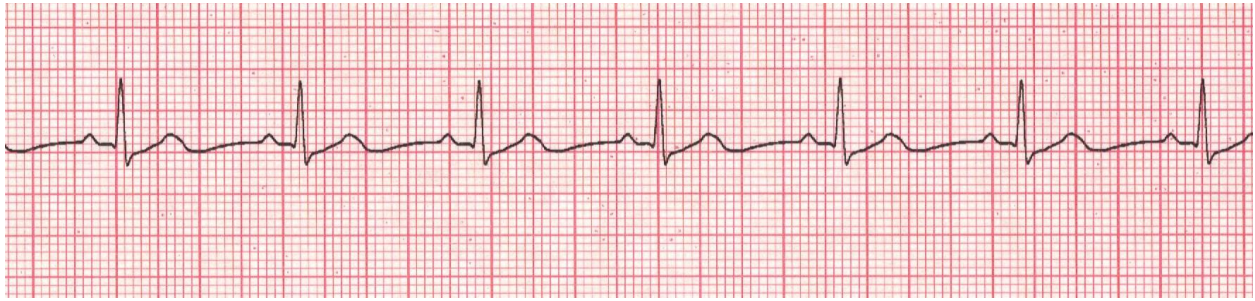


Review Packet  
EKG Competency  
2016

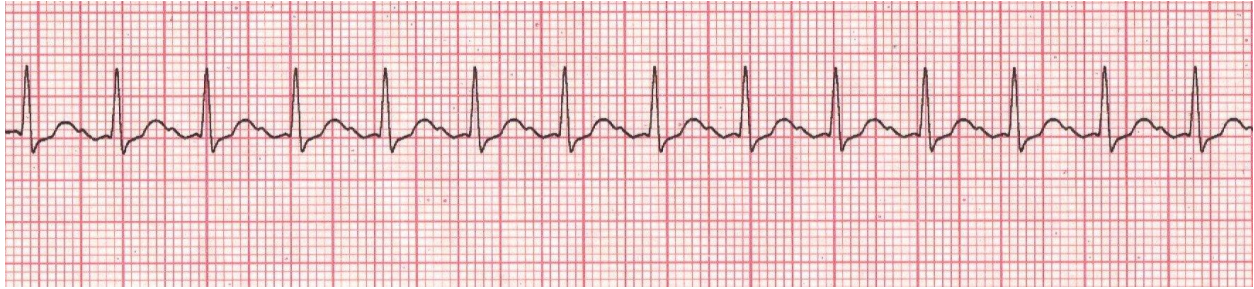
This packet is a review of the information you will need to know for the proctored EKG competency test.

## Normal Sinus Rhythm



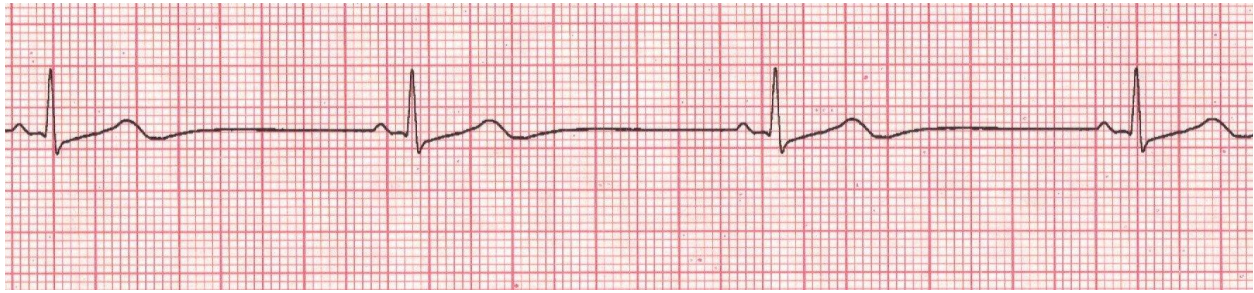
<u>Parameters</u> Rhythm: Regular Ventricular Rate: 60-100 bpm P Wave: upright, matching, 1:1 Atrial Rate: 60-100 bpm PR Interval: 0.12-0.20 seconds QRS Interval: < 0.10 seconds	<u>Etiology</u> None
<u>Significance</u> Normal	<u>Treatment</u> None

## Sinus Tachycardia



<p><u>Parameters</u></p> <p>Rhythm: Regular</p> <p>Ventricular Rate: 101-150</p> <p>P Wave: upright, matching, 1:1</p> <p>Atrial Rate: 101-150</p> <p>PR Interval: 0.12-0.20 seconds</p> <p>QRS Interval: &lt; 0.10 seconds</p>	<p><u>Etiology</u></p> <p>Exercise</p> <p>Fever</p> <p>Hypoxia</p> <p>Hypovolemic</p> <p>Pulmonary embolism</p> <p>Myocardial ischemia</p> <p>Hypotension</p> <p>Caffeine</p> <p>Alcohol</p> <p>Nicotine</p>
<p><u>Significance</u></p> <ul style="list-style-type: none"> <li>• Increases myocardial oxygen demands, increasing the hearts workload             <ul style="list-style-type: none"> <li>○ In an acute MI, this may lead to an increase in myocardial ischemia, angina, or extend the infarct</li> <li>○ May also trigger ventricular dysrhythmia</li> <li>○ May be a warning sign of right sided heart failure</li> </ul> </li> <li>• Shortens ventricular filling times which decreases stroke volume which affects cardiac output</li> </ul>	<p><u>Treatment</u></p> <ul style="list-style-type: none"> <li>• Find and treat underlying cause</li> <li>• Monitor for signs of decreased coronary perfusion             <ul style="list-style-type: none"> <li>○ Diaphoresis</li> <li>○ Chest pain</li> <li>○ Dyspnea</li> </ul> </li> </ul>

## Sinus Bradycardia



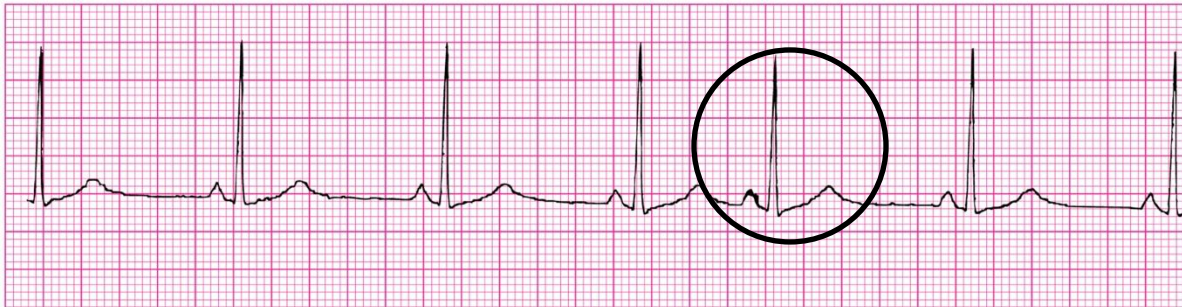
<p><u>Parameters</u></p> <p>Rhythm: Regular</p> <p>Ventricular Rate: &lt; 60 bpm</p> <p>P Wave: upright, matching, 1:1</p> <p>Atrial Rate: &lt; 60 bpm</p> <p>PR Interval: 0.12-0.20 seconds</p> <p>QRS Interval: &lt; 0.10 seconds</p>	<p><u>Etiology</u></p> <p>Normal for trained athletes</p> <p>An MI to the RCA</p> <p>“Reperfusion Rhythm”</p> <p>Elevated ICP</p> <p>Medications (beta-blockers, calcium channel blockers, digitalis)</p> <p>Degenerative diseases, such as sick sinus syndrome</p> <p>Vagal stimulation from vomiting, sleeping, nausea</p>
<p><u>Significance</u></p> <ul style="list-style-type: none"> <li>• Normal in healthy adults and athletes</li> <li>• Can be beneficial in injured hearts to allow increased ventricular filling time and decreased myocardial oxygen demands</li> <li>• Some individuals experience a significant decrease in cardiac output (<math>HR \times SV = CO</math>) as well as blood pressure</li> </ul>	<p><u>Treatment</u></p> <ul style="list-style-type: none"> <li>• Treat only if SYMPTOMATIC:             <ol style="list-style-type: none"> <li>1. IVP Atropine</li> <li>2. Pacemaker                 <ul style="list-style-type: none"> <li>• Temporary transcutaneous or transvenous</li> <li>• Chronic bradycardia may require a permanent pacemaker</li> </ul> </li> </ol> </li> <li>• Discontinue any bradycardia inducing medications</li> </ul>

