

Dysrhythmia Interpretation & Management

Objectives

- Explain relationships between mechanical and electrical events in the heart
- Interpret the basic dysrhythmias generated from the sinoatrial node, atria, atrioventricular node, and ventricles
- Describe appropriate interventions for common dysrhythmias
- Explain basic concepts of cardiac pacing

Introduction

- Dysrhythmia interpretation is a fundamental skill of critical care nurses
- Crucial for early nursing and medical intervention

Basic Electrophysiology

- Automaticity
 - Cardiac muscle can generate its own electrical activity
 - Special group of cells generate the automatic impulse

Cardiac Cycle

- Composed of two activities
 - Electrical (caused by automaticity)
 - Mechanical (muscular) known as a *contraction*

Cardiac Cycle -(cont'd)

- **T -wo phases of electrical activity**

- Depolarization = active
- Repolarization = resting

- **Two mechanical responses**

- Systole-Contraction
- Diastole-Relaxation

Cardiac Cycle -(cont'd)

- Depolarization = systole = contraction
- Repolarization = diastole = resting or filling phase
- Electrical activity precedes mechanical activity
- Electrical + mechanical = *cardiac contraction*

Cardiac Action Potential

- Cardiac muscle cells generate an electrical current = cardiac action potential
- Sinoatrial node (SA node)
- Exchange of electrolytes

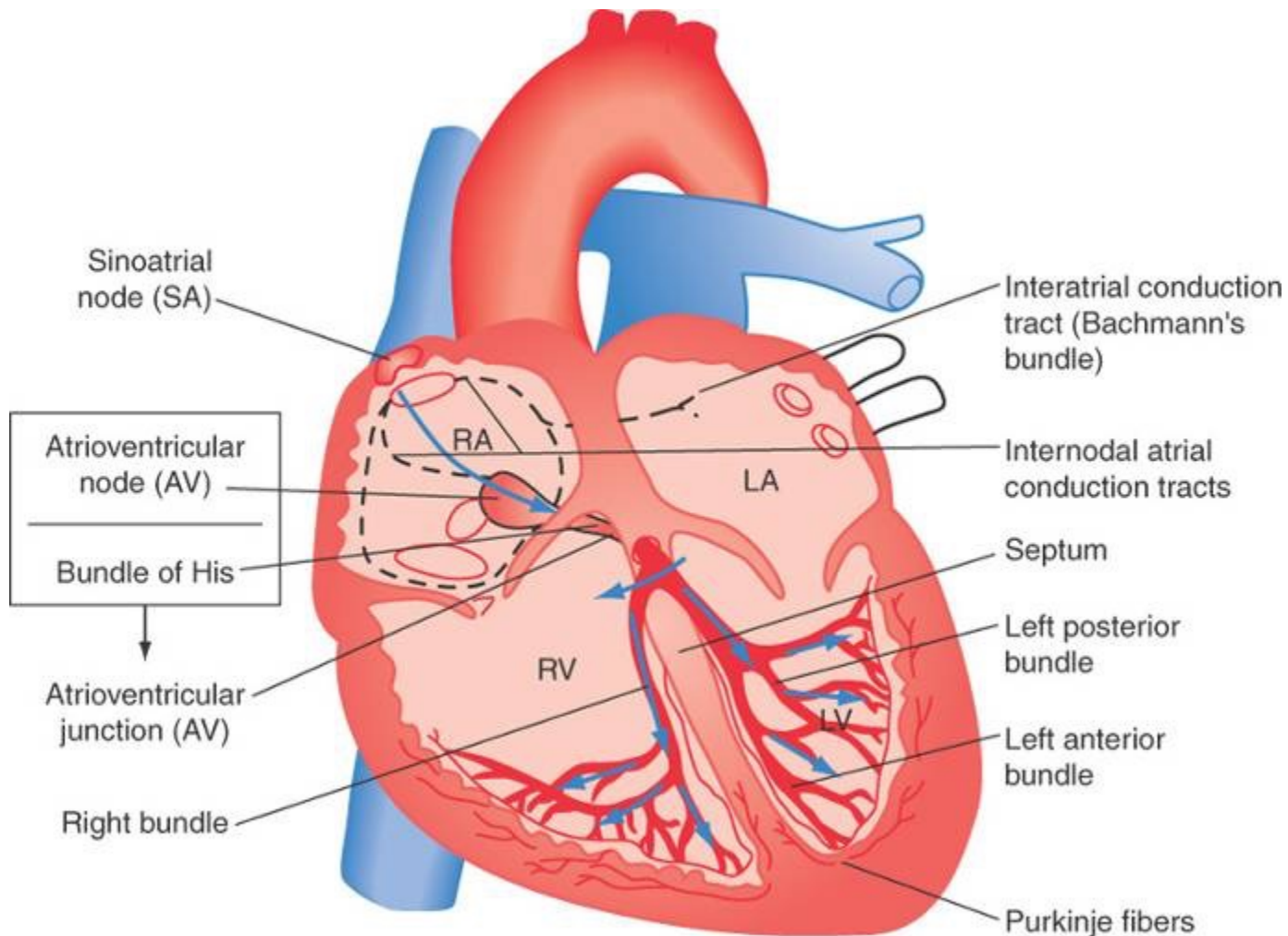
Cardiac Action Potential - (cont'd)

- Depolarization (systole/contraction)
 - Na outside cell; K⁺ inside the cell
 - Change cell permeability
 - Na enters cells; K leaves cells
 - Ca slowly enter cells
 - ATP needed to move electrolytes back to resting state
- Repolarization begins (relaxation)

Muscular Contraction

- Depolarization leads to contraction
- Repolarization leads to resting and filling of ventricles from atria
- ECG is evidence of electrical activity, not contraction

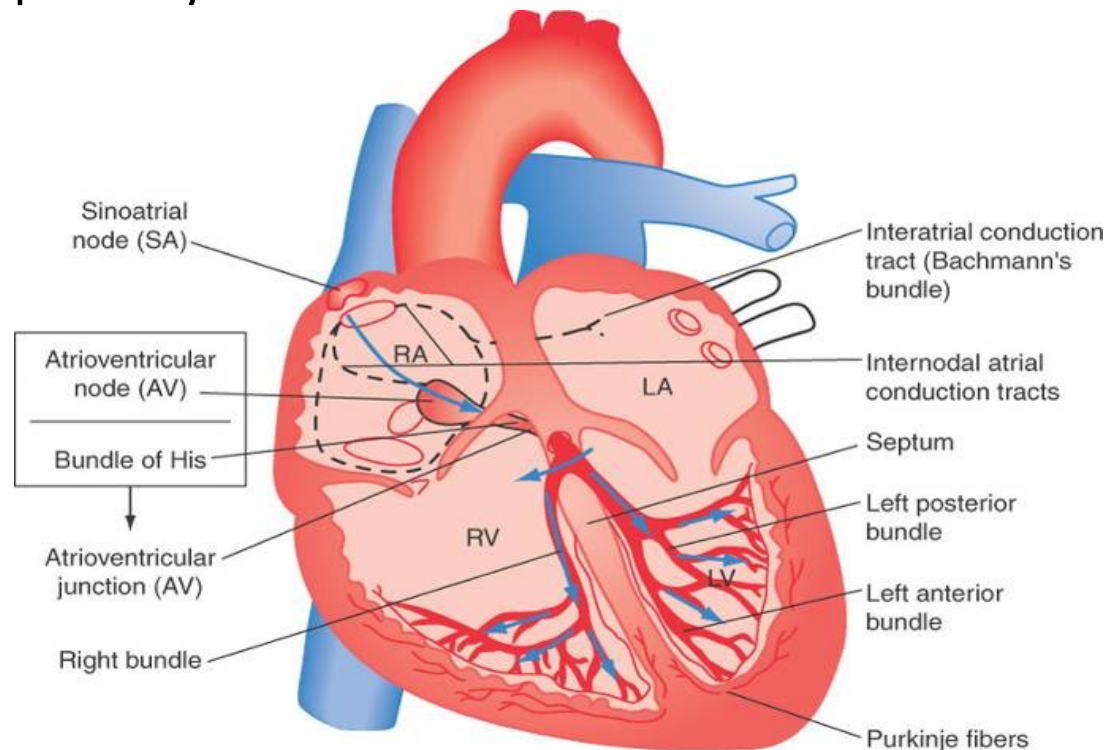
Cardiac Conduction Pathway



(Modified from Paul, S., & Hebrs, J., [1998]. The nurse's guide to cardiac rhythm interpretation: Implications for patient care. Philadelphia: Saunders.)

Cardiac Conduction Pathway (cont'd)

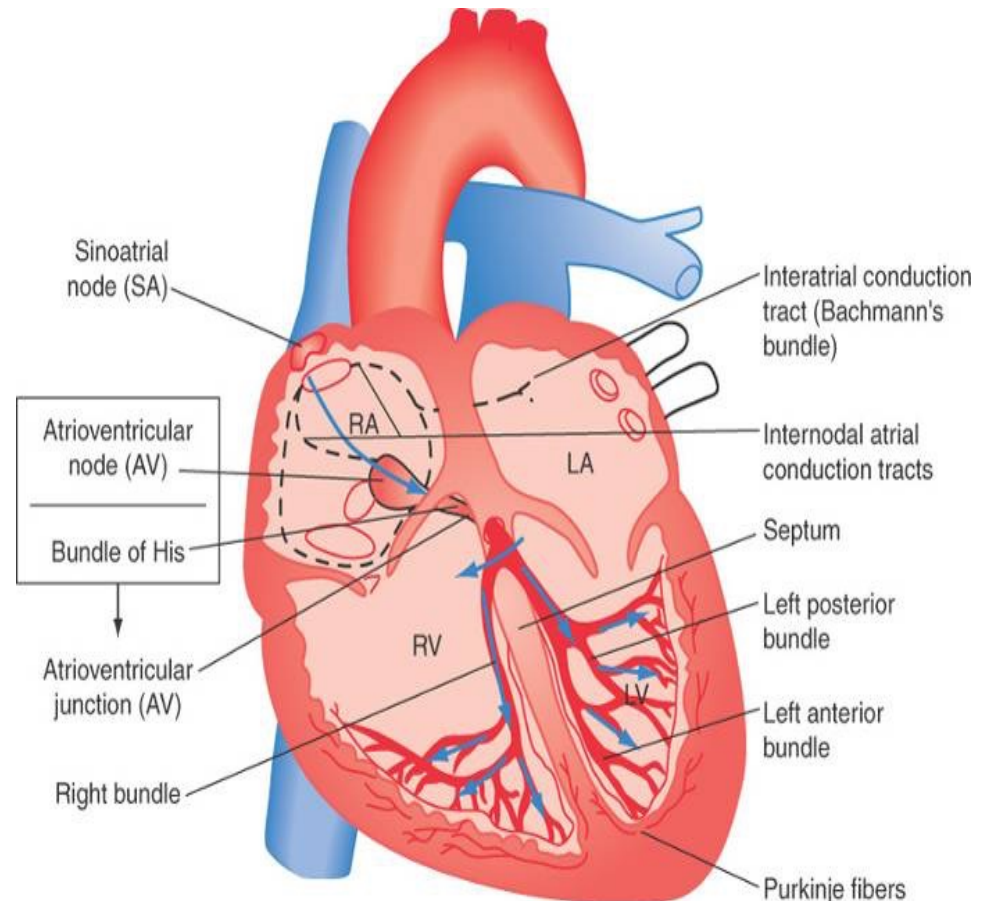
- SA node
 - Depolarization begins
 - Atrial contraction or atrial kick
- Interatrial and internodal pathways to AV node



(Modified from Paul, S., & Hebra, J., [1998]. The nurse's guide to cardiac rhythm interpretation: Implications for patient care, Philadelphia: Saunders.)

Cardiac Conduction Pathway (cont'd)

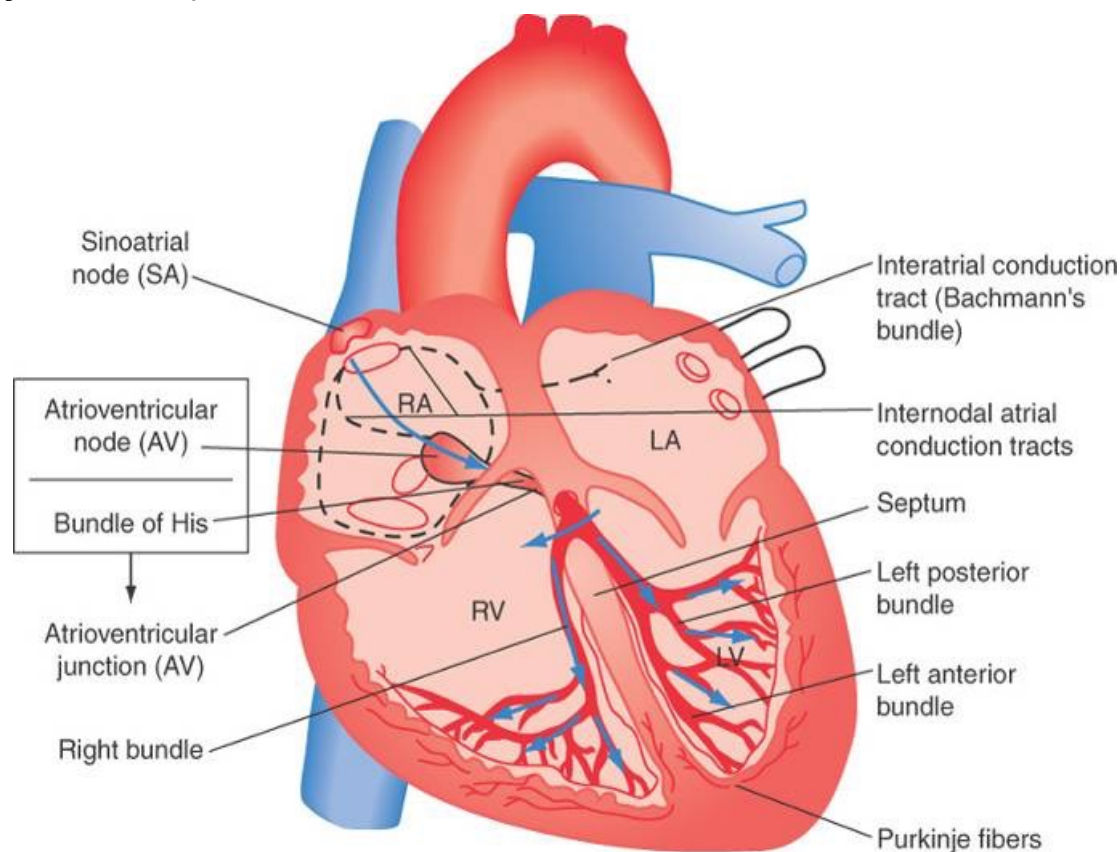
- AV node
 - Delays impulse to ventricles; allows for filling
 - Back-up pacemaker
- Bundle of His
- Left and right bundle branches; fascicles
- Purkinje fibers



(Modified from Paul, S., & Hebra, J. [1998]. The nurse's guide to cardiac rhythm interpretation: Implications for patient care. Philadelphia: Saunders.)

Inherent Rates

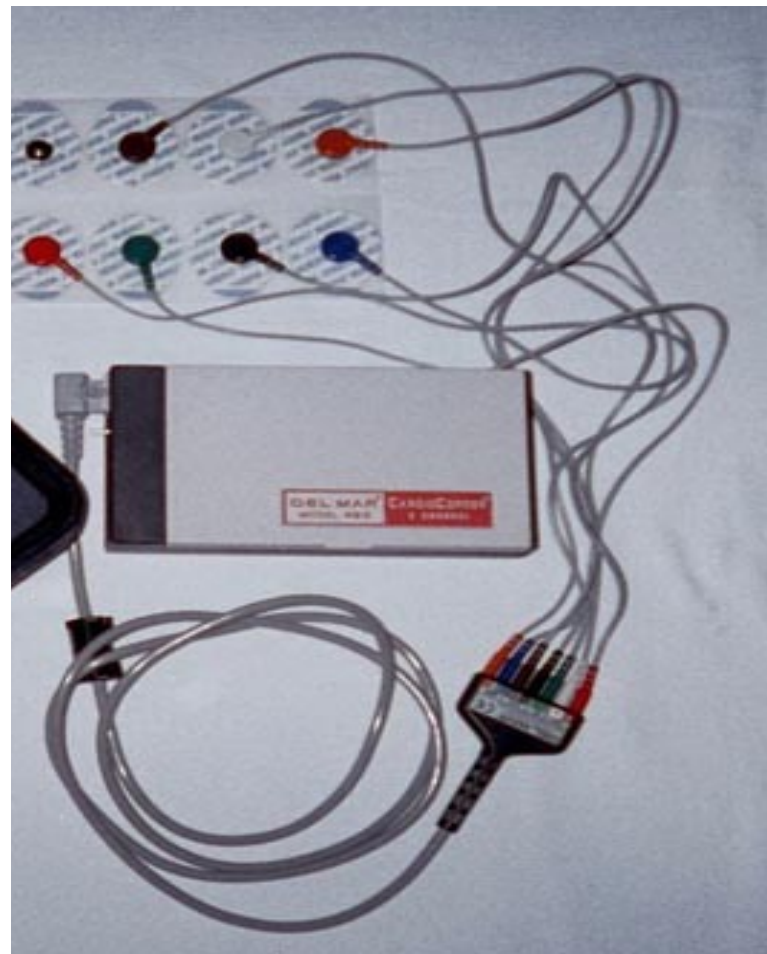
- SA node = 60 to 100 beats/min
- AV node = 40 to 60 beats/min
- Ventricles (Purkinje fibers) = 15 to 40 beats/min



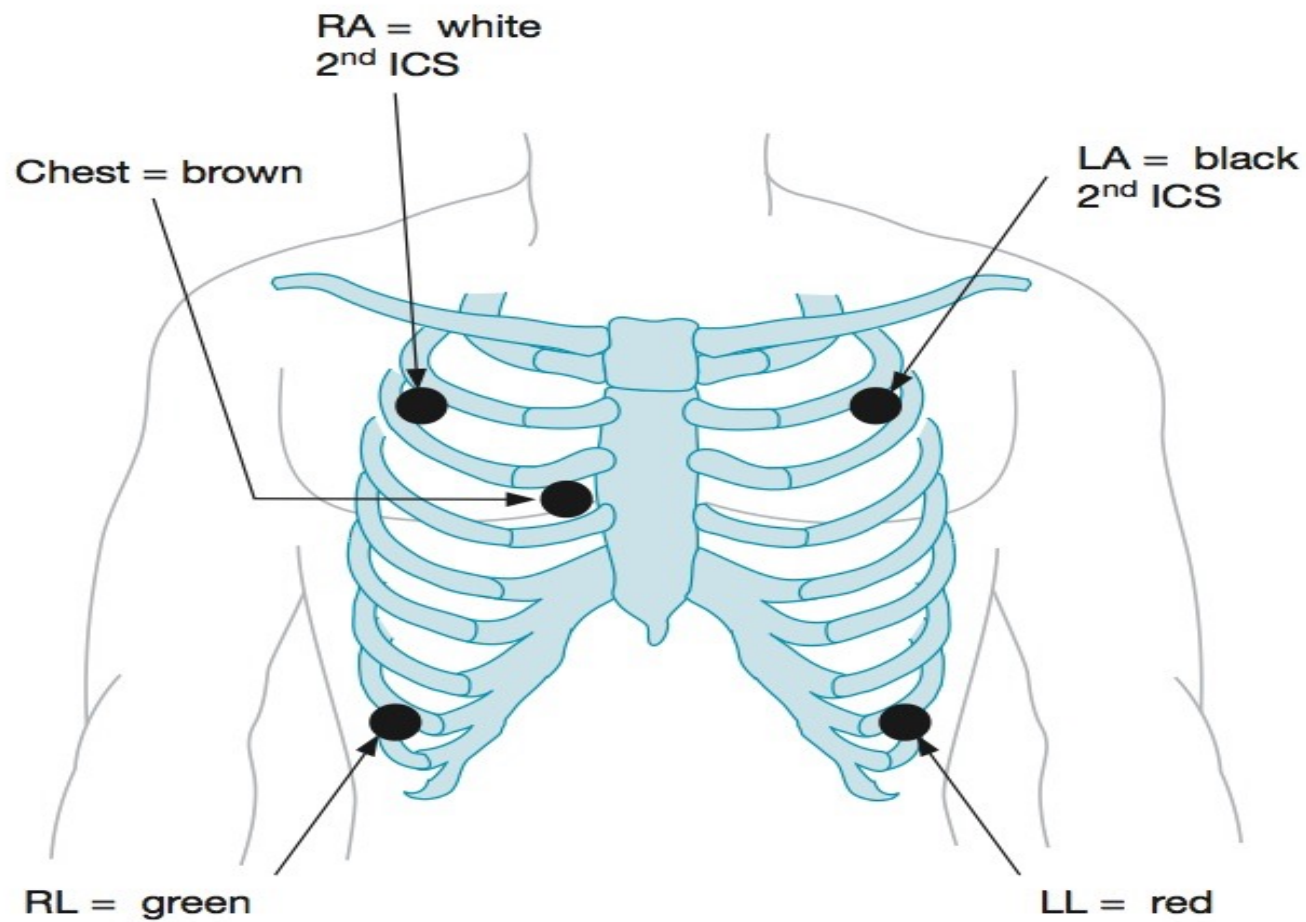
(Modified from Paul, S., & Hebra, J. [1998]. The nurse's guide to cardiac rhythm interpretation: Implications for patient care. Philadelphia: Saunders.)

