ECG BASICS

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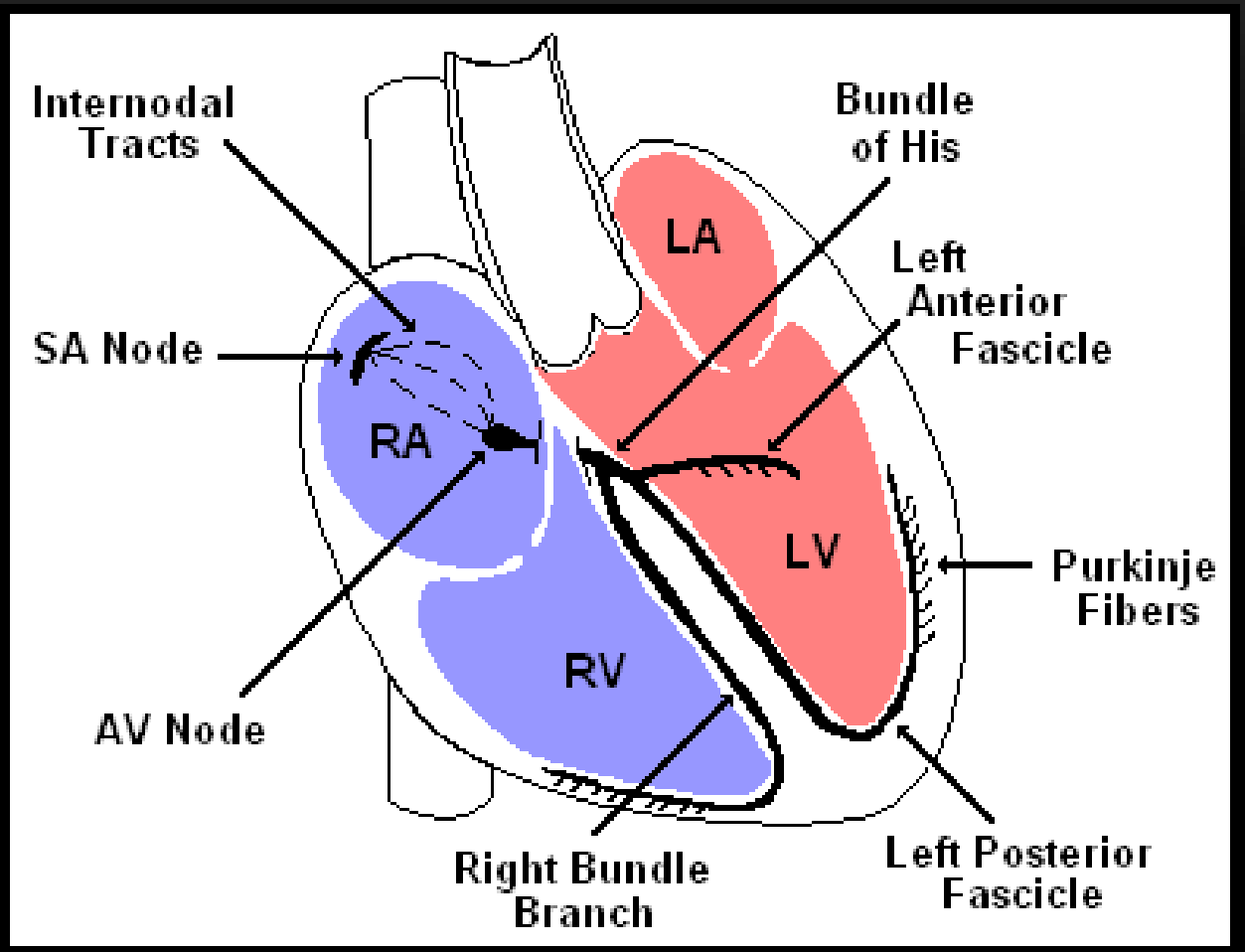
OUTLINE

1. Review of the conduction system
2. ECG waveforms and intervals
3. ECG leads
4. Determining heart rate
5. Determining heart axis
6. Determining heart rhythm

THE NORMAL CONDUCTION SYSTEM



WHAT IS AN ECG?

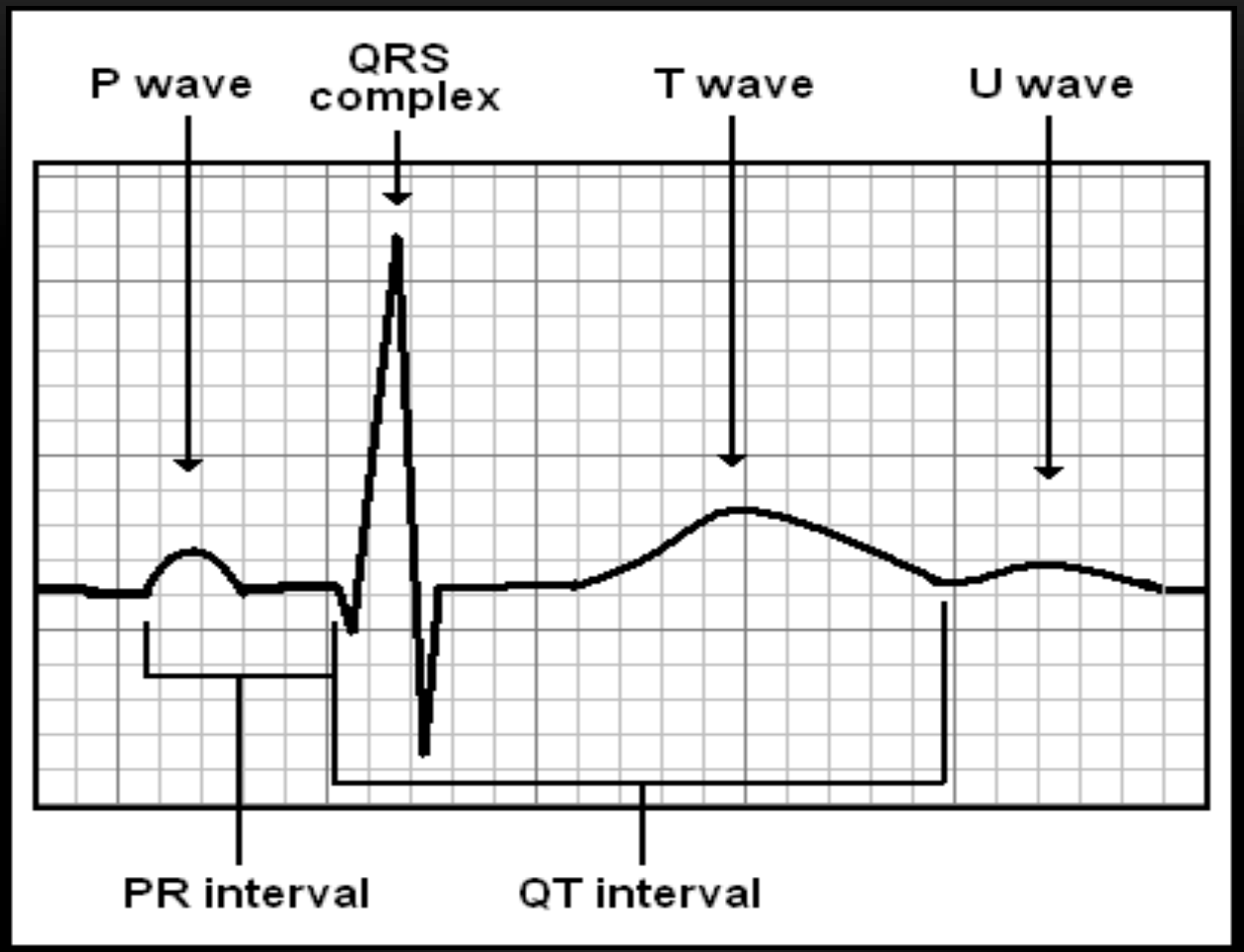
The electrocardiogram (ECG) is a representation of the sum of all the electrical events of the cardiac cycle.

Each event has a distinctive waveform, the study of which can lead to greater insight into a patient's cardiac pathophysiology.

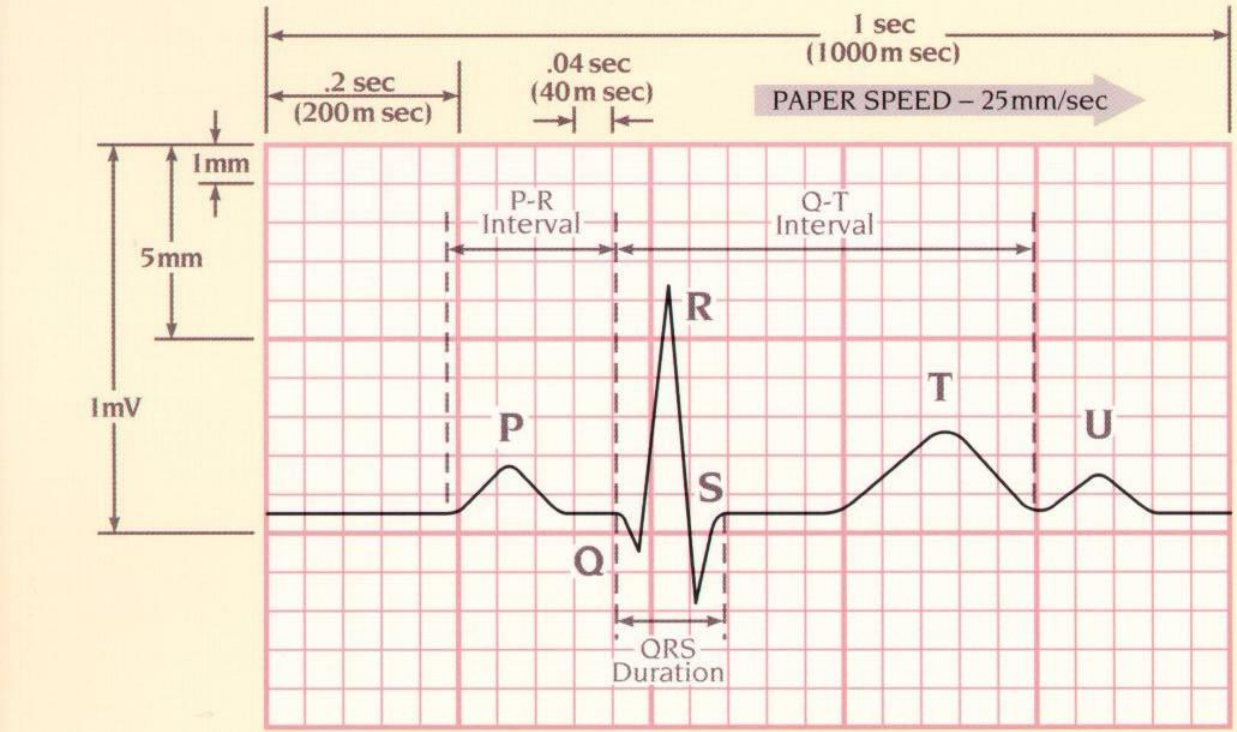
WHAT TYPES OF INFORMATION CAN WE OBTAIN FROM AN ECG?

- Heart rate
- Heart Rhythem
- Myopathies
- Electrolyte disturbances (i.e. hyperkalemia, hypokalemia)
- Drug toxicity (i.e. digoxin and drugs which prolong the QT interval)

WAVEFORMS AND INTERVALS



WAVEFORMS AND INTERVALS



VERTICAL AXIS	
	1 Small Square = 1mm (0.1mV)
	1 Large Square = 5mm (0.5mV)
	2 Large Squares = 1mV

HORIZONTAL AXIS	
	1 Small Square = .04 sec (40 m sec)
	1 Large Square = .2 sec (200 m sec)
	5 Large Squares = 1 sec (1000 m sec)

ECG LEADS

Leads are electrodes which measure the difference in electrical potential between either:

1. Two different points on the body (bipolar leads)

2. One point on the body and a virtual reference point with zero electrical potential, located in the center of the heart (unipolar leads)

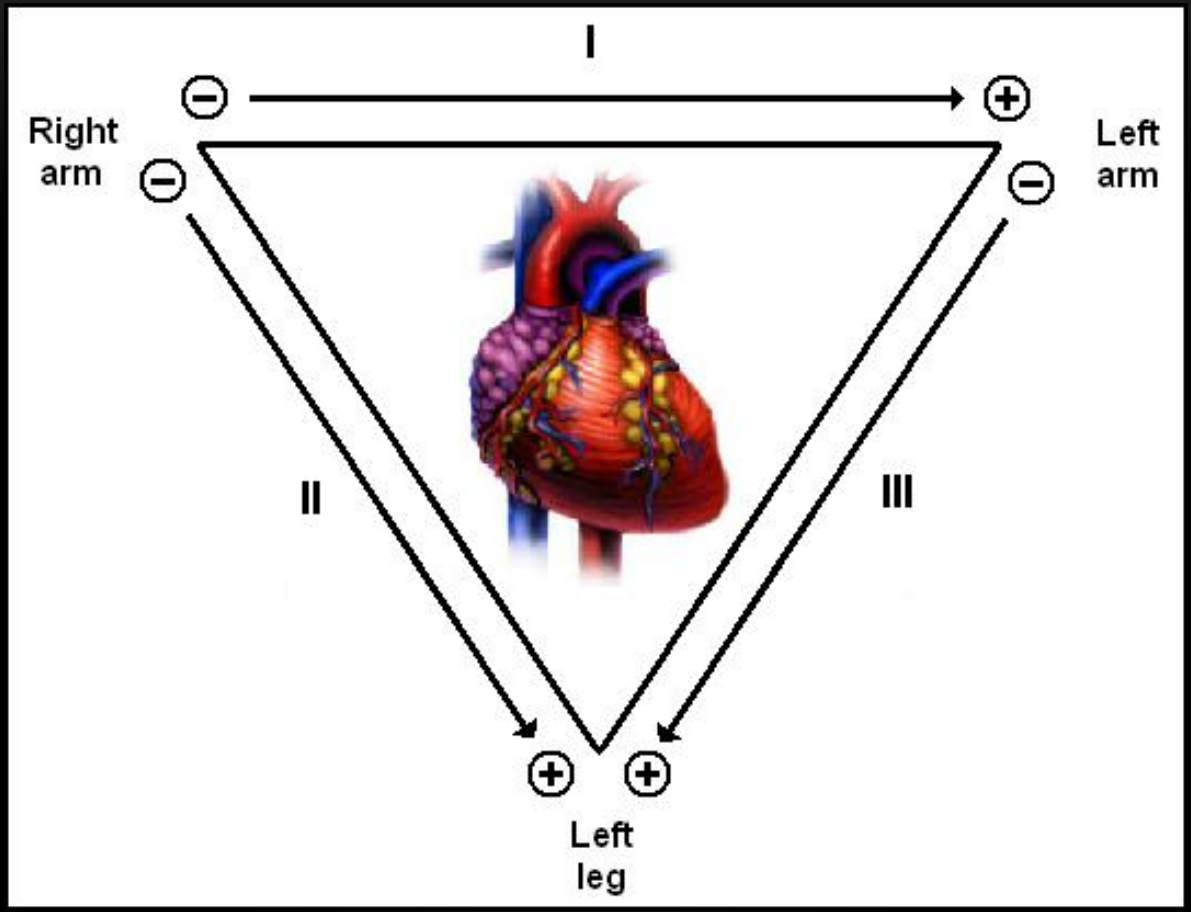
ECG LEADS

The standard ECG has 12 leads:

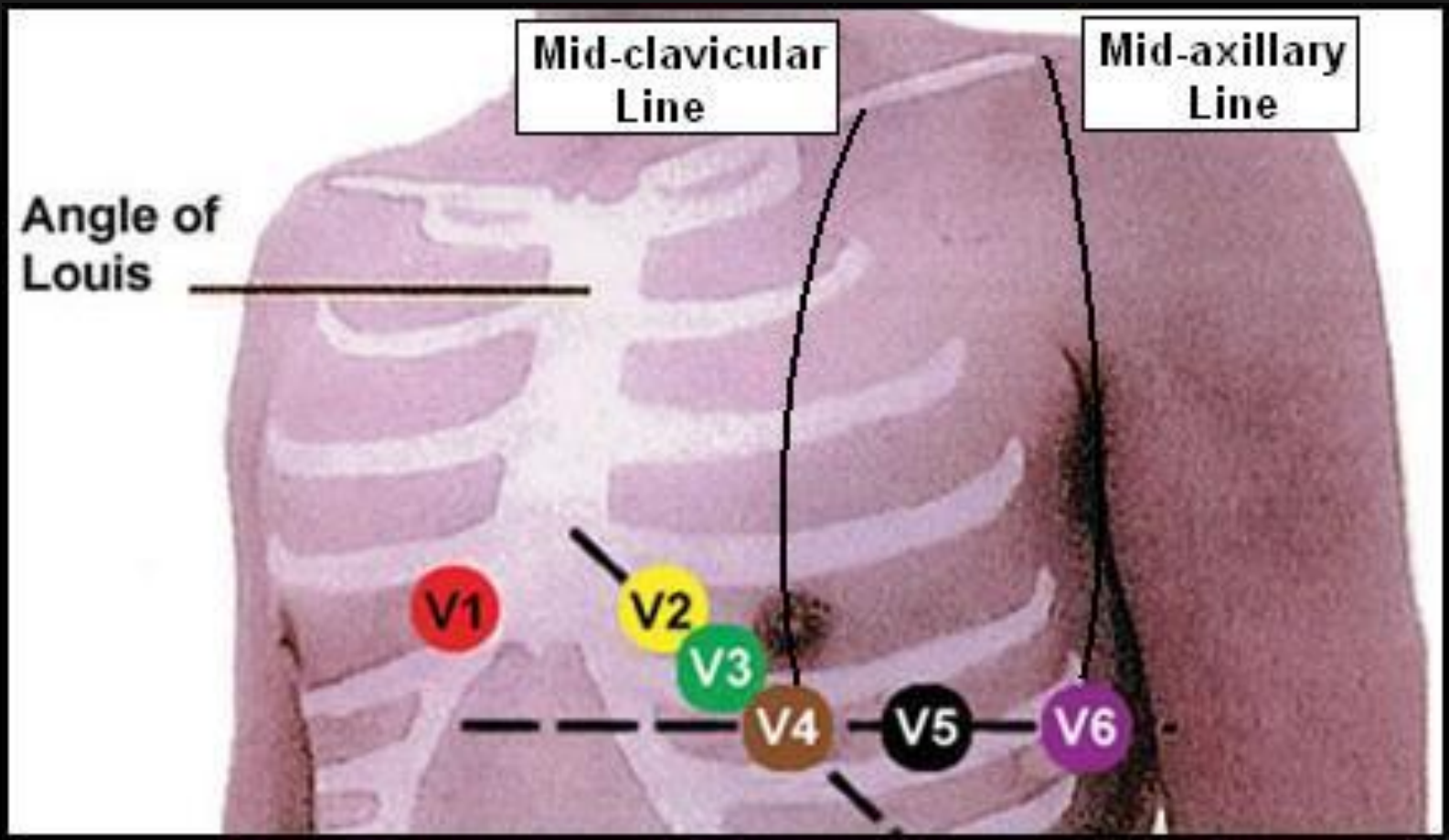
- 3 Standard Limb Leads
- 3 Augmented Limb Leads
- 6 Precordial (chest) Leads

The axis of a particular lead represents the viewpoint from which it looks at the heart.

