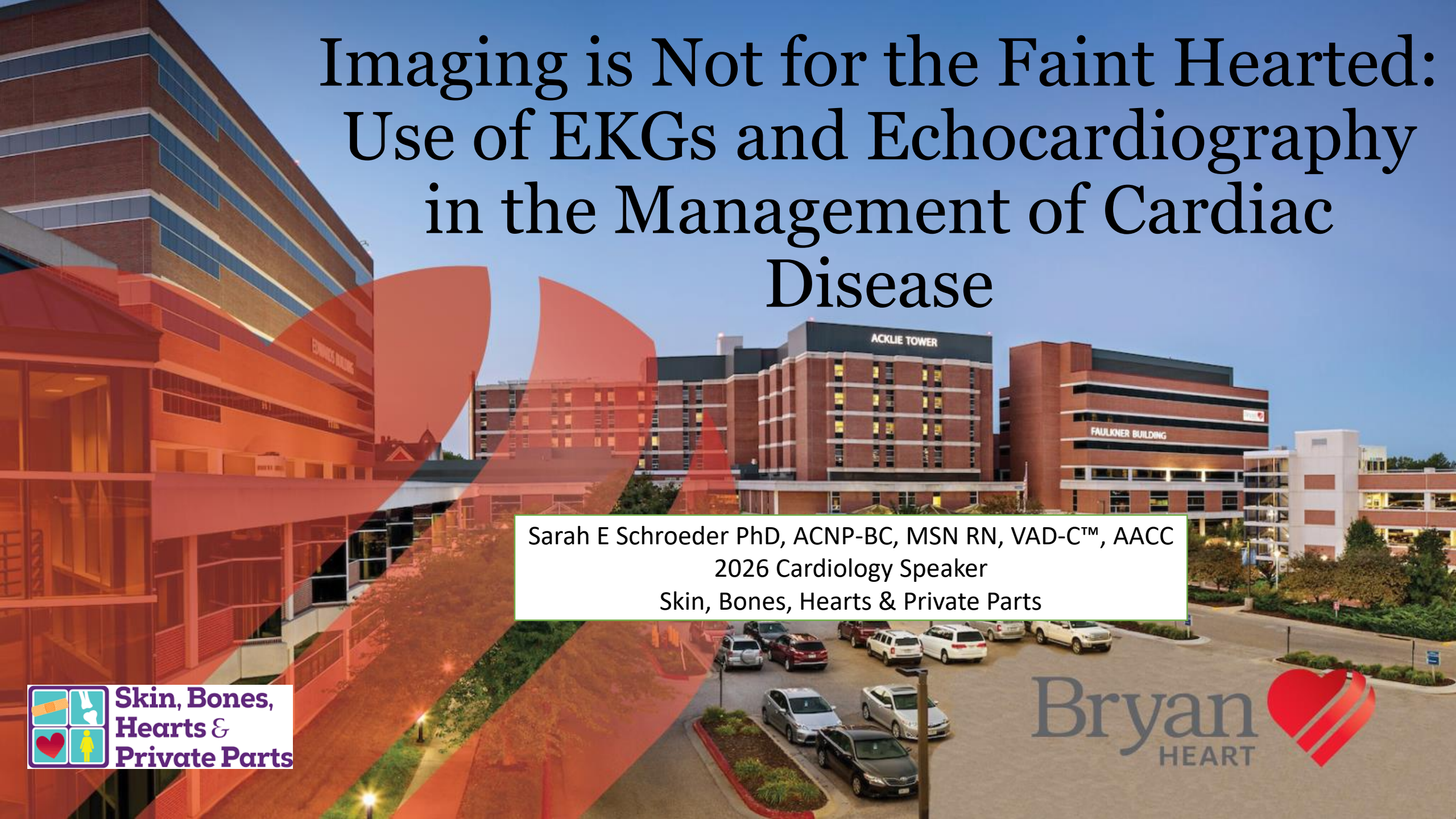
Imaging is Not for the Faint Hearted: Use of EKGs and Echocardiography in the Management of Cardiac Disease



Sarah E Schroeder PhD, ACNP-BC, MSN RN, VAD-C™, AACC
2026 Cardiology Speaker
Skin, Bones, Hearts & Private Parts

Skin, Bones, Hearts & Private Parts

Disclosures

- Investigator-Driven Research Grant, Abbott Labs, 2023-2026
- VAD Coordinator Professional Development Grant, ICCAC, 2024-2026

I will occasionally discuss patient scenarios – any pictures directly of patients are displayed following consent and will be noted

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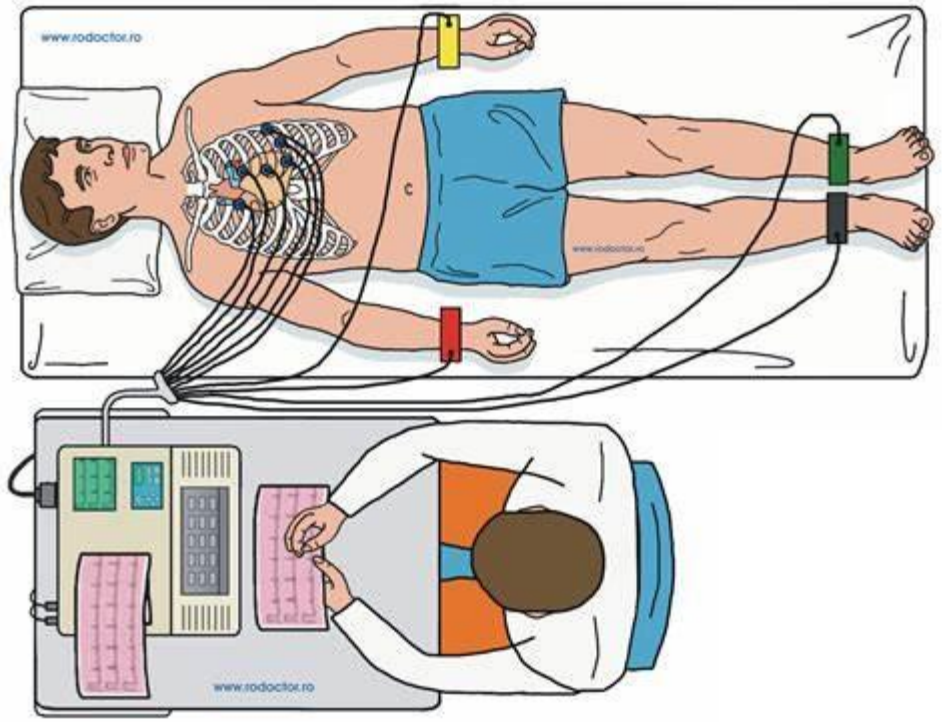
Objectives

- The Use of EKGS and Echocardiography in Assessment of Cardiac Disease
- Systematic Evaluation of EKGs
  - Steps
  - When they are beneficial (… and when they are not)
  - What NOT to miss
- The 4-1-1 on Echocardiography in Cardiac Disease
  - The primary views
  - What are we looking for
  - What NOT to miss
- A little Snippet on Transesophageal Echocardiograms
- Final PEARLS for Understanding the Utility of EKGs and Echos

The Purpose of an EKG

- Non-invasive, PAINLESS study
- Records electrical activity of heart
- Diagnose many common heart problems
  - Myocardial infarctions/Heart Attacks (NEW OR OLD)
  - Arrhythmias
  - Enlarged heart and heart failure
  - Congenital defects



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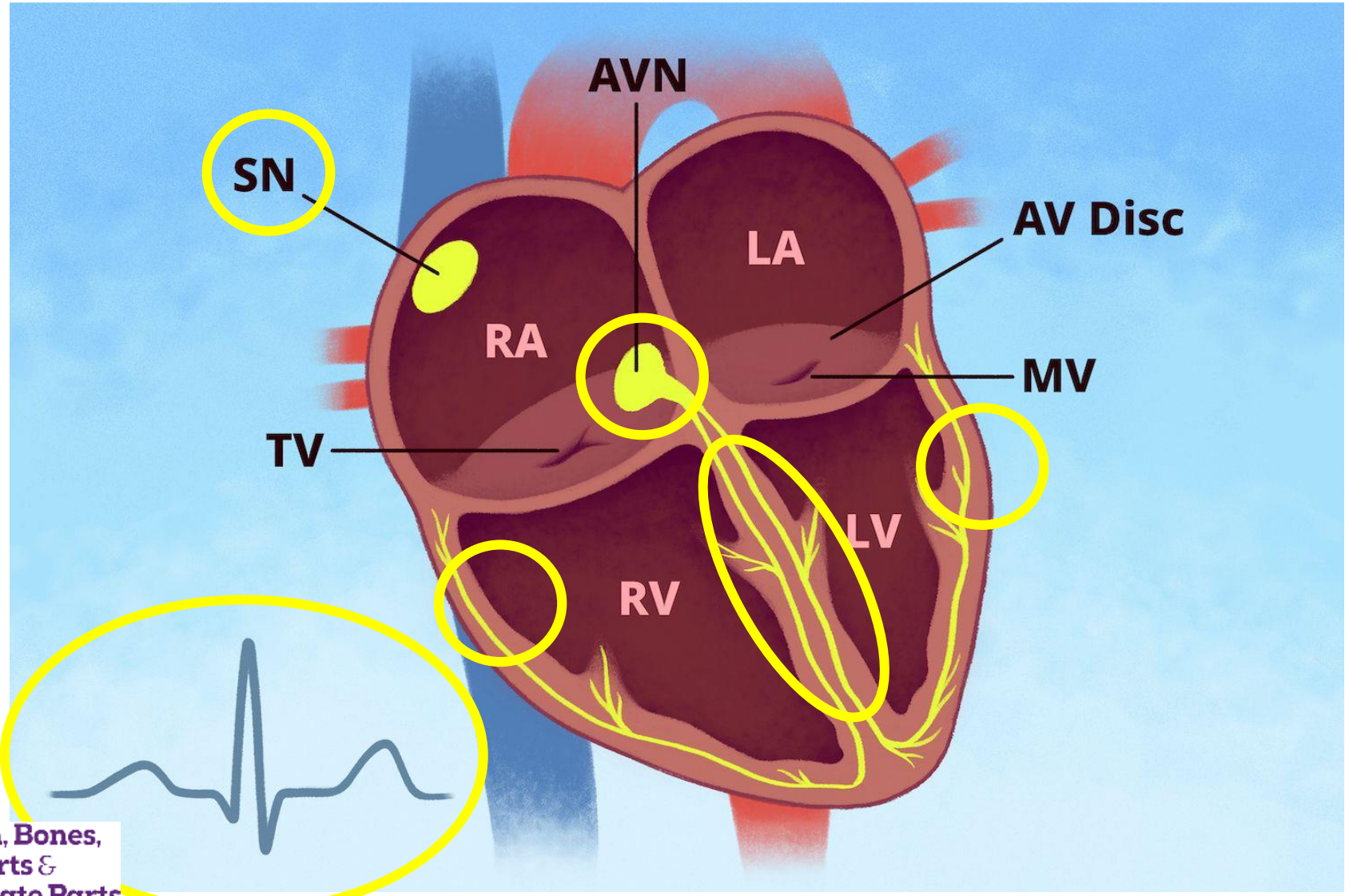
Cardiac Electrical Conductivity



Sinus Node

↓

AV Node

↓

Bundle Branches

↓

Purkinje Fibers

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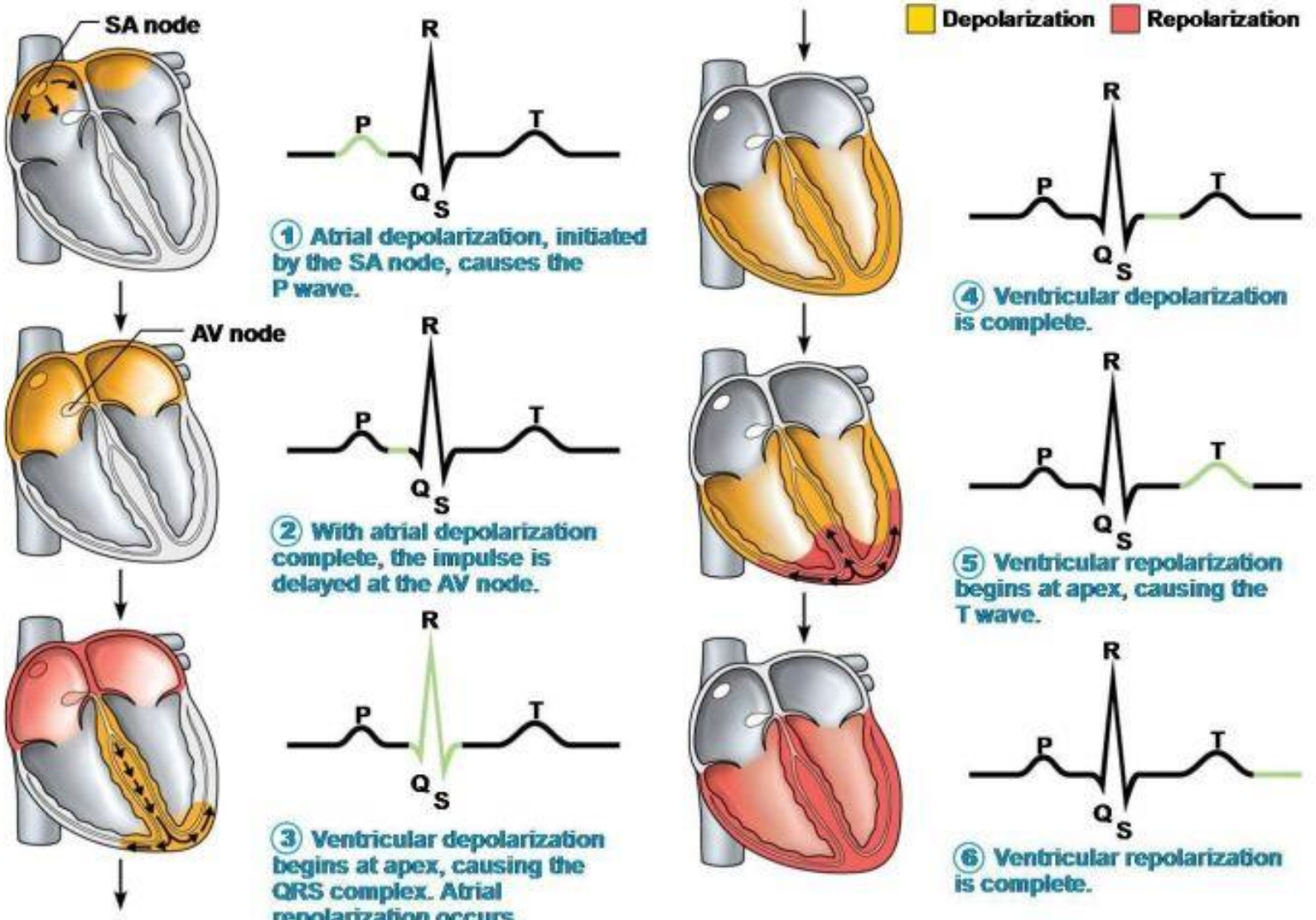

Figure 18.17

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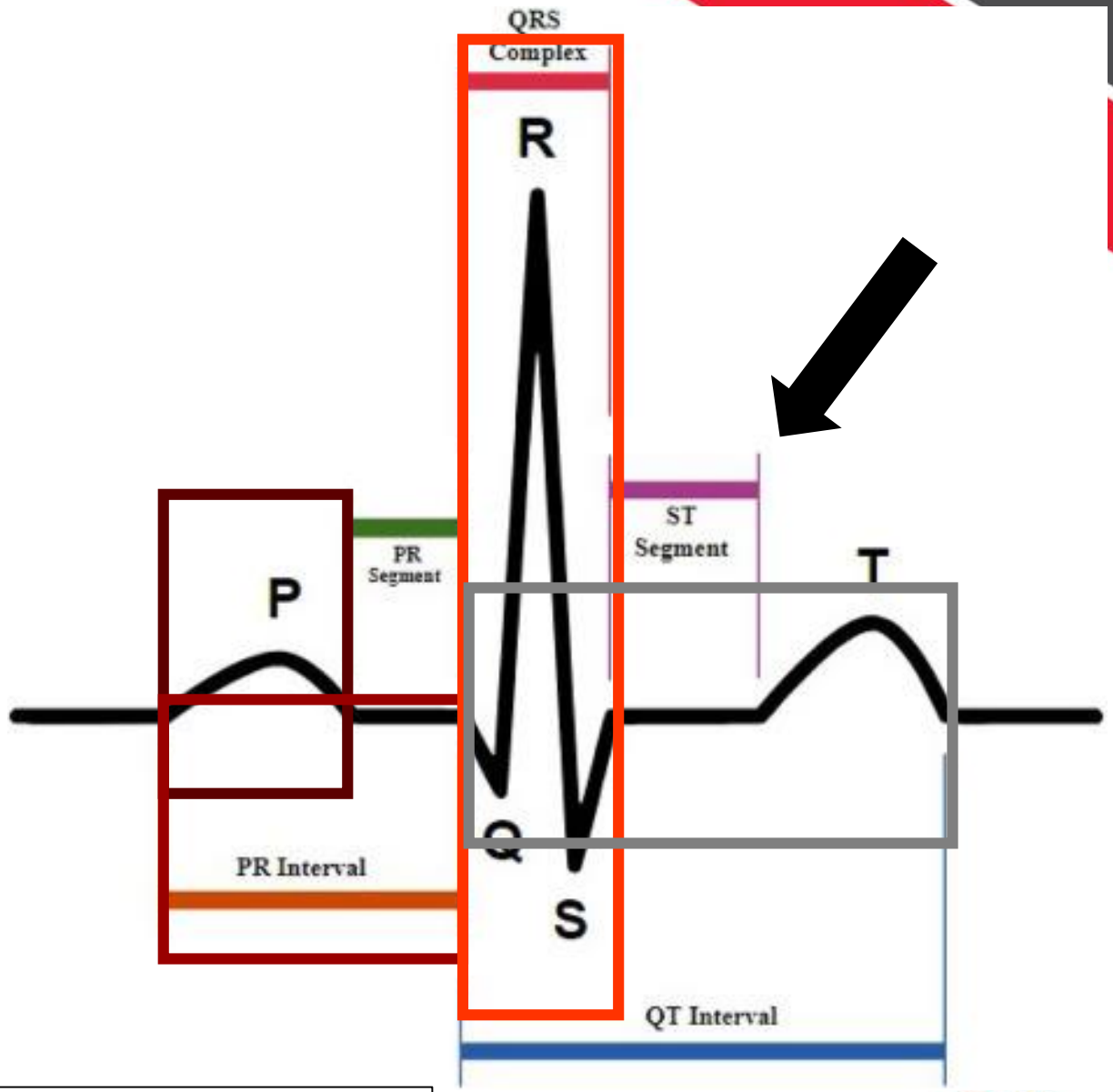
Bried Teaching, 2018. ECG – The Basics – BRI ED Teaching (wordpress.com)

P Wave created when SINUS NODE conduction travels to ATRIA

PR interval represents time between squeeze of ATRIA to squeeze of VENTRICLES

QRS represents the squeeze of the VENTRICLES

QT interval represents time from VENTRICLE squeeze to full rest and next cycle



ST Segment is VERY important as well, and represents the phase between contraction and relaxation of the VENTRICLES

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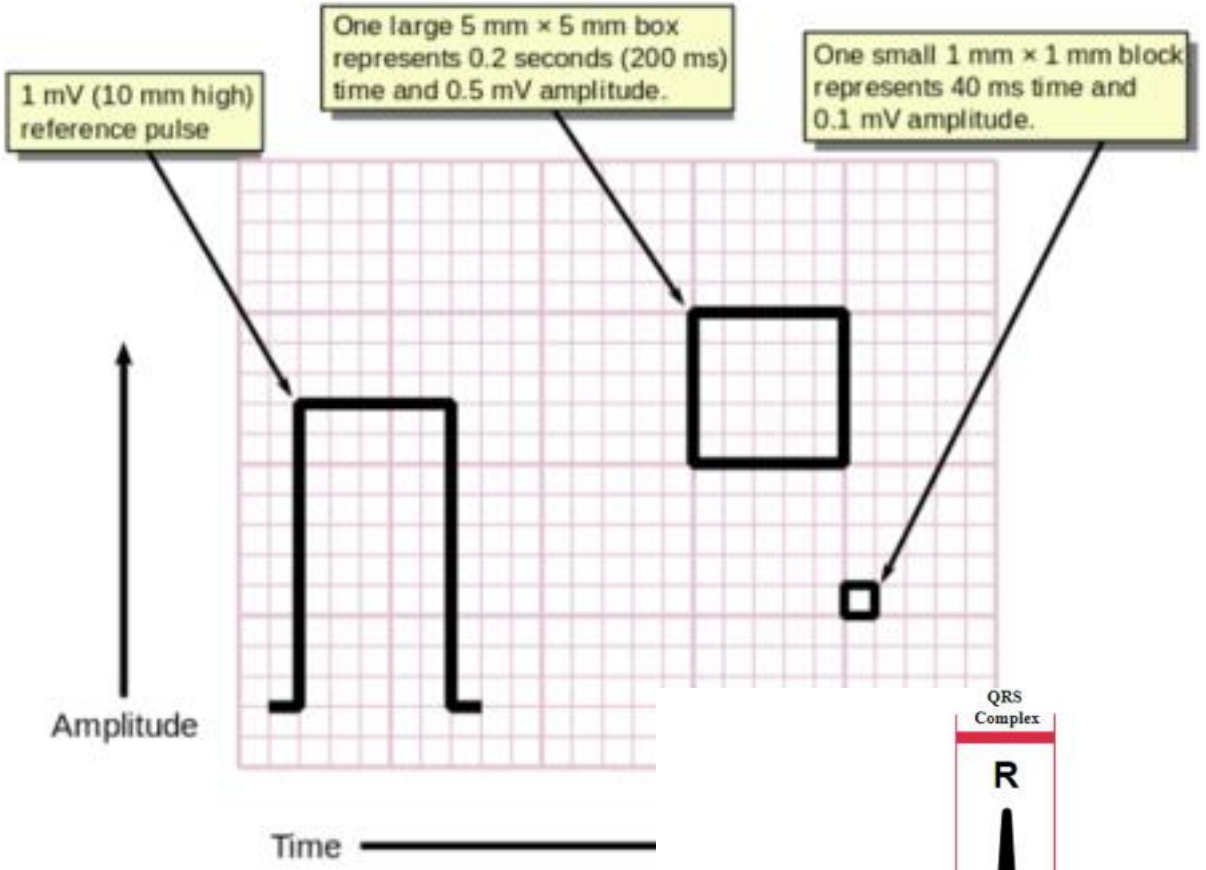