Cardiac Monitoring

- Most ICUs use five-lead system
- ER and EMS may use three-lead system

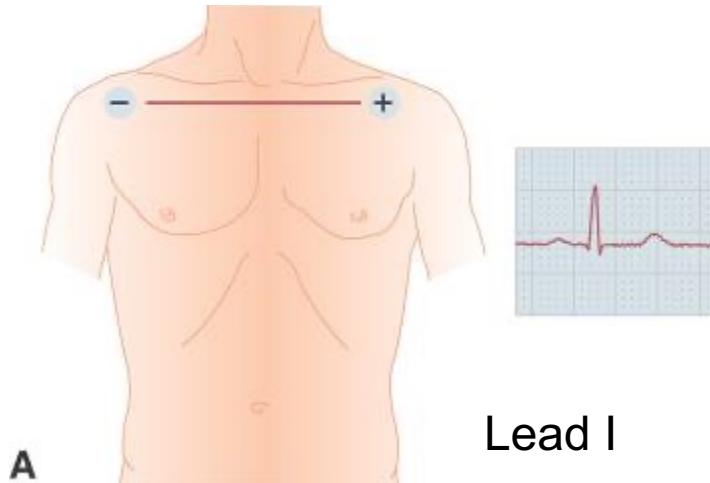


5-lead Placement

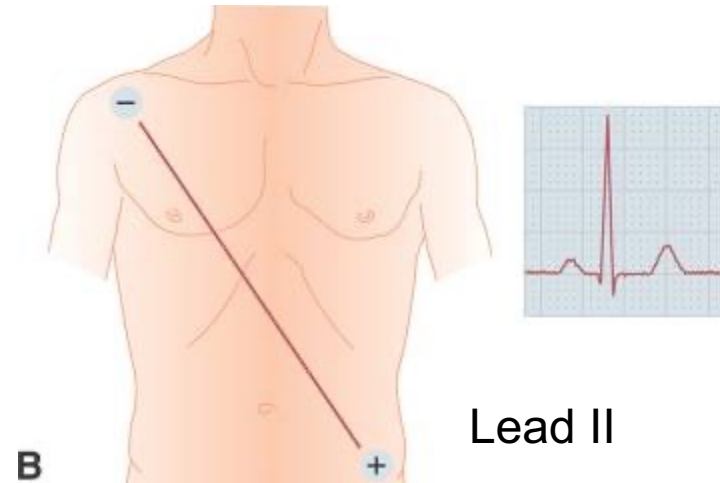


5-Electrode System

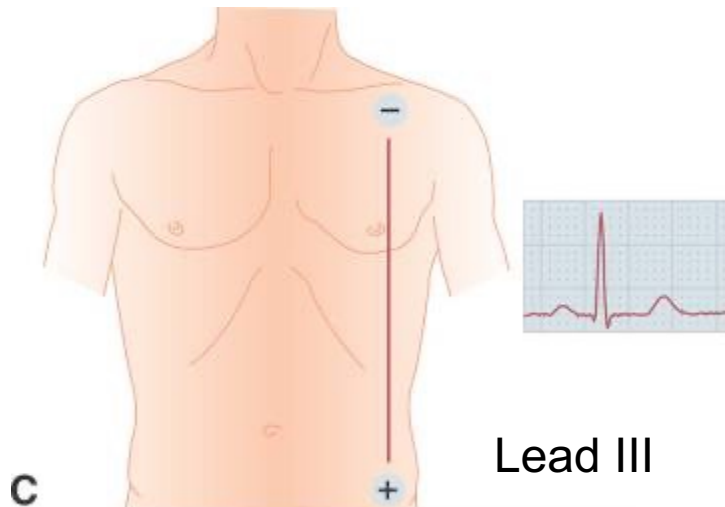
Cardiac Monitoring (continued)



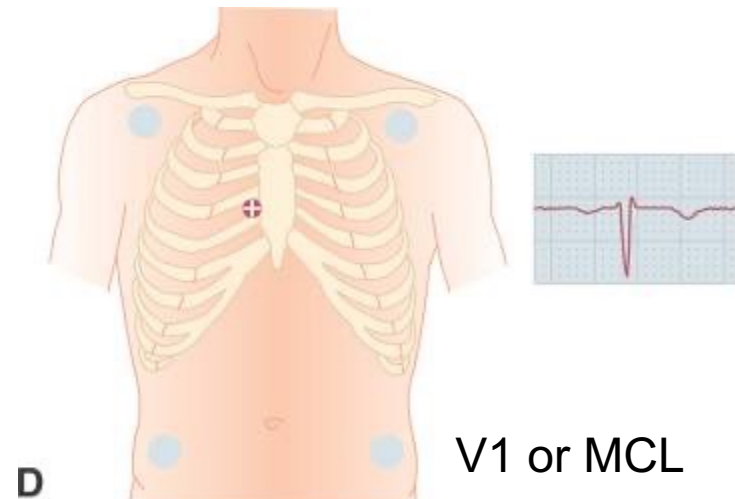
(From Post, S., & Hinkle, J. (1998). The nurse's guide to cardiac rhythm interpretation: implications for patient care. Philadelphia: Saunders.)



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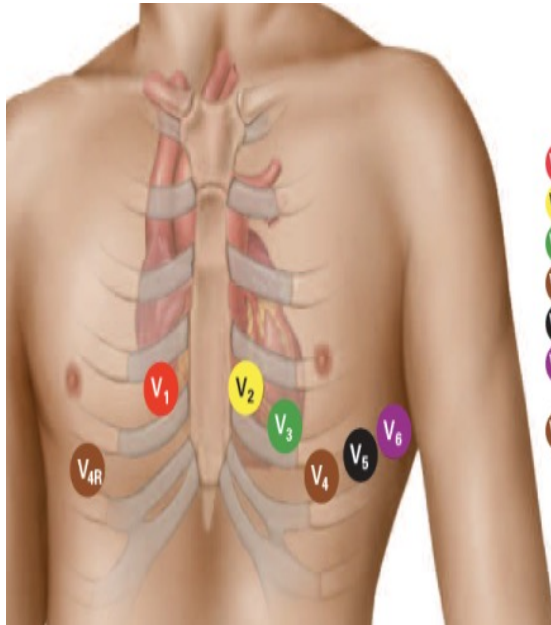


(From Post, S., & Hinkle, J. (1998). The nurse's guide to cardiac rhythm interpretation: implications for patient care. Philadelphia: Saunders.)

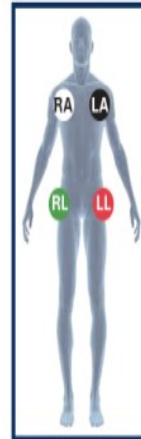


(From Post, S., & Hinkle, J. (1998). The nurse's guide to cardiac rhythm interpretation: implications for patient care. Philadelphia: Saunders.)

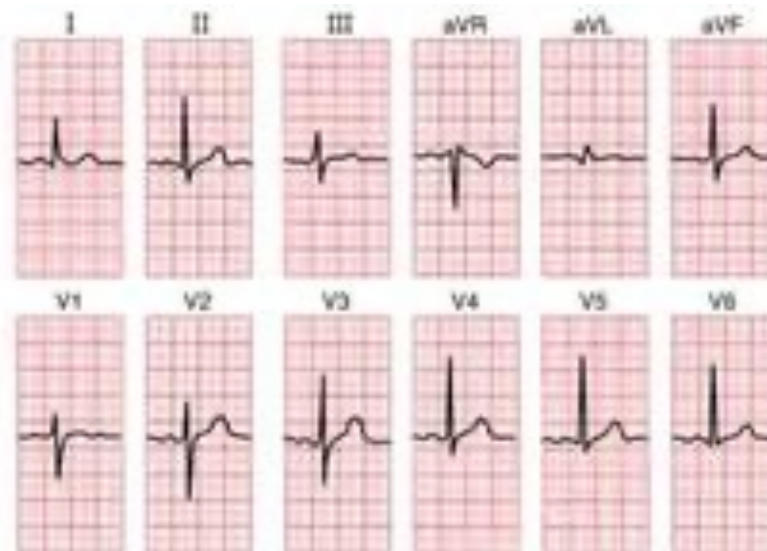
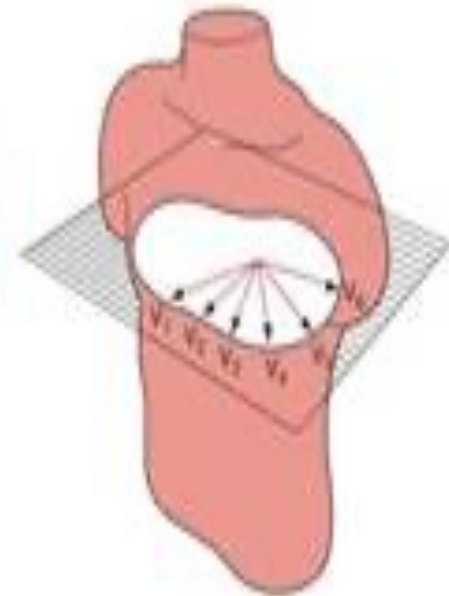
12-Lead ECG



- V₁** 4th intercostal space to the right of the sternum
- V₂** 4th intercostal space to the left of the sternum
- V₃** directly between the leads V₂ & V₄
- V₄** 5th intercostal space at midclavicular line
- V₅** level with V₄ at left anterior axillary line
- V₆** level with V₅ at left midaxillary line (directly under the midpoint of the ampit)
- V_{4R}** 5th intercostal space, right midclavicular line



- RA** Right Arm
- LA** Left Arm
- LL** Left Leg
- RL** Right Leg



Precordial leads
(chest leads)

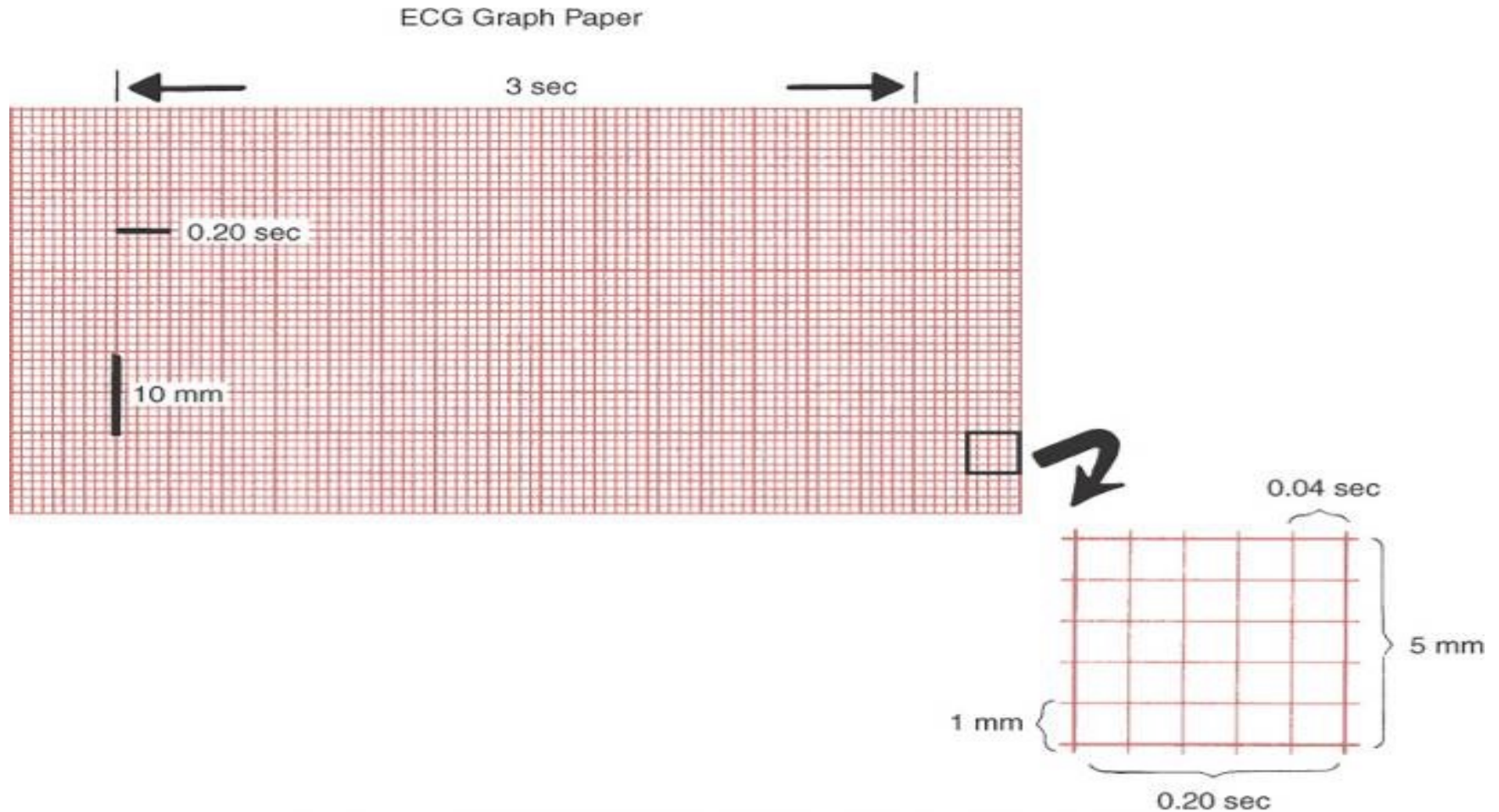
Cardiac Monitoring-ICU (cont'd)

- Record and interpret 6-second strip every 4 hours
- Monitor ST segment constantly (monitor has settings for this)
- Monitor dysrhythmias (aided by monitor alarm settings)
- Daily 12-lead ECG for acute cardiac patients (i.e., s/p MI or cardiac surgery)

Analyzing Cardiac Rhythms

- Graph paper
 - Used to standardize tracings
 - Vertical boxes measure voltage/amplitude (strength of cardiac muscle)
 - Horizontal boxes measure time

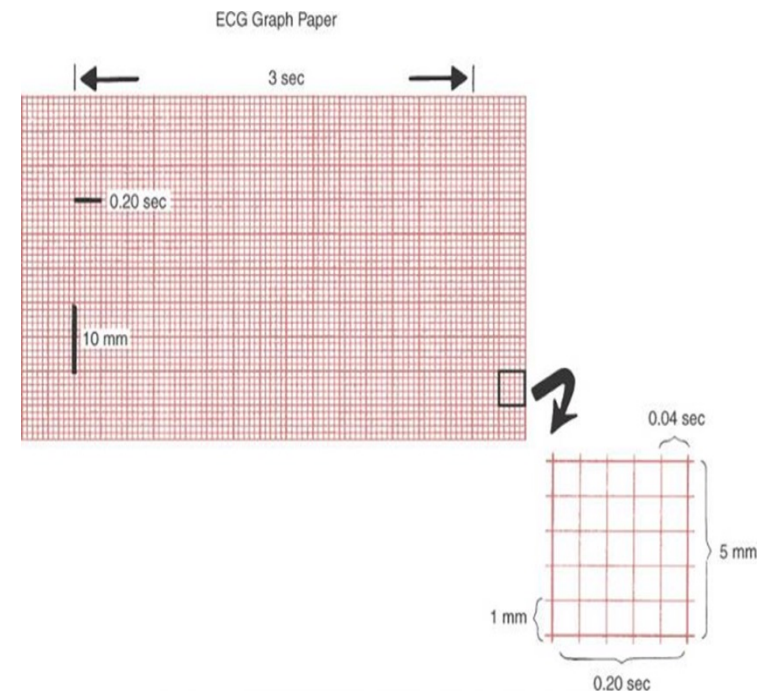
Analyzing Cardiac Rhythms (cont'd)



(From Goldberger, A. L. [2006]. Clinical electrocardiography: A simplified approach [7th ed., p. 10]. St. Louis: Mosby.)

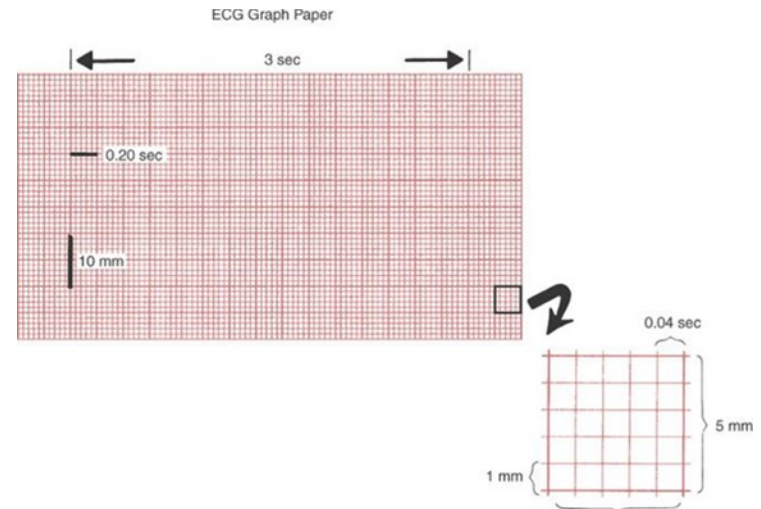
Analyzing Cardiac Rhythms (continued)

- Horizontal boxes
- 1 small box = 0.04 second
- 1 large box = 0.20 second
 - 5 large boxes = 1 second
 - 10 large boxes = 2 seconds
 - 15 large boxes = 3 seconds



Analyzing Cardiac Rhythms (continued)

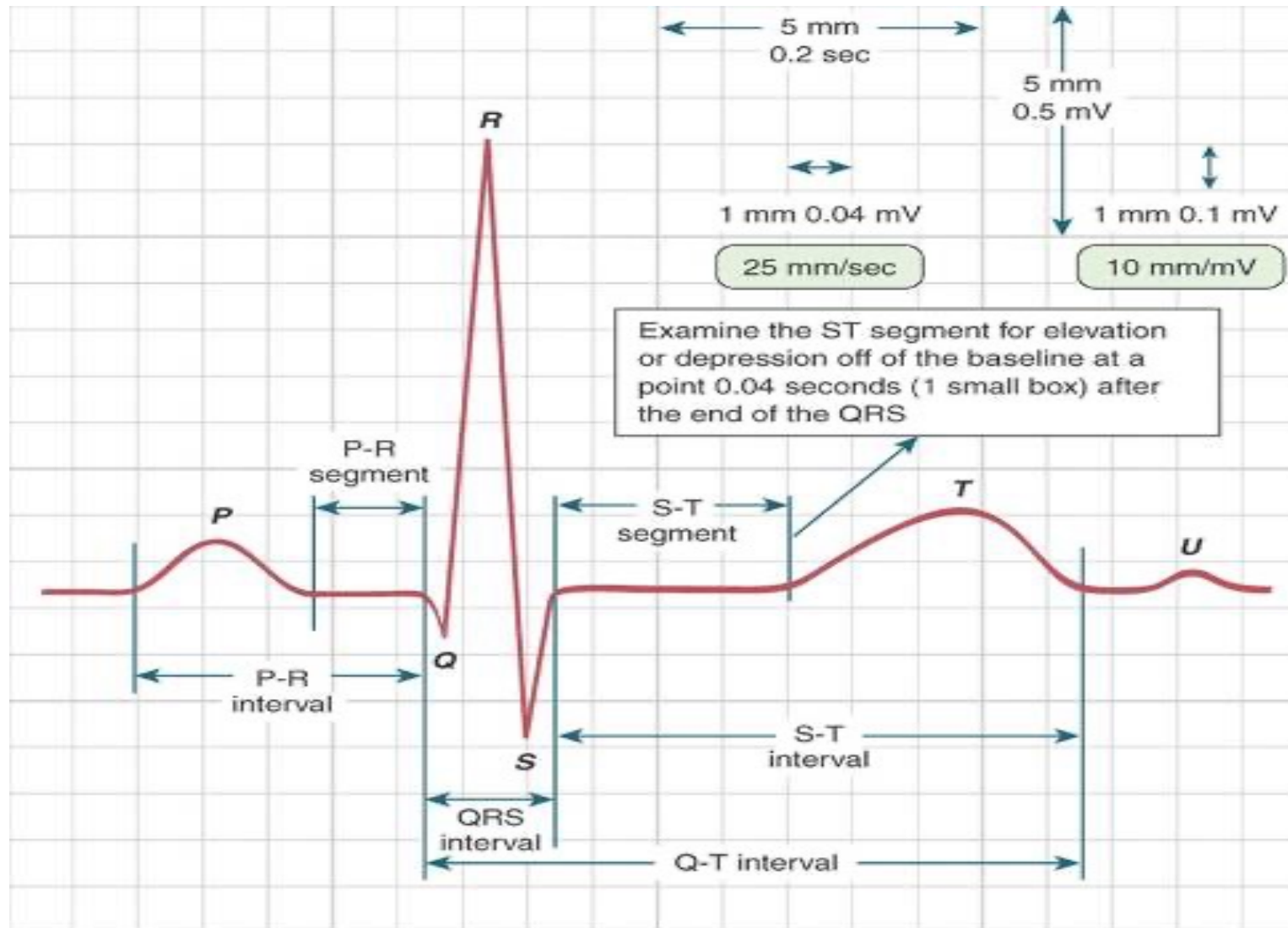
- Vertical boxes
- 1 small box = 0.1 mV
- Small waveforms (weak/damaged heart) produce low voltage
- Large waveforms (enlarged heart) produce high voltage



Analyzing Cardiac Rhythms (continued)

