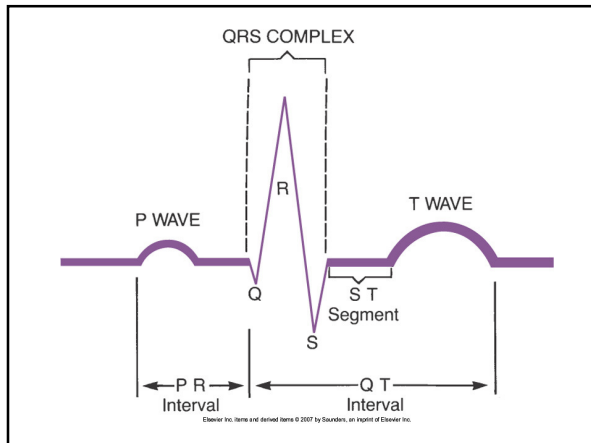


## Dysrhythmias & Anti-Dysrhythmics

## Dysrhythmias

- Rhythm bad in the heart:  
Whitewater rafting
- Electrical impulses coordinate heart
  - Reduction in Cardiac Output
- PEA
- Asystole



## EKG Parameters

- P wave
- QRS complex
- T wave
- PR interval
- QT interval
- ST segment
- Analysis
  1. Heart rate
  2. Rhythm
  3. P wave
  4. Intervals: PR, QRS
  5. T wave (ST segment)

## Dysrhythmias

- Etiology
  - Electrolyte imbalances
  - Medications
  - Hypoxia
  - Elevated preload
  - Aging
- Manifestation
  - ECG, ↓ Cardiac Output

## Dysrhythmias

- Impulse Formation
  - Ectopy
  - Atrial rhythms (Supraventricular)
  - Junctional rhythms
  - Ventricular rhythms
  - Types
    - Fibrillation
    - Flutter
    - Tachy
    - Brady
- Slowed Conduction
  - AV blocks
    - 1<sup>st</sup> degree
    - 2<sup>nd</sup> degree Mobitz I
    - 2<sup>nd</sup> degree Mobitz II
    - 3<sup>rd</sup> Degree
  - BB blocks (don't need to worry about)

## Dysrhythmias

- “Sinus arrhythmias”
  - Tachy/brady
- Ectopy(early contraction)
  - Premature Atrial Contraction (PAC)
  - Premature Ventricular Contraction (PVC)
- Atrial rhythms
  - Atrial tachy
  - Atrial flutter, Atrial fibrillation

## Dyrhythmias

- Junctional rhythms
- Ventricular rhythms
  - Ventricular tachycardia\*
    - Pulse or no Pulse, that is the question!
  - Ventricular fibrillation

## Dysrhythmias

- 1° AVB block
- 2° AVB block Mobitz I
- 2° AVB block Mobitz II
- 3° AVB block\*
- Ventricular block (BBB)
  
- Wolf-Parkinson-White: tx with CCBs

## Anti-dysrhythmic Therapy

- Antidysrhythmic therapy is declining overall
  - All anti-dysrhythmic drugs may increase risk of death
  - Implantable defibrillators
  - Ablation techniques

## Electrical Properties of the Heart

- SA node → AV node → His → Purkinje  
→ Myocardium

## Antidysrhythmic Classifications

- Class I: Sodium Channel Blockers
- Class II: Beta blockers
- Class III: Potassium Channel Blockers
- Class IV: Calcium Channel Blockers
- Non classed drugs

## Class I Antidysrhythmics

- Three subclasses: all block sodium channel
  - IA: delay repolarization (don't use)
  - IB: accelerate repolarization (only one drug)
  - IC: prodysrhythmic (don't use)

## Class IB

- Lidocaine (IV)
  - Enhances repolarization (no QT prolongation)
  - No anticholinergic effects
  - Only works for ventricular dysrhythmias
  - Adverse effects
    - CNS, toxicity: seizures, resp arrest

## Class II: Beta blockers

- Propranolol
- Acebutolol
- Esmolol
- Sotalol: also blocks Potassium (class III)
- Adverse effects (you should already know these, same as all beta blockers)
  - Heart failure, AV block, sinus arrest

## Class III: Potassium Channel Blockers

- Amiodarone (PO, IV)
  - Book lies: used for all kinds of dysrhythmias
  - First line for V-fib maintenance
  - Works against both atrial and ventricular
  - Adverse: ↓HR, lung damage, visual impairment

## Class IV: Calcium Channel Blockers

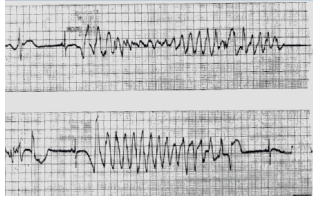
- Only non-dihydropyridines
  - Verapamil & diltiazem
  - Slow SA node automaticity
  - Delay AV conduction
  - Reduction of myocardial contractility
- Adverse effects
  - ↓HR, AV block, Heart failure, hypotension, constipation

## Other Antidysrhythmics

- Adenosine
  - Short half life, termination of paroxysmal SVT
- Digoxin
  - Decreases conduction through AV node, increases Vagal tone, decreases SA automaticity
- Ibutilide

## Terms and Concerns

- Supraventricular
- Prodyrhythmic effects
  - QT prolongation: Torsades de pointes