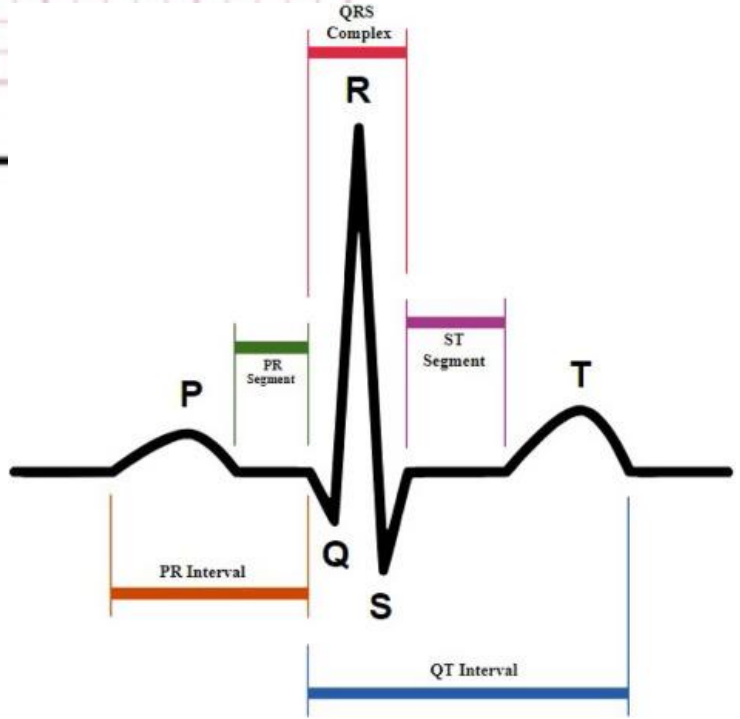

PR Interval: 0.12-0.20

QRS 0.08-0.12

QT Interval: (0.36-0.44)
Males: 0.35 – 0.45
Females: 0.36-0.46

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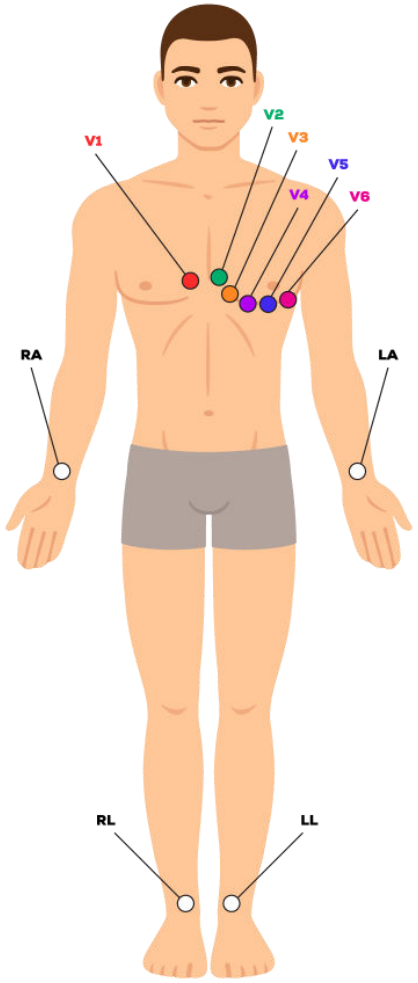
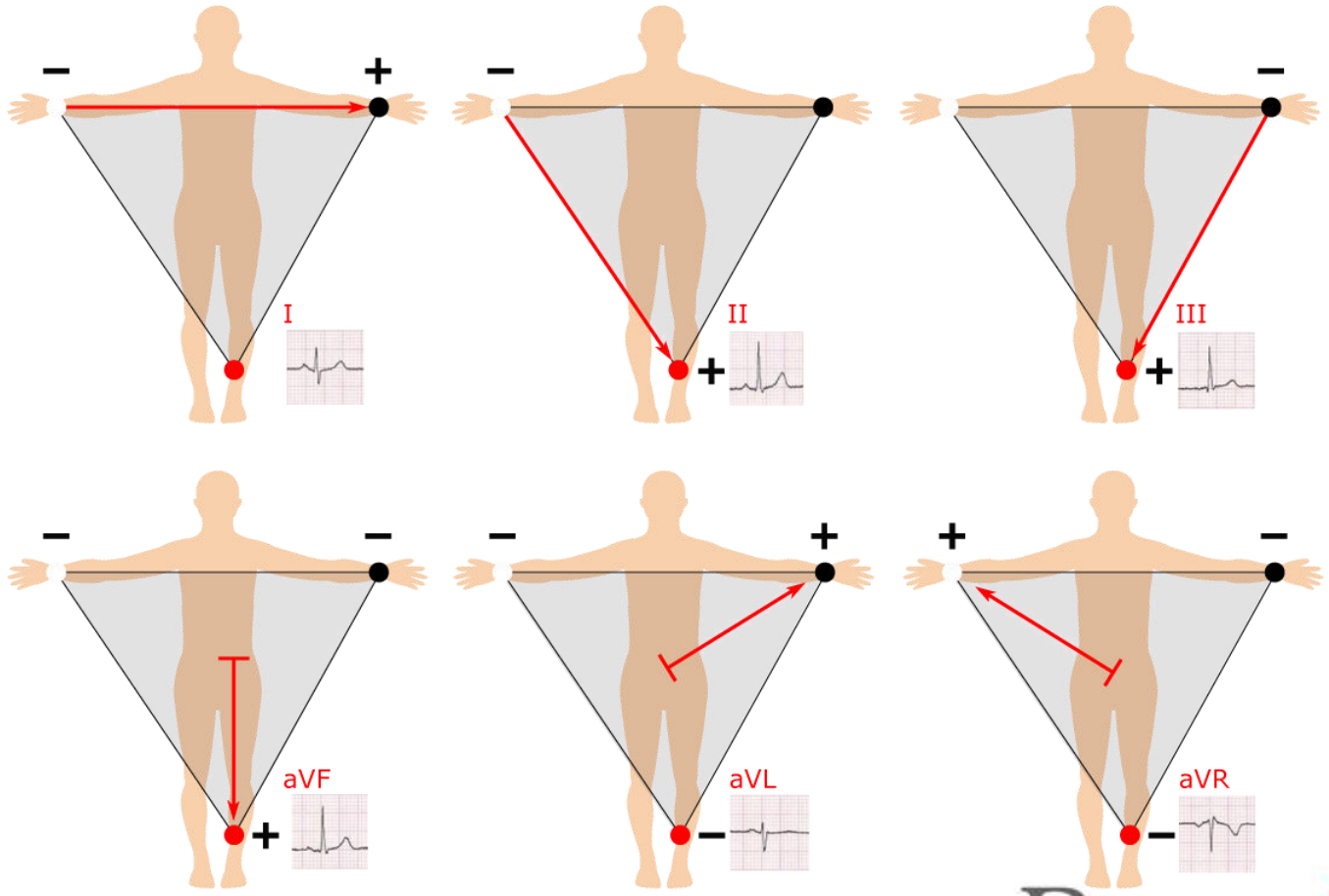
Importance of Lead Location for EKGs





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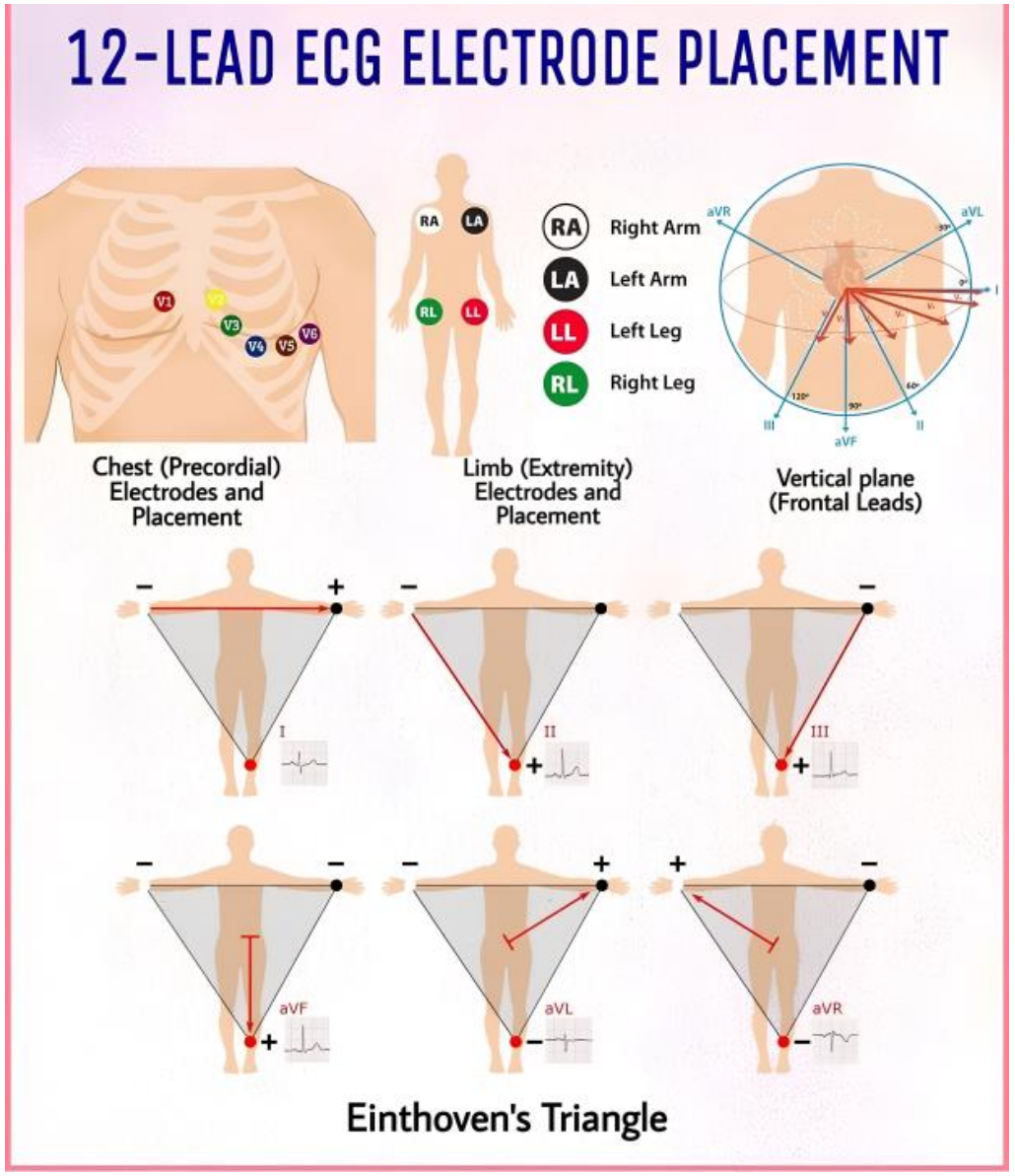

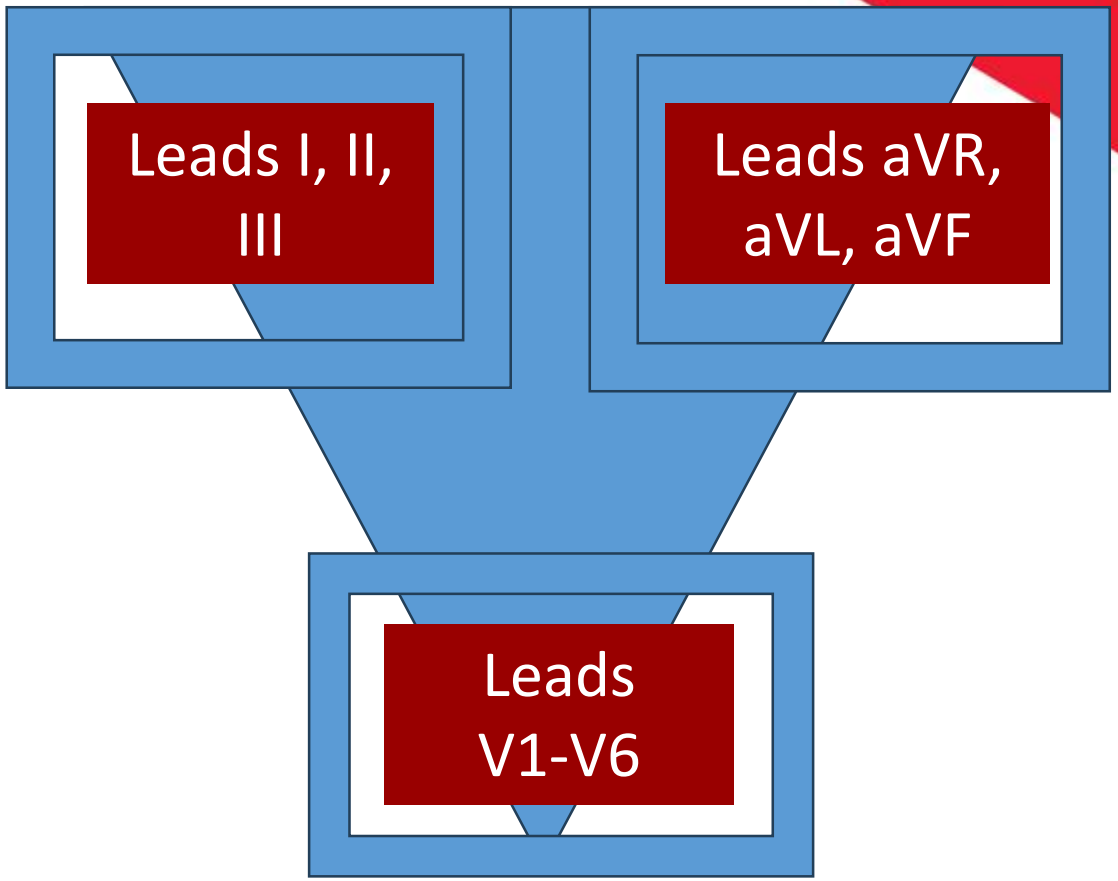

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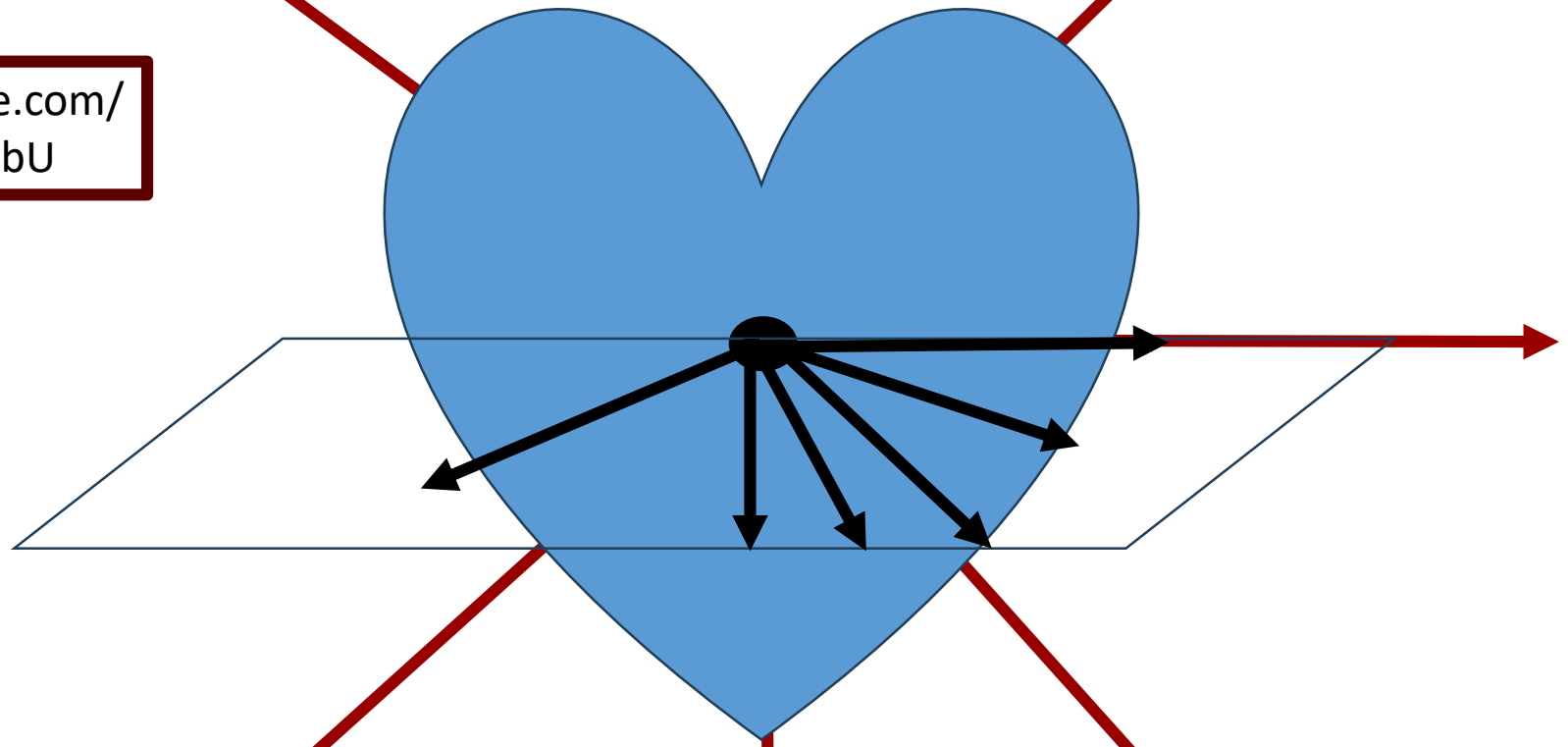
A Complete Guide to Einthoven's Triangle & ECG Testing (linkedin.com)

