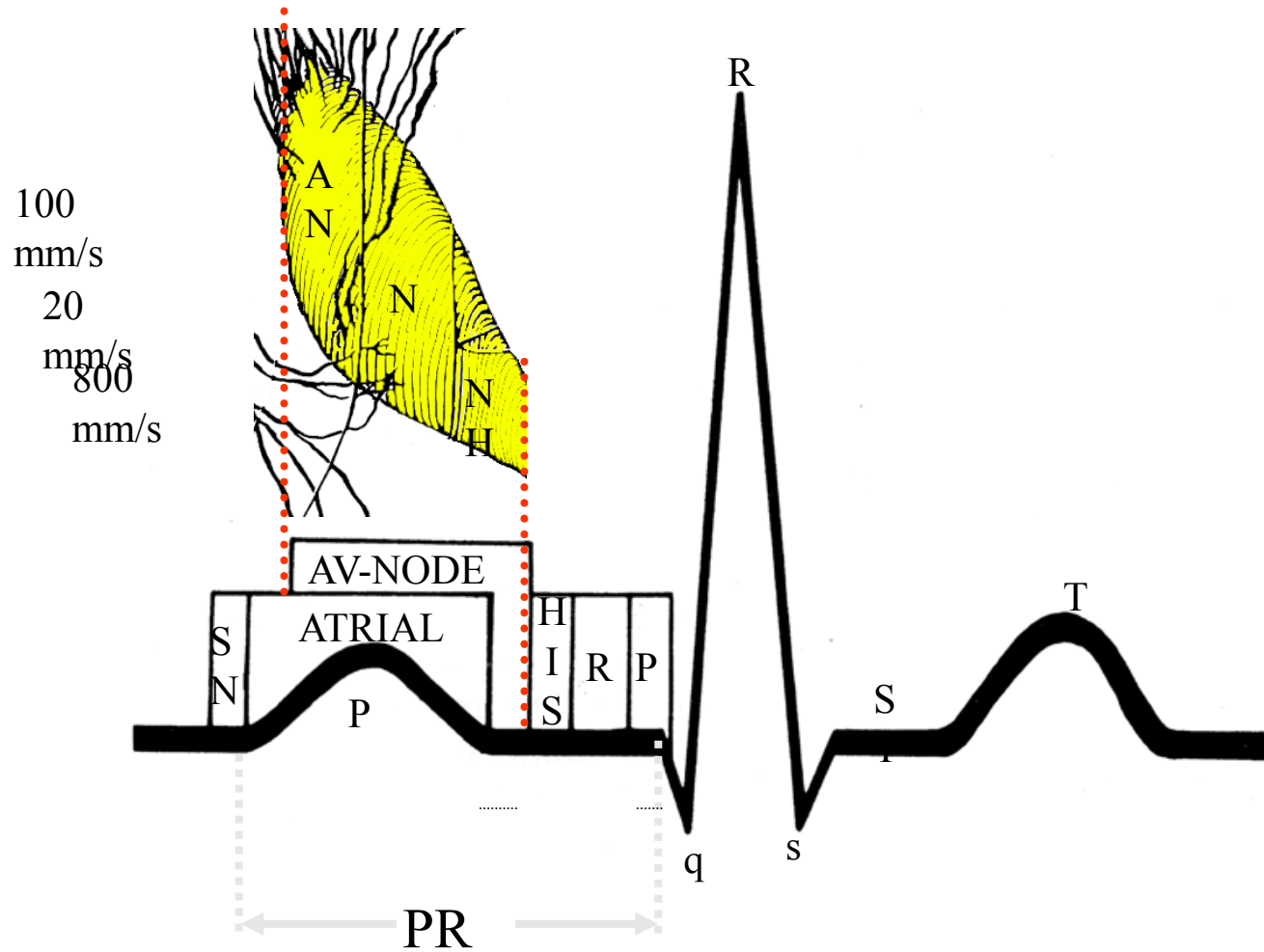# The normal and abnormal PR interval

THE PR INTERVAL

Representation of the PR interval of the onset of P wave at the onset of the QRS complex.
During the PR interval, the stimulus runs through the SA node(SN), the atria, the AV node, the His bundle, Purkinje branches and arborizations.
In the superior part of the figure the three areas of the AV node are represented: AN region (conduction velocity: 100 mm/s), N or central region (conduction velocity: 20 mm/s) and the NH region (conduction velocity: 800 mm/s).

PR interval
## Variations of PR interval with age (Values with normal heart rate)

Age	Average ms	Minimum/ms	Maximum/ms
Premature	90		
Full-term healthy newborn	100	80	120
From 1 to 6 Months	115	90	140
From 3 years to 8 years of age	130	100	160
From 8 years to 16 years of age	140	100	180
Adults	120	160	200
Elderly	120	165	210
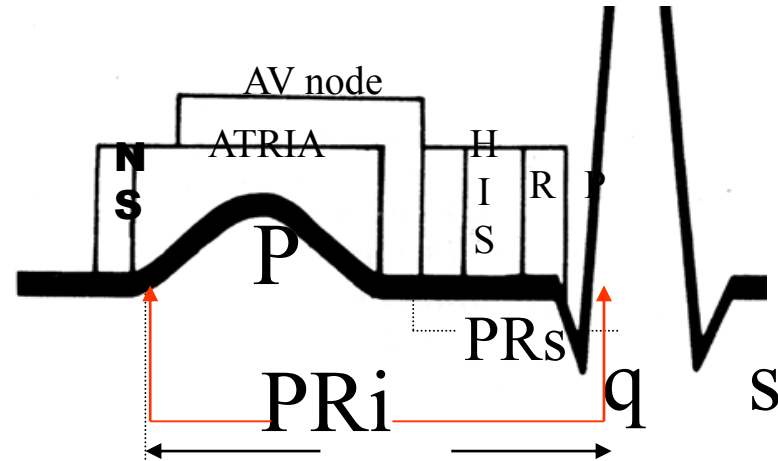
Normal values for the PR interval are related to age and heart rate.

Physiological and pathological causes of short and long PR intervals.

✓ Short PR interval (< 120ms)
  ✓ With wide QRS: delta wave: Wolff-Parkinson-White Syndrome.
  ✓ With negative P wave on inferior leads II, III and aVF.
  ✓ With normal P and QRS waves Accelerated AV conduction.
  ✓ Short PR interval without a δ wave and a prolonged QRS interval, supraventricular and ventricular arrhythmias, and concentric left ventricular hypertrophy is suspect of Anderson-Fabry disease.(Gambarin 2010) Junctional complex, are narrow regular rhythms arising from the AV node. P waves are either absent or abnormal (e.g. inverted) with a short PR interval (=retrograde P waves).

✓ Long PR interval: First degree of AV block. May occur in isolation or co-exist with other blocks (e.g., second-degree AV block, trifascicular block)
  ✓ Physiologic: Vagotony (Atropine shortens the PR interval).
  ✓ Pathological:
    ✓ Coronary insufficiency: Obstruction of left anterior descending artery.
    ✓ Acute rheumatic fever (minor signal of Jones).
    ✓ Digitalis intoxication.
    ✓ Ostium primum defect and complete AV septal defect.
    ✓ Holt-Oran syndrome.
    ✓ Ebstein's anomaly of the Tricuspid Valve (20% of cases).
    ✓ Congenitally Corrected transposition of the Great Arteries and Brugada syndrome
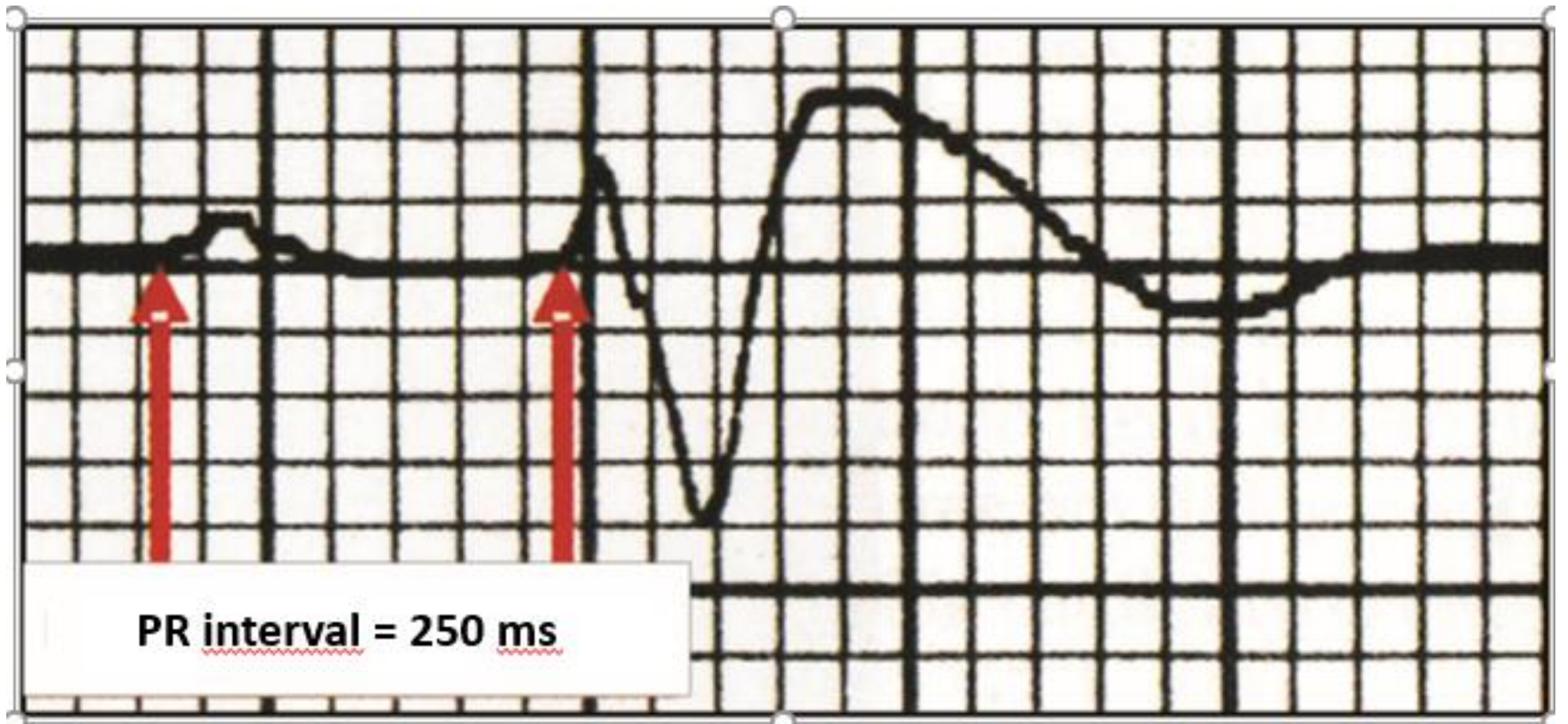
PR interval = 250 ms

The figure shows a tracing of a symptomatic patient with Brugada syndrome after intravenous ajmaline injection. First-degree atrioventricular block (PR interval = 216 ms) and Brugada type-1 ECG pattern in V_1 lead (positive test).

In BrS the PR interval of ECG and the His bundle electrogram in approximately 50% of the cases are prolonged, even reaching sometimes figures of 100 ms (**Yokokawa 2007**). This prolongation of the PR interval is observed predominantly in cases where the SCN5A gene mutation can be proven (carriers). The presence of a prolongued HV interval is possible in HBE by the existence of intra-His or infra-His block.

