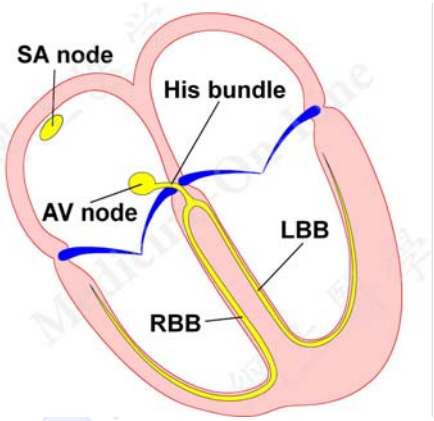
Introduction

Origin of the Heart Beat and Electrocardiogram

Under physiological conditions, the sinoatrial (SA) node generates pacemaker impulses that spread to the right and left atria, converge on the atrioventricular (AV) node, and continue down the His bundle and bundle branches (right bundle branch or RBB and left bundle branch or LBB) to activate the ventricles. Depolarization is followed by repolarization and the sequence of depolarization⇨activation-and-contraction⇨repolarization repeats itself to generate rhythmical heart beats. Under abnormal conditions, ectopic foci in the atria, the AV junction, and the ventricles can usurp pacing dominance from this node and generate ectopic beats.



The wave of depolarization and repolarization described above can be mapped on the body surface by sensing electrodes placed on the extremities and the chest wall. The resultant waveform traced on graph paper is called the electrocardiogram (ECG).

The ECG Graph Paper

Horizontal axis of the ECG graph paper represents time in milliseconds (ms) while the vertical axis represents amplitude or voltage in millivolts (mV). Each 1-mm-division on the horizontal axis is 40 ms; each 5-mm-division is 200 ms. Two 5-mm-divisions on the vertical axis are calibrated to represent 1 mV. Despite the latter, ECG waves are commonly described by their height in mm rather than by their strength in mV.