## Sinus Arrhythmia



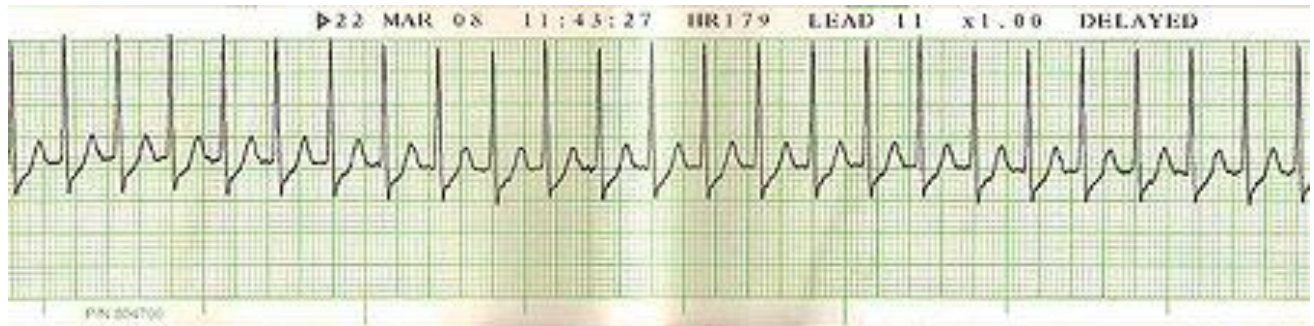
<p><u>Parameters</u></p> <p>Rhythm: Irregular</p> <p>Ventricular Rate: any rate</p> <p>P Wave: upright, matching, 1:1</p> <p>Atrial Rate: any rate</p> <p>PR Interval: 0.12-0.20 seconds</p> <p>QRS Interval: &lt;0.10 seconds</p>	<p><u>Etiology</u></p> <p>May be seen in young children and elderly</p> <p>Change in vagal tone due to respirations</p> <p>May also be caused by:</p> <ul style="list-style-type: none"><li>• Increased ICP</li><li>• Dig toxicity</li><li>• Inferior wall MI</li></ul>
<p><u>Significance</u></p> <ul style="list-style-type: none"><li>• None depending on rate</li><li>• If rate is bradycardic, may decrease cardiac output</li></ul>	<p><u>Treatment</u></p> <ul style="list-style-type: none"><li>• None, unless rate is bradycardic.</li><li>• If patient is symptomatic with bradycardia:<ul style="list-style-type: none"><li>○ IVP Atropine</li><li>○ Pacemaker</li></ul></li></ul>

## Premature Atrial Contraction(PAC)



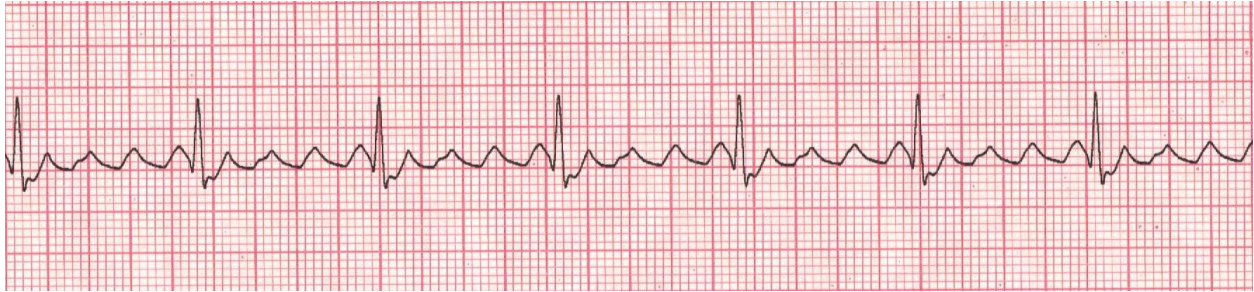
<p><u>Parameters</u></p> <p>Rhythm: that of underlying rhythm</p> <p>Ventricular Rate: that of underlying</p> <p>P Wave: upright, abnormal in size and shape, p wave may be in T wave</p> <p>Atrial Rate: that of underlying rhythm</p> <p>PR Interval: 0.12-0.20 seconds</p> <p>QRS Interval: &lt;0.10 seconds</p>	<p><u>Etiology</u></p> <p>Can occur in normal hearts</p> <ul style="list-style-type: none"> <li>○ Can be seen with emotional distress</li> </ul> <p>Heart disease</p> <p>Ingestion of alcohol, caffeine, or nicotine</p> <p>Hypoxia</p> <p>Myocardial ischemia</p> <p>Chronic lung disease</p> <p>Medications</p>
<p><u>Significance</u></p> <ul style="list-style-type: none"> <li>• Usually common and do not require treatment</li> <li>• Frequent PAC's may warn of or initiate:             <ul style="list-style-type: none"> <li>○ PAT</li> <li>○ Atrial Fibrillation</li> <li>○ Atrial Flutter</li> </ul> </li> </ul>	<p><u>Treatment</u></p> <ul style="list-style-type: none"> <li>• Usually no treatment</li> <li>• Remove underlying cause:             <ul style="list-style-type: none"> <li>○ Nicotine</li> <li>○ Alcohol</li> <li>○ Caffeine</li> </ul> </li> </ul>

## Paroxysmal Supraventricular Tachycardia (PSVT or SVT)



<p><u>Parameters</u></p> <p>Rhythm: Regular</p> <p>Ventricular Rate: &gt; 150 bpm</p> <p>P Wave: unable to see</p> <p>Atrial Rate: NA</p> <p>PR Interval: NA</p> <p>QRS Interval: &lt;0.10 seconds</p>	<p><u>Etiology</u></p> <p>Stress</p> <p>Caffeine</p> <p>Tobacco</p> <p>Alcohol</p> <p>COPD</p> <p>Digitalis Toxicity</p>
<p><u>Significance</u></p> <ul style="list-style-type: none"> <li>• Shortens ventricular filling time which can decrease stroke volume which can decrease cardiac output</li> <li>• Increases myocardial oxygen requirements and cardiac workload</li> </ul>	<p><u>Treatment</u></p> <p>If unstable:</p> <ul style="list-style-type: none"> <li>○ Electrical Cardioversion</li> </ul> <p>If stable:</p> <ol style="list-style-type: none"> <li>1. Sedation</li> <li>2. Vagal maneuvers</li> <li>3. IVP Adenosine</li> <li>4. Rate controlling medication such as a calcium channel blocker (ex. Diltiazem) or a beta blocker.</li> </ol>