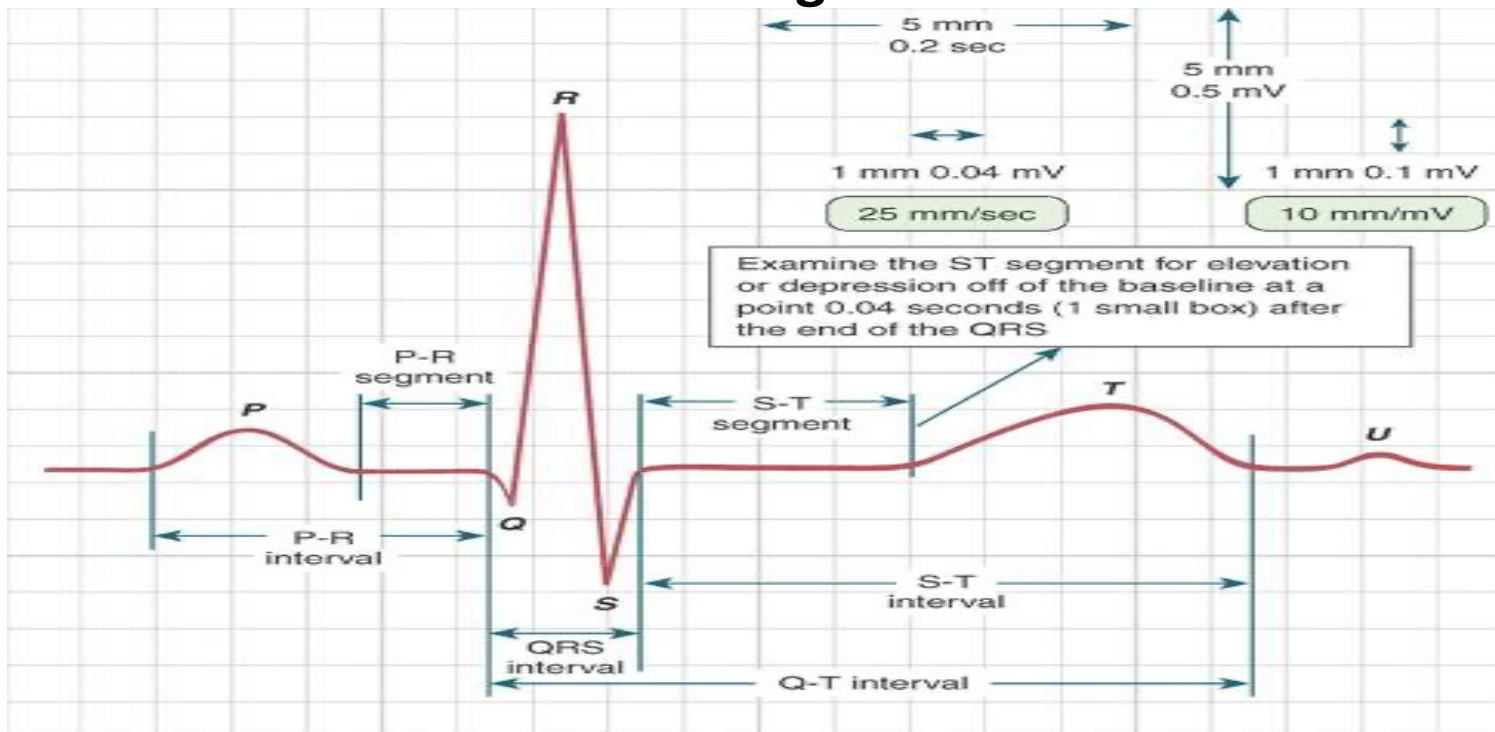
- Hash marks used to designate seconds at top of paper
 - Varies from 1-, 2-, or 3-second intervals
 - Check system at facility

Analyzing Cardiac Rhythms (continued)



P Wave

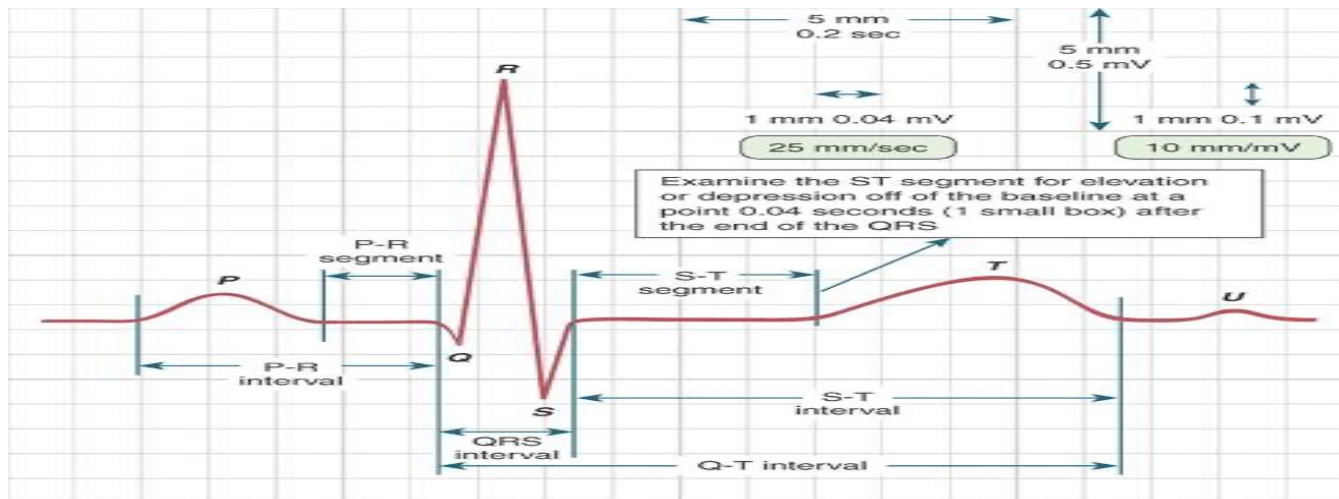
- Atrial depolarization
 - Normally indicates firing of the sinoatrial node
 - Not to exceed three boxes high



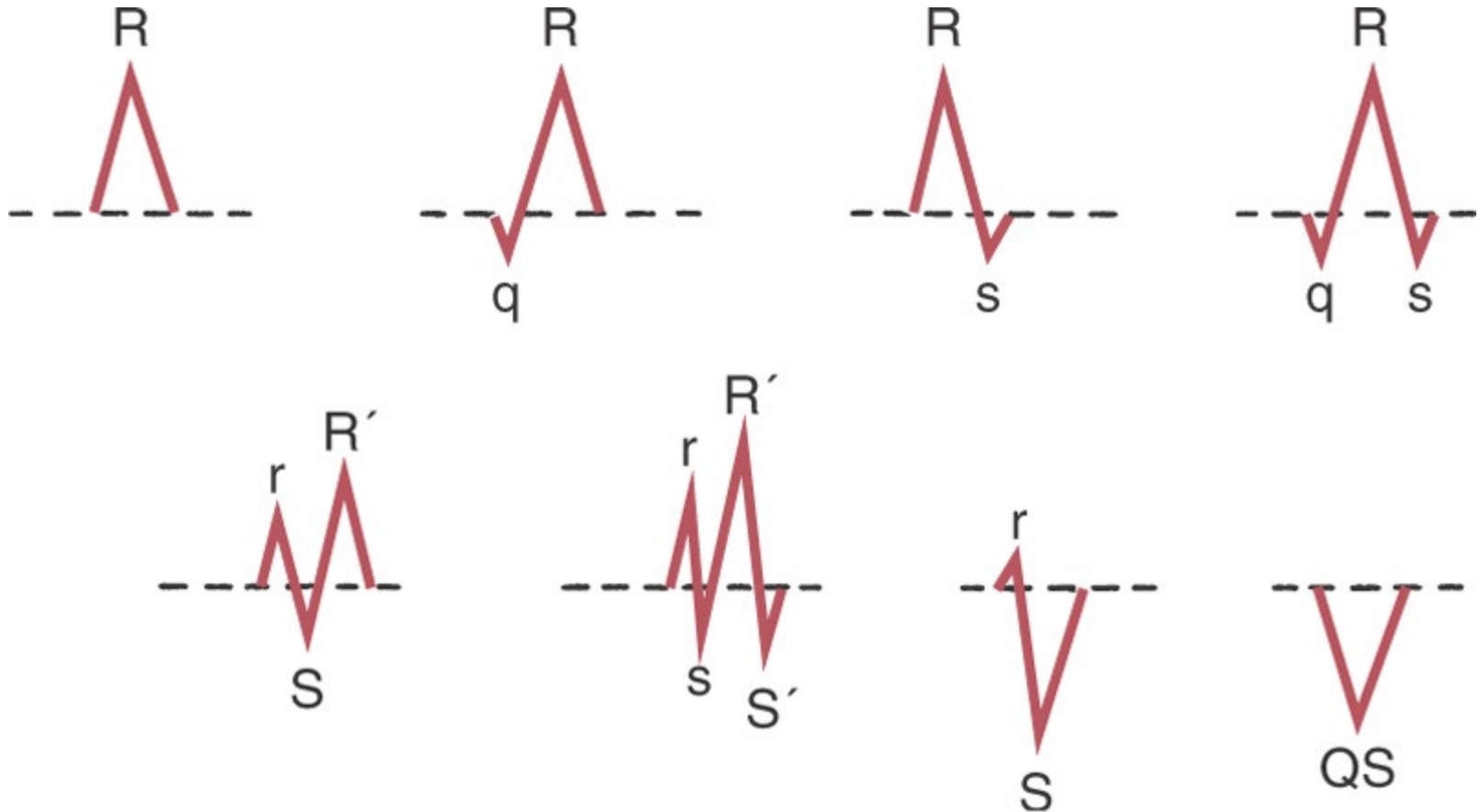
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QRS Complex

- Ventricular depolarization
 - Q wave first negative deflection after P wave
 - R wave first positive deflection after P wave
 - S wave negative waveform after R wave
- Not everyone has a traditional QRS



QRS Complex (continued)

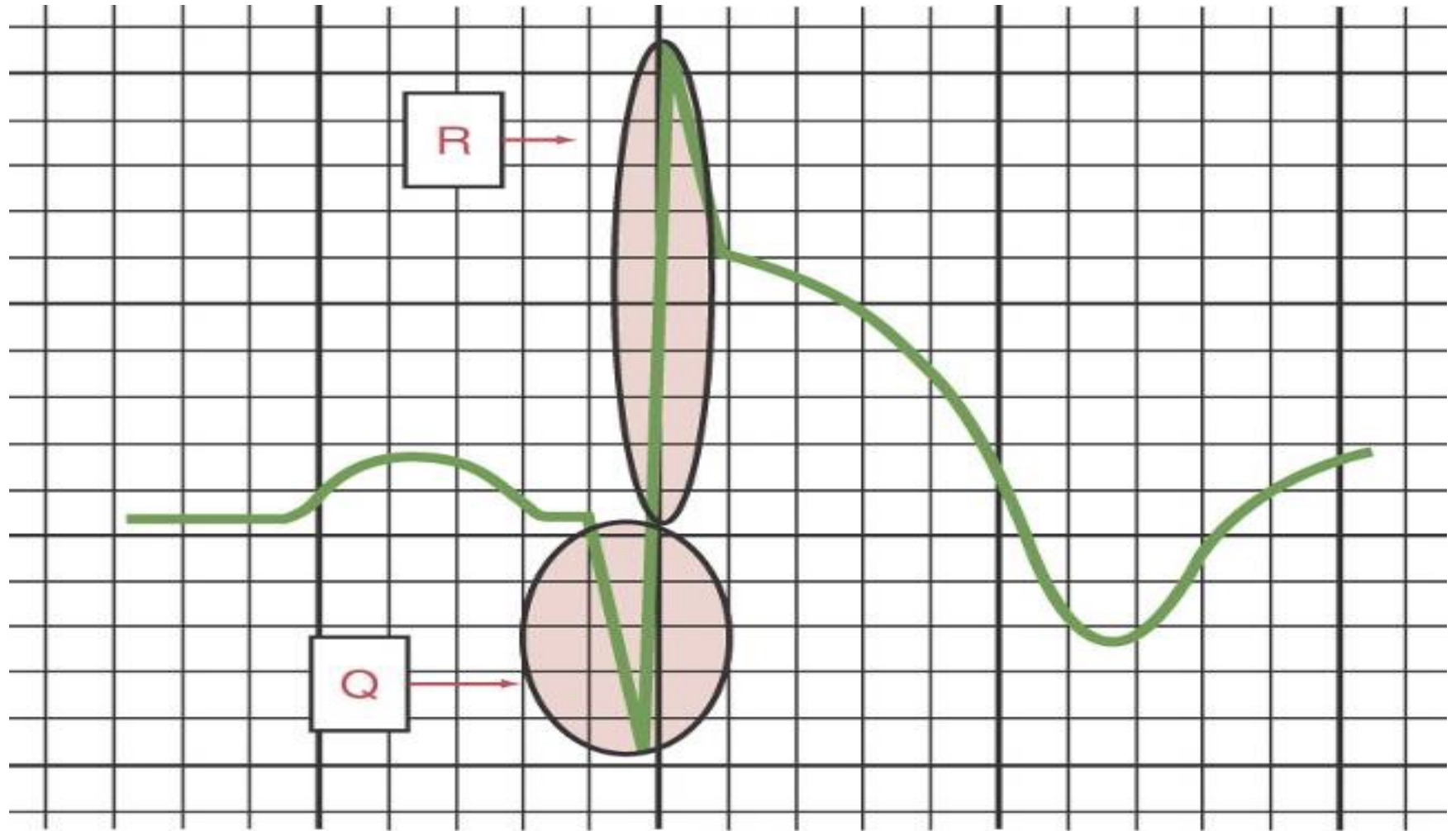


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Waveforms and Intervals

- Pathologic Q waves
 - 0.04 second in width
 - More than $\frac{1}{4}$ of the R-wave amplitude
 - Indication of a myocardial infarction
 - Myocardial tissue has died

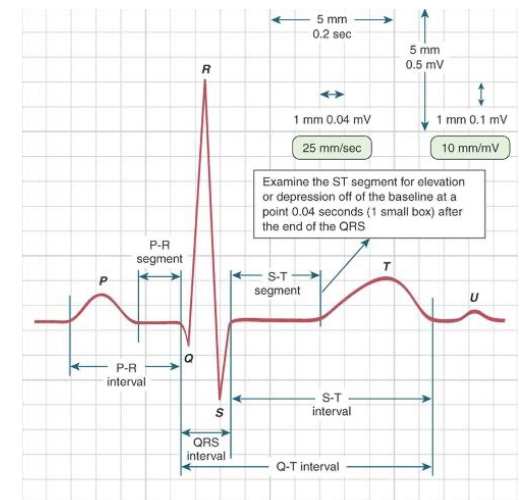
QRS Complex



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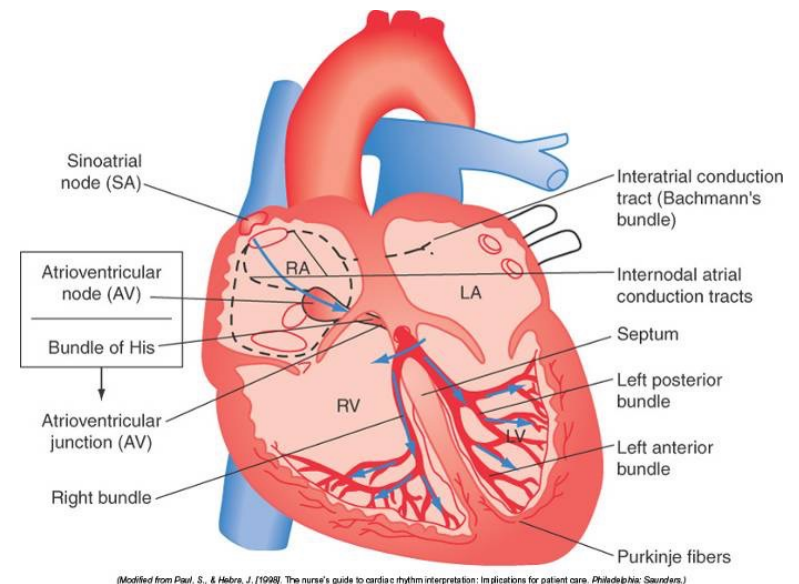
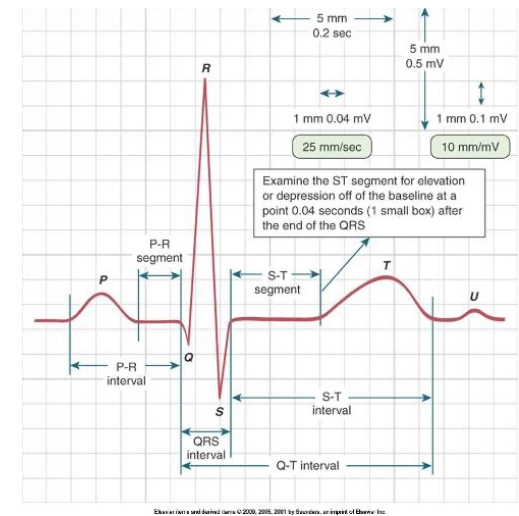
PR Interval

- Atrial depolarization/delay in AV node
- Beginning of P wave to beginning of QRS complex
- 0.12 to 0.20 second
- Shorter interval = impulse from AV junction
- ***Longer interval = first-degree AV block***



QRS Interval

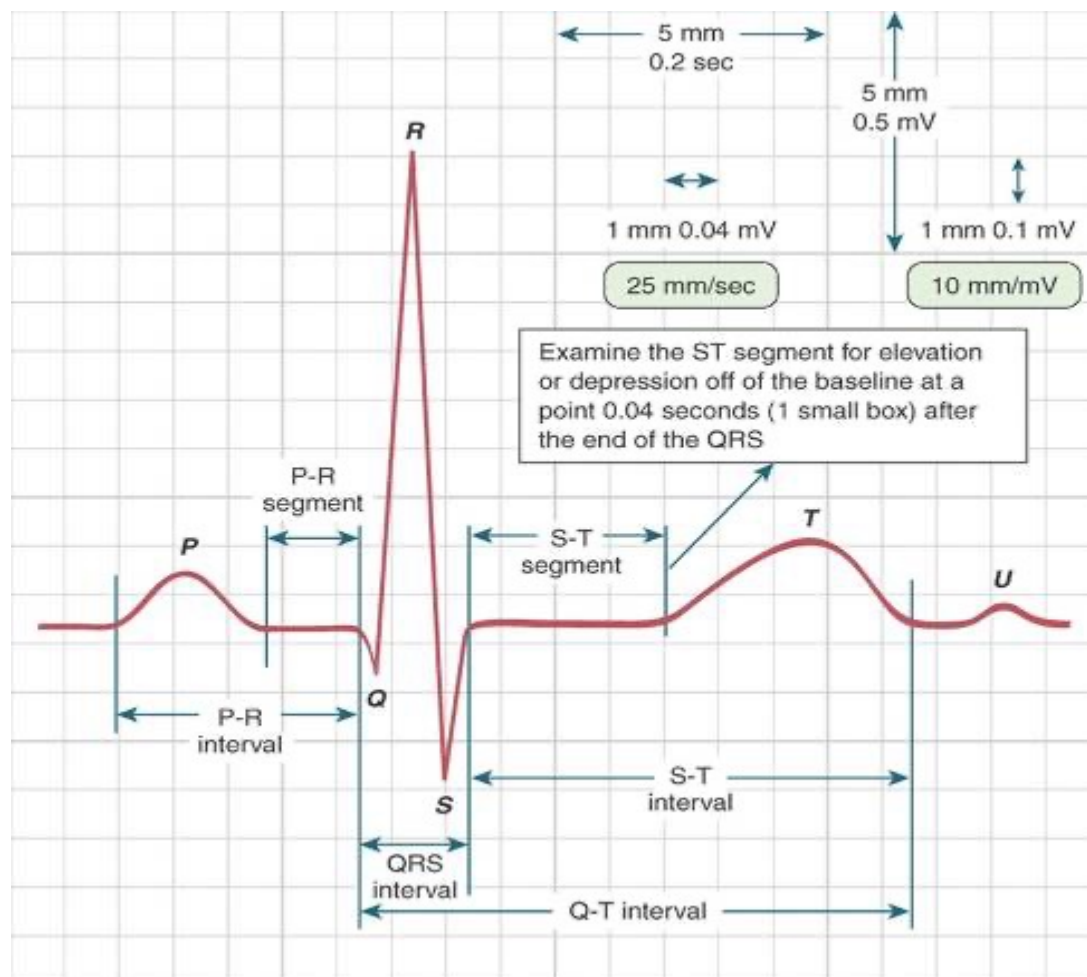
- Ventricular depolarization
- 0.06 to 0.10 second (narrow complex)
- Various configurations
- Wide complex: slowed conduction
 - Bundle branch block (BBB)
 - Ventricular rhythm



(Modified from Paul, S., & Hebra, J. (1998). The nurse's guide to cardiac rhythm interpretation: Implications for patient care. Philadelphia: Saunders.)

