Electrocardiogram

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UNDER THE SUPERVISION OF:
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i. Anatomy of the heart.

ii. Blood flow through the heart.

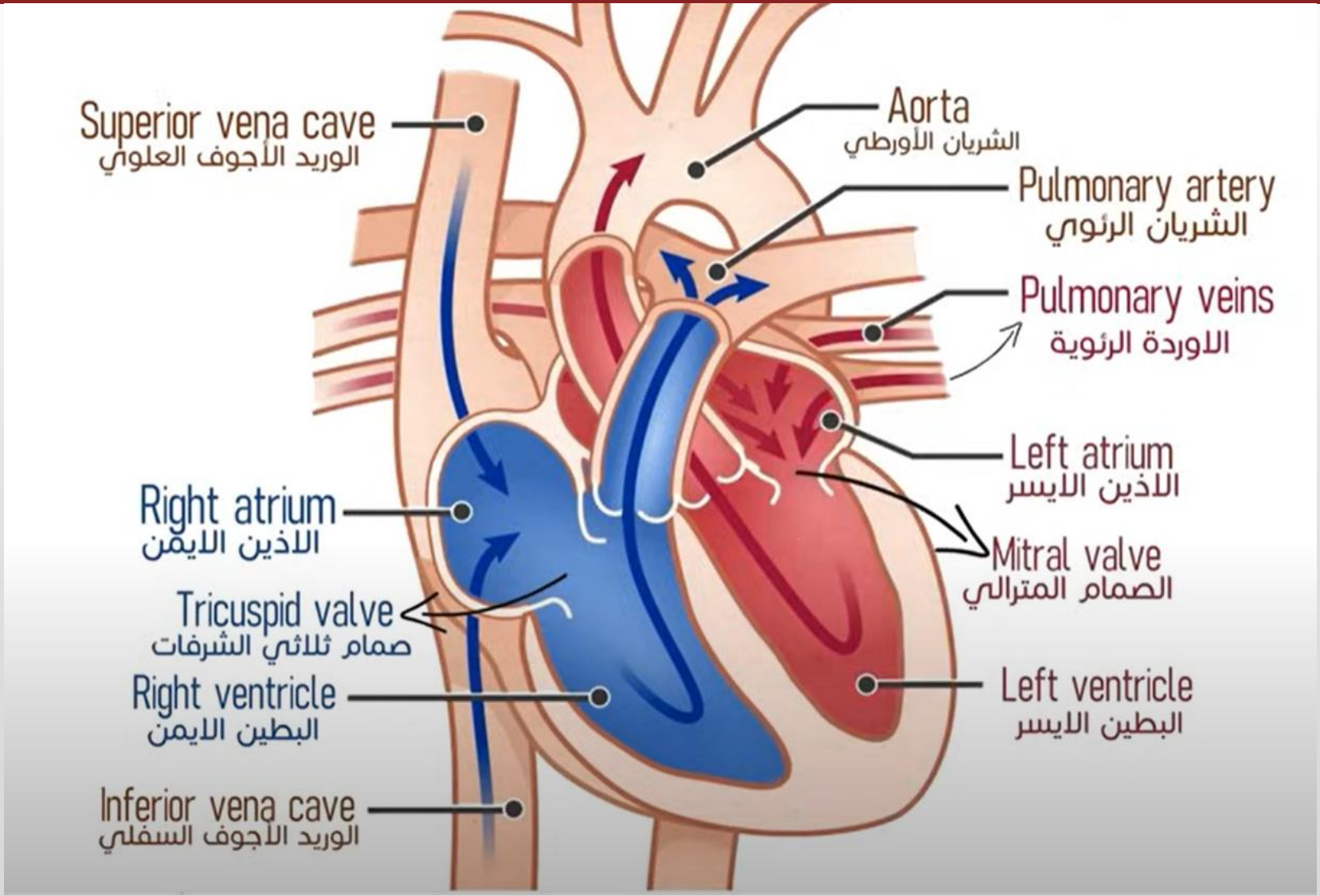
iii. ECG introduction.

iv. Conductive system of the heart.

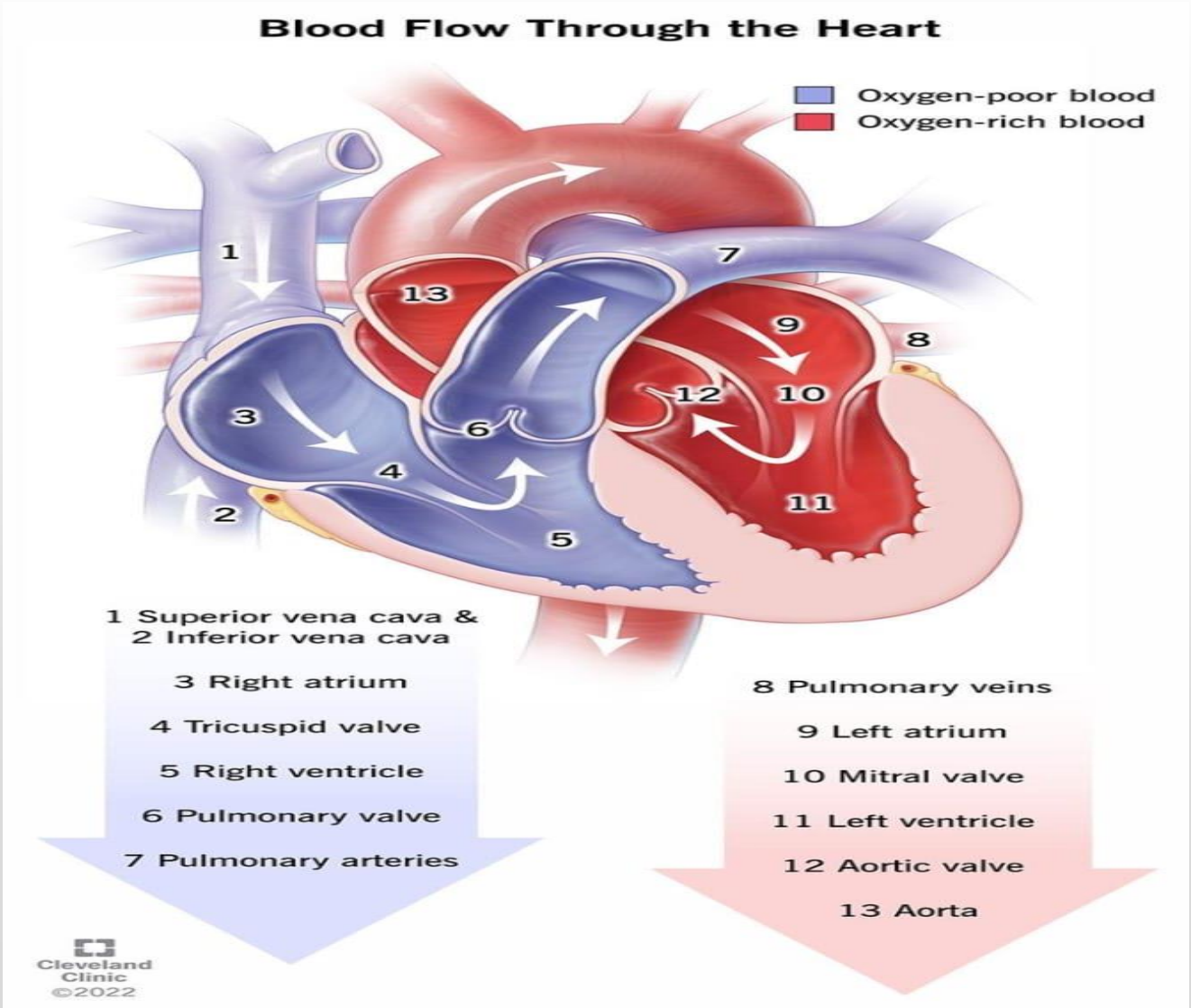
v. Basics of ECG.

vi. ECG problems

ANATOMY OF THE HEART:



Blood flow through the heart :



ECG introduction :

What is an ECG ?

‘ECG’ stands for electrocardiogram, or electrocardiograph

What is the function of ECG?

The ECG records where electrical impulses start and how they flow through the heart.

When do you need an ECG?

chest pain,
palpitations, breathlessness or dizziness, or if the patient has had an episode of syncope (blackout) or an unexplained fall. In addition, a patient with a stroke or a transient ischaemic attack (TIA) must have an ECG as these may be due to an irregular heart rhythm.

How to record an ECG?

Electrodes are placed on the chest and limbs of the patient to record different views of the heart's electrical activity.
Each view of the heart is described as a ‘lead’. The word ‘lead’ does **not** refer to the electrodes.

Lead positions for a 12-lead ECG with 12 views of the heart :

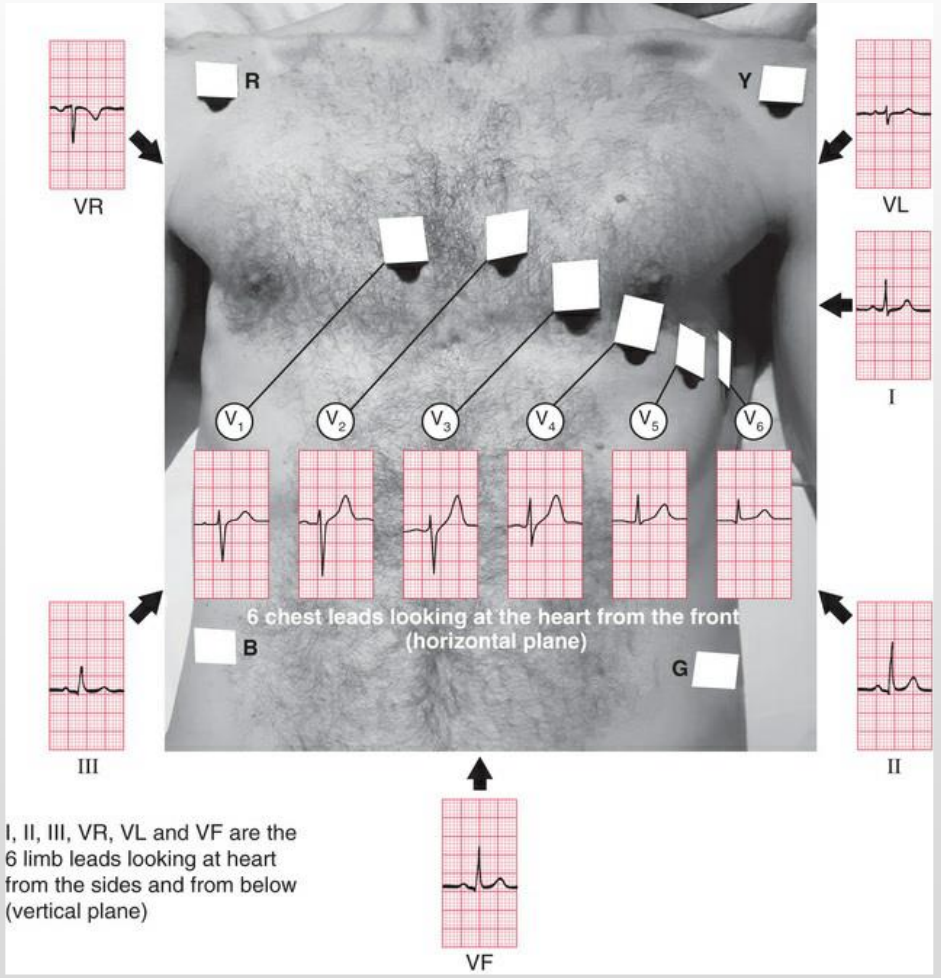
For a full picture of the heart's electrical activity, a 12-lead view is conventional.

