12

Origin and Clinical Aspects of AV Heart Blocks

Fast & Easy ECGs – A Self-Paced Learning Program

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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)

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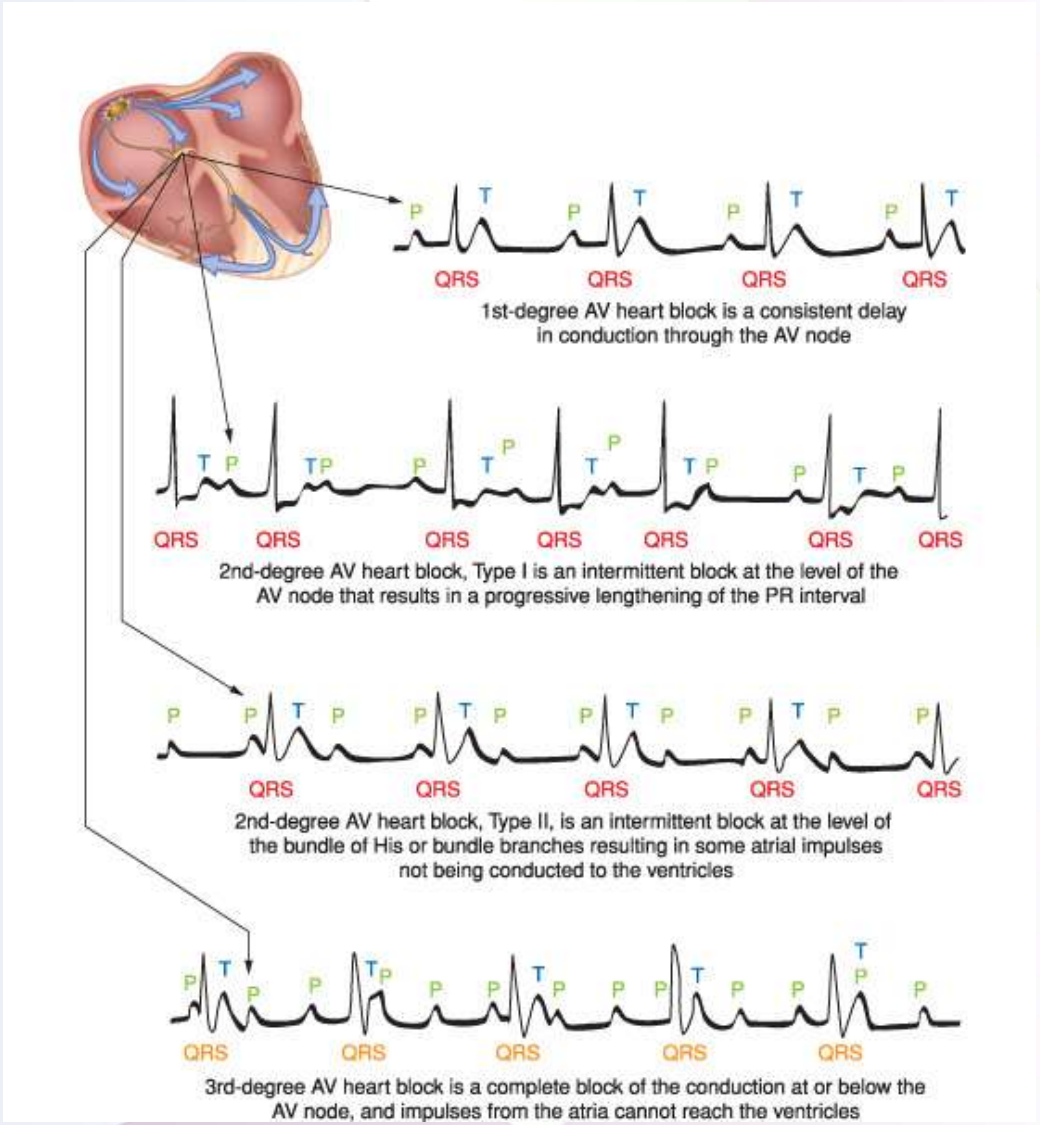
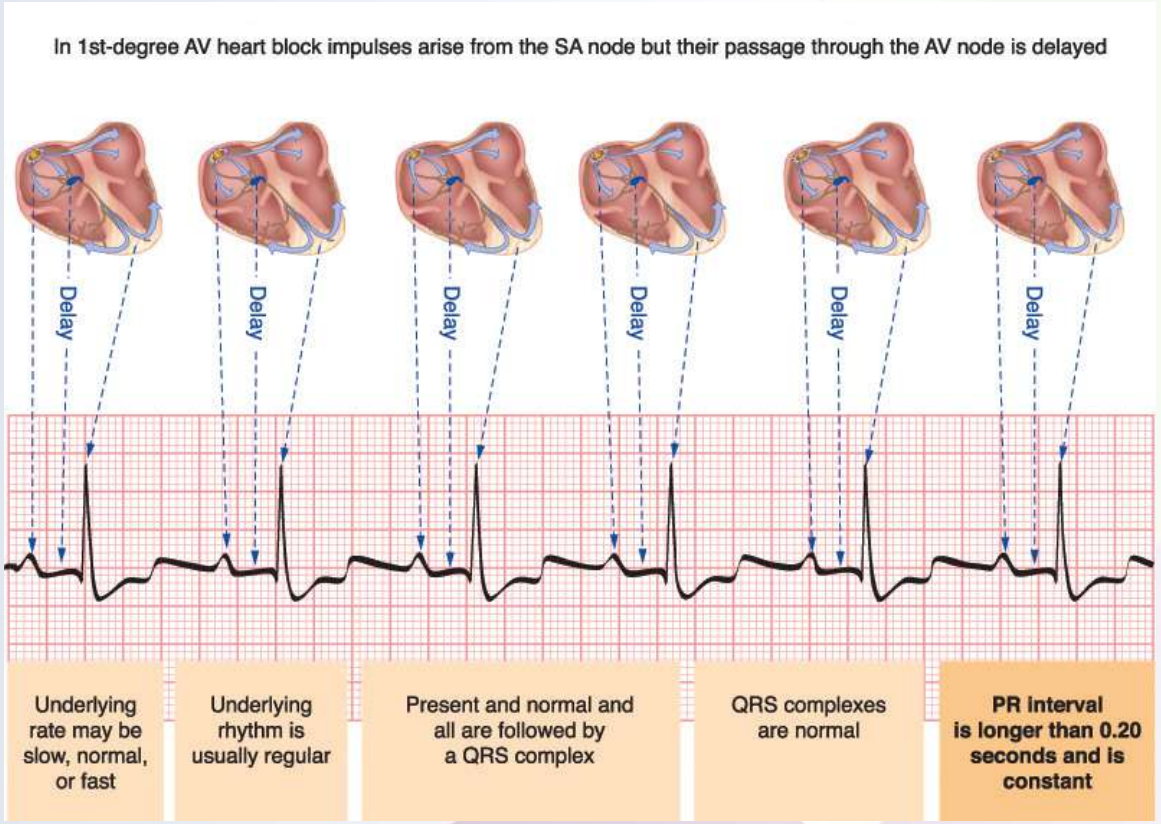
AV Heart Blocks

- 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



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1st-Degree AV Heart Block

- Often of little or no clinical significance because all impulses are conducted to the ventricles
- Can progress to higher degree block, especially in the presence of inferior wall myocardial infarction

