Section 2

Dysrhythmias

Objectives

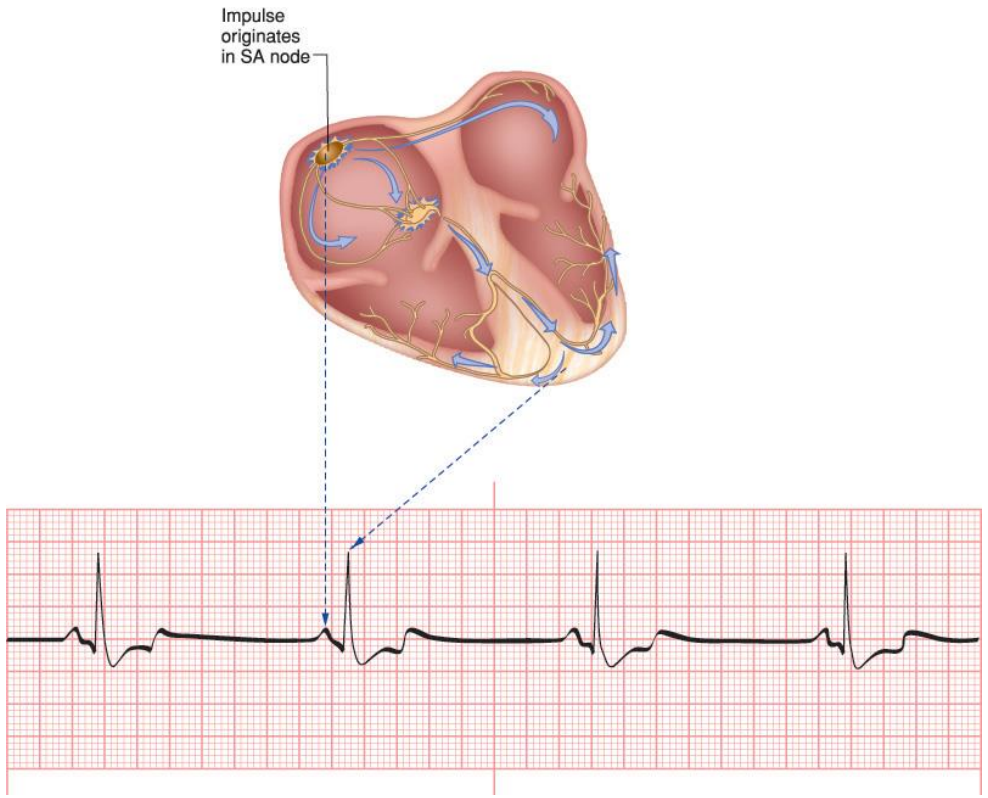
- At the conclusion of this presentation the participant will be able to
  - Outline a systematic approach to 12 lead ECG interpretation
  - **Dysrhythmias**
  - Demonstrate the process for determining axis
  - List criteria for LVH, RVH, RAE, LAE LBBB, RBBB, Bifasicular and trifasicular block, acute and chronic MI changes
  - Define other significant findings

Heart Rates

- Average adult has a heart rate of 60-100 BPM
- Heart rate < 60 BPM called *bradycardia*
- Heart rate > 100 BPM called *tachycardia*

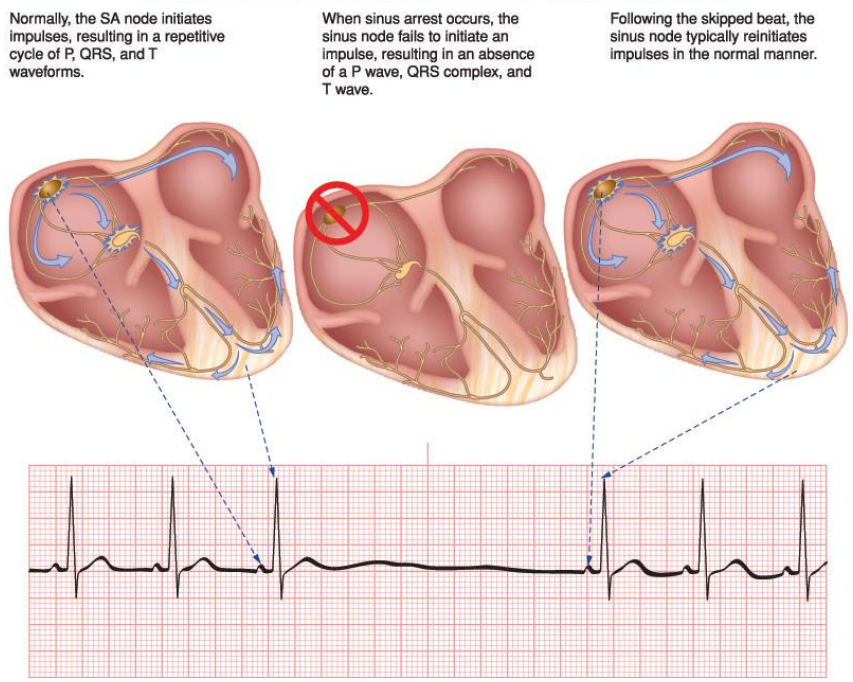
Sinus Bradycardia

- Slow rate that arises from SA node
- May or may not have an adverse affect on cardiac output
- In extreme cases it can lead to severe reductions in cardiac output and eventually deteriorate into asystole



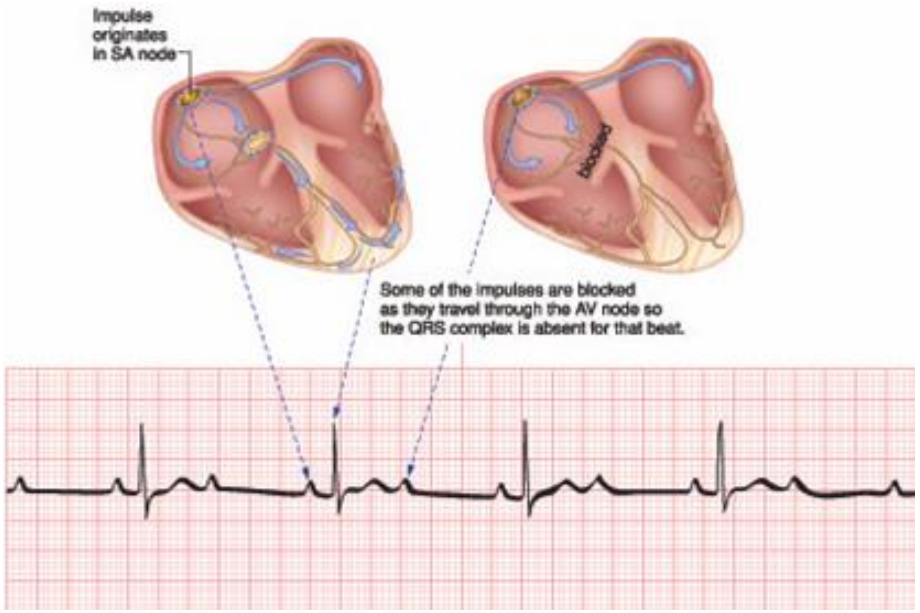
Sinus Arrest

- Transient failure of SA node to initiate a heartbeat
- Can lead to a slow heart rate



