Waves and Intervals

I. P Wave
- A. Characteristics
  - 1. Pacemaker site
    - -SA node
  - 2. Relationship to A&P
    - -represents normal depolarization of the atria
    - -P wave occurs normally during ventricular diastole
  - 3. Description
    - -onset is first abrupt or gradual deviation from baseline
    - -end is where wave flattens out and returns to baseline
    - -direction is positive in lead II
    - -duration is 0.10 sec or less
    - -amplitude is 0.5 to 2.5 mm in lead II
    - -rarely over 2.0 mm high
    - -shape is smooth and rounded
    - -a QRS normally follows every sinus P wave
  - 4. Significance
    - -a normal sinus P wave indicates that the electrical impulse originated in the SA node and normal depolarization of the R and L atria has occurred

II. PR Interval
- A. Characteristics
  - 1. Relationship to A&P
    - -represents the time of progression of the impulse from the SA node, an ectopic pacemaker in the atria, or an ectopic or escape pacemaker in the AV junction, through the entire electrical conduction system
  - 2. Description
    - -PR interval includes a P wave and the short, flat isoelectric line that follows it
    - -PRI begins with the onset of the P wave and ends with the onset of the QRS
    - -duration is normally 0.12-0.20 sec
  - 3. Significance
    - -normal PRI indicates that the electrical impulse originated in the SA node and has progressed normally through the conduction system without delay

III. QRS Complex
- A. Characteristics
  - 1. Pacemaker site
    - -SA node
  - 2. Relationship to A&P
    - -represents normal depolarization of the ventricles
  - 3. Description
    - -onset is where the first wave of the complex begins to deviate from the baseline
    - -end is where the last wave begins to flatten out at, above, or below the baseline
    - -Q wave: first negative deflection
    - -R wave: first positive deflection
    - -subsequent positive deflections are R', R'', etc.
    - -S wave: first negative deflection after the R wave
    - -subsequent negative deflections: S', S'', etc.
    - -direction can be positive, negative, or equiphasic (positive and negative)
    - -duration is normally 0.06-0.10 sec or less
    - -duration of Q wave does not normally exceed 0.04 sec
    - -amplitude may vary from 1-2 mm to 15 mm or more

-normal Q wave is less than 25% of the height of the succeeding R wave
-shape of QRS complex is generally narrow and sharply pointed

4. Significance
-normal QRS indicates that the electrical impulse has originated in the SA node and has progressed normally from the Bundle of His through the R and L bundle branches and that normal depolarization of the R and L ventricles has occurred

IV. ST Segment

A. Characteristics

1. Relationship to A&P
-represents early part of ventricular repolarization

2. Description
-ST segment begins with the end of the QRS complex and ends with the onset of the T wave
-junction between QRS complex and ST segment is called the junction or J point
-duration is 0.20 sec or less
-amplitude is normally flat
-if elevated, it may be flat, concave, or arched
-if depressed, it may be flat, upsloping, or downsloping

3. Significance
-normal ST segment indicates that normal repolarization of the R and L ventricles has occurred

V. T Wave

A. Characteristics

1. Relationship to A&P
-normal T wave represents repolarization of the ventricles
-T wave occurs during the last part of ventricular systole

2. Description
-onset is the first abrupt or gradual deviation from the baseline
-end is where the T wave returns to the baseline
-direction is upright in lead II
-duration is 0.10 to 0.25 sec or greater
-amplitude is less than 5 mm
-shape is normally sharply or bluntly rounded and slightly asymmetrical
-normally the first part of the T wave is longer than the second

3. Significance
-normal T wave indicates that repolarization of the R and L ventricles has occurred

VI. U Wave

A. Characteristics

1. Relationship to A&P
-probably represents repolarization of a small segment of the ventricles after most of the R and L ventricles have been repolarized

2. Description
-onset is the first abrupt or gradual deviation from the baseline or downward slope of the T wave
-end is where it returns to the baseline
-direction is positive
-duration is not determined routinely
-amplitude is less than 2 mm and is always smaller than the T wave
-shape is rounded and symmetrical

3. Significance
-indicates repolarization of the ventricles has occurred