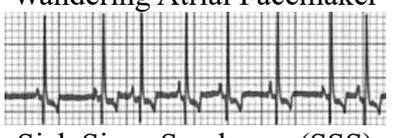


ECG Breakdown

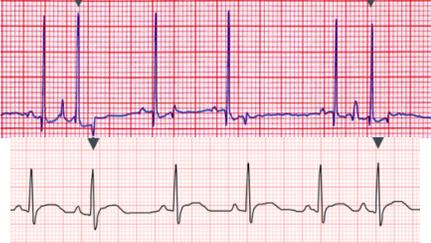
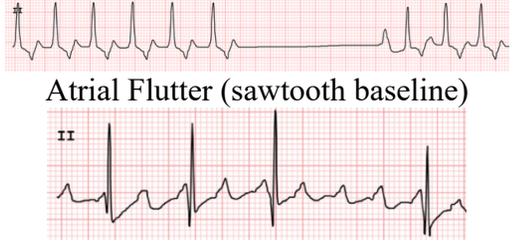
Sinus Rhythms

Normal Sinus Rhythm	Sinus Bradycardia	Sinus Tachycardia	Sinus Arrhythmia
Normal HR P wave for every QRS QRS for every P wave Normal PR interval	Slow HR P wave for every QRS QRS for every P wave Normal PR interval	Fast HR P wave for every QRS QRS for every P wave Normal PR interval	Regularly Irregular HR Usually varies with respiration P wave for every QRS QRS for every P wave Normal PR interval
Dog 60-160 bpm  Cat 140-220 bpm 	Cat <140 bpm 	Cat >220 bpm 	 Wandering Atrial Pacemaker  Sick Sinus Syndrome (SSS)
			SSS Tx Pacemaker Medications to increase sympathetic tone/reduce parasympathetic tone Methylxanthines Beta agonists Anticholinergic agents

Supraventricular Arrhythmias

Atrial Premature Complexes	Atrial Fibrillation	Supraventricular Tachycardia
Occur due to abnormal early depolarization of the atrium that is	Tachycardia No P waves Irregular R-R interval	Faster heart rate and is typically regular during the tachycardia May be paroxysmal or sustained

ECG Breakdown

<p>conducted to the ventricles via the normal conduction system Narrow QRS complexes that look like sinus beats Occur before the next sinus beat is expected</p>	<p>+/- Fibrillatory waves/undulating baseline Variable R wave amplitude Usually, narrow complex unless a conduction abnormality is present</p>	<p>Usually do not see normal P waves during the tachycardia May observe normal sinus complexes in between runs of SVT</p>
	<p style="text-align: center;">Dog</p>  <p style="text-align: center;">Cat</p> 	 <p style="text-align: center;">Atrial Flutter (sawtooth baseline)</p>
	<p style="text-align: center;">Rhythm control Electrical cardioversion Rate control Diltiazem (concern for neg. inotropic potential) Digoxin Beta blockers</p>	

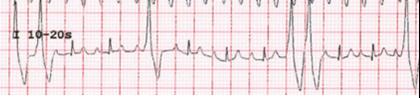
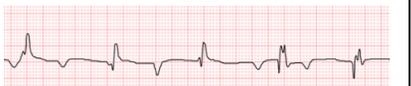
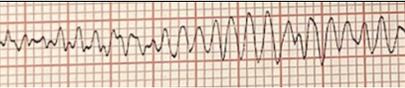
Treatment of Supraventricular Arrhythmias

- In hospital: if stable may be able to go straight to oral treatment
 - Vagal maneuver
 - IV diltiazem
 - IV esmolol
 - IV procainamide (good choice if you are unsure SVT vs VT)
- At home:

ECG Breakdown

- Sotalol (neg. inotrope, neg. chronotrope)
- Diltiazem (neg. inotrope, NEG chronotrope)
- Atenolol (NEG inotrope, neg. chronotrope)
- Digoxin (slows AV nodal conduction, positive inotrope)

Ventricular Arrhythmias

Ventricular Premature Complexes	Ventricular Tachycardia	Ventricular Escape	Ventricular Fibrillation
<p>Wide and bizarre QRS complex Does not look like the sinus beats No P wave initiating the complex VPCs come in early</p>	<p>HR > 16-180 bpm dogs, >220 bpm in cats Paroxysmal bursts of V-tach that abruptly start and stop Monomorphic or polymorphic configuration If >350 bpm in dogs – high tendency to degenerate into Vfib</p>	<p>Wide and bizarre QRS complex Does not look like the sinus beats No P wave initiating the complex Ventricular escape complexes come in early</p>	<p>Disorganized ventricular rhythm Requires defibrillation</p>
	<p style="text-align: center;">Dog</p>  <p style="text-align: center;">Cat</p> 	<p style="text-align: center;">Dog</p>  <p style="text-align: center;">Cat</p> 	

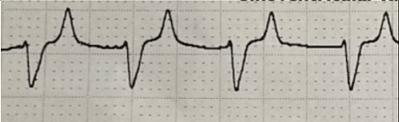
Treatment of Ventricular Arrhythmias

- In hospital: Lidocaine
 - Dogs – 2mg/kg IV bolus up to 4x
 - Cats use 1/10 the dose, esmolol, or oral sotalol

ECG Breakdown

- At home:
 - Sotalol orally
 - Dogs – 1.3-3 mg/kg PO q 12h
 - Most effective solo agent in ARVC dogs
 - Mexiletine
 - Dogs – 4-8 mg/kg PO q 8h
 - Synergistic action when administered w/ sotalol
 - Can consider atenolol orally for mild arrhythmias
 - Consider negative inotropic consequences
 - Fish oil supplementation

Bradyarrhythmias and AV Blocks

Hyperkalemia	1st Degree AV Block	2nd Degree AV Block	3rd Degree AV Block
<p>Cells become refractory to depolarization</p> <p>Atrial myocytes are more sensitive</p> <p>Early sign: Tall, tented T waves</p> <p>More severe: Loss of P waves, wide QRS complexes, bradycardia</p>	<p>Every P wave has a QRS but the conduction through the AV node is slower than usual</p> <p>Prolonged RP interval</p> <p>All P waves are conducted</p> <p>Can be obliterated by a stimulus or atropine</p>	<p>Some P waves are conducted, and some are not</p> <p>Low-grade: every other P wave or less is blocked</p> <p>High-grade: > every other P wave is blocked</p> <p><i>*See table below for more examples</i></p>	<p>No P waves conducted – QRS dissociated</p> <p>No consistent PR interval</p> <p>Ventricular or junctional escape rhythm</p> <p>No response to stimulus/atropine</p> <p>Pacemaker recommended</p>
		<p style="text-align: center;">Low Grade</p>  <p style="text-align: center;">High Grade</p> 	

ECG Breakdown

Second Degree AV Blocks

Mobitz Type I	Mobitz Type II
Wenckebach phenomenon PR gradually prolongs until a P wave is blocked Cause: Increased vagal tone Stimulus or atropine can obliterate	PR interval is unchanged, P wave randomly blocked Often non-responsive to atropine/stimulus Frequently secondary to heart dz usually idiopathic AV nodal fibrosis
	

Treatment of AV Blocks

- 1st degree and Mobitz type I Second Degree: treat underlying cause of vagal tone
 - Atropine response test will confirm if vagal tone is the cause
- High-grade second-degree AV block and 3rd degree AV block
 - Emergency pacemaker implantation
 - Can try oral therapy with high grade 2nd degree but a pacemaker is a better option
 - Cats: therapy is NOT indicated unless they are symptomatic