STANDARD LIMB LEADS



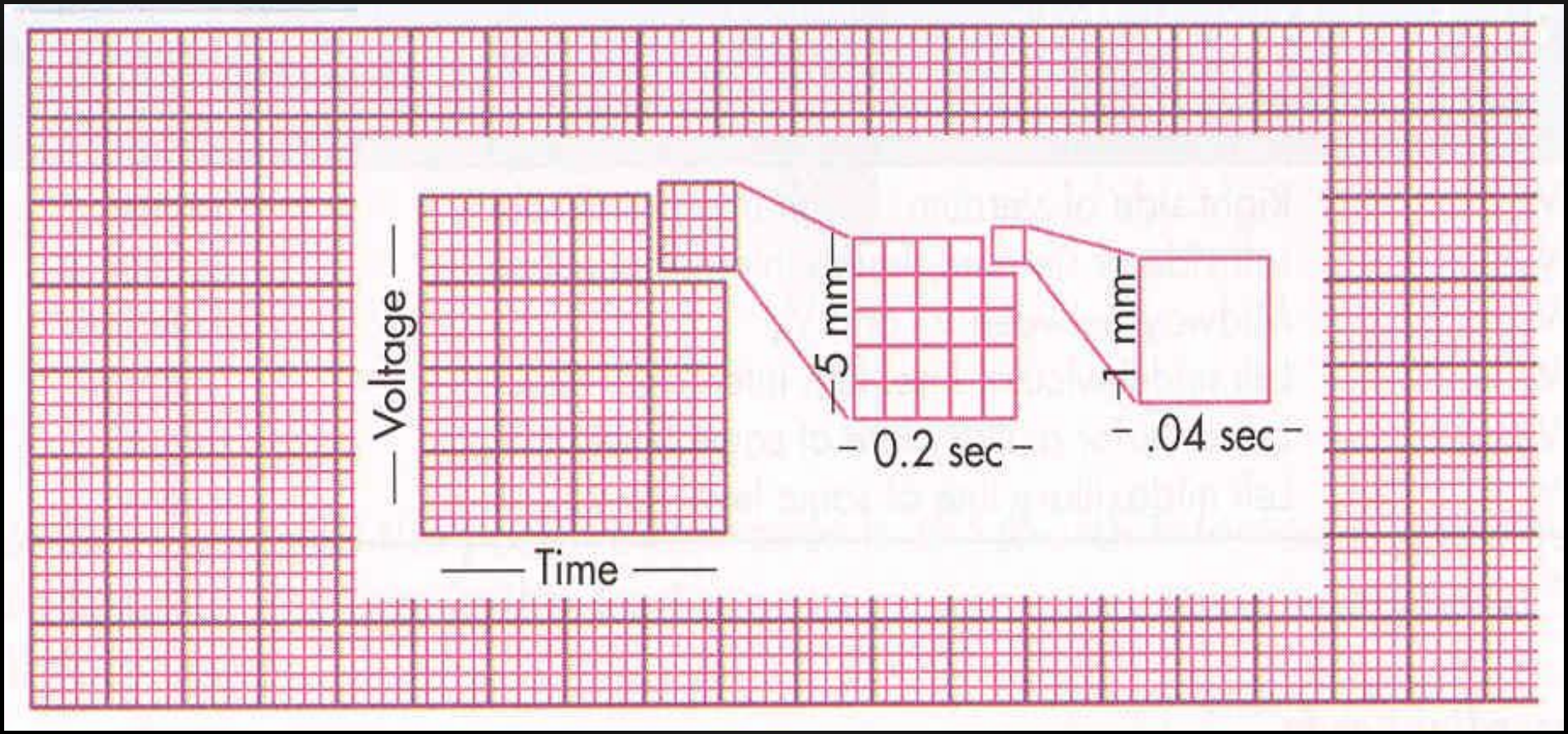
PRECORDIAL LEADS



SUMMARY OF LEADS

	Limb Leads	Precordial Leads
Bipolar	I, II, III (standard limb leads)	-
Unipolar (V leads)	aVR, aVL, aVF (augmented limb leads)	V_1-V_6

CALIBRATION OF ECG PAPER



DETERMINING THE HEART RATE

Take the number of “smallest boxes moved by the machine per minute” i.e. (1500) , and divide by the number of boxes between adjacent “R”-”R” waves.