SHOULDER

SHOULDER

https://www.youtube.com/watch?v=kwLbSx9BNbU



Left Side

RIGHT LEG

BELLY BUTTON

LEFT LEG

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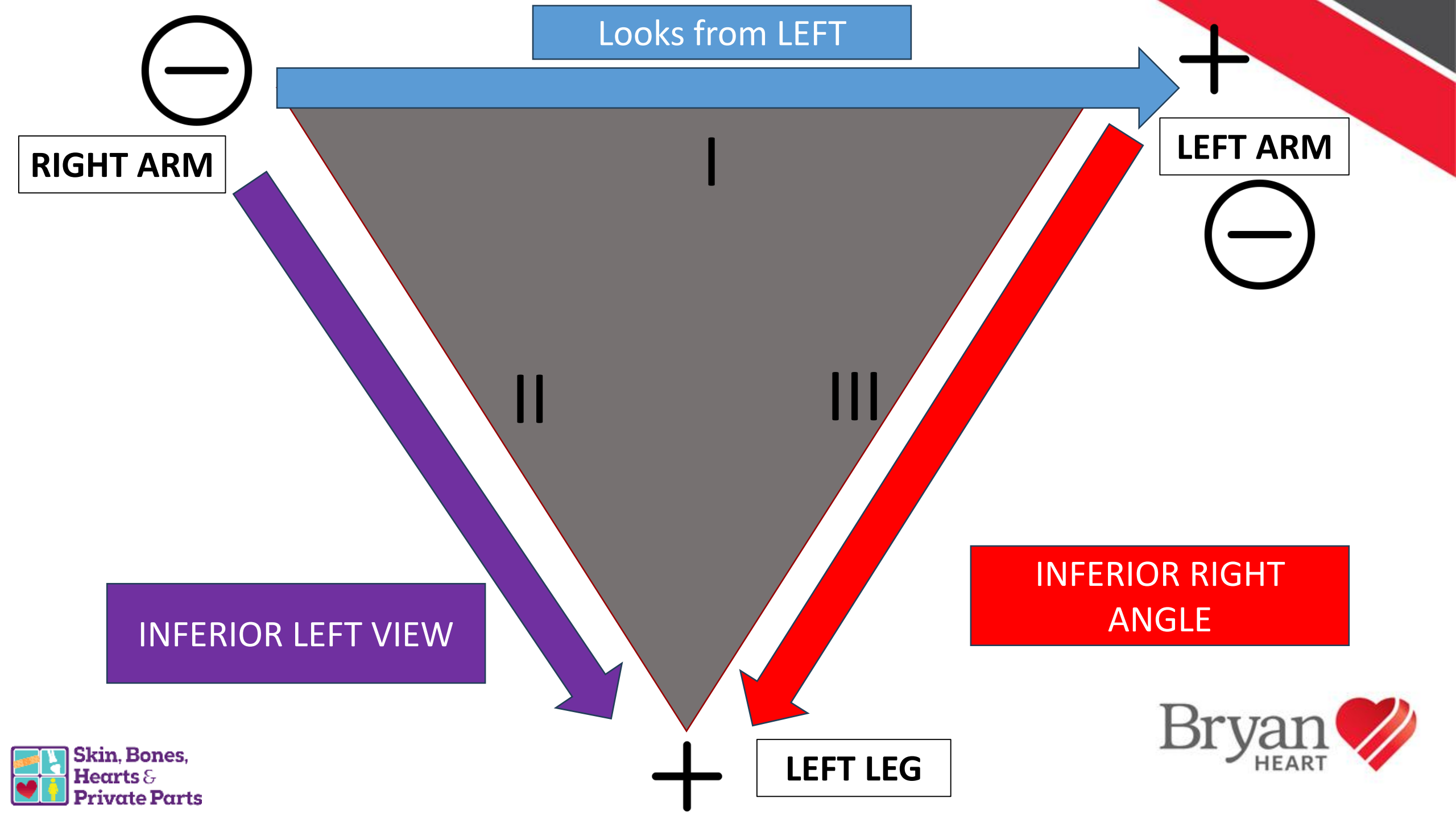

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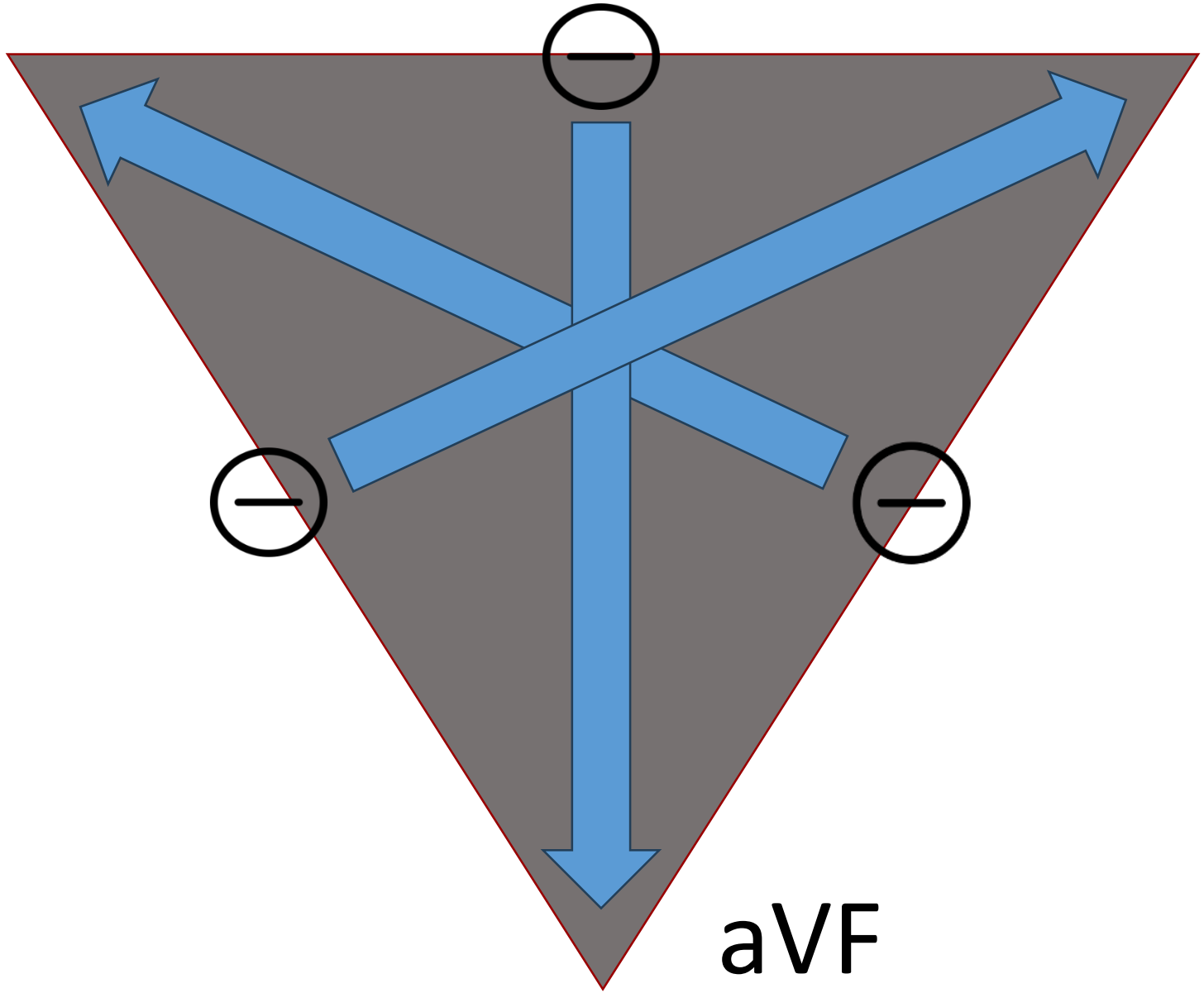
RIGHT ARM

aVR



LEFT ARM

aVL

aVF

LEFT LEG

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DEPOLARIZATION=CONTRACTION

DEPOLARIZATION TOWARDS A LEAD=POSITIVE DEFLECTION

DEPOLARIZATION AWAY FROM A LEAD=NEGATIVE DEFLECTION

REPOLARIZATION=RELAXATION

REPOLARIZATION TOWARDS A LEAD=NEGATIVE DEFLECTION

REPOLARIZATION AWAY FROM A LEAD=POSITIVE DEFLECTION

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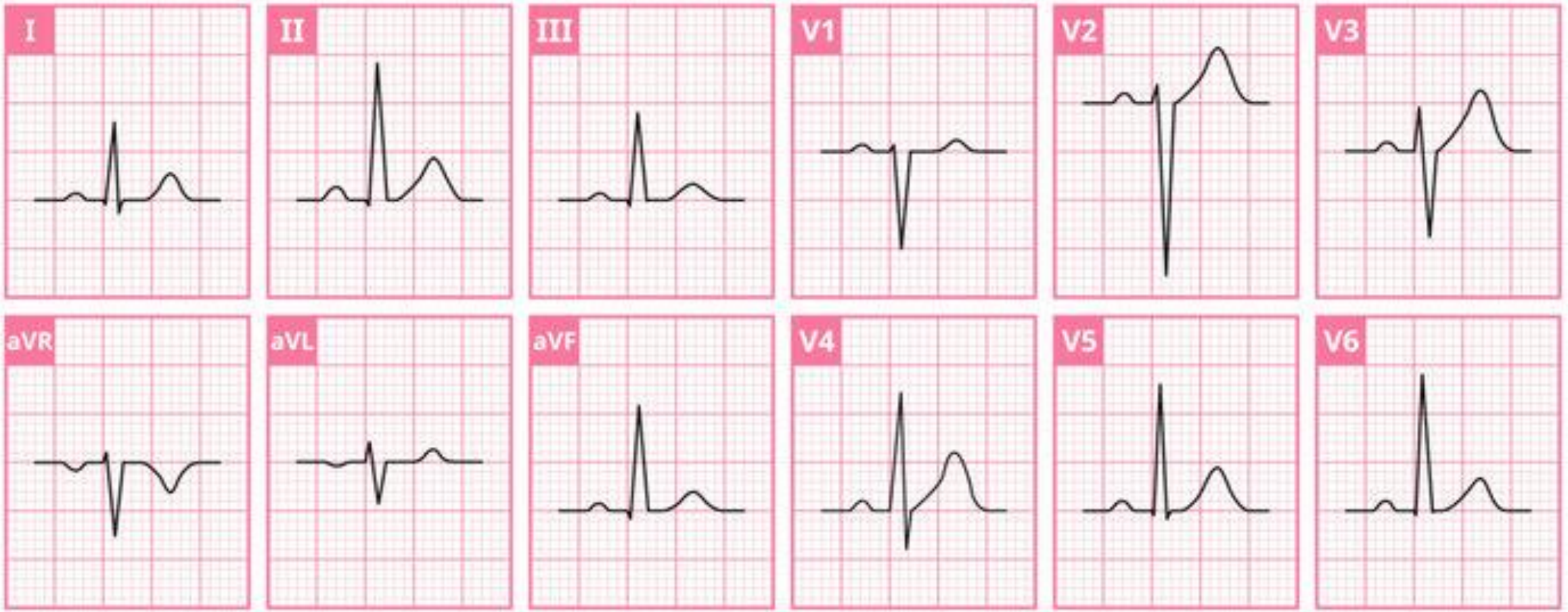
Electro-Cardio-Gram