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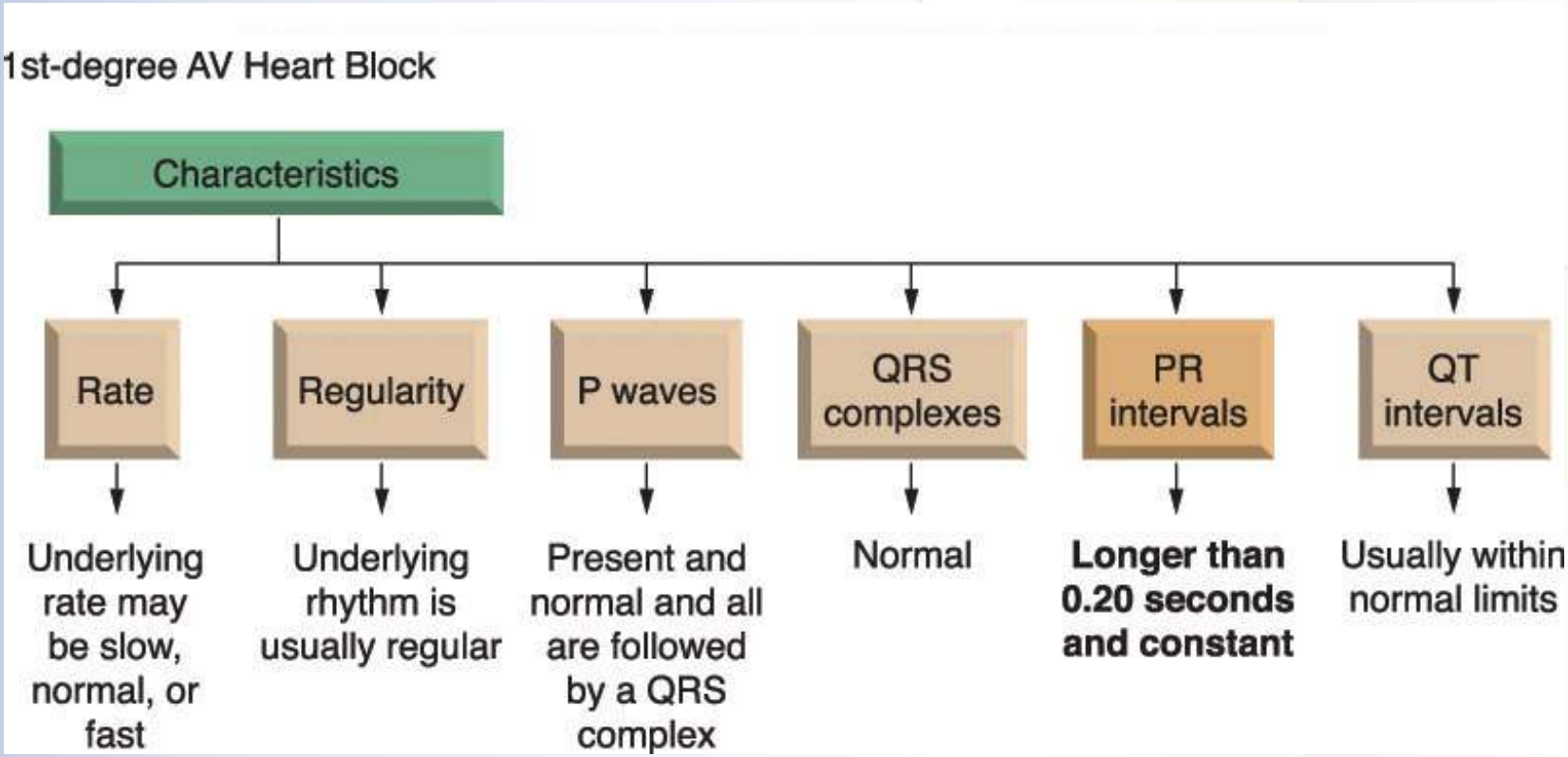
1st-Degree AV Heart Block



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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

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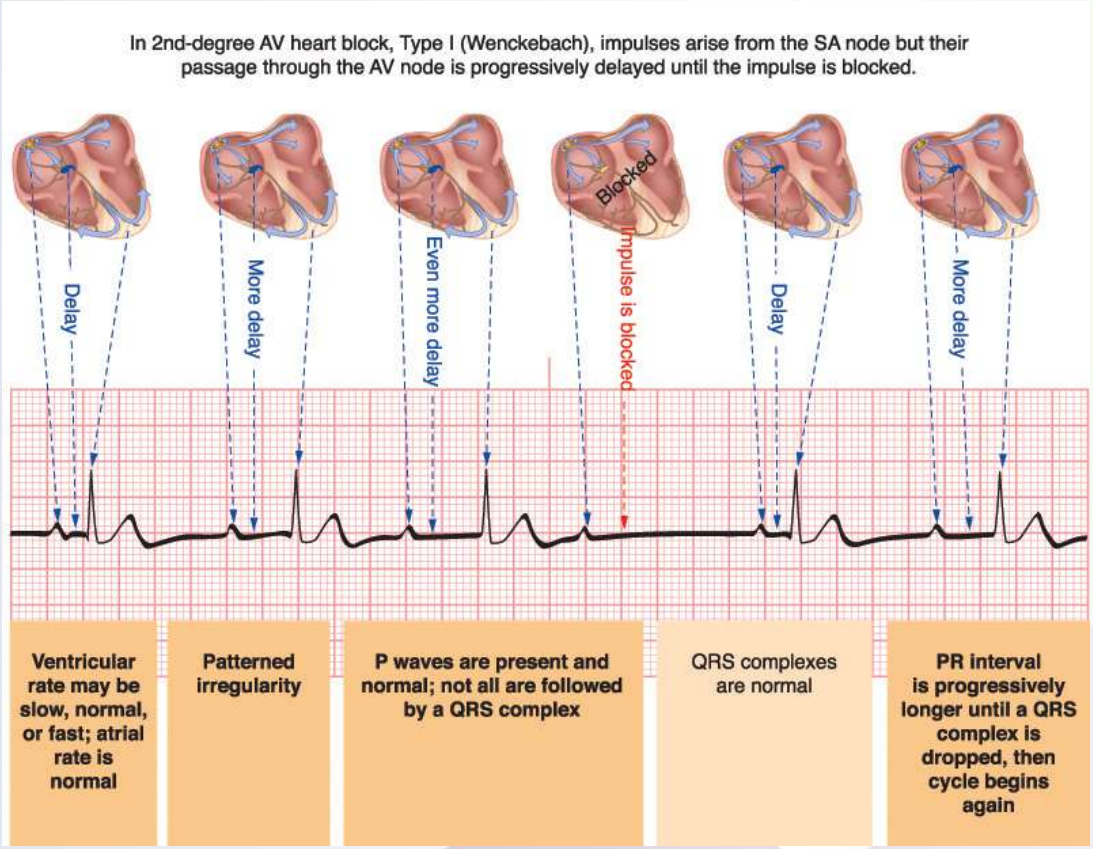
2nd-Degree AV Heart Block, Type I

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



2nd-Degree AV Heart Block, Type I

- More P waves than QRS complexes and the rhythm has patterned irregularity
- PR interval increases until a QRS complex is dropped
- After dropped beat the next PR interval is shorter
- As each subsequent impulse generated there is a progressively longer PR interval until again, a QRS is dropped
- Cycle repeats