H.R. = 1500 / # of squares b/w 2 “R - R” waves

RULE OF 1500

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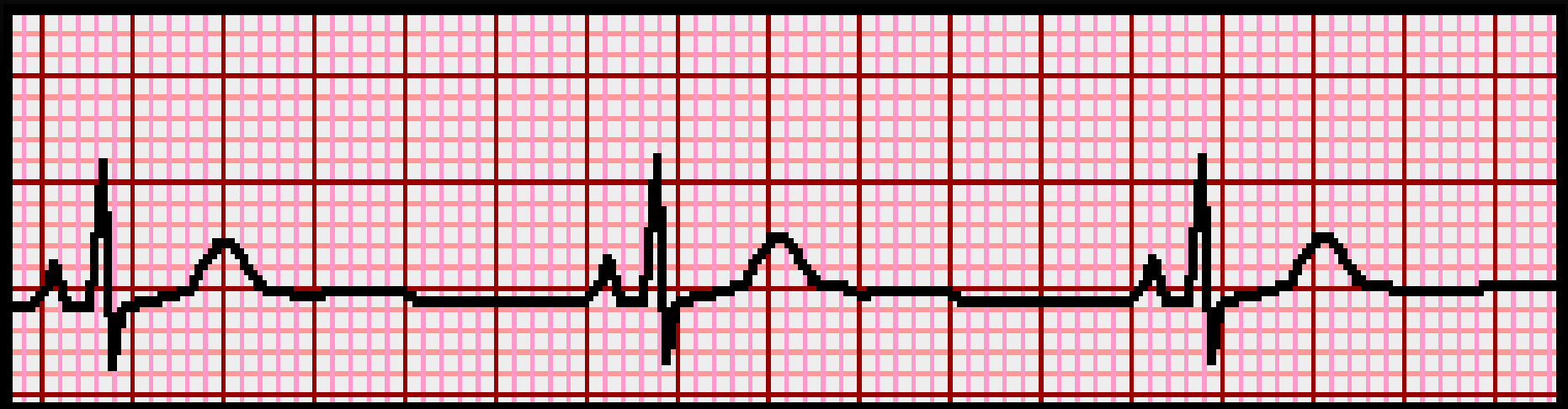
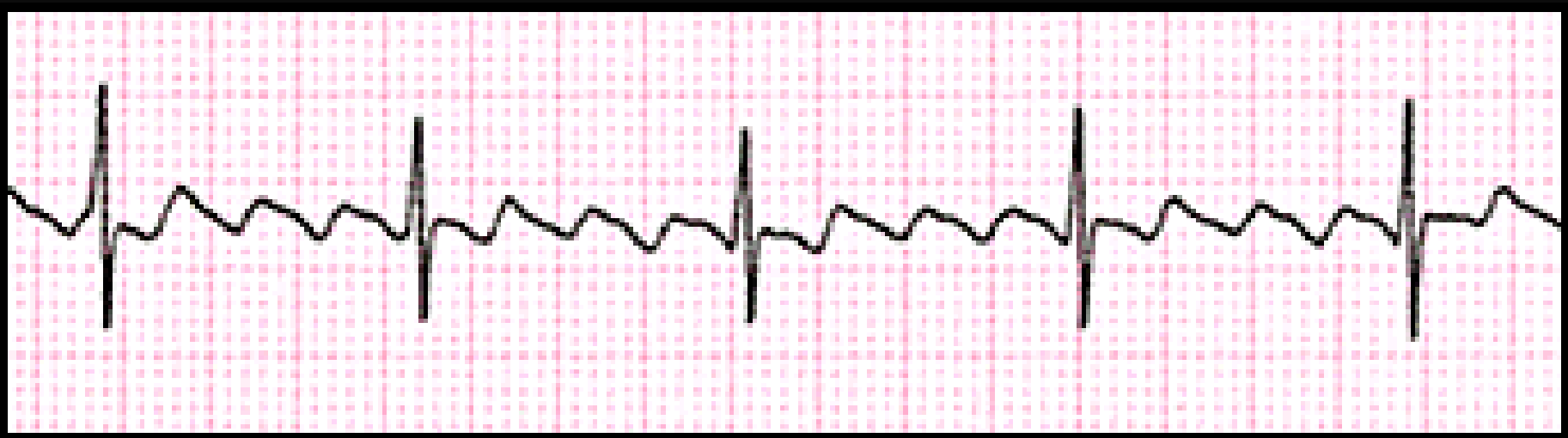
WHAT IS THE HEART RATE?