PR prolongation consequence of HV split or HV prolongation is considered another ECG risk marker (**Miyamoto 2011**).
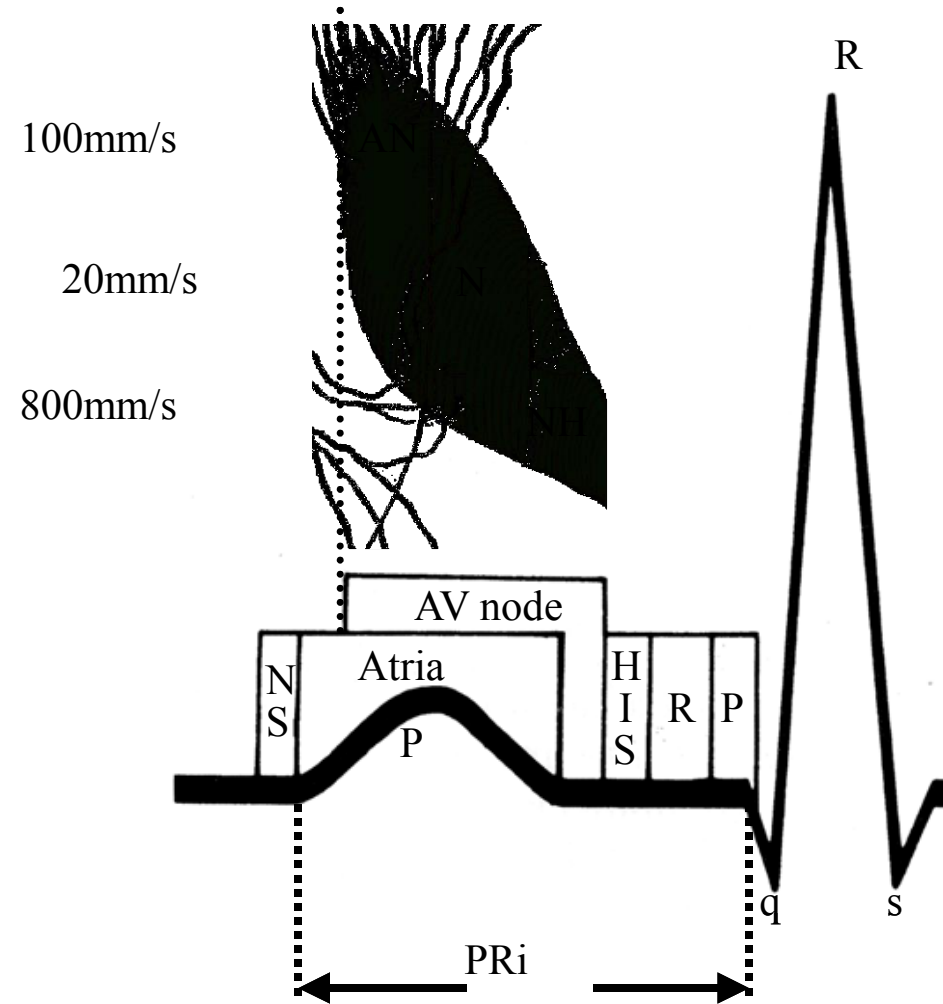
Proper measurement of the PR interval in three-channel device for simultaneous recording.
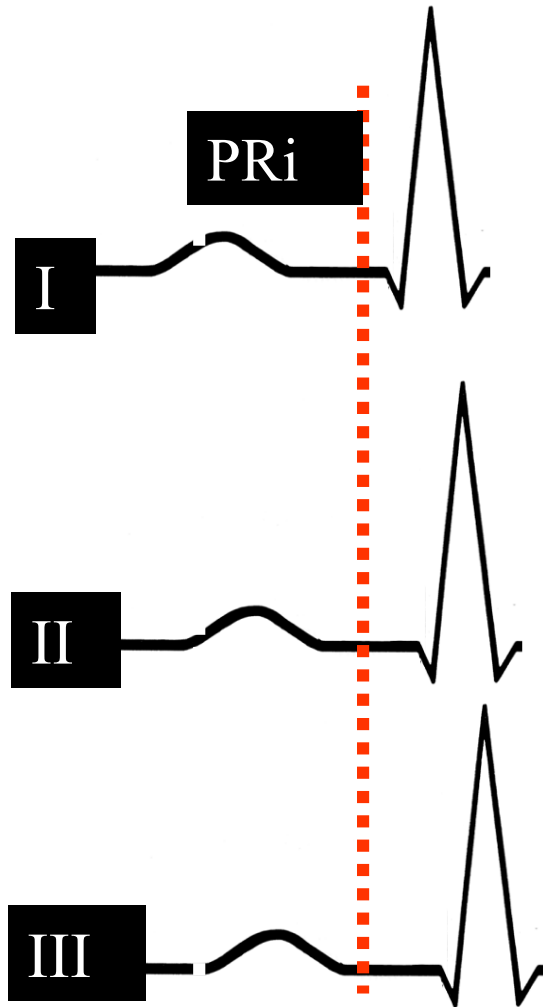
The lead that starts before should be considered the true onset; and the lead that ends before should be considered the end of the PR interval.

In the example, I is the lead that expresses the proper duration of the PR interval.

Interval & PR segment: PRs & PRi

Representation of PR interval of P wave onset at the beginning of the QRS complex. During the PR interval, the stimulus runs through the SA node, the atria, the AV node, the His bundle, Purkinje branches and arborizations. In the superior part of the figure the three portions of the AV node are represented: AN region (conduction velocity: 100 mm/s), N or central region (conduction velocity: 20 mm/s) and the NH region (conduction velocity: 800 mm/s).