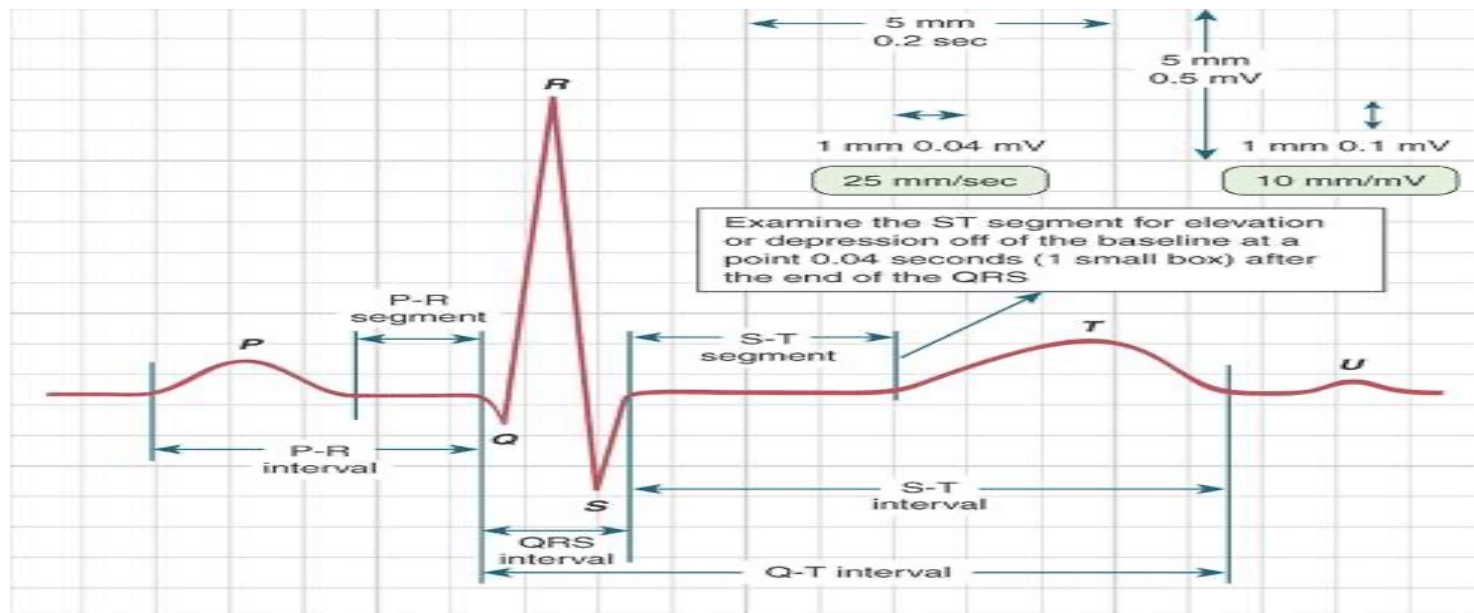
ST Segment

- Look for depression or elevation
 - ST elevation: myocardial injury
 - ST depression: reciprocal changes, digoxin, and ischemia



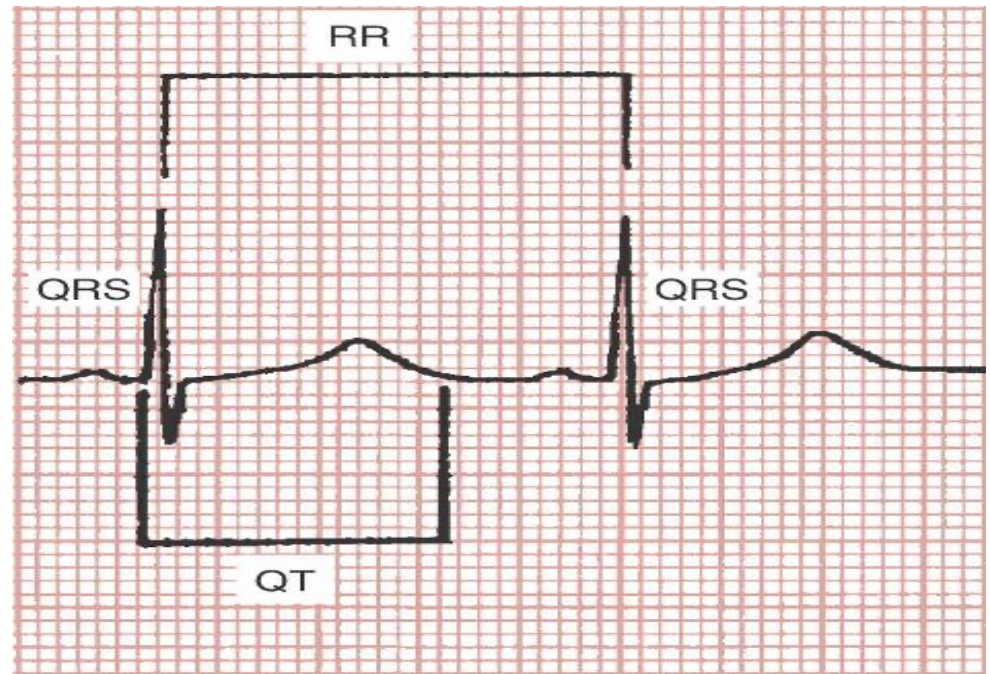
T Wave

- Ventricular repolarization
 - Follows a QRS complex
 - Bigger than a P wave
 - No greater than five small boxes high
 - Inversion indicates ischemia to myocardium



QT Interval

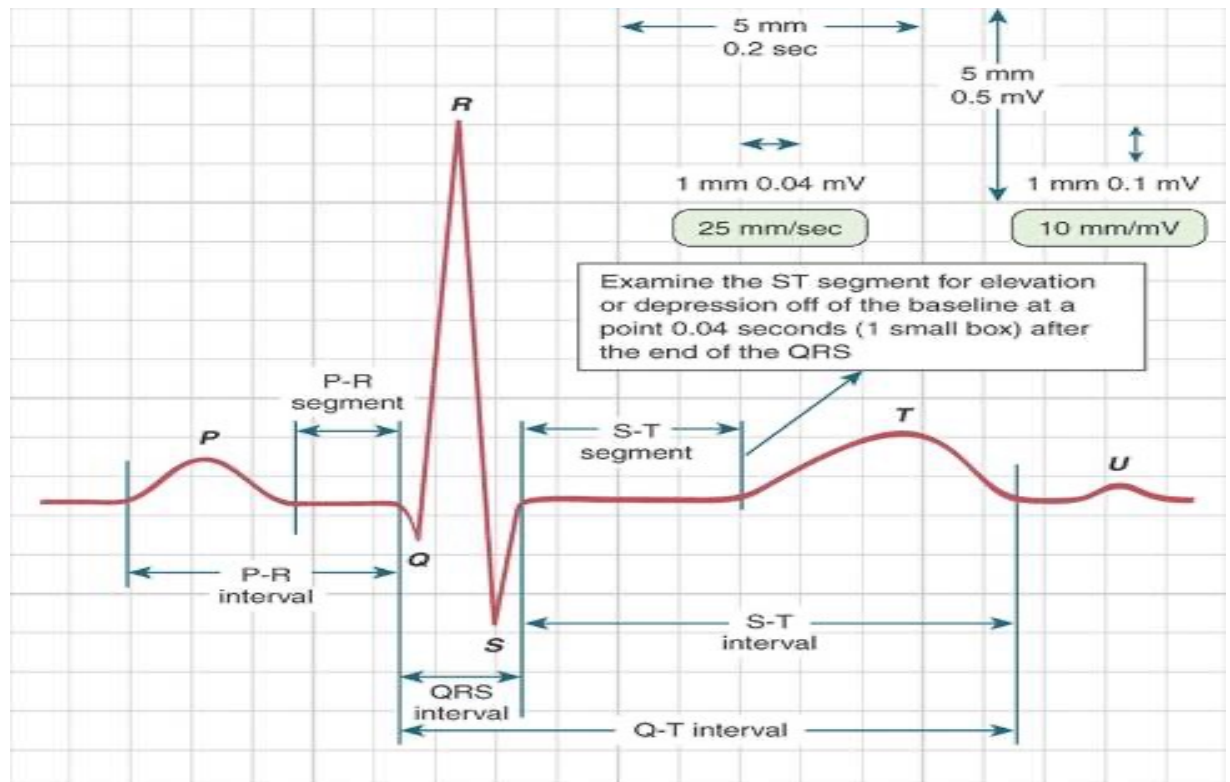
- Beginning of QRS complex to end of T wave
- 0.32 to 0.50 second
- Varies with heart rate



(From Goldberger, A. L. (2005). Clinical electrocardiography: A simplified approach (7th ed., p. 152. St. Louis: Mosby.)

U Wave

- Sometimes seen after T wave
- Unknown origin
 - May be normal
 - May indicate hypokalemia



Interpretation of Rhythms

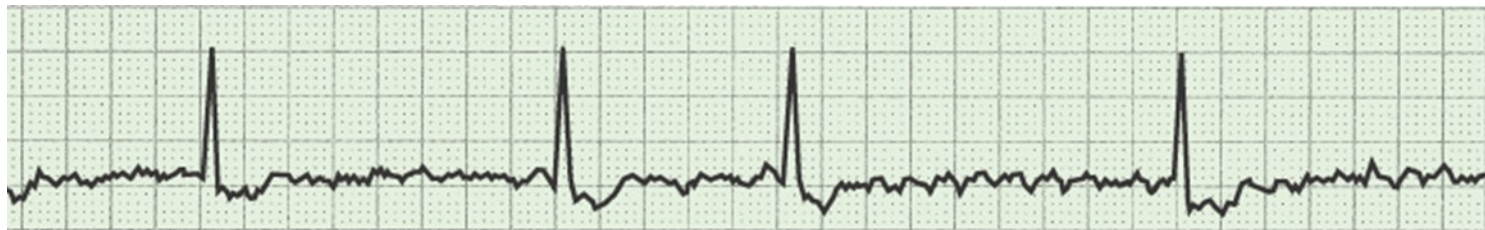
- Develop a systematic approach
- Four steps
 1. Rhythmicity (regular or irregular)
 2. Rate (atrial *and* ventricular) fast, slow or normal
 3. Waveform configuration and location
 4. Intervals of components



Courtesy of Armstrong Medical Industries, Lincolnshire, IL.

Regular (sinus rhythm)

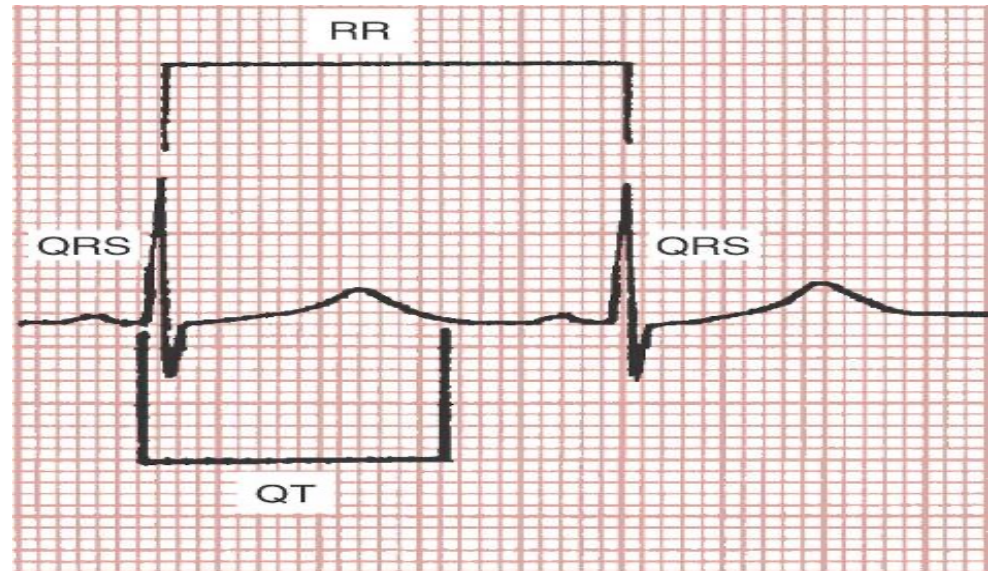
Irregular (atrial fibrillation)



(From Paul, S., & Hebra, J. D. [1998]. The nurse's guide to cardiac rhythm interpretation: Implications for patient care. Philadelphia: Saunders.)

Rhythmicity

- Regularity or pattern of heart beats
- P-P intervals (atrial)
 - Is regular when distance between P-P intervals is equal
- R-R intervals (ventricles)
 - Is regular when distance between R-R intervals is equal



(From Goldberger, A. L. (2009). Clinical electrocardiography: A simplified approach (7th ed., p. 15). St. Louis: Elsevier.)

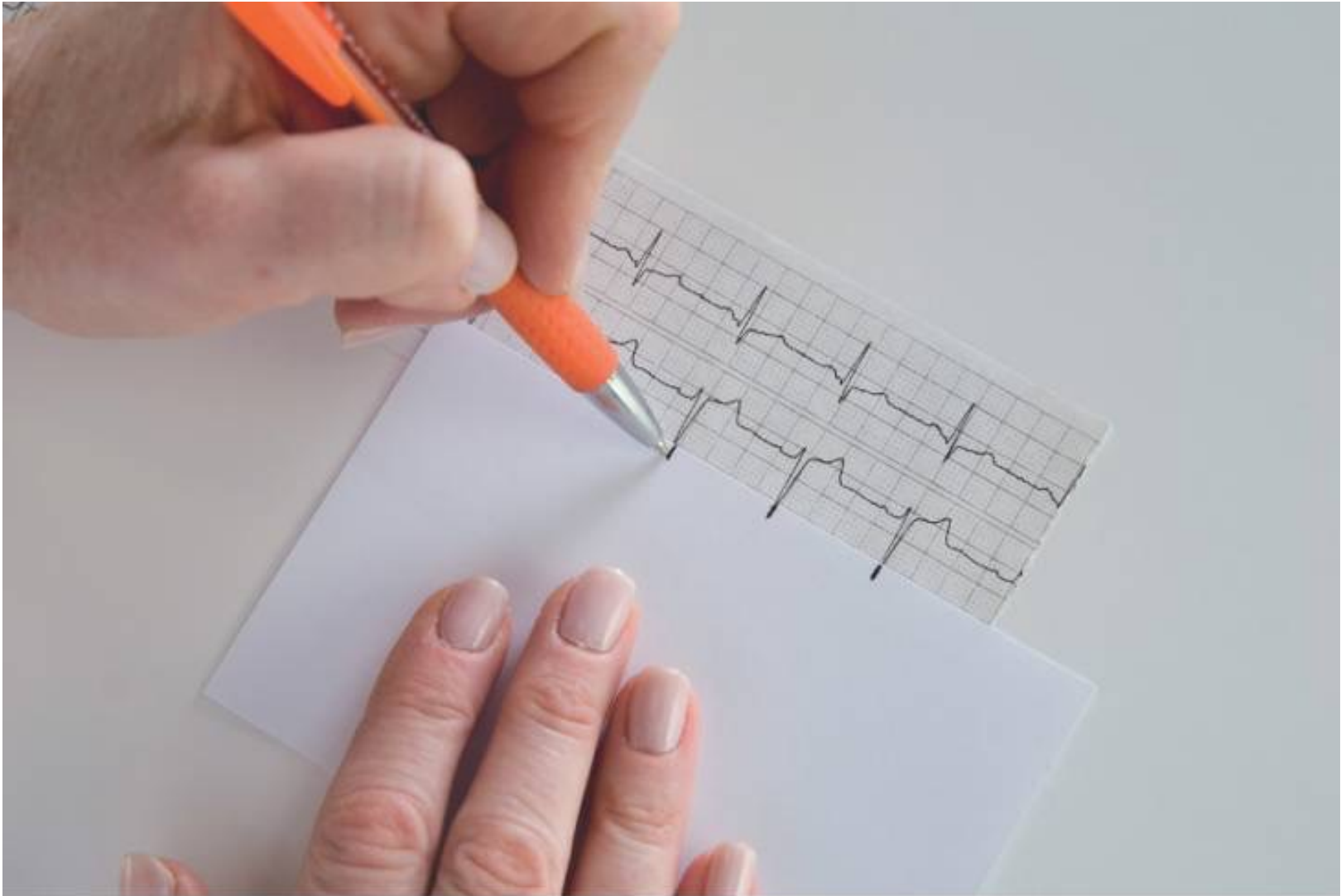
Rate

- How fast the heart is depolarizing
- Regular (number of R waves/beats)
 - Small blocks between R waves into 1500
 - Large blocks into 300
- Irregular = measure on a 6-second strip
(number of beats x 10)

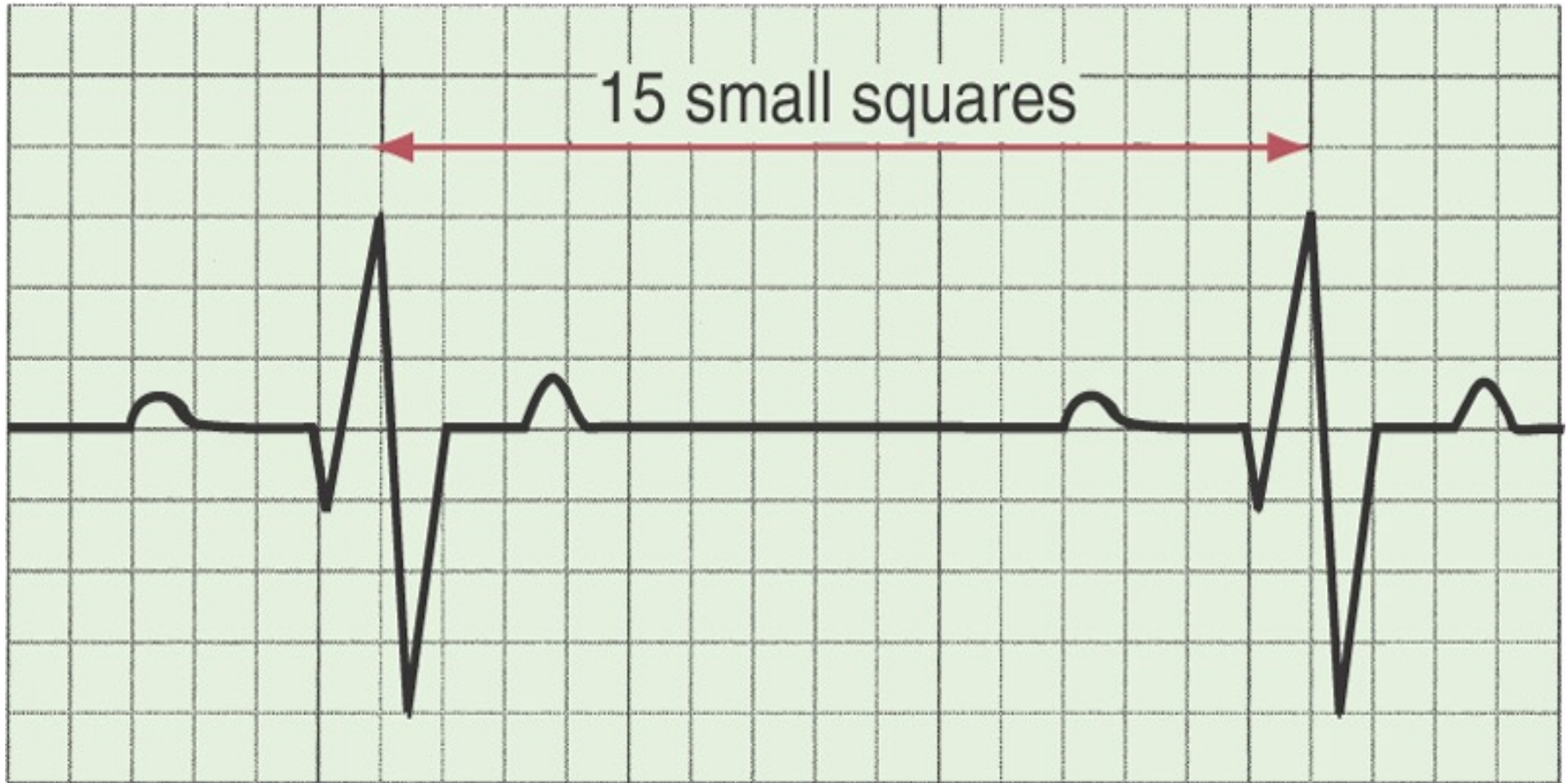
Methods for Measuring Rate



Methods for Measuring Rate (cont'd)



Methods for Measuring Rate (cont'd)



(From Paul, S., & Hebra, J. D. [1998]. The nurse's guide to cardiac rhythm interpretation: Implications for patient care. Philadelphia: Saunders.)

Divide into 1500=100

Rate (continued)

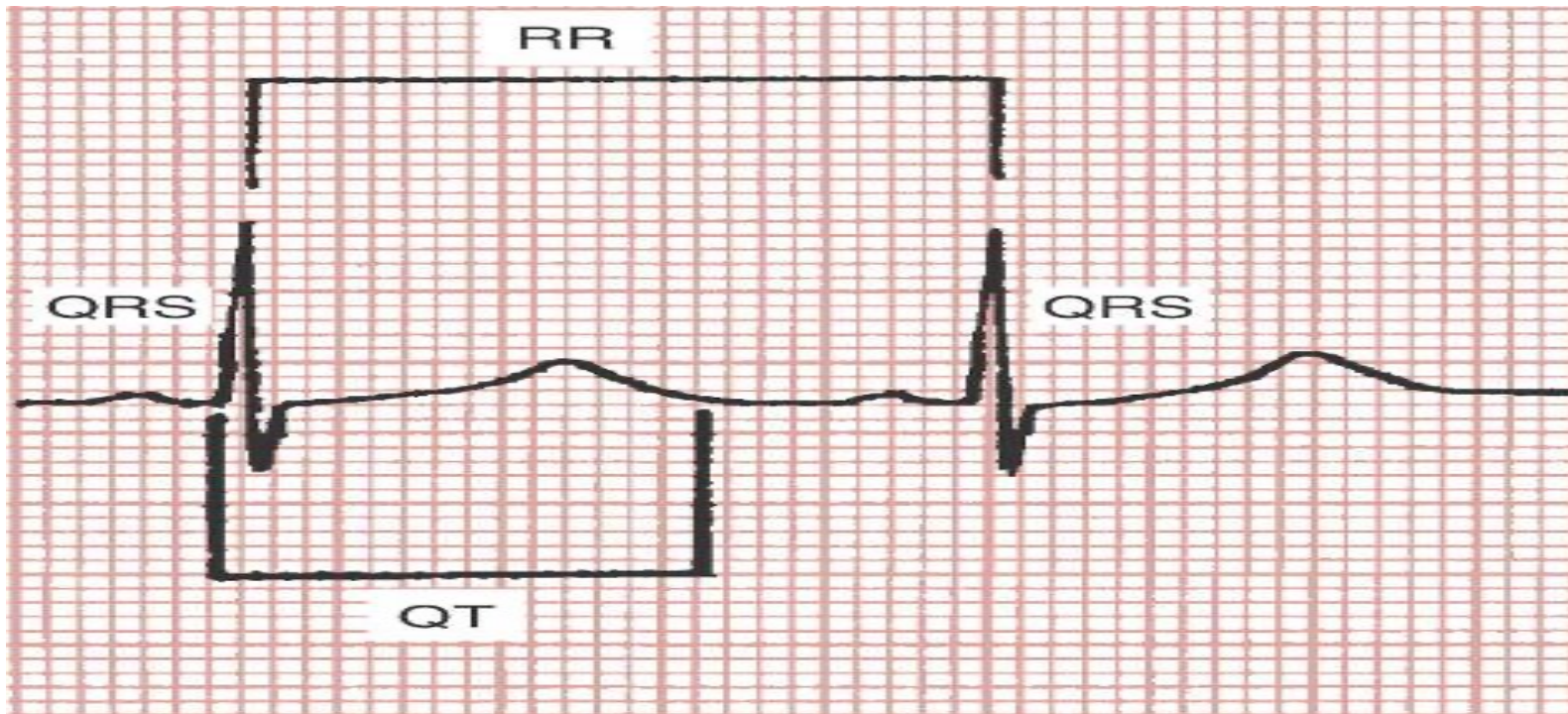
- Calculate both *atrial* and *ventricular* rates
- Atrial rate = P-P
- Ventricular rate = R-R

Waveform Configuration and Location

- Check P, Q, R, S, and T waveforms
- Each waveform has unique shape
- Comparison of waveform on 6-second strip
- Check for correct sequence of each waveform

Interval

- Measure PR interval
- Measure QRS interval
- Measure QT interval



Rhythm Interpretation

- Dysrhythmia is abnormal cardiac rhythm; preferred term
- Arrhythmia means no rhythm but is most commonly used

Basic Dysrhythmias

- Grouped by anatomic areas:
- Atrial
 - SA node
 - Atria
 - AV node
- Ventricular
 - Ventricles

Normal Sinus Rhythm

- Regular rhythm
- Rate 60 to 100 beats/min
- Normal P wave
- P wave before each QRS
- Normal PR, QRS, and QT intervals



(Courtesy of Armstrong Medical Industries, Lincolnshire, IL.)

