



Pharmacology Team

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Orange = Important

RED = very important

Blue & Black & Other = General
Explanation

Mind Map

CLASSIFICATION OF ANTIARRHYTHMIC DRUGS <i>According to Vaughan-Williams</i>		Examples
<p style="text-align: center; font-weight: bold;">Class I</p> <ul style="list-style-type: none"> ❖ block Na channels ❖ decrease the slope of phase 0 (depolarization phase) ❖ suppression of Ap generation ❖ acts on non nodal tissues divided according to binding and dissociation (kinetic action) 	<p style="text-align: center;">Class I (a)</p> <p>moderate Na channels Blockade</p> <p>↑ Action potential duration & refractory period</p>	<p>Quinine</p> <p>Procainamide</p>
	<p style="text-align: center;">Class I (b)</p> <p>Weak Na channels Blockade</p> <p>↓ Action potential duration</p>	<p>Lidocaine</p> <p>Mexiletine</p>
	<p style="text-align: center;">Class I (c)</p> <p>Strong Na channels blockade</p> <p>NO effect on Action potential duration</p>	<p>Flecainide</p> <p>Propafenone</p>
<p style="text-align: center; font-weight: bold;">Class II</p>	<ul style="list-style-type: none"> • Block β_1- receptors • Reduce the sympathetic effect • Act on SA node and ectopic pacemaker 	<p>Propranolol</p> <p>Esmolol</p>
<p style="text-align: center; font-weight: bold;">Class III</p>	<ul style="list-style-type: none"> ❖ Block K channels ❖ ↑ Action potential duration & refractory period ❖ Prolong Phase 3 (repolarization phase) 	<p>Amiodarone</p> <p>Ibutilide</p>
<p style="text-align: center; font-weight: bold;">Class IV</p>	<ul style="list-style-type: none"> ▪ (L-type) Ca channels Blocker ▪ Act on AV & SA node 	<p>Verapamil</p> <p>Diltiazem</p>
<p style="font-weight: bold;">Miscellaneous: different groups but all share anti-arrhythmic effect</p>	<p>Adenosine</p> <p>Electrolyte supplement (magnesium, potassium)</p> <p>Digitalis</p> <p>Atropine</p>	

Class I Drugs: (They Block Na channels)

- ❖ At high concentration they have local anaesthetic
- ❖ -Ve inotropic effect (cardiac depression)

Class I (a)

Main Effects:

- moderate Na channels Blockade
- Increase Action potential duration & refractory period
 - Slow phase 0 depolarization
 - Decrease conduction velocity

Also, they have Potassium channel blocking effect → Prolong QT interval in ECG

Anticholinergic Effects:

Increase conduction through the A.V. node and decrease Av conduction time

↓
lead to increase ventricular rate in atrial flutter and fibrillation

↓
So, we should give a drug that slow A.V. conduction such as : digoxin , B-blockers or Ca channel blockers

Negative inotropic effect

1- Quinidine

NOTE \ (It has α -adrenergic blocking effect)
So, it causes **vasodilatation**

Adverse Effects

- ❖ GIT \ nausea & vomiting & diarrhea
- ❖ CARDIAC \ **quinidine syncope**
→ Duo to (**torsades de pointes**)
(may terminate or lead to fatal ventricular fibrillation)

What is (torsades de pointes)??? <http://www.youtube.com/watch?v=E8xe-rFOeH8>
- ❖ Cinchonism \ (toxicity due to cinchona alkaloid overdose)
→ Which Appear as (tinnitus ,diarrhea, headache & dizziness)
- ❖ Hypotension
- ❖ If serum **concentrations exceed 5 $\mu\text{g/ml}$**
→ it produce **asystole** (cardiac arrest)

Drug interactions

Increase serum concentration of **digoxin**

GIVEN **ORALLY**

rarely given I.V. because of toxicity .

2- PROCAINAMIDE

NOTES \

- less toxic can be **given I.V.** (common route)
- **more effective in ventricular than in atrial arrhythmias**
 - Weak α -blocking actions or anticholinergic
 - Less depressant on cardiac contractility

Adverse Effects

- **Lupus Erythematosus-like Syndrome**
 - Hypotension
 - **Torsades de pointes**
 - Hallucination & psychosis

NOTES

Used as a **Second choice in ventricular tachycardia after acute myocardial infarction**

The first choice is (lidocaine)

*any drug blocks K channels and prolongs phase 3 leads to torsades de pointes(either terminate or leads to ventricular fibrillation)

Clinical uses

- ❖ Atrial flutter, Atrial fibrillation (not used alone)
- ❖ Supraventricular, ventricular tachyarrhythmias

CLASS I (b)

- Decrease phase 3 (repolarization phase)
- Shorten action potential duration and refractory period

Examples	
<p>Lidocaine</p> <p>NOT effective orally GIVEN (I.V.)</p>	<p>Uses Drug of choice for treatment of ventricular tachycardia in acute myocardial infarction (Emergency) Effective for suppressing arrhythmias due to digitalis toxicity and ischemia</p> <p>Adverse Effects • Hypotension • Neurological \ (paresthesia, tremor, dysarthria (slurred speech), convulsions)</p> <p>NOTES 97% of the drug is metabolized in the liver SO,,, it has (3% bioavailability)</p>
<p>Mexiletine</p> <p>Given Orally</p>	<p>Uses ▪ Chronic treatment of ventricular arrhythmia ▪ Digitalis-induced arrhythmias ▪ chronic pain e.g. diabetic neuropathy and nerve injury</p> <p>Adverse Effects (Nausea,,, Vomiting,,, Neurological,,, Hypotension)</p>

Ex: patient presented with prolong Ap due to ischemia or arrhythmia you give drug that lowers Ap (Lidocaine) so like u decrease arrhythmia

Class I (c)

NO effect on action potential duration

Negative inotropic effect

Slow conduction in all cardiac tissues

Clinical Uses:

- supraventricular tachyarrhythmias (SVT), atrial flutter or fibrillation
- ventricular tachyarrhythmias (life threatening ones)
- arrhythmias not responding to drugs

Examples

FLECAINIDE Proarrhythmic drug	Adverse Effects	<ul style="list-style-type: none">• Arrhythmias in any dosage• Heart failure• Neurological
	NOTES	Induce ventricular arrhythmias
Propafenone Weak B-blocking action	NOTES	Cause metallic taste

Increase mortality when given to myocardial infarction patients

*Shaikha Aldossari found a good mnemonic for treatment of ventricular tachycardia:

LAMB:

Lidocaine

Amiodarone

Mexiltene/ **M**agnesium

Beta-blocker

MCQs\

1- Which of the following actions doesn't belong to Class I (a) drugs :

- a- Na Blockade**
- b- Increase Action potential**
- c- Decrease conduction velocity**
- d- Decrease refractory period**

2- The purpose of prescribing digoxin and Quinidine together for a patient who has Atrial flutter is :

- a- Increase serