Ofonime Bleess is a Family and Emergency Nurse Practitioner with dual board certifications and a Doctorate in Nursing Practice. Currently, she serves as an Assistant Professor in Texas, where she plays a pivotal role in guiding graduate students as they prepare to transition into clinical practice. Beyond academia, Dr. Bleess remains deeply rooted in the Emergency clinical setting, actively precepting students, mentoring, and teaching cadaver procedural skills with Memorial Hermann Life Flight. Her commitment to bridging the gap between theoretical knowledge and clinical practice is embodied in her role as the founder of Medskill Mastery.

Dr. Corey Naranjo is an Emergency Room and EMS Nurse Practitioner with over twenty-three years of healthcare experience. He earned a Bachelor of Science in Human Development and Family Studies from Texas Tech University, a Bachelor of Science in Nursing from Texas A&M University-Corpus Christi, and a Doctorate in Nursing Practice from The University of Texas Health Science Center at Houston, along with a post-graduate program in Emergency and Trauma Care at UTHealth.

Before his current role, he worked as a Paramedic, Field Training Officer, Community Health Paramedic, and ER nurse. He is committed to delivering exceptional emergency care through evidence-based practices and is particularly interested in social determinants of health, supporting high-risk populations, and reducing emergency room utilization.

Corey lives in Cypress, Texas, and enjoys being a dad to his 12-year-old son, Jacob. They love fishing, camping, going to church, and spending time with family and friends. His professional interests also include complex case management, interdisciplinary collaboration, and quality improvement.

Reading Between the Lines: Practical EKG Skills for the Advanced Clinician

Ofonime Bleess, DNP, MBA, APRN, FNP-BC, ENP-C

Corey Naranjo, DNP, APRN, FNP-C, ENP-C, LP

Disclosures

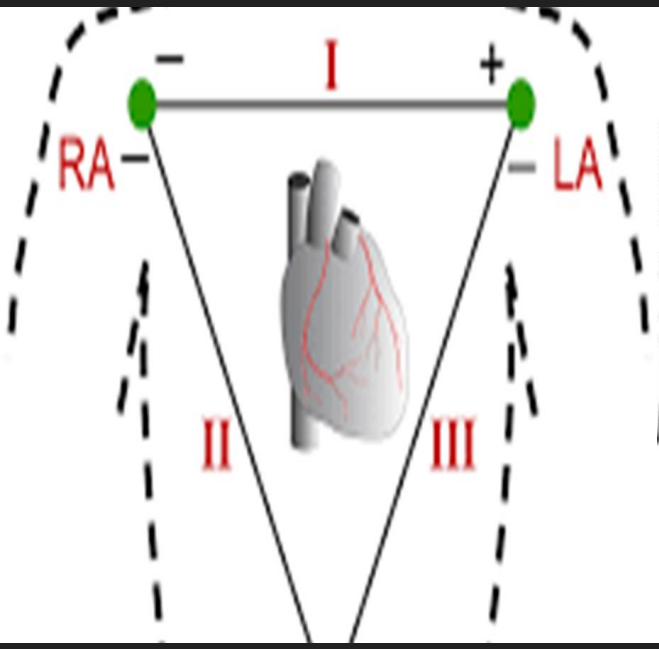
- Dr. Ofonime Bleess has no financial relationships or conflicts of interest to disclose in relation to this presentation.
- Dr. Corey Naranjo has no financial relationships or conflicts of interest to disclose in relation to this presentation

Objectives

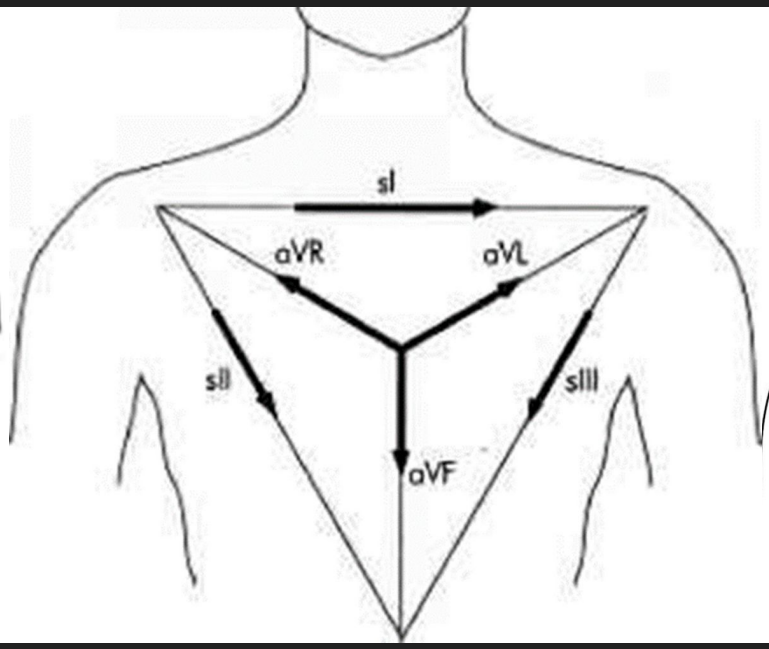
1. Recall the fundamental components and principles of electrocardiogram (EKG) interpretation, including lead placement, wave morphology, and normal parameters.
2. Correlate cardiac mechanical physiology with the electrical conduction pathway and demonstrate how these processes are reflected on the EKG tracing.
3. Apply a systematic, step-by-step approach to EKG interpretation that ensures comprehensive and accurate analysis.
4. Identify ST-elevation myocardial infarctions (STEMIs) using current American Heart Association (AHA) guidelines and criteria.
5. Demonstrate proficiency in EKG interpretation through hands-on analysis of various cardiac rhythm strips and 12-lead EKGs.

