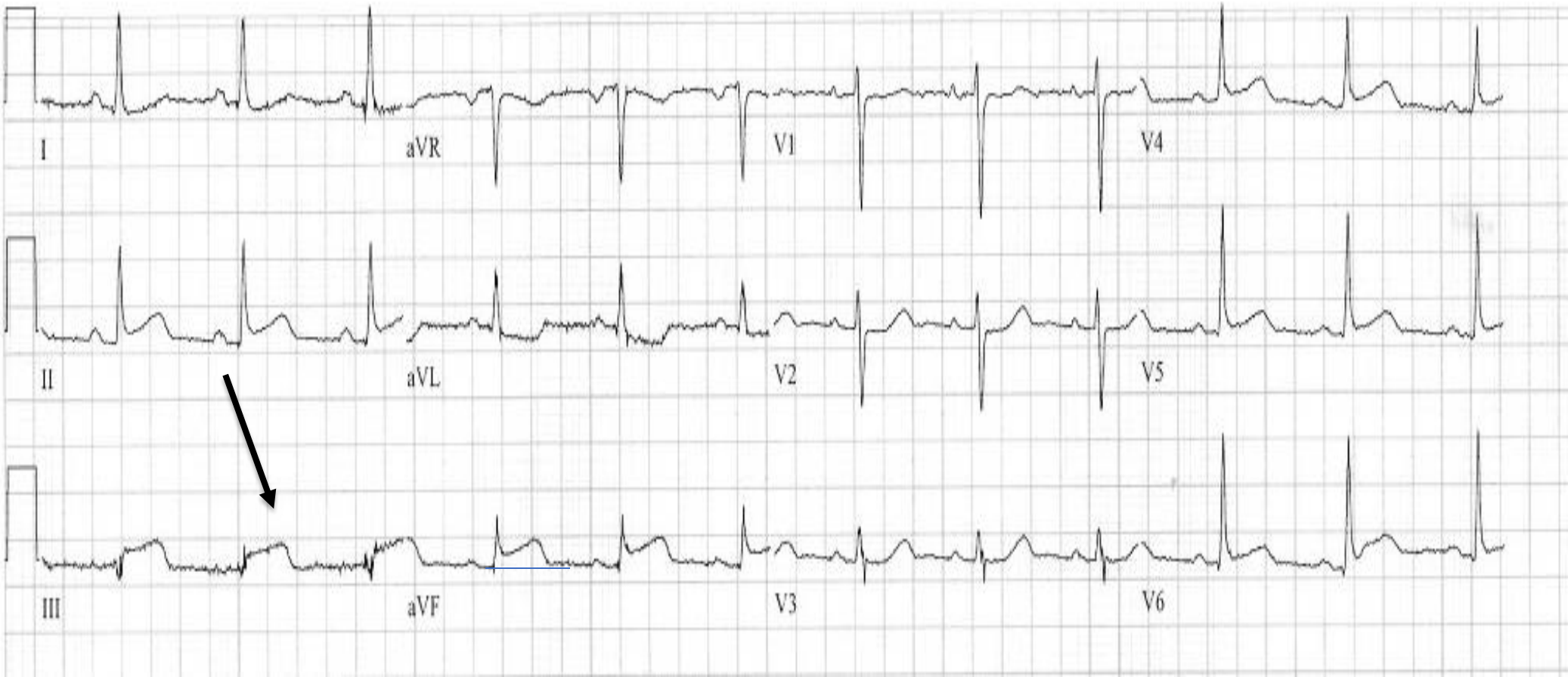
7. Axis



Vent. rate	71	BPM
PR interval	164	ms
QRS duration	88	ms
QT/QTc	426/462	ms
P-R-T axes	27 31	83