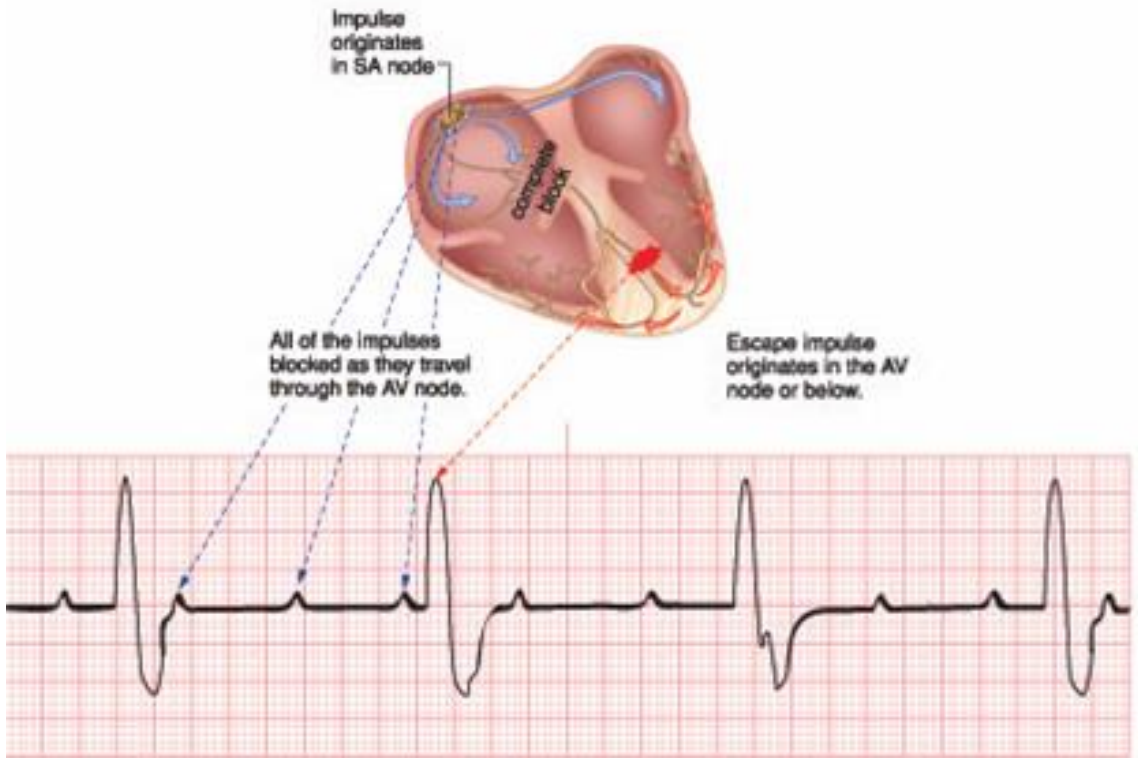
AV Heart Blocks

- Blockage of the impulse traveling through the AV node can cause a slow heart rate
- 2nd – degree AV heart block



AV Heart Blocks

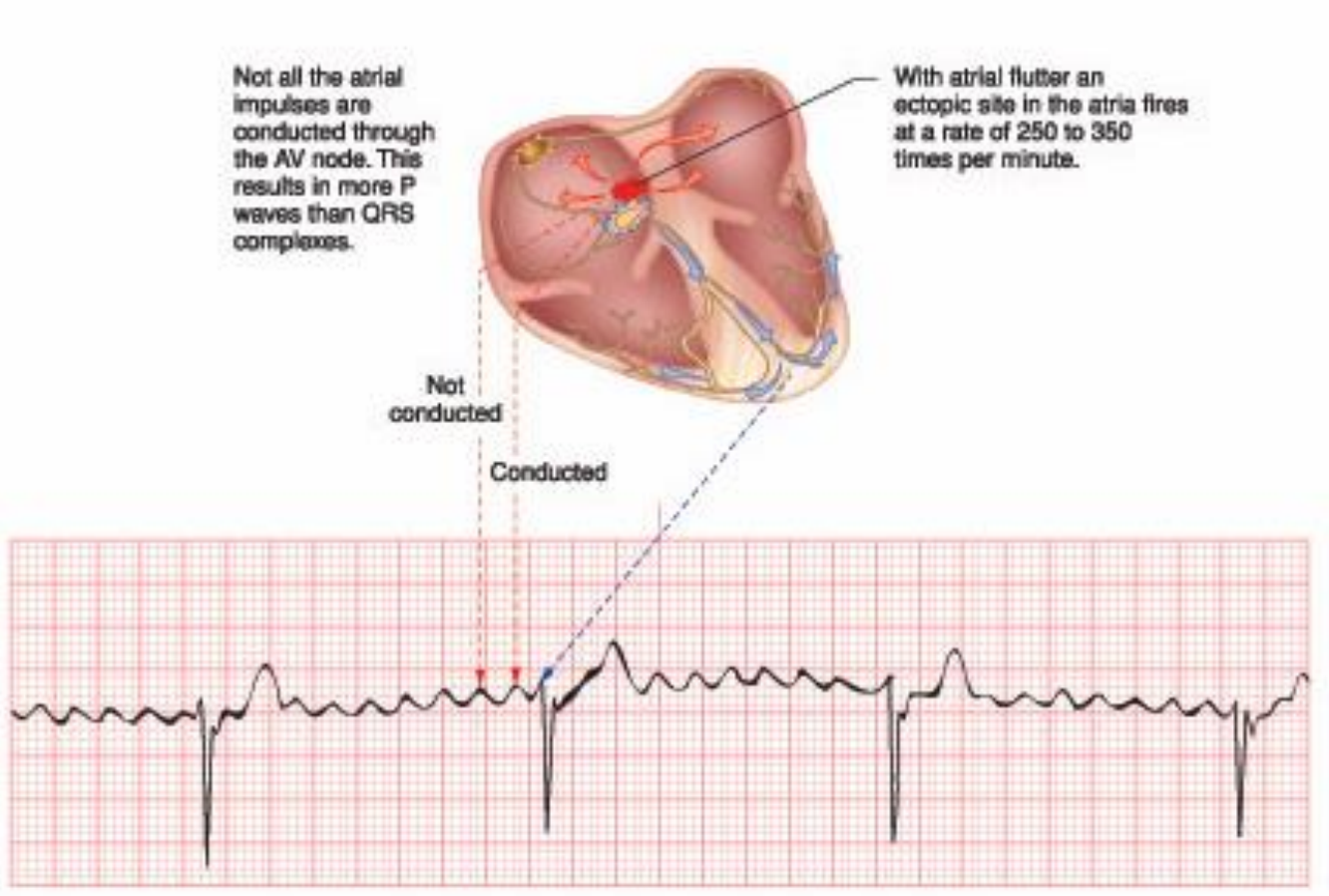
- 3rd - degree AV heart block occurs with complete blockage of AV node



