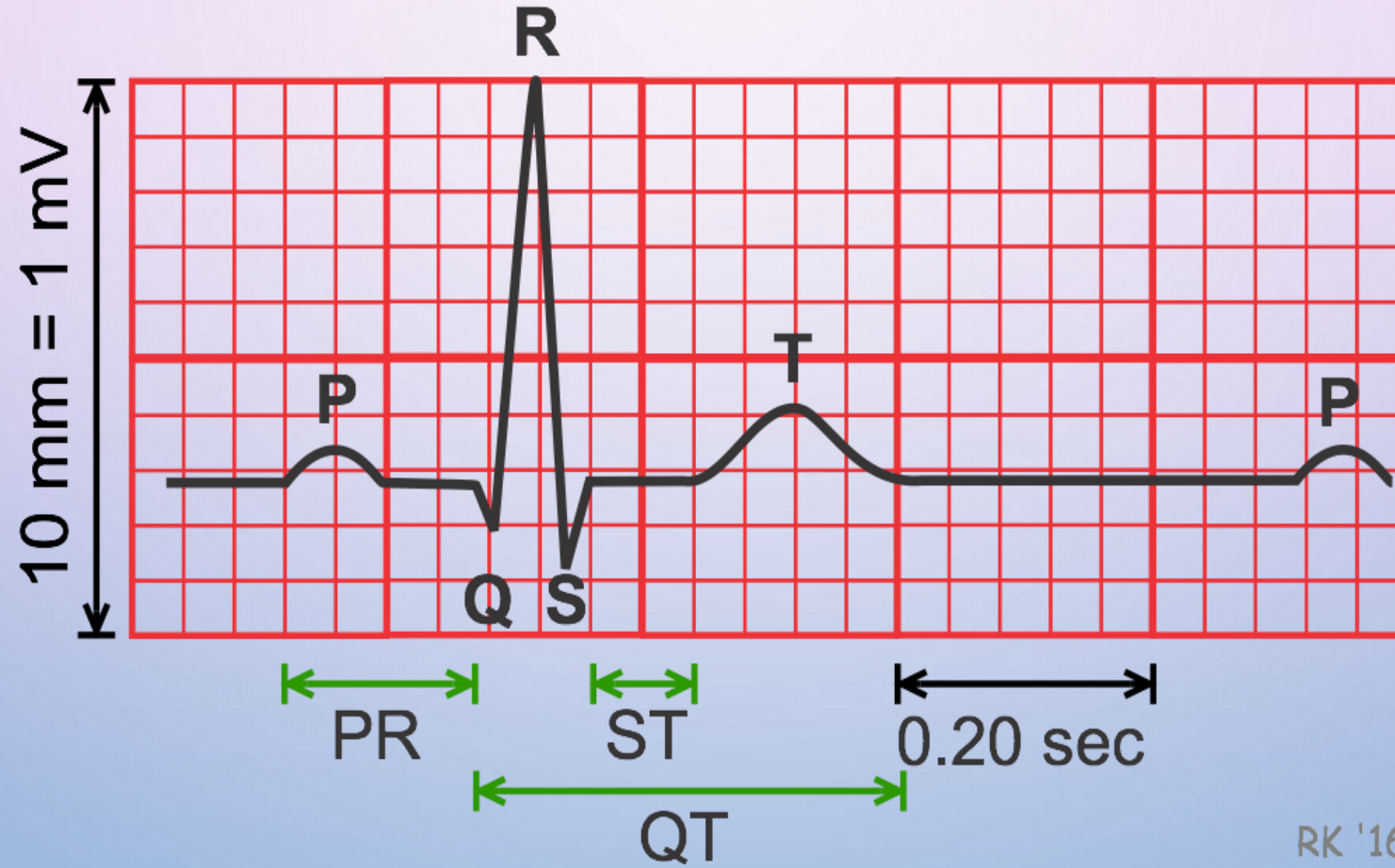
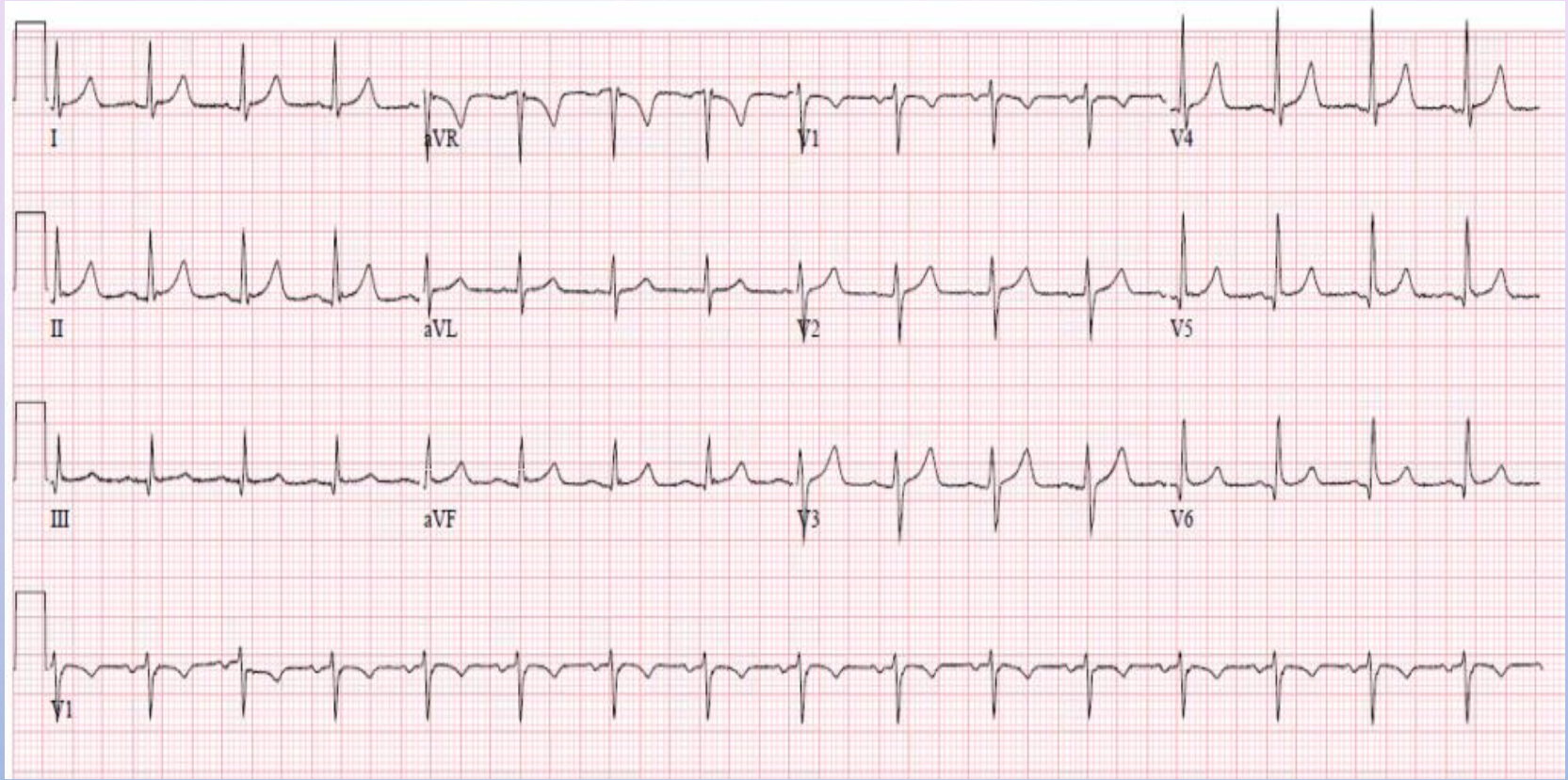


Myocardial infarction and other ischemic states

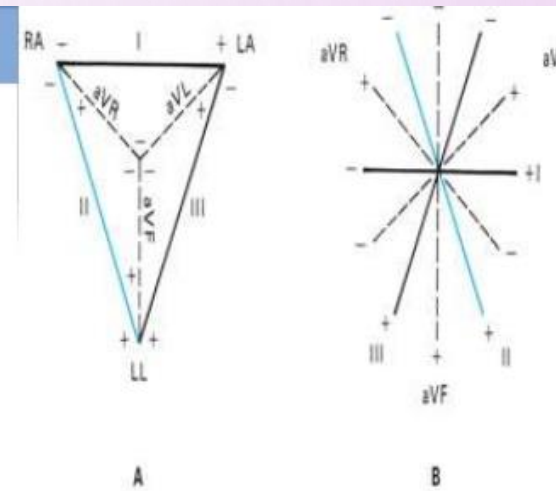
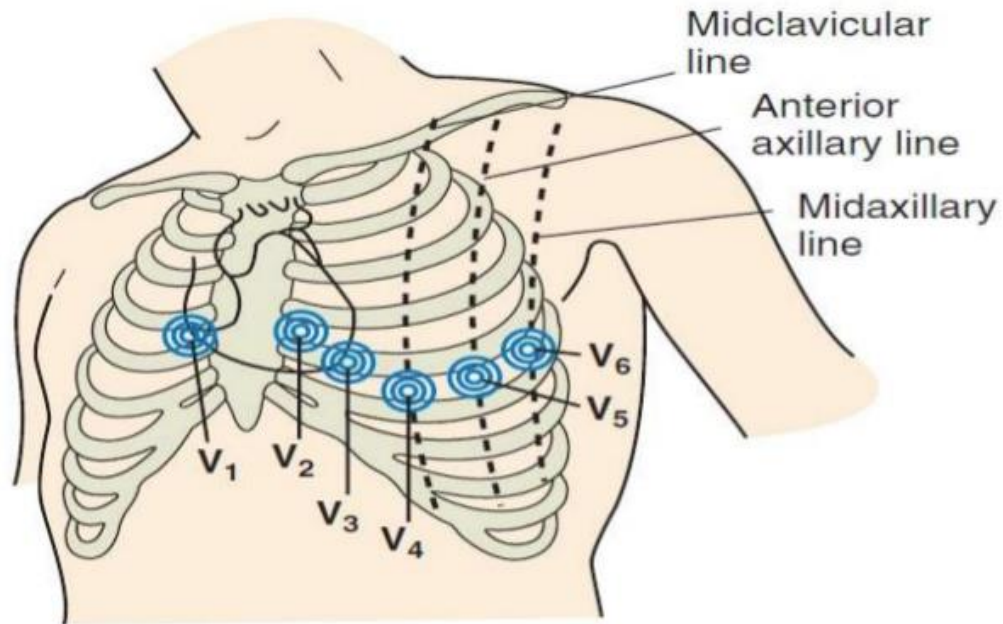
Dr. S. Nik Farjam
Interventional cardiologist
GUMS