Normal 12-Lead ECG



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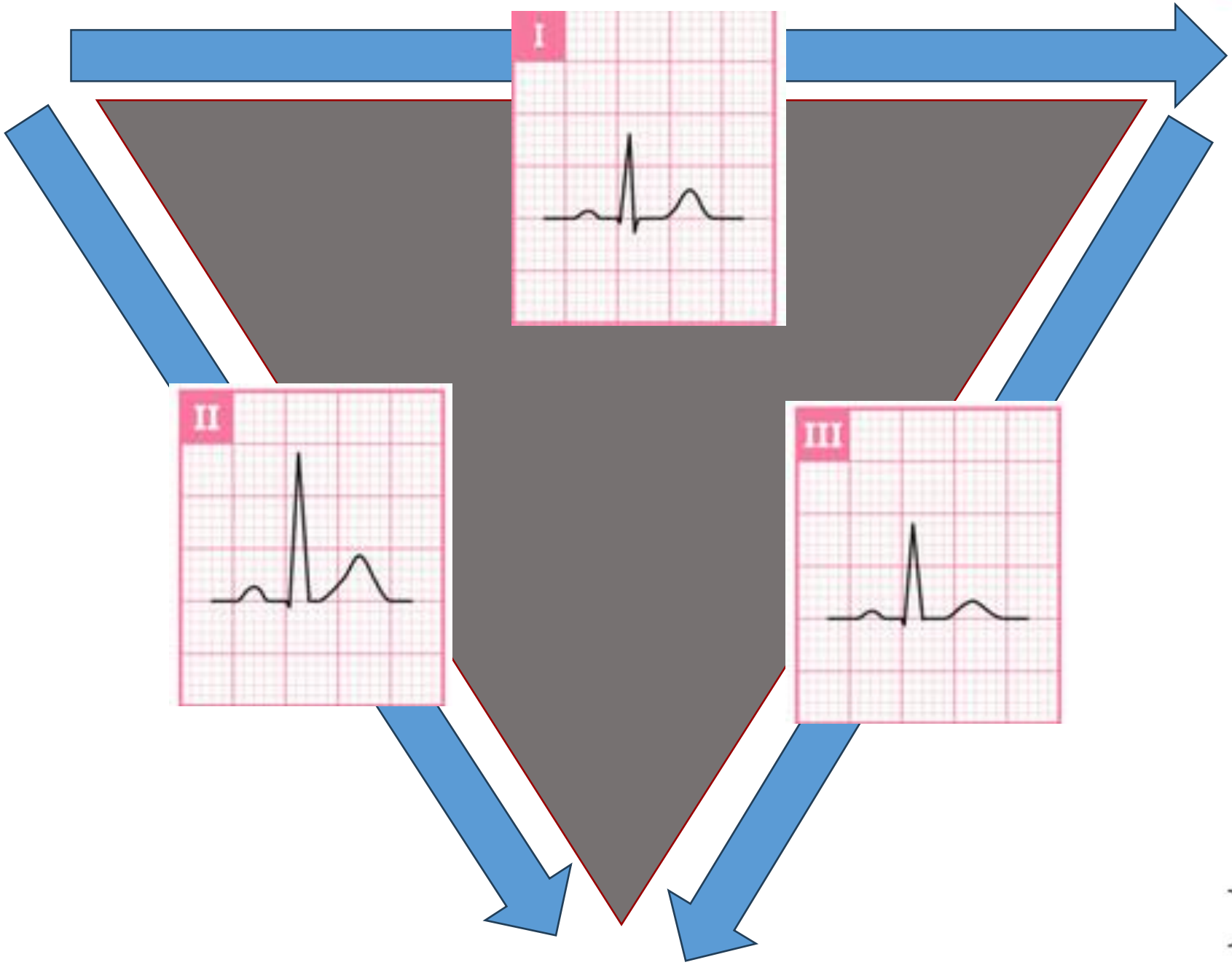

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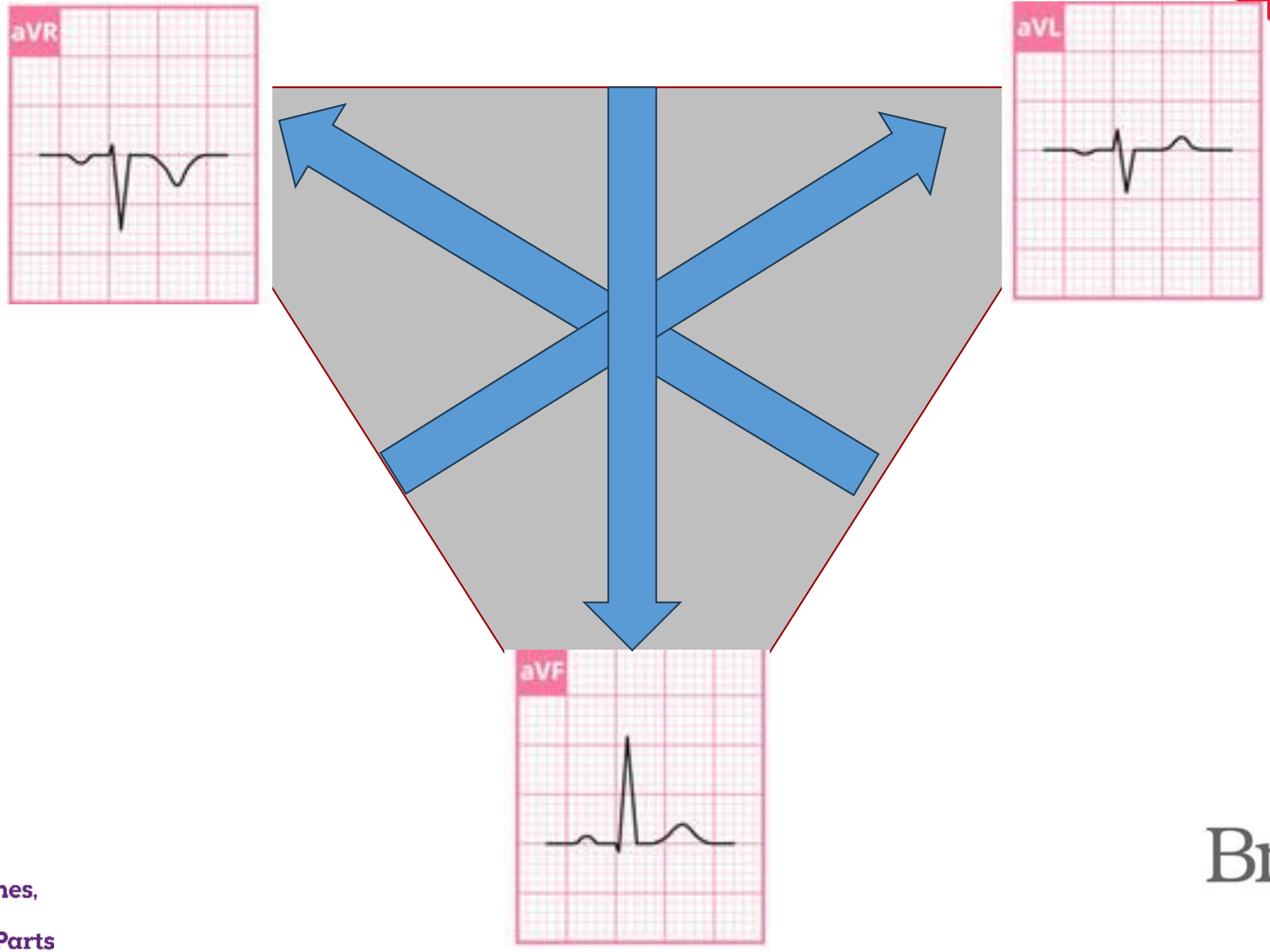

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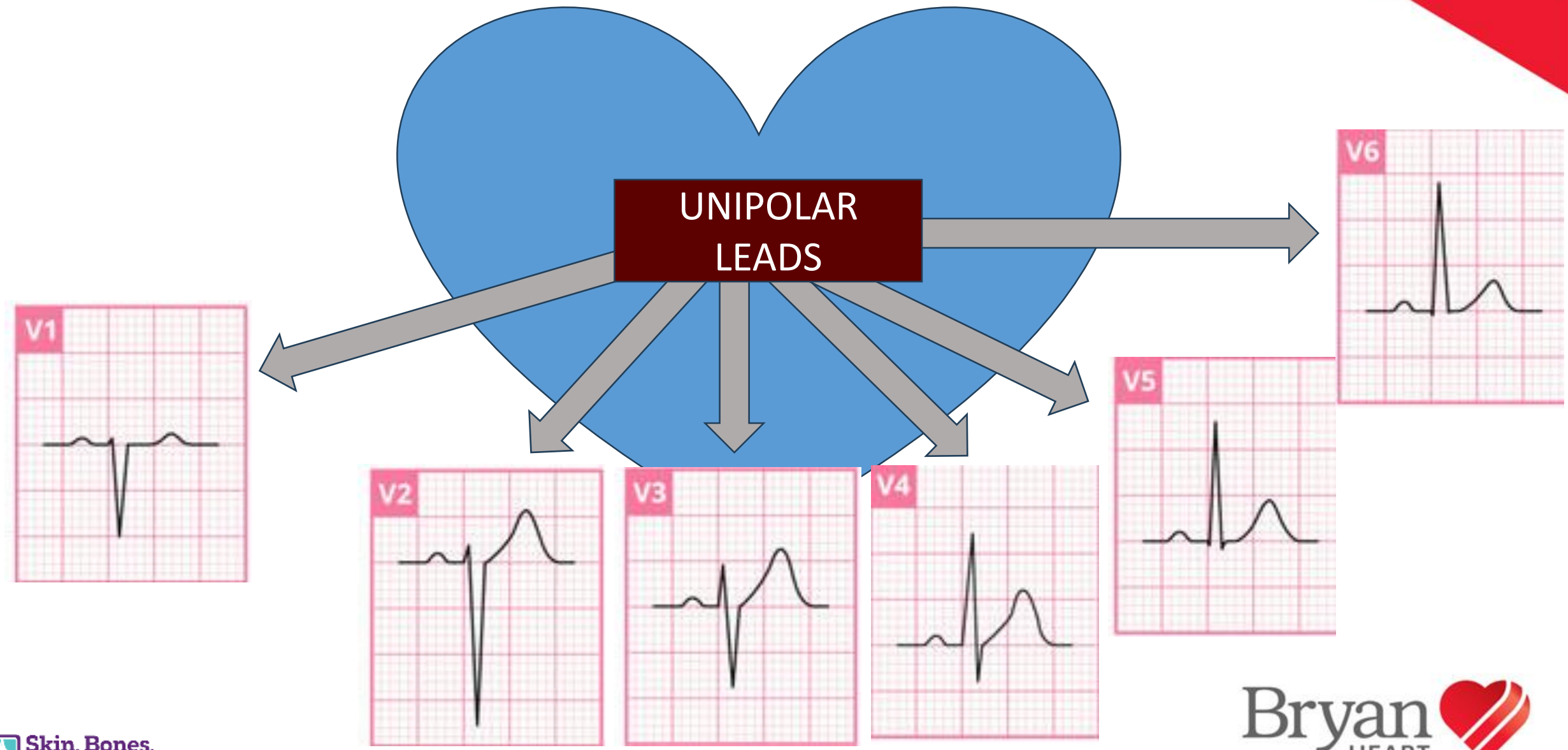

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The Use of EKGS and Echocardiography in Assessment of Cardiac Disease

- Diagnosis
- Symptoms

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Systematic Evaluation of EKGs