EKG Introduction and Review

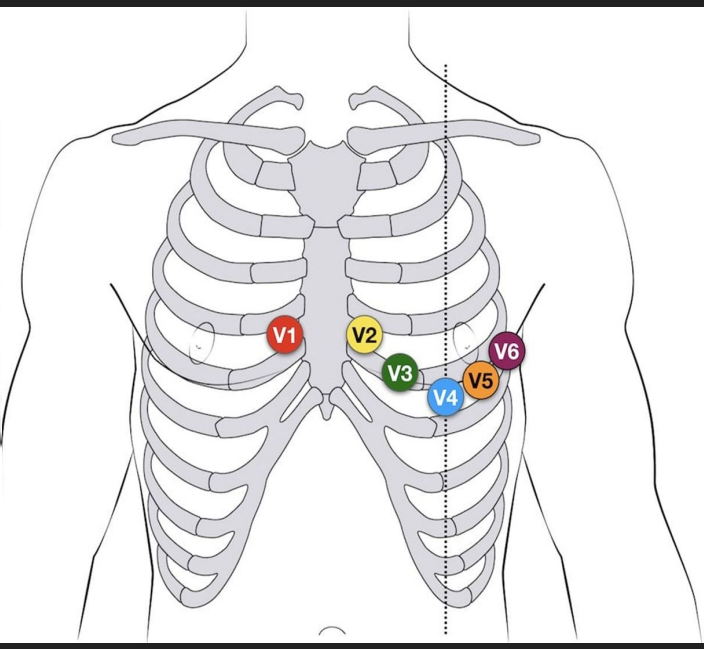
Bipolar Leads



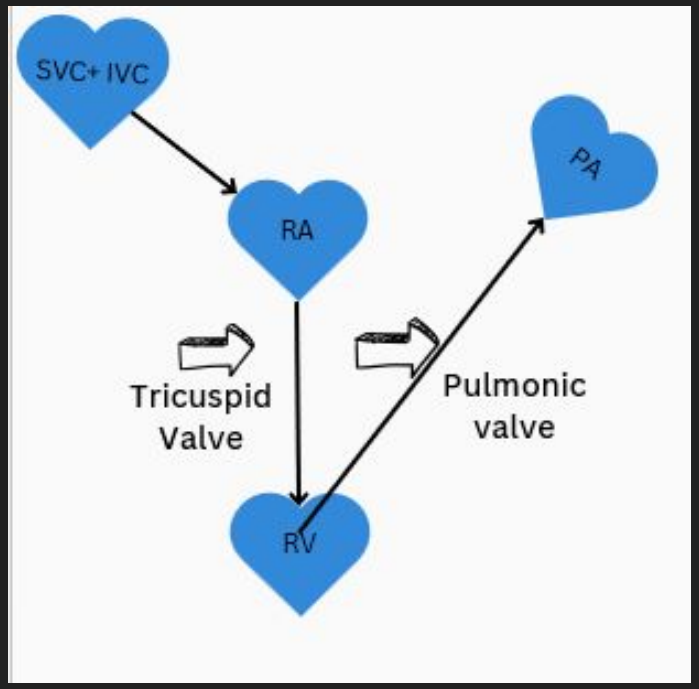
Augmented Limb Leads

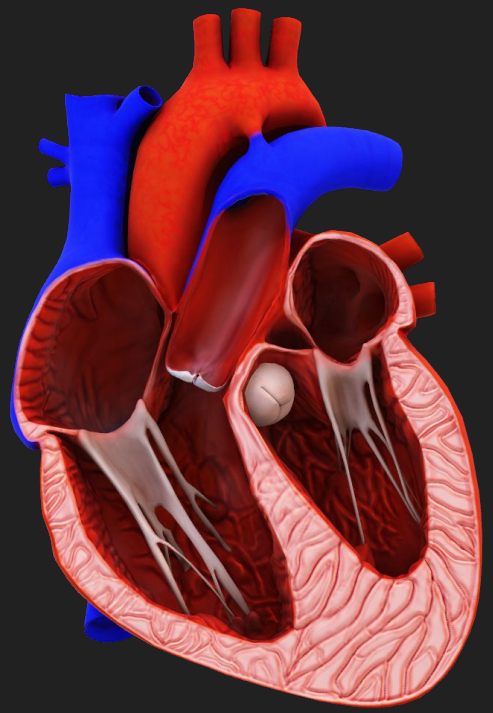


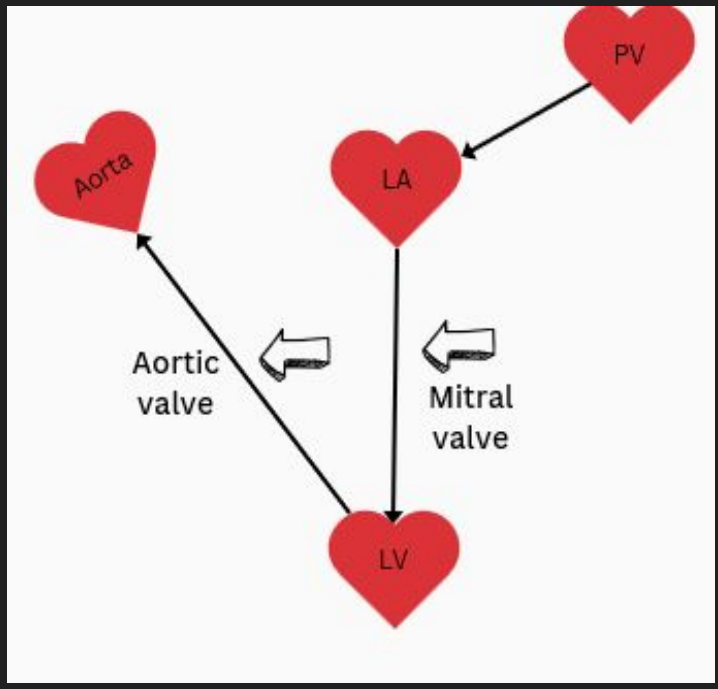
Chest Leads



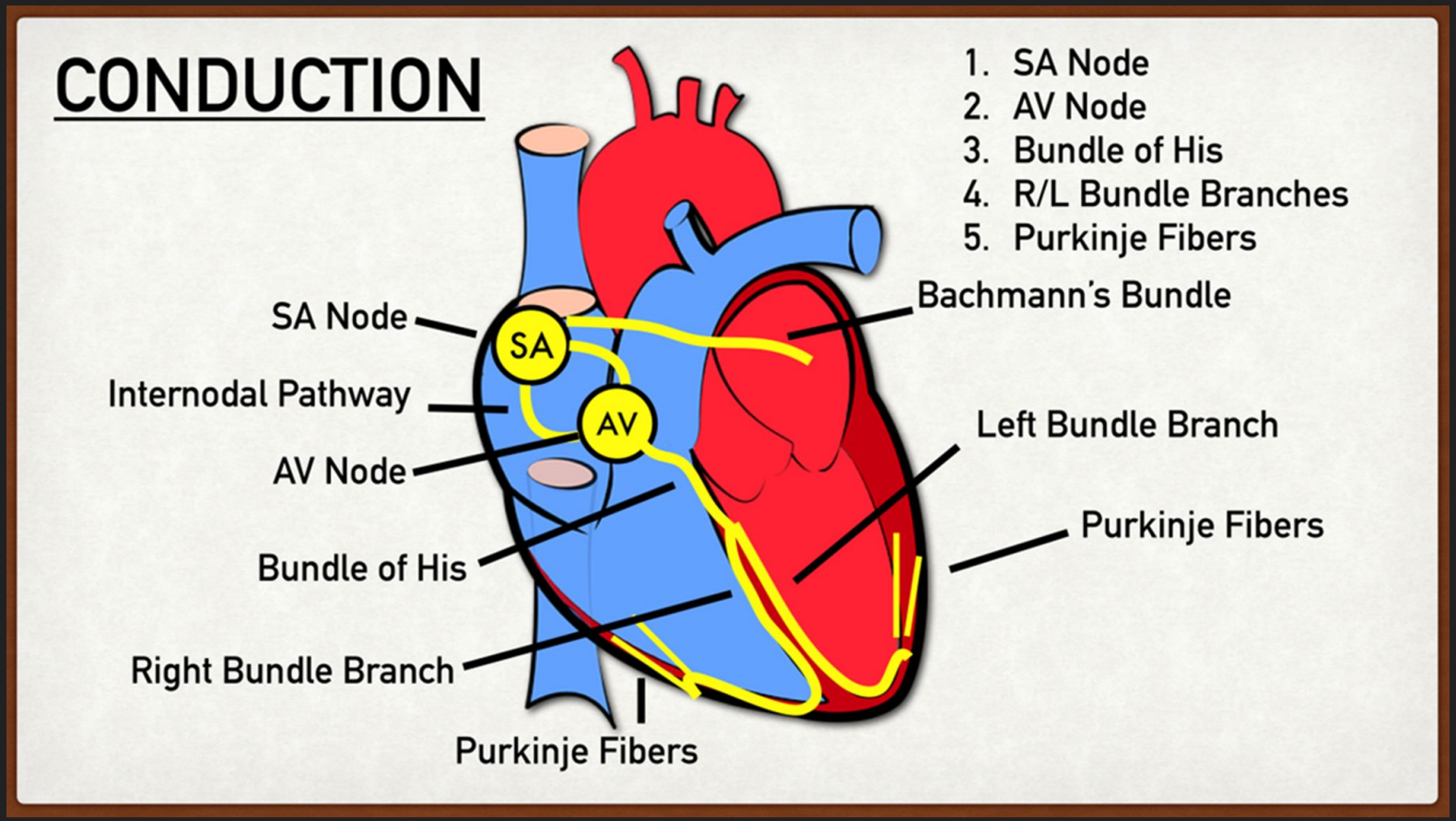
Introduction to Cardiac Mechanical Physiology







Introduction to Electrical Cardiac Physiology



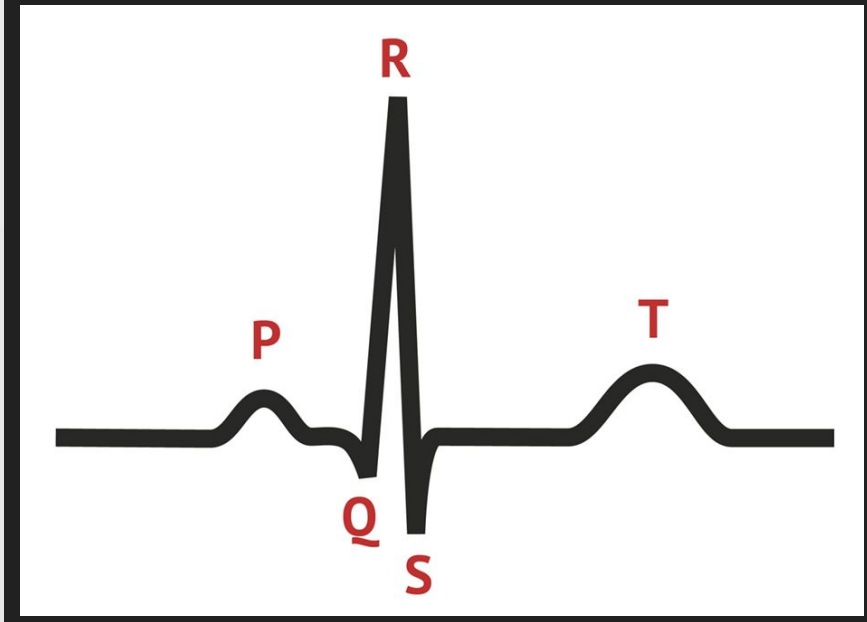
The EKG Alphabet

P wave: the progressive activation (depolarization) of the right and left atria

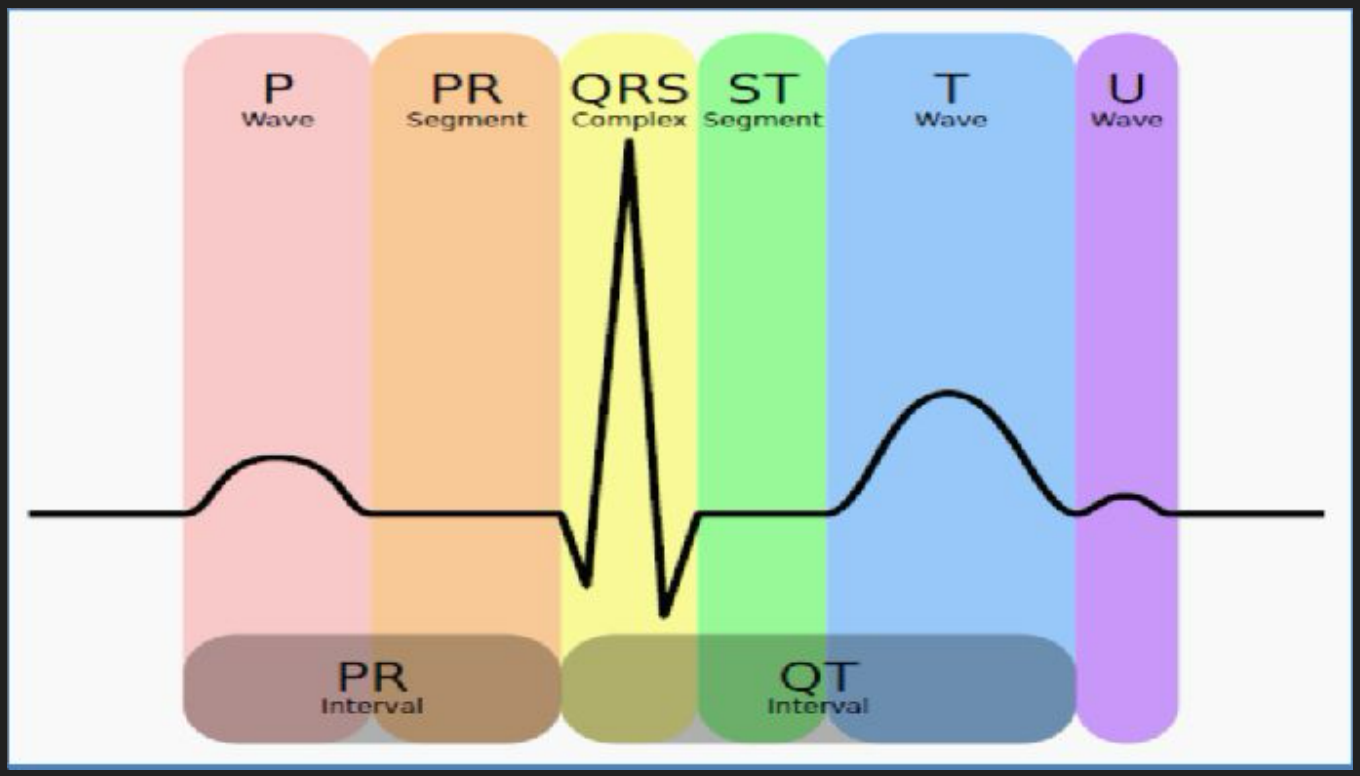
QRS complex: right and left ventricular depolarization (normally the ventricles are activated simultaneously)

ST-T wave: ventricular repolarization

U wave: origin for this wave is not clear - but probably represents "after depolarizations" in the ventricles (rarely seen on EKG)

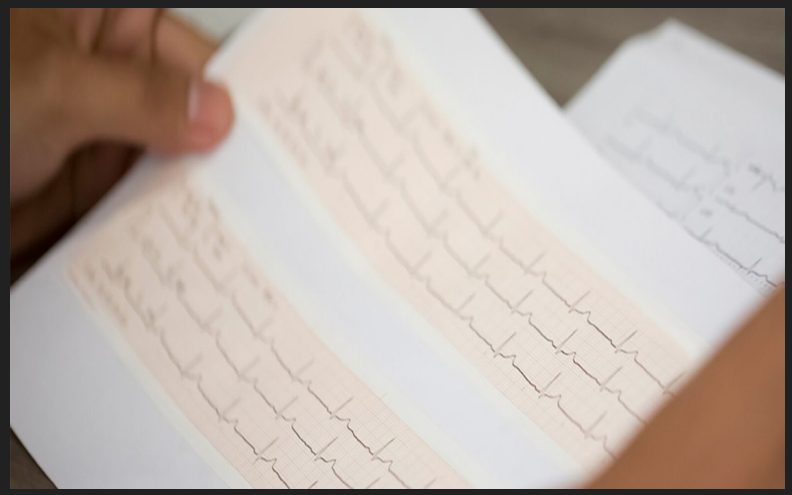


Is it Really as Simple as PQRST?



Systematic Approach to EKG Interpretation

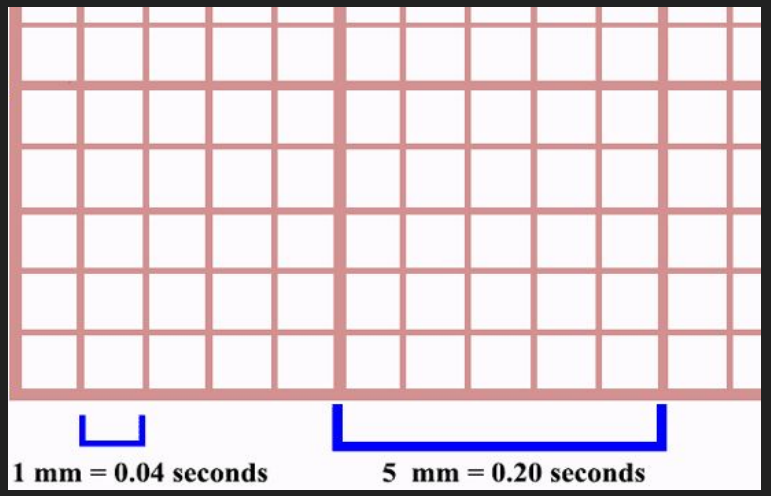
1. Patient History & Case Details
2. Rate
3. Rhythm
4. Intervals
5. ST-T wave Morphology

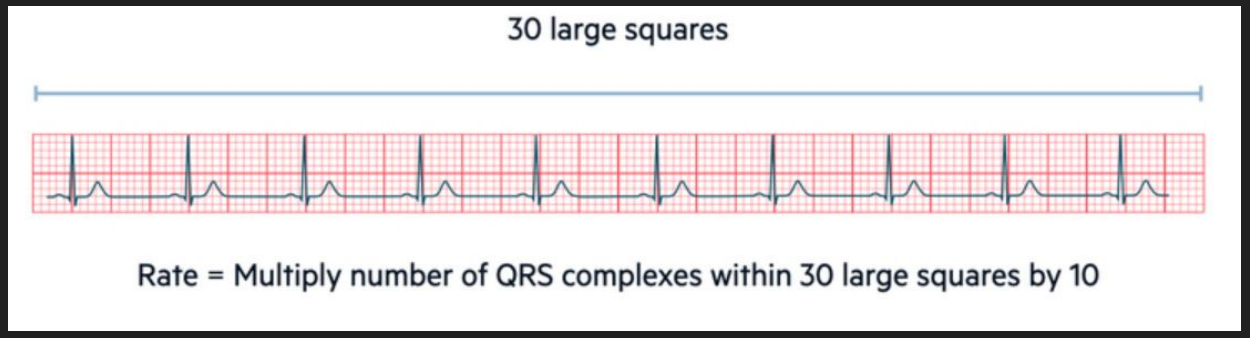


Review of EKG Paper

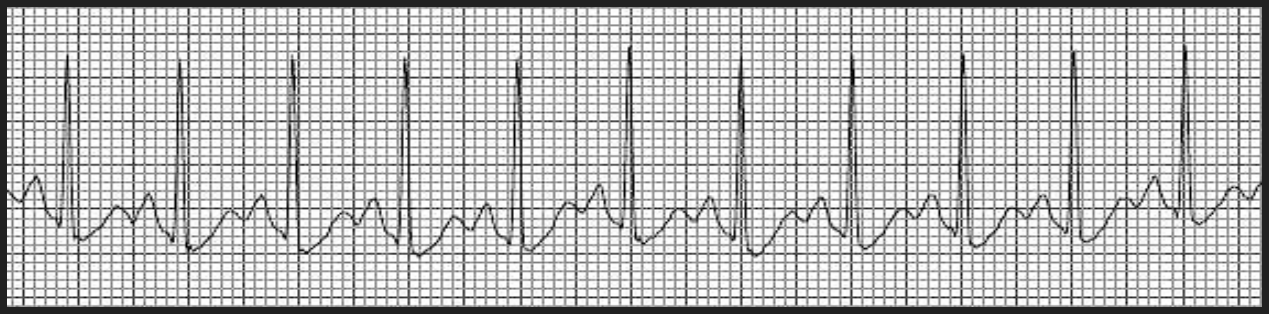
- X - axis – horizontal line
  - Measures TIME (seconds or ms)
  - One small box (1 mm) □ 0.04 seconds
  - One large box (5 mm) □ 0.20 seconds
  - Five large boxes (25 mm) □ 1 second

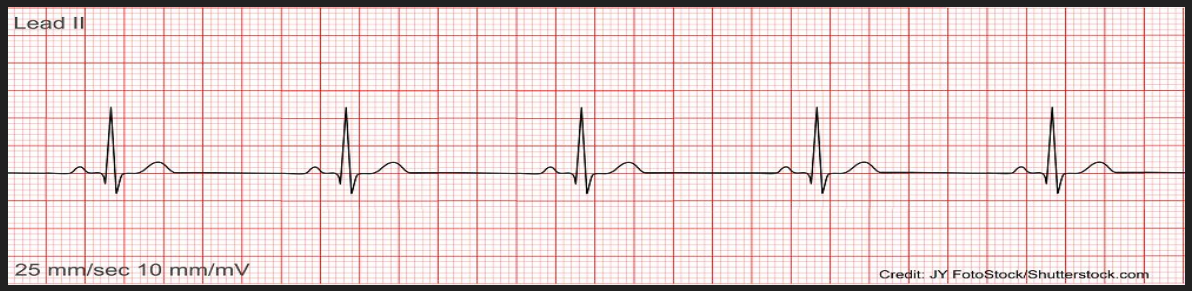
  - Thirty large boxes □ 6 seconds

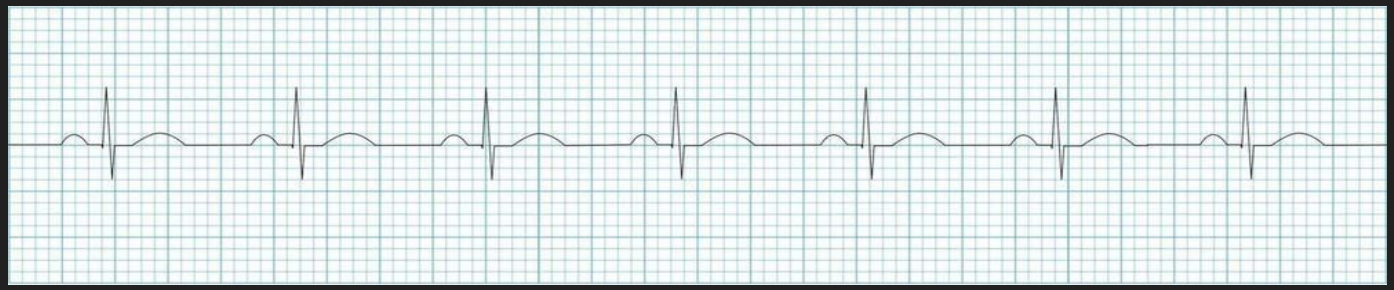




Rate: Too fast? Too slow? Or just right?

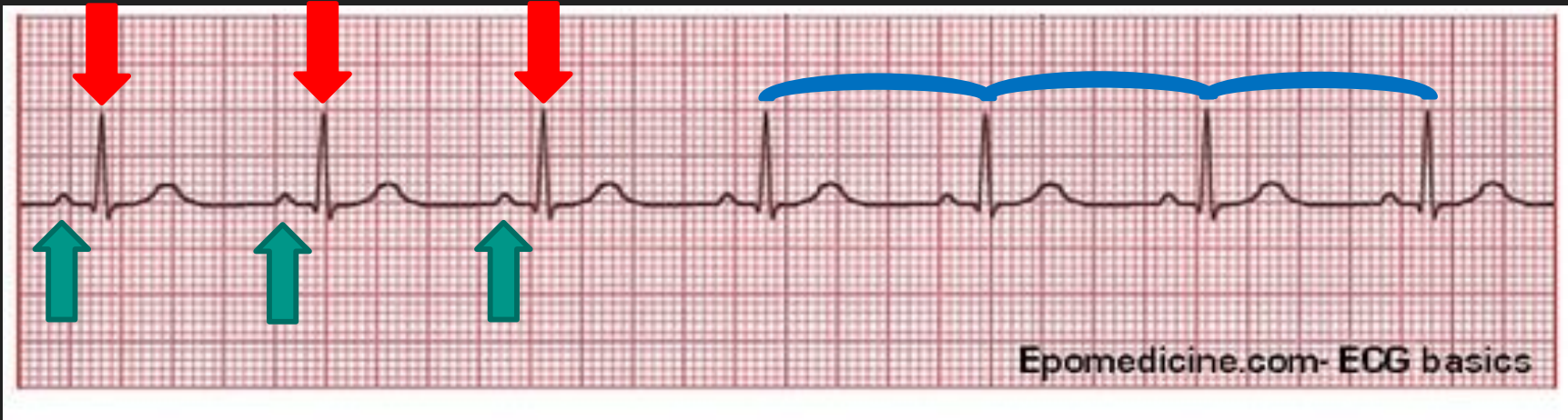






Rhythm

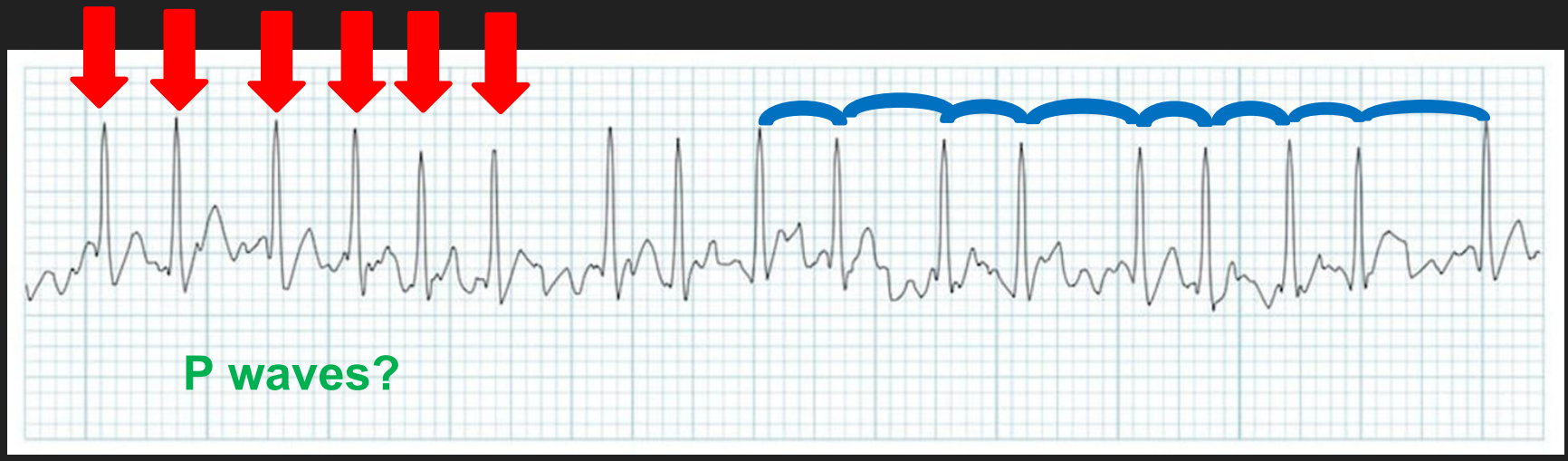
- P for every QRS?
- QRS for every P?



- Regular or Irregular?
- R-to-R march out?