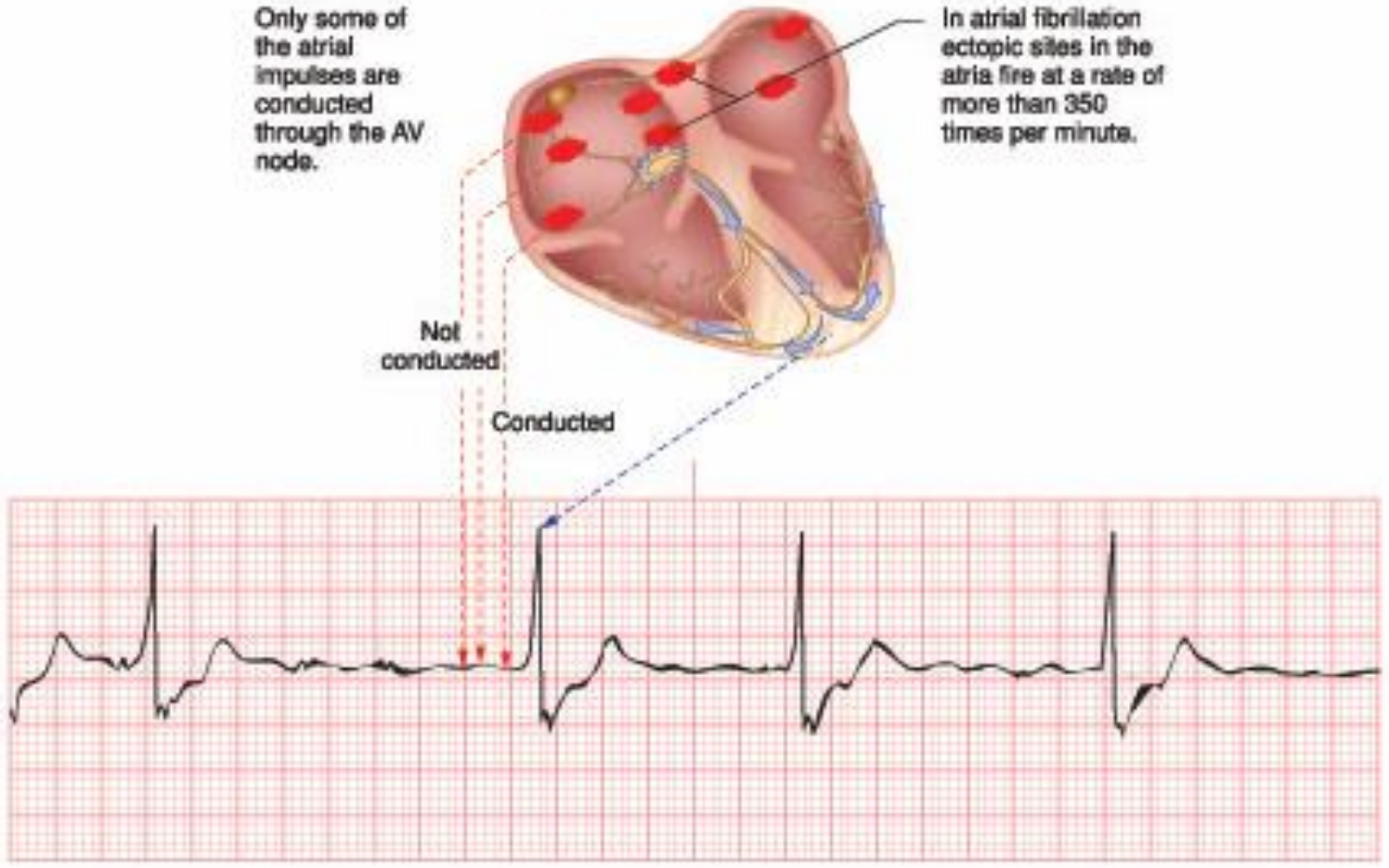
Rapid Atrial Rates With Slow Ventricular Rates

- Because of the rapid rate not all atrial impulses are conducted through to the ventricles
- A slower than normal ventricular rate can result if the number of atrial impulses reaching the ventricles falls to less than normal

Atrial Flutter

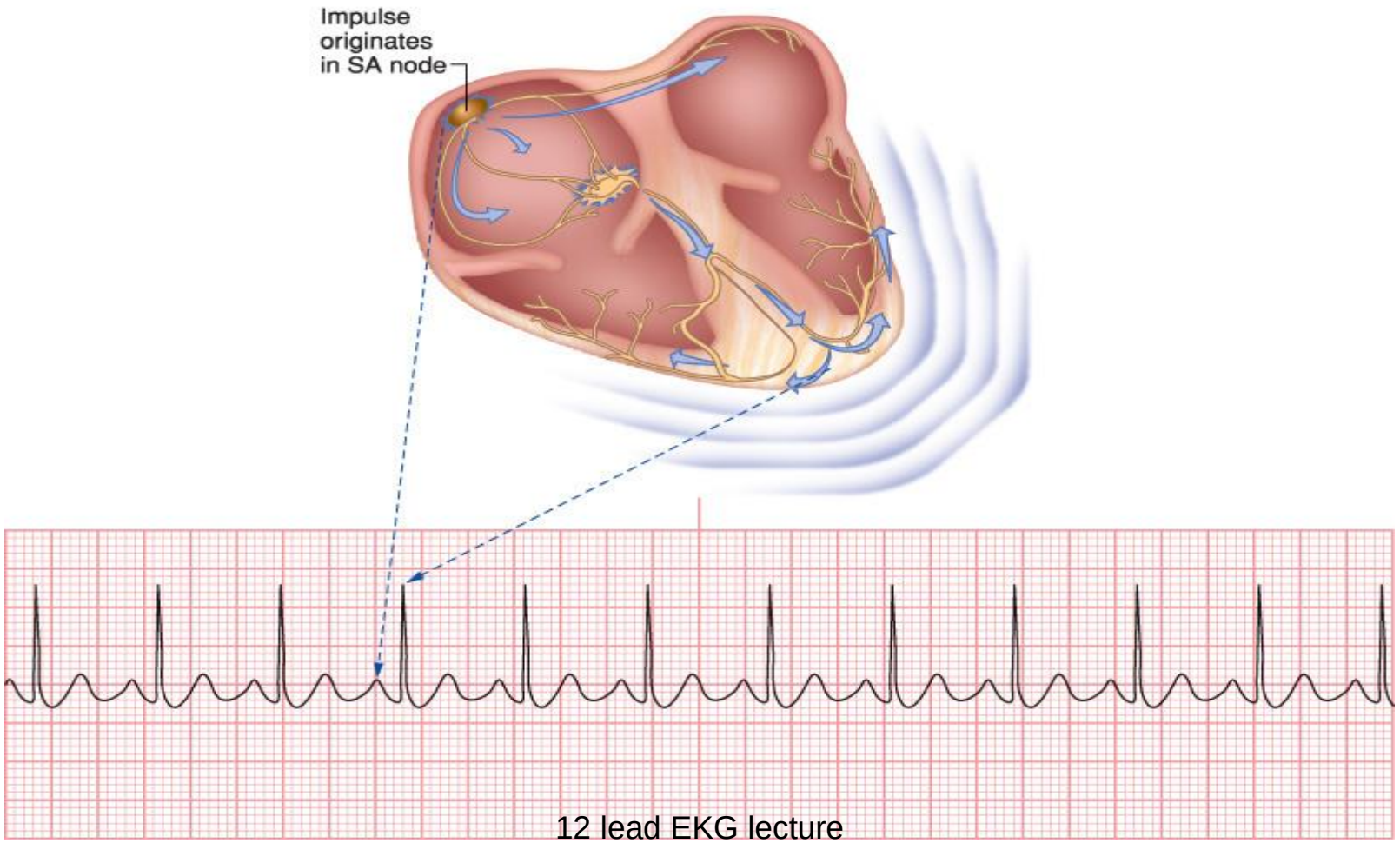


Atrial Fibrillation



Sinus Tachycardia

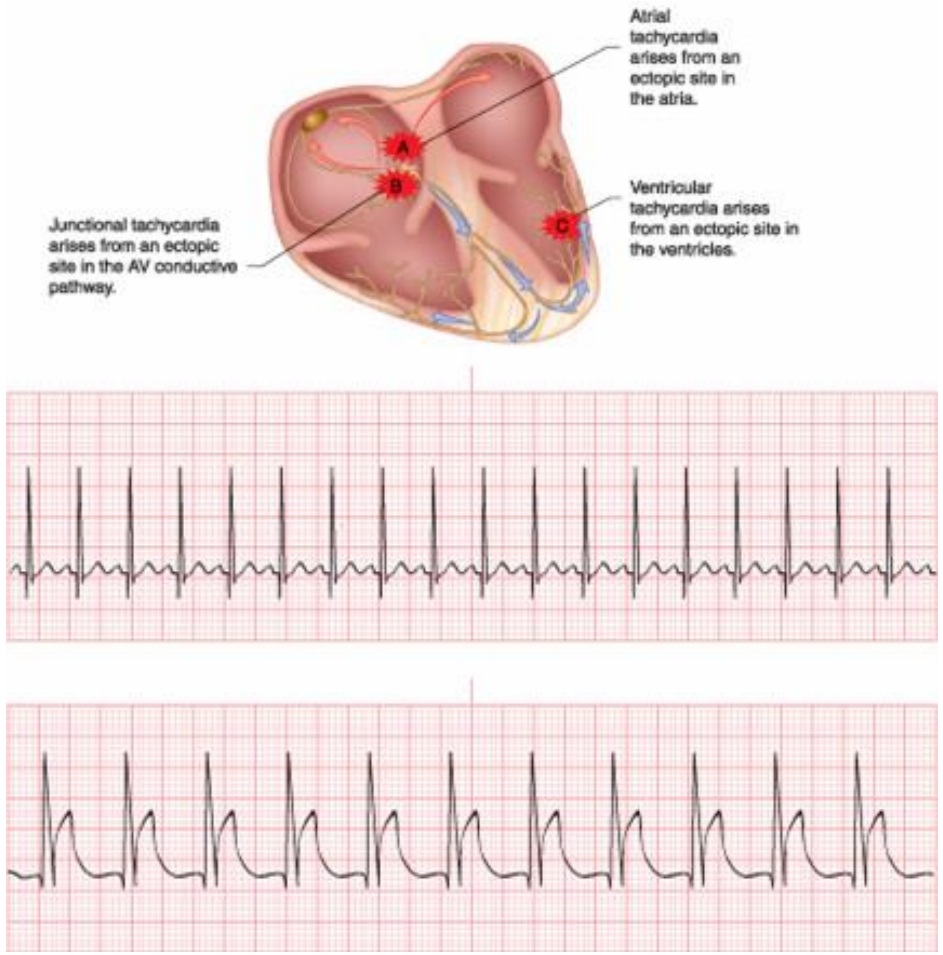
- Fast rate, > 100 BPM, arises from the SA node