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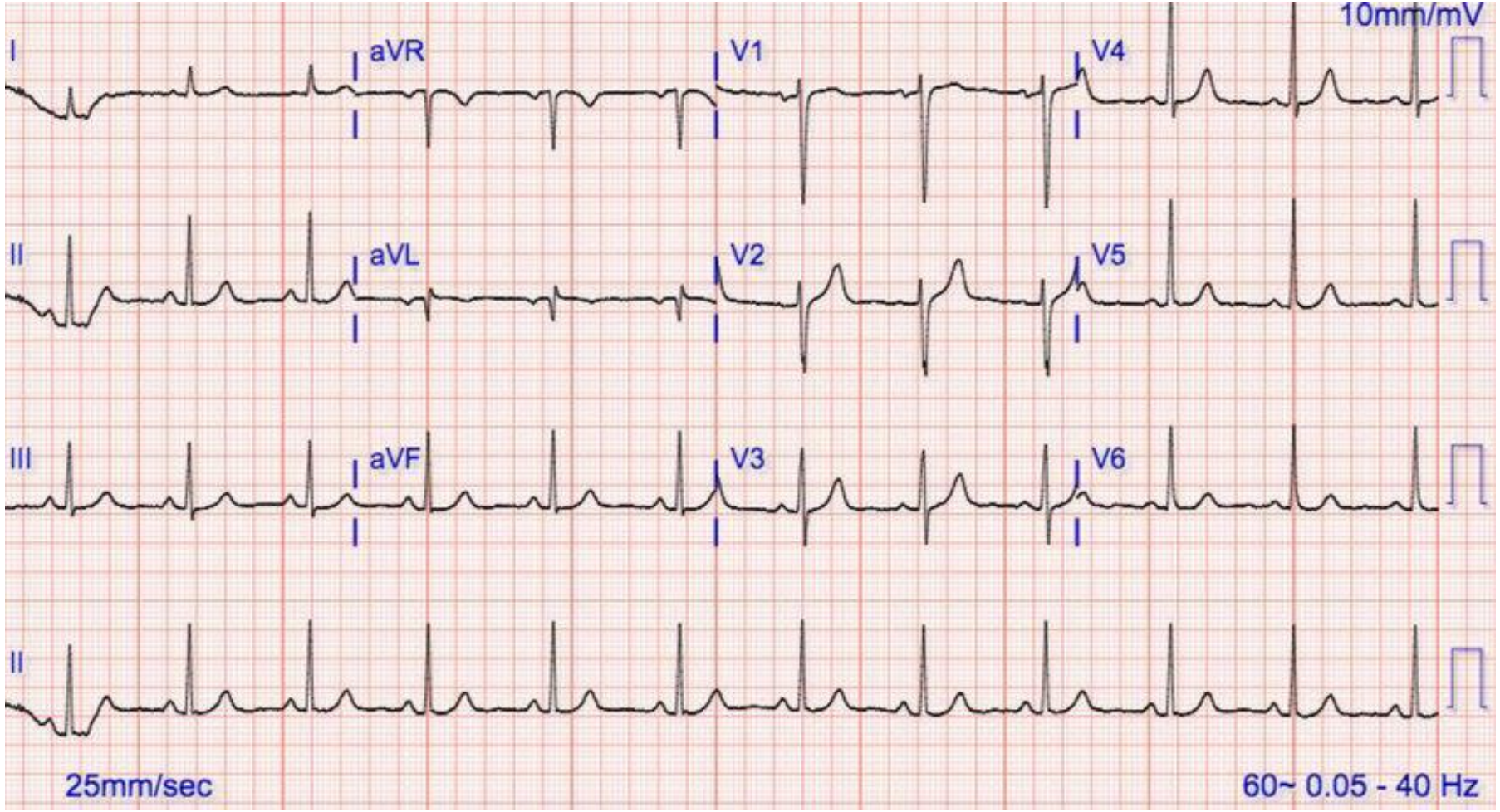
1. Look at the WHOLE EKG first



a) P waves
b) QRS
c) T Waves
d) REGULAR???

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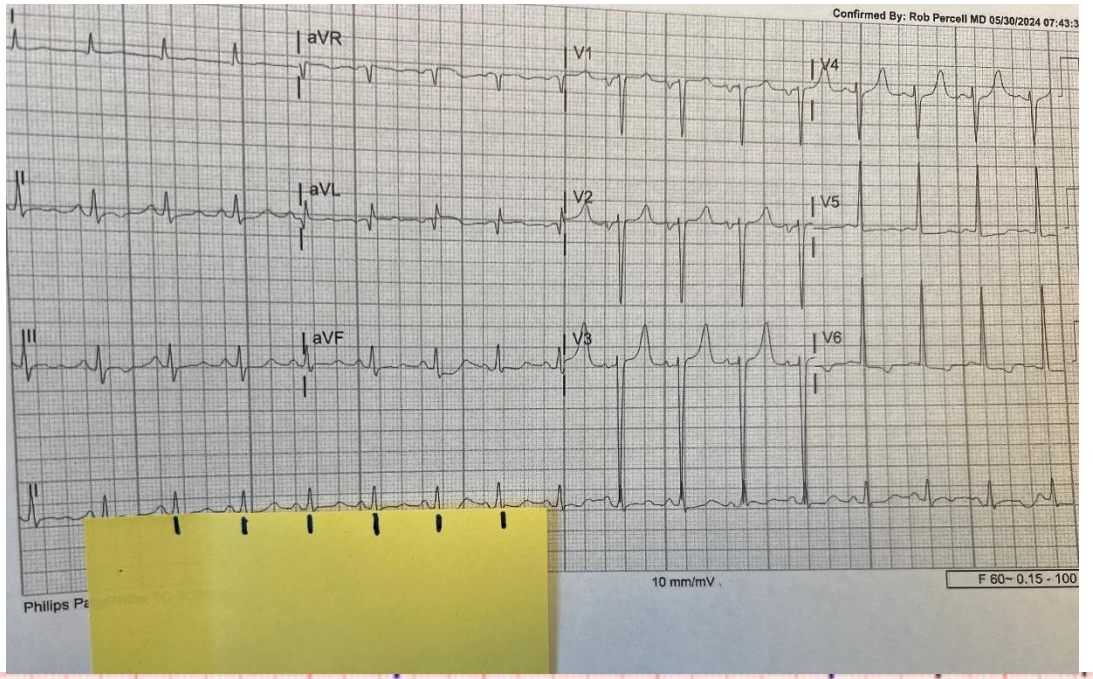
MEASURE!!!!!!!!!!!



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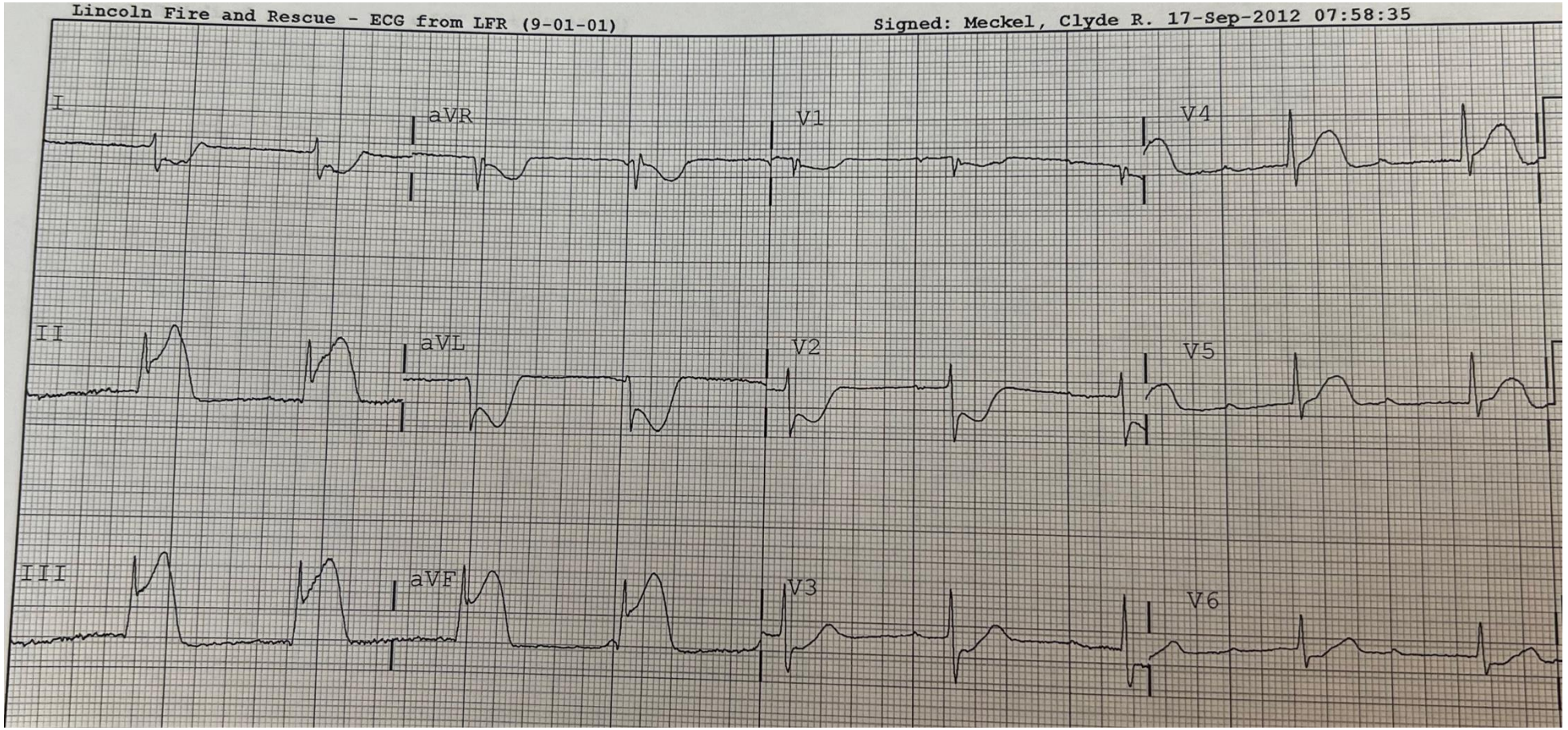
2. ST Segment Abnormalities



a) ST Depression
b) ST Elevation
c) CONTIGUOUS LEADS???

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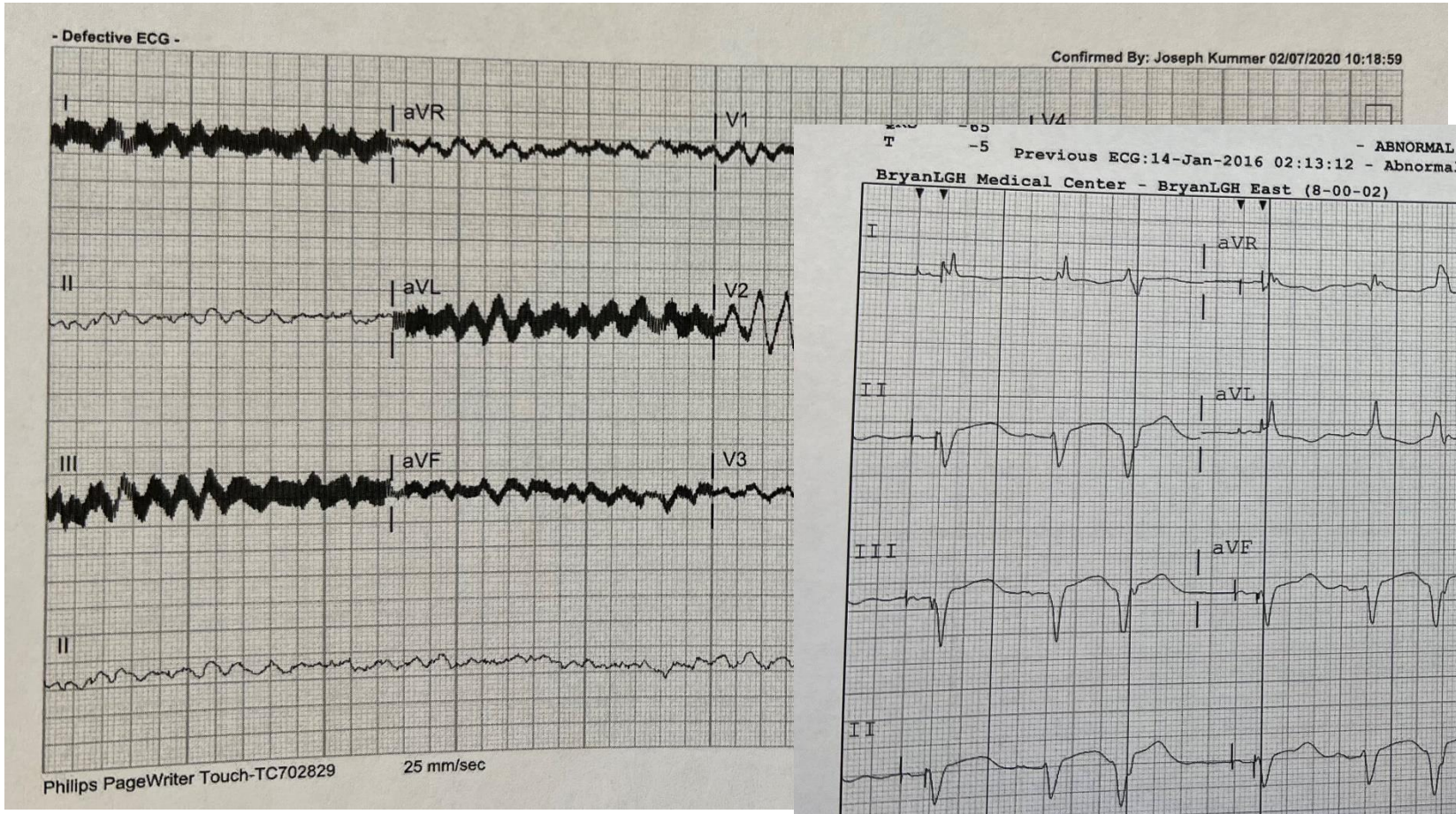
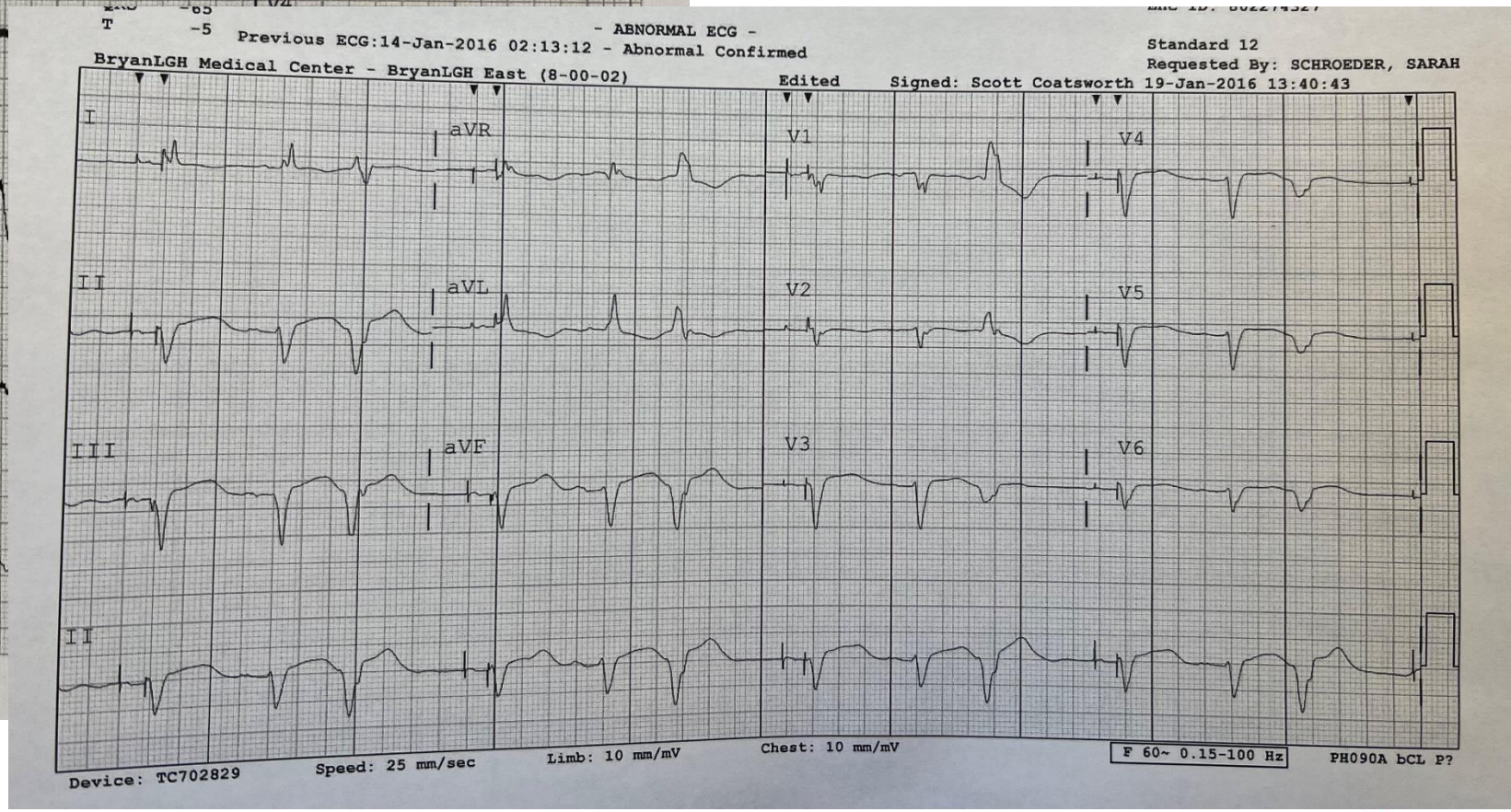
3. Extra Rhythm Parts