NORMAL ECG



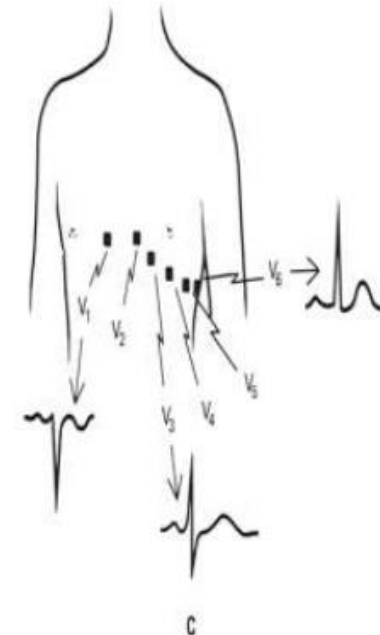


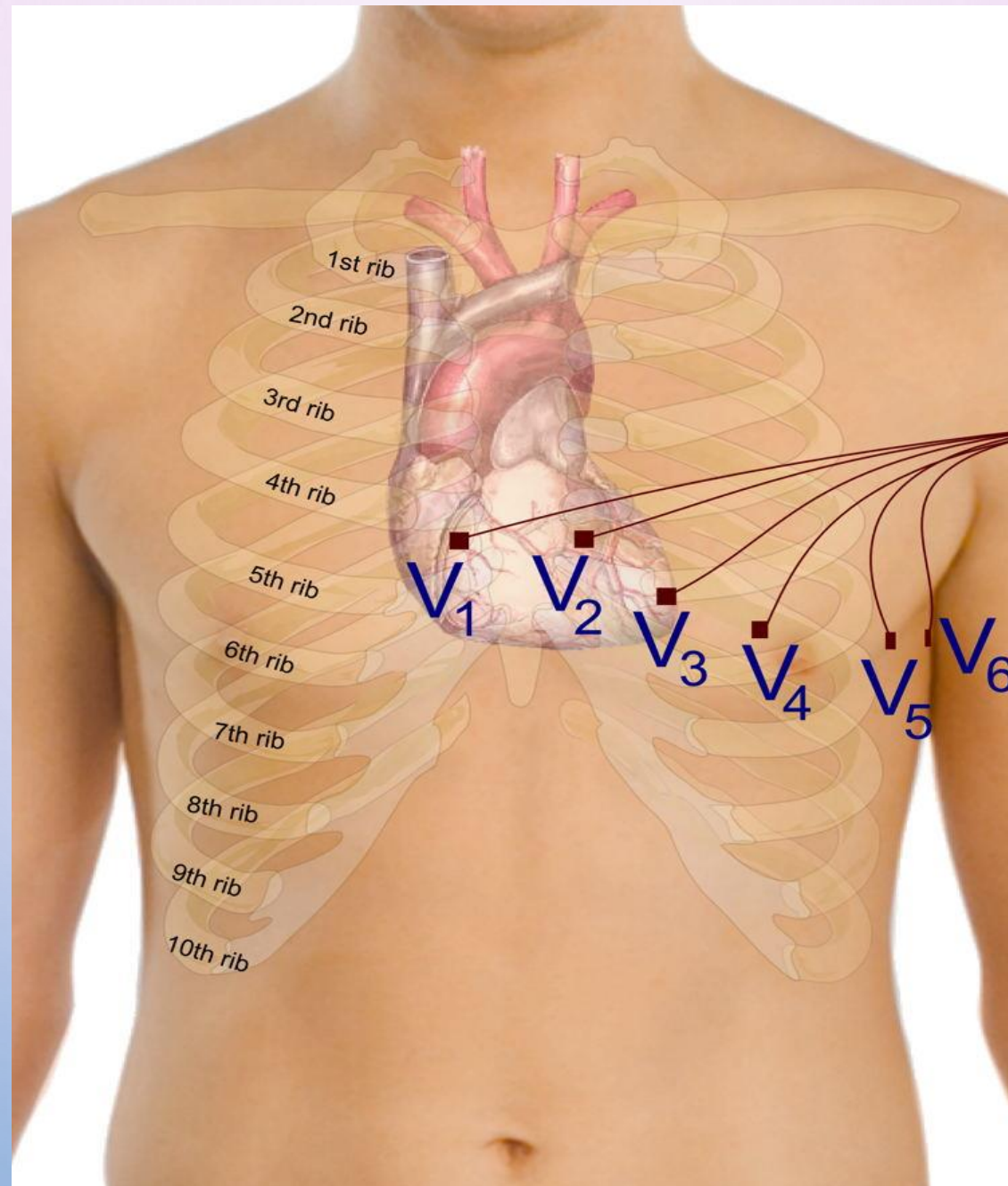
Standard Chest Lead Electrode Placement



Elements of Chest Leads

Lead	Positive Electrode Placement	View of Heart
V ₁	4th Intercostal space to right of sternum	Septum
V ₂	4th Intercostal space to left of sternum	Septum
V ₃	Directly between V ₂ and V ₄	Anterior
V ₄	5th Intercostal space at left midclavicular line	Anterior
V ₅	Level with V ₄ at left anterior axillary line	Lateral
V ₆	Level with V ₅ at left midaxillary line	Lateral



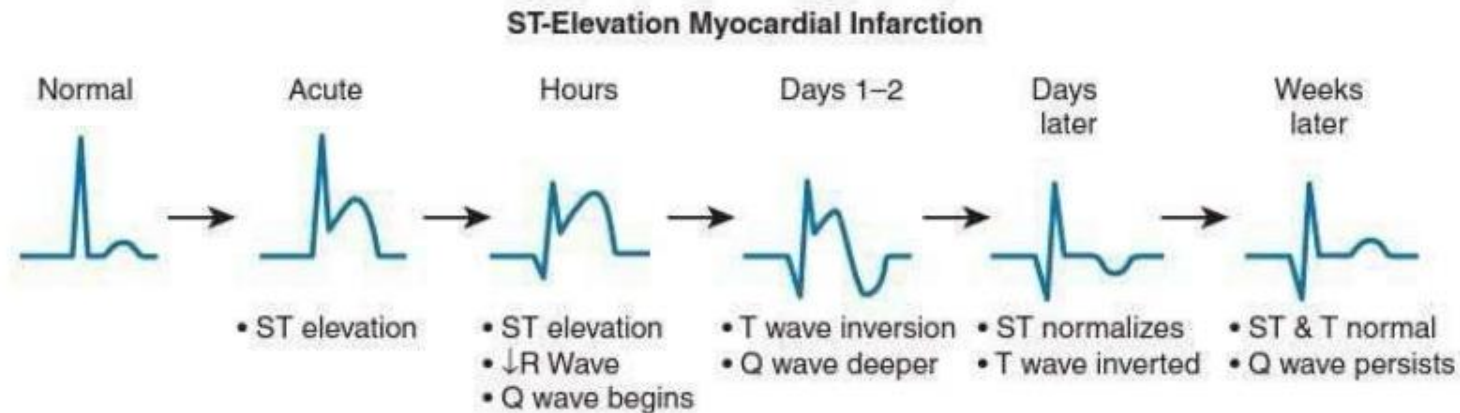


Characteristic Changes in AMI

- ▶ ST segment elevation over area of damage
- ▶ ST depression in leads opposite infarction
- ▶ Inverted T waves
- ▶ Pathological Q waves

ST Elevation MI

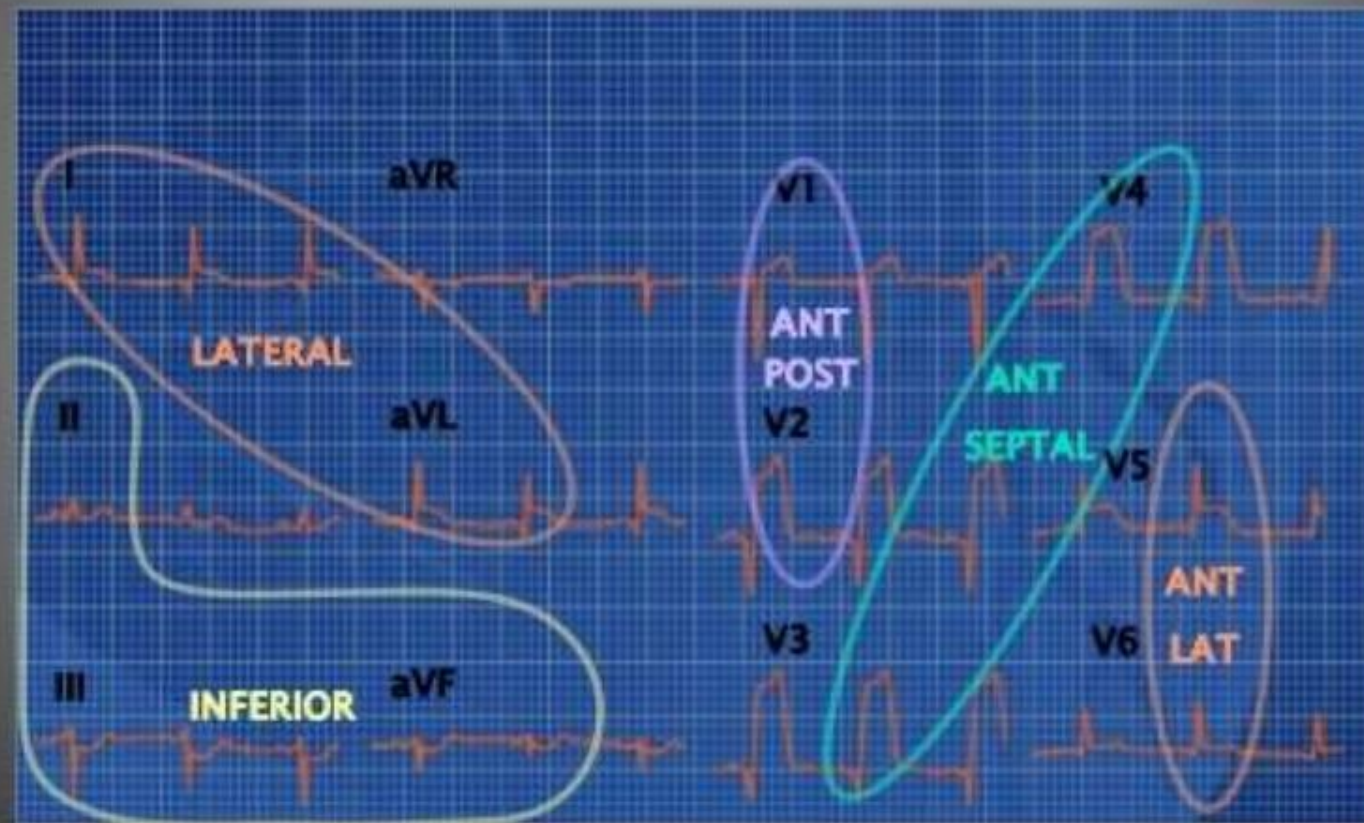
- ▶ Know what to look for–
 - ST elevation $> 1\text{ mm}$
 - 2 contiguous leads
- ▶ Know where to look–
 - I, AVL, V5, V6 – Lateral
 - V1 V2 V3 V4 – Anterior
 - II, III, AVF – Inferior



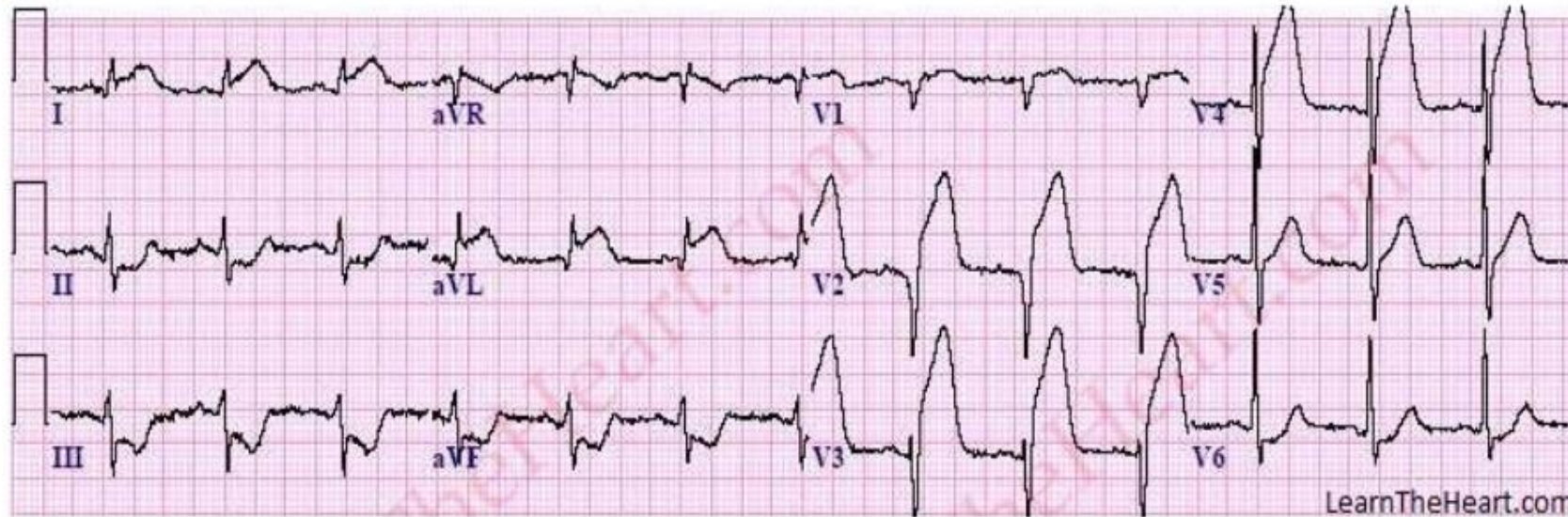
ECG evolution in non-reperfused myocardial infarction