## Supraventricular Rhythms

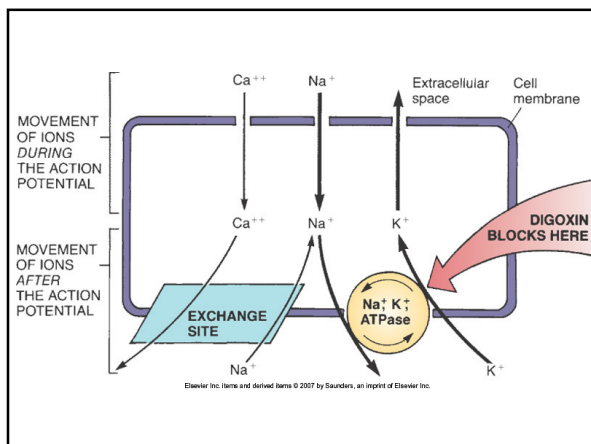
- A-Tach (SVT)
- A flutter
- A fib
  - DC cardioversion
  - Beta blocker, calcium channel blocker, digoxin,

## Cardiac Glycosides: Digoxin

- Derived from digitalis pupurea & lanata
- Digoxin is only one in U.S. (digitoxin)
  - Troublesome drug
  - Decreases morbidity but not mortality
    - May cause increased mortality in women
  - Narrow therapeutic range; prodyrhythmic

## Digoxin

- + inotropic effect
  - Inhibits Na-K ATPase --> calcium accumulates in myocytes
  - Competes with K<sup>+</sup> for binding sites
    - Low K<sup>+</sup> will enhance toxicity
    - High K<sup>+</sup> reduces effectiveness
- - Dromotropic effects
  - SA node, AV node, ventricular conduction
- + Chronotropic effects: vagal stimulation



## Digoxin

- Therapeutic Uses
  - Heart Failure
  - A. fib, A. flutter
  - Atrial Tachycardia

## Adverse Effects

- Dysrhythmias
  - May mimic ANY dysrhythmia
  - If in doubt, hold digoxin
- Bradycardia
- Monitor K<sup>+</sup>
- Monitor dig levels

## Interactions

- Diuretics: K<sup>+</sup>
- ACE inhibitors: K<sup>+</sup>
- Sympathomimetics
- Increase levels of digoxin
  - Quinidine
  - Verapamil

## Kinetics

- Administration:
  - Apical pulse → < 60BPM, hold
  - PO: 0.125 - 0.375 mg
  - Loading dose: 0.4 – 0.6 mg (IV)
  - Maintenance: 0.125 – 0.5 mg (IV)
- Distribution: 23% bound to albumin
- Elimination: renal
  - Must check renal function

## Heart Failure & Cardiomyopathies

## Heart Failure

- Failure of the heart to meet metabolic demands of the body
  - Supply O<sub>2</sub>
  - Supply nutrients
  - Transport waste to liver and kidneys
- Acute or Chronic

## Heart Failure

- May be left or right sided failure
  - Congestive (left)
  - Cor Pulmonale (right)
- Two basic forms
  - Systolic dysfunction
  - Diastolic dysfunction

## Systolic/Diastolic Dysfunction

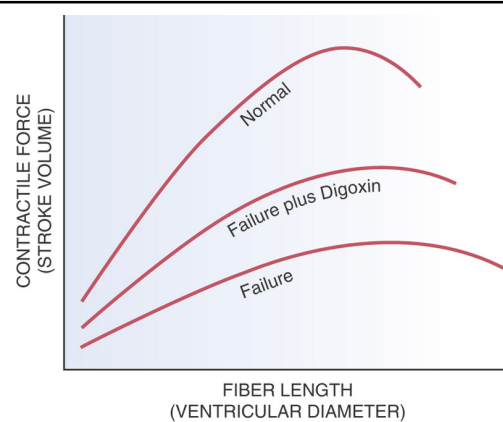
- Failure of the heart to pump efficiently
  - Ischemic Heart Disease, Idiopathic, Viral/Bacterial infections, valve disease
- Failure of heart to fill adequately
  - Valvular, pericarditis, hypertension, cardiac hypertrophy

## General Heart Failure

- Heart fails to meet body's demand for oxygen
  - Epinephrine/Norepinephrine release
  - Renin-Angiotensin-Aldosterone
    - Vaso, fluid
  - Cardiac remodeling
    - Fibrosis, apoptosis, necrosis, hypertrophy

## General Heart Failure

- Cardiac Dilation
  - Frank Starling's Law of the Heart
- Increased Sympathetic Tone
- Water Retention
  - Competing neurohormones
  - ANP, BNP, Ang II, Aldosterone, Epi
- Decompensation



## Heart Failure Manifestations

- High blood pressure, tachycardia, S3
- Edema, Pulmonary Edema
- Dyspnea, DOE, activity intolerance
  - Heart vs. disuse
- Nervousness, irritability
- Weight gain

## HF Classifications

- NYHA
  - Class I: no limitations
  - Class II: slight limitations
  - Class III: Marked limitation
  - Class IV: Symptoms occur at rest
- Note: Diseases that affect oxygenation will exacerbate HF symptoms

## Heart Failure Treatment

- The “Big Five”
  - ACE inhibitor/ARB
  - Aldactone
  - Digoxin
  - Lasix
  - Beta blocker
- Other
  - Inotropics, BNP, isosorbide plus hydralazine

## Other Drugs

- Sympathomimetics
  - Dopamine
  - Dobutamine
- BNP
  - The secret weapon
  - Used to assess and to treat (Nesiritide)
  - IV only: lowers catecholamine release, vasodilation, diuresis

## Managing HF Patients

- Class I: life style, ACE inhibitors, ETOH
- Class II: add beta blocker if <EF or MI
- Class III: Diuretic, Aldactone, Digoxin
  - Avoid antidysrhythmics, NSAIDS, CCBs
  - Exercise
- Class IV: hospitalization: BNP, sympathomimetics

## Final Considerations

- Blood Pressure Changes
- Patient Education