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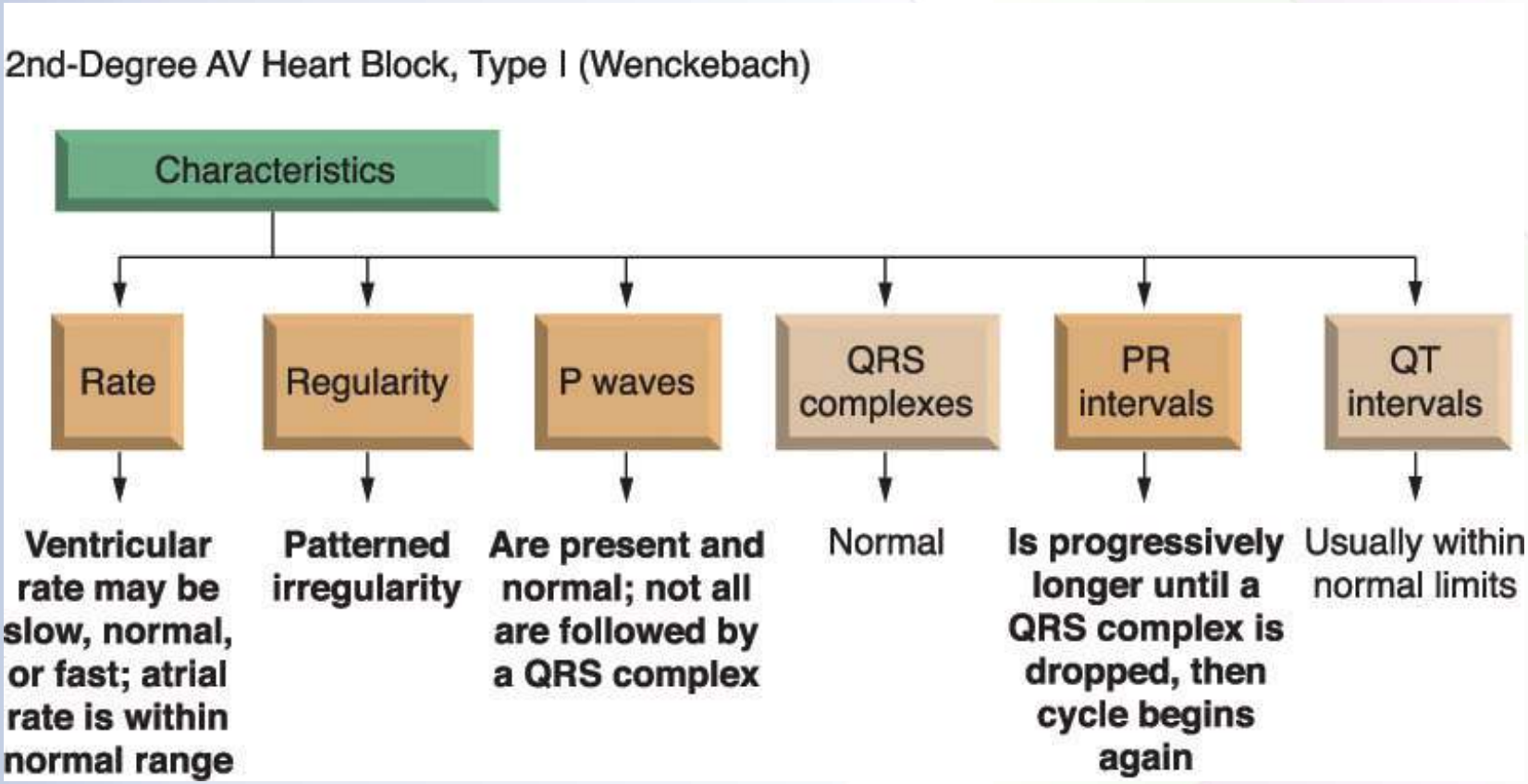
2nd-Degree AV Heart Block, Type I



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

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2nd-Degree AV Heart Block, Type I

- May occur in otherwise healthy persons
- Usually transient and reversible, mostly resolving when the underlying condition is corrected
- May progress to more serious blocks (particularly if it occurs early in myocardial infarction)

2nd-Degree AV Heart Block, Type I

- If dropped ventricular beats occur frequently, patient may show signs and symptoms of decreased cardiac output

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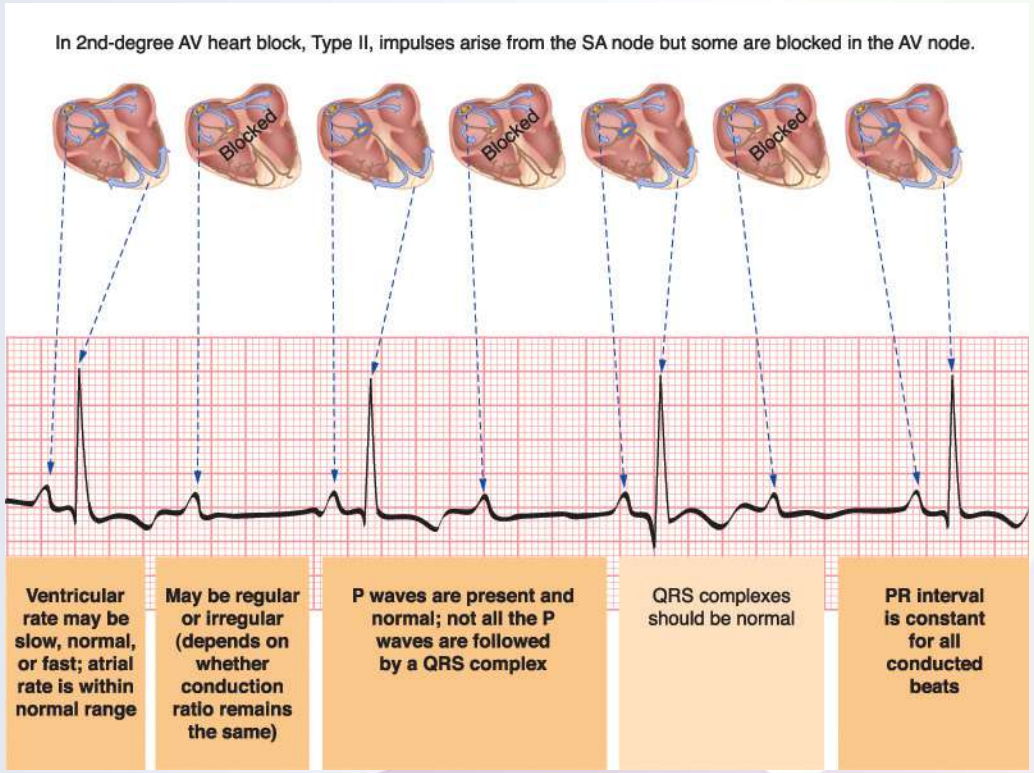
2nd-Degree AV Heart Block, Type II

