

# Chapter 5

## Junctional Rhythms

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- ### Objectives
- Describe the ECG characteristics, possible causes, signs and symptoms, and emergency management for the following dysrhythmias that begin in the AV junction:
    - a. Premature junctional complexes
    - b. Junctional escape beats
    - c. Junctional escape rhythm
    - d. Accelerated junctional rhythm
    - e. Junctional tachycardia
  - Explain the difference between premature junctional complexes and junctional escape beats
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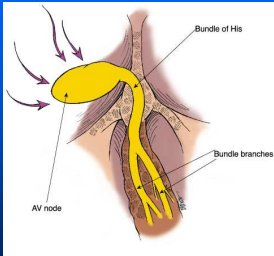
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### AV Node

- Specialized cells located in lower portion of right atrium
- Delays the electrical impulse
  - Allows atria to contract and complete filling of ventricles before next ventricular contraction



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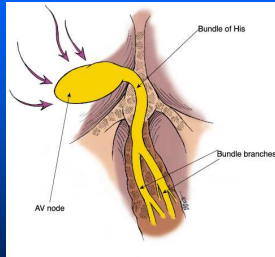
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## Bundle of His

- Connects AV node with bundle branches
- Has pacemaker cells capable of discharging at a rhythmic rate of 40-60 bpm



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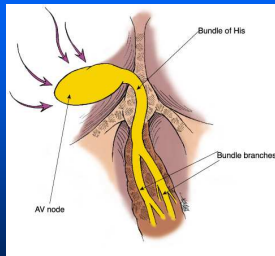
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## AV Junction

- AV node and the nonbranching portion of the bundle of His = "AV junction"



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## AV Junction

- AV junction may assume responsibility for pacing the heart if:
  - The SA node fails to discharge
  - An impulse from the SA node is generated but blocked as it exits the SA node
  - The rate of discharge of the SA node is slower than that of the AV junction
  - An impulse from the SA node is generated and is conducted through the atria but is not conducted to the ventricles

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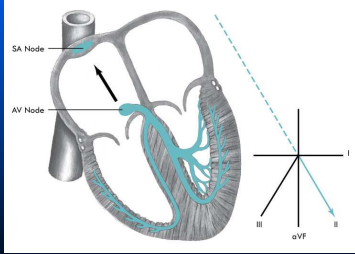
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## AV Junction

- If the AV junction paces the heart, the electrical impulse must travel in a backward (retrograde) direction to activate the atria



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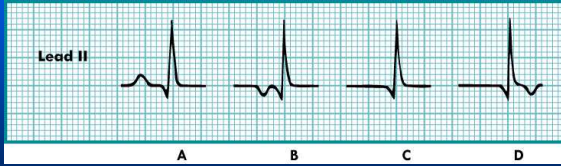
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## AV Junction

- P wave may appear before, during, or after the QRS complex



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## Premature Junctional Complexes (PJC)

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## PJC—How Do I Recognize It?

- A PJC arises from an irritable site within the AV junction that fires before the next expected sinus beat
- QRS will usually measure  $\leq 0.10$  sec
- Often followed by a noncompensatory (incomplete) pause



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## PJC—How Do I Recognize It?

- A P wave may or may not be present with a PJC
- If a P wave is present, it is inverted (retrograde) and may precede or follow the QRS



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## PJC—How Do I Recognize It?

- Not an entire rhythm; it is a single beat
- Identify underlying rhythm and ectopic beat(s)
  - Example: Sinus rhythm at 98 bpm with 2 PJCs



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### PJC—How Do I Recognize It?



<b>Rate</b>	Usually within normal range, but depends on underlying rhythm
<b>Rhythm</b>	Regular with premature beats
<b>P waves</b>	May occur before, during, or after the QRS; if visible, the P wave is inverted in leads II, III, and aVF

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### PJC—How Do I Recognize It?



<b>PR interval</b>	If a P wave occurs before the QRS, the PR interval will usually be $\leq 0.12$ sec; if no P wave occurs before the QRS, there will be no PR interval
<b>QRS</b>	Usually $\leq 0.10$ sec unless it is aberrantly conducted or an intraventricular conduction delay exists

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### PJC—How Do I Recognize It?

<b>Rate</b>	Usually WNL, but depends on underlying rhythm
<b>Rhythm</b>	Regular with premature beats
<b>P waves</b>	May occur before, during, or after the QRS; if visible, the P wave is inverted in leads II, III, and aVF
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### PJC—What Causes It?

- Congestive heart failure
- Acute coronary syndromes
- Mental and physical fatigue
- Valvular heart disease
- Digitalis toxicity
- Electrolyte imbalance
- Rheumatic heart disease
- Stimulants: caffeine, tobacco



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### PJC—What Do I Do About It?

- Most individuals with PJs are asymptomatic
- PJs may lead to symptoms of palpitations or the feeling of skipped beats



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### PJC—What Do I Do About It?

- PJs do not normally require treatment
- If they occur because of the ingestion of stimulants or digitalis toxicity, these substances should be withheld



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# Junctional Escape Beats

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## Junctional Escape Beat— How Do I Recognize It?

- A junctional escape beat originates in the AV junction and appears late (after the next expected sinus beat)
  - A junctional escape beat is protective—preventing cardiac standstill

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## Junctional Escape Beat— How Do I Recognize It?