Rhythm

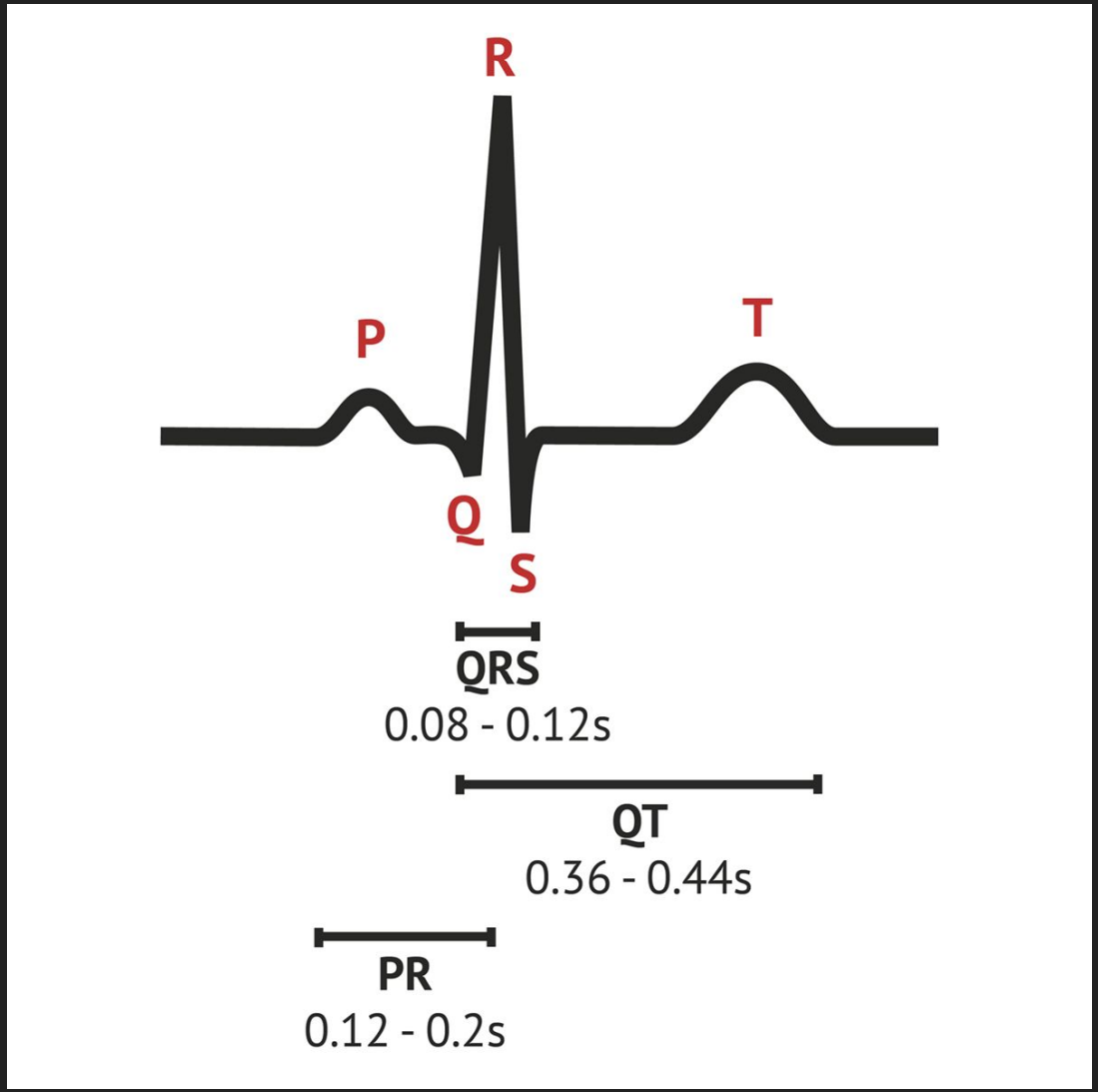
- P for every QRS?
- QRS for every P?



- Regular or Irregular?
- R-to-R march out?

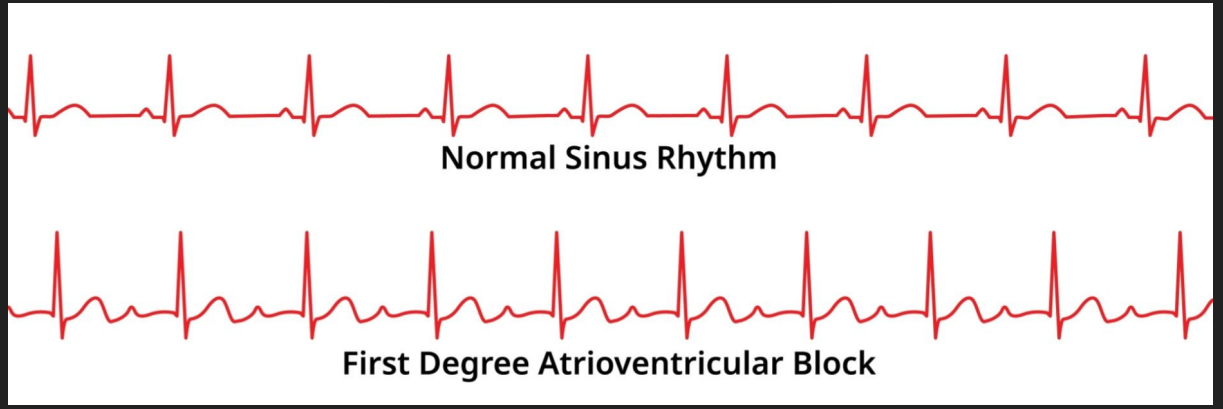
Interval

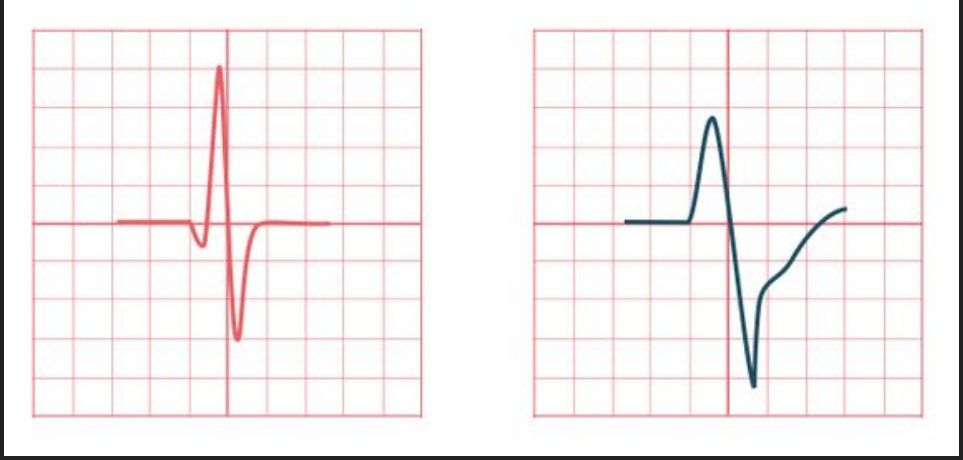
- PR – long or short?
- QRS – wide or narrow?
- QTc – past midway?

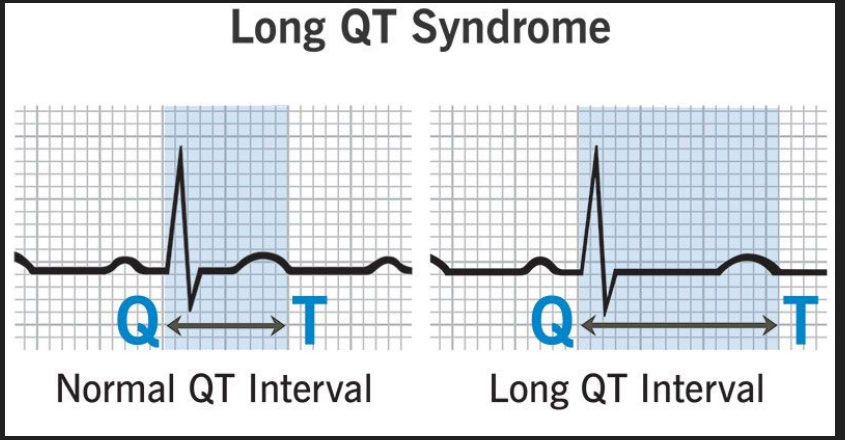


Interval Practice

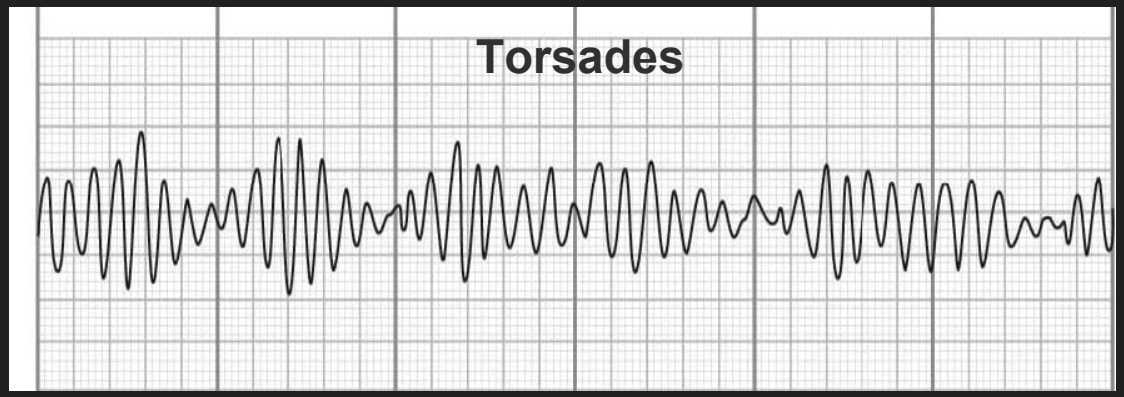
- PR – long or short?
- QRS – wide or narrow?
- QTc – past midway?