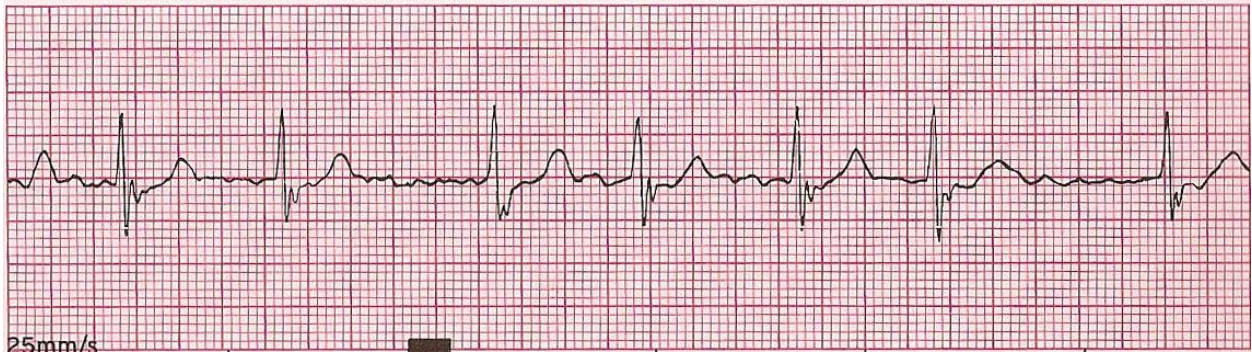
## Atrial Flutter



<p><u>Parameters</u></p> <p>Rhythm: Regular/Irregular</p> <p>Ventricular Rate: varies</p> <p>P Wave: flutter, sawtooth</p> <p>Atrial Rate: 250-350 bpm</p> <p>PR Interval: NA</p> <p>QRS Interval: &lt;0.10 seconds</p>	<p><u>Etiology</u></p> <p>Valvular heart disease</p> <p>Hypertensive heart disease</p> <p>Cardiomyopathy</p> <p>Heart failure</p> <p>Pulmonary disease</p> <p>Pulmonary emboli</p> <p>Post-cardiac surgery</p>
<p><u>Significance</u></p> <ul style="list-style-type: none"> <li>• If ventricular rate is rapid:             <ul style="list-style-type: none"> <li>○ Ventricular filling time is shortened which can decrease stroke volume which can decrease cardiac output</li> <li>○ Myocardial oxygen requirements and cardiac workload are increased</li> </ul> </li> <li>• If ventricular rate is slow:             <ul style="list-style-type: none"> <li>• Decrease in cardiac output due to slow heart rate</li> </ul> </li> <li>• Stasis of blood in atria can lead to thrombus formation &amp; possible arterial or pulmonary embolism</li> </ul>	<p><u>Treatment</u></p> <p>If patient is <u>stable</u> and the rhythm has been present treatment depends on ventricular rate &amp; patient symptoms:</p> <ul style="list-style-type: none"> <li>• Amiodarone, Calcium Channel Blockers, Beta Blockers</li> <li>• If <u>unstable</u>: Cardiovert immediately</li> </ul> <p><b>Goal is to restore sinus rhythm!</b></p>



## Atrial Fibrillation



<p><u>Parameters</u></p> <p>Rhythm: Irregular</p> <p>Ventricular Rate: varies</p> <p>P Wave: not seen, fibrillatory waves</p> <p>Atrial Rate: &gt;300 bpm</p> <p>PR Interval: NA</p> <p>QRS Interval: &lt; 0.10 seconds</p>	<p><u>Etiology</u></p> <p>Valvular heart disease</p> <p>Hypertensive disease</p> <p>Coronary heart disease</p> <p>Cardiomyopathy</p> <p>Heart failure</p> <p>Hyperthyroidism</p> <p>Pulmonary disease</p> <p>Cardiac surgery</p>
<p><u>Significance</u></p> <p>Same as atrial flutter.</p>	<p><u>Treatment</u></p> <ul style="list-style-type: none"> <li>• Same as atrial flutter</li> <li>• Chronic atrial fibrillation (present for months or years) may not convert to sinus rhythm with any type of therapy. Typically no attempt is made to return chronic atrial fibrillation patients to sinus rhythm.</li> </ul>

## Junctional Rhythm



<p><u>Parameters</u></p> <p>Rhythm: Regular</p> <p>Ventricular Rate: 41-60 bpm</p> <p>P Wave: inverted, absent, inverted after QRS</p> <p>Atrial Rate: 41-60</p> <p>PR Interval: &lt;0.12 seconds</p> <p>QRS Interval: &lt;0.10 seconds</p>	<p><u>Etiology</u></p> <p>SA node disease</p> <p>Myocardial infarction</p> <p>Dig toxicity</p> <p>Increase in vagal tone</p>
<p><u>Significance</u></p> <ul style="list-style-type: none"> <li>• AV junction not reliable as pacemaker for long periods</li> <li>• The slow rate may cause:             <ul style="list-style-type: none"> <li>○ Hypotension</li> <li>○ Decrease in Cardiac Output</li> </ul> </li> </ul>	<p><u>Treatment</u></p> <ul style="list-style-type: none"> <li>• Depends on tolerance of slowed heart rate</li> <li>• Identify and treat underlying cause</li> </ul> <p>If symptomatic:</p> <ol style="list-style-type: none"> <li>1. Atropine IVP</li> <li>2. Transcutaneous or transvenous pacing</li> </ol>

## Accelerated Junctional Rhythm



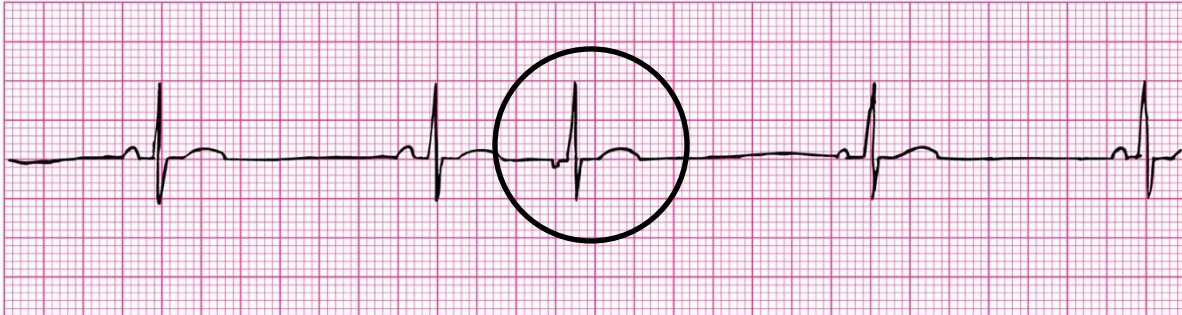
<p><u>Parameters</u></p> <p>Rhythm: Regular</p> <p>Ventricular Rate: 61-100 bpm</p> <p>P Wave: inverted, absent, inverted after QRS</p> <p>Atrial Rate: 61-100 bpm</p> <p>PR Interval: &lt;0.12 seconds</p> <p>QRS Interval: &lt;0.10 seconds</p>	<p><u>Etiology</u></p> <p>Dig toxicity</p> <p>Damage to AV node secondary to Inferior wall MI</p> <p>Heart failure</p> <p>Acute rheumatic fever</p> <p>Valvular heart disease</p> <p>Open heart surgery</p> <p>Myocarditis</p>
<p><u>Significance</u></p> <ul style="list-style-type: none"> <li>• Typically well tolerated</li> <li>• For some the loss of normal atrial depolarization can cause a decrease in cardiac output.</li> </ul>	<p><u>Treatment</u></p> <ul style="list-style-type: none"> <li>• Treatment should be directed at identifying the underlying cause and correcting it.</li> </ul>

## Junctional Tachycardia



<p><u>Parameters</u></p> <p>Rhythm: Regular</p> <p>Ventricular Rate: &gt;101bpm</p> <p>P Wave: inverted, absent, inverted after QRS</p> <p>Atrial Rate: &gt;101 bpm</p> <p>PR Interval: &lt;0.12 seconds</p> <p>QRS Interval: &lt;0.10 seconds</p>	<p><u>Etiology</u></p> <p>Dig Toxicity</p> <p>Damage to AV node (Inferior MI)</p> <p>Heart Failure</p> <p>Myocarditis</p> <p>Rheumatic Fever</p>
<p><u>Significance</u></p> <ul style="list-style-type: none"><li>• If ventricular rate is rapid:<ul style="list-style-type: none"><li>○ Ventricular filling time is shortened which can decrease stroke volume which can decrease cardiac output</li><li>○ Myocardial oxygen requirements and cardiac workload are increased</li></ul></li></ul>	<p><u>Treatment</u></p> <ul style="list-style-type: none"><li>• Identify and treat cause</li><li>• Vagal Maneuvers</li><li>• If there is no apparent cause and the patient is symptomatic:<ul style="list-style-type: none"><li>○ Diltiazem</li><li>○ Beta blockers</li><li>○ Amiodarone</li></ul></li></ul>