PR or PQ segment (PRs-PQ)
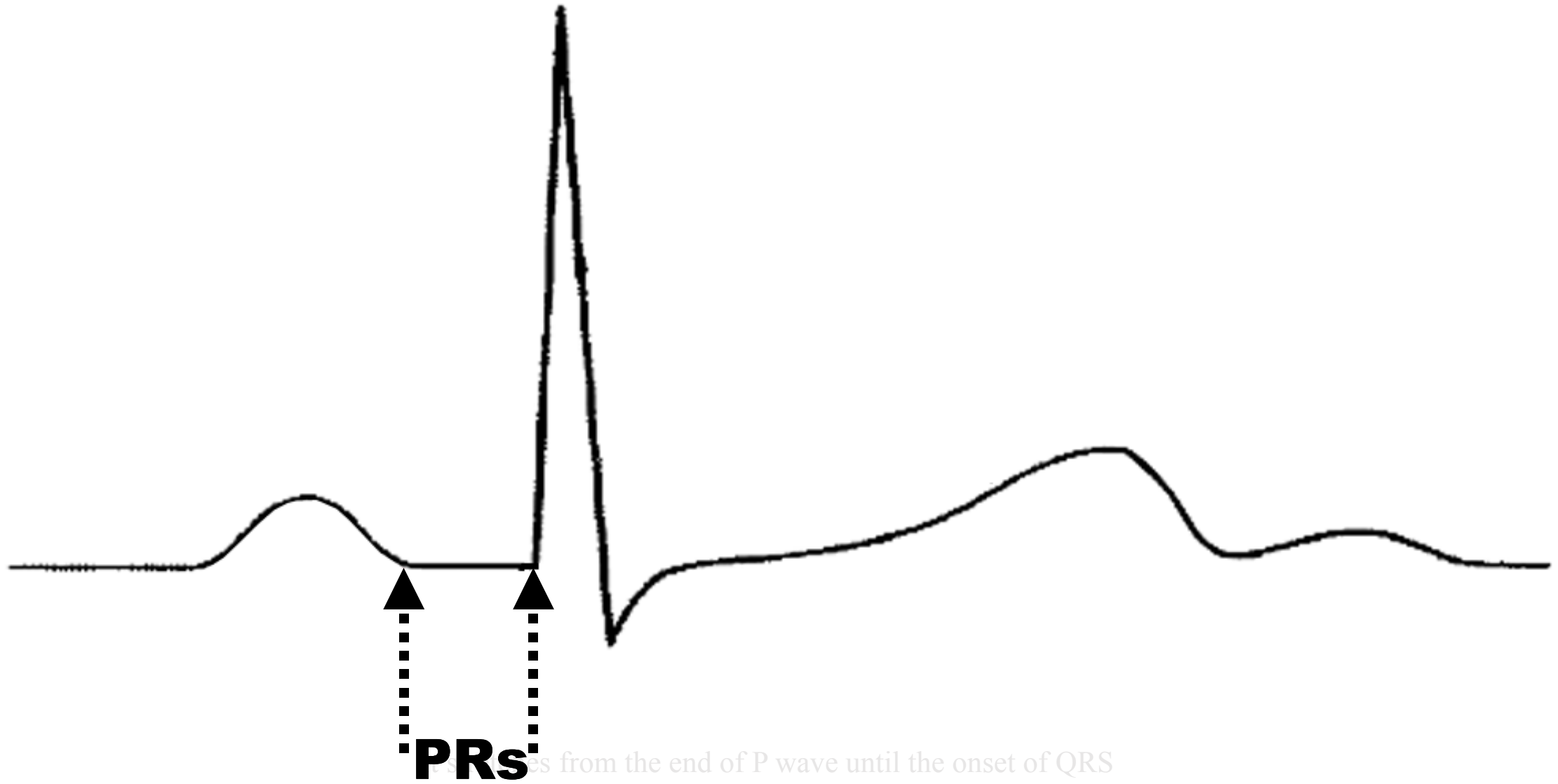
PRs

R with q or r wave). presentation of the PR segment from the end of the P wave to the onset of the QRS complex (onset)

PR or PQ Segment (PRs-PQ)

Concept of PQ interval when the QRS complex begins with the Q wave.