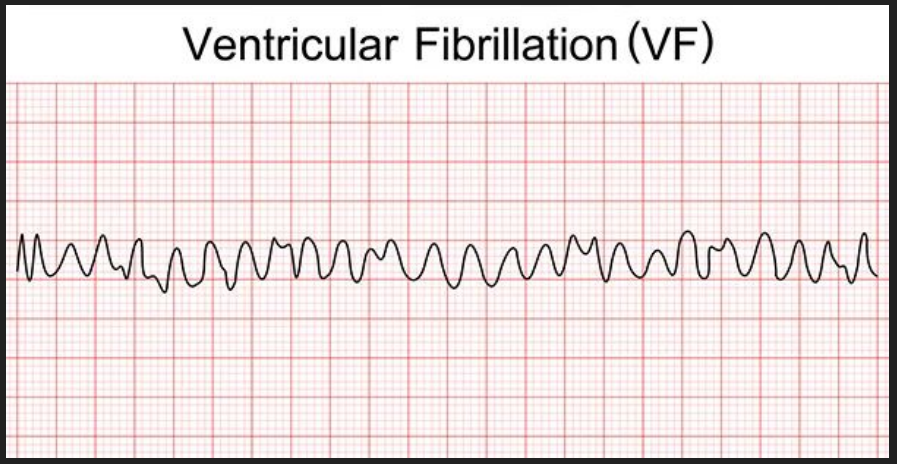


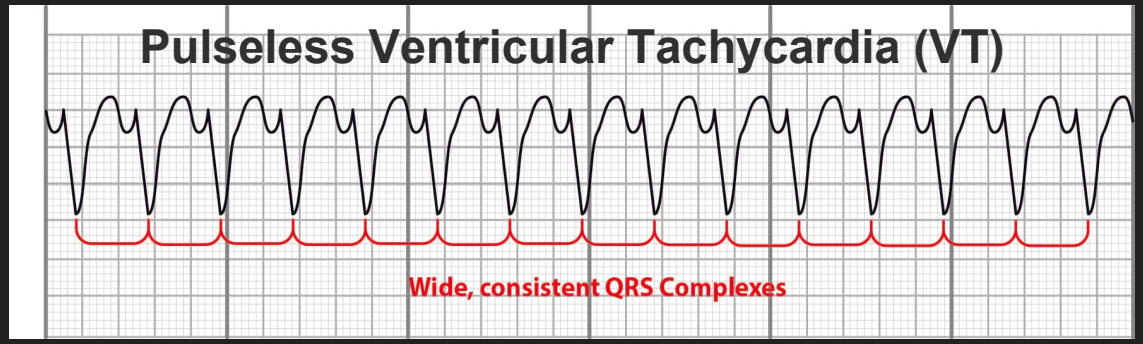




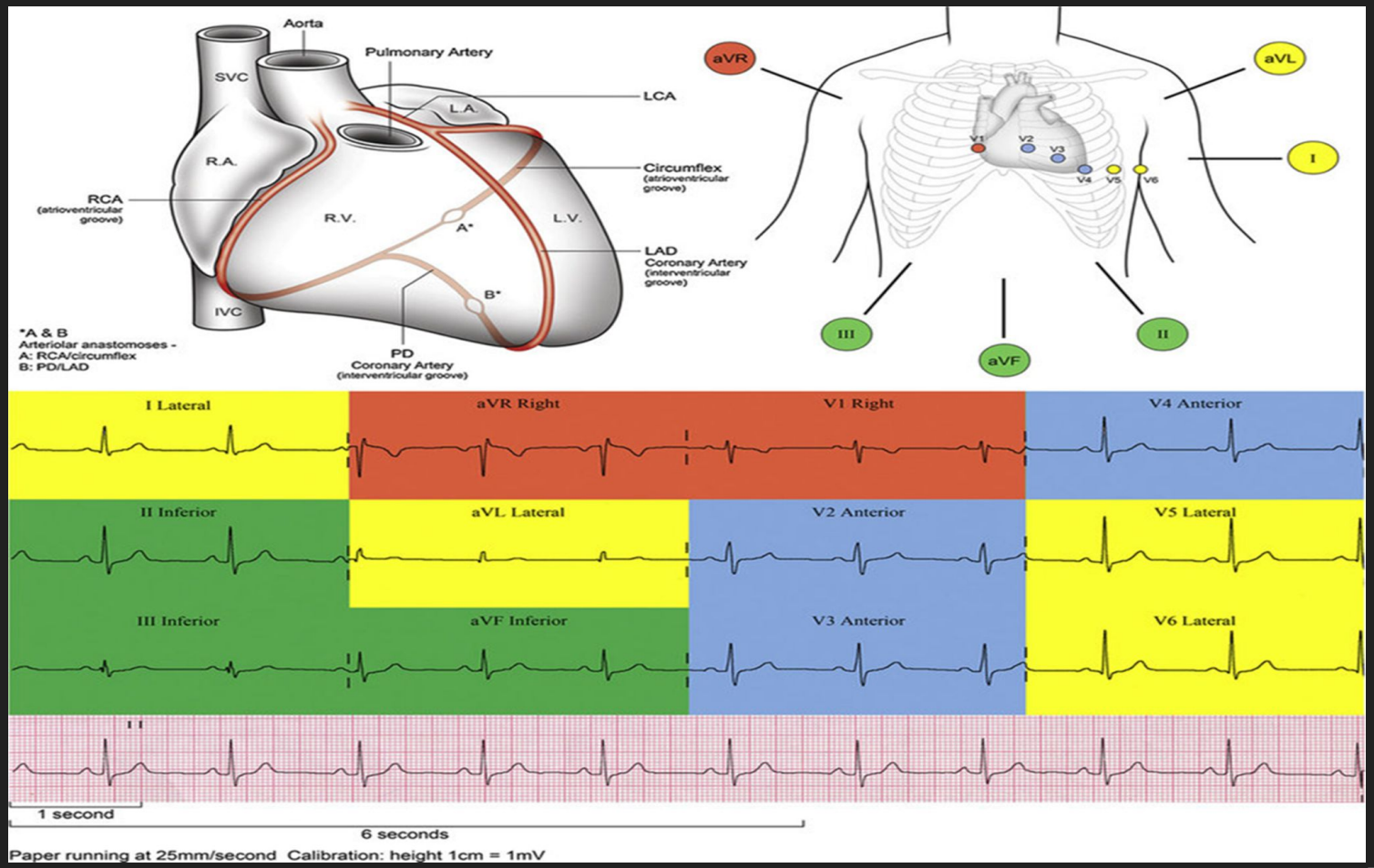
These EKGs are “Shockingly” Bad!







ST Morphology: Connect Physiology to Coronary Arteries



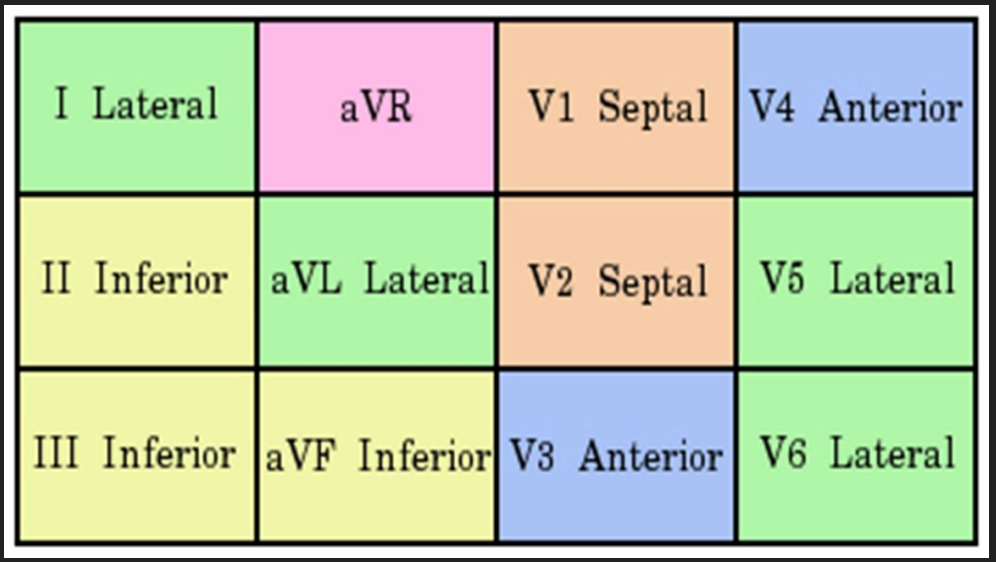
Blakeway et al., 2012

STEMI (AHA Guidelines)

Symptoms of myocardial ischemia

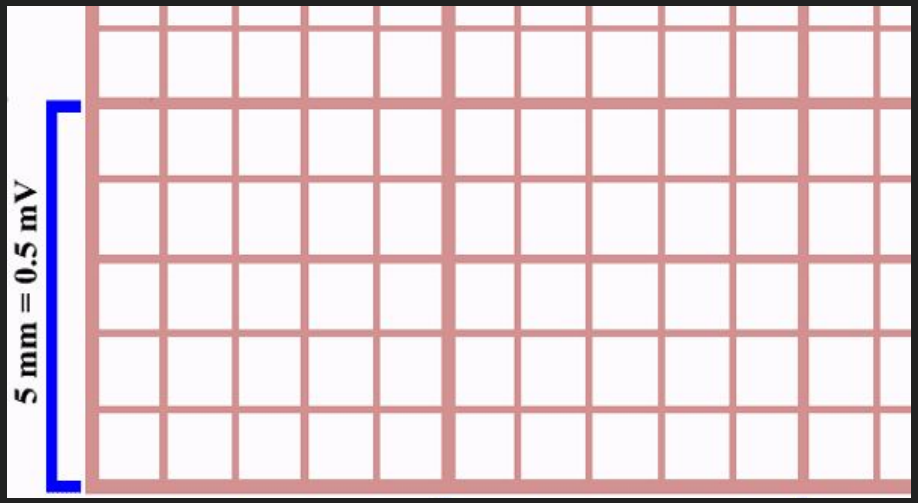
AND

- ST-Elevation in <u>contiguous</u> leads:
  - V2 – V3:
    - ≥ 2 mm in men
    - ≥ 1.5 mm in women
  - Other leads:
    - ≥ 1 mm
- New LBBB*
- Old LBBB (Sgarbossa Criteria