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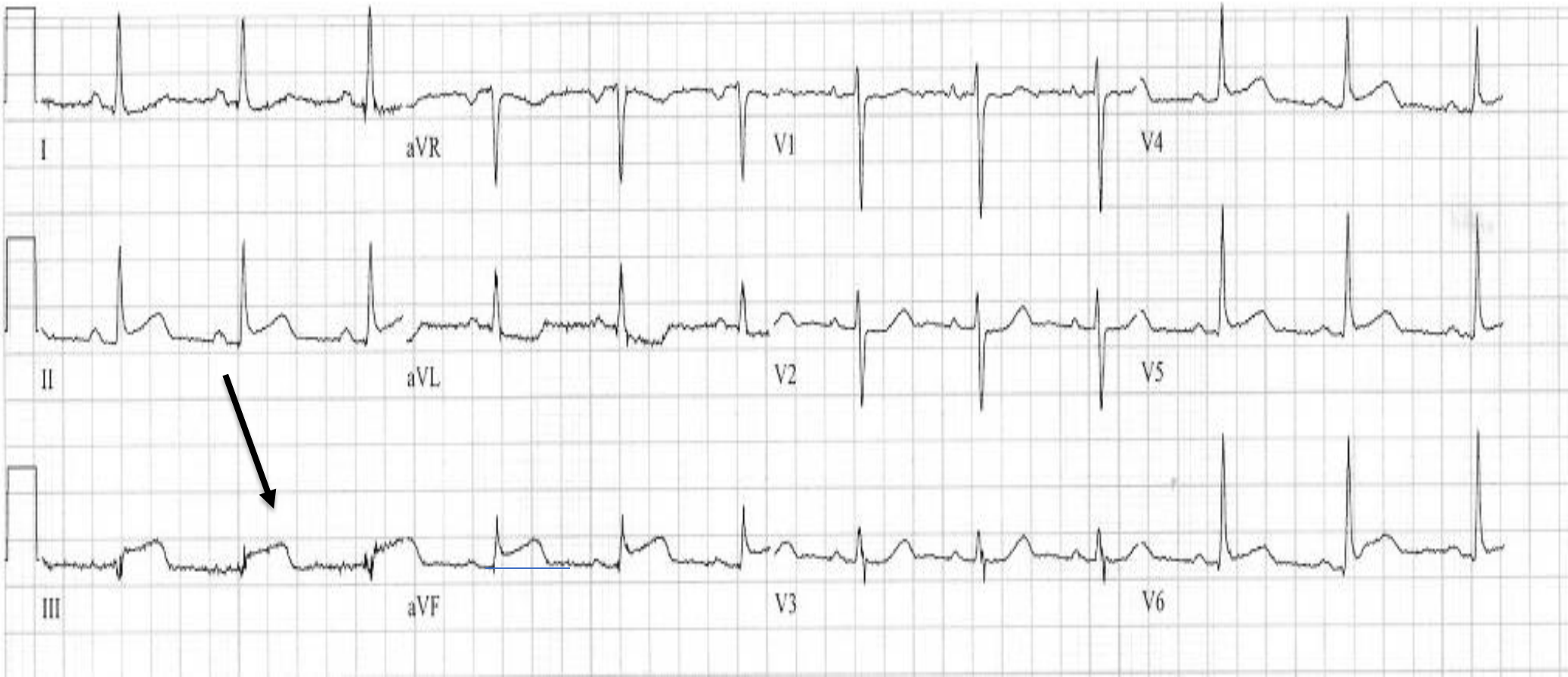
8. Hypertrophy, voltage.



Vent. rate	71	BPM
PR interval	164	ms
QRS duration	88	ms
QT/QTc	426/462	ms
P-R-T axes	27 31	83

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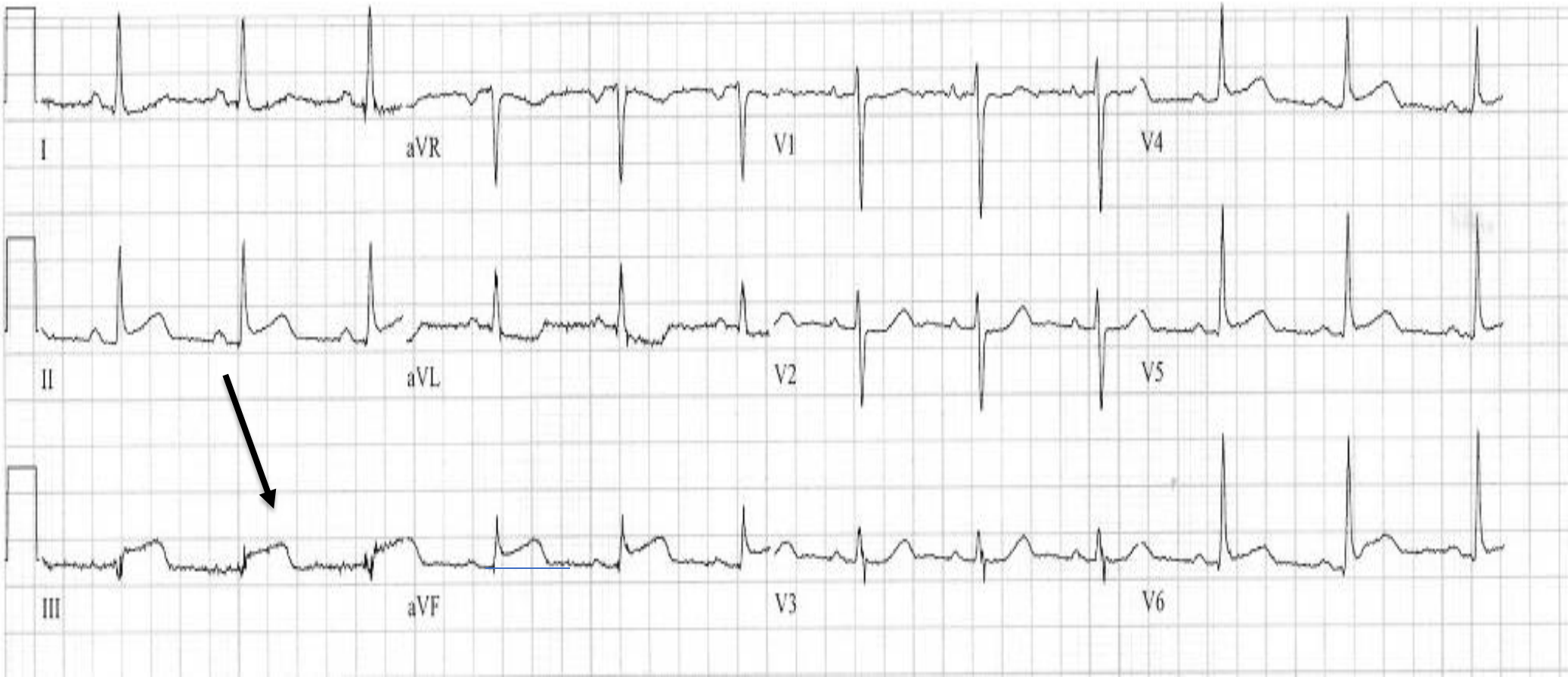
9. T wave rules