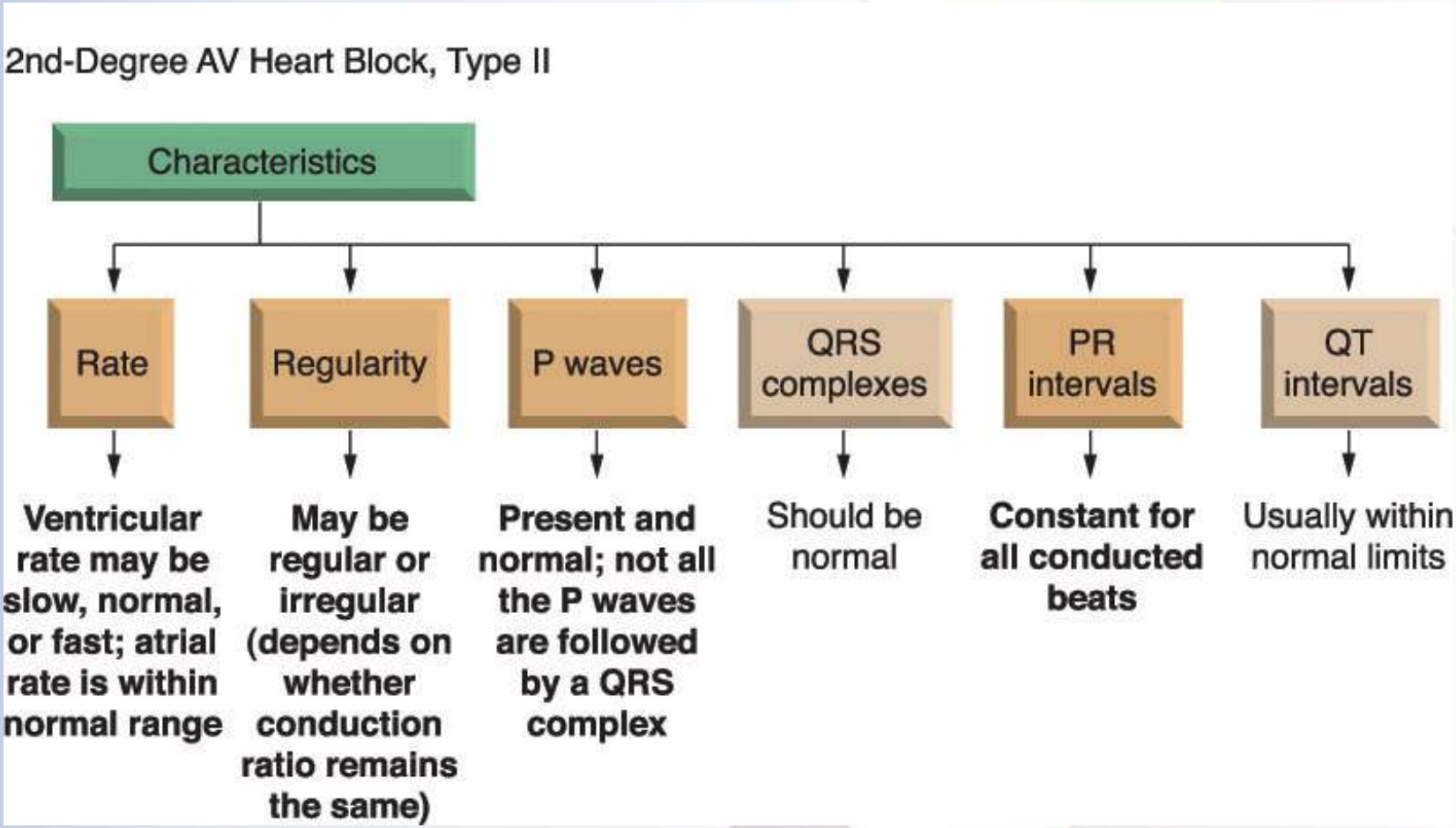
- Intermittent block at the level of the bundle of His or bundle branches resulting in atrial impulses that are not conducted to the ventricles



2nd-Degree AV Heart Block, Type II

- More P waves than QRS complexes
- Duration of PR interval of the conducted beats remains constant

2nd-Degree AV Heart Block, Type II



2nd-Degree AV Heart Block, Type II

- A serious dysrhythmia (usually considered malignant in the emergency setting)
- Can result in decreased cardiac output and may produce signs and symptoms of hypoperfusion
- May progress to a more severe heart block and ventricular asystole

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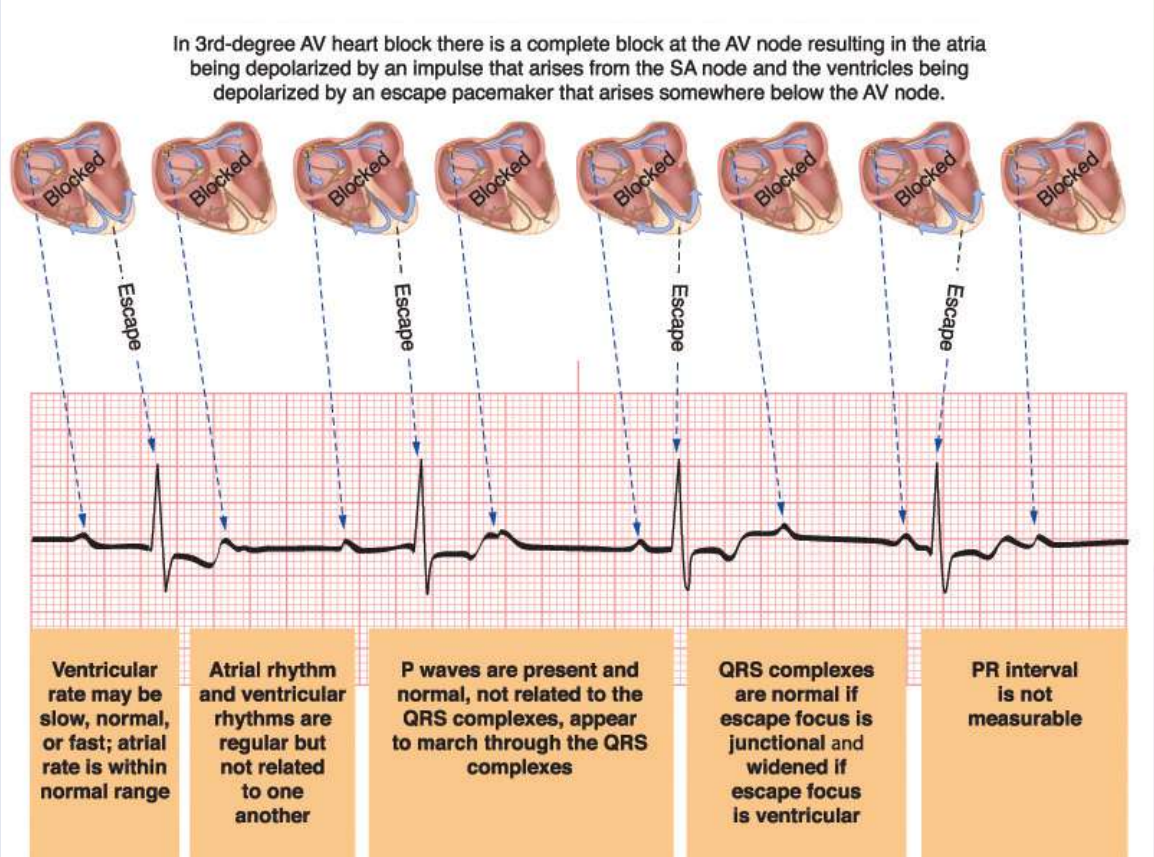
3rd-Degree AV Heart Block

- 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

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3rd-Degree AV Heart Block

- Upright and round P waves seem to "march right through the QRS complexes"