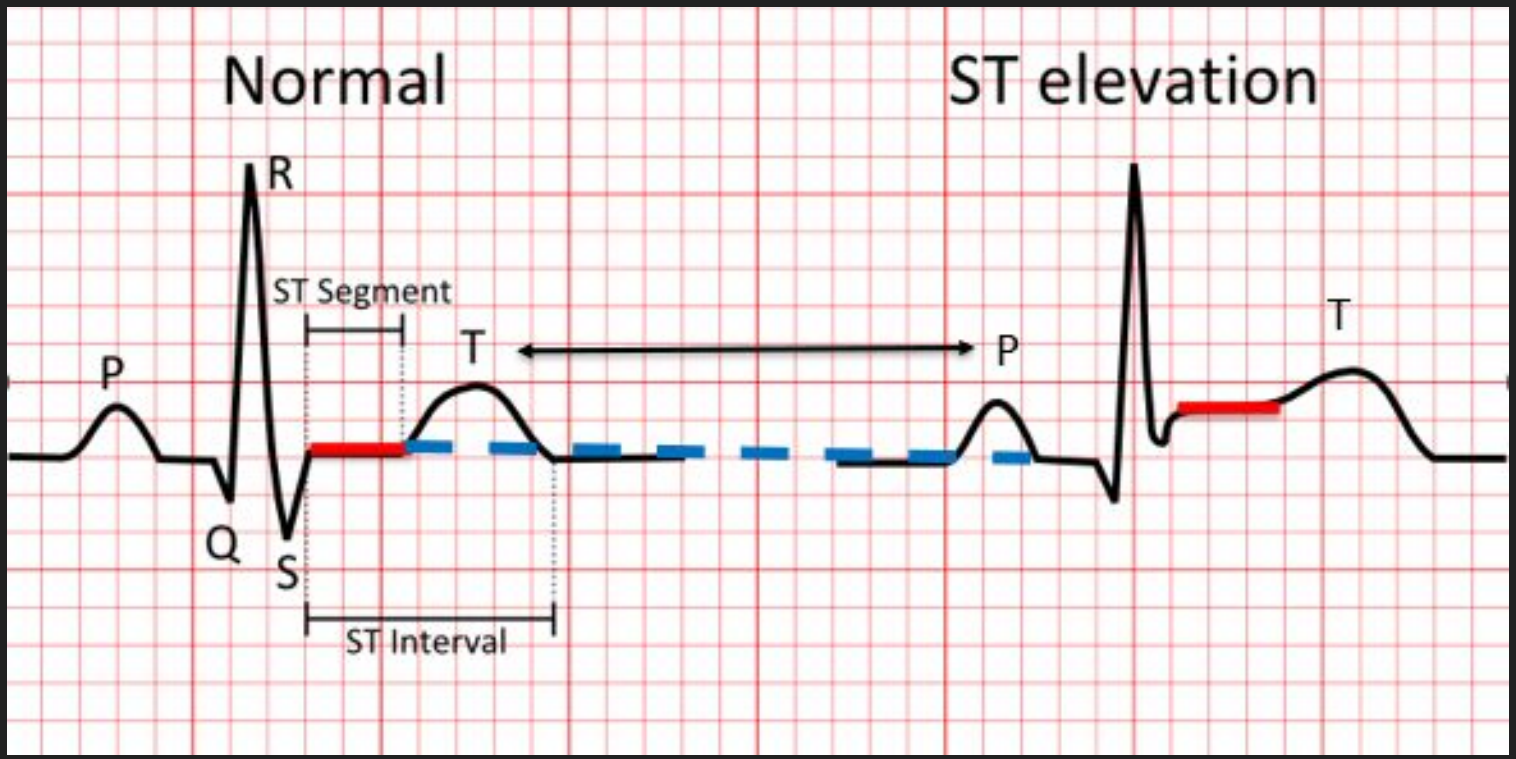


Review of EKG Paper: ST Morphology

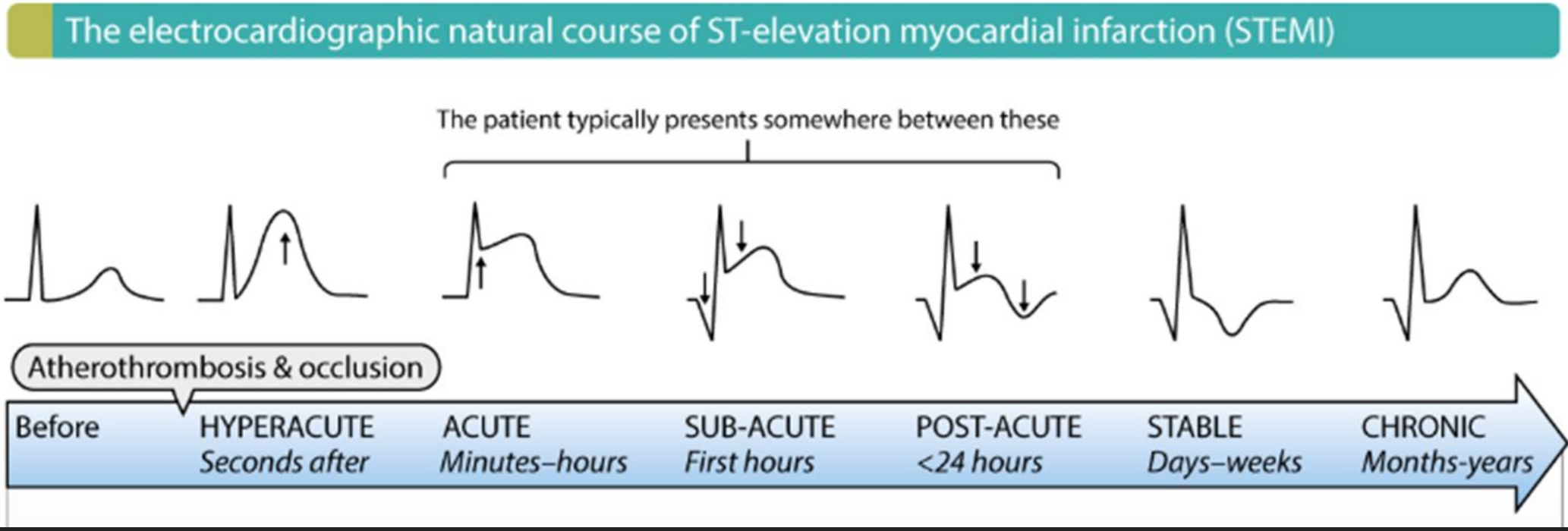
- X - axis – vertical line
  - Measures voltage (mv)
  - One small box (1 mm) 0.1 mv
  - One large box (5 mm) 0.5 mv



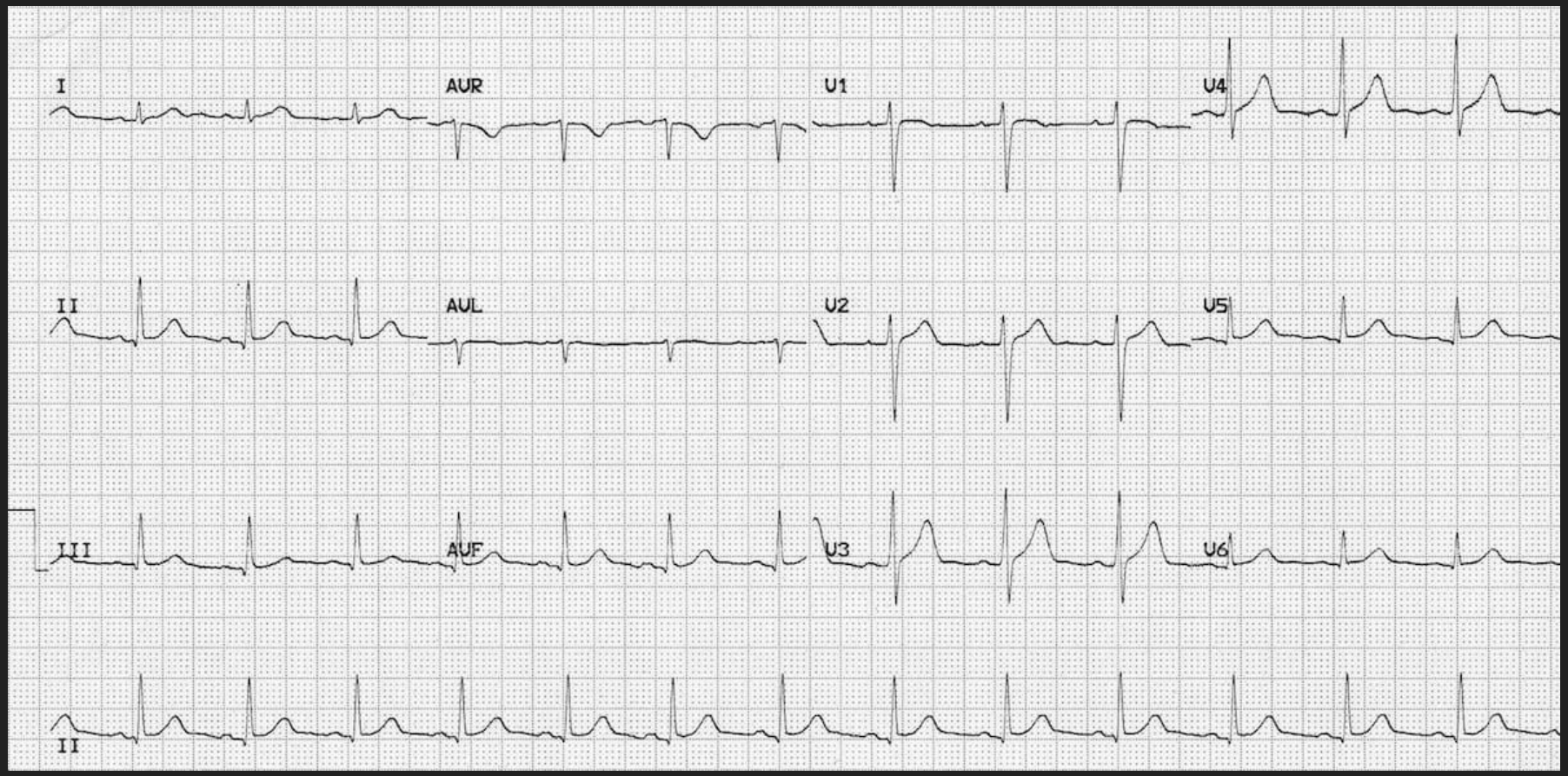
ST Morphology – STEMI or no STEMI?