One electrode is attached to each limb. These four electrodes provide six ‘limb leads’ or six different views of the heart in a vertical plane. These are called leads I, II, III, VL, VF and VR. VL, VF and VR used to be called AVL, AVF and AVR, respectively, but the A is essentially meaningless and is redundant.

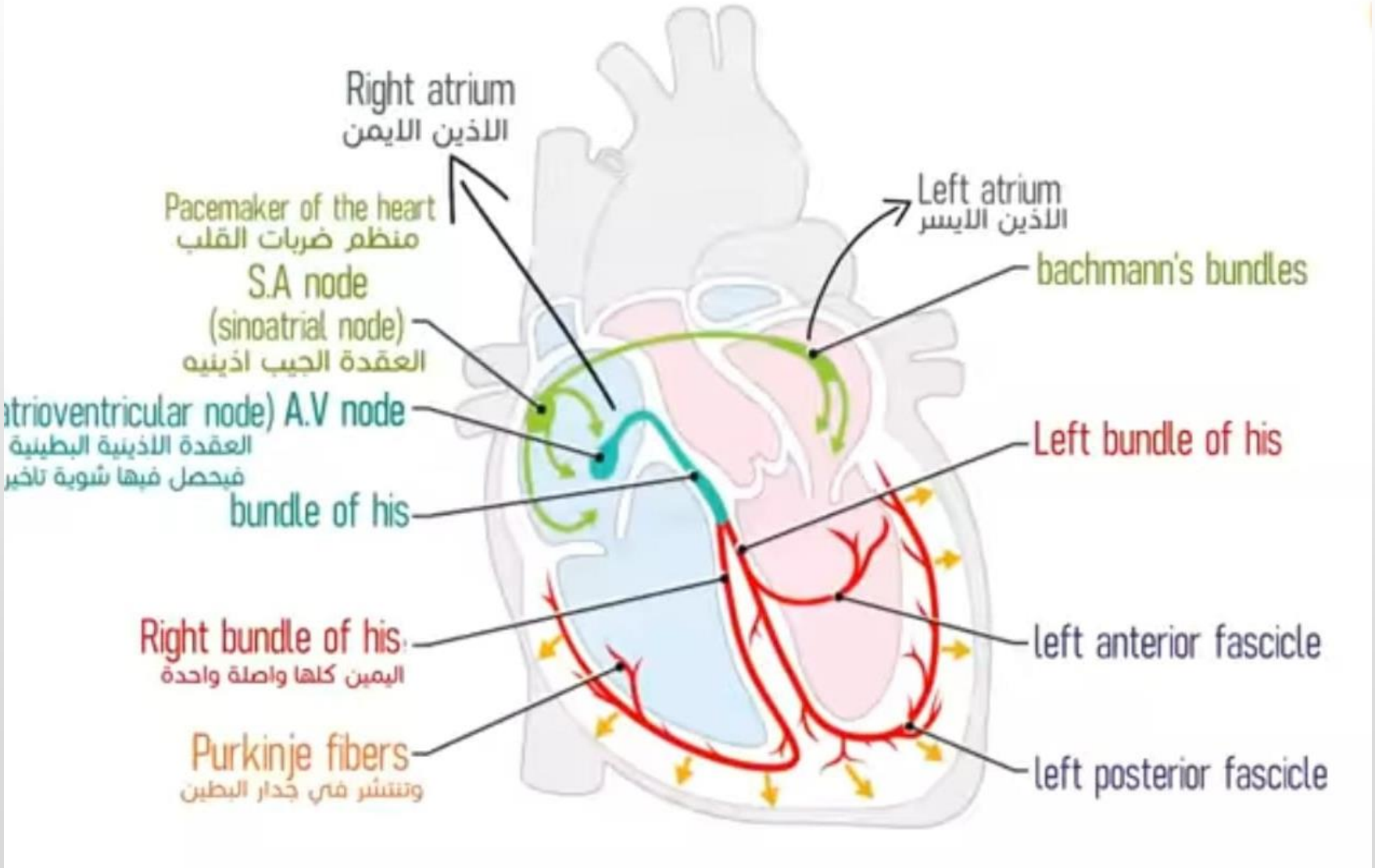
Six electrodes are attached to the chest, recording leads V1 to V6.

Accurate placement of these electrodes is essential for comparing later

ECGs

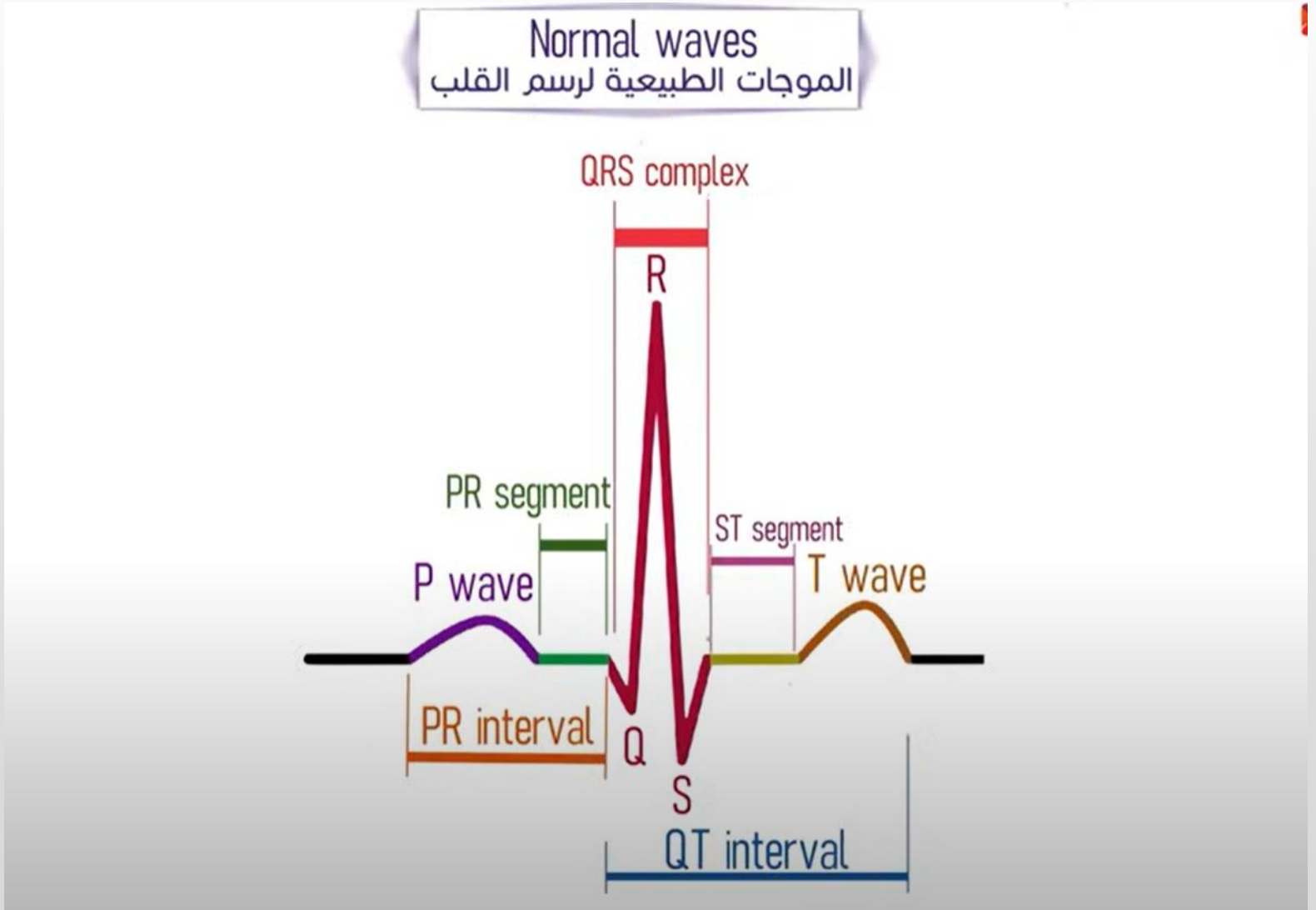


Conductive system of the heart :

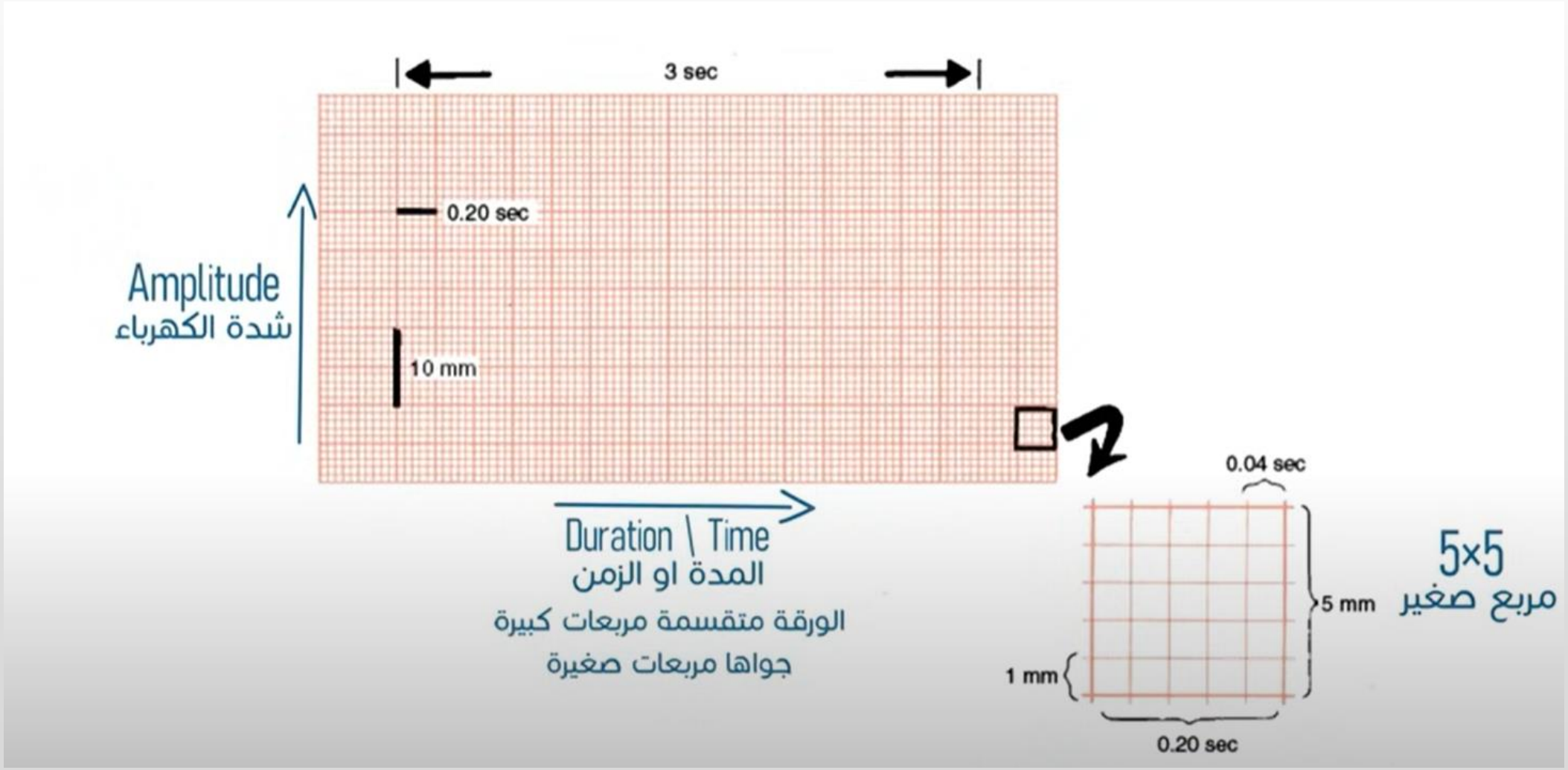


Bacics of ECG :