<b>Rate</b>	Usually WNL, but depends on underlying rhythm
<b>Rhythm</b>	Regular with <b>LATE</b> beats
<b>P waves</b>	May occur before, during, or after the QRS; if visible, the P wave is inverted in leads II, III, and aVF

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## Junctional Escape Beat— How Do I Recognize It?



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## Junctional Escape Rhythm



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## Junctional Rhythm— How Do I Recognize It?

- A junctional escape rhythm is several sequential junctional escape beats



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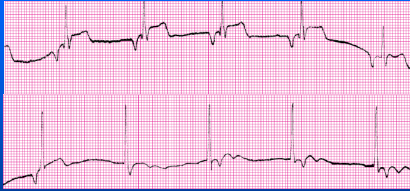
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### Junctional Rhythm— How Do I Recognize It?



<b>Rate</b>	40-60 bpm
<b>Rhythm</b>	Very regular
<b>P waves</b>	May occur before, during, or after the QRS; if visible, the P wave is inverted in leads II, III, and aVF

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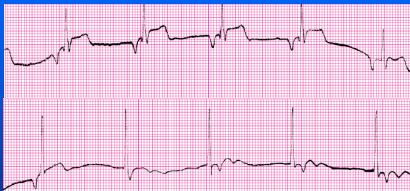
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### Junctional Rhythm— How Do I Recognize It?



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### Junctional Escape Beats/Rhythm— What Causes It?

- Acute myocardial infarction
  - Particularly inferior wall MI
- Rheumatic heart disease
- Valvular disease
- Disease of the SA node
- Hypoxia
- Increased parasympathetic tone
- Immediately after cardiac surgery
- Patients taking:
  - Digitalis
  - Quinidine
  - Beta-blockers
  - Calcium channel blockers



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### Junctional Rhythm— What Do I Do About It?

- The patient may be asymptomatic or may experience signs and symptoms associated with the slow heart rate and decreased cardiac output



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### Junctional Rhythm— What Do I Do About It?

- Signs and symptoms may include:
  - Weakness
  - Chest pain or pressure
  - Syncope
  - Altered level of consciousness
  - Hypotension



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## Junctional Rhythm— What Do I Do About It?

- If the patient's signs and symptoms are related to the slow heart rate, consider:
  - Atropine sulfate and/or transcutaneous pacing
  - Dopamine intravenous infusion
  - Epinephrine intravenous infusion



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## Accelerated Junctional Rhythm



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## Accelerated Junctional Rhythm— How Do I Recognize It?

- An ectopic rhythm caused by enhanced automaticity of the bundle of His
- Results in a regular ventricular response at a rate of 61-100 bpm



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### Accelerated Junctional Rhythm— How Do I Recognize It?



<b>Rate</b>	61-100 bpm
<b>Rhythm</b>	Very regular
<b>P waves</b>	May occur before, during, or after the QRS; if visible, the P wave is inverted in leads II, III, and aVF



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### Accelerated Junctional Rhythm— How Do I Recognize It?



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## Accelerated Junctional Rhythm— What Causes It?

- Digitalis toxicity
- Acute myocardial infarction
- Cardiac surgery
- Rheumatic fever
- COPD
- Hypokalemia



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## Accelerated Junctional Rhythm— What Do I Do About It?

- The patient may be asymptomatic, but monitor closely
- If the rhythm is caused by digitalis toxicity, this medication should be withheld



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## Junctional Tachycardia



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## Junctional Tachycardia— How Do I Recognize It?

- Nonparoxysmal junctional tachycardia
  - Usually starts as an accelerated junctional rhythm
  - Heart rate gradually increases to >100 bpm
  - Usual ventricular rate is 101-140 bpm
- Paroxysmal junctional tachycardia
  - Starts and ends suddenly
  - Often precipitated by a PJC
  - Ventricular rate is generally >140 bpm



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## Junctional Tachycardia— How Do I Recognize It?



<b>Rate</b>	101-180 bpm
<b>Rhythm</b>	Very regular
<b>P waves</b>	May occur before, during, or after the QRS; if visible, the P wave is inverted in leads II, III, and aVF



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## Junctional Tachycardia— How Do I Recognize It?



<b>PR interval</b>	If a P wave occurs before the QRS, the PR interval will usually be $\leq 0.12$ sec; if no P wave occurs before the QRS, there will be no PR interval
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## Junctional Tachycardia— How Do I Recognize It?

<b>Rate</b>	101-180 bpm
<b>Rhythm</b>	Very regular
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## Junctional Tachycardia— What Causes It?

- Thought to be caused by enhanced automaticity
- May occur because of:
  - Acute coronary syndromes
  - Congestive heart failure
  - Theophylline administration
  - Digitalis toxicity



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## Junctional Tachycardia— What Do I Do About It?

- Junctional tachycardia associated with an acute coronary syndrome may:
  - Increase myocardial ischemia
  - Increase the frequency and severity of chest pain
  - Extend the size of a myocardial infarction
  - Cause congestive heart failure, hypotension, or cardiogenic shock
  - Predispose the patient to ventricular dysrhythmias



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## Junctional Tachycardia— What Do I Do About It?

- Depends on severity of patient symptoms
- Observe if patient tolerates rhythm well
- If symptomatic:
  - Oxygen therapy, IV access
  - Vagal maneuvers, adenosine
  - Possible beta-blocker, calcium channel blocker, or amiodarone if no contraindications exist



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## Questions?



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