Understanding ECG Scans

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The fundamentals of Electrocardiograms

- Contraction and relaxation of cardiac muscle is caused by depolarisation and repolorisation of myocardial cells
- Electrical changes recorded via electrodes placed on limbs and chest wall are then transcribed to graph paper to produce an **electrocardiogram** (ECG)
- ECG provides information about electrical activity from **12 separate views** of the heart based on a specific anatomical region - we can therefore work out which part of the heart is affected

How do I interpret ECG intervals and segments?

ECG Component	Where to measure	What does this indicate
R-R interval	From peak to peak of R waves	Shorter interval = faster heart rate
QRS complex	Start of Q wave to end of S wave	Wider QRS complexes may be caused by abnormal ventricular depolarisation (contraction)
PR interval	Start of P wave to start of Q wave	Longer interval = slowed conduction from the atria to ventricles
ST segment	End of S wave to start of T wave	Elevated ST segment = myocardial infarction or ischaemia
QT interval	Start of Q wave to end of T wave	Longer interval = prolonged repolarisation of the ventricles = arrhythmia

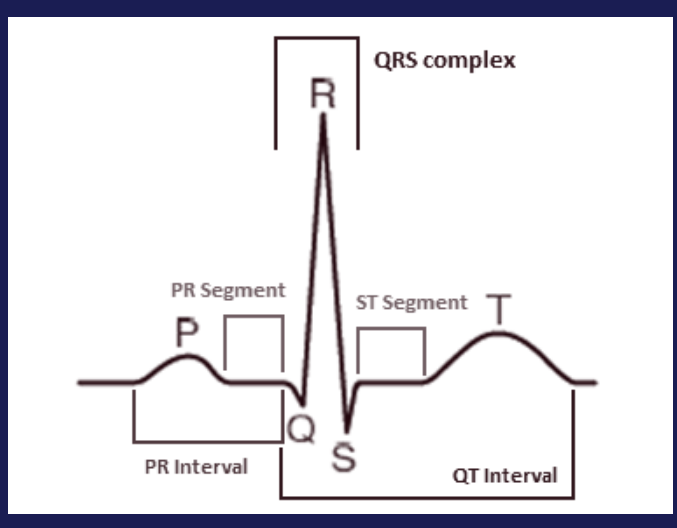
How do I calculate heart rate from an ECG?

1. When the rhythm is regular:

   Divide 300 by the number of large squares in one R-R interval. For example, if the interval between two QRS complexes is two large boxes, then the rate is 150 beats per minute (300/2 = 150 bpm)

2. When the rhythm is irregular:

   Count the number of QRS complexes in 6 seconds, then multiply by 10 to get the total heart beats in 60 seconds (1 minute)



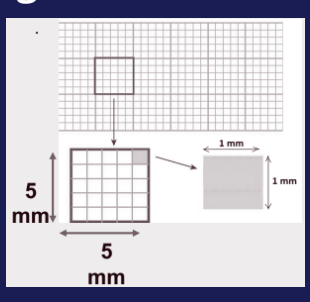
Intervals determine the type of rhythm:

- A normal PR interval should be **0.12 - 0.20 seconds** or 3-5 small boxes
- A normal QRS interval should be < **0.12 seconds** or < 3 small boxes
- A normal corrected QT interval should be **< 0.44 seconds** or < 11 small boxes

Further information on calculating heart rate:

ECG paper has:

- Small squares (1mm x 1mm)
- Large squares (5mm x 5mm)



Based on this:

- 1 small square = 40 millli seconds
- 1 large square = 200 milli seconds (5 x 40 milli seconds = 200 milli seconds/ 0.2 seconds)
- 5 large squares = 1 second (5 x 200 milli seconds)
- 30 large squares = 6 seconds (30 x 200 milli seconds)
- 300 large squares = 1 minute (300 x 200 milli seconds)