Normal		
Peaked T wave		minutes
Progression of ST segment elevation		minutes - hours
Loss of R wave, Q wave formation		hours - days
T wave inversion		days
T wave normalisation persisting Q wave		days - weeks - months

Location of infarct combinations



Anterior Wall ST Elevation MI



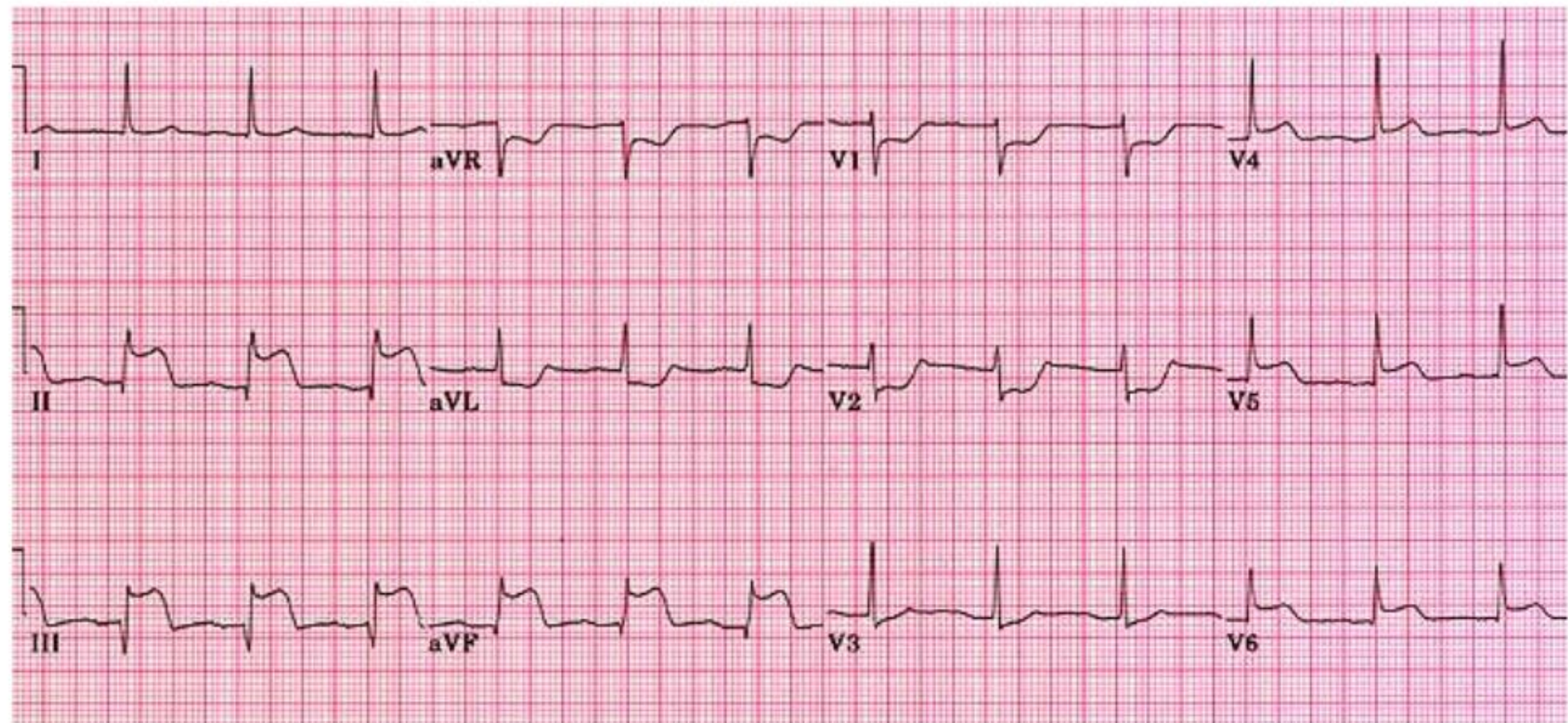
ECG Findings:

- ▶ 1. ST segment elevation in the anterior leads at the J point and sometimes in septal or lateral leads depending on the extent of the myocardial infarction.
- ▶ 2. Reciprocal ST segment depression in the inferior leads (II, III and aVF).

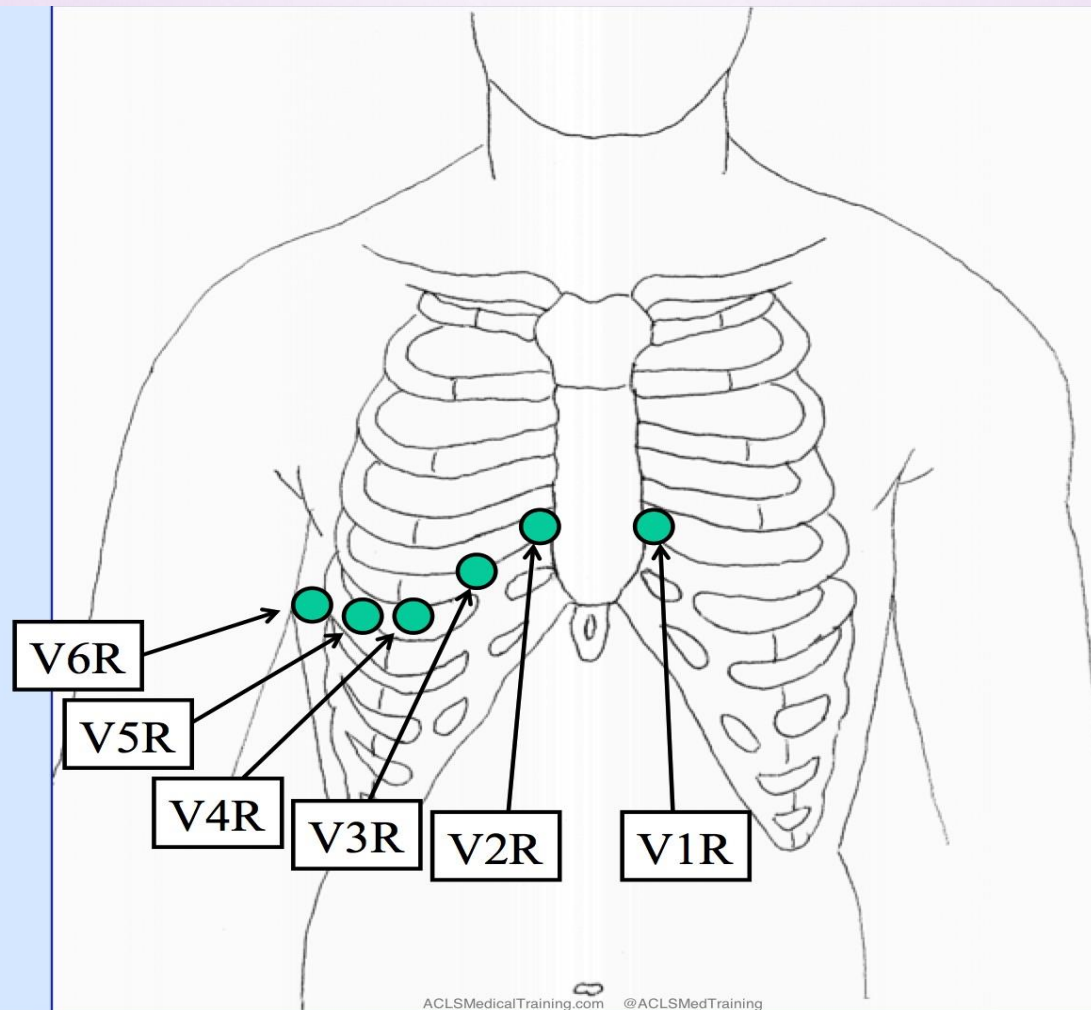
Inferior Wall ST Elevation MI

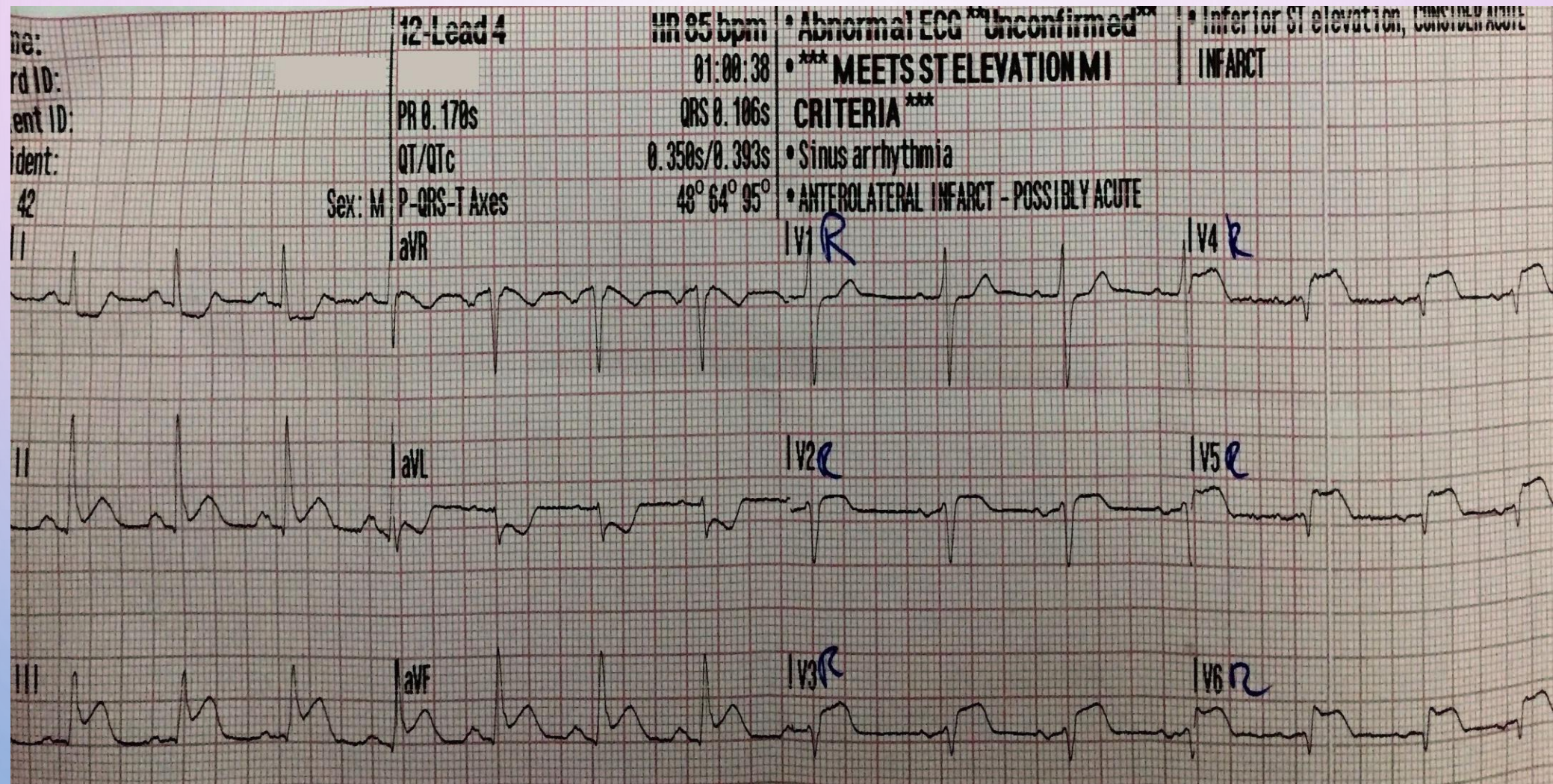
ECG findings:

- ▶ ST segment elevation in the inferior leads (II, III, and aVF)
- ▶ Reciprocal ST segment depression in the lateral and/or high lateral leads (I, aVL, V5 and V6)



RV MI

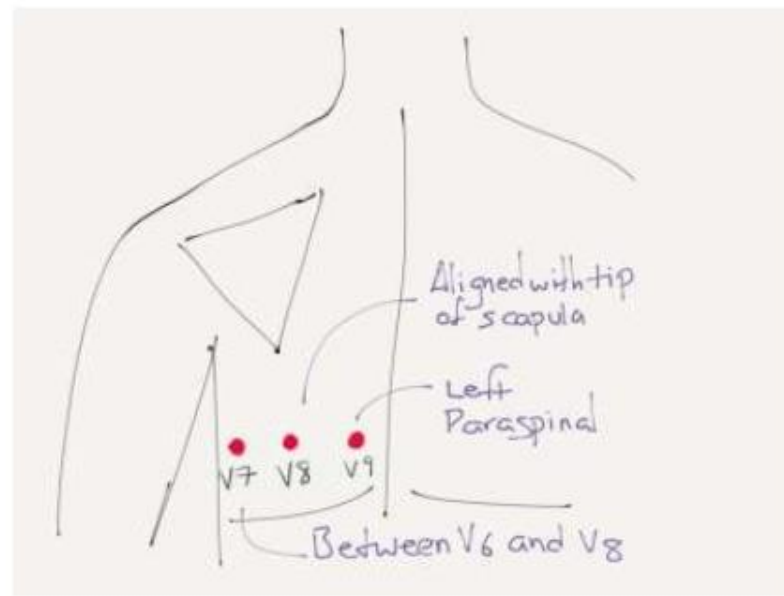
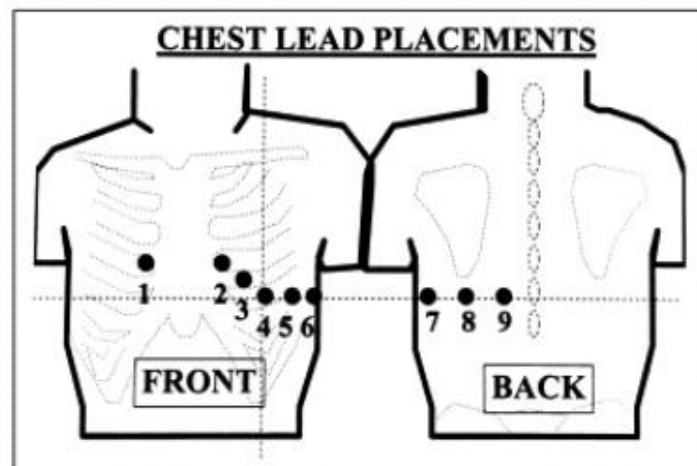
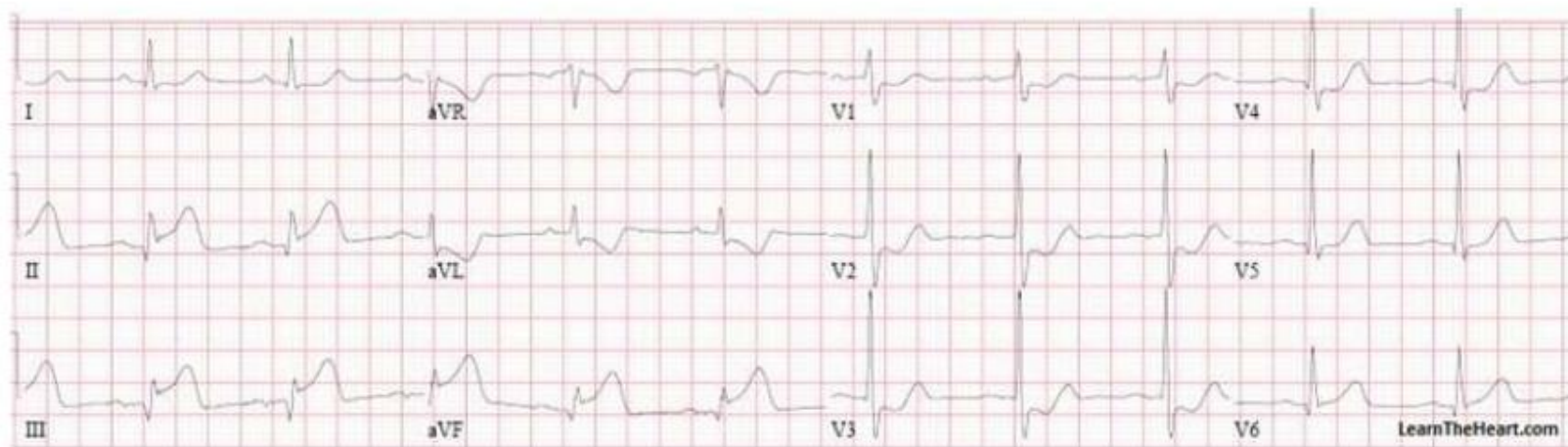




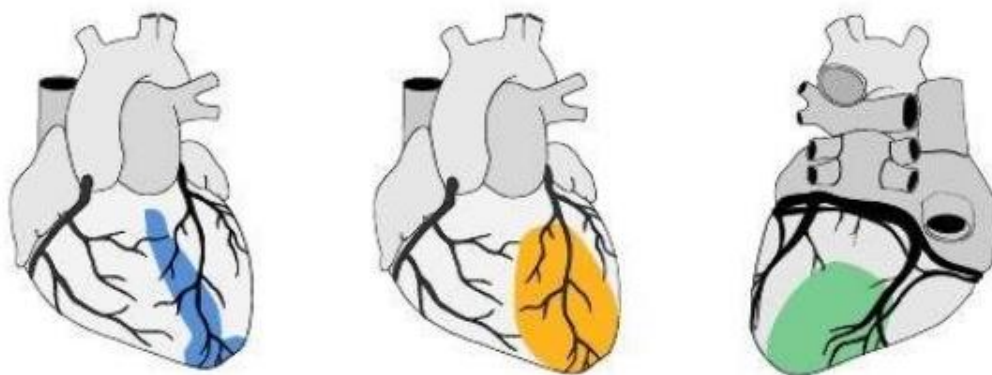
Posterior Wall MI ECG

ECG findings:

- ▶ ST segment depression in the septal and anterior precordial leads (V1 to V4).
- ▶ The ratio of the R wave to the S wave in leads V1 or V2 is > 1 .
- ▶ ST elevation in the posterior leads of a posterior ECG (leads V7 to V9).
- ▶ ST elevation in the inferior leads (II, III, and aVF) may be seen if an inferior MI is also present.