Supraventricular Dysrhythmias

Sinus Tachycardia

- Sinus rhythm with a rate of 100 to 150 beats/min
- Causes: stimulants, exercise, fever, and alterations in fluid status
- Assess for symptoms of low cardiac output



(From Goldberger, A. L. [2006]. Clinical electrocardiography: A simplified approach [7th ed., p. 158]. St. Louis: Mosby.)

Sinus Bradycardia (SB)

- Sinus rhythm with rate less than 60
- Causes: vagal, drugs, ischemia, elevated intracranial pressure (ICP), and athletes (normal)
- Produces various hemodynamic responses



(From Goldberg, A. L. [2006]. Clinical electrocardiography: A simplified approach [7th ed., p. 158]. St. Louis: Mosby.)

Sinus Dysrhythmia

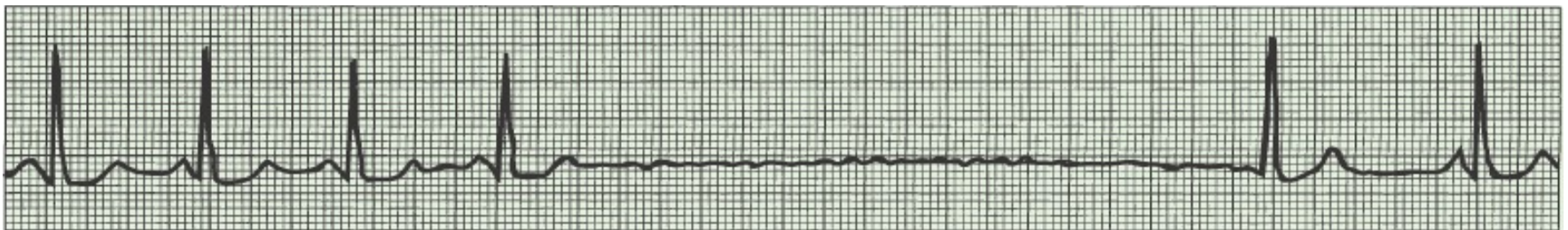
- Sinus rhythm
- Rate varies with respirations
 - Inspire = increase
 - Expire = decrease
- Rarely affects hemodynamic status



(From Goldberger, A. L. [2006]. Clinical electrocardiography: A simplified approach [7th ed., p. 159]. St. Louis: Mosby.)

Sinus Arrest or Exit Block

- Sinus node fails to initiate impulse
- Causes: vagal responses, heart disease, and drugs that slow heart rate
- Heart rate can be normal or slow
- Irregular rhythm
- Can decrease cardiac output



(From Huszar, R. J. [2002]. Basic dysrhythmias interpretation & management [3rd ed., p. 104]. St. Louis: Mosby.)

Atrial Dysrhythmias

- Increased automaticity in the atrium
- Generally have P-wave changes

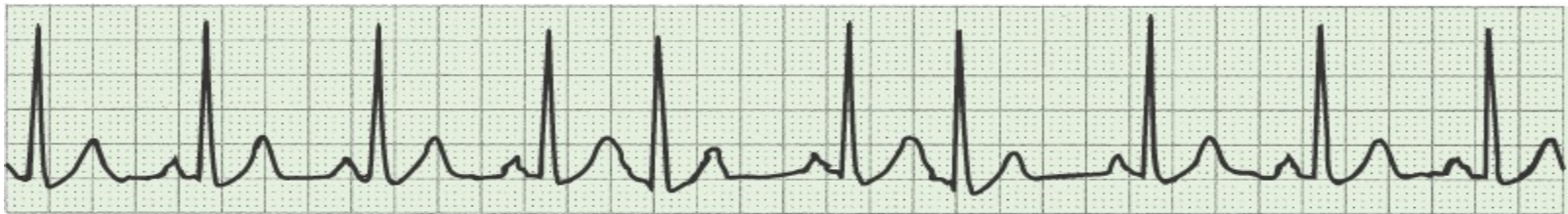
- Causes

- Stress
- Electrolyte imbalances
- Hypoxemia
- Atrial injury

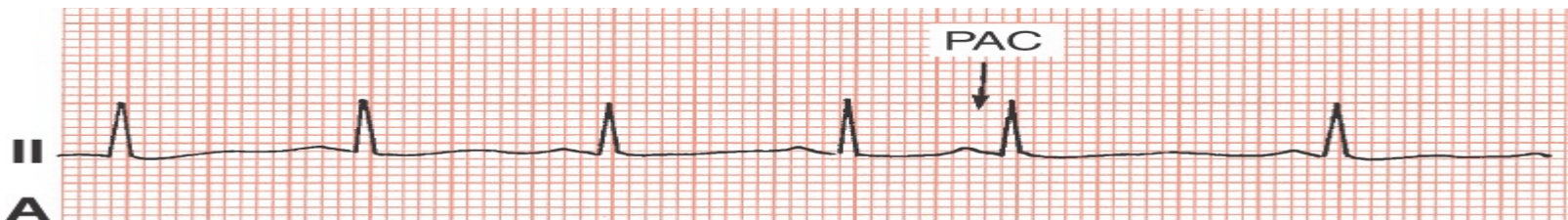
- Digitalis toxicity
- Hypothermia
- Hyperthyroidism
- Alcohol
- Pericarditis

Premature Atrial Contractions (PAC)

- Early beats initiated by atrium
- P waves and PR interval may vary
- Noncompensatory pause
- P wave may be found in T wave



(From Paul, S., & Hebra, J. D. [1998]. The nurse's guide to cardiac rhythm interpretation: Implications for patient care. Philadelphia: Saunders.)



(From Goldberger, A. L. [2006]. Clinical electrocardiography: A simplified approach [7th ed., p. 164]. St. Louis: Mosby.)

Blocked Premature Atrial Contractions

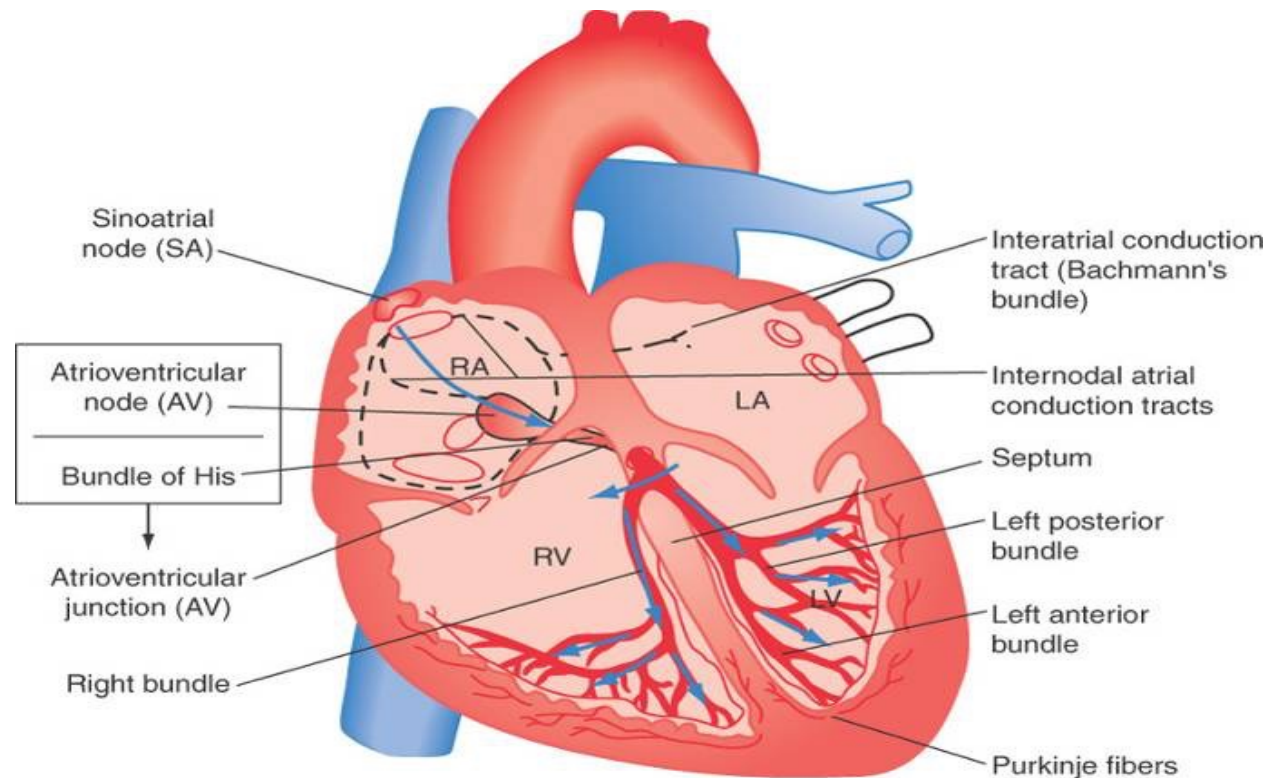
- Pause noted on rhythm strip
- Premature P wave
- May alter cardiac output



(From Goldberger, A. L. [2006]. Clinical electrocardiography: A simplified approach [7th ed., p. 164]. St. Louis: Mosby.)

Wandering Atrial Pacemaker

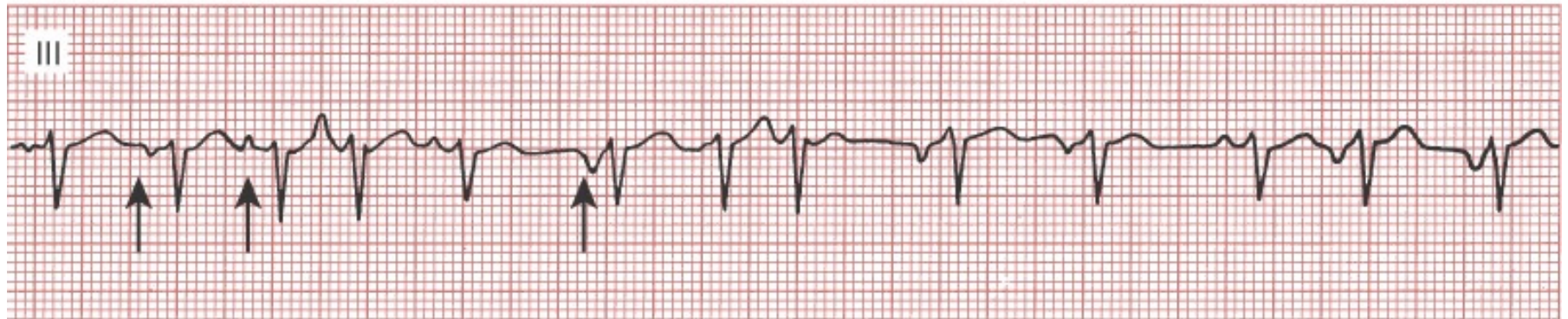
- Varying configurations of P waves
- At least three different looking P waves must be seen
- Heart rate not greater than 100
- PR interval varies
- Irregular rhythm



(Modified from Paul, S., & Hebre, J., [1998]. The nurse's guide to cardiac rhythm interpretation: Implications for patient care. Philadelphia: Saunders.)

Wandering Atrial Pacemaker (continued)

Multifocal Atrial Tachycardia



(From Goldberger, A. L. [2006]. Clinical electrocardiography: A simplified approach [7th ed., p. 241]. St. Louis: Mosby.)

Multifocal Atrial Tachycardia

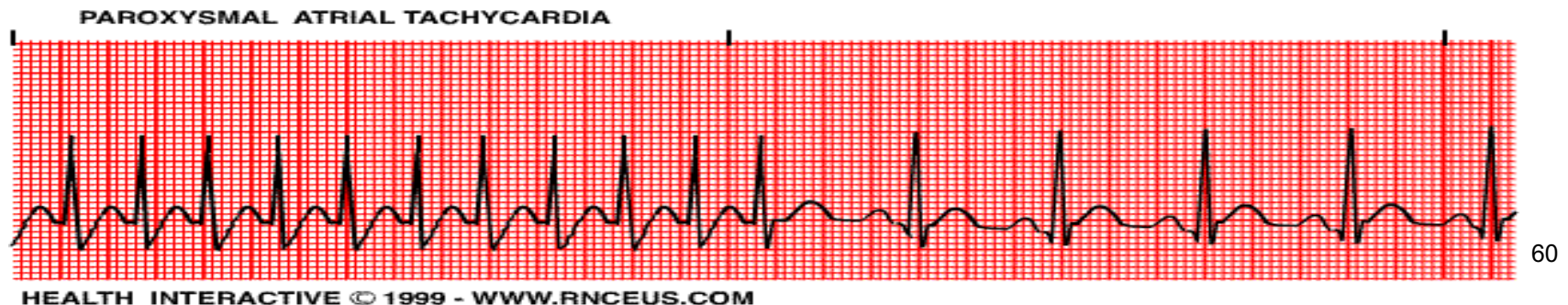
- Same as a wandering atrial pacemaker
- Heart rate exceeds 100 beats/min
- Common in COPD patients



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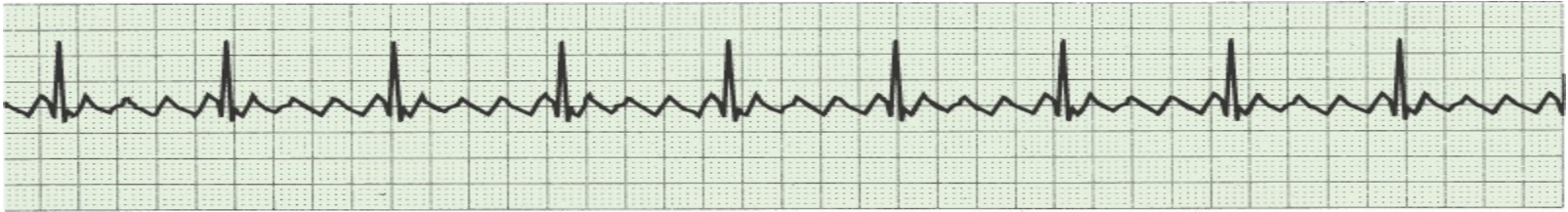
Paroxysmal Atrial Tachycardia (PAT, PSVT)

- Without warning
- Heart rate 150 to 250 beats/min
- Regular rhythm
- P waves (if present) may merge in T waves
- AV block
- QRS complex width is normal
- Hemodynamic effects vary

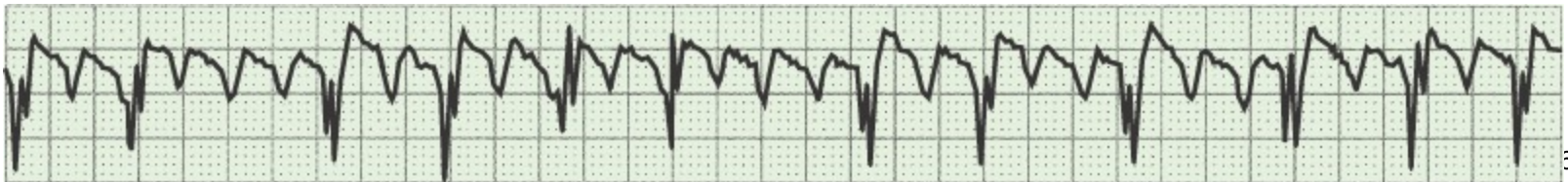


Atrial Flutter

- Ectopic foci in atria, heart disease
- Classic “sawtooth” pattern in leads II, III, and aVF
- Atrial rate fast and regular (250 to 350 beats/min) with AV block
- Degree of conduction varies; may be 3:1, 4:1, etc.



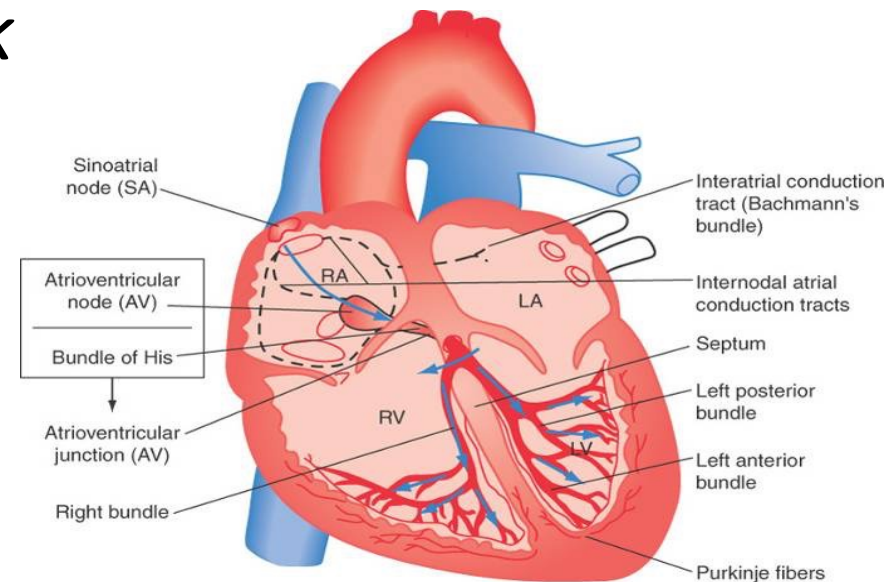
(Courtesy of Armstrong Medical Industries, Lincolnshire, IL.)



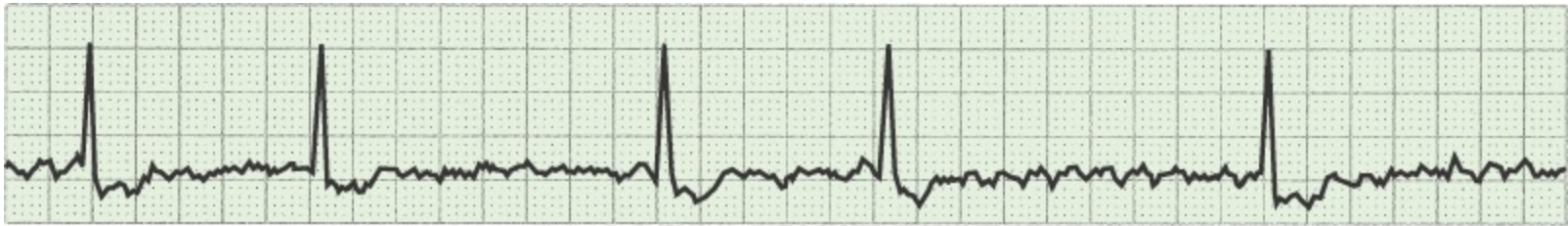
(From Paul, S., & Hebra, J. D. [1998]. The nurse's guide to cardiac rhythm interpretation: Implications for patient care. Philadelphia: Saunders.)