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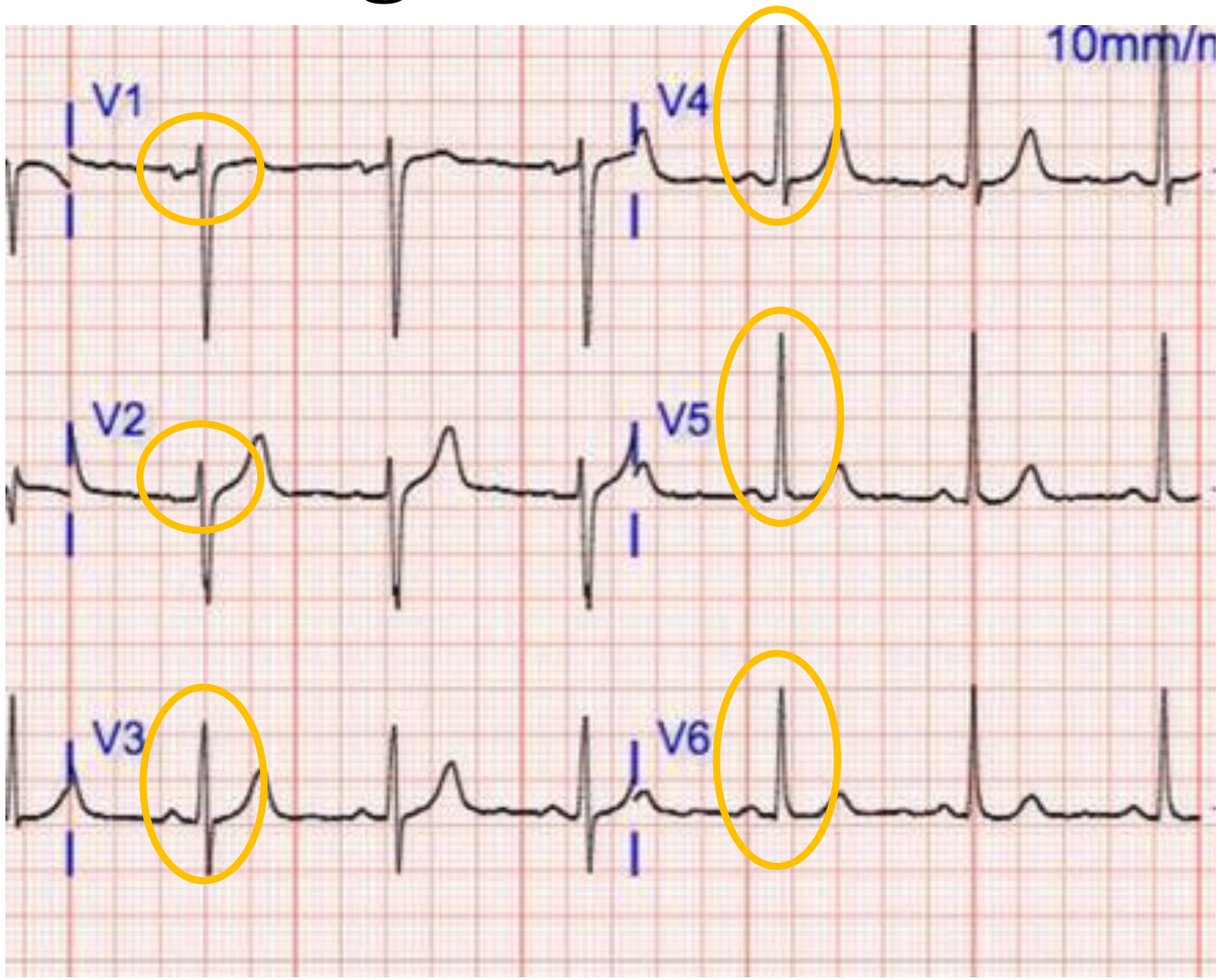
4. R Wave Progression



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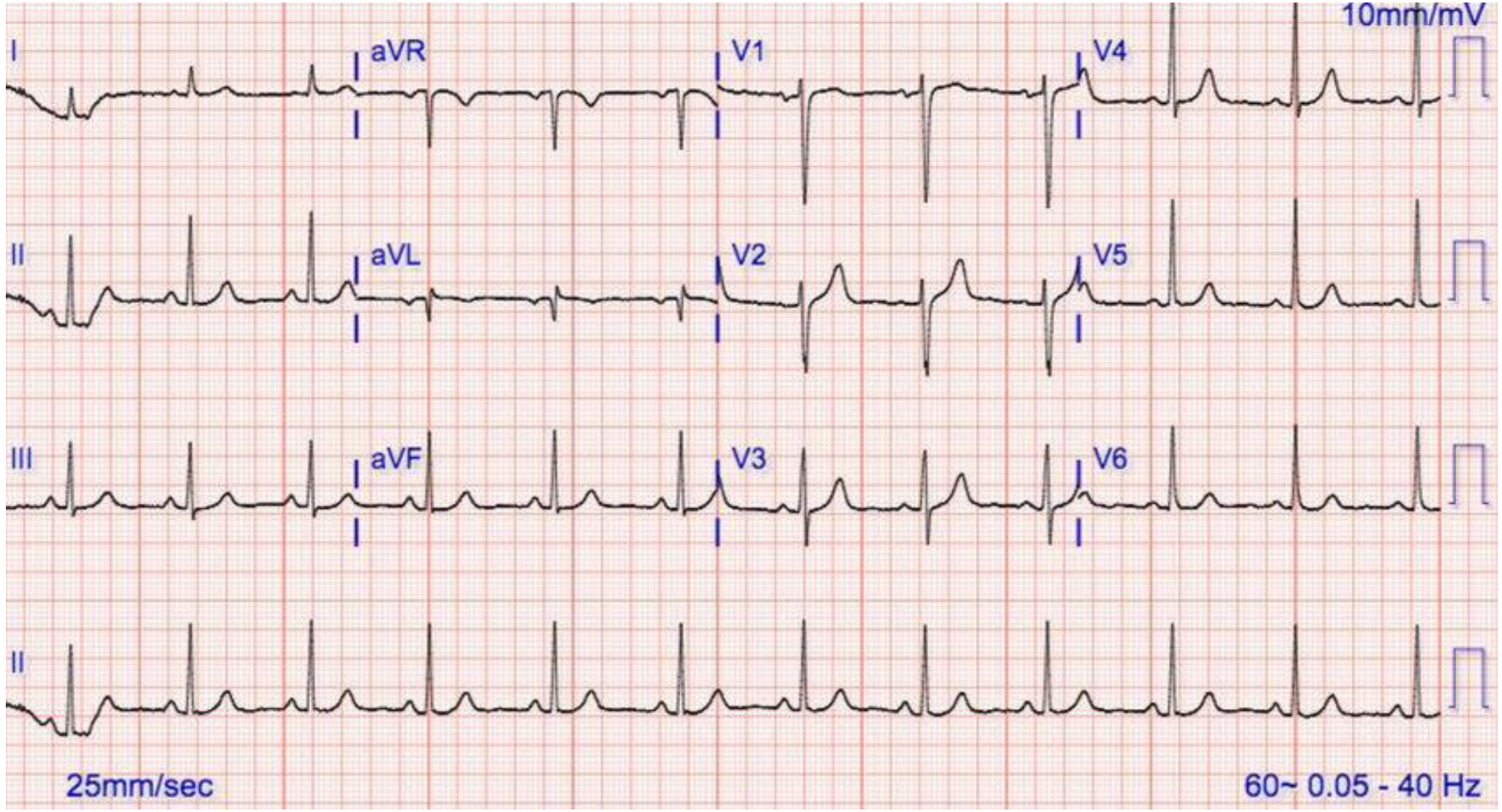
5. Look at the WHOLE EKG AGAIN



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Practice EKG's with Q/A options

- Will review SR, SB, ST
- RBBB and LBBB
- 1st Degree, 2nd Degree T1 and T2, 3rd Degree AVB
- Asystole
- Atrial Tachycardia vs AFF
- Ventricular Arrhythmias
- Paced Rhythms

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EKGs slides (1 slide per rhythm, up to 15)

- Fill in with EKG's

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The 4-1-1 on Echocardiography in Cardiac Disease

- Why do we use Echos
- Basic Understanding of the probe direction for what we see…
- Understanding the views of Echocardiography and what we can find in each view