Tachycardia From an Ectopic Pacemaker

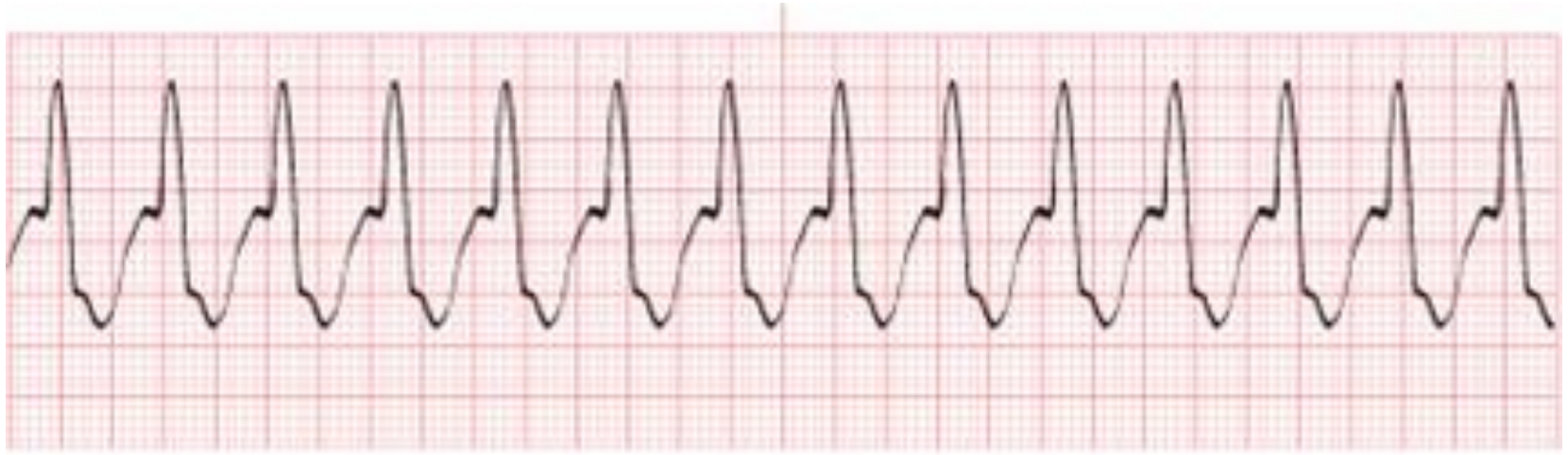
- Results from rapid depolarization that overrides the SA node
- *Supraventricular tachycardia* is term used for ectopic tachycardia arising from above the ventricles
  - Atrial tachycardia
    - Generally 150-250 BPM
  - Junctional tachycardia
    - Generally 100-180 BPM

Tachycardia From an Ectopic Site



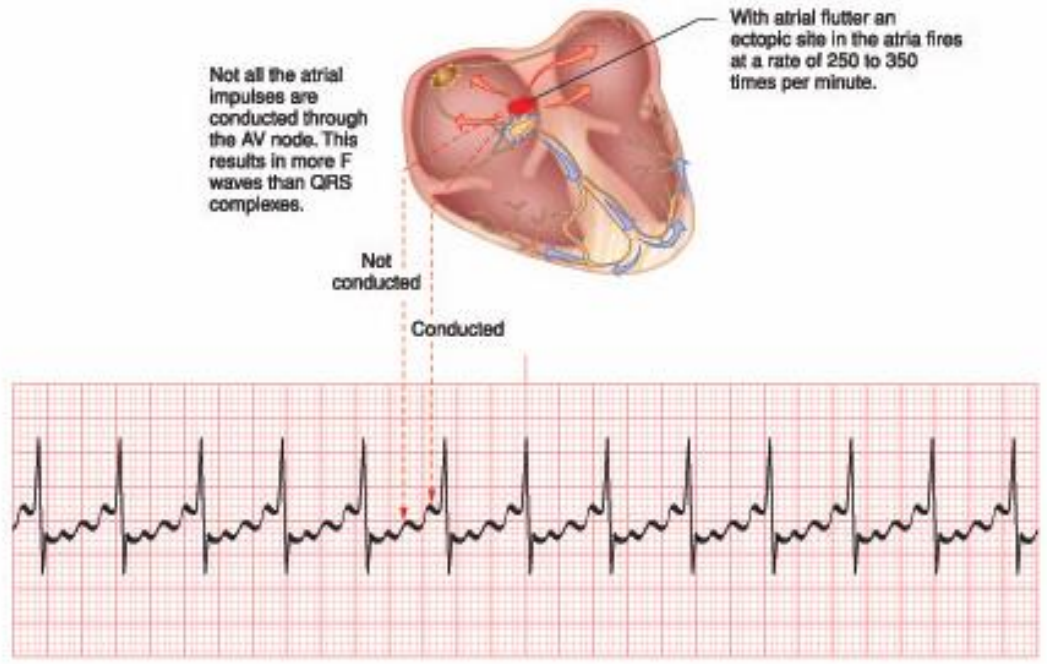
Tachycardia From an Ectopic Pacemaker

- Ventricular tachycardia arises in the ventricles and has a rate of 150-250 BPM



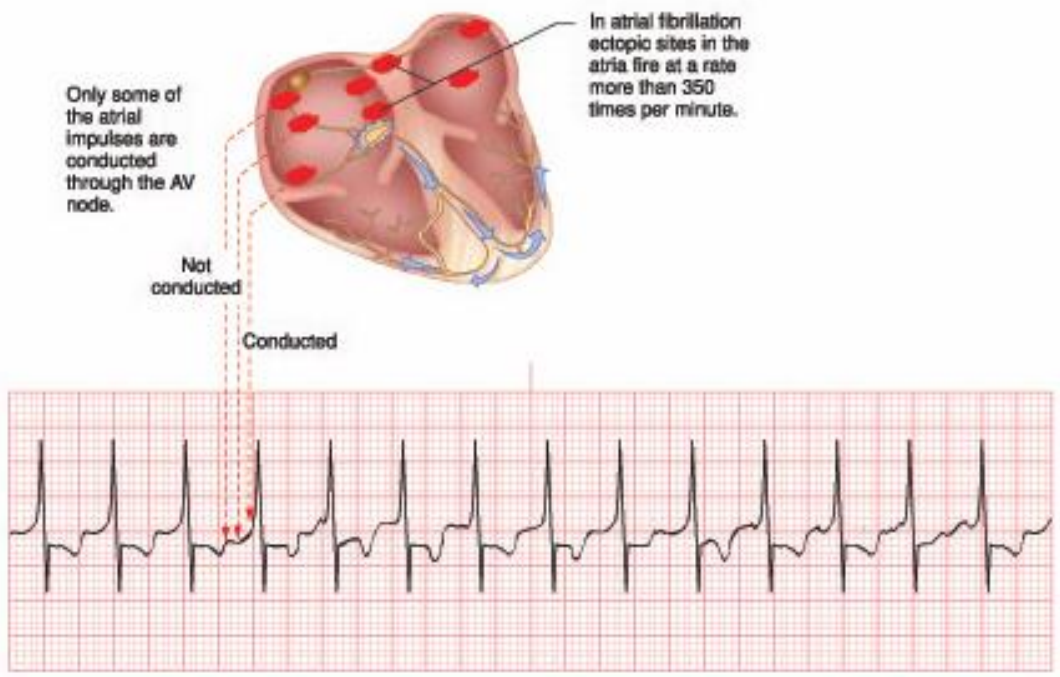
Rapid Atrial Rates With Fast Ventricular Rates

- In addition to having either a normal or slow ventricular rate in atria flutter the ventricular rate can also be fast



Rapid Atrial Rates With Fast Ventricular Rates

- In addition to having either a normal or slow ventricular rate in atria fibrillation the ventricular rate can also be fast



Summary

- Approach each ECG tracing analysis in a logical and systematic manner.