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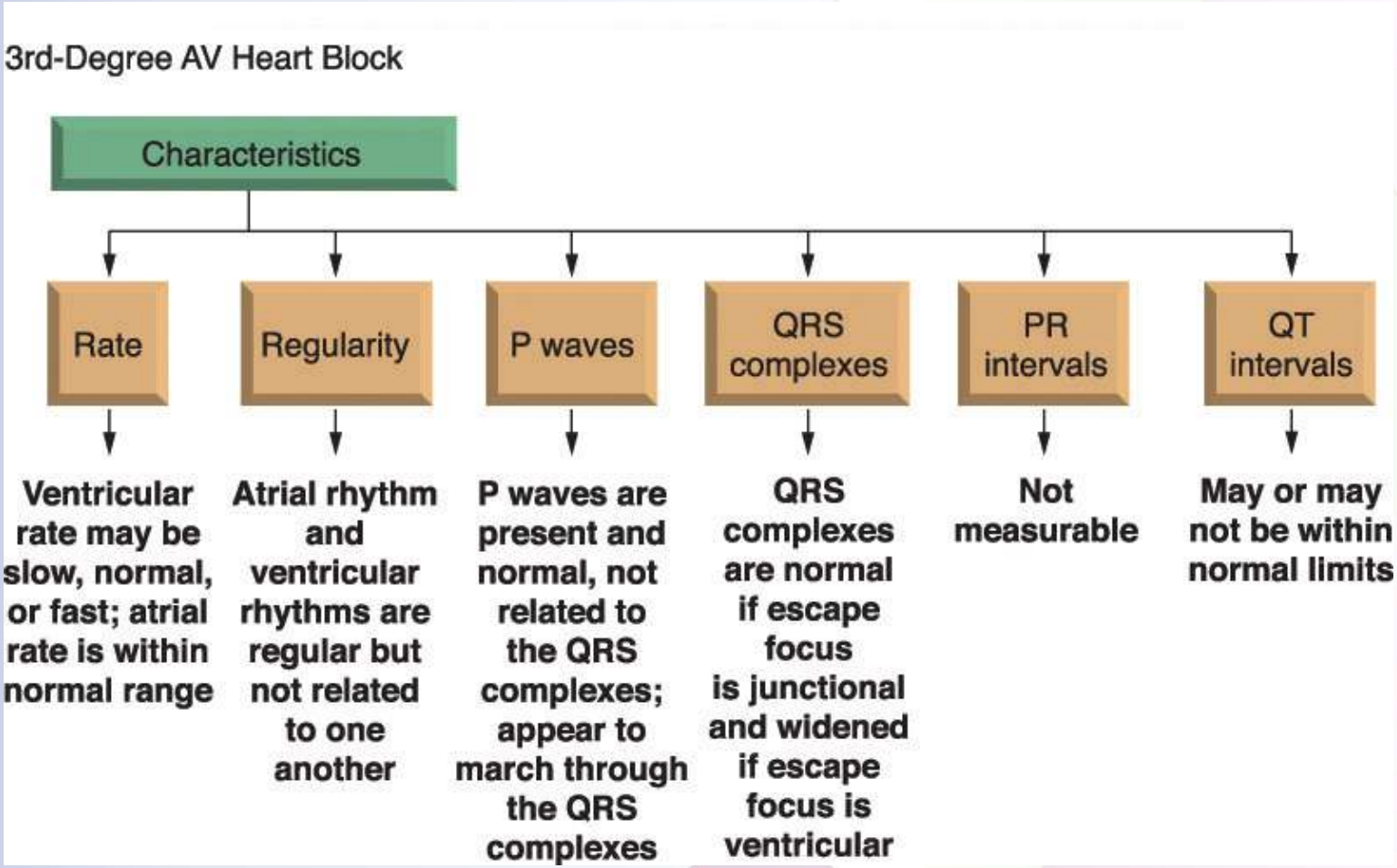
3rd-Degree AV Heart Block



3rd-Degree AV Heart Block

Table 12-3 3rd-Degree AV Heart Block

Causes of 3rd-degree AV heart block	Examples
Cardiac disorders	Coronary artery disease, myocardial ischemia or infarction (inferior/posterior and inferior wall), degenerative changes in the heart, septal necrosis, myocarditis
Use of certain drugs	Digitalis, calcium channel blockers, beta-adrenergic blockers
Other	Increased vagal tone, surgical injury

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3rd-Degree AV Heart Block

- Well tolerated as long as the escape rhythm is fast enough to generate a sufficient cardiac output to maintain adequate perfusion
- Can result in decreased cardiac output because of the asynchronous action of the atria and ventricles and if the ventricular rate is slow

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Remember!

2nd- and 3rd-degree AV heart block can lead to decreased cardiac output if the ventricular rate slows sufficiently

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

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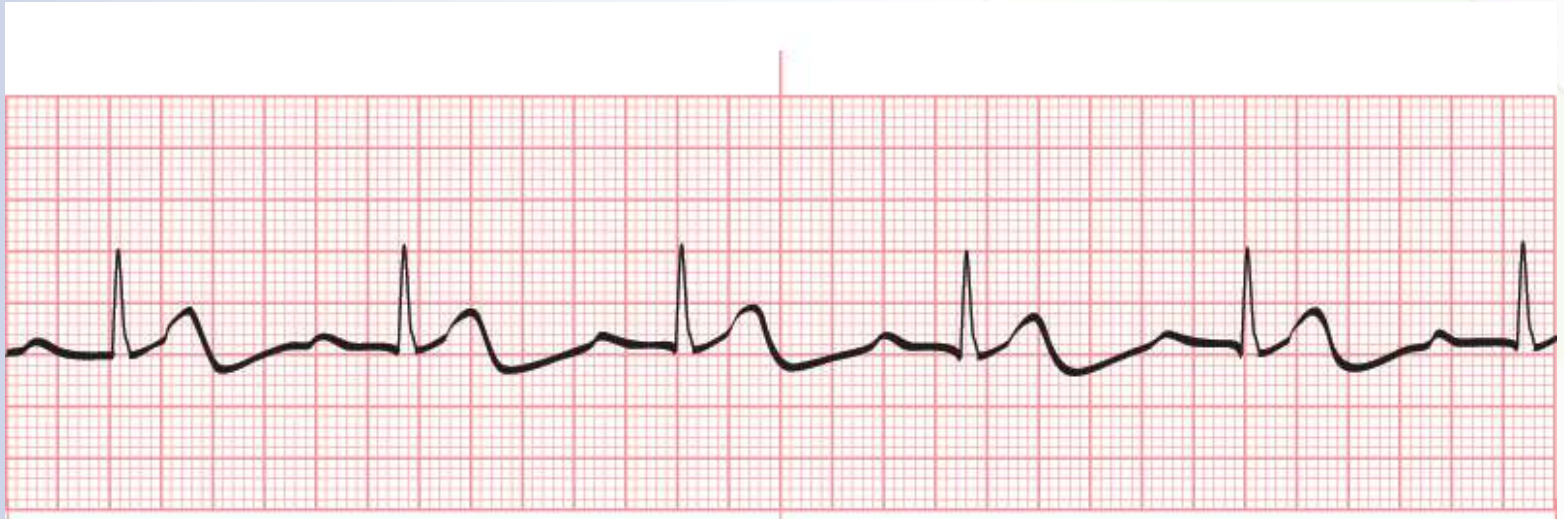
Practice Makes Perfect

- Determine the type of dysrhythmia



Rate: _____ (atrial) _____ (ventricular)
P waves: _____ QRS complexes: _____
QT intervals: _____ Dysrhythmia: _____

Regularity: _____
PR intervals: _____

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Practice Makes Perfect

- Determine the type of dysrhythmia

Rate: _____ (atrial) _____ (ventricular)
P waves: _____ QRS complexes: _____
QT intervals: _____ Dysrhythmia: _____