Vent. rate	71	BPM
PR interval	164	ms
QRS duration	88	ms
QT/QTc	426/462	ms
P-R-T axes	27 31	83

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10. Chief complaint based approach



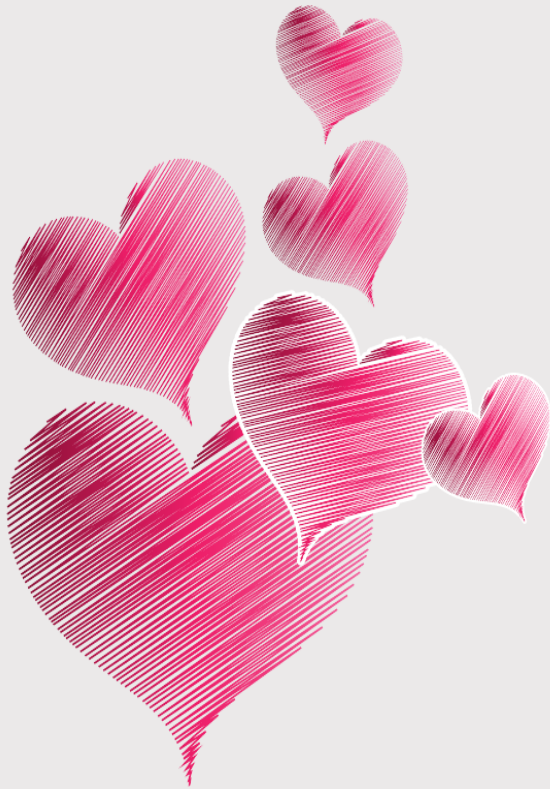
Priority Chief Complaints

- **Palpitations** – WPW, SVT, AF, VT
- **Chest pain** – MI, S1, q3, T3
- **Dyspnea** – MI, s1, q3, t3, R axis, LVH
- **Dizzy light headed** – Arrhythmia, QT, WPW
- **Weakness** – EVERYTHING
- **Dialysis** – peaked T, slow rate

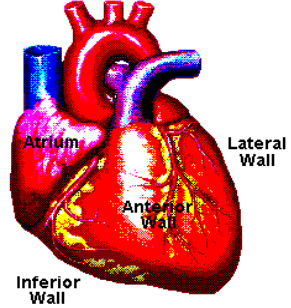
DEEP DIVE

On the heart





What's going on inside?



Which ones are “contiguous”?

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Myocardial Infarction Window

Circle all relevant findings below

Lead I High Lateral	AVR	VI Anteroseptal	v4 Anterior
II Inferior	AVL High Lateral	V2 Anteroseptal	v5 Anterolateral
III Inferior	AVF Inferior	V3 Anterior	V6 Anterolateral

Inverted T waves = ischemia or reciprocal changes



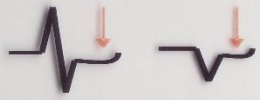
Ant/Sep
Lateral
Inferior

ST segment elevation = acute injury (Hyperacute T waves may occur early)



Ant/Sep
Lateral
Inferior

Depressed ST segments = ischemia or reciprocal changes



Ant/Sep
Lateral
Inferior

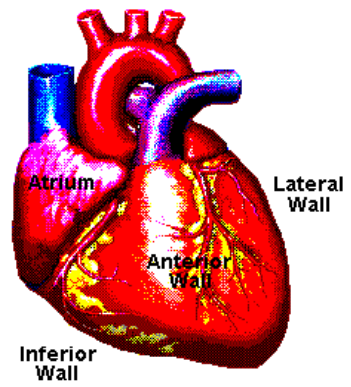
Pathological Q wave (one small box wide) = infarction