Atrial Fibrillation

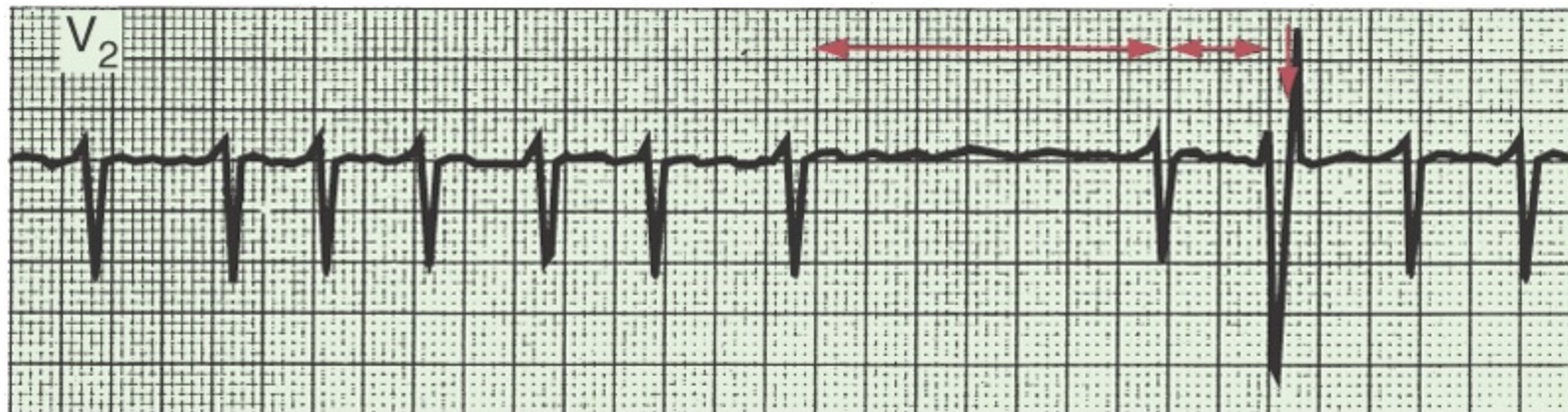
- Erratic impulse formation in atria
- No discernible P wave
- Irregular ventricular rate
- Aberrant (abnormal) ventricular conduction can occur
- *Results in loss of atrial kick*
- High risk for pulmonary or systemic emboli



Atrial Fibrillation -(continued)



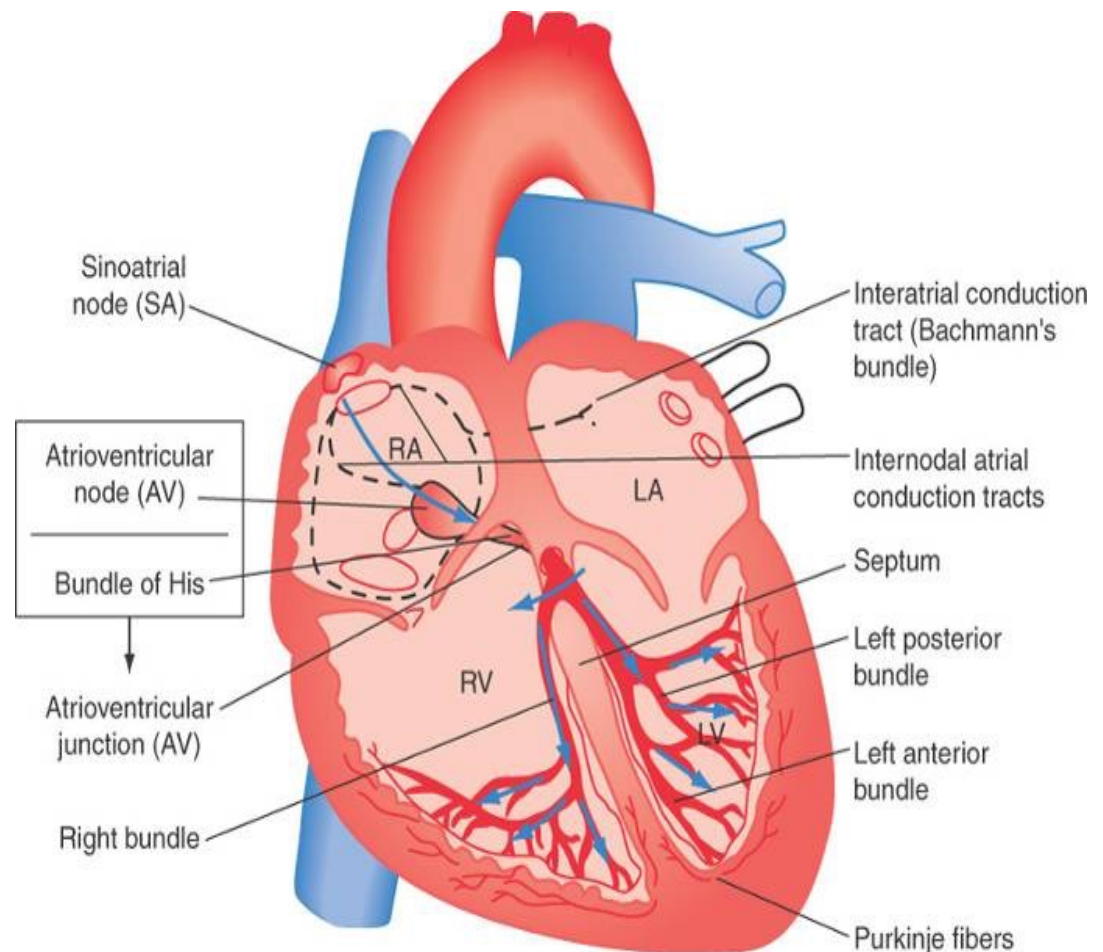
(From Paul, S., & Hebra, J. D. [1998]. *The nurse's guide to cardiac rhythm interpretation: Implications for patient care*. Philadelphia: Saunders.)



(From Laver, J. [1992]. *Electrical activity of the heart and dysrhythmias*. In C. Guzzetta & B. Dossey [Eds.], *Cardiovascular nursing: Body mind tapestry*. St. Louis: Mosby.)

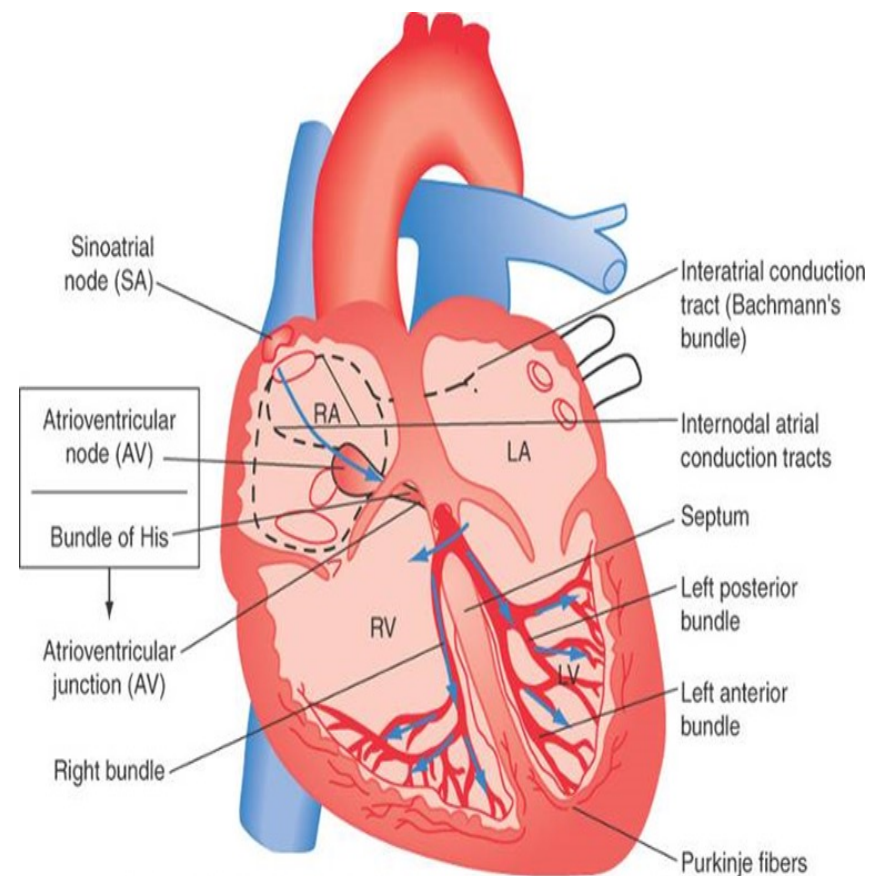
Junctional (Nodal) Rhythms

- Dysrhythmias from the AV junction
- P-wave changes
 - Shorter PR intervals
 - No P wave
 - Retrograde P waves



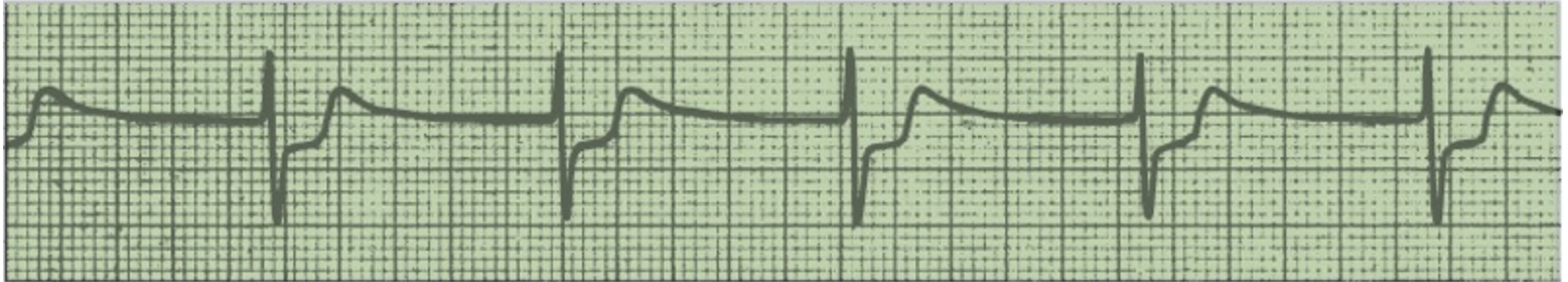
Junctional Rhythm

- Regular rhythm
- PR interval low end of normal
- P-wave changes
- Rate usually 40 to 60 beats/min
- Symptoms of decreased cardiac output possible

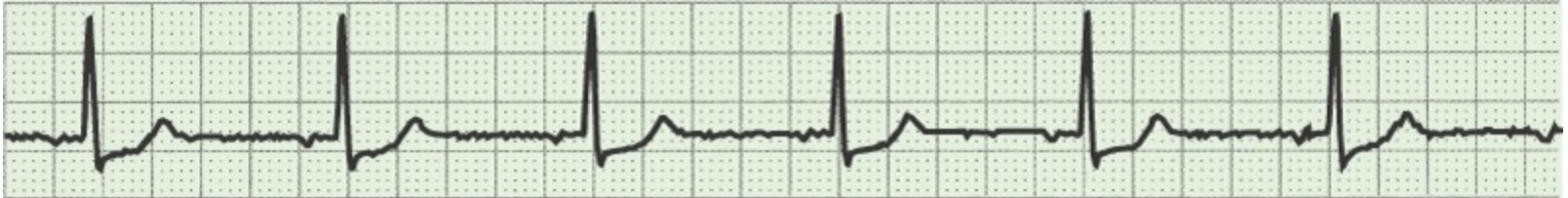


(Modified from Paul, S., & Hebr, J. [1998]. The nurse's guide to cardiac rhythm interpretation: Implications for patient care. Philadelphia: Saunders.)

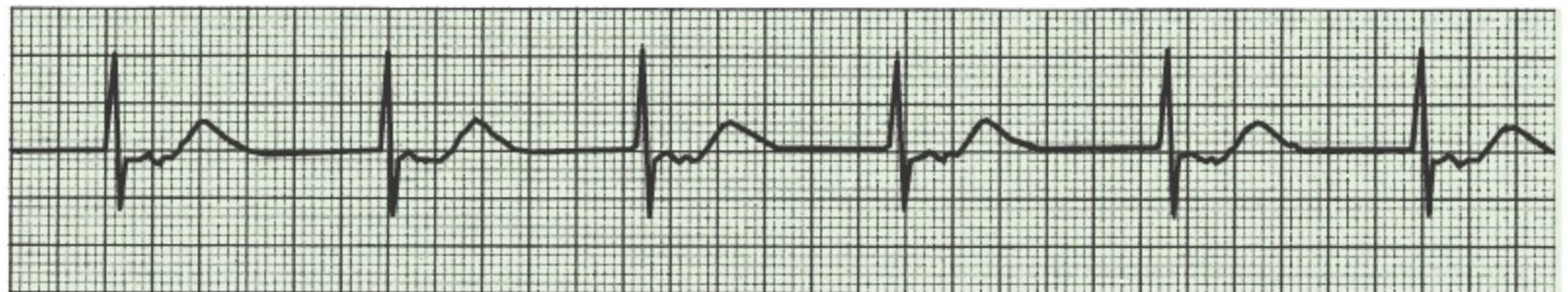
Junctional (Nodal) Rhythms



(From Lewis, S., Collier, I. C., & Heitkemper, M. M. [1996]. *Medical-surgical nursing: Assessment and management of clinical problems* [4th ed.]. St. Louis: Mosby.)



(From Paul, S., & Hebra, J. D. [1998]. *The nurse's guide to cardiac rhythm interpretation: Implications for patient care*. Philadelphia: Saunders.)



(From Patel, J., McGowan, S., & Moody, L. [1989]. *Arrhythmias: Detection, treatment, and cardiac drugs*. Philadelphia: Saunders.)

Junctional Tachycardia

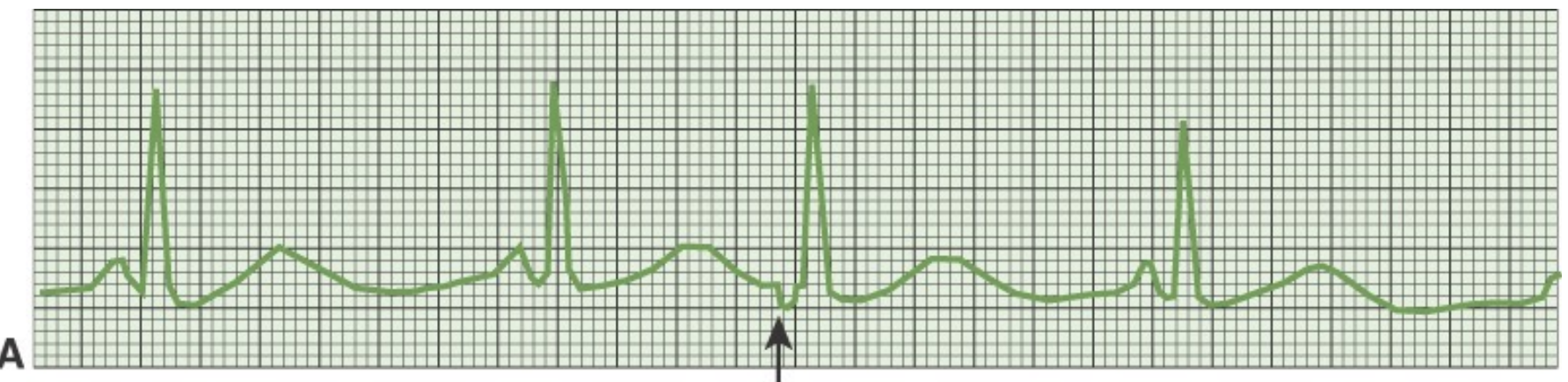
- Rhythm initiated from the AV junction
- Rate is 60 to 100 beats/min for accelerated junctional rhythm
- Rate is 100 to 150 beats/min for junctional tachycardia



(Courtesy of Armstrong Medical Industries, Lincolnshire, IL.)

Premature Junctional Contractions (PJC)

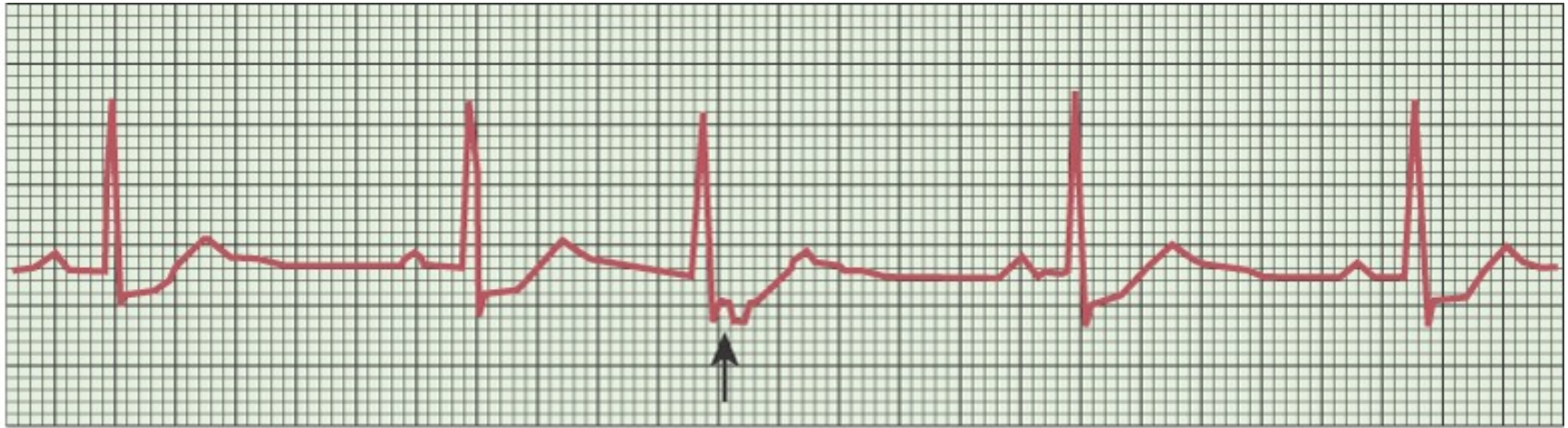
- Early beats initiated by AV junction
- P-wave changes
- PR interval is shorter than normal
- Usually a Non-compensatory pause



(From Conover, M. B. [1996]. Understanding electrocardiography [7th ed.]. St. Louis: Mosby.)

Premature Junctional Contractions

(continued)

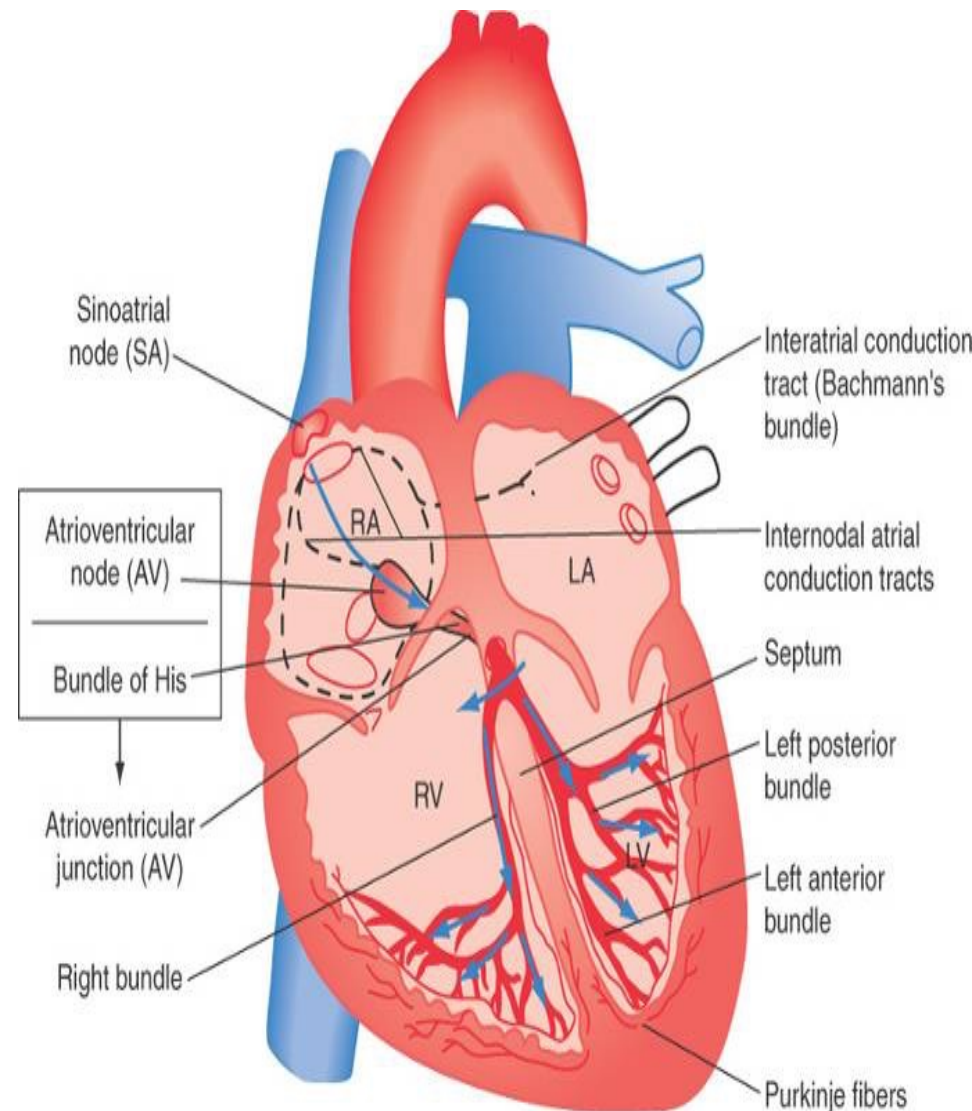


(From Conover, M. B. [1996]. Understanding electrocardiography [7th ed.]. St. Louis: Mosby.)