(1500 / 30) = 50 bpm

WHAT IS THE HEART RATE?



(1500 / ~18) = ~ 83 bpm

WHAT IS THE HEART RATE?

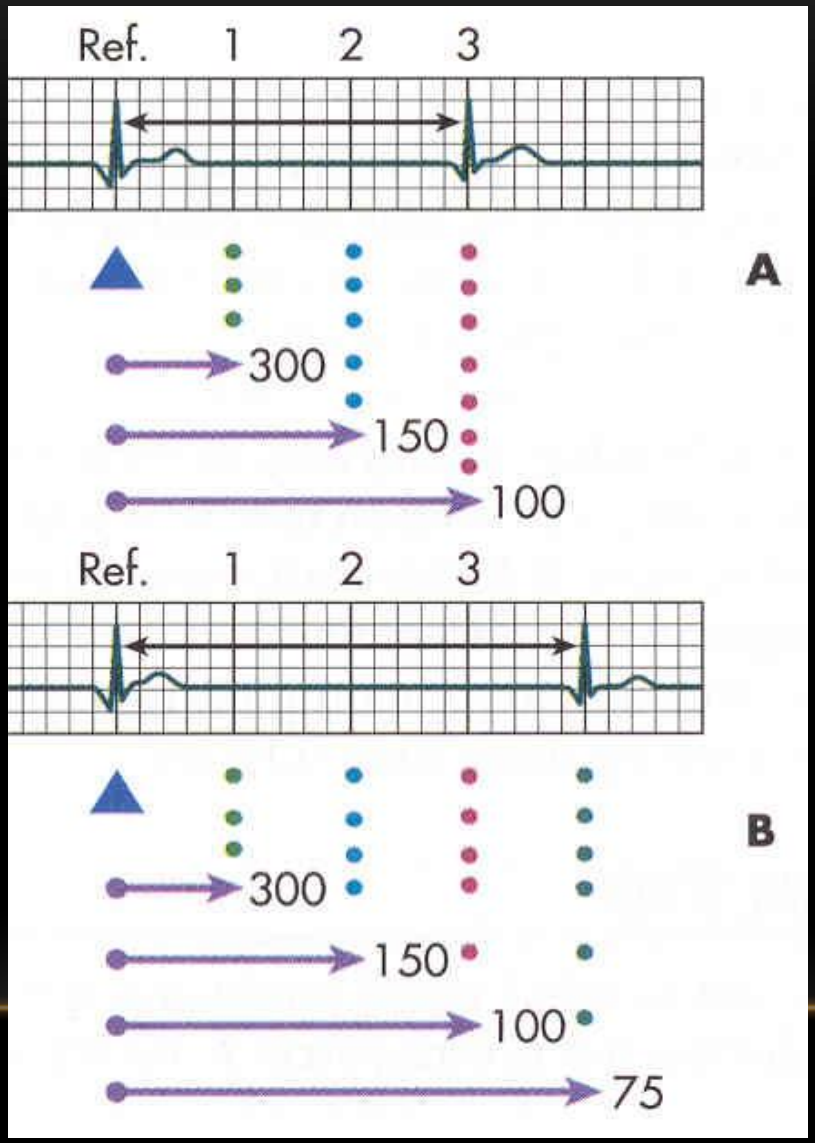
(1500 / 8) = 187 bpm

THE RULE OF 1500

It may be easiest to memorize the following table:

# of big boxes	Rate
1	300
2	150
3	100
4	75
5	60

THE RULE OF 1500



RHYTHM

The Rhythem is defined as the time interrelationship between 2 (adjacent) “R” waves.

The rhythm of the heart can be regular or irregular.

AXIS (Rule of the thumb)

Leads I and III are used (but I and AVf can also be used)

- Both +ve (Normal axis)
- I +ve and III –ve (Left axis deviation)
- I –ve and III +ve (Right axis deviation)

THANK YOU