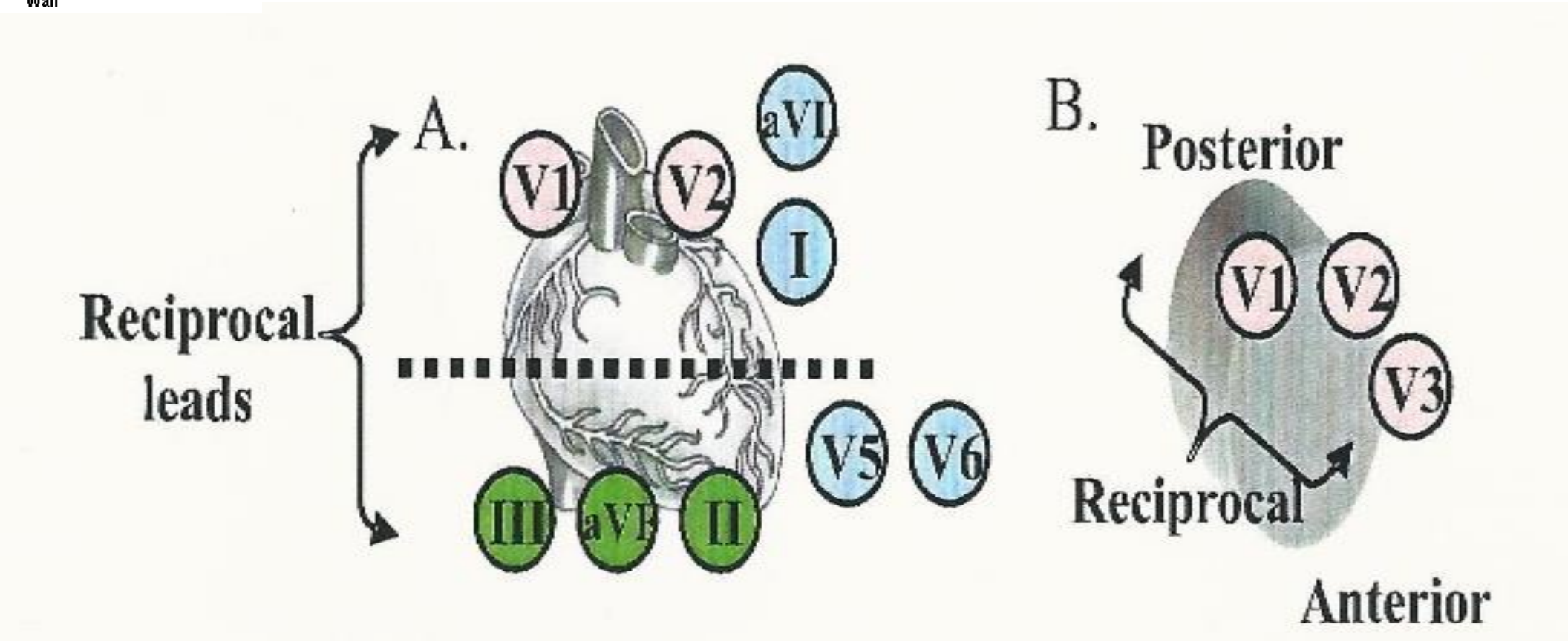
Ant/Sep
Lateral
Inferior

Poor R wave progression/new LBBB = ? infarction
ST elevation in Lead III = Do a right-sided EKG

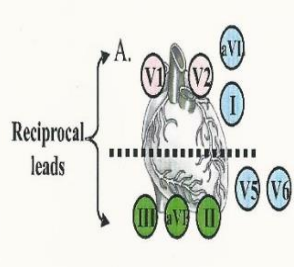
ST/T changes without ST elevation = Consider NSTEMI
Tall R wave w/ ST depression in V1-V3 = ? Posterior MI



“Reciprocal changes”