- Some dysrhythmias are of no problem to the patient whereas others are life threatening.

- Five steps to analyzing an ECG rhythm are determining the:
    1. Heart rate
    2. Regularity
    3. Presence of and characteristics of P waves
    4. Presence of and characteristics of QRS complexes
    5. Presence of and characteristics of the PR intervals

Summary

- To determine the heart rate first check to see if the rate is slow, normal or fast.
- The 6-second interval x 10 method multiplies by 10 the number of QRS complexes found in a 6-second portion of the ECG tracing.
- The 300, 150, 100, 75, 60, 50 method involves locating an R wave on a bold line on the ECG paper, then finding the next consecutive R wave and using the 300, 150, 100, 75, 60, 50 values for subsequent bold lines to determine the rate.
- To use the 1500 method count the number of small squares between two consecutive R waves and divide 1500 by that number.

Summary

- A heart rate less than 60 beats per minute is called bradycardia.
  - Slow heart rates are seen with sinus bradycardia, junctional escape rhythm, idioventricular rhythm, AV heart block and atrial flutter or fibrillation with slow ventricular response.

- A heart rate greater than 100 beats per minute is called tachycardia.
  - Fast heart rates are seen with sinus tachycardia, atrial tachycardia, junctional tachycardia, ventricular tachycardia and atrial flutter or fibrillation with rapid ventricular response.

Heart Blocks

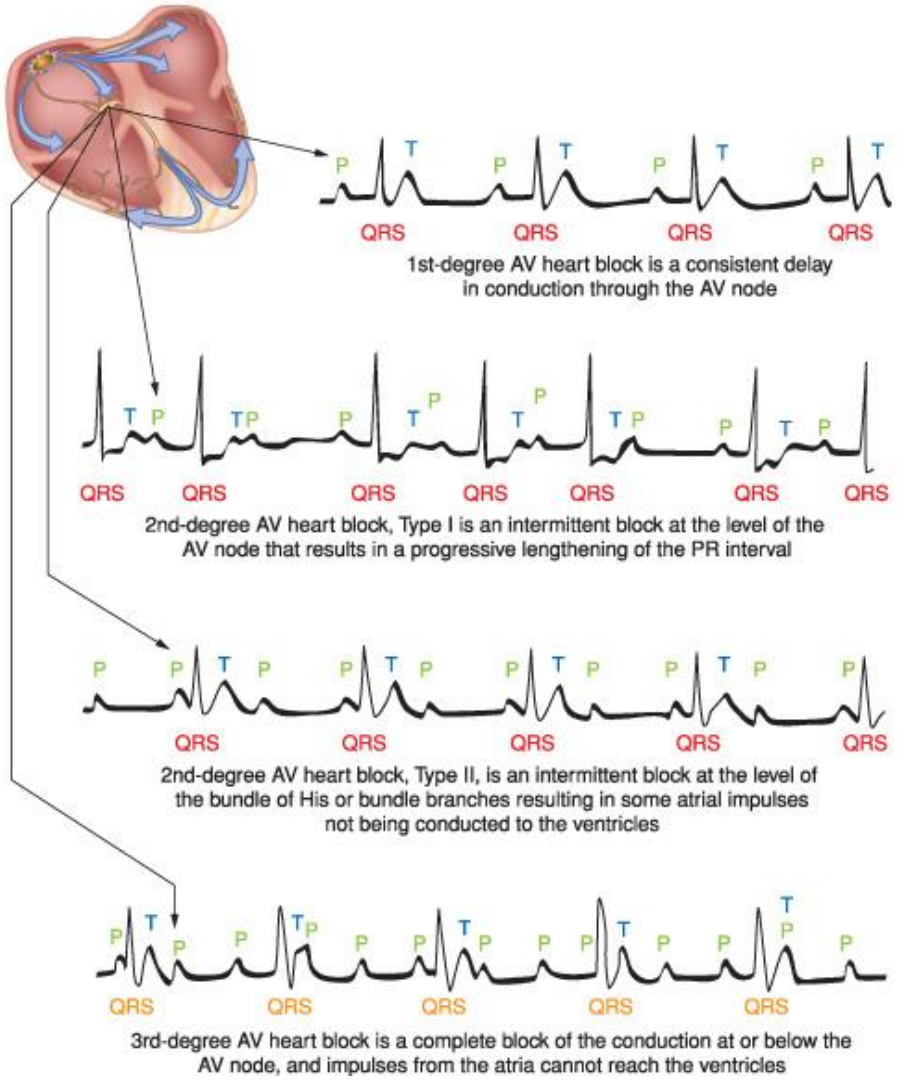
- Partial delays or complete interruptions in the cardiac conduction pathway between the atria and ventricles
- The degree of block defines the type and classification of heart block

Heart Blocks

- Common causes:
  - Ischemia
  - Myocardial necrosis
  - Degenerative disease of the conduction system
  - Congenital anomalies
  - Drugs (especially digitalis preparations)

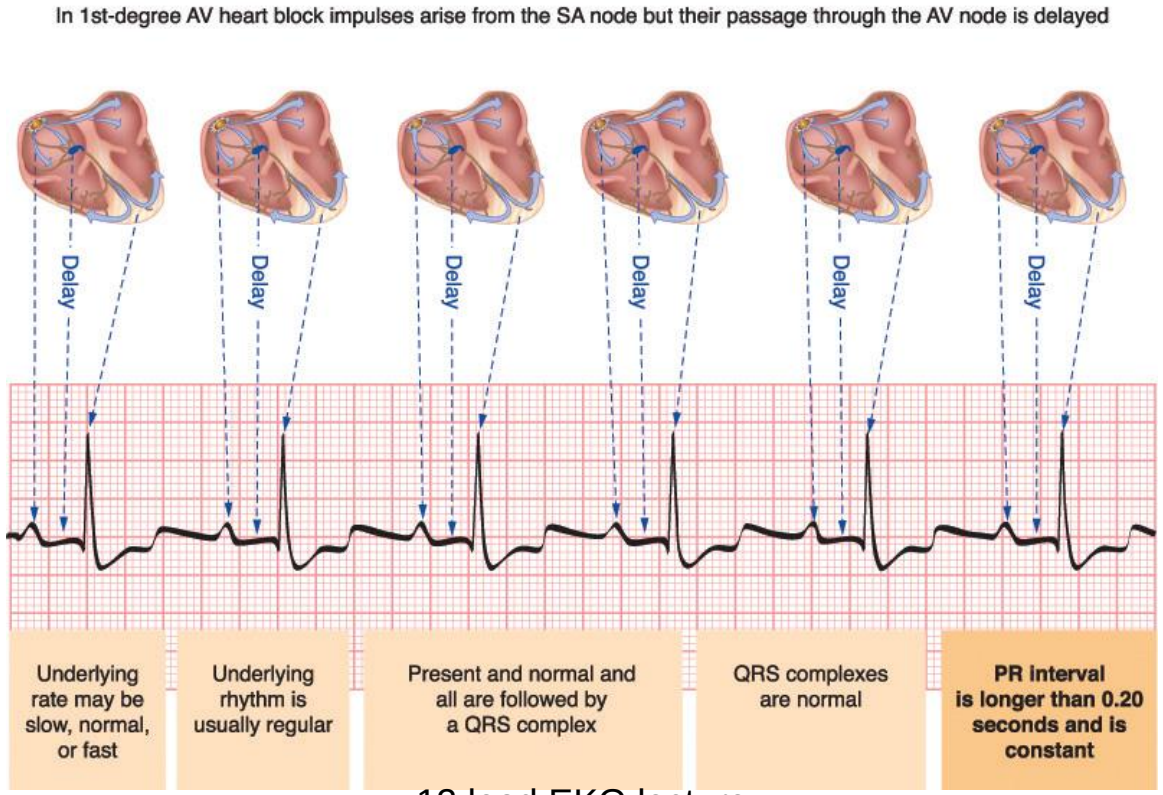
AV Heart Blocks

- 1st-degree AV heart block
- 2nd-degree AV heart block, Type I (Wenckebach)
- 2nd-degree AV heart block, Type II
- 3rd-degree AV heart block