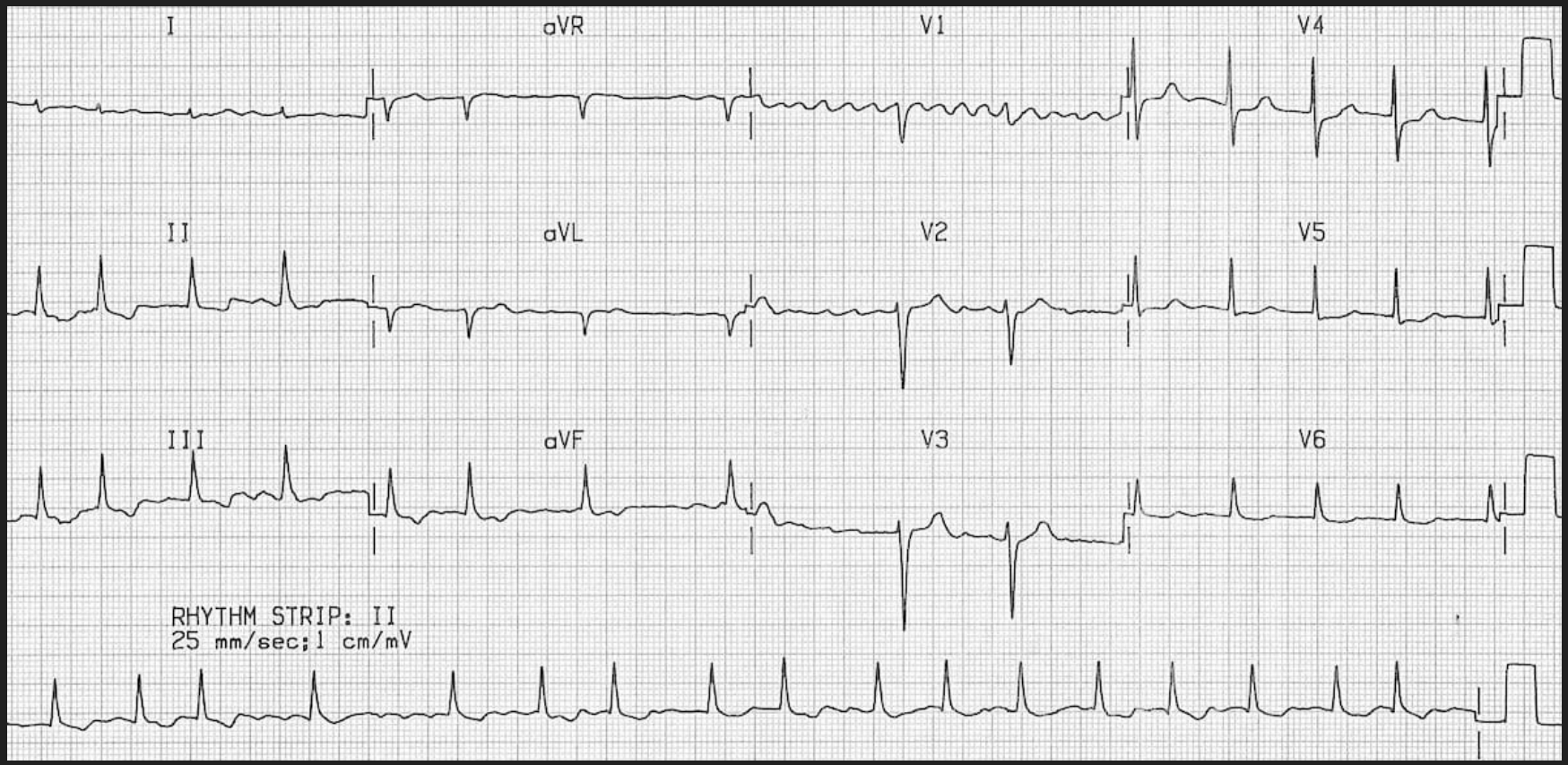
The EKG Evolution of MI



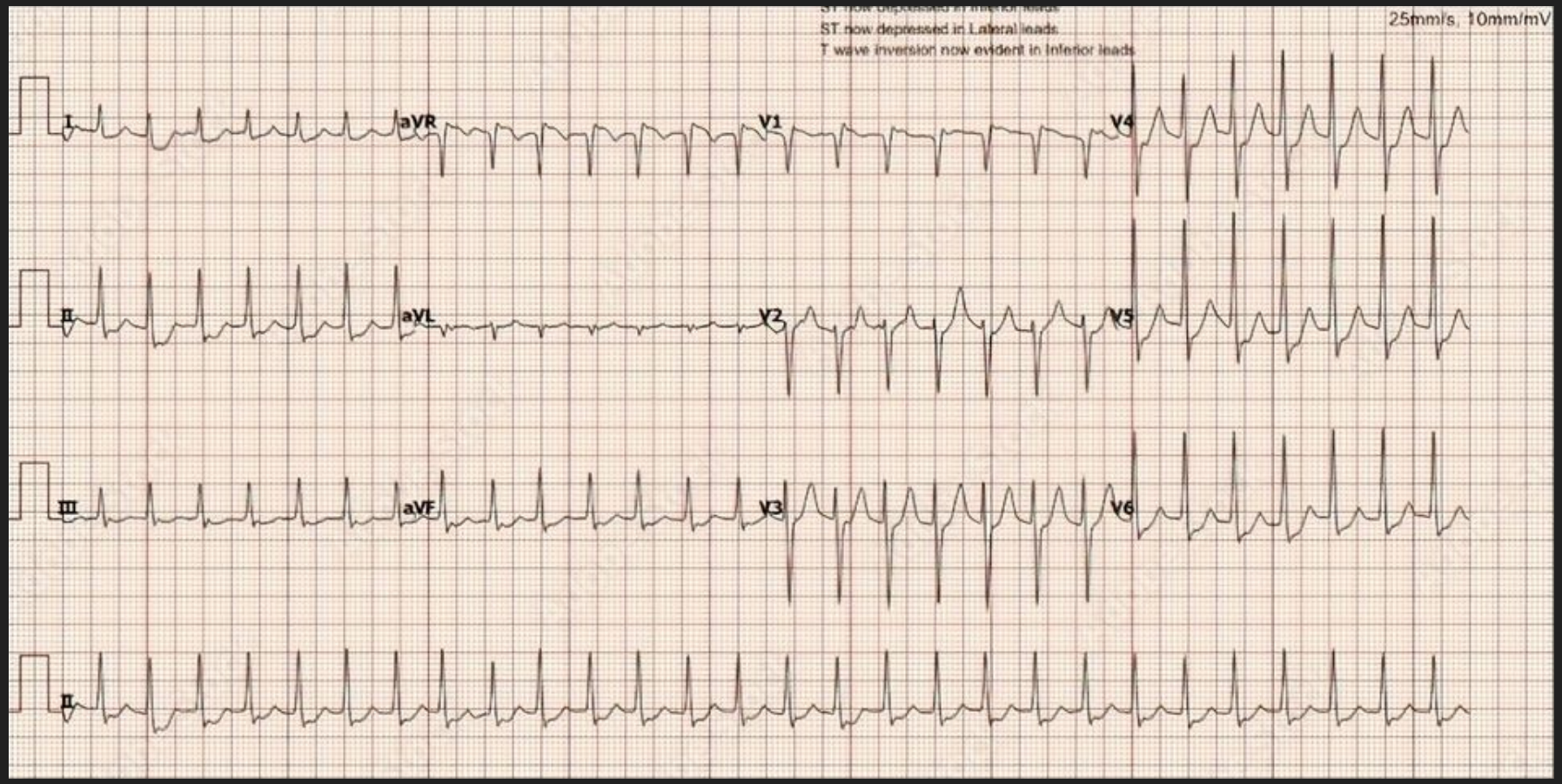
Practice EKG 1



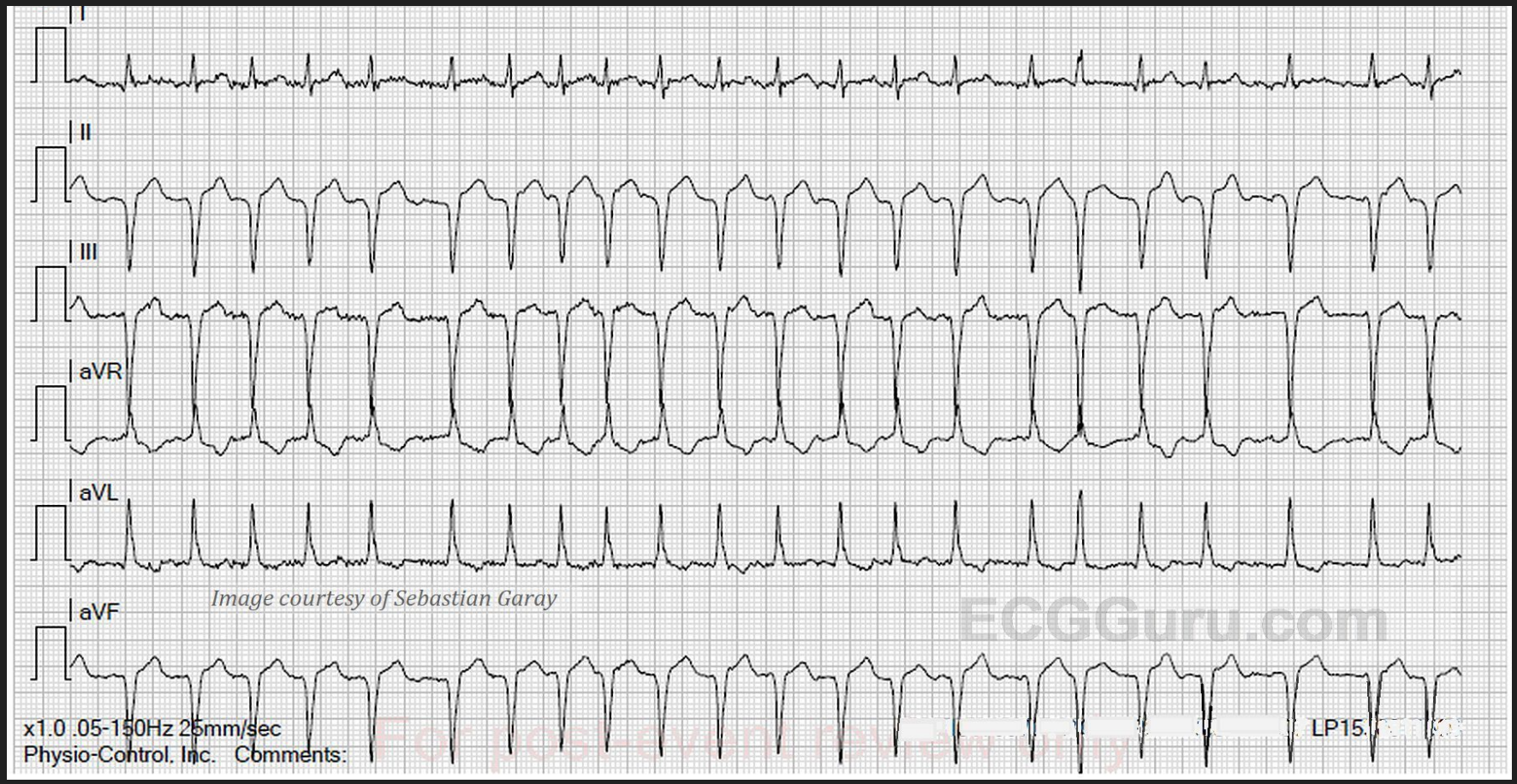
Practice EKG 2



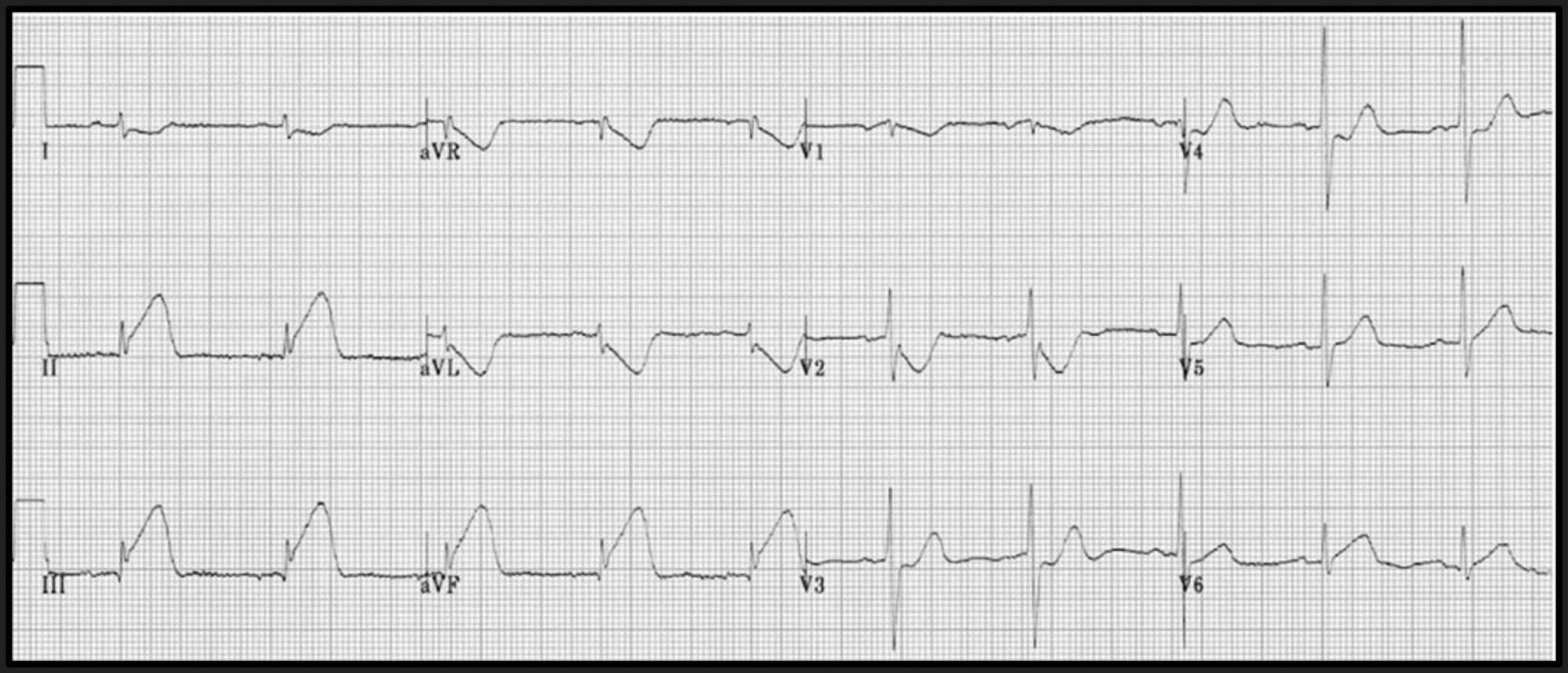
Practice EKG 3



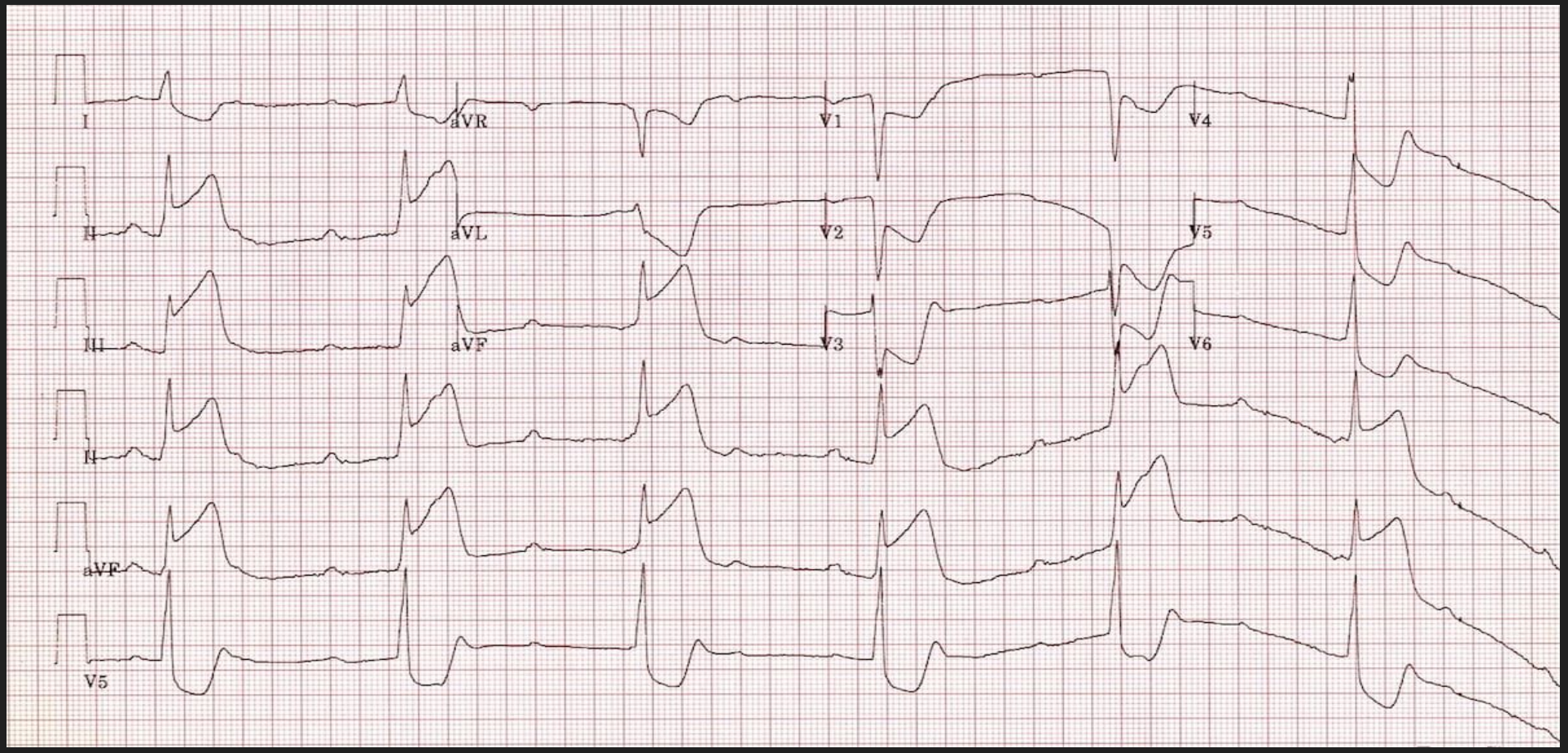
Practice EKG 4



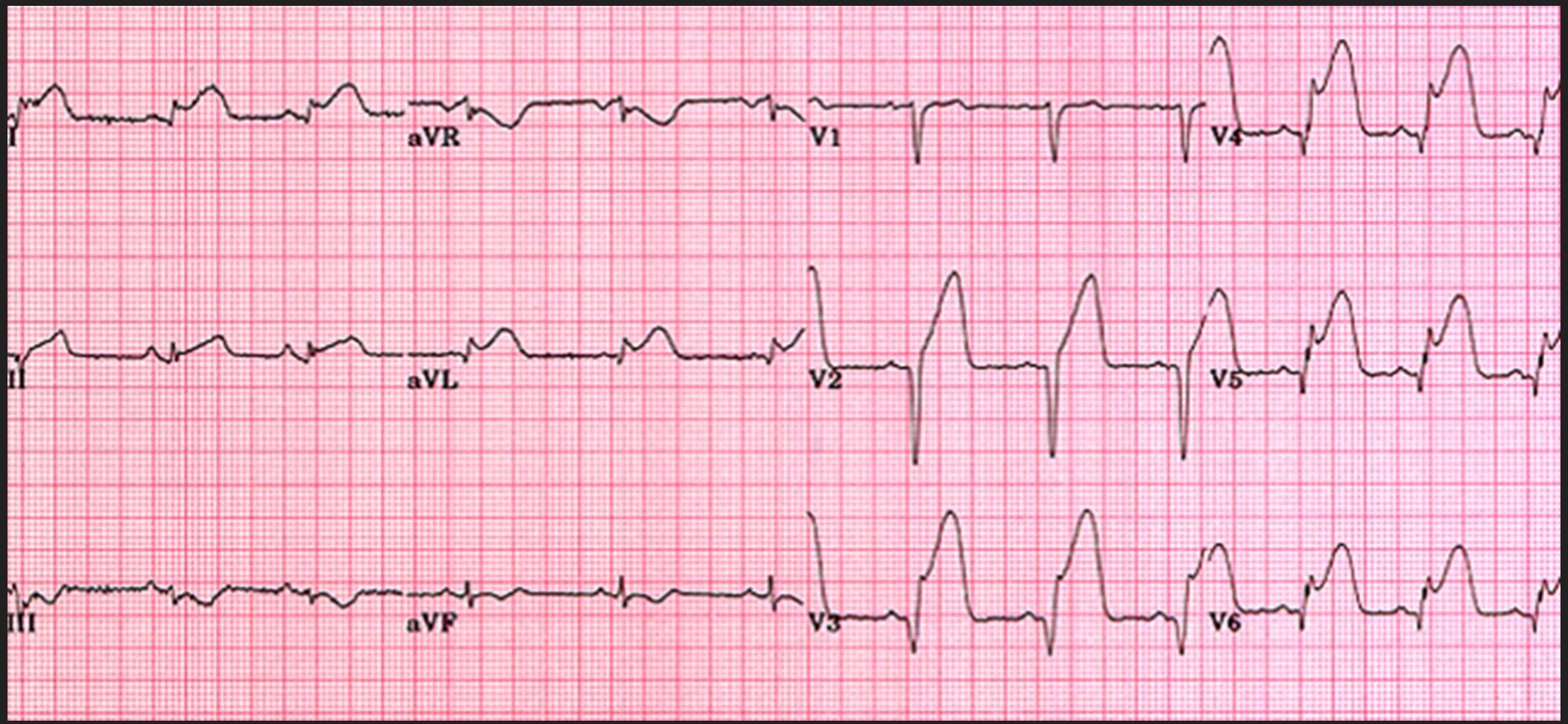
Practice EKG 5



Practice EKG 6



Practice EKG 7