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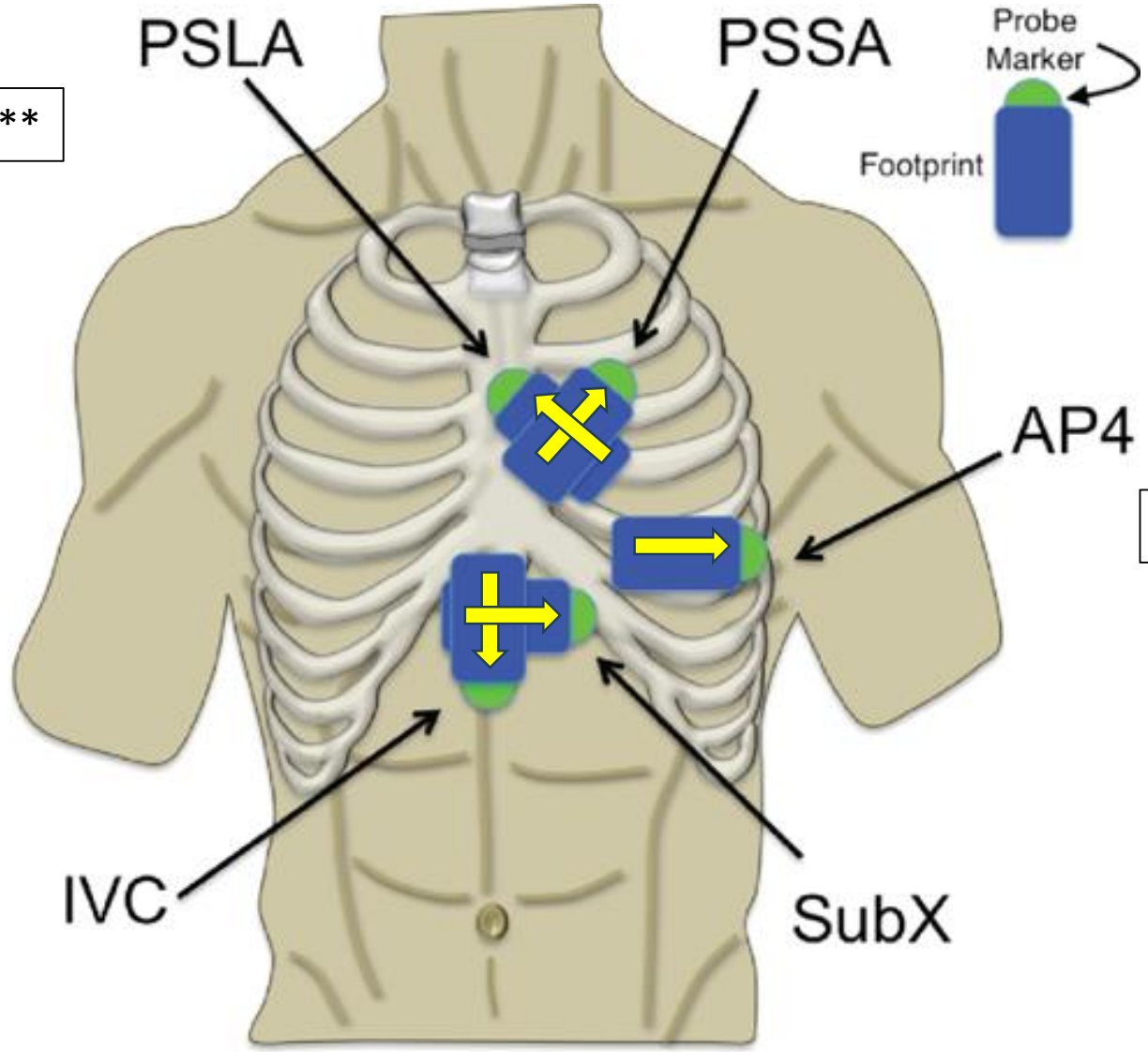
Parasternal Long Axis



Parasternal Short Axis

Apical 4-Chamber View

Source: K.J. Knoop, L.B. Stack, A.B. Storrow, R.J. Thurman: The Atlas of Emergency Medicine, 4th Edition, www.accessemergencymedicine

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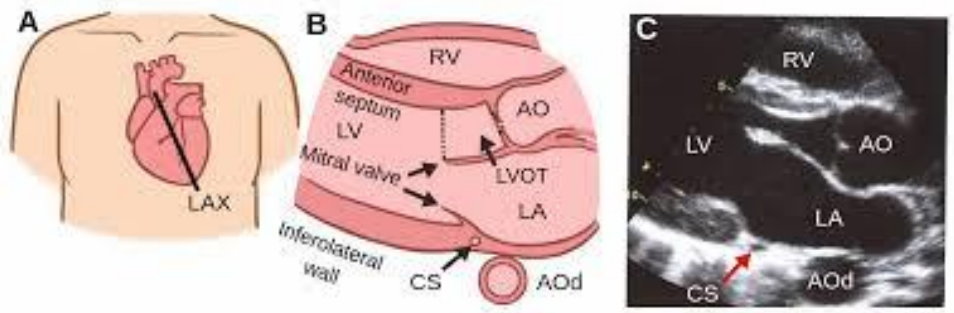
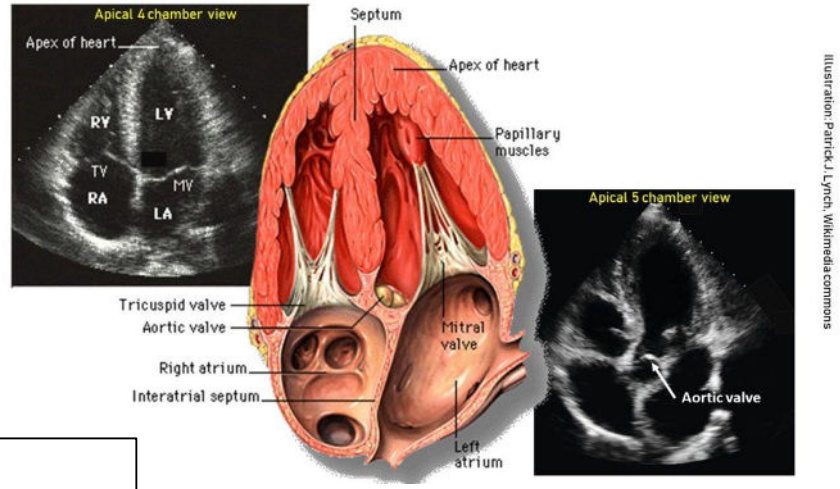
Dechick & McAfferty, 2022. Intern Ultrasound of the Month: A Left Atrial Aneurysm & Review of the Basics — University Hospitals Emergency Medicine Residency

4 Views to Know and Understand

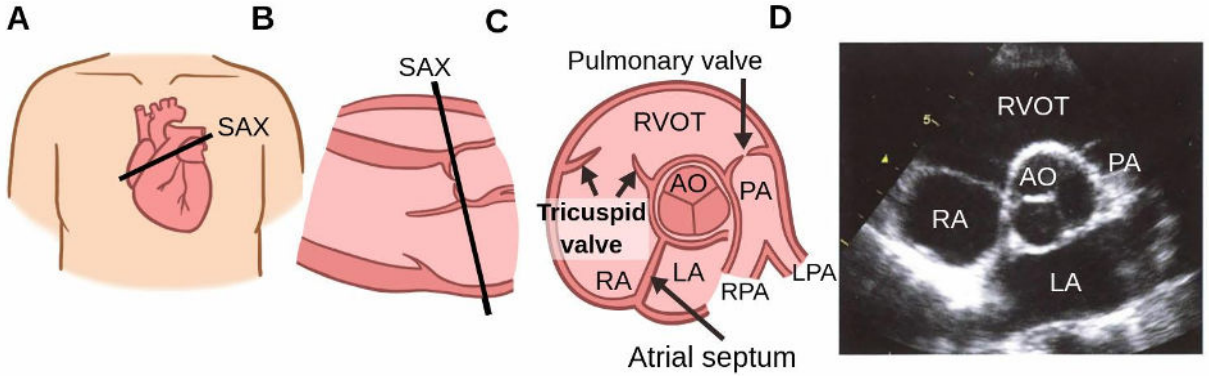
Parasternal Long Axis

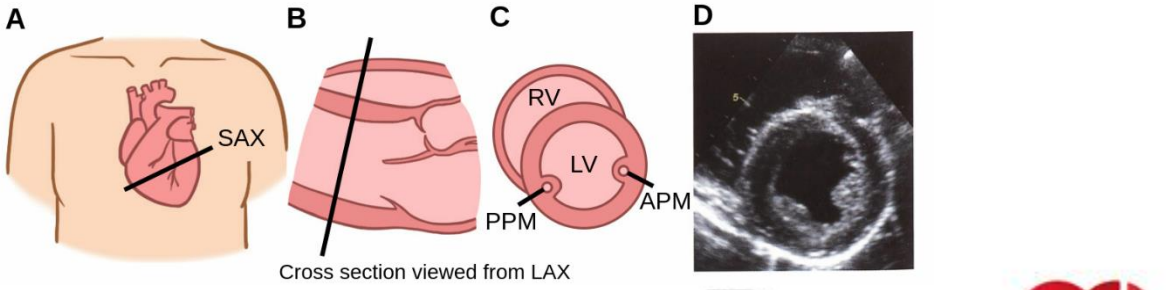


Apical 4-Chamber View



Short Axis and LV Short Axis





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Labster (nd). Parasternal long axis view – Labster

Labster (nd). Parasternal short axis view – Labster

Koratala, A. (2019). Focused Cardiac Ultrasound for the Nephrologist: The apical window - Renal Fellow Network

Labster (nd). Parasternal short axis view in the papillary plane - Labster

Normals vs Abnormals

- Will include images and videos of normal EF, normal valves etc… vs not normal EF, dysfunctional valves, RV dysfunction and measurements

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Normals vs Abnormals (cont'd for probably 4-5 slides) > videos and pics

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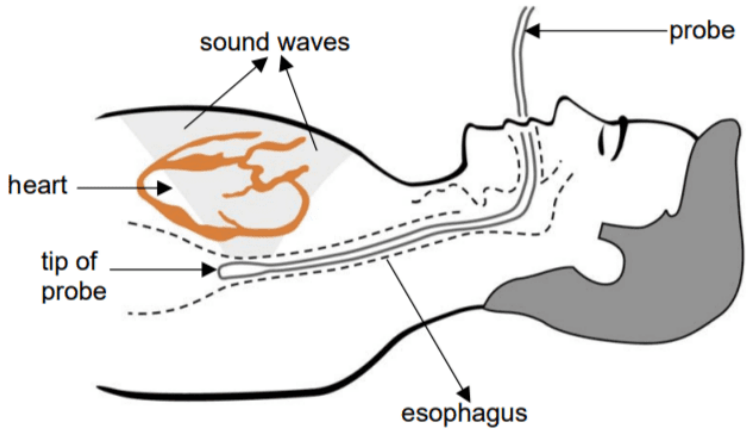
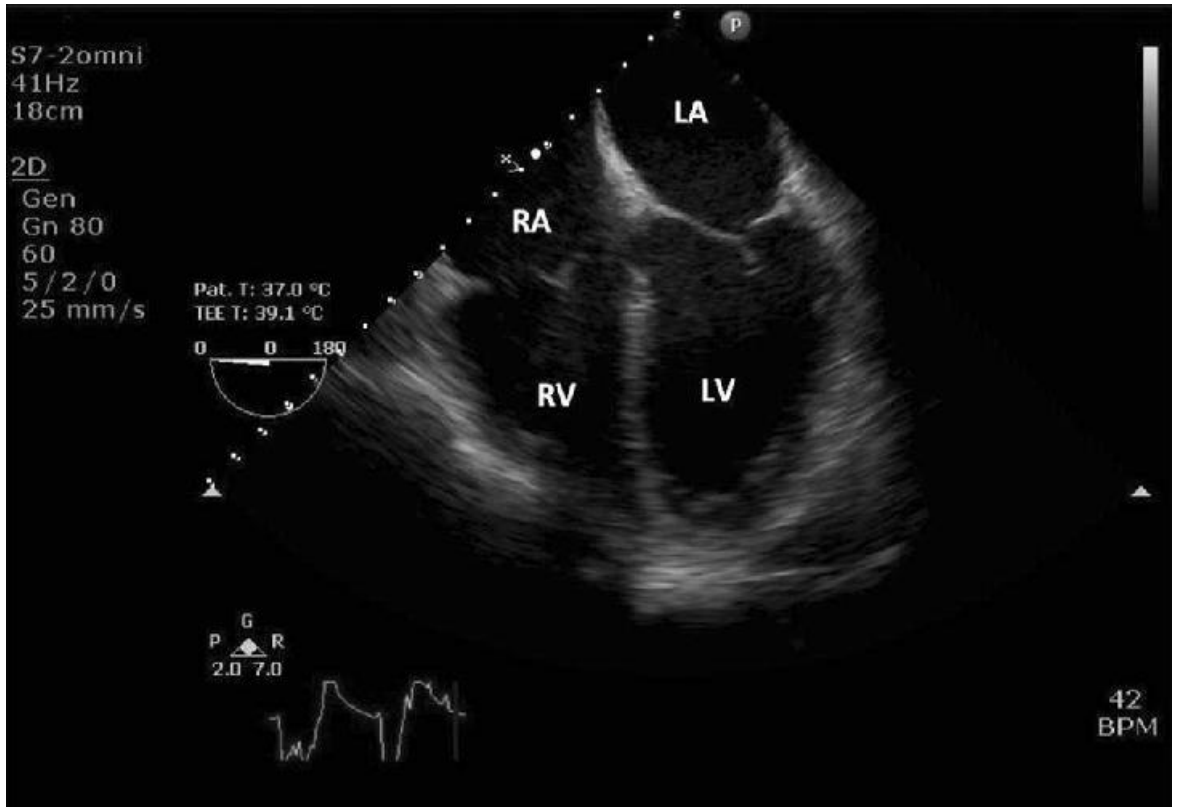
A little Snippet on Transesophageal Echocardiograms





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Final PEARLS…

- EKGs –
- Echos –
- TEEs –

Questions?

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References

- Bried Teaching (2018). ECG basics. Retrieved December 1, 2025, from ECG – The Basics – BRI ED Teaching (wordpress.com)
- Labster (nd). Parasternal long axis view. Retrieved December 1, 2025, from Parasternal long axis view – Labster
- Labster (nd). Parasternal short axis view. Retrieved December 1, 2025, from Parasternal short axis view – Labster
- Koratala A. (2019). Apical 4-chamber view. Retrieved December 1, 2025, from Focused Cardiac Ultrasound for the Nephrologist: The apical window - Renal Fellow Network
- Labster (nd). Parasternal short axis – papillary view point. Retrieved December 1, 2025, from Parasternal short axis view in the papillary plane - Labster

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