Localization



I	aVR	V1	V4
II	aVL	V2	V5
III	aVF	V3	V6

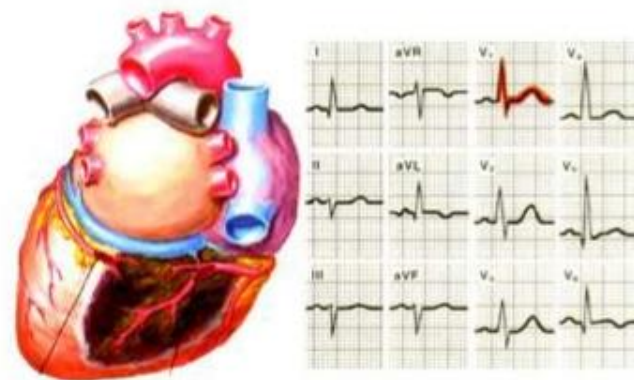
Inferior: II, III, AVF

Septal: V1, V2

Anterior: V3, V4

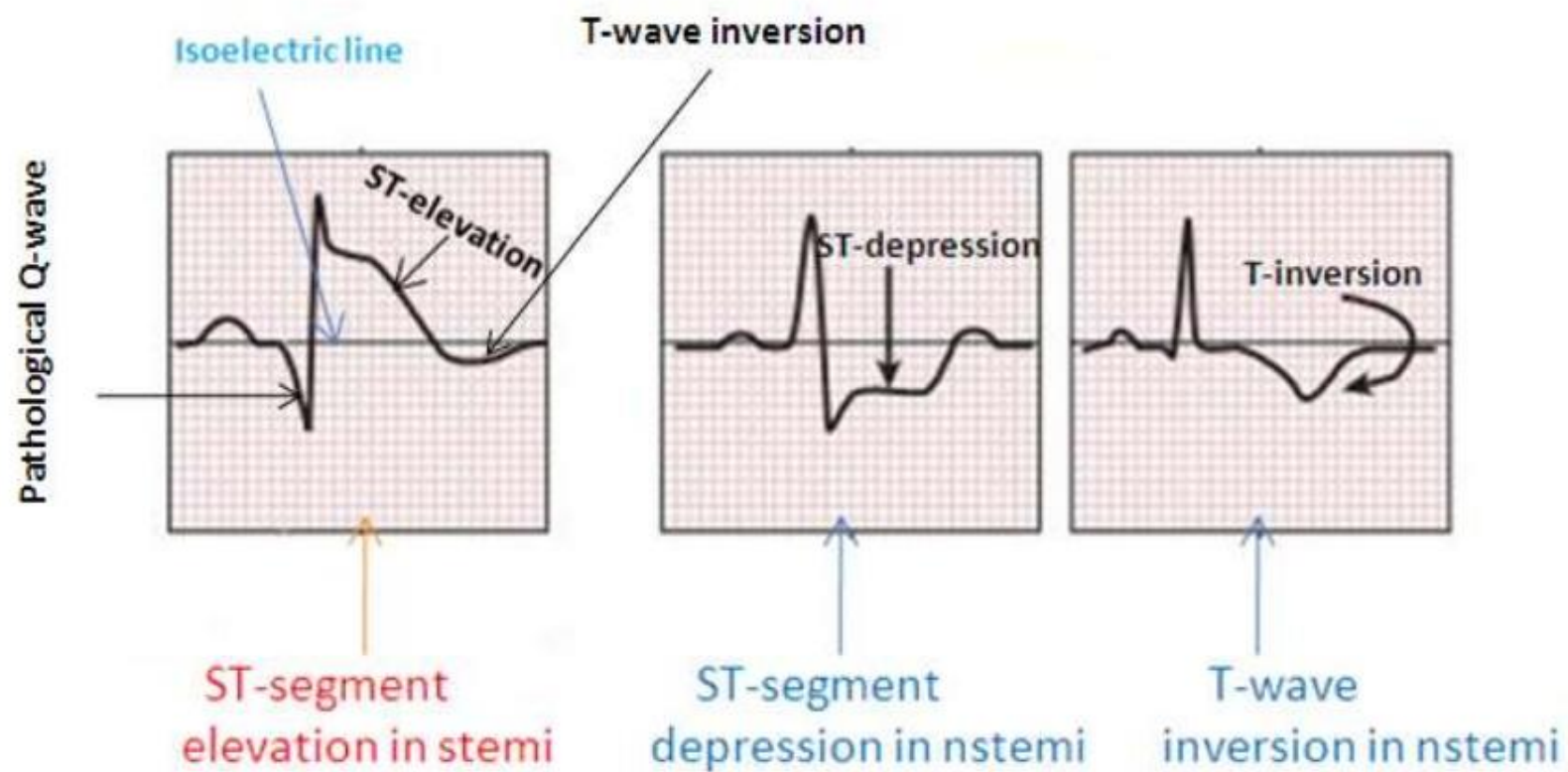
Lateral: I, AVL, V5, V6

Posterior MI



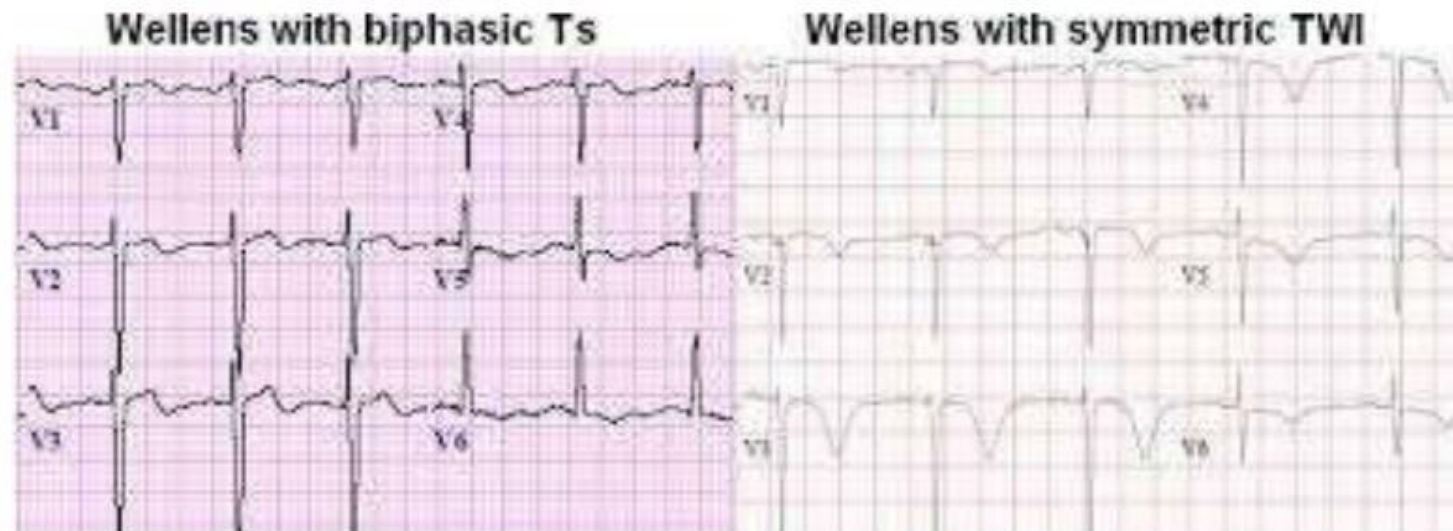
Non ST elevation MI

- ▶ ECG features can be any of the following:
 - ▶ 1. ST depression (70–80% sensitivity)
 - ▶ 2. T wave inversion (10–20% sensitivity)
 - ▶ 3. Both ST depression and T wave inversion
 - ▶ 4. Normal ECG



Wellens' Syndrome

- ▶ Wellens' syndrome (or sign) is a pattern of deeply inverted or biphasic T waves in V2-3, which is highly specific for a critical stenosis of the left anterior descending artery (LAD).
- ▶ ***Subacute LAD occlusion** (within the next week)



De Winter ST/T waves



De Winter ST/T-Waves



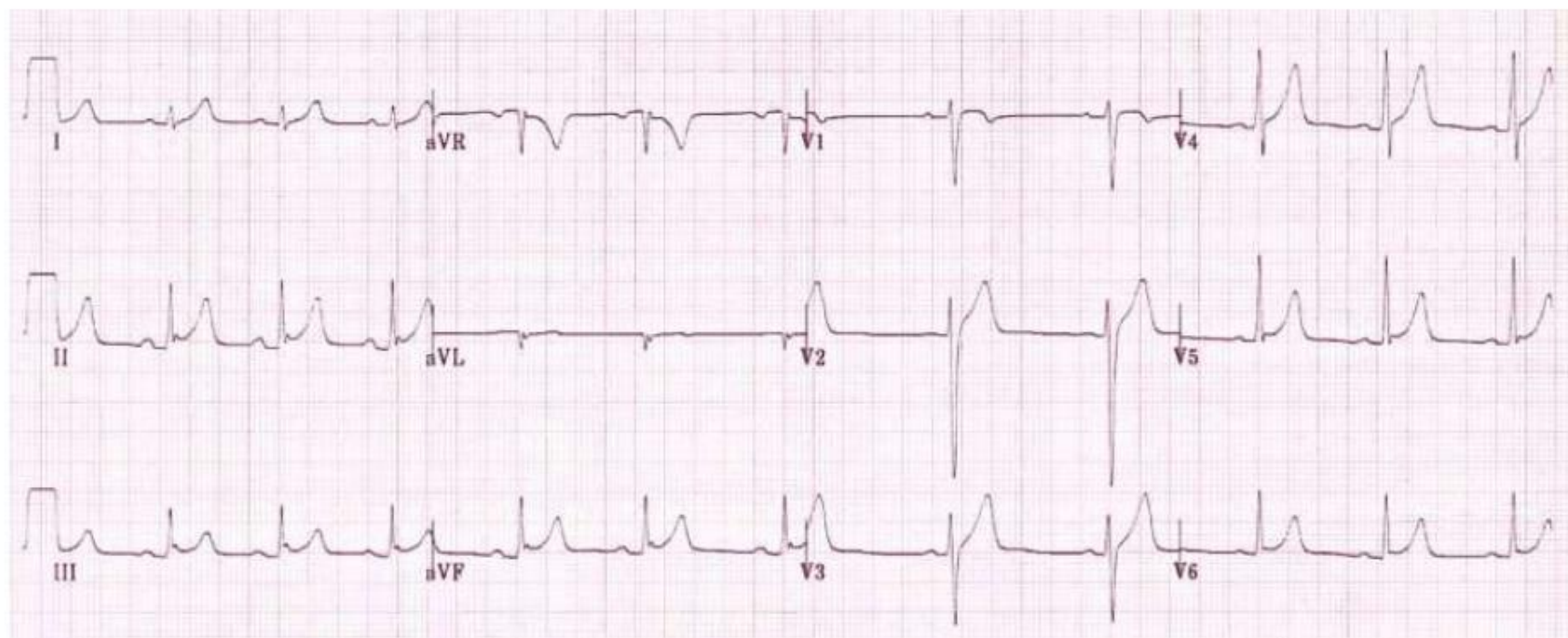
@ECGTraining

ECGMedicalTraining.com

- ▶ ECG abnormality described by de Winter et al. in 1998
- ▶ Suspicious for **Acute LAD occlusion**
- ▶ Characterized by 1–3 mm of ST–depression with upright, symmetrical T–waves

Benign Early Repolarization

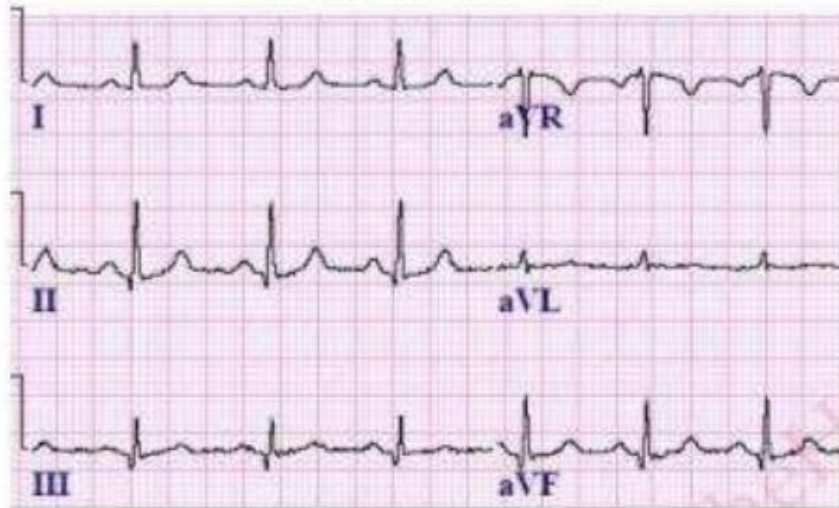
- ▶ Widespread concave ST elevation.
- ▶ Notching or slurring at the J-point.
- ▶ Prominent, slightly asymmetrical T-waves that are concordant with the QRS complexes
- ▶ No reciprocal ST depression to suggest STEMI (except in aVR).
- ▶ ST changes are relatively stable over time (no progression on serial ECG tracings).



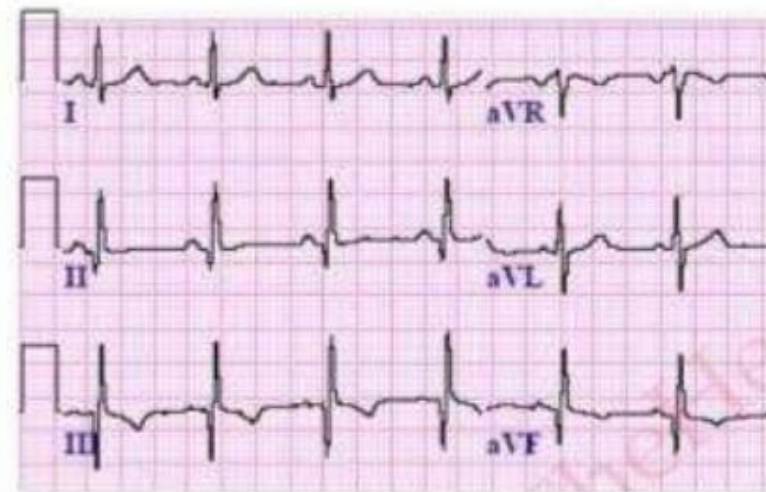
ECG in Chronic MI

- ▶ Pathologic Q waves tend to be deeper and wider, and as with ST/T wave changes should be seen in at least 2 contiguous (neighbouring) leads.