Ventricular Dysrhythmias

Ventricular Dysrhythmias

- Impulses initiated from lower portion of the heart
- Depolarization occurs, leading to abnormally wide QRS complex
- Ectopic and escape beats

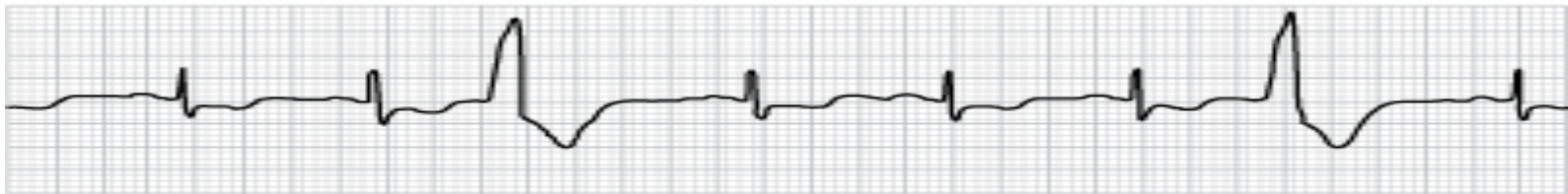


Ventricular Dysrhythmias - (continued)

- Common causes
 - Myocardial ischemia, injury, and infarction
 - Low potassium or magnesium
 - Hypoxemia
 - Acid-base imbalances

Premature Ventricular Contractions (PVCs)

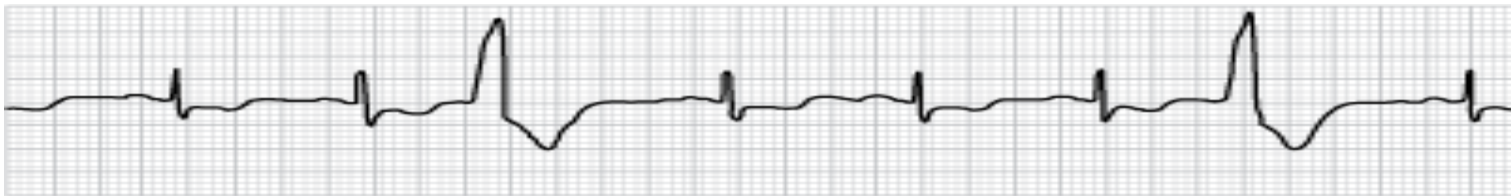
- Wide and bizarre beats
- Compensatory pause
- Patterns
 - Bigeminy and trigeminy
 - Couplets and triplets
- Unifocal versus multifocal



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Premature Ventricular Contractions -(continued)

- QRS complex greater than 0.10 second
- Irregular rhythm
- Compensatory pause
- Absent P waves

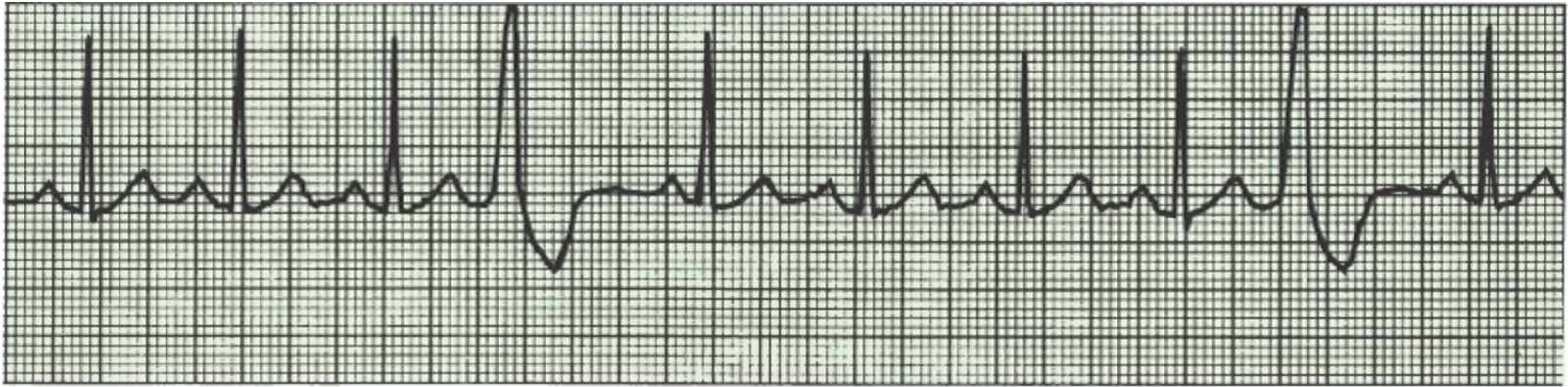


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Premature Ventricular Contractions - (continued)

- Assess and treat cause
 - Hypoxia
 - Ischemia
 - Electrolyte imbalance
- May need antiarrhythmic agents

Premature Ventricular Contractions (continued)



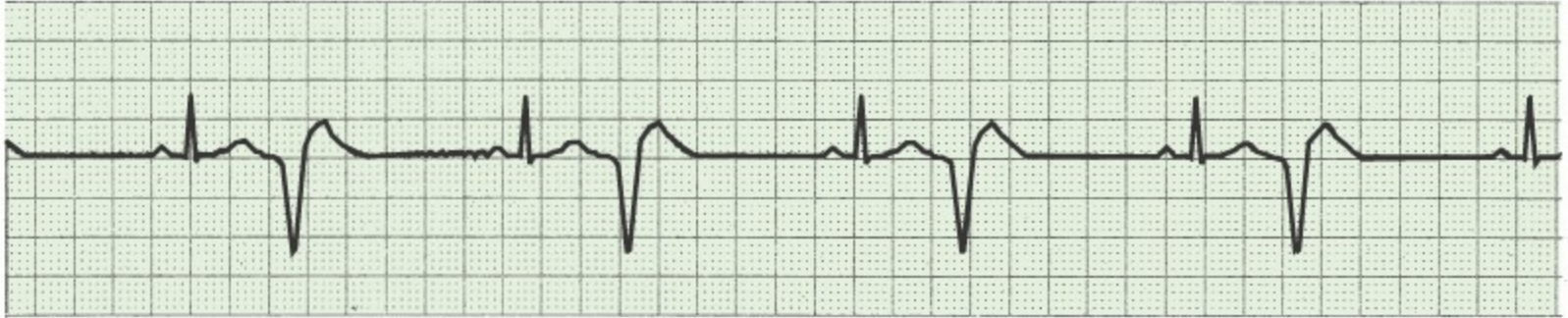
(From Patel, J., McGowan, S., & Moody, L. [1989]. Arrhythmias: Detection, treatment, and cardiac drugs. Philadelphia: Saunders.)



(From Patel, J., McGowan, S., & Moody, L. [1989]. Arrhythmias: Detection, treatment, and cardiac drugs. Philadelphia: Saunders.)

Premature Ventricular Contractions

(continued)



(Courtesy of Armstrong Medical Industries, Lincolnshire, IL.)



(From Patel, J., McGowan, S., & Moody, L. [1989]. Arrhythmias: Detection, treatment, and cardiac drugs. Philadelphia: Saunders.)

Premature Ventricular Contractions

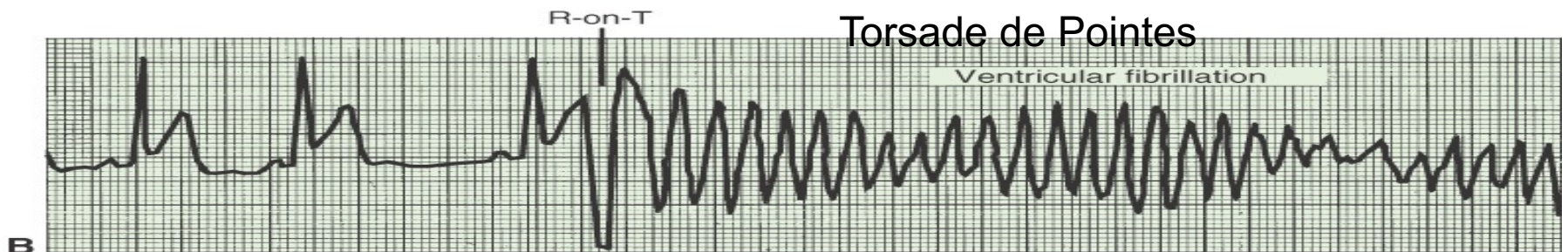
(continued)



(From Patel, J., McGowan, S., & Moody, L. [1989]. Arrhythmias: Detection, treatment, and cardiac drugs. Philadelphia: Saunders.)

When Are PVCs Dangerous?

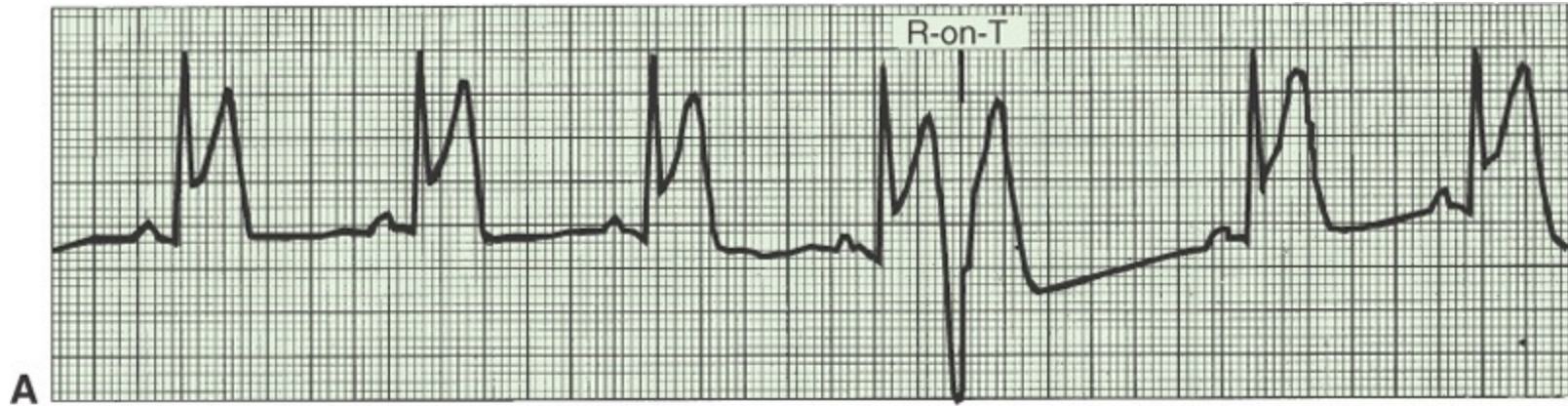
- Frequent
- Multifocal
- Two or more in a row
- R on T
 - PVC falls into the vulnerable period of the T wave
 - Ventricular tachycardia or fibrillation can result



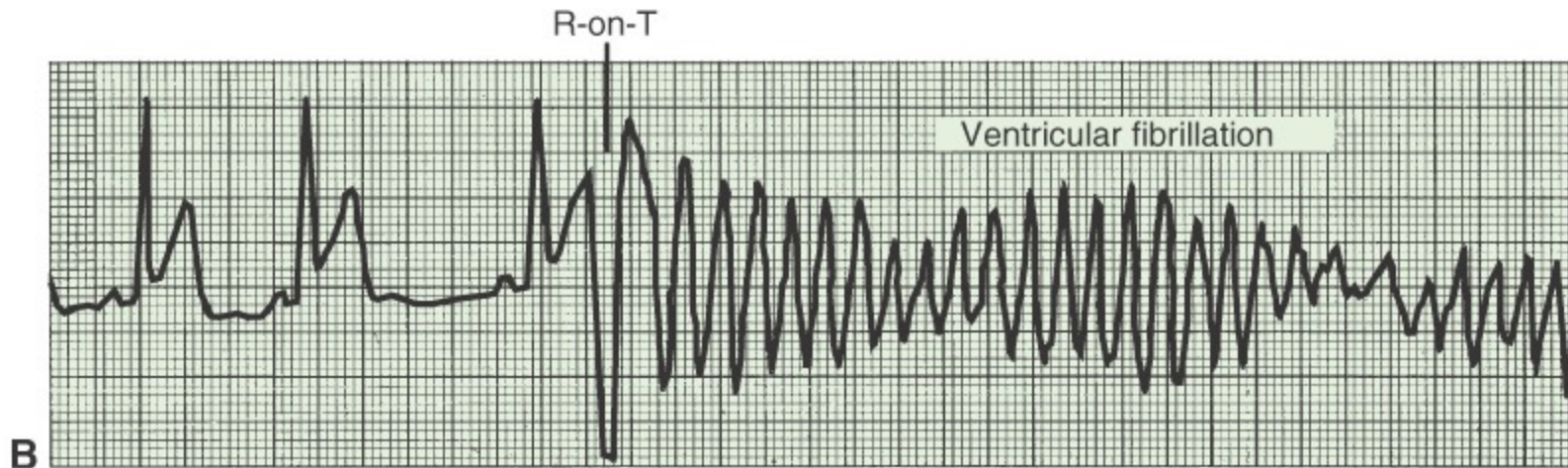
(From Conover, M. B. [1996]. Understanding electrocardiography [7th ed.]. St. Louis: Mosby.)

Premature Ventricular Contractions

(continued)



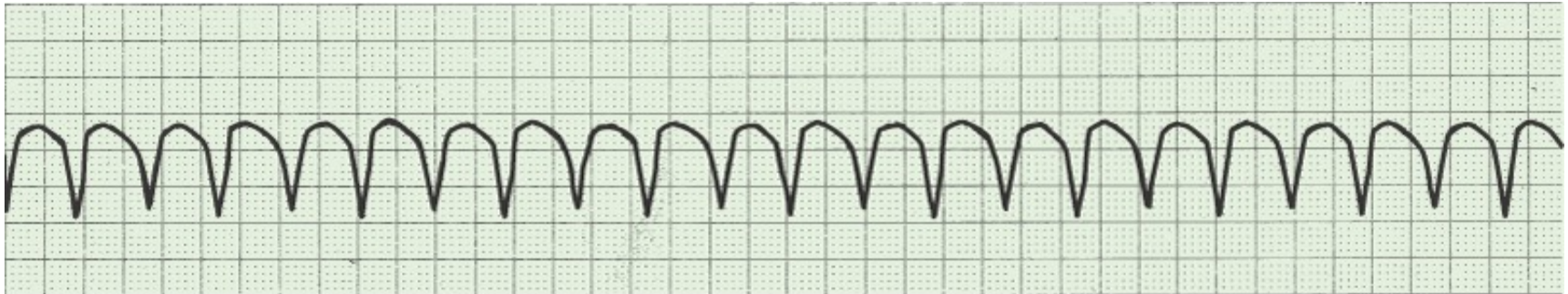
(From Conover, M. B. [1996]. Understanding electrocardiography [7th ed.]. St. Louis: Mosby.)



(From Conover, M. B. [1996]. Understanding electrocardiography [7th ed.]. St. Louis: Mosby.)

Ventricular Tachycardia

- Rapid, life-threatening dysrhythmia
- Three or more PVCs in a row
- Fast rate (>100 beats/min)
- Initiated by ventricles



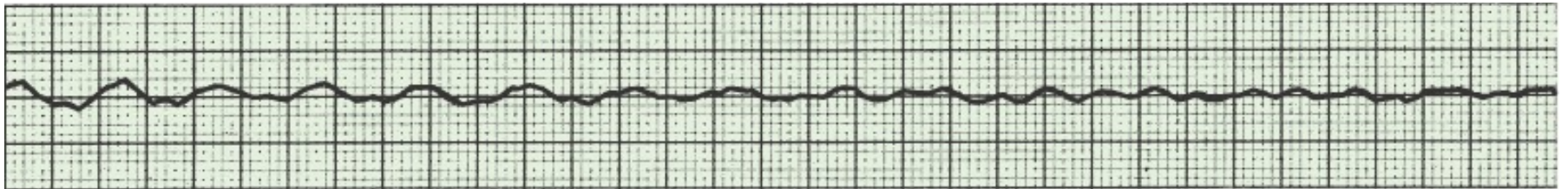
(Courtesy of Armstrong Medical Industries, Lincolnshire, IL.)

Ventricular Tachycardia (continued)

- Wide QRS complex; greater than 0.10 second
- Usually regular
- May or may not have pulse
 - Treat pulseless same as ventricular fibrillation
- Significant loss of cardiac output
- Hypotension

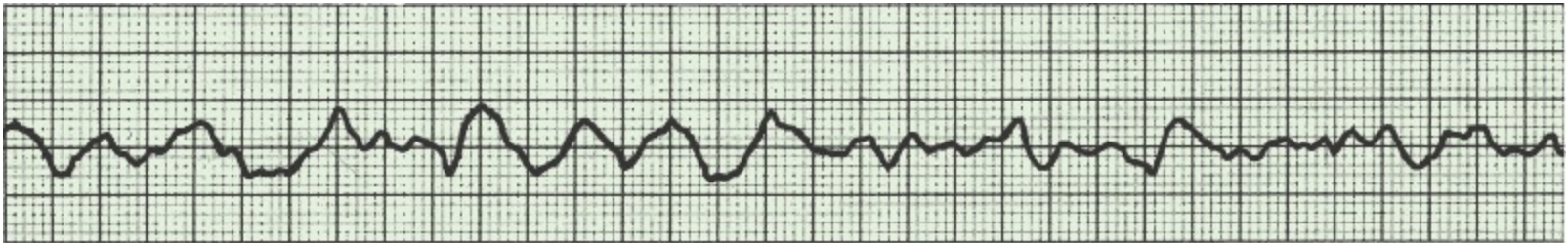
Ventricular Fibrillation

- Chaotic pattern
- No discernible P, Q, R, S, or T waves
- Coarse versus fine
- No cardiac output; life threatening
- Emergent defibrillation



(From Patel, J., McGowan, S., & Moody, L. [1989]. Arrhythmias: Detection, treatment, and cardiac drugs. Philadelphia: Saunders.)

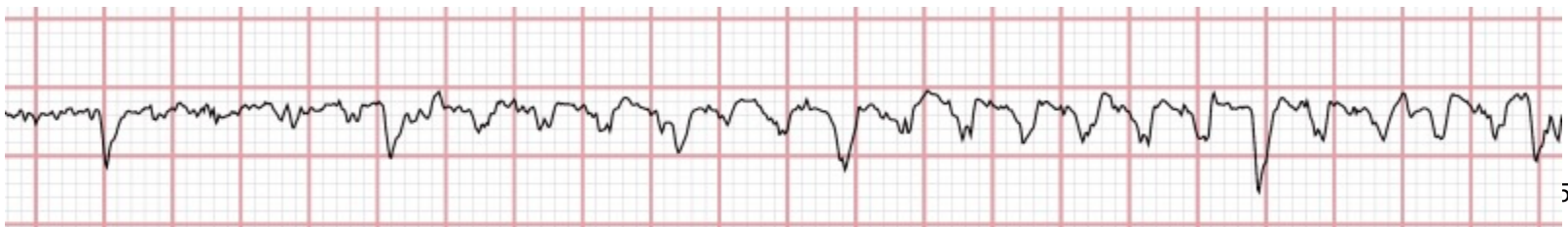
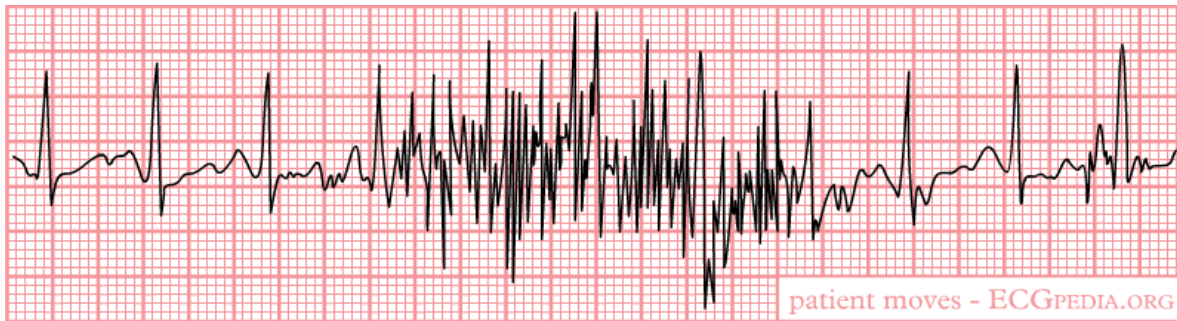
Ventricular Fibrillation - (continued)



(From Patel, J., McGowan, S., & Moody, L. [1989]. *Arrhythmias: Detection, treatment, and cardiac drugs*. Philadelphia: Saunders.)

Artifact

- Related to movement
- 60-cycle interference from other electronic equipment
- Always check the patient

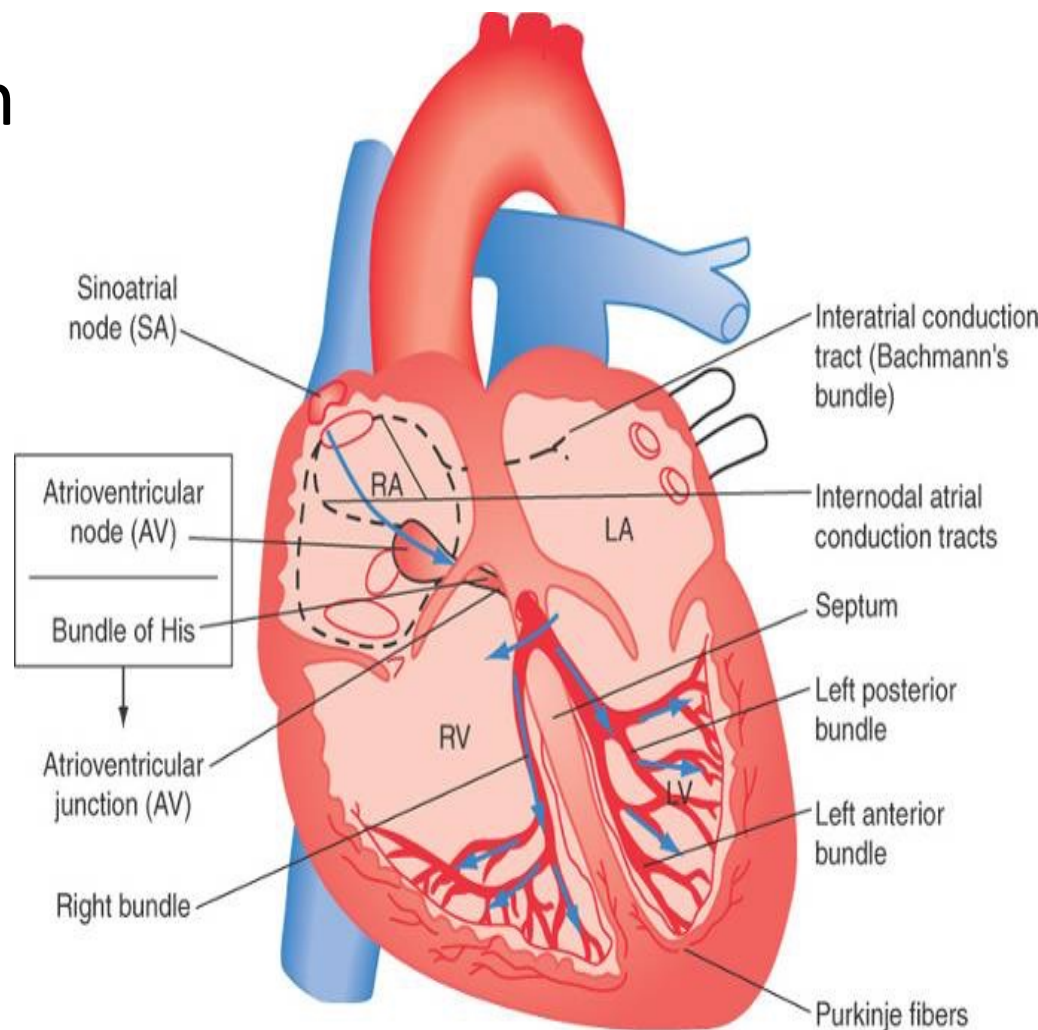


Critical Thinking Challenge

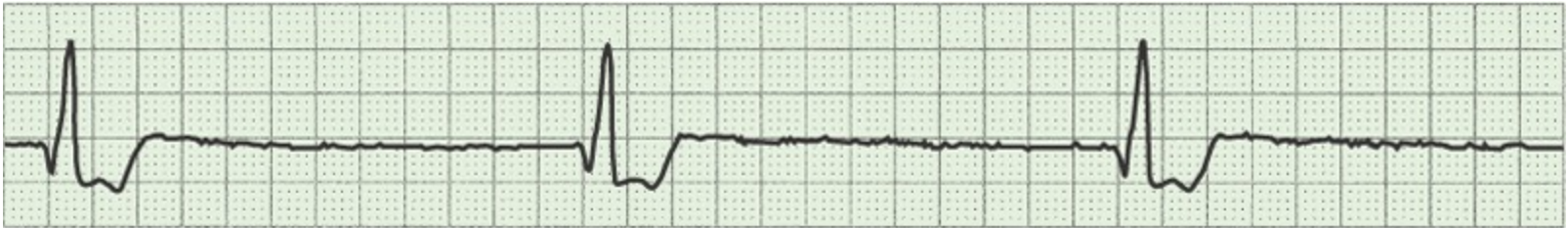
- The nurse is talking with the patient. Suddenly, the nurse looks up at the monitor and sees a ventricular fibrillation pattern. What should she do?