## Premature Junctional Contraction



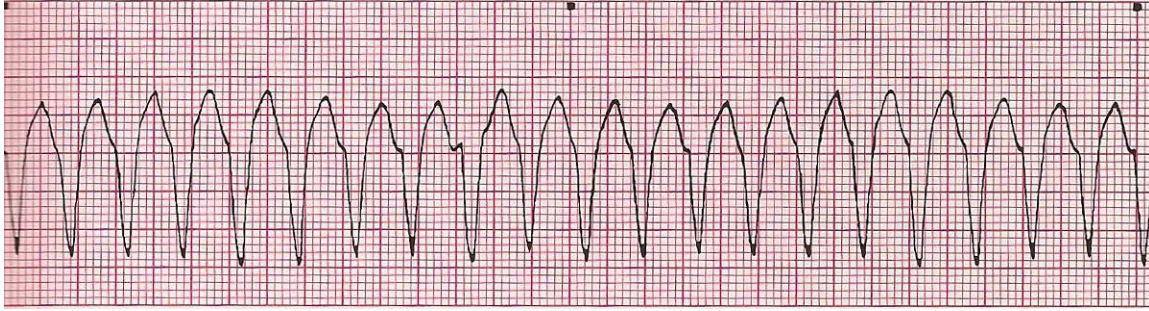
<p><u>Parameters</u></p> <p>Rhythm: Usually regular</p> <p>Ventricular Rate: underlying rhythm</p> <p>P Wave: inverted, absent, or inverted after the QRS</p> <p>Atrial Rate: underlying rhythm</p> <p>PR Interval: &lt;0.12 seconds</p> <p>QRS Interval: &lt;0.10 seconds</p>	<p><u>Etiology</u></p> <p>Alcohol</p> <p>Simulants:</p> <ul style="list-style-type: none"><li>○ Coffee</li><li>○ Tea</li><li>○ Tobacco</li></ul> <p>Coronary artery disease</p> <p>Digoxin toxicity</p> <p>Inferior wall MI</p>
<p><u>Significance</u></p> <ul style="list-style-type: none"><li>• Unusual in healthy adults</li><li>• Early sign of digoxin toxicity</li><li>• May precipitate junctional tachycardia</li></ul>	<p><u>Treatment</u></p> <ul style="list-style-type: none"><li>• Treat underlying cause</li></ul>

## Ventricular Fibrillation



<p><u>Parameters</u></p> <p>Rhythm: Chaotic Ventricular Rate: NA P Wave: NA Atrial Rate: NA PR Interval: NA QRS Interval: NA</p>	<p><u>Etiology</u></p> <p>Most common cause of death for people with coronary heart disease</p> <p>Most common cause of sudden cardiac death in patients with an acute MI</p> <p>Other causes:</p> <ul style="list-style-type: none"><li>• Myocardial Ischemia</li><li>• Cardiomyopathy</li><li>• Hypoxia</li><li>• Cocaine toxicity</li><li>• Electrolyte imbalance</li></ul>
<p><u>Significance</u></p> <p>No organ perfusion!</p>	<p><u>Treatment</u></p> <p>Check for Pulse!</p> <ul style="list-style-type: none"><li>• (If there is a pulse, not VF.)</li></ul> <p>If there is no pulse:</p> <ol style="list-style-type: none"><li>1. Defibrillation</li><li>2. CPR</li><li>3. Drugs:<ul style="list-style-type: none"><li>• Epinephrine</li><li>• Amiodarone</li></ul></li></ol>

## Ventricular Tachycardia



<p><u>Parameters</u></p> <p>Rhythm: Regular</p> <p>Ventricular Rate: &gt;101 bpm</p> <p>P Wave: none</p> <p>Atrial Rate: none</p> <p>PR Interval: NA</p> <p>QRS Interval: <math>\geq 0.12</math> seconds</p>	<p><u>Etiology</u></p> <p>Heart disease</p> <p>Myocardial ischemia or infarction</p> <p>Cardiomyopathy</p> <p>CHF</p> <p>Medications</p> <p>Hypoxia</p> <p>Electrolyte imbalance</p>
<p><u>Significance</u></p> <ul style="list-style-type: none"> <li>• Seriousness depends on duration, rate, and how well the heart functions</li> <li>• Patients may have “bursts” of VT</li> <li>• <b>Sustained VT is a life-threatening arrhythmia</b></li> <li>• Can progress to Ventricular Fibrillation</li> <li>• Decrease or absence of Cardiac Output</li> </ul>	<p><u>Treatment</u></p> <ul style="list-style-type: none"> <li>• Assess Patient (pulse, BP, LOC)</li> <li>• V. Tach <b>with a pulse</b> and:             <ul style="list-style-type: none"> <li>○ <u>Stable</u> <ol style="list-style-type: none"> <li>1. Amiodarone</li> <li>2. Cardioversion</li> </ol> </li> <li>○ <u>Unstable</u> <ol style="list-style-type: none"> <li>1. Cardioversion</li> </ol> </li> </ul> </li> <li>• V. Tach <b>without a pulse</b>:             <ol style="list-style-type: none"> <li>1. Defibrillation</li> <li>2. CPR (initiate immediately)</li> <li>3. Epinephrine</li> <li>4. Amiodarone</li> </ol> </li> </ul>

## Ventricular Standstill



<u>Parameters</u>	<u>Etiology</u>
Rhythm: Atrial Regular	Acidosis
Ventricular Rate: NA	Hypoxia
P Wave: upright, matching	Hyperkalemia
Atrial Rate: varies	Hypothermia
PR Interval: NA	Drug Overdose
QRS Interval: NA	



## Idioventricular Rhythm



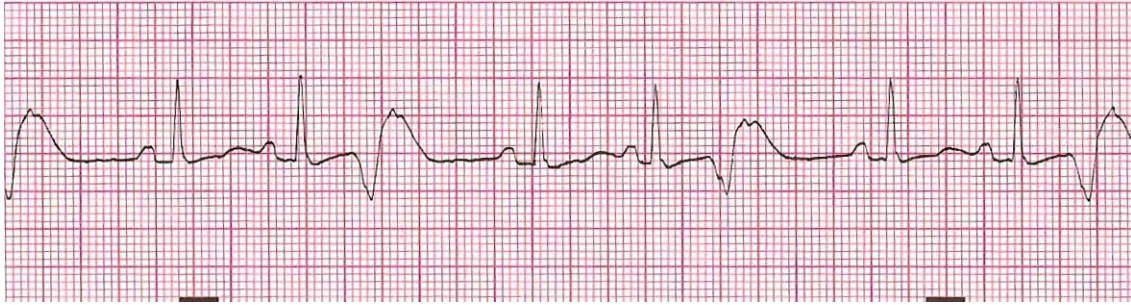
<p><u>Parameters</u></p> <p>Rhythm: Regular</p> <p>Ventricular Rate: 21-40 bpm</p> <p>P Wave: NA</p> <p>Atrial Rate: NA</p> <p>PR Interval: NA</p> <p>QRS Interval: <math>\geq 0.12</math> seconds Wide and Bizarre</p>	<p><u>Etiology</u></p> <p>Disease or injury to the SA node or AV node</p> <p>Medications that can slow or inhibit the SA node or AV node</p> <p>May occur in brief intervals</p> <ul style="list-style-type: none"> <li>• Advanced heart failure</li> <li>• CHF</li> </ul>
<p><u>Significance</u></p> <ul style="list-style-type: none"> <li>• Decrease in cardiac output</li> <li>• Commonly precedes asystole</li> <li>• Sign of a “dying heart”</li> </ul>	<p><u>Treatment</u></p> <ul style="list-style-type: none"> <li>• Goal is to establish a reliable pacemaker and increase the heart rate</li> <li>• <b>Never attempt to obliterate an Idioventricular rhythm with antiarrhythmic drugs</b></li> <li>• Treat with:             <ul style="list-style-type: none"> <li>○ Atropine</li> <li>○ Transcutaneous or Transvenous pacemaker</li> <li>○ Dopamine for hypotension</li> </ul> </li> </ul>