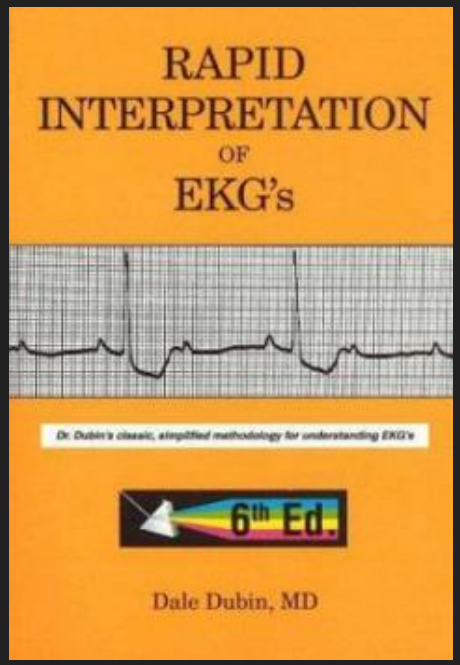
Summary

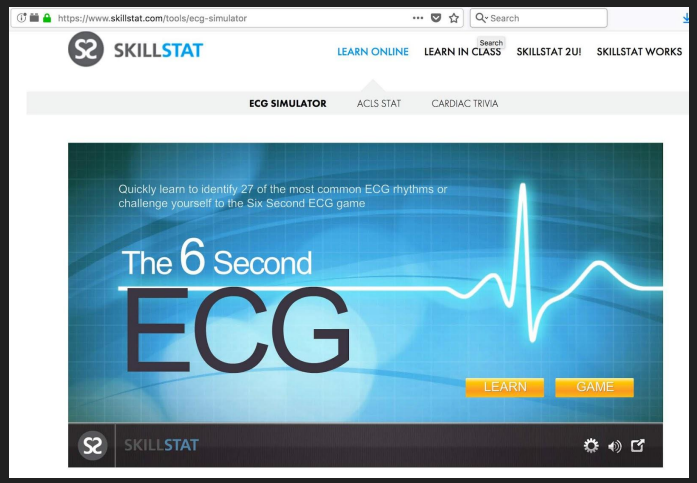
- Be systematic
- Use the right data
- Practice!

EMS 12-Lead

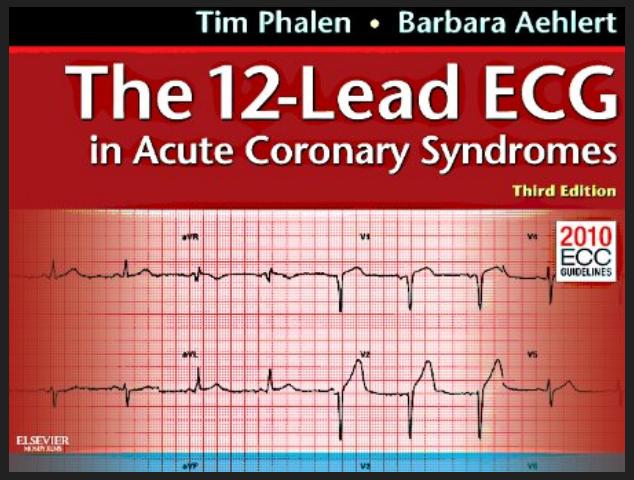
Dr. Smith's *ECG Blog*

Instructive ECGs in Emergency Medicine Clinical Content





LIFE IN THE FASTLANE



ECG Wave-Maven

Self-Assessment Program for Students and Clinicians

References

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