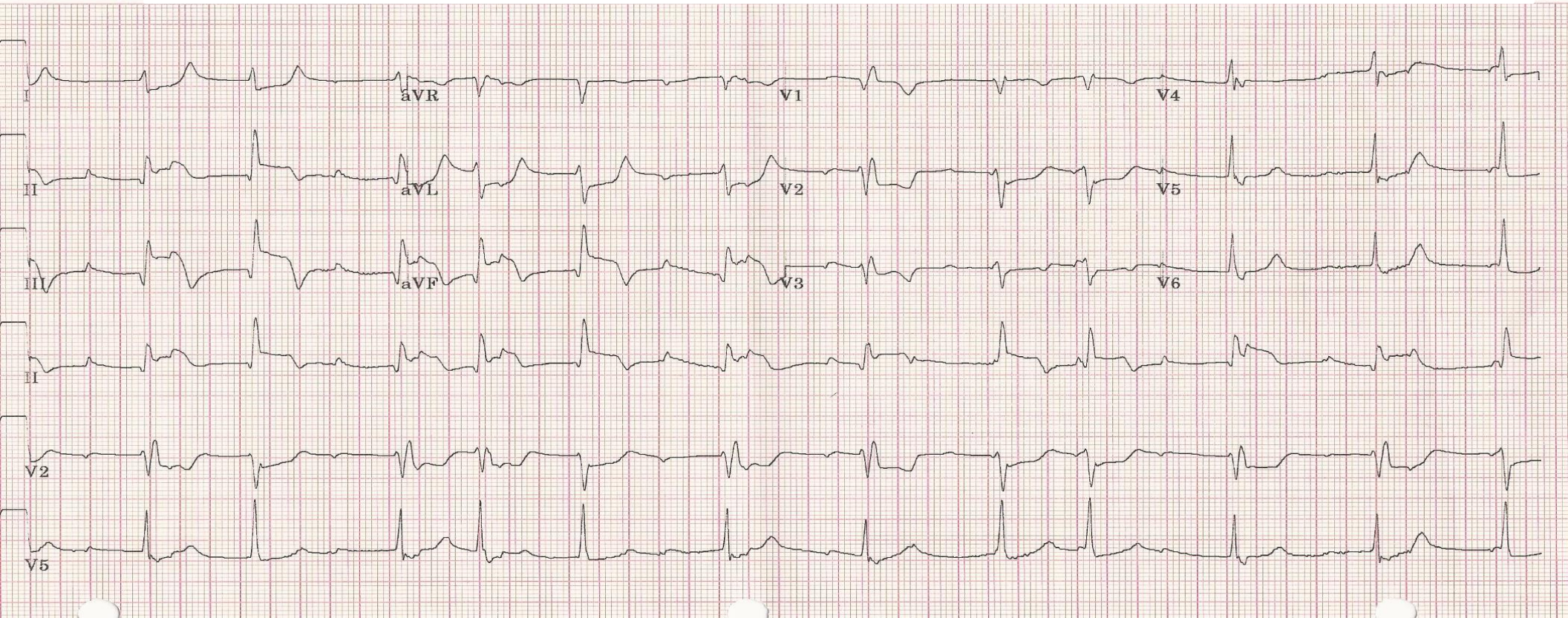
Courtesy of EKGtools.com



Where's the STEMI
MI

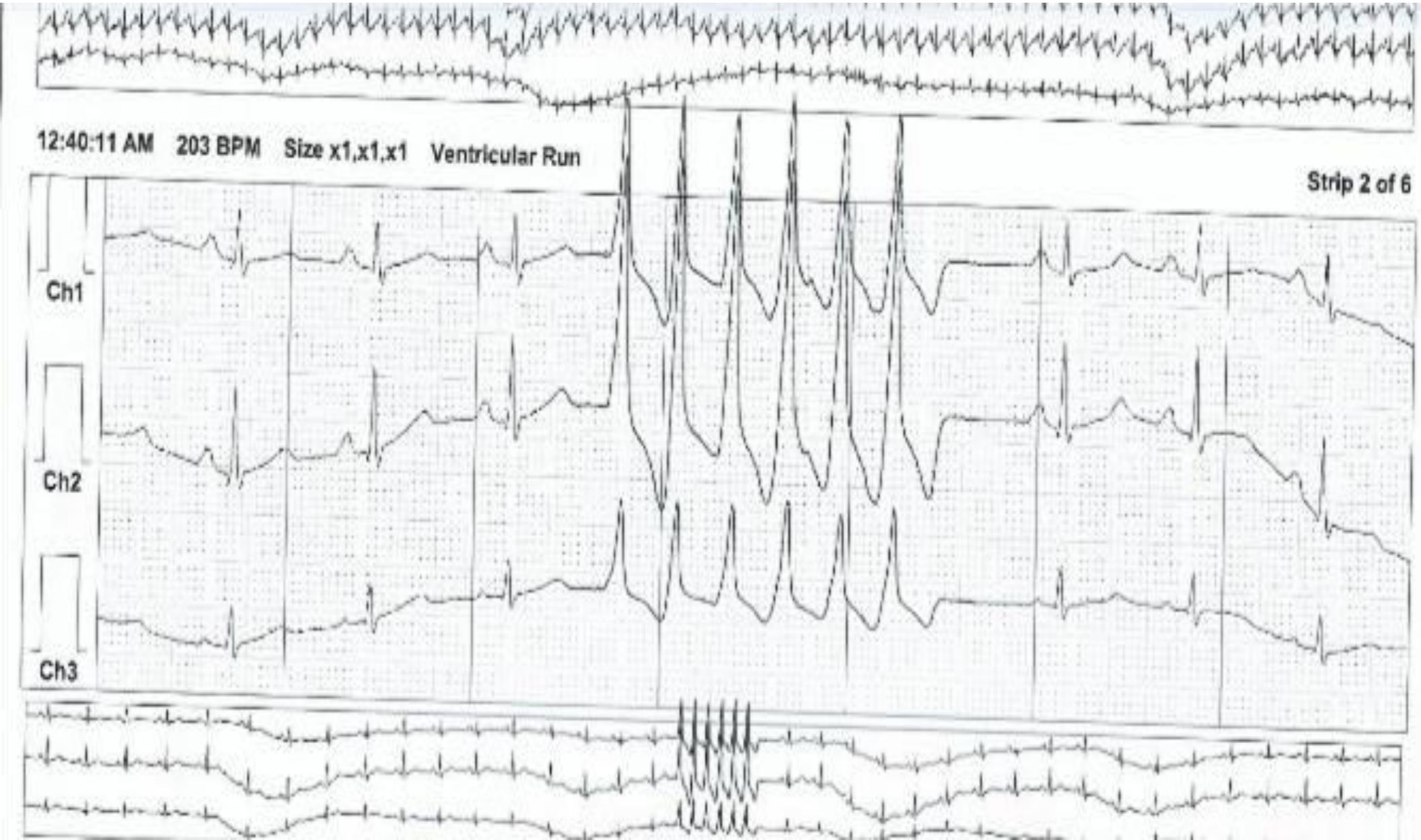
Vent. rate	73	bpm
PR interval	*	ms
QRS duration	104	ms
QT/QTc	432/475	ms
P-R-T axes	* 87	-20

Atrial fibrillation with a competing junctional pacemaker with premature ventricular or aberrantly conducted complexes
ST elevation, consider inferior injury or acute infarct
** ** ACUTE MI / STEMI ** **
Consider right ventricular involvement in acute inferior infarct
Abnormal ECG