## Accelerated Idioventricular Rhythm



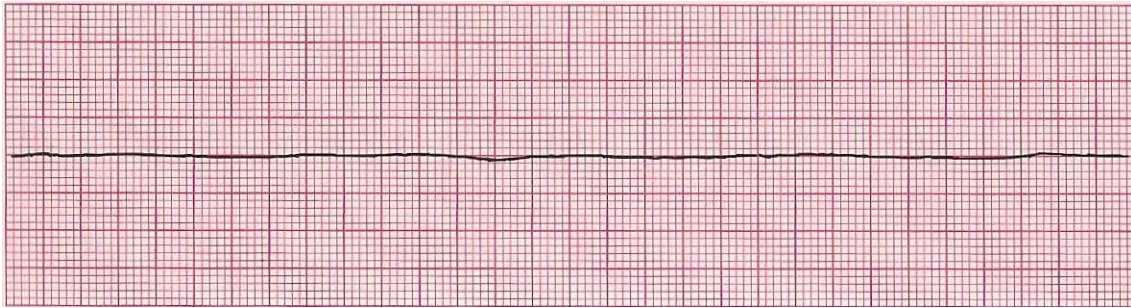
<p><u>Parameters</u></p> <p>Rhythm: Regular/Irregular</p> <p>Ventricular Rate: 41-100 bpm</p> <p>P Wave: NA</p> <p>Atrial Rate: NA</p> <p>PR Interval: NA</p> <p>QRS Interval: <math>\geq 0.12</math> seconds, Wide and bizarre</p>	<p><u>Etiology</u></p> <p>Common following thrombolytic therapy</p> <p>Can be a transient rhythm</p> <p>May be a result of dig toxicity</p>
<p><u>Significance</u></p> <ul style="list-style-type: none"><li>• Typically well tolerated</li><li>• May have decreased cardiac output at lower heart rates</li></ul>	<p><u>Treatment</u></p> <ul style="list-style-type: none"><li>• No treatment usually necessary</li><li>• Monitor the patient's hemodynamic values (blood pressure)</li></ul>

## Premature Ventricular Contraction



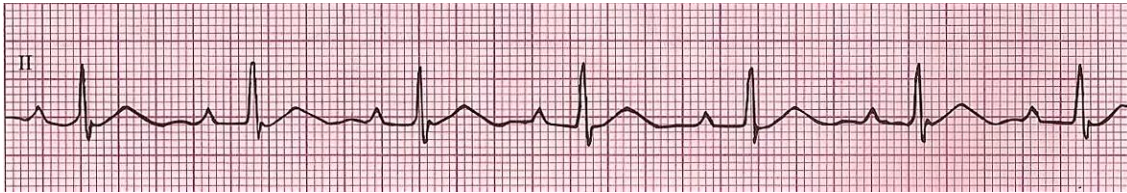
<p><u>Parameters</u></p> <p>Rhythm: underlying rhythm</p> <p>Ventricular Rate: underlying rhythm</p> <p>P Wave: <i>absent on premature beat</i></p> <p>Atrial Rate: underlying rhythm</p> <p>PR Interval: none</p> <p>QRS Interval: <math>\geq 0.12</math> seconds</p>	<p><u>Etiology</u></p> <p>Anxiety</p> <p>Excessive caffeine/alcohol intake</p> <p>Drugs</p> <p>CHF</p> <p>Electrolyte imbalance (Hypokalemia, hypomagnesemia)</p> <p>Heart surgery</p> <p>Reperfusion after thrombolytics</p>
<p><u>Significance</u></p> <ul style="list-style-type: none"> <li>• PVC's are very common</li> <li>• Become more frequent as we age</li> <li>• Can precipitate life-threatening arrhythmias</li> </ul>	<p><u>Treatment</u></p> <p>Treat the cause</p> <ul style="list-style-type: none"> <li>• Medications</li> <li>• Electrolyte replacement</li> <li>• Decrease caffeine consumption</li> </ul>

## Asystole



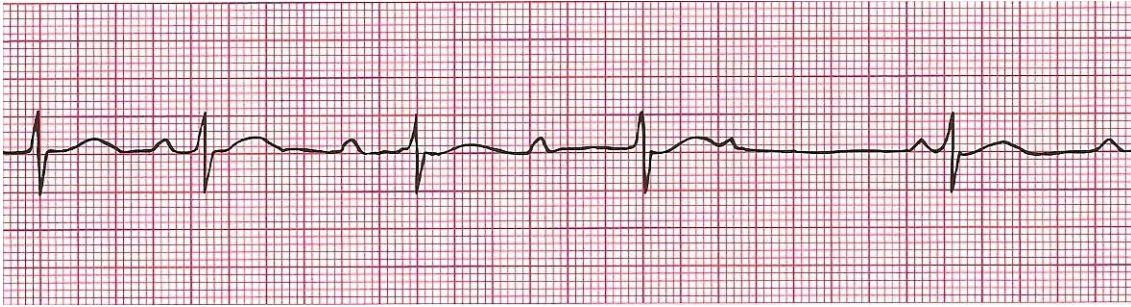
<p><u>Parameters</u></p> <p>Rhythm: NA Ventricular Rate: NA P Wave: NA Atrial Rate: NA PR Interval: NA QRS Interval: NA</p>	<p><u>Etiology</u></p> <p>Most common cause is MI Hypoxia Hypothermia Drug overdose Acidosis Hyper/Hypokalemia</p>
<p><u>Significance</u></p> <ul style="list-style-type: none"><li>• No cardiac output!!</li><li>• Poor prognosis despite resuscitative efforts</li></ul>	<p><u>Treatment</u></p> <ul style="list-style-type: none"><li>• Check for Pulse!</li><li>• Always check another lead to ensure true asystole</li><li>• If no pulse:<ol style="list-style-type: none"><li><b>1. Initiate CPR</b></li><li>2. Epinephrine or Vasopressin</li><li>3. Temporary pacemaker</li><li><b>4. Find and treat underlying cause</b></li></ol></li></ul>

## Sinus Rhythm with First-Degree Heart Block



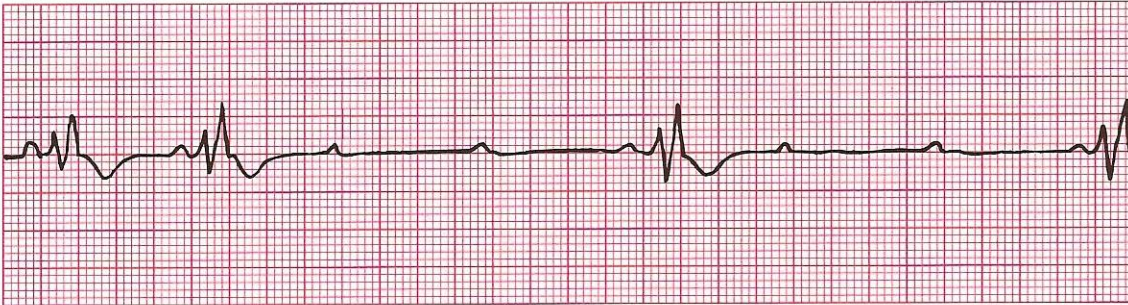
<p><u>Parameters</u></p> <p>Rhythm: Regular</p> <p>Ventricular Rate: 60-100 bpm</p> <p>P Wave: upright, matching, 1:1</p> <p>Atrial Rate: 60-100 bpm</p> <p>PR Interval: &gt; 0.20 seconds</p> <p>QRS Interval: &lt; 0.10 seconds</p>	<p><u>Etiology</u></p> <p>Ischemic Injury to AV node or surrounding tissue</p> <p>Medications:</p> <ul style="list-style-type: none"> <li>• Digitalis</li> <li>• Beta-blockers</li> <li>• Calcium-channel blockers</li> </ul> <p>Increased vagal tone</p> <p>Hyperkalemia</p> <p>Inferior wall MI</p> <p>Degeneration due to aging</p>
<p><u>Significance</u></p> <ul style="list-style-type: none"> <li>• No specific symptoms</li> <li>• Risk for progressing to a more severe AV block</li> </ul>	<p><u>Treatment</u></p> <ul style="list-style-type: none"> <li>• No specific treatment</li> <li>• Monitor for development of a more serious AV Block</li> <li>• Review and discontinue medications that may cause AV Block</li> </ul>