Idioventricular Rhythm

- Escape ventricular rhythm from Purkinje fibers
- Rate 15 to 40 beats/min
- Regular rhythm
- Wide QRS interval
- No P waves



Idioventricular Rhythm - (continued)



(From Paul, S., & Hebra, J. D. [1998]. The nurse's guide to cardiac rhythm interpretation: Implications for patient care. Philadelphia: Saunders.)

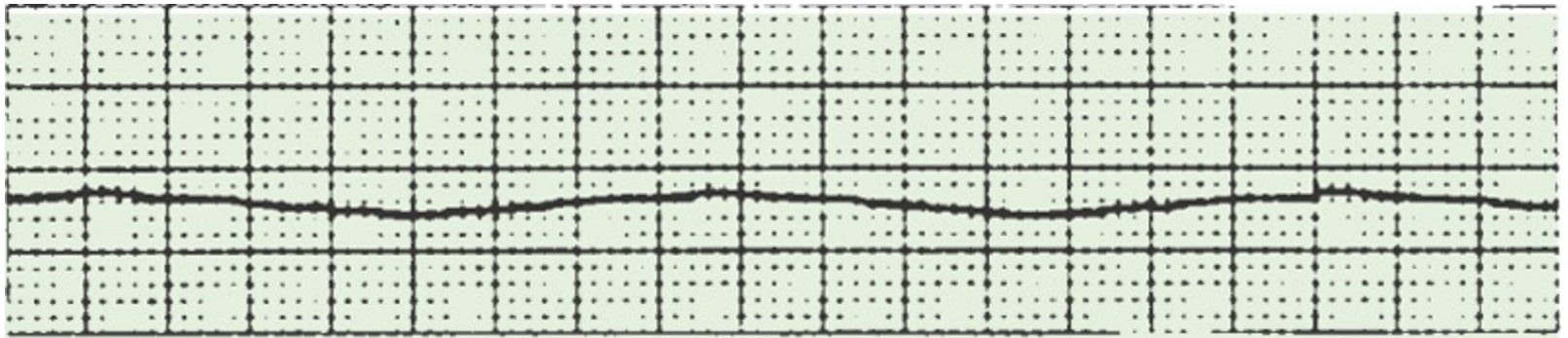
Accelerated Idioventricular Rhythm

- Same as idioventricular rhythm
- Rate more than 40 beats/min
- Hemodynamic effects correspond to heart rate



Ventricular Standstill

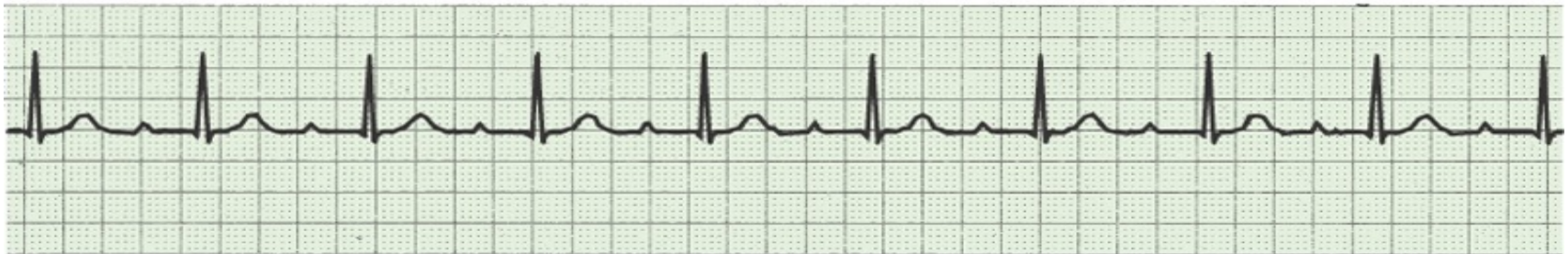
- Asystole
- No P, Q, R, S, or T waveforms
- Assess in two leads
 - Why?
- No cardiac output
- Death



(From Fenstermacher, K. (1989). Dysrhythmia recognition and management. Philadelphia: Saunders.)

Pulseless Electrical Activity (PEA)

- Electrical activity without a mechanical event
- How can it be assessed?
- Causes (H's and T's)
- Must treat the cause



(Courtesy of Armstrong Medical Industries, Lincolnshire, IL.)

Pulseless Electrical Activity Causes

- Hypoxia
- Hypovolemia
- Hypothermia
- H⁺ ions (acidosis)
- Hypokalemia or hyperkalemia
- Tablets (overdose)
- Tamponade (cardiac)
- Tension pneumothorax
- Thrombosis (coronary)
- Thrombosis (pulmonary)

AV Blocks

Atrioventricular Blocks (AVB)

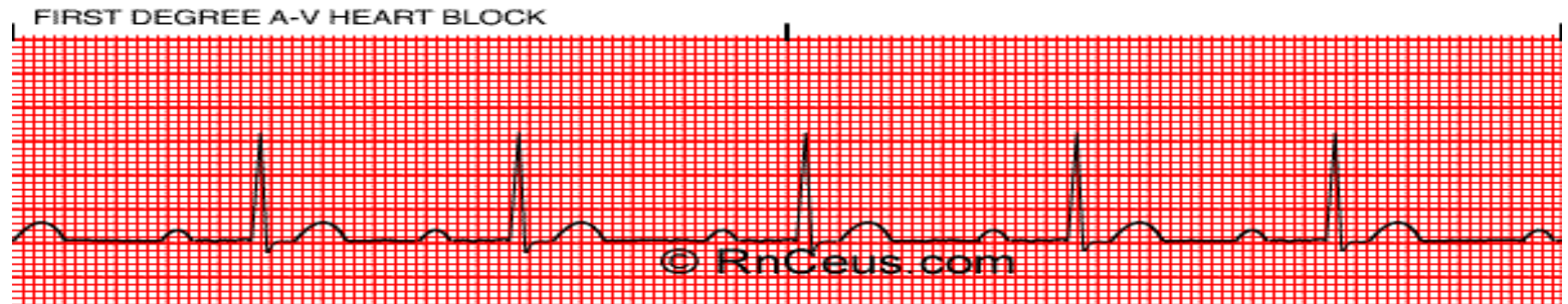
- Block of conduction from atria to ventricles
- Coronary artery disease
- Myocardial infarction (e.g., inferior wall)
- Infections
- Enhanced vagal tone
- Drug effects (e.g., digoxin toxicity)

Atrioventricular Blocks - (continued)

- Always assess for decreased cardiac output and treat cause
- Four types
 1. First-degree block
 2. Second-degree block, Mobitz type I
Wenckebach
 3. Second-degree block, Mobitz type II
 4. Third-degree block (complete)

First-Degree Block (1° AVB)

- Delayed conduction from sinus node to AV node
- Prolonged PR interval
 - Greater than 0.20 second
- Same PR interval for each beat



Second-Degree Block (2° AVB): Mobitz Type I Wenckebach

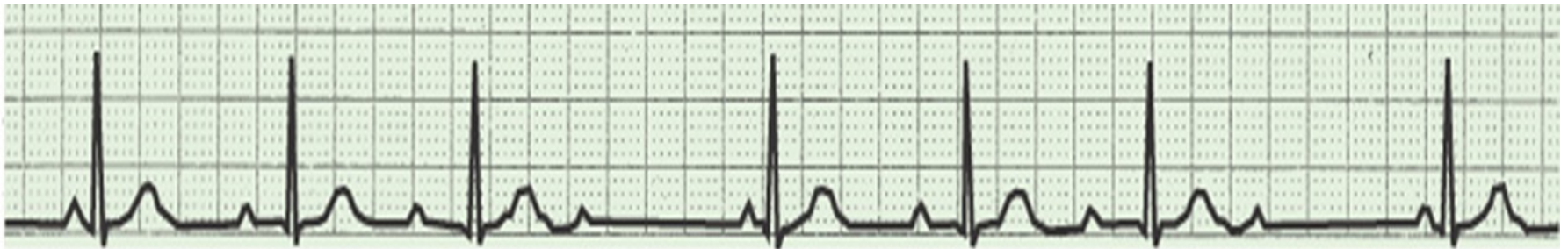
- Steadily lengthening PR interval
- Nonconducted P waves
- P-P interval regular
- R-R interval irregular



(Courtesy of Armstrong Medical Industries, Lincolnshire, IL.)

Second-Degree Block (2° AVB): Mobitz Type I Wenckebach - (continued)

- QRS normal
- Self-limiting; rarely progresses
- May decrease cardiac output



(Courtesy of Armstrong Medical Industries, Lincolnshire, IL.)

Second-Degree Block: Mobitz Type II

- More severe AV block
- Often associated with bundle branch block
- PR interval is fixed
- P-P interval is regular
- Occasional P wave not followed by QRS



(Courtesy of Armstrong Medical Industries, Lincolnshire, IL.)

Third-Degree Block (Complete)

- Atria and ventricles beat independently of each other
- P waves not associated with QRS complex
 - P-P intervals regular
 - R-R intervals regular



(Courtesy Armstrong Medical Industries, Lincolnshire, IL.)

Third-Degree Block

- Junctional or ventricular escape rhythms
- May need pacemaker
 - Temporary
 - Permanent
- Hemodynamic status based on ventricular rate



(Courtesy Armstrong Medical Industries, Lincolnshire, IL.)

Dysrhythmia Treatment Options

Tachydysrhythmia Treatment

Mediate effect of sympathetic nervous system

- Vagal maneuvers
- Drugs-Adenosine, Cardizem, Verapamil
- Cardioversion or defibrillation
- Overdrive pacemakers
- Ablation

Brady dysrhythmia Treatment

- Mediate affect of parasympathetic nervous system
- Drugs-Atropine, Isuprel (Isoproterenol), Dopamine
- Pacemakers

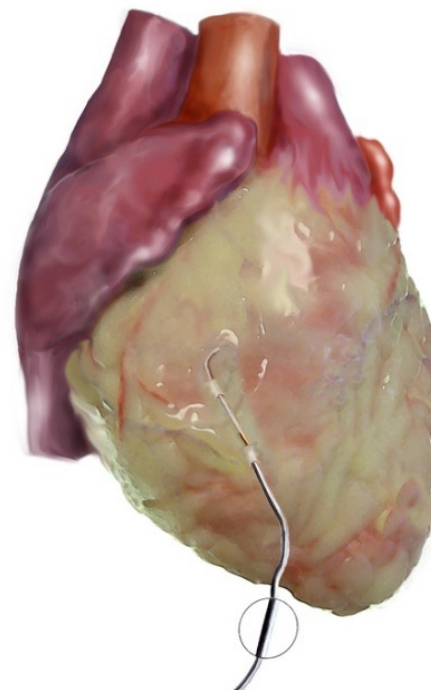
Pacemakers

Electrical Pacemakers

- Deliver an electrical current to stimulate depolarization
- Temporary versus permanent

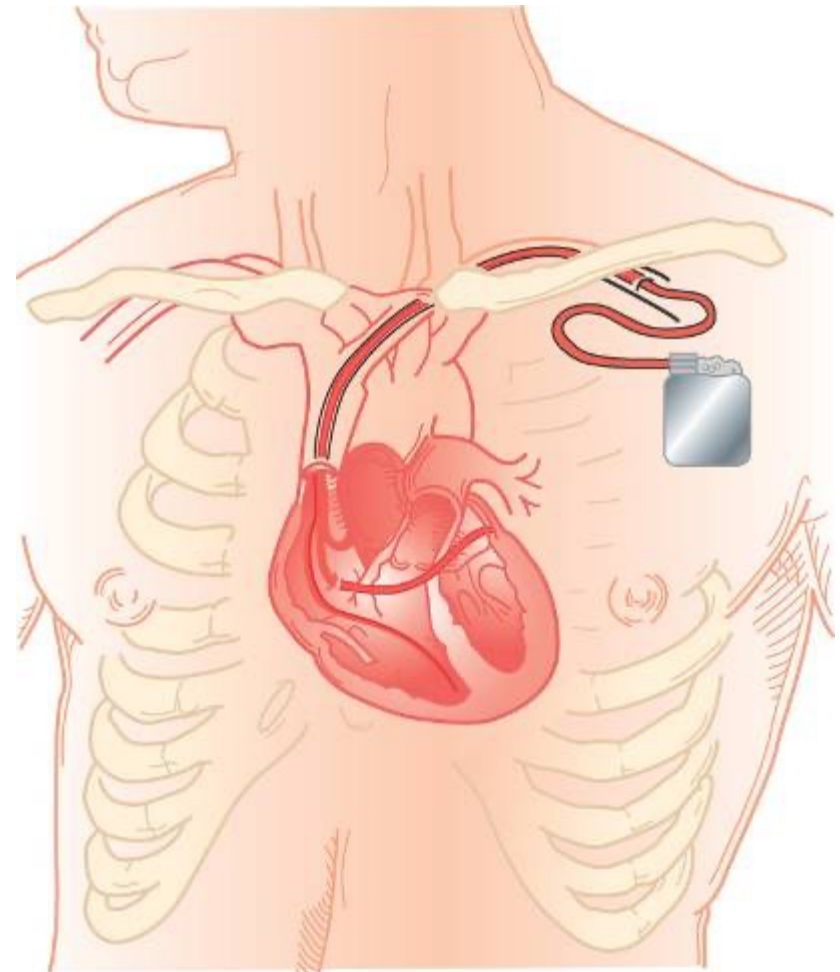
Electrical Pacemakers - (continued)

- Method of pacing
 - Transthoracic: post cardiac surgery
 - Transvenous
 - Epicardial
- Can pace:
 - Atrium
 - Ventricle
 - Both chambers



Electrical Pacemakers -(continued)

- Single chamber
- Dual chamber
 - Atrial and ventricular
- Bi-ventricular pacing
 - Leads in both R and L ventricles
 - Used in HF patients to improve synchrony



(Courtesy of Guidant Corporation, St. Paul, MN.)

Electrical Pacemakers -(continued)

Atrial
pacing



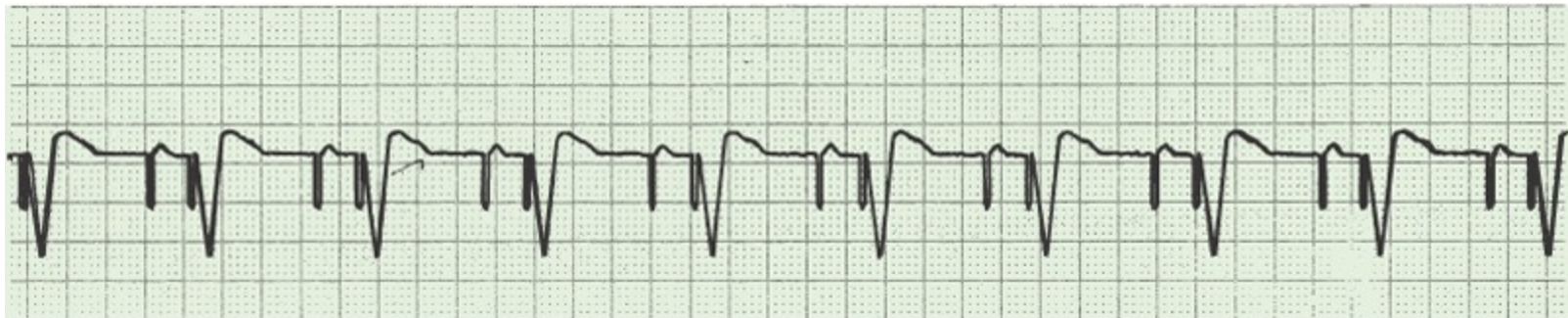
(Courtesy of Armstrong Medical Industries, Lincolnshire, IL.)

Ventricular
pacing



(Courtesy of Armstrong Medical Industries, Lincolnshire, IL.)

Atrial &
Ventricular
pacing



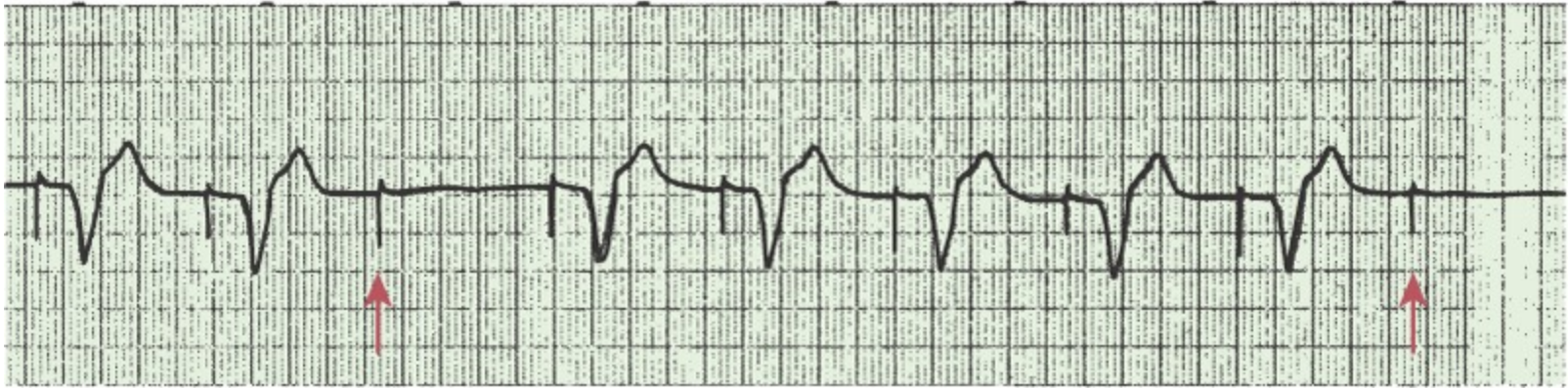
(Courtesy of Armstrong Medical Industries, Lincolnshire, IL.)

Electrical Pacemakers

- Complications
 - Failure to pace
 - Failure to capture
 - Failure to sense

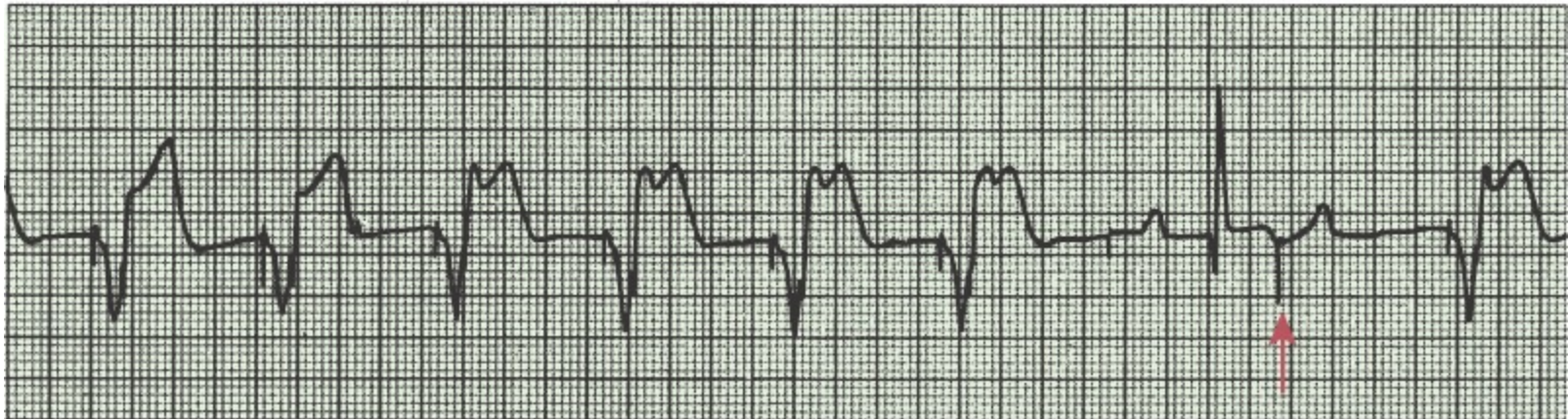
Electrical Pacemakers-Problems - (continued)

Failure to Pace



(From Smith, L. F., & Fish, F. H. [1995]. Pure practice for ECGs. Philadelphia: Saunders.)

Failure to Sense



(From Smith, L. F., & Fish, F. H. [1995]. Pure practice for ECGs. Philadelphia: Saunders.)