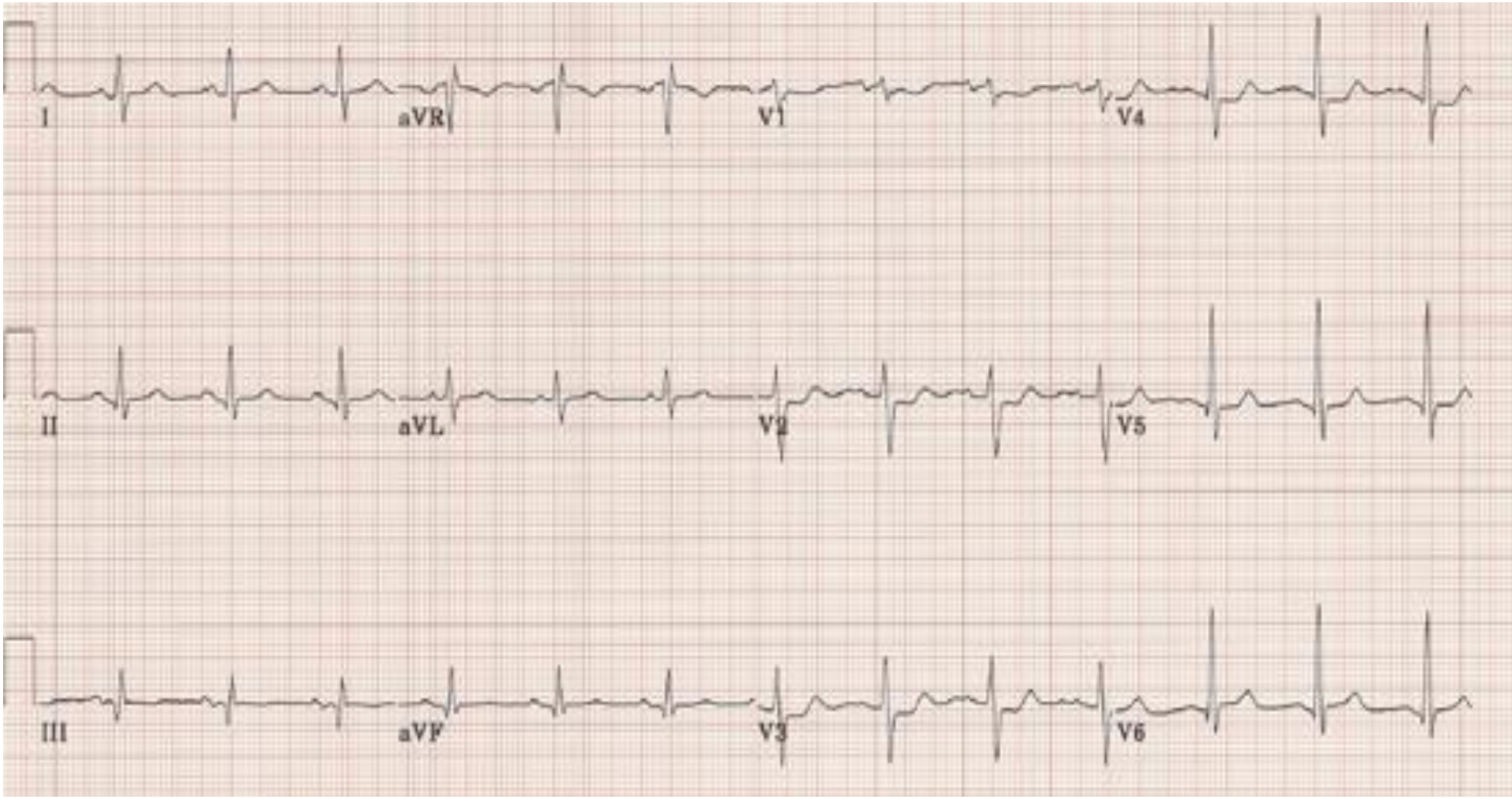



Lets practice!