P wave:
Atrial depolarization (contraction).
QRS :
ventricular depolarization (contraction).
PR interval :
AV node point of physiological delay,
Decreas atrium peats from 300 to 120 to prevent ventrical fibrillation.
ST segment:
Iso electric period no have any electric activity.
T wave :
Ventricular repolarization(relaxation)
U wave :
Hypokalimia(Ca level decreas)

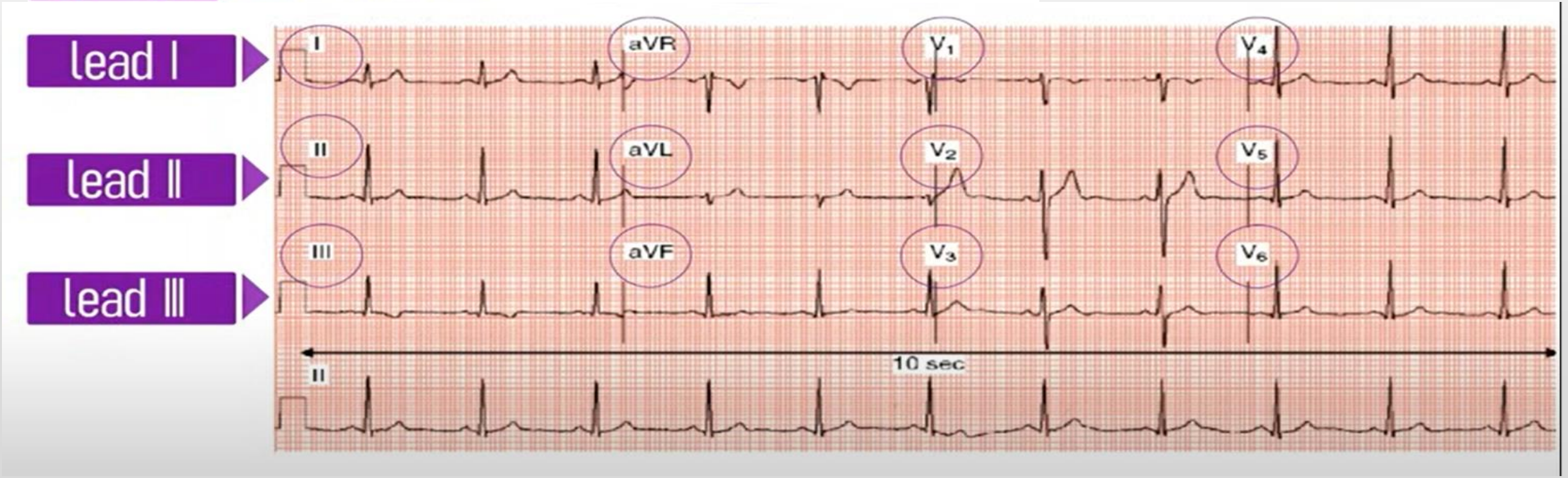


Any electrical current have:
Force & direction ECG record them.



ECG 12 leads :

V1 – V2	Right ventricle البطين الأيمن
V3 – V4	Interventricular septum الحاجز الموجود بين البطينين
V5 – V6	Left ventricle البطين الايسر



ECG reading :

1) Rhythm
2) Heart rate
3) Voltage
4) Position of the heart
5) Axis
6) P wave
7) PR interval
8) QRS complex
9) ST segment
10) T wave
11) QT interval
12) U wave

Rhythm:

Regular rhythm:

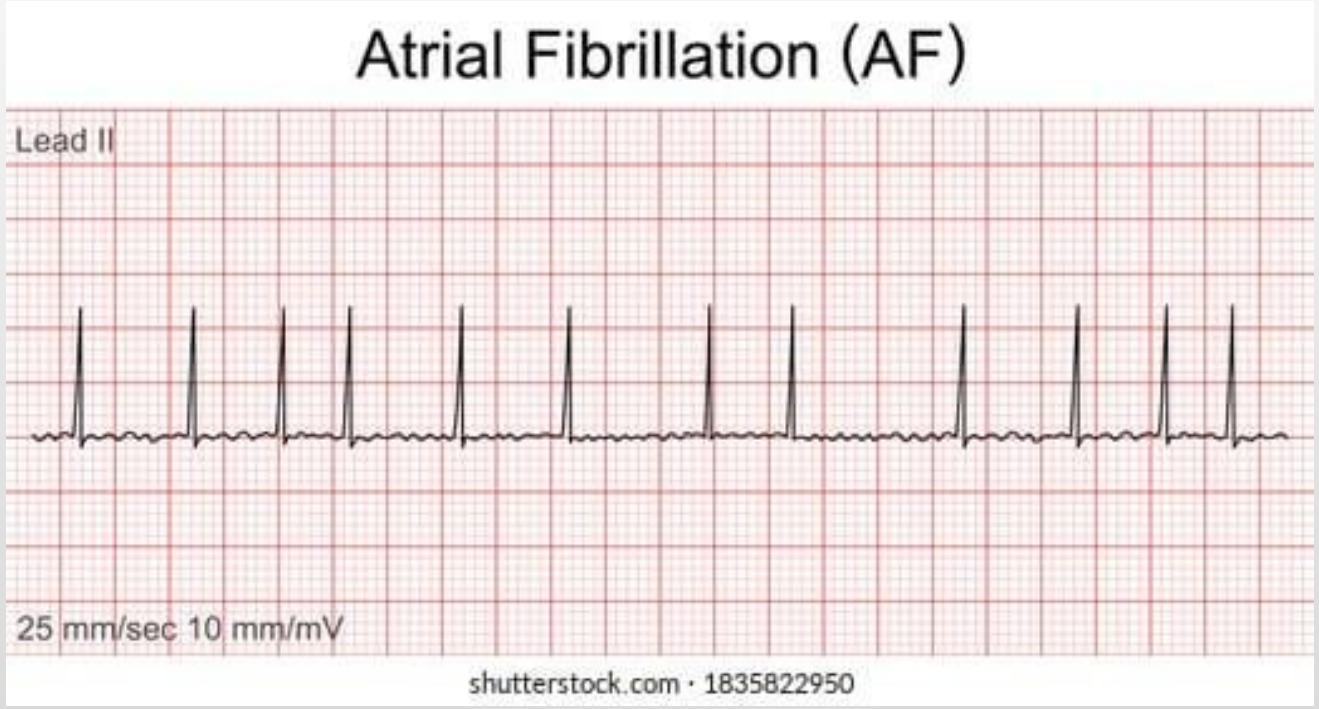
Distance between each “R” weave is similar.

Irregular rhythm:

Irregular rhythm classified in to :

_Irregular irregularity

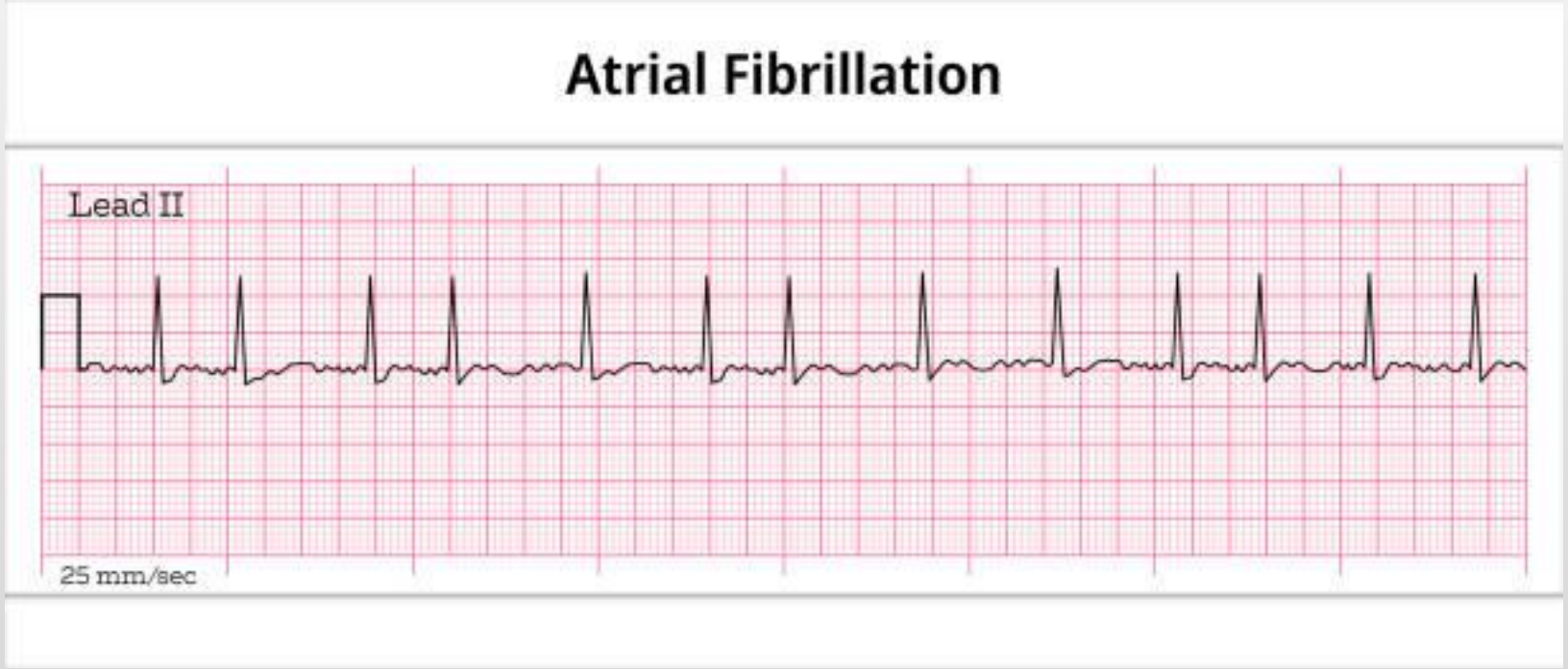
_ Irregular regularity



Irregular irregularity : No p wave cause (Aterial fibrillation)