Regularity: _____
PR intervals: _____

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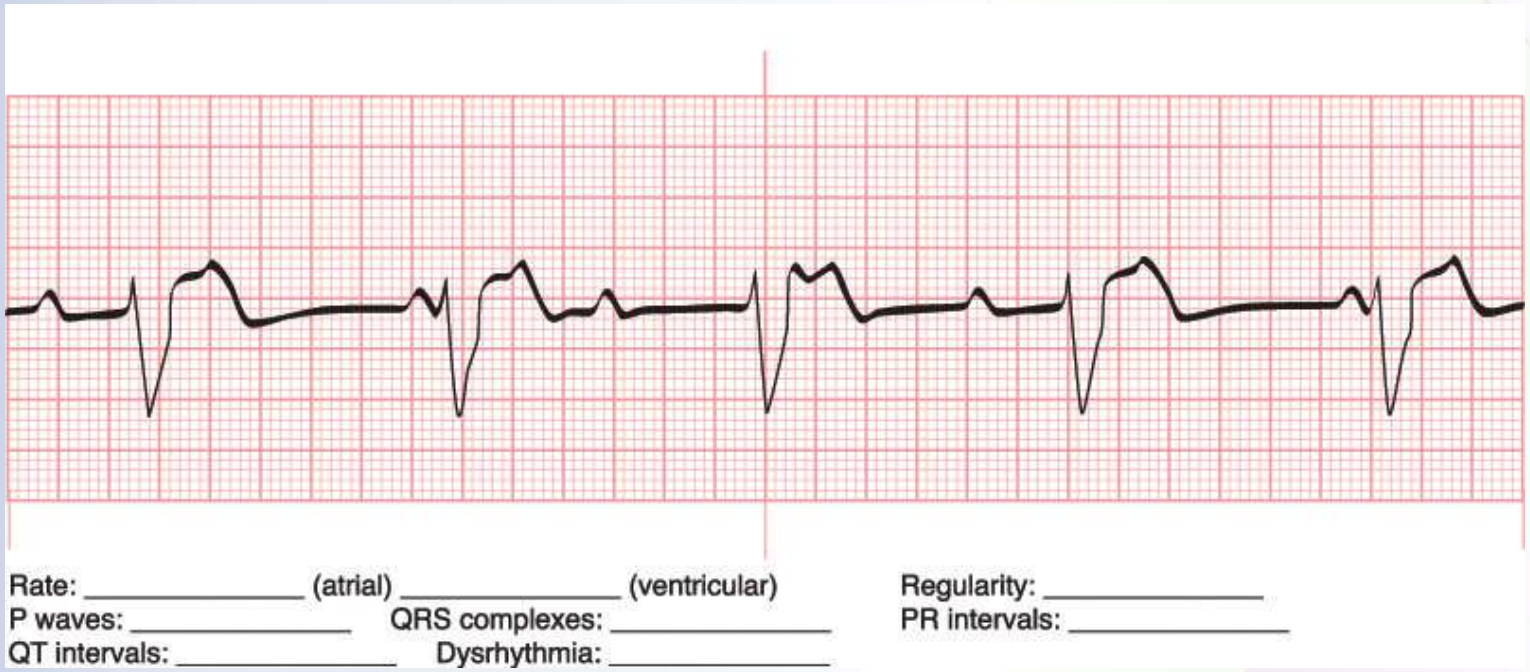
Practice Makes Perfect

- Determine the type of dysrhythmia



Rate: _____ (atrial) _____ (ventricular)
P waves: _____ QRS complexes: _____
QT intervals: _____ Dysrhythmia: _____

Regularity: _____
PR intervals: _____

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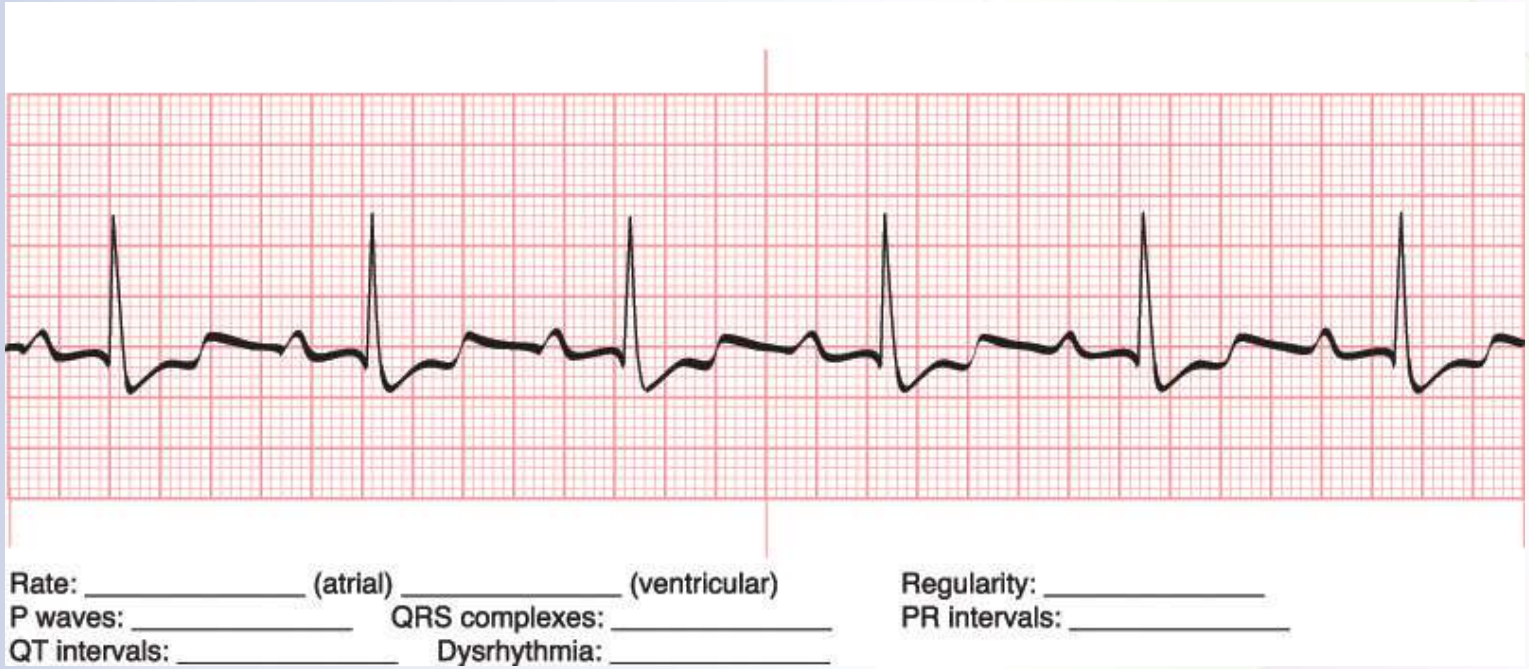
Practice Makes Perfect

- Determine the type of dysrhythmia



Rate: _____ (atrial) _____ (ventricular)
Regularity: _____
P waves: _____ QRS complexes: _____
PR intervals: _____
QT intervals: _____ Dysrhythmia: _____