Normal Q waves

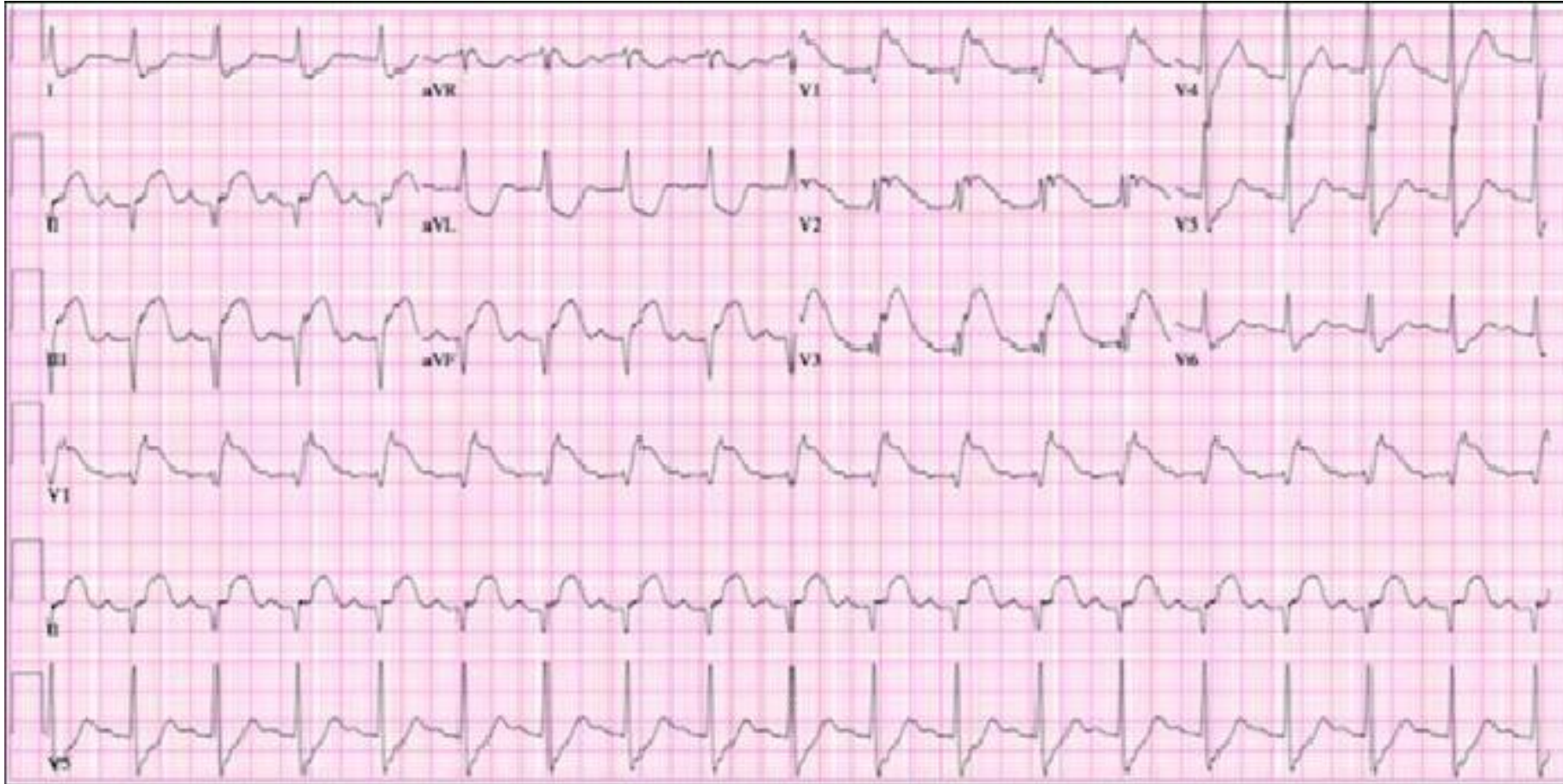


Pathologic Q waves

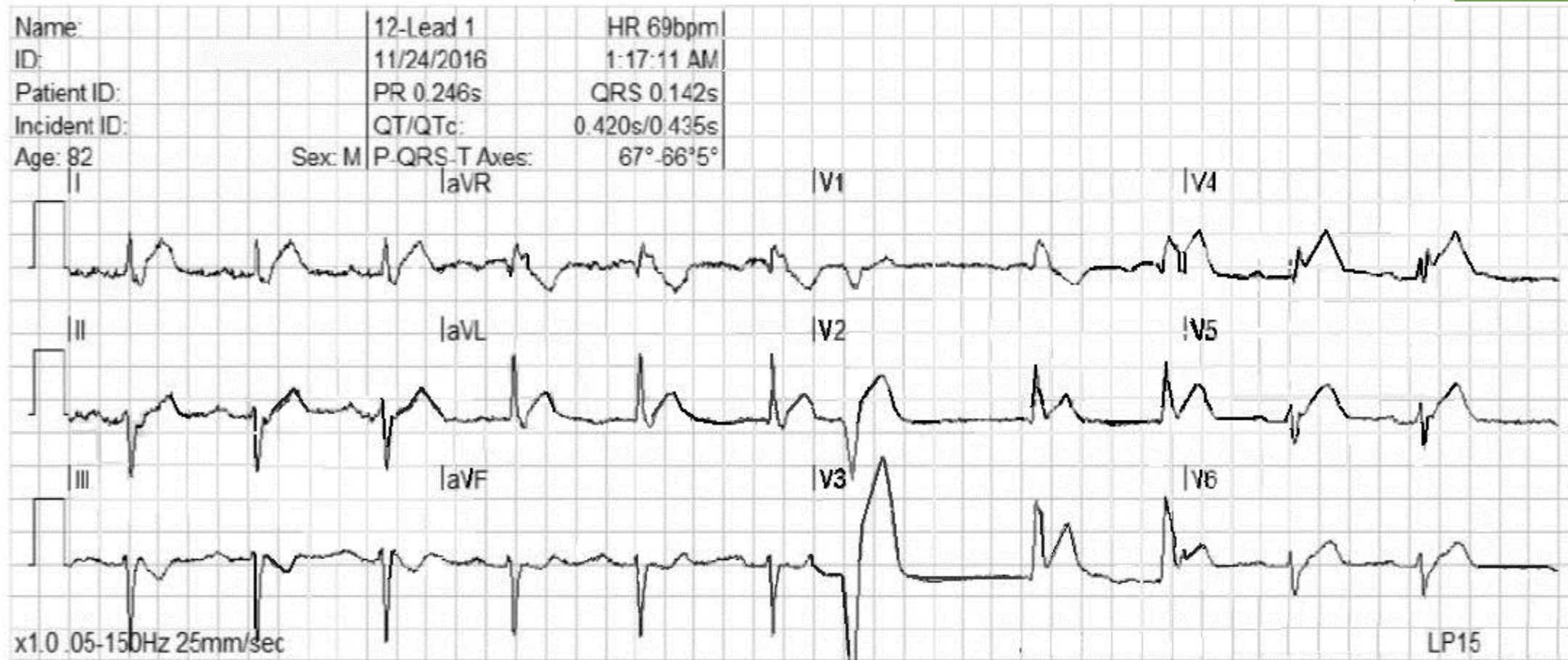


Cardiac arrhythmias in the emergency settings of acute coronary syndrome

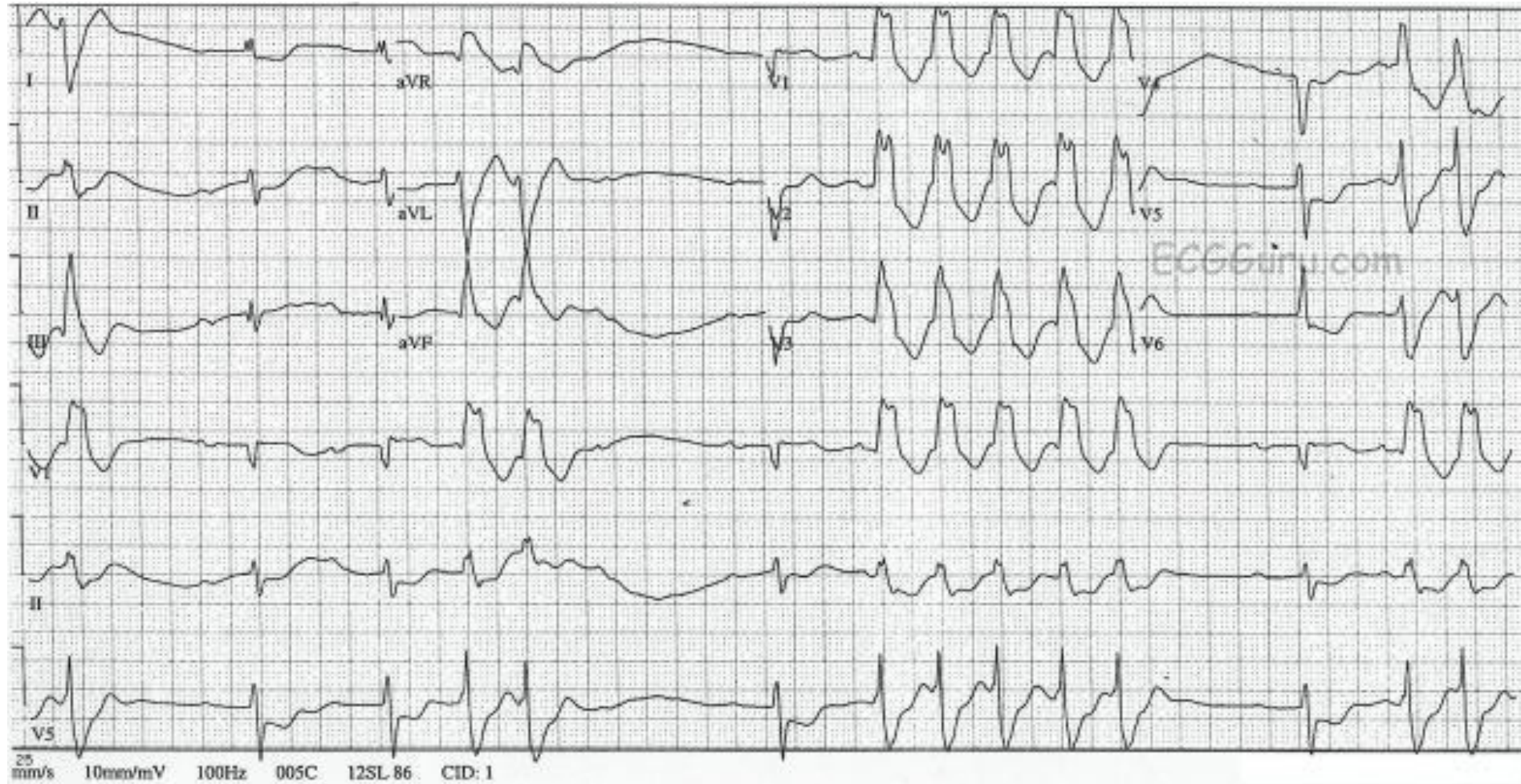
➤ Sinus tachycardia



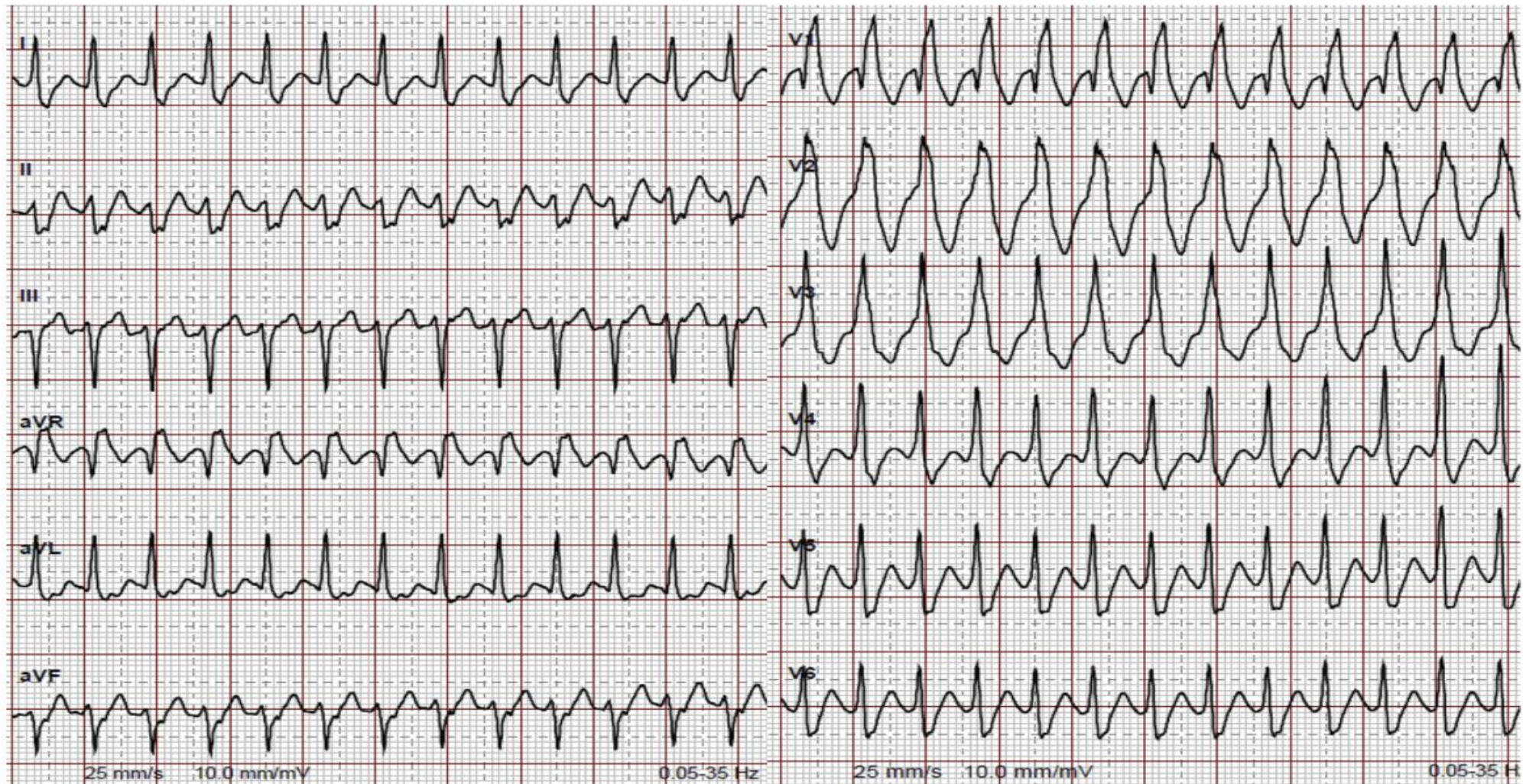
► ventricular premature beats



► non-sustained monomorphic ventricular tachycardia



► sustained monomorphic ventricular tachycardia



► Polymorphic ventricular tachycardia



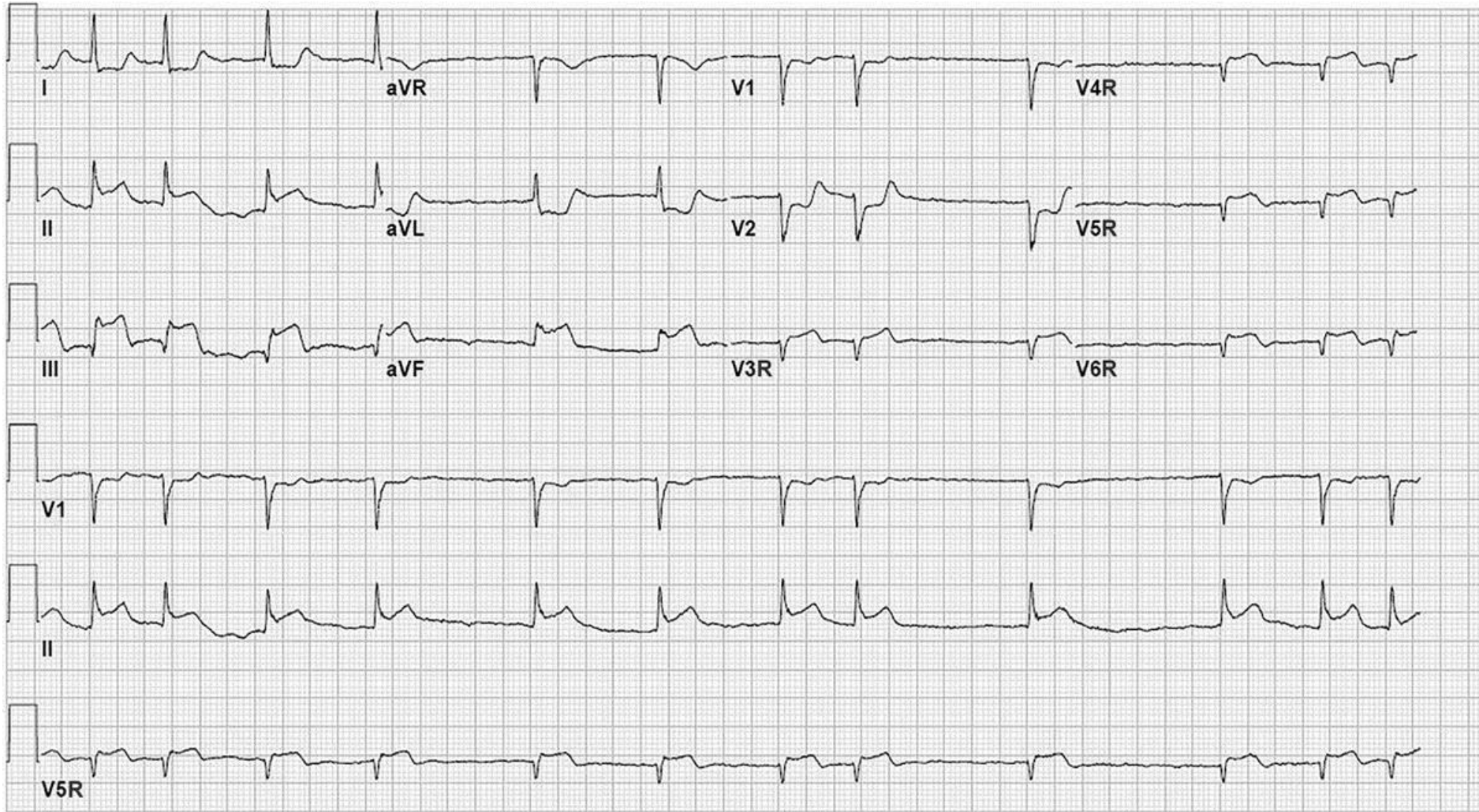
► ventricular fibrillation



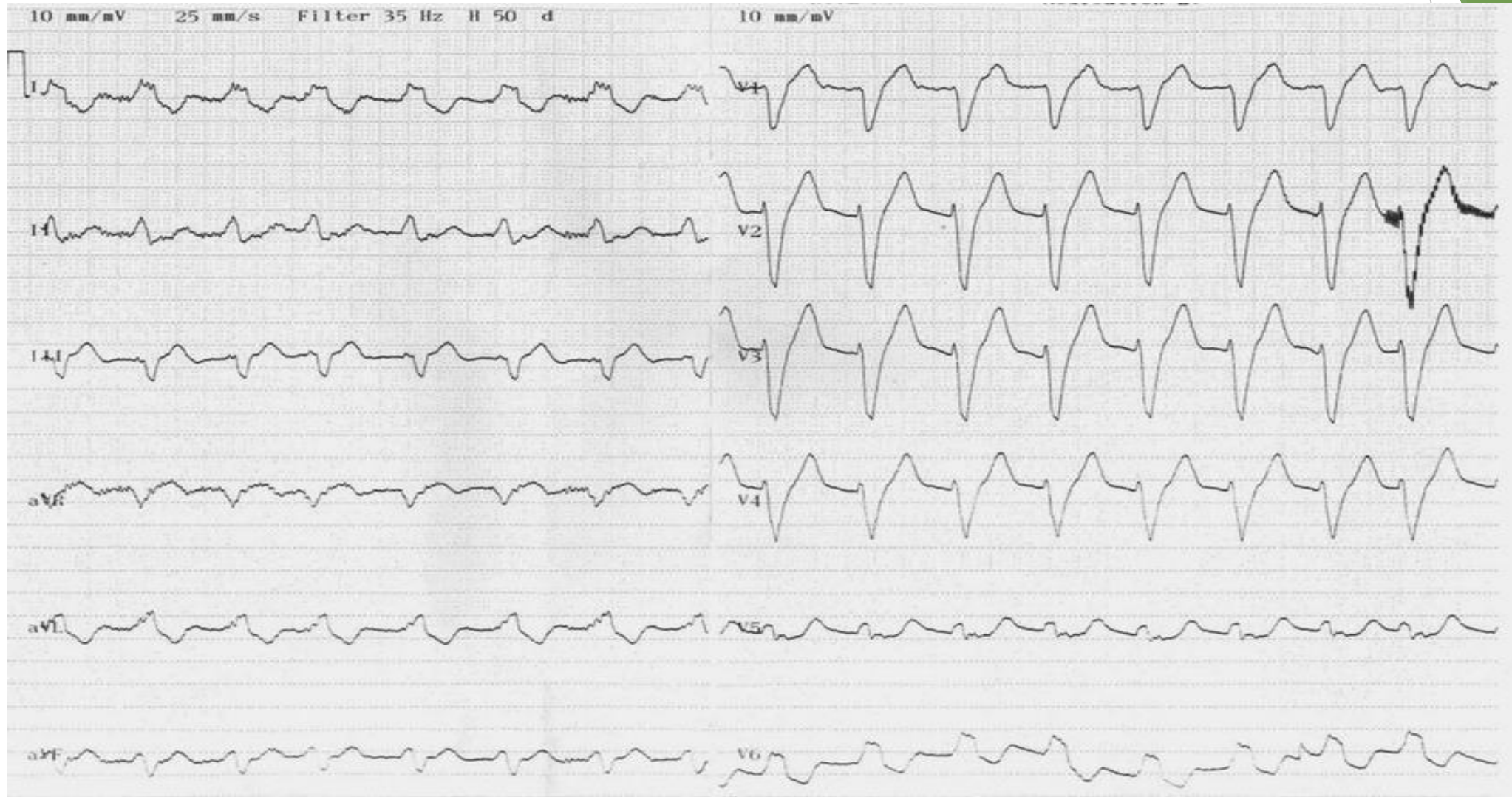
Correction of electrolyte imbalances (hypokalaemia and hypomagnesaemia) is recommended in patients with VT and/or VF.		1,63
Intravenous beta-blockers and/or amiodarone treatment is indicated for patients with recurrent polymorphic VT and/or VF unless contraindicated.		64
Electrical cardioversion/defibrillation is the intervention of choice to promptly terminate life-threatening Vas.		65
Prompt and complete (even staged) revascularization is recommended to treat myocardial ischaemia presenting with recurrent VT/VF.		66,67
Intravenous lidocaine can be considered (as second choice) for recurrent VAs with haemodynamic intolerance not controlled by amiodarone, beta-blockers, or repetitive electrical cardioversion.		61
Overdrive pacing should be considered if VT is frequently recurrent despite anti-arrhythmic therapy and cannot be controlled by repetitive electrical cardioversion.		68,69
In hemodynamically unstable patients with refractory VAs a percutaneous LVAD (Impella, TandemHeart, or extracorporeal life support) may be considered.		69,70
In patients with recurrent life-threatening VAs sedation (preferably with benzodiazepines) or general anaesthesia to reduce sympathetic drive should be considered.		60
Early administration of iv beta-blockers at the time of presentation should be considered in haemodynamically stable patients. ^a		69,71
Asymptomatic, non-sustained and hemodynamically well tolerated VAs should not be treated with anti-arrhythmic drugs before reperfusion ('wait and see').		1
Prophylactic treatment with anti-arrhythmic drugs, with the exception of beta-blockers, is not recommended.		72,73

a Intravenous beta-blockers must be avoided in patients with hypotension, acute heart failure or AV block, or severe bradycardia.
ACE-I, angiotensin-converting-enzyme inhibitors; ARB, angiotensin II receptor blocker; iv, intravenous; LVAD, left ventricular assist device; VA, ventricular arrhythmia; VF, ventricular fibrillation; VT, ventricular tachycardia.