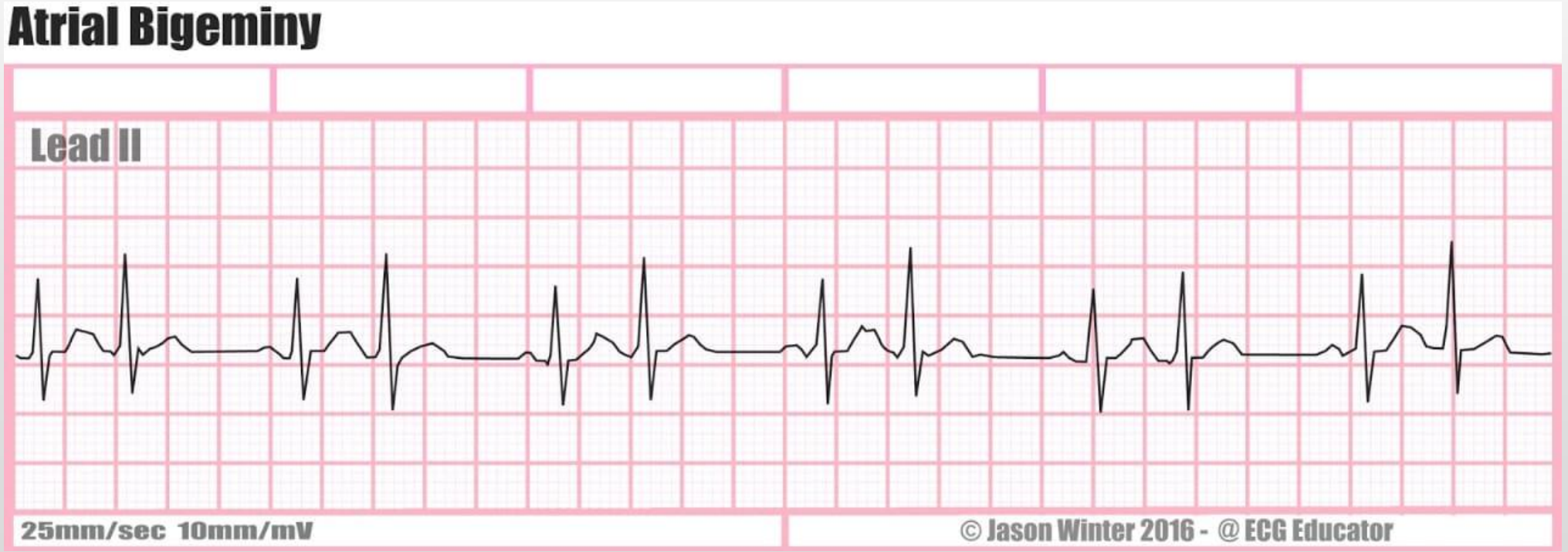
Irregular rhythm:

_ Irregular regularity



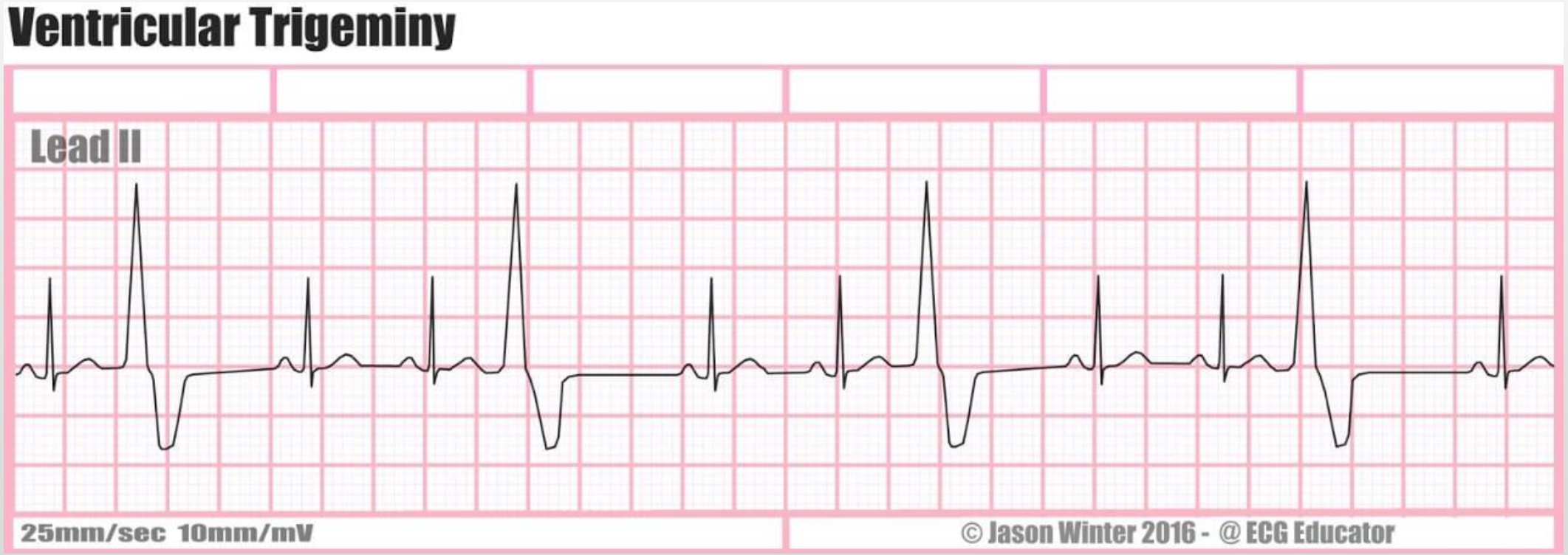
Irregular regularity:

1_ Bigeminy (1 normal wave + pvc)



Irregular regularity:

2_ Trigeminy (2 normal wave +pvc)



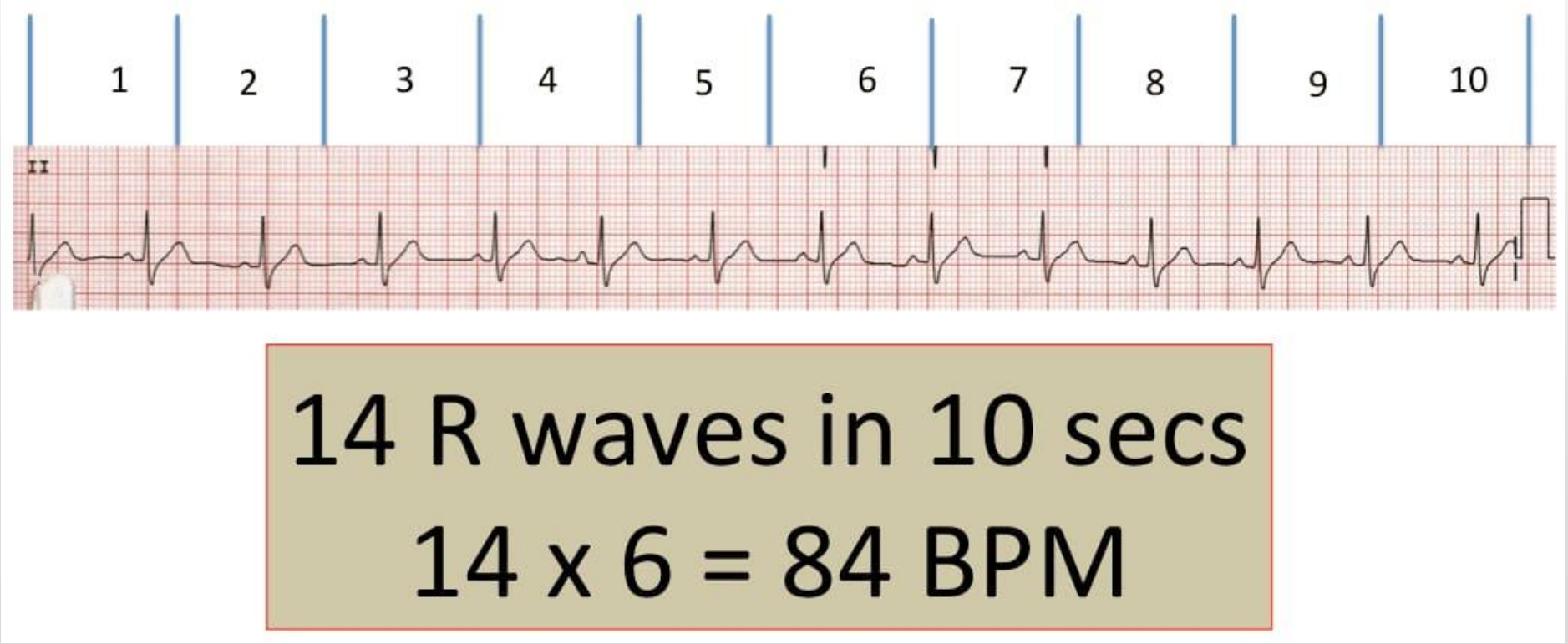
2- Rate :

Normal rate of the heart 60 -100 per/ minute Rate of regular rhythm:=300/R_R square.

Regular rhythm :
Rate : 300/4= 75 per/minute

Rate of Irregular rhythm:

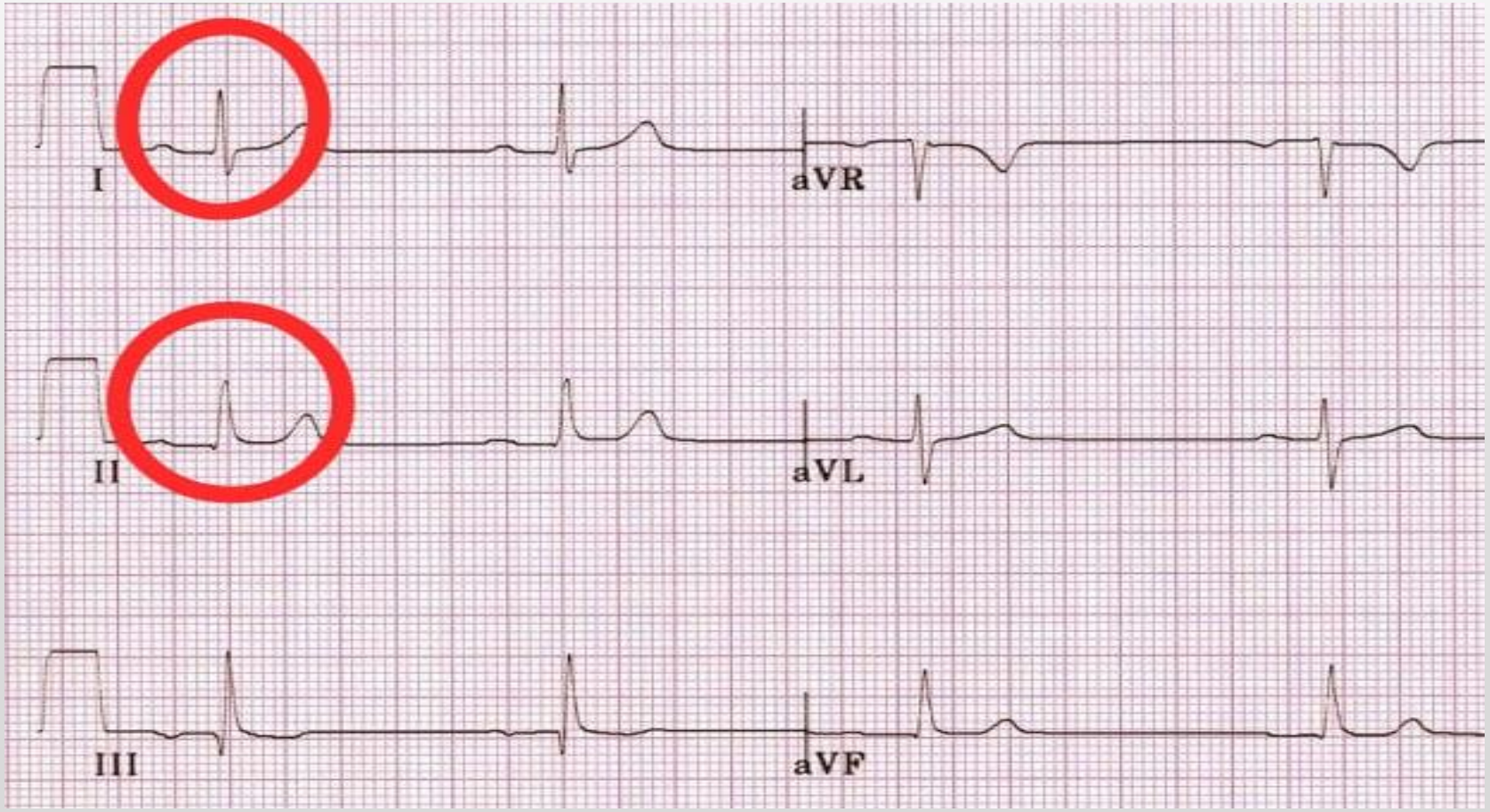
Rate of irregular rhythm:=how many QRS in 10 seconds ×6