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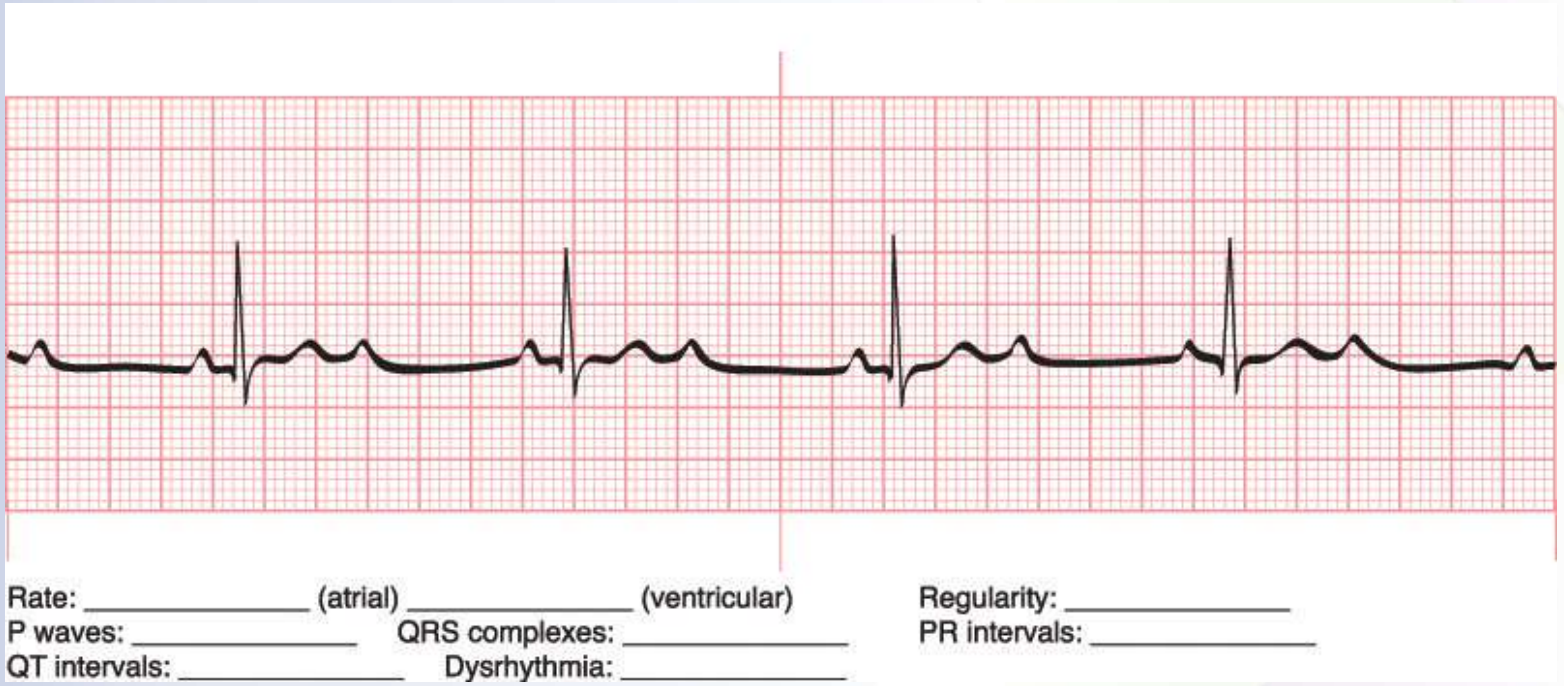
Practice Makes Perfect

- Determine the type of dysrhythmia



Rate: _____ (atrial) _____ (ventricular)
Regularity: _____
P waves: _____ QRS complexes: _____
PR intervals: _____
QT intervals: _____ Dysrhythmia: _____

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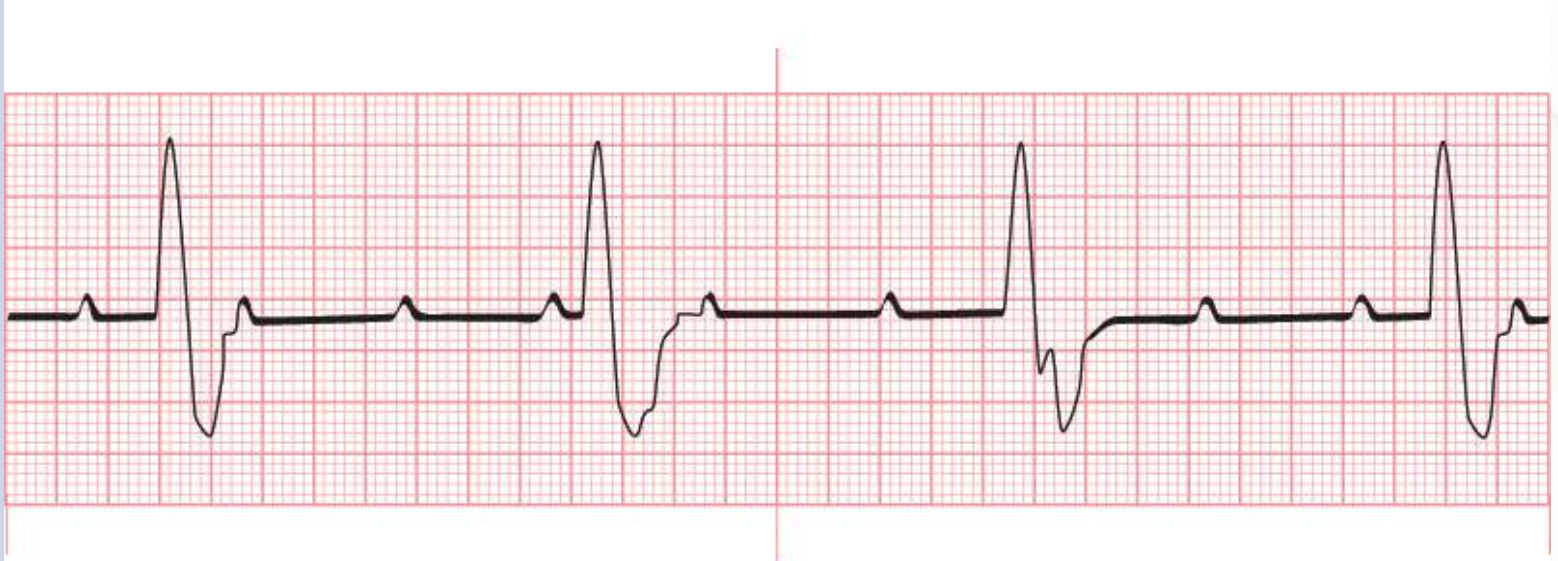
Practice Makes Perfect

- Determine the type of dysrhythmia



Rate: _____ (atrial) _____ (ventricular)
P waves: _____ QRS complexes: _____
QT intervals: _____ Dysrhythmia: _____

Regularity: _____
PR intervals: _____

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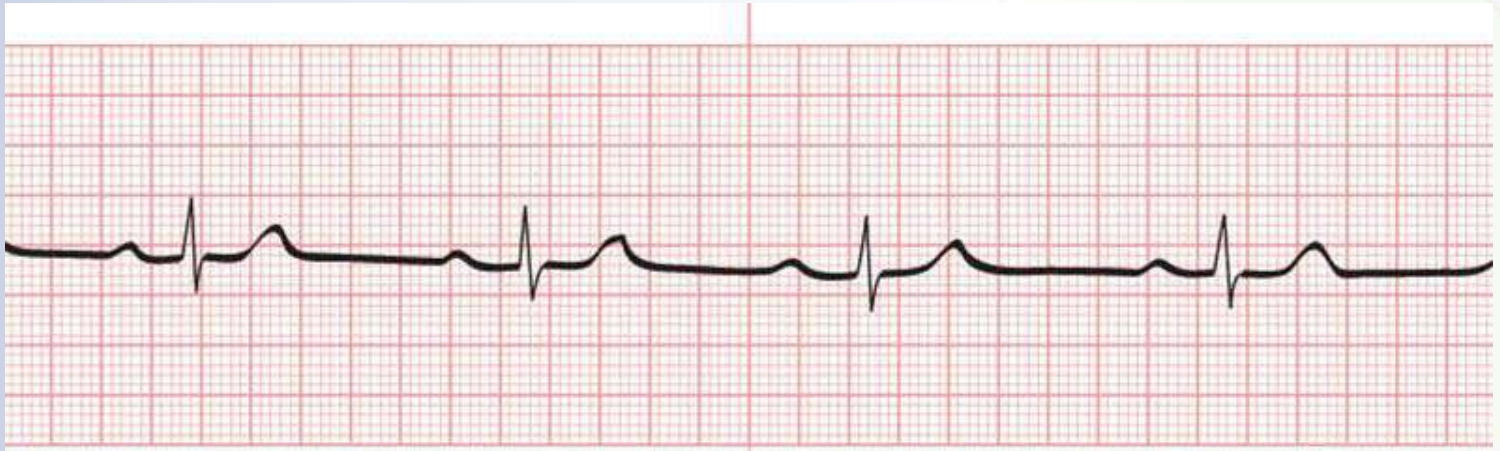
Practice Makes Perfect

- Determine the type of dysrhythmia



Rate: _____ (atrial) _____ (ventricular)
P waves: _____ QRS complexes: _____
QT intervals: Dysrhythmia:

Regularity: _____
PR intervals: _____

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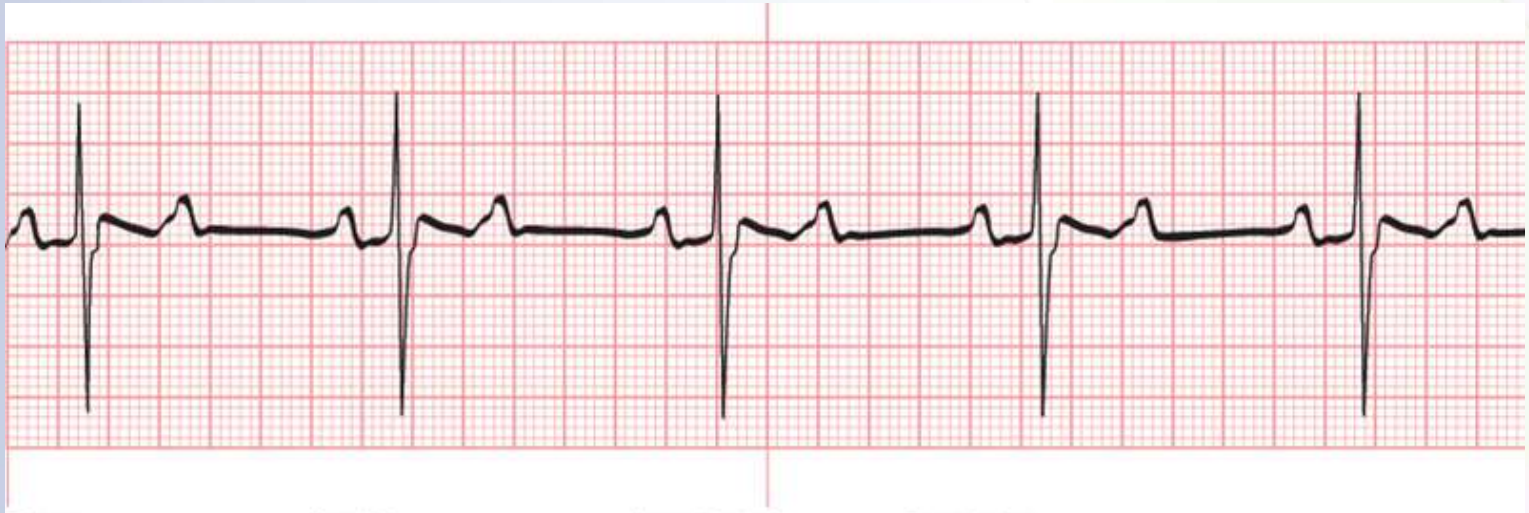
Practice Makes Perfect

- Determine the type of dysrhythmia



Rate: _____ (atrial) _____ (ventricular)
Regularity: _____
P waves: _____ QRS complexes: _____
PR intervals: _____
QT intervals: _____ Dysrhythmia: _____

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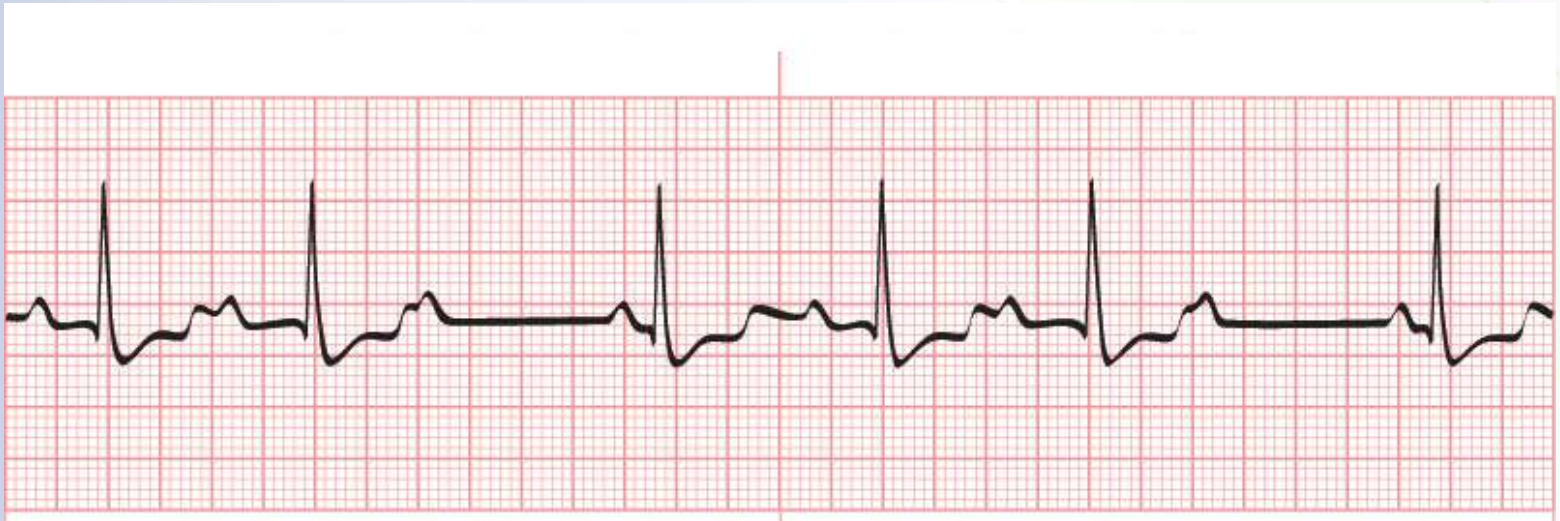
Practice Makes Perfect

- Determine the type of dysrhythmia



Rate: _____ (atrial) _____ (ventricular)
Regularity: _____
P waves: _____ QRS complexes: _____
PR intervals: _____
QT intervals: _____ Dysrhythmia: _____

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Practice Makes Perfect

- Determine the type of dysrhythmia

Rate: _____ (atrial) _____ (ventricular)
P waves: _____ QRS complexes: _____
QT intervals: _____ Dysrhythmia: _____

Regularity: _____
PR intervals: _____

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Summary

- Heart blocks are partial delays or complete interruptions in the cardiac conduction pathway between the atria and ventricles.
- 1st-degree AV heart block is not a true block. Instead it is a consistent delay of conduction at the level of the AV node which results in a PR interval that is greater than 0.20 seconds in duration.
- 2nd-degree AV heart block, Type I is an intermittent block at the level of the AV node.

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Summary

- With 2nd-degree AV heart block, Type I, the PR interval increases until a QRS complex is dropped. After the dropped beat the next PR interval is shorter. Then as each subsequent impulse is generated and transmitted through the AV junction there is a progressively longer PR interval until again, a QRS is dropped. This cycle can repeat itself.

- With 2nd-degree AV heart block, Type I, there are more P waves than QRS complexes and the rhythm is regularly irregular.

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Summary

- 2nd-degree AV heart block, Type II is an intermittent block at the level of the bundle of His or bundle branches resulting in atrial impulses that are not conducted to the ventricles.
- With 2nd-degree AV heart block, Type II, there are more P waves than QRS complexes and the duration of PR interval of the conducted beats remains the same (are constant).
- 3rd-degree AV heart block is a complete block of the conduction at or below the AV node and impulses from the atria cannot reach the ventricles.

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Summary

- In 3rd-degree AV heart block the pacemaker for the atria arises from the SA node while the pacemaker for the ventricles arises as an escape rhythm from the AV junction or from the ventricles.
- With 3rd-degree AV heart block the upright and round P waves seem to “march right through the QRS complexes." This reveals that there is no relationship between the P waves and QRS complexes.
- 2nd- and 3rd-degree AV heart block can lead to decreased cardiac output.

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