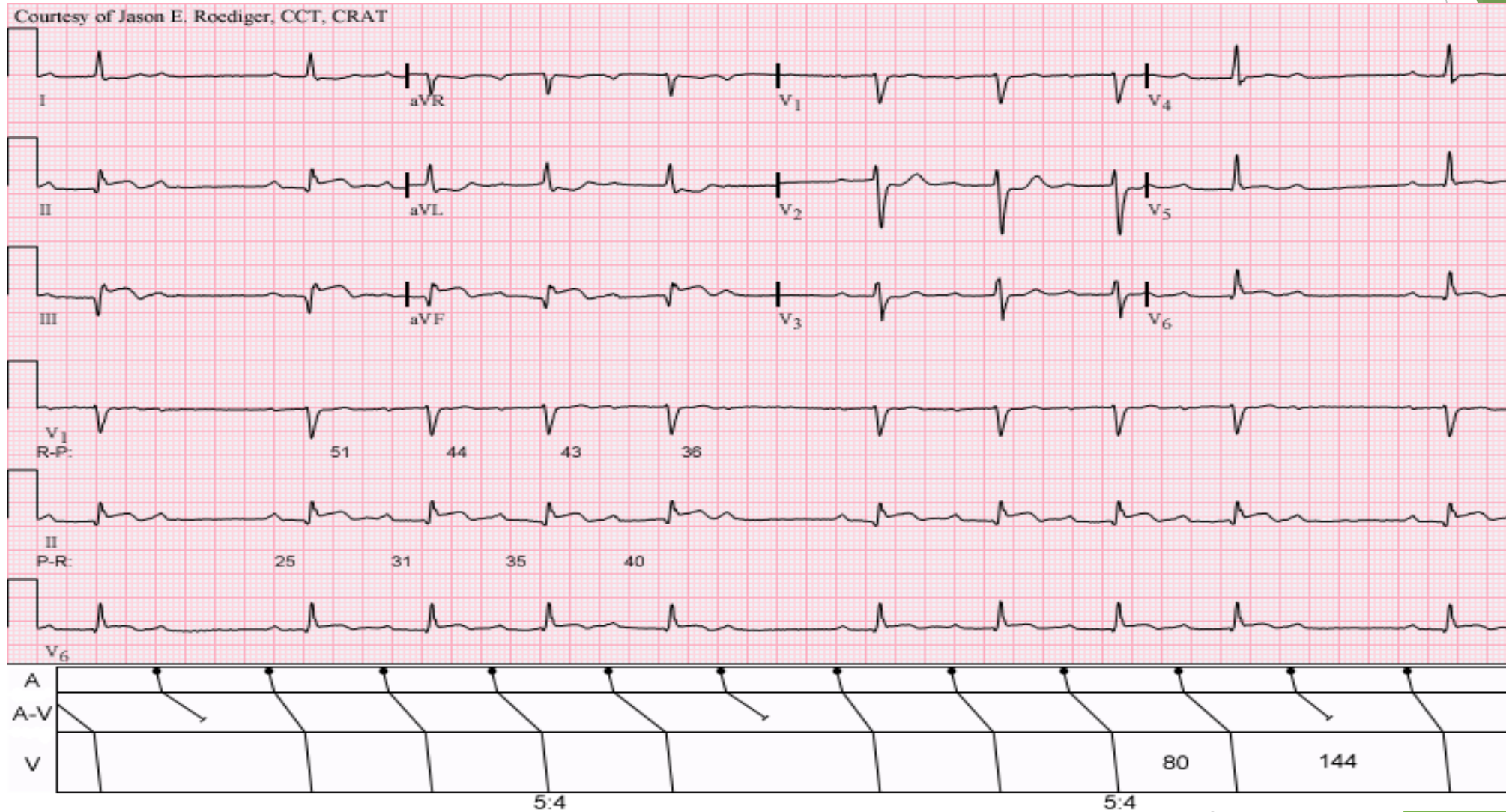
► Acute atrial fibrillation



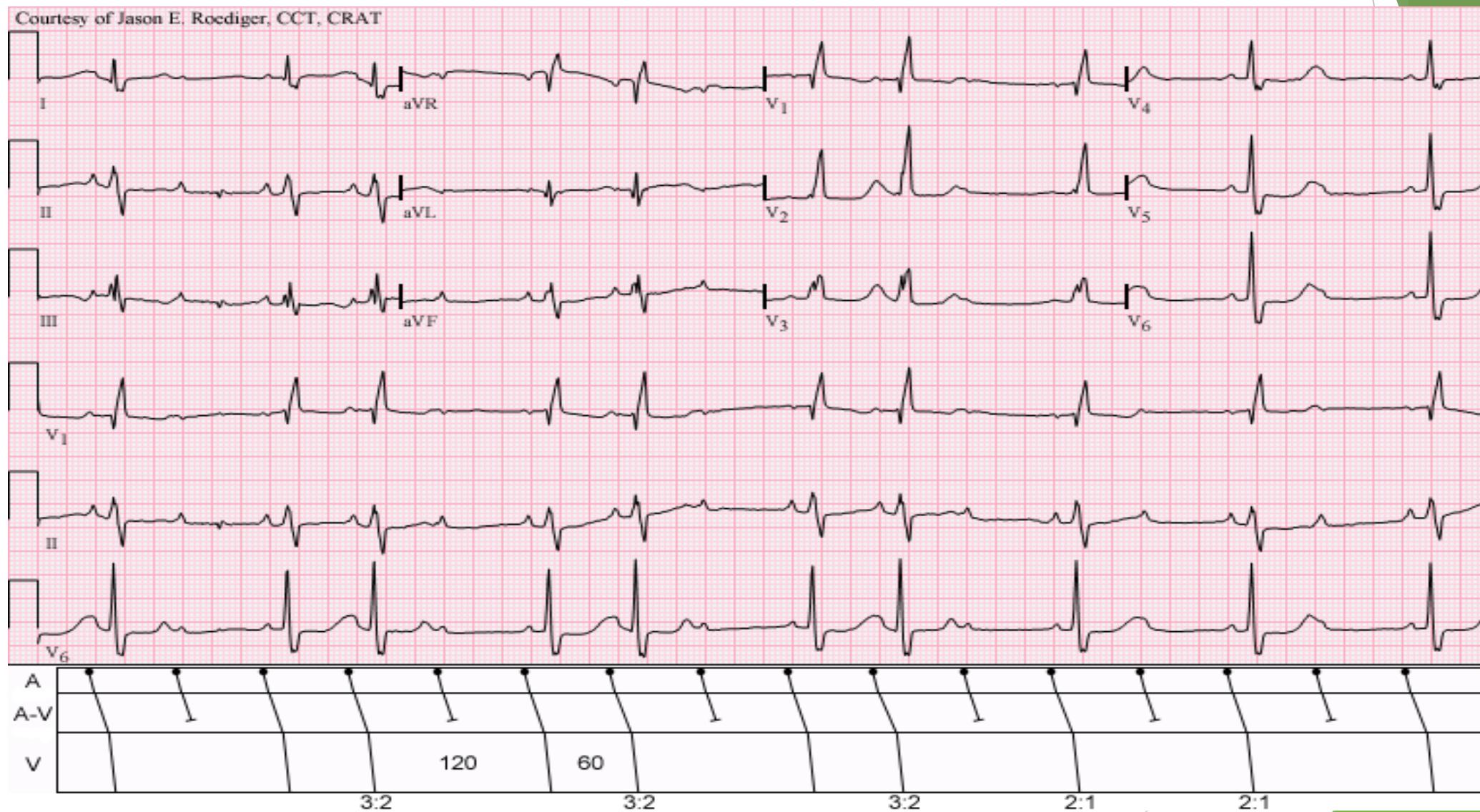
► accelerated idioventricular rhythm (AIVR)

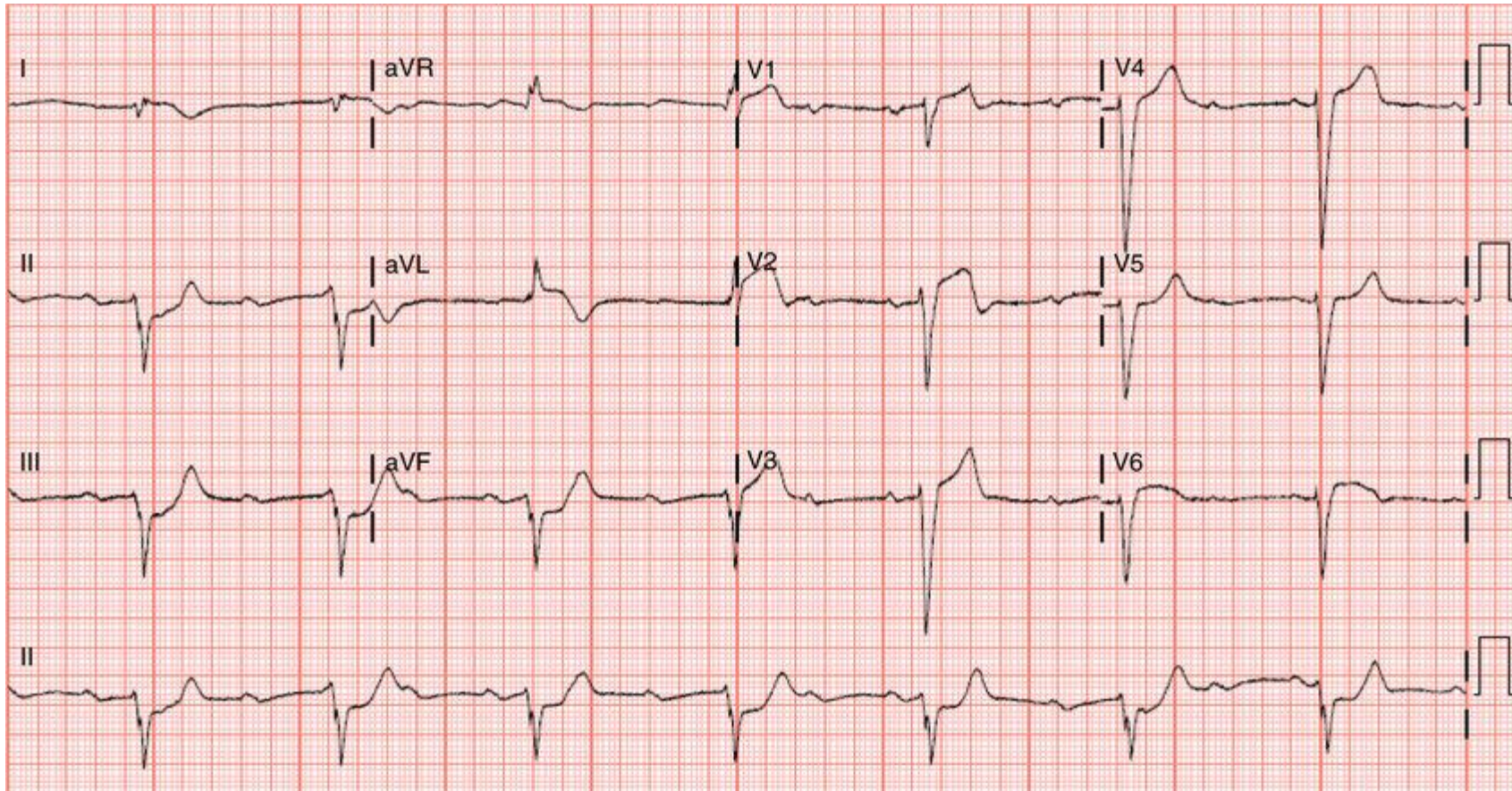


► Mobitz type 1 (Wenckebach)



► Mobitz type 2







THANK YOU