## Second-Degree Heart Block Type 1 (Wenkebach)



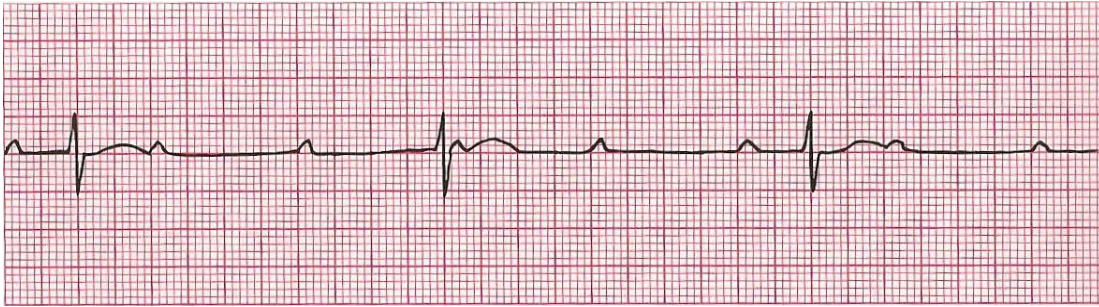
<p><u>Parameters</u></p> <p>Rhythm: Ventricular-Irregular/Regular Atrial-Regular</p> <p>Ventricular Rate: varies</p> <p>P Wave: upright, matching</p> <p>Atrial Rate: varies</p> <p>PR Interval: progressively lengthens</p> <p>QRS Interval: &lt; 0.10 seconds</p>	<p><u>Etiology</u></p> <p>Ischemia of the AV due to an inferior MI</p> <p>Same medications as First Degree</p> <p>Acute Infections</p> <p>May be normal in athletes</p>
<p><u>Significance</u></p> <ul style="list-style-type: none"> <li>• Seldom a serious form of heart block</li> <li>• Rarely progresses to higher degree of block</li> </ul>	<p><u>Treatment</u></p> <ul style="list-style-type: none"> <li>• Monitor for development of a more serious AV Block</li> <li>• Review and discontinue medications that may cause AV Block</li> <li>• If symptomatic due to bradycardia:             <ul style="list-style-type: none"> <li>○ Atropine</li> <li>○ Pacemaker, not usually necessary</li> </ul> </li> </ul>

## Second-Degree Heart Block Type 2



<p><u>Parameters</u></p> <p>Rhythm: Ventricular-Regular/Irregular Atrial-Regular</p> <p>Ventricular Rate: Vary</p> <p>P Wave: upright, matching, 2:1, 3:1, 4:1</p> <p>Atrial Rate: varies</p> <p>PR Interval: constant</p> <p>QRS Interval: &lt; 0.10 seconds</p>	<p><u>Etiology</u></p> <p>Associated with anterior or anteroseptal MI</p> <p>Degeneration of electrical conduction system- Usually age related</p>
<p><u>Significance</u></p> <ul style="list-style-type: none"> <li>• Can progress <b>suddenly</b> to <b>Third-Degree AV Block or ventricular standstill</b></li> </ul>	<p><u>Treatment</u></p> <ul style="list-style-type: none"> <li>• Placement of transvenous pacemaker ASAP (because of possible sudden progression to third-degree block or ventricular standstill)</li> <li>• If patient is <u>symptomatic</u>:             <ol style="list-style-type: none"> <li>1. Transcutaneously pace until transvenous pacemaker can be placed</li> <li>2. Atropine must be used with caution- may cause paradoxical slowing of ventricular rate, if ineffective</li> <li>3. If Atropine or Pacing ineffective treat with Dopamine or Epinephrine infusion</li> </ol> </li> </ul>

## Third-Degree Heart Block (Complete)



<p><u>Parameters</u></p> <p>Rhythm: Ventricular-Regular Atrial-Regular</p> <p>Ventricular Rate: varies</p> <p>P Wave: upright, matching</p> <p>Atrial Rate: varies</p> <p>PR Interval: varies</p> <p>QRS Interval: &lt; 0.120seconds</p>	<p><u>Etiology</u></p> <p>Acute anterior MI</p> <p>Inferior MI</p> <p>Drug toxicity</p> <p>Commonly seen in elderly patients due to degeneration of their conduction system</p> <p>Causes: same as 2<sup>nd</sup> degree blocks</p>
<p><u>Significance</u></p> <ul style="list-style-type: none"> <li>• Serious and potentially life-threatening arrhythmia</li> <li>• May progress to asystole or ventricular standstill with no warning</li> <li>• Loss of atrial “kick”</li> </ul>	<p><u>Treatment</u></p> <ul style="list-style-type: none"> <li>• Placement of transvenous pacemaker ASAP (because of possible sudden progression to ventricular standstill)</li> <li>• If patient is <u>symptomatic</u>:             <ol style="list-style-type: none"> <li>1. Transcutaneously pace until transvenous pacemaker can be placed</li> <li>2. Atropine should only be used if the QRS is narrow. Will have no effect on complete heart block with a wide QRS</li> <li>3. If Atropine/Pacing ineffective treat with Dopamine or Epinephrine infusion.</li> </ol> </li> <li>• Unresolved third-degree heart block will require a permanent pacemaker</li> </ul>



## Ventricular Pacing



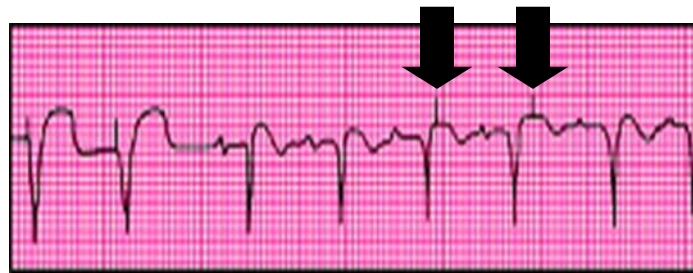
<p><u>Parameters</u></p> <p>Chamber Paced: Ventricle</p> <p>Interpretation: Normal V-Pacing</p>	<p><u>Etiology</u></p> <p>Bradycardia</p> <p>Third Degree Heart Block</p> <p>Pauses</p> <p>Overdrive of tachyarrhythmia</p> <p>Prophylactic for heart surgeries</p>
<p><u>Significance</u></p> <ul style="list-style-type: none"><li>• Maintains cardiac output and blood pressure</li></ul>	<p><u>Treatment</u></p> <ul style="list-style-type: none"><li>• Used to treat any of the above etiologies</li></ul>