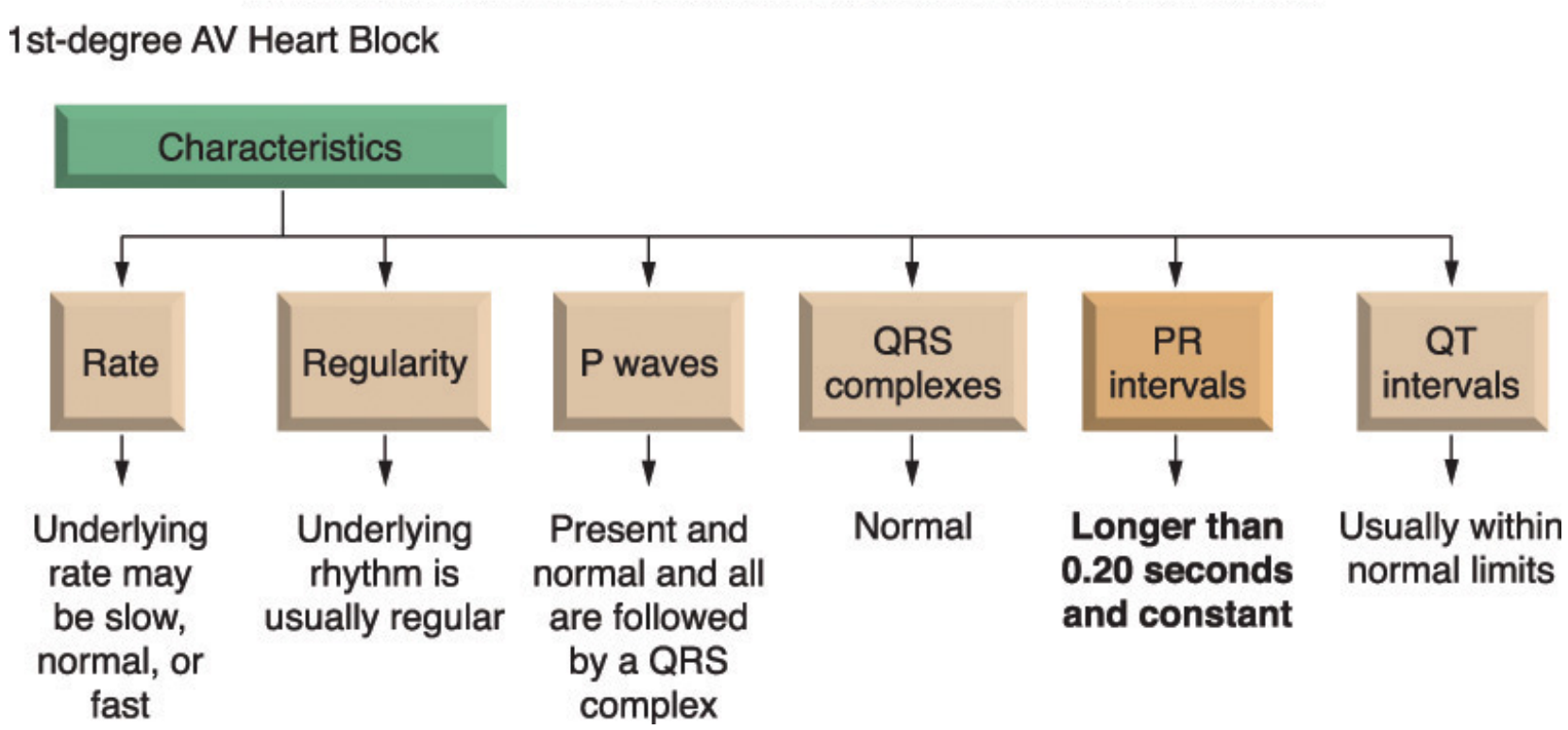


1st-Degree AV Heart Block

- Not a true block
- A consistent delay of conduction at the level of the AV node