36 y/o military wife with four kids



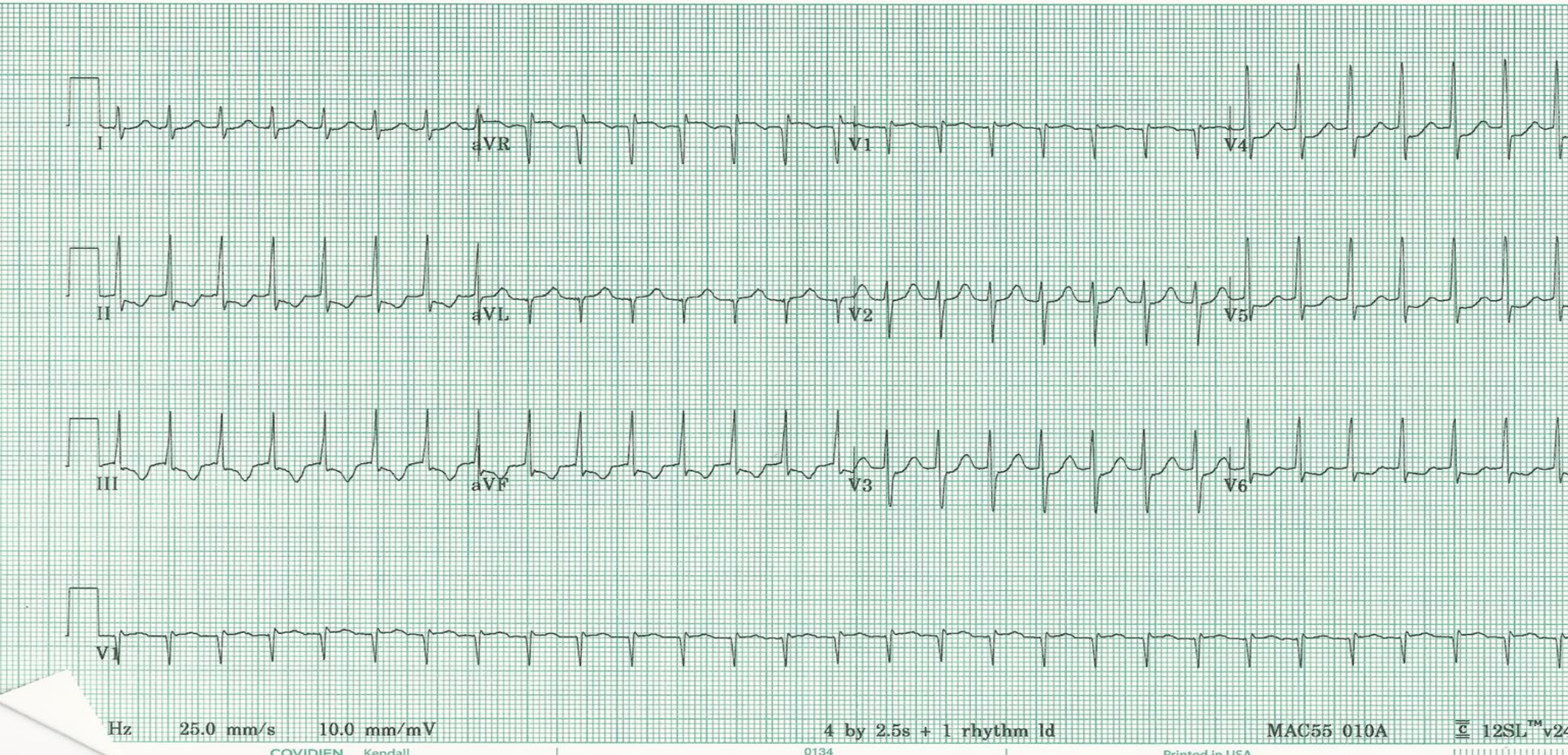
Weakness in a 70 year old



Vent. rate	175	bpm
PR interval	*	ms
QRS duration	70	ms
QT/QTc	262/447	ms
P-R-T axes	* 83	-75

Supraventricular tachycardia
Marked ST abnormality, possible inferior subendocardial injury
Abnormal ECG

KEEP
IN
PERMANENT
RECORD



COVIDIEN Kendall 0134 Printed in USA

Patient **dizzy**.
PMD put her on Metoprolol 100 mg for HTN.



70 year old male with Palpitations

Vent. rate	127	bpm
PR interval	*	ms
QRS duration	82	ms
QT/QTc	266/386	ms
P-R-T axes	* -24	52

Atrial fibrillation with rapid ventricular response with premature aberrantly conducted complexes
Nonspecific ST abnormality, probably digitalis effect
Abnormal ECG

Technician:
Test ind:

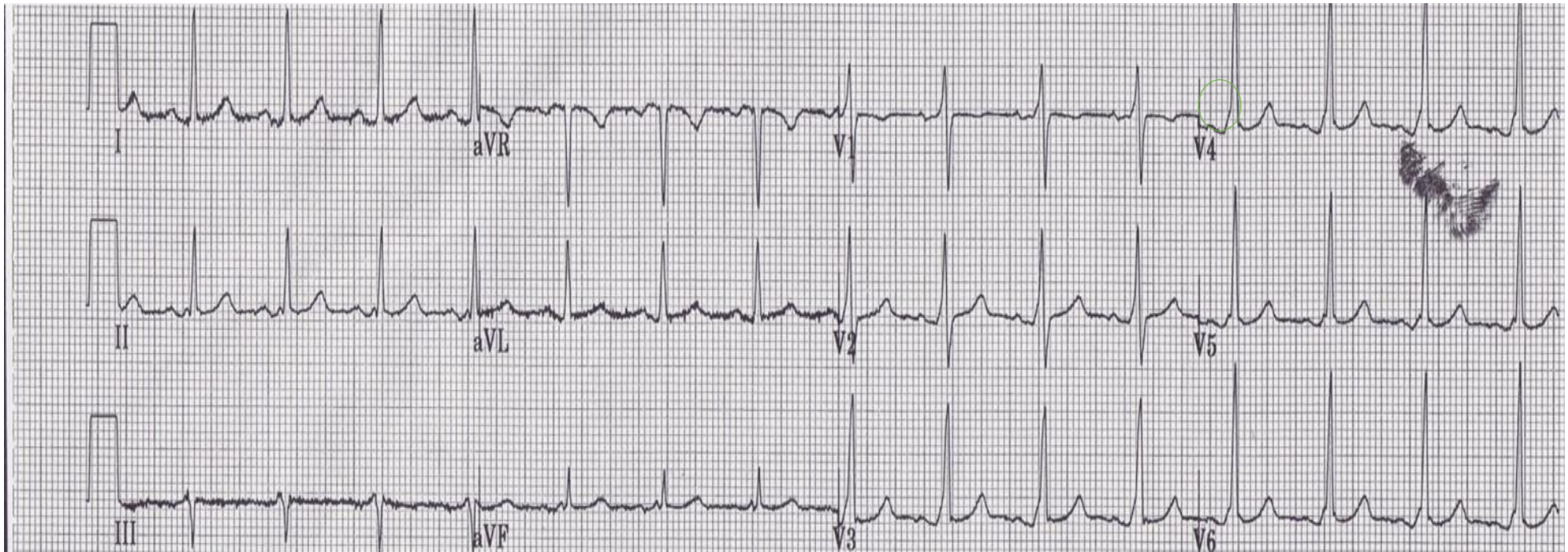
Referred by:

Unconfirmed



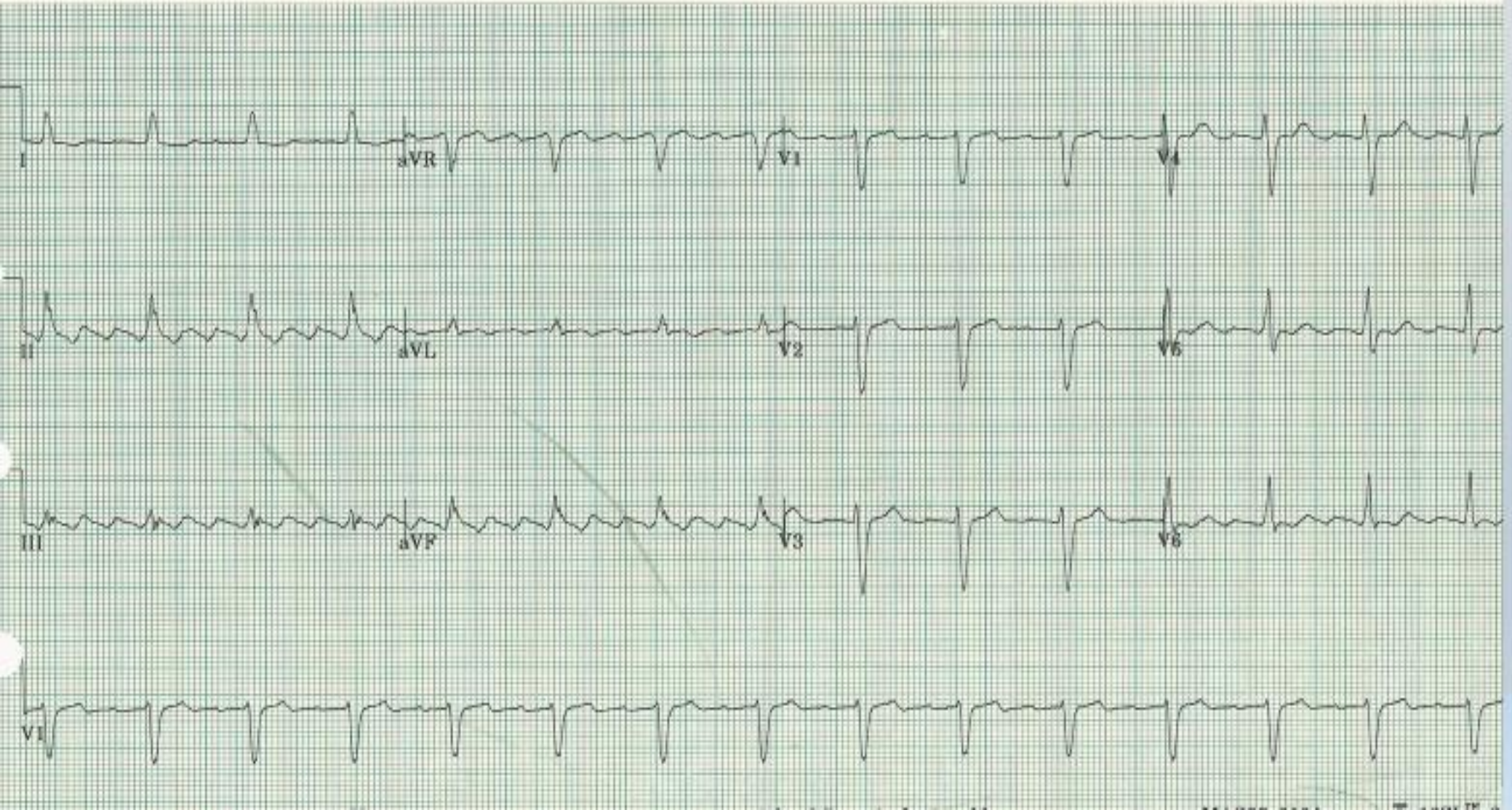
19 year old with Palpitations

- WAVE
- PR interval (<120 ms)
- Wide QRS



Vent. rate	89	bpm
PR interval	*	ms
QRS duration	124	ms
QT/QTc	390/474	ms
P-R-T axes	78 53 91	

Atrial flutter with 3:1 AV conduction
Nonspecific intraventricular conduction delay
Nonspecific ST and T wave abnormality
Abnormal ECG



Take Home Points

- The president should always run the heart
- Don’t trust the EKG interpretation
- PQRST
- The EKG family should always be holding hands
- Memorize your intervals


Thank
you!