## Failure to Capture



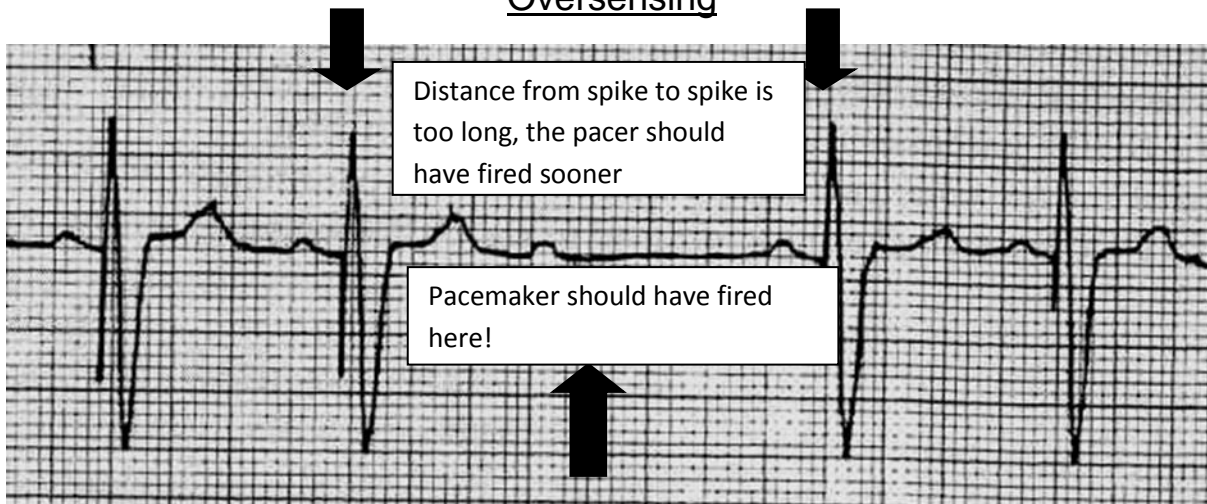
<p><u>Parameters</u></p> <p>Chamber Paced: Unknown</p> <p>Interpretation: Failure to capture</p>	<p><u>Etiology</u></p> <p>Bradycardia</p> <p>Third Degree Heart Block</p> <p>Pauses</p> <p>Overdrive of tachyarrhythmias</p> <p>Prophylactic for heart surgeries</p>
<p><u>Significance</u></p> <ul style="list-style-type: none"><li>• Decreased cardiac output and blood pressure</li><li>• <b>Life threatening emergency!</b></li></ul>	<p><u>Treatment</u></p> <ul style="list-style-type: none"><li>• May be fixed by increasing the milli-amps (MA)</li></ul>

Undersensing



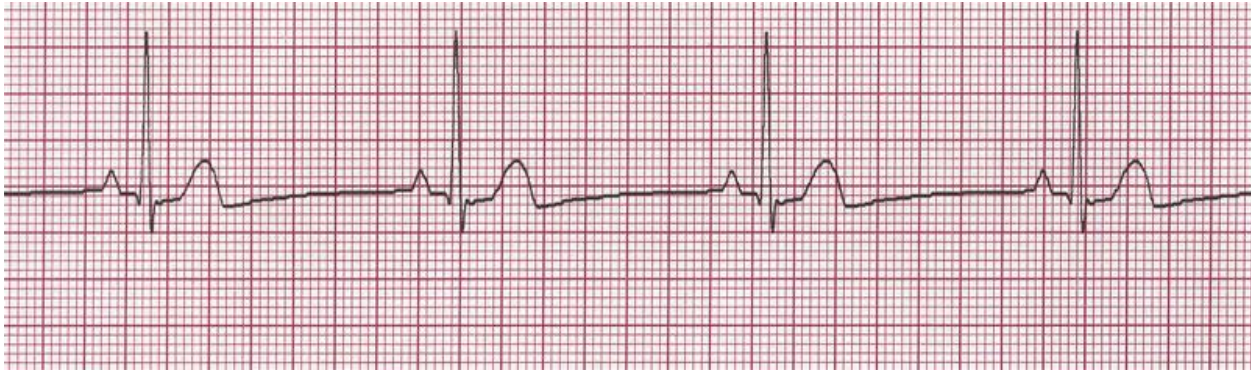
<p><u>Parameters</u></p> <p>Chamber Paced: Ventricular</p> <p>Interpretation: V-Paced with undersensing</p>	<p><u>Etiology</u></p> <p>Bradycardia</p> <p>Third Degree Heart Block</p> <p>Pauses</p> <p>Overdrive of tachyarrhythmias</p> <p>Prophylactic for heart surgeries</p>
<p><u>Significance</u></p> <ul style="list-style-type: none"><li>• Decreased cardiac output and blood pressure</li><li>• May cause PVC's or V. Tach if spikes land on t-wave during relative refractory period</li></ul>	<p><u>Treatment</u></p> <ul style="list-style-type: none"><li>• May be fixed by increasing the milli-volts (MV)</li></ul>

## Oversensing



<u>Parameters</u> Chamber Paced: Ventricular Interpretation: V-Paced with oversensing	<u>Etiology</u> Bradycardia Third Degree Heart Block Pauses Overdrive of tachyarrhythmias Prophylactic for heart surgeries
<u>Significance</u> <ul style="list-style-type: none"><li>Decreased cardiac output and blood pressure</li></ul>	<u>Treatment</u> <ul style="list-style-type: none"><li>May be fixed by decreasing the milli-volts</li></ul>

## Practice Strips



Ventricular Rhythm:

Atrial Rhythm:

Ventricular Rate:

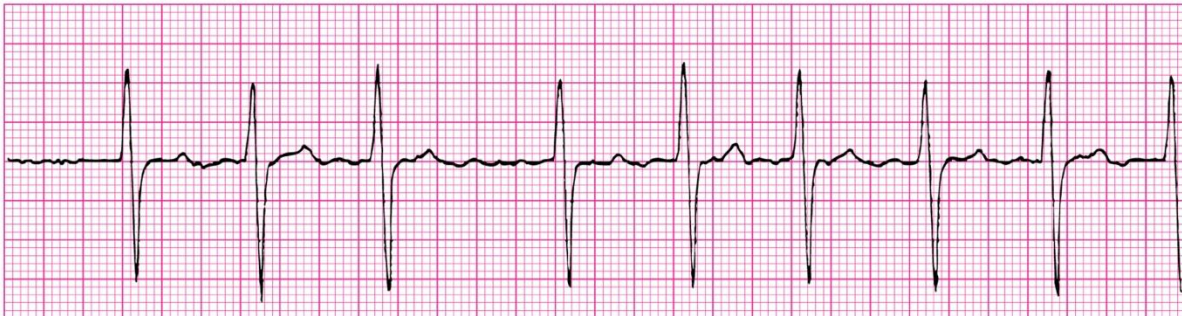
Atrial Rate:

P waves:

PR Interval:

QRS Interval:

Interpretation:



Ventricular Rhythm:

Atrial Rhythm:

Ventricular Rate:

Atrial Rate:

P waves:

PR Interval:

QRS Interval:

Interpretation:



Ventricular Rhythm:

Atrial Rhythm:

Ventricular Rate:

Atrial Rate:

P waves:

PR Interval:

QRS Interval:

Interpretation:



Ventricular Rhythm:

Atrial Rhythm:

Ventricular Rate:

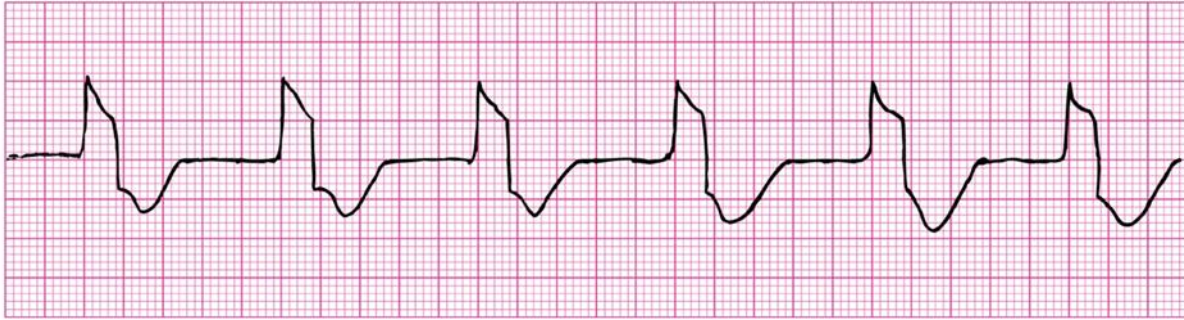
Atrial Rate:

P waves:

PR Interval:

QRS Interval:

Interpretation:



Ventricular Rhythm:

Atrial Rhythm:

Ventricular Rate:

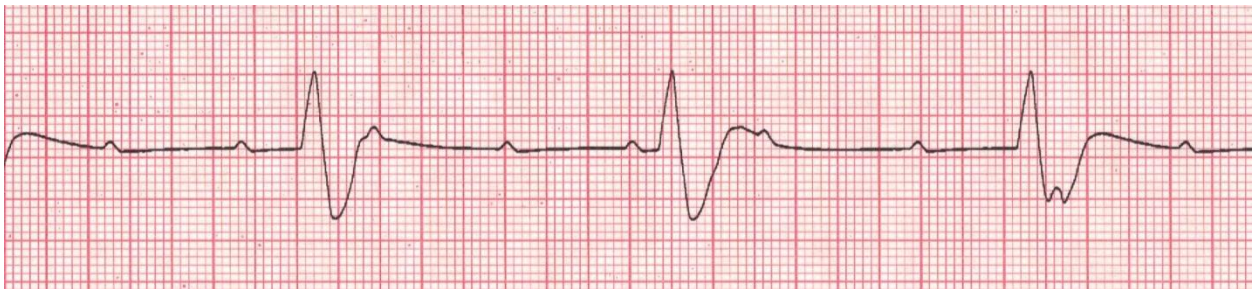
Atrial Rate:

P waves:

PR Interval:

QRS Interval:

Interpretation:



Ventricular Rhythm:

Atrial Rhythm:

Ventricular Rate:

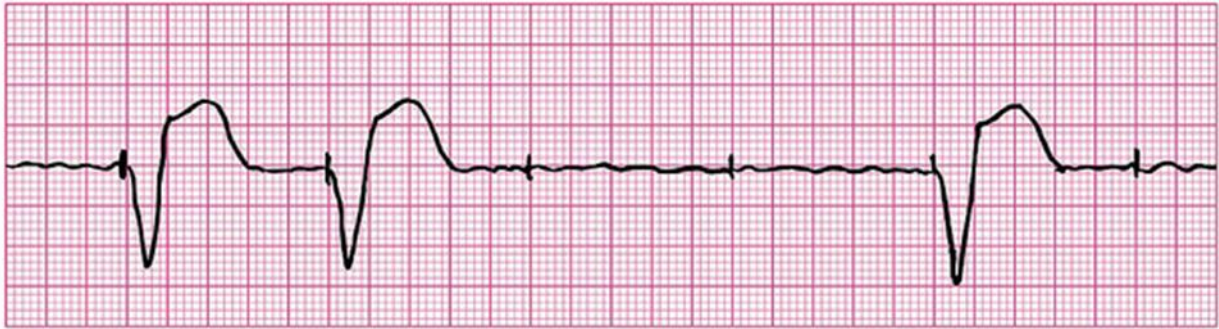
Atrial Rate:

P waves:

PR Interval:

QRS Interval:

Interpretation:



Ventricular Rhythm:

Atrial Rhythm:

Ventricular Rate:

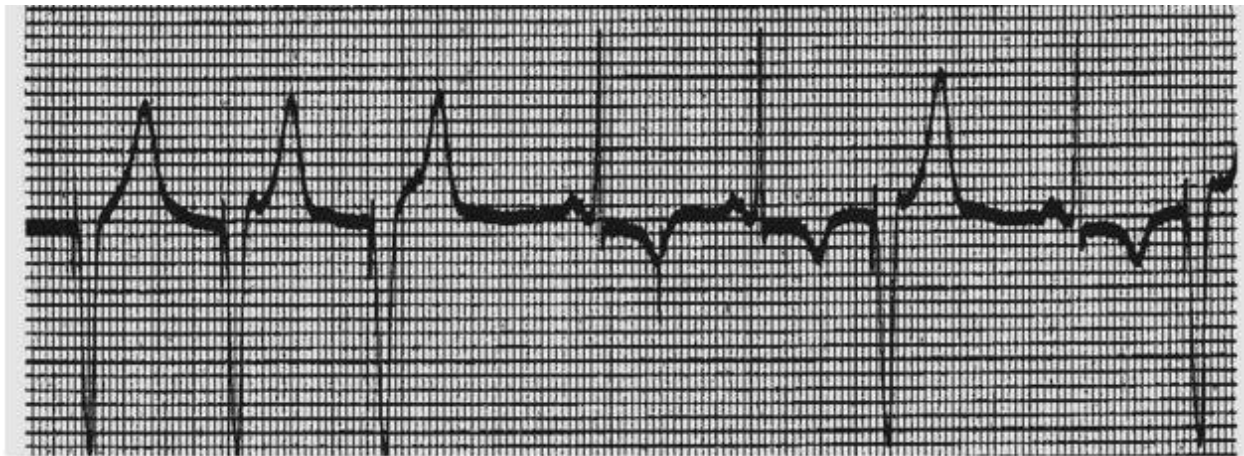
Atrial Rate:

P waves:

PR Interval:

QRS Interval:

Interpretation:



Ventricular Rhythm:

Atrial Rhythm:

Ventricular Rate:

Atrial Rate:

P waves:

PR Interval:

QRS Interval:

Interpretation:



## Answers to Practice Strips

### Strip 1:

Ventricular Rhythm: **Regular**  
Atrial Rhythm: **Regular**  
Ventricular Rate: **42**  
Atrial Rate: **42**  
P waves: **Upright, Matching, 1:1**  
PR Interval: **0.16 seconds**  
QRS: **0.12 seconds**  
Interpretation: **Sinus Bradycardia with IVCD**

### Strip 2:

Ventricular Rhythm: **Irregular**  
Atrial Rhythm: **NA**  
Ventricular Rate: **80-90**  
Atrial Rate: **NA**  
P waves: **Fibrillatory**  
PR Interval: **NA**  
QRS: **0.12 seconds**  
Interpretation: **Atrial Fibrillation with IVCD**

### Strip 3:

Ventricular Rhythm: **Regular**  
Atrial Rhythm: **NA**  
Ventricular Rate: **58-60**  
Atrial Rate: **NA**  
P waves: **Inverted after QRS complex**  
PR Interval: **NA**  
QRS: **0.06 seconds**  
Interpretation: **Junctional Rhythm**

### Strip 4:

Ventricular Rhythm: **NA**  
Atrial Rhythm: **NA**  
Ventricular Rate: **NA**  
Atrial Rate: **NA**  
P waves: **NA**  
PR Interval: **NA**  
QRS: **NA**  
Interpretation: **Ventricular Fibrillation**

Strip 5:

Ventricular Rhythm: **Regular**  
Atrial Rhythm: **NA**  
Ventricular Rate: **60-63**  
Atrial Rate: **NA**  
P waves: **NA**  
PR Interval: **NA**  
QRS: **0.16-0.18 seconds**  
Interpretation: **AIVR**

Strip 6:

Ventricular Rhythm: **Regular**  
Atrial Rhythm: **Regular**  
Ventricular Rate: **35-36**  
Atrial Rate: **94**  
P waves: **Upright, Matching**  
PR Interval: **0.36, 0.18, 0.50 seconds**  
QRS: **0.24 seconds**  
Interpretation: **Third Degree Heart Block or Complete Heart Block**

Strip 7:

Chamber Paced: **Ventricle**  
Paced Rate: **60**  
Interpretation: **Ventricular paced rhythm with non capture**

Strip 8:

Chamber Paced: **Ventricle**  
Paced Rate: **75**  
Interpretation: **V-Paced with Undersensing**