1st-Degree AV Heart Block



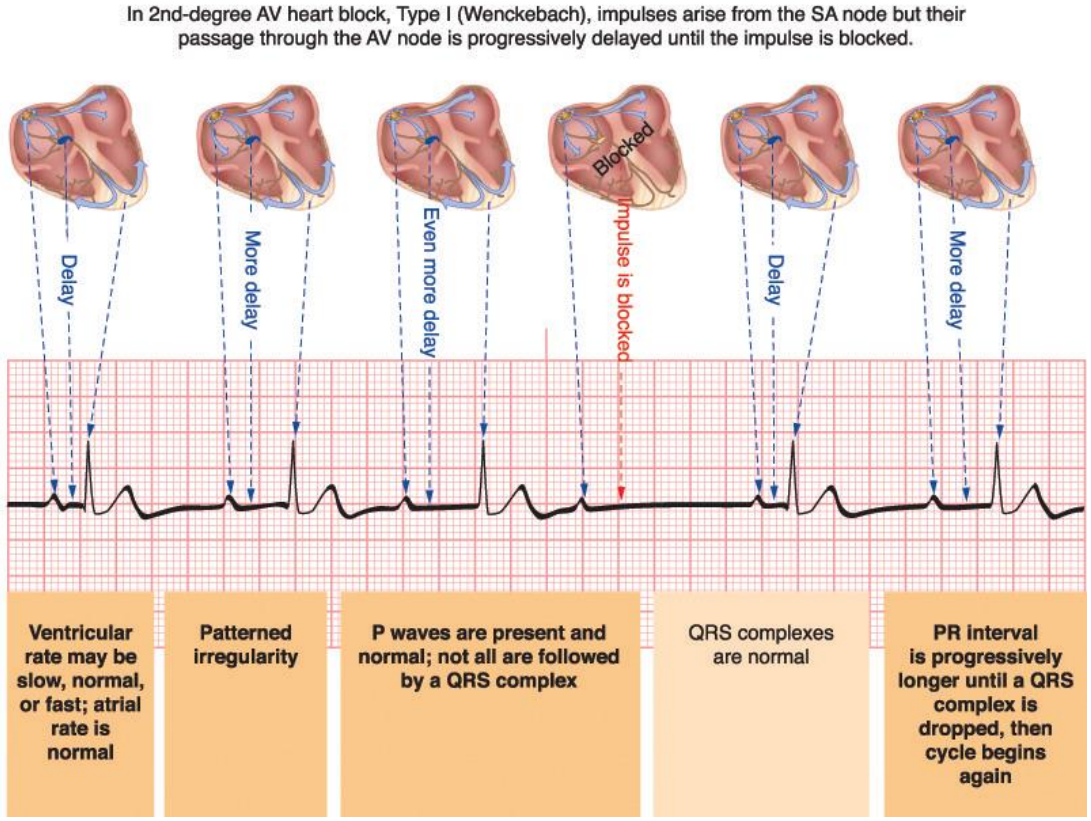
1st-Degree AV Heart Block

Table 12-1 1st-Degree AV Heart Block

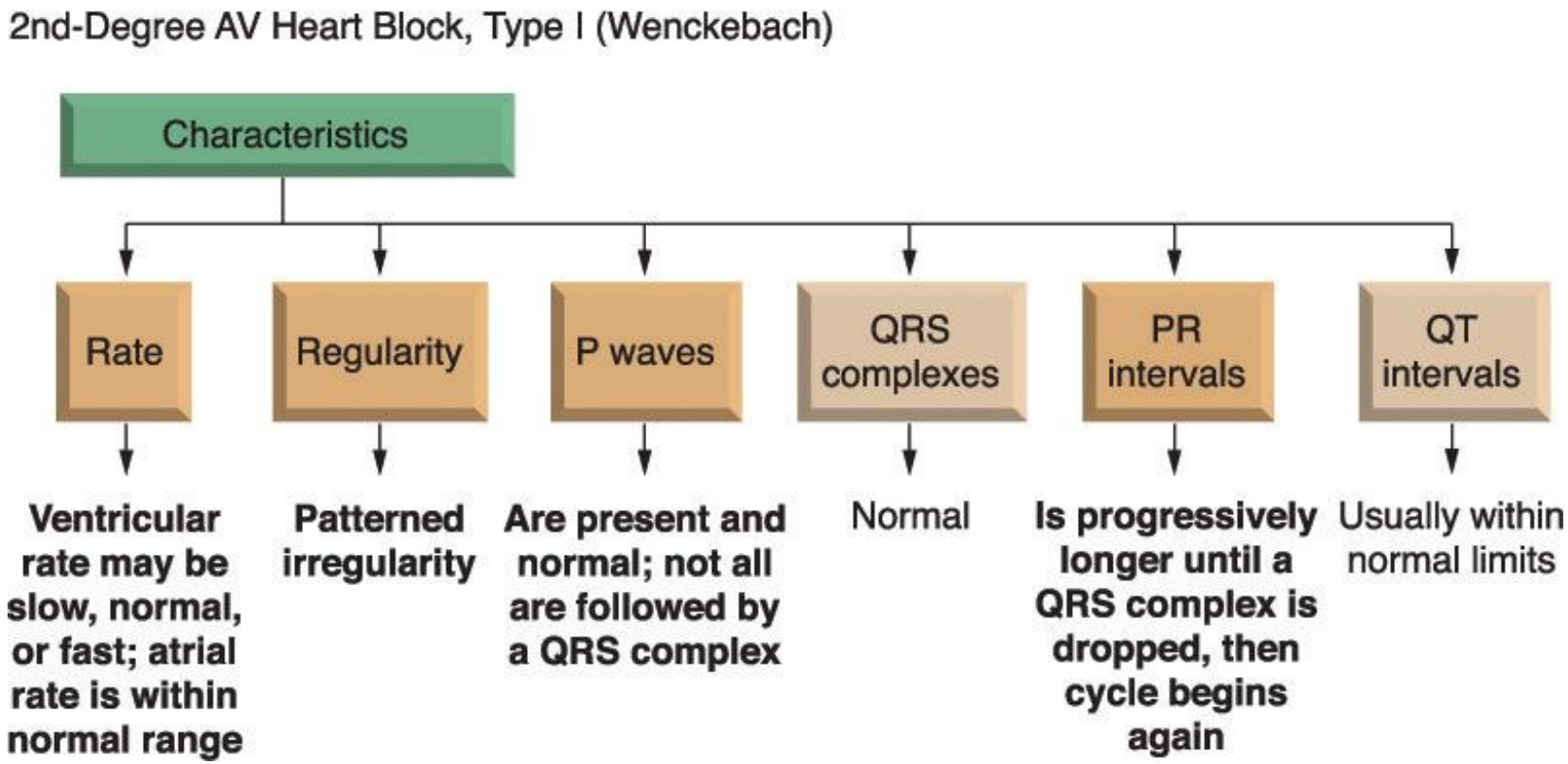
Causes of 1st-degree AV heart block	Examples
Cardiac disorders	Myocardial ischemia or infarction (often inferior wall MI), injury or ischemia to the AV node or junction, myocarditis, degenerative changes in the heart
Use of certain drugs	Digoxin, calcium channel blockers, beta-adrenergic blockers, quinidine, procainamide, amiodarone
Other	Increased vagal tone, hyperkalemia

2nd-Degree AV Heart Block, Type I

- Intermittent block at the level of the AV node
- Also referred to as Wenckebach

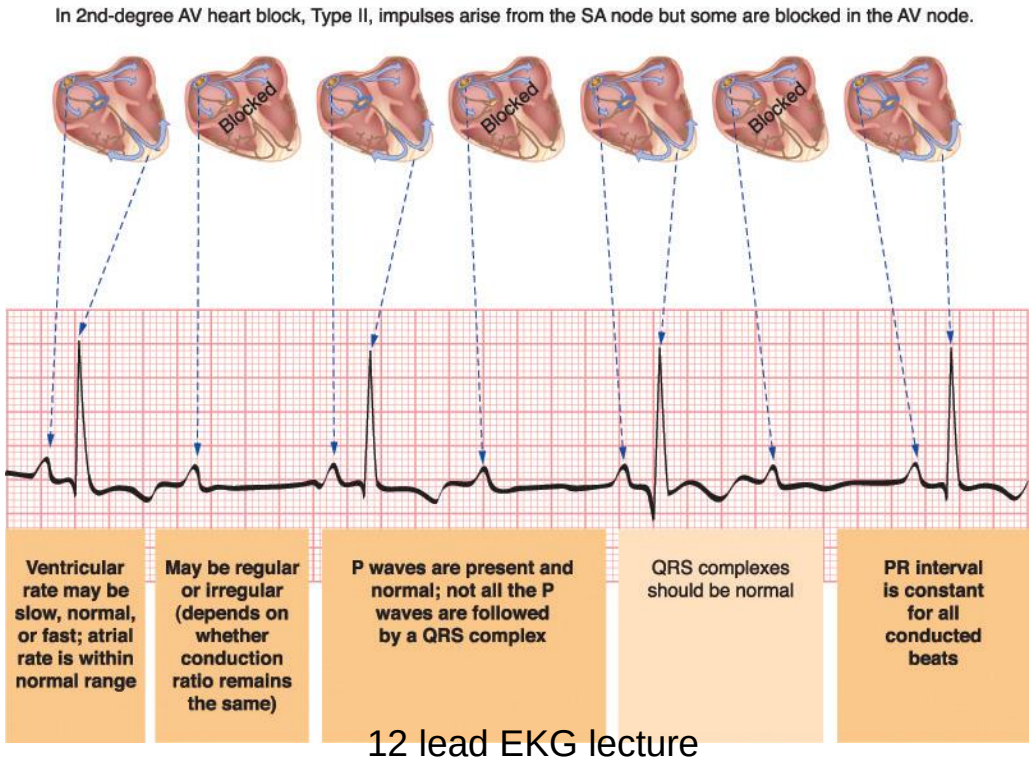


2nd-Degree AV Heart Block, Type I



2nd-Degree AV Heart Block, Type II

- Intermittent block at the level of the bundle of His or bundle branches resulting in atrial impulses that are not conducted to the ventricles

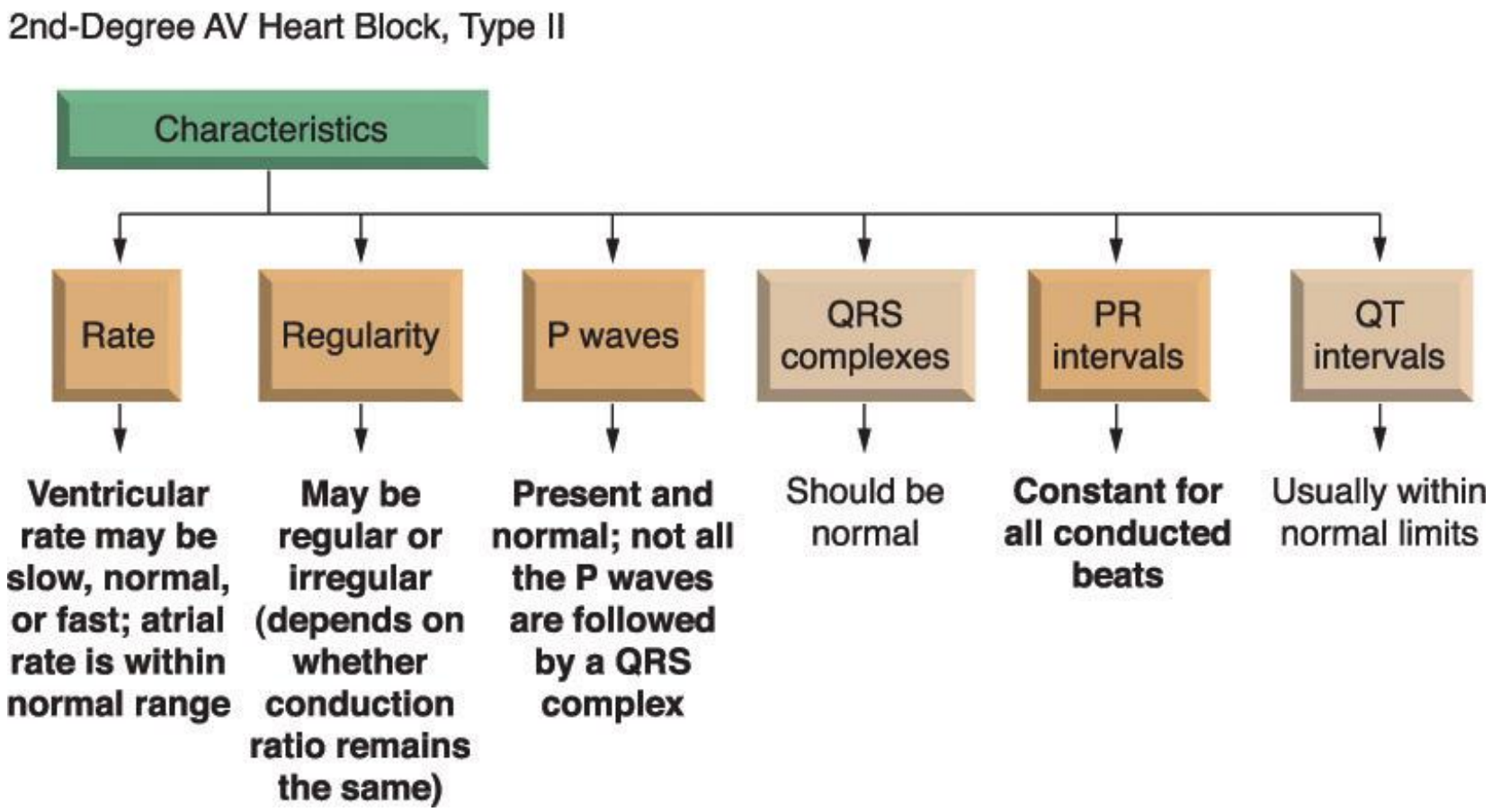


2nd-Degree AV Heart Block, Type I

Table 12-2 2nd-Degree AV Heart Block

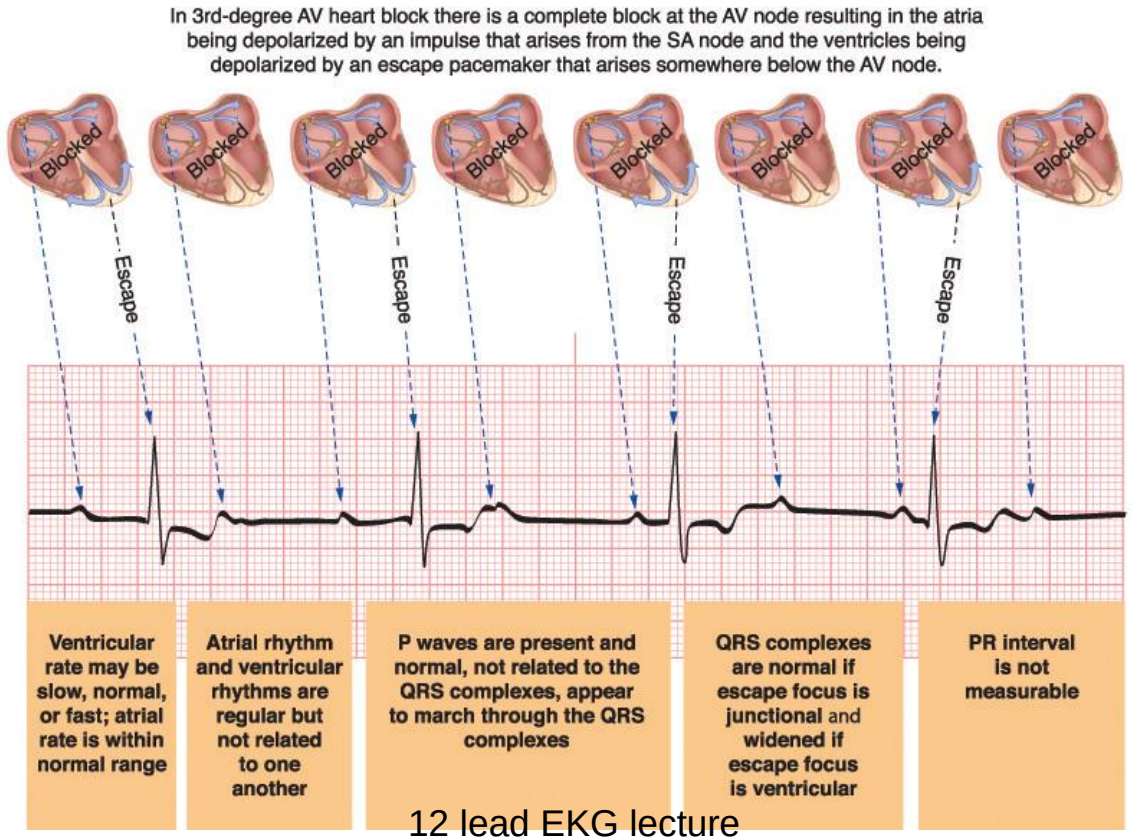
Causes of 2nd-degree AV heart block, Type I	Examples
Cardiac disorders	AV nodal ischemia secondary to right coronary artery occlusion, myocardial ischemia or infarction (inferior wall MI), myocarditis, rheumatic fever
Use of certain drugs	Digitalis, calcium channel blockers, beta-adrenergic blockers, verapamil
Other	Increased vagal tone, hyperkalemia

2nd-Degree AV Heart Block, Type II



3rd-Degree AV Heart Block

- Complete block of conduction at or below the AV node
- Impulses from atria cannot reach ventricles



3rd-Degree AV Heart Block

- Atrial pacemaker site is the SA node
  - Atrial rate 60 to 100 BPM
- Ventricular pacemaker site is an escape rhythm
  - From AV junction rate 40 to 60 BPM
  - From ventricles rate 20 to 40 BPM

Table 12-4 Types of AV Heart Blocks

	Rhythm	P Waves	QRS complexes	PR intervals
1st-degree	Underlying rhythm is usually regular	Present and normal; all the P waves are followed by a QRS complex	Normal	Longer than 0.20 seconds and is is constant
2nd-degree, Type I	Patterned irregularity	Present and normal; not not all the P waves are followed by a QRS complex	Normal	Progressively longer until a QRS complex is dropped; the cycle then begins again
2nd-degree, Type II	May be regular or irregular (depends on whether conduction ratio remains the same)	Present and normal; not all the P waves are followed by a QRS complex	Normal	Constant for all conducted beats
3rd-degree	Atrial rhythm and ventricular rhythms are regular but not related to one another	Present and normal; not related to the QRS complexes; appear to march through the QRS complexes	Normal if escape focus is junctional and widened if escape focus is ventricular	Not measurable