"Axis deviations of ECG"

Normal axis ECG

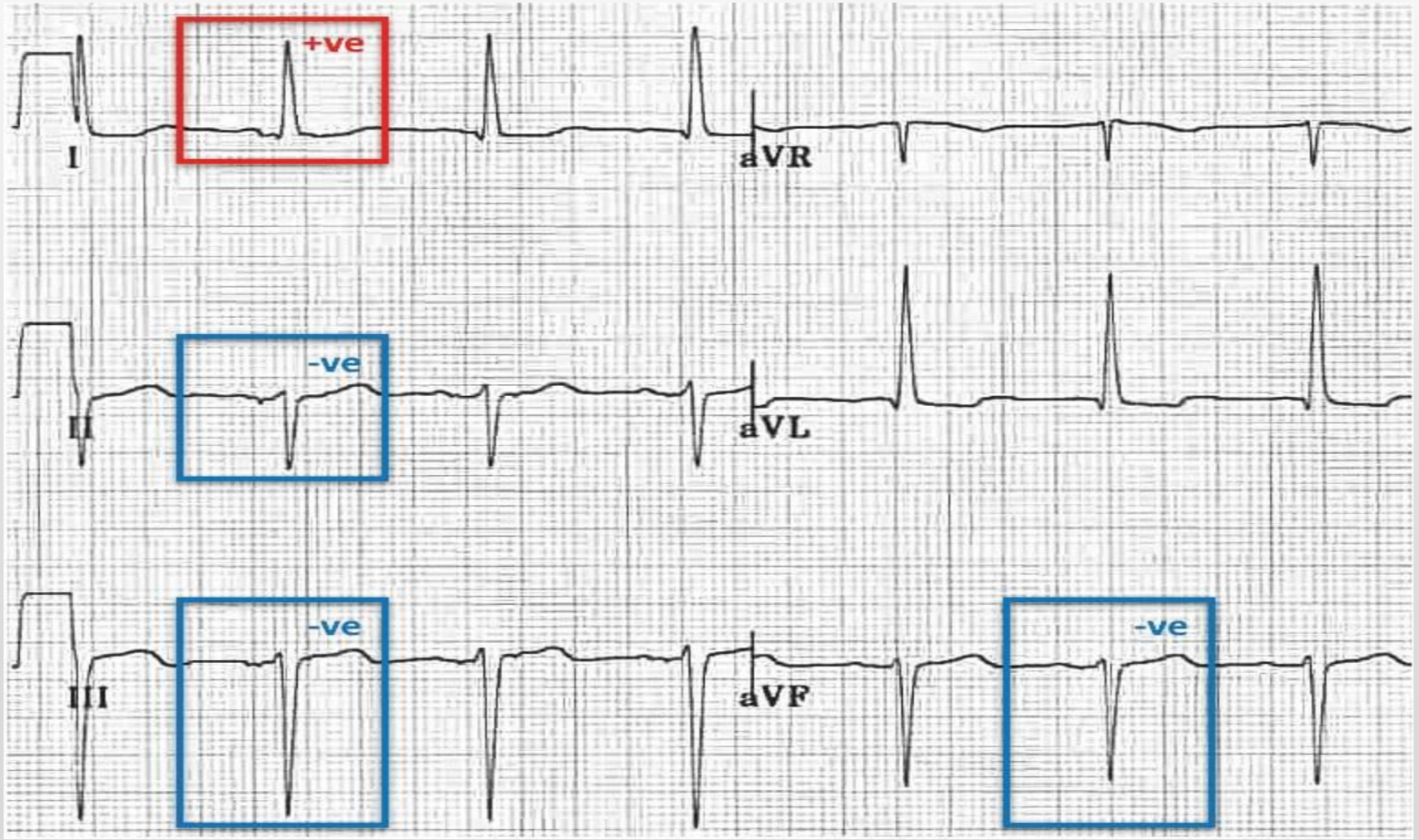
Notice lead 1&2Has the same direction



"Axis deviations of ECG"

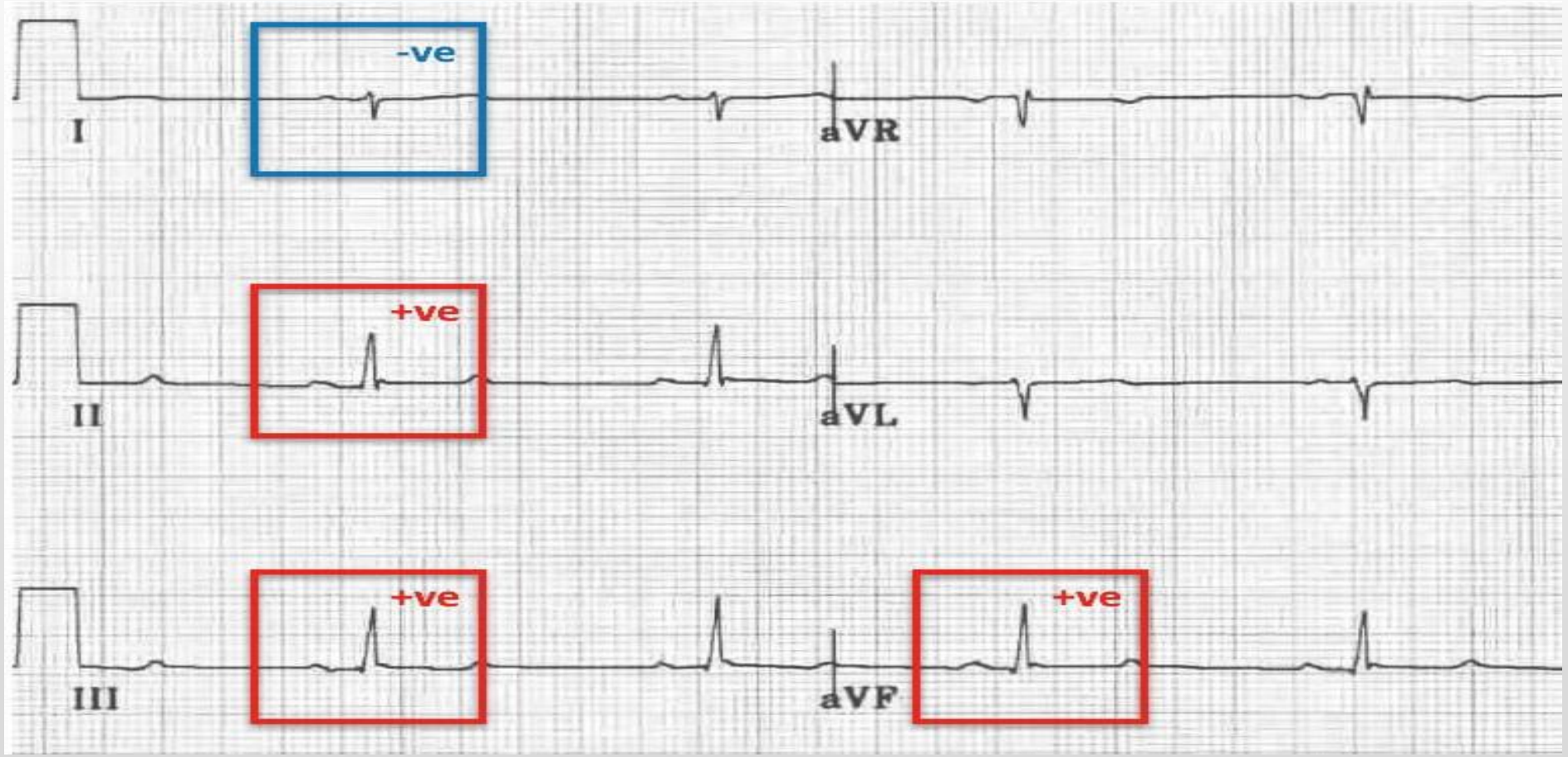
Left axis deviations (LAD)

lead 1 & 2 are opposite direction.



"Axis deviations of ECG"

Right axis deviations (RAD)



" Causes Of Axis deviations "

Left axis deviation ECG causes:

Inferior myocardial infarction

Hyperkaliemia

Ventricular ectopy

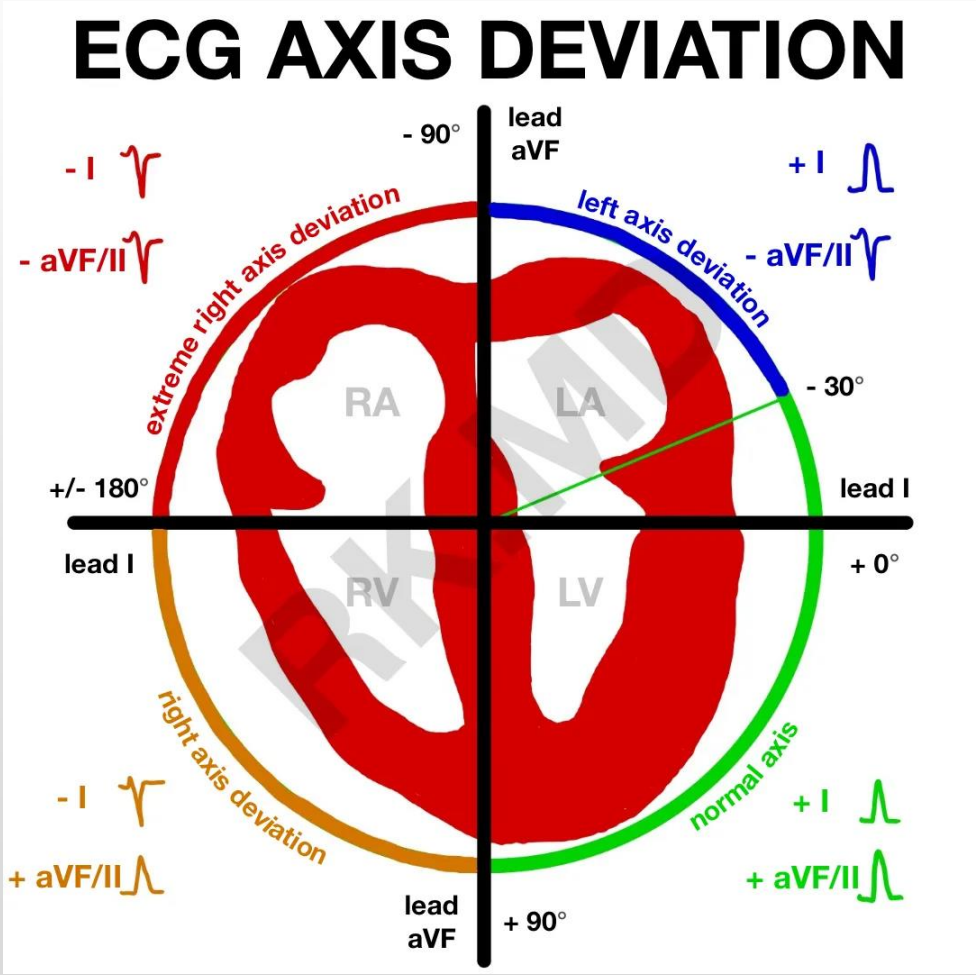
Artificial cardiac pacing

causes of the right axis deviation:

right ventricular hypertrophy,

reduced muscle mass of left ventricle,

altered conduction pathways and change in the position of the heart in the chest.



“p” wave :

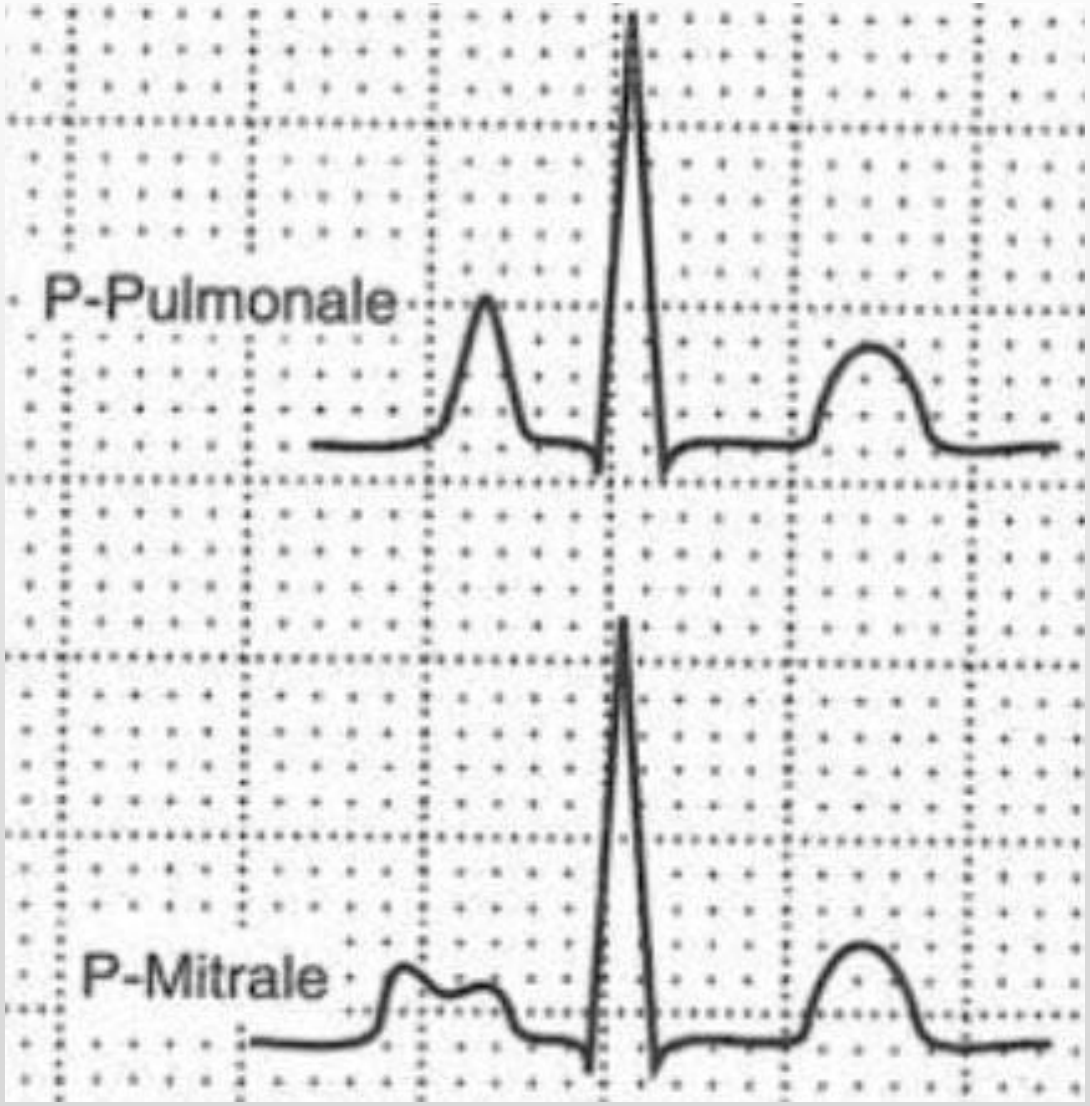
Result of contraction (depolarization) of atrium.
Normal duration = 3 small square
Normal amplitude = 2.5 small square

Normal p wave

“p” wave :

P- pulmonal :
Indicated to right arterial enlargement.

P- mitral :
Indicated to left atrial enlargement.



P-R interval

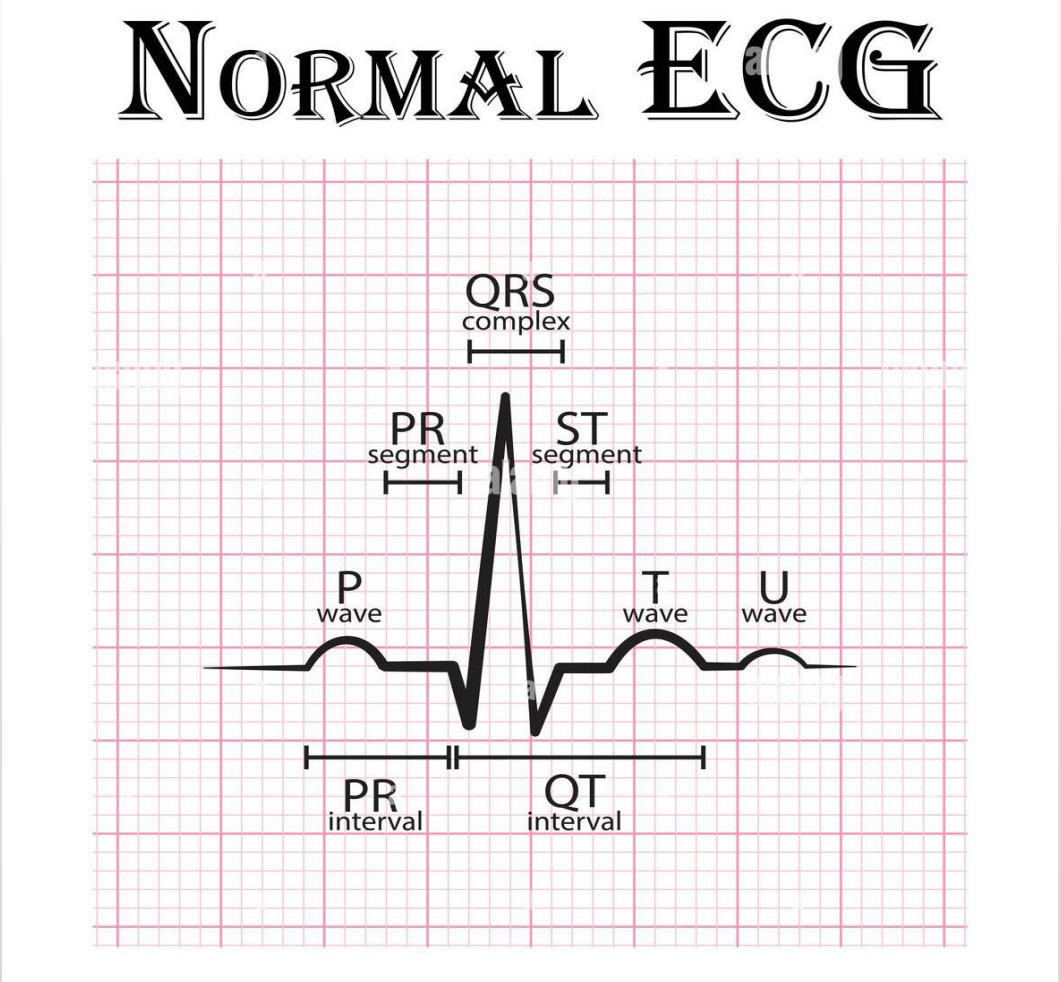
" P-R interval “

Indicated for electricity direction from A.V node to

A.V bundle.

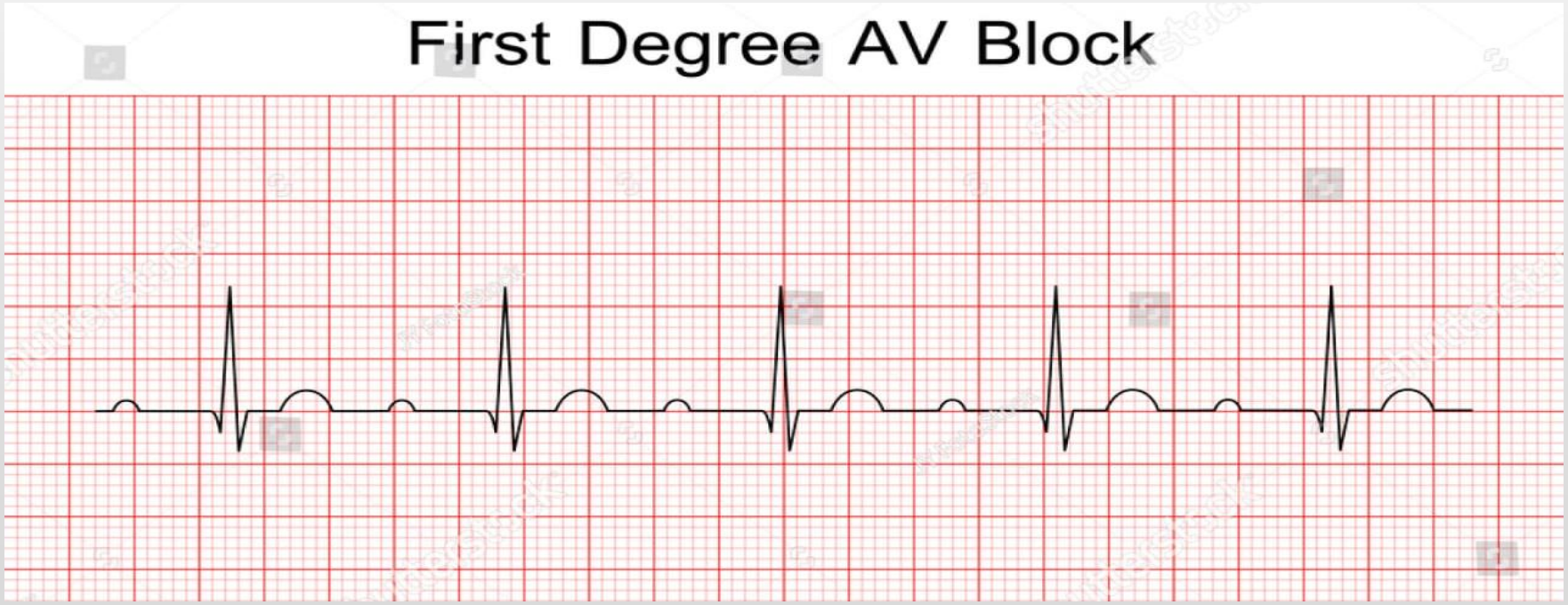
Normal duration:

3-5 small square



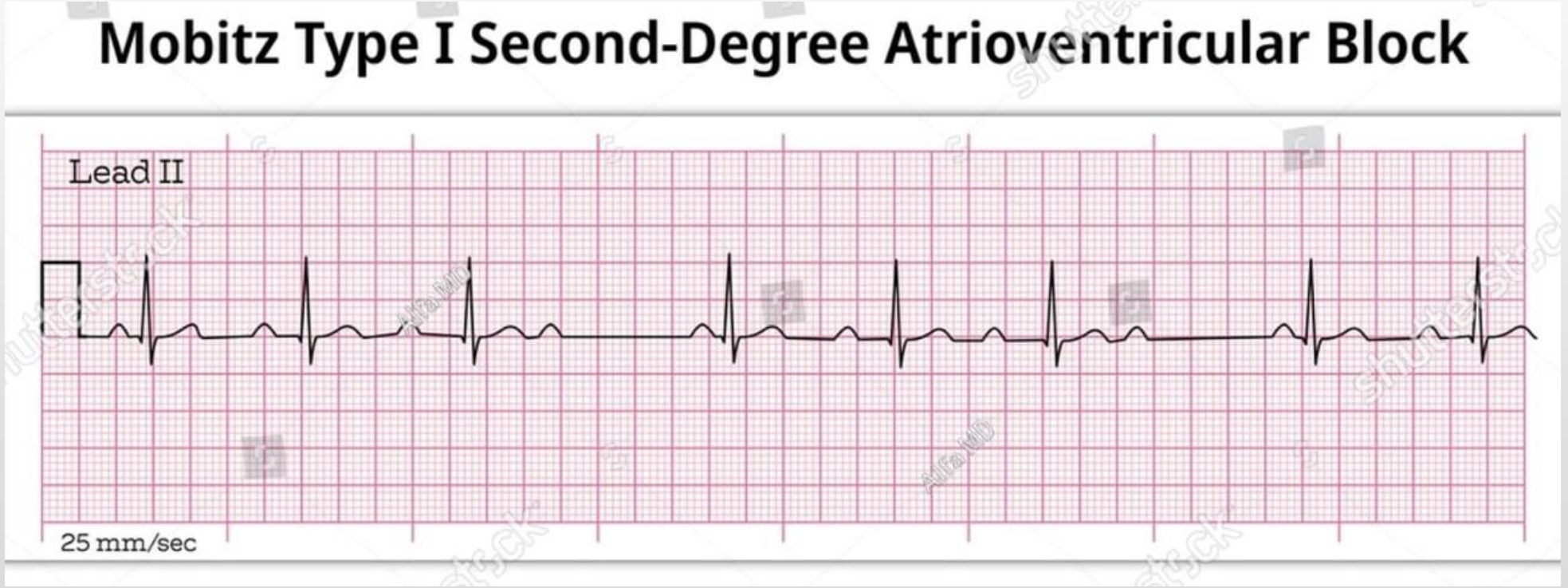
" Types of heart block "

First degree heart block:
(large P-R interval) a condition where the heart's wiring is slow to send electrical signals.



Second degree heart block:

Mobitz type 1
Mobitz type 2

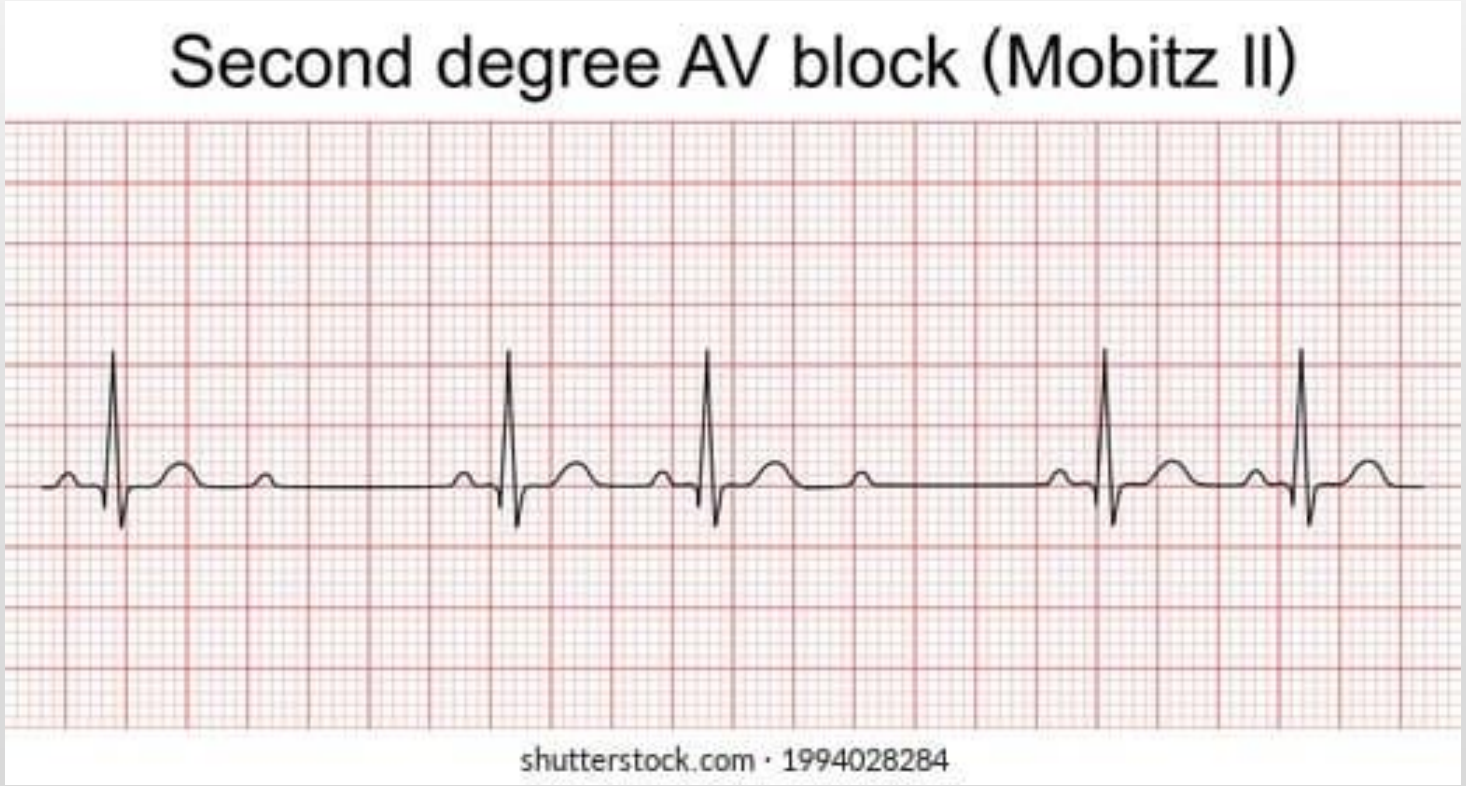


Mobitz type 1:Gradual prolongation then dropped p wave followed by QRS complex.

Mobitz type 2 :

Mobitz type 2

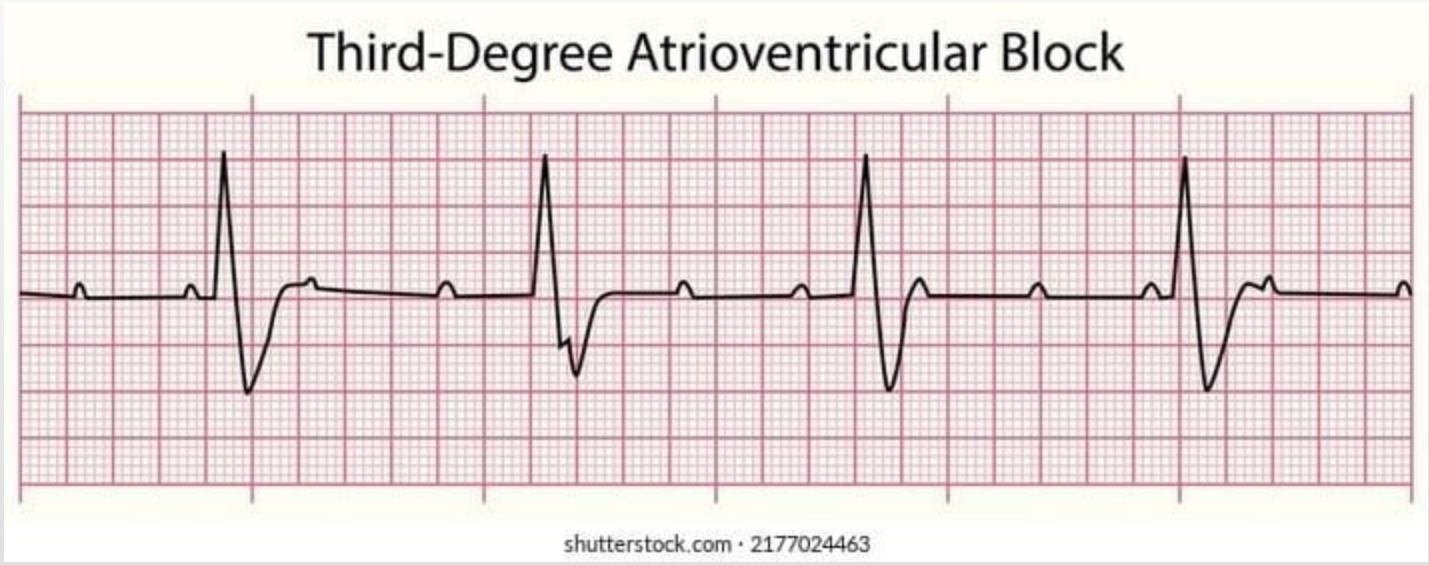
P_R interval not prolonged but have dropped peak after p wave.



Third degree heart block :

Third degree heart block :

Multiple p wave



Causes of heart block:

Older age .Heart attack or coronary artery disease.
Cardiomyopathy.
Sarcoidosis.
Lyme disease.
High potassium levels.
Severe hyperthyroidism.
Certain hereditary neuromuscular diseases.

Symptom of the heart block:

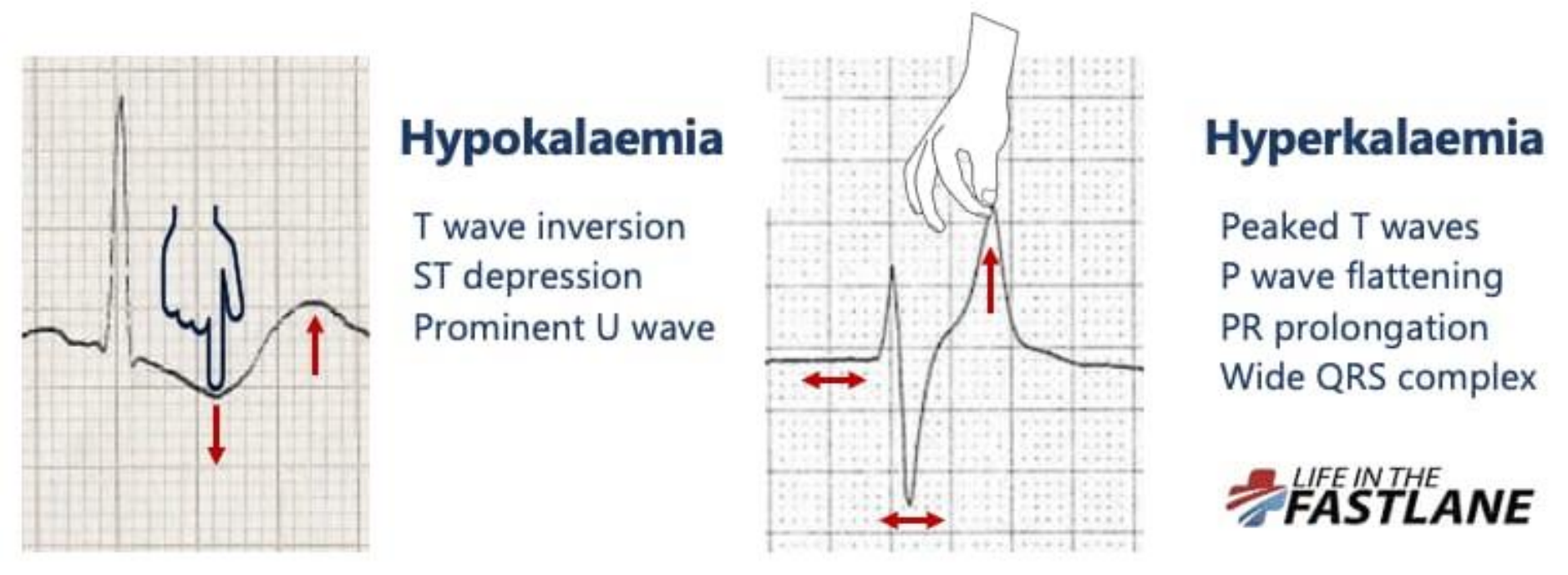
fainting, tiredness and shortness of breath ,chest pain.

" T- wave "

" T- wave "Indicate for :

Hyperkalemia

Hypokalemia

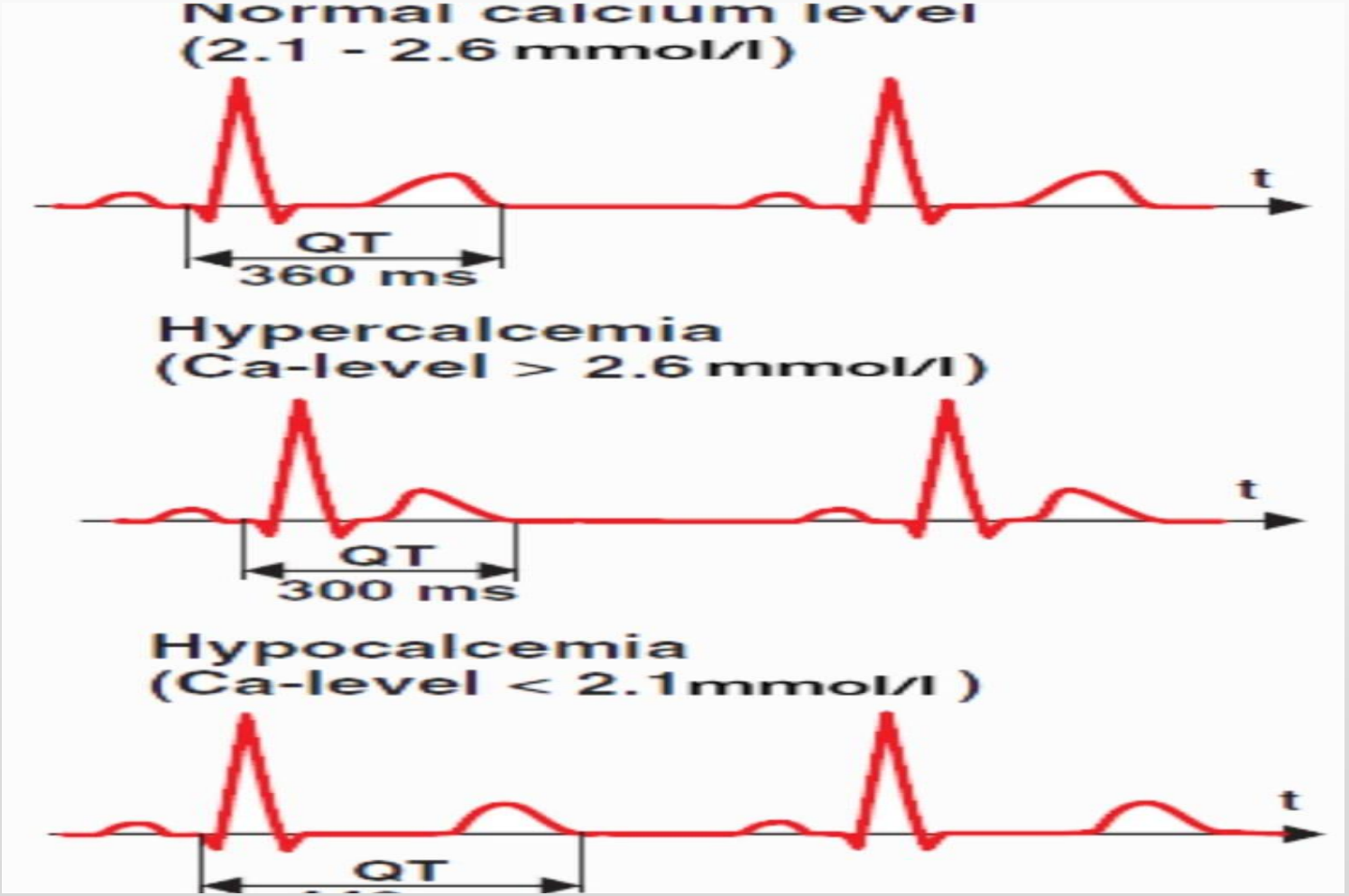


" T- wave "

" T- wave "Indicate for :

Hypocalcemia

Hyperglycemia



Main Leads:

•12-lead ECG includes:

- Limb leads: I, II, III, aVR, aVL, aVF.
- Chest leads: V1-V6.

General Overview:

•Heart rate:

Determined by measuring the R-R intervals.

Appears regular.

•PR interval:

Normal (0.12-0.20 seconds).

Additional Notes:

•Speed:

25 mm/s.

•P wave:

Normal, indicating proper atrial activation.

•Heart rhythm:

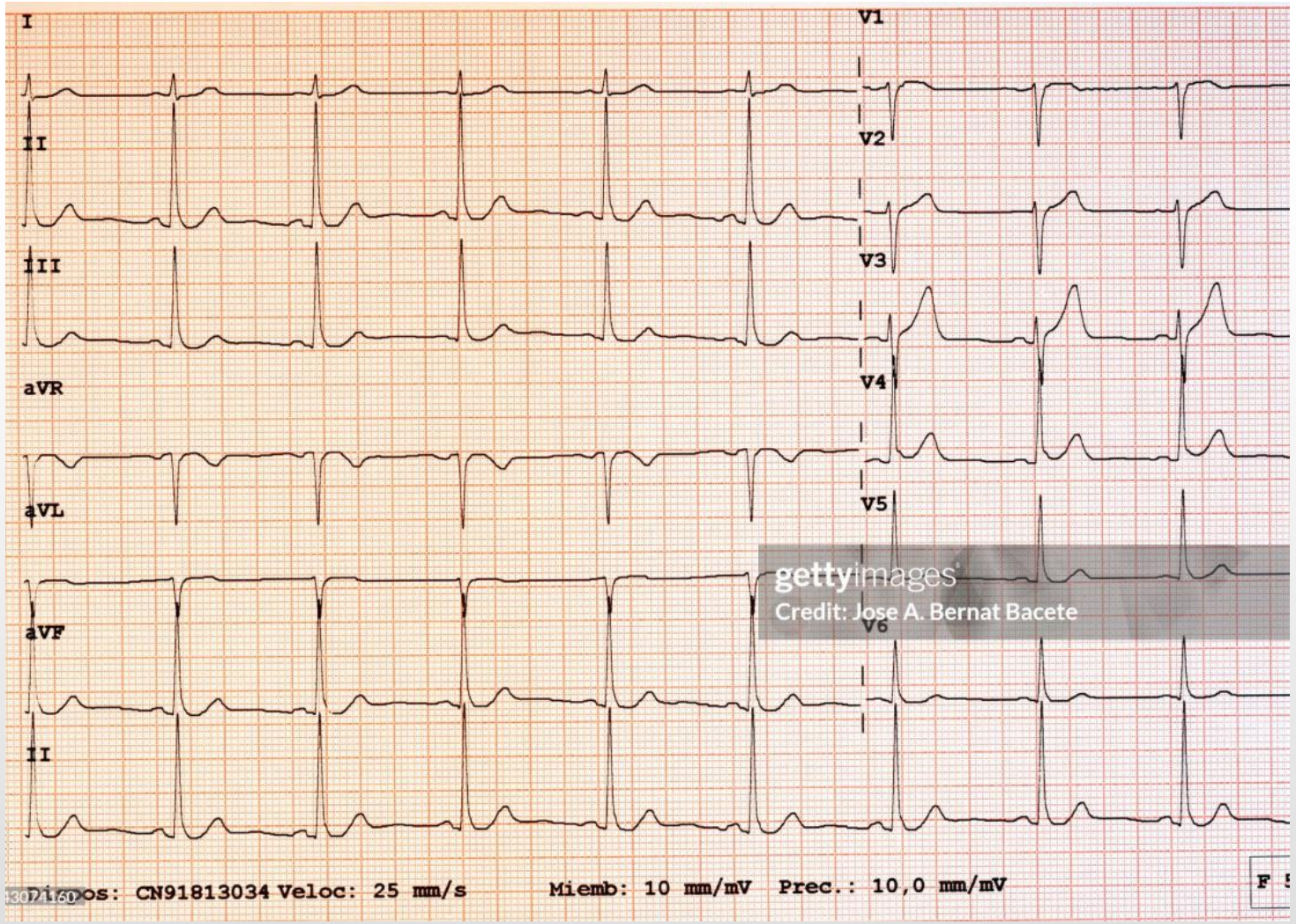
Likely sinus rhythm, as there is a P wave before every QRS complex.

QRS complex:

Narrow (less than 0.12 seconds), indicating normal ventricular conduction.

•T wave:

Appears normal in most leads, indicating proper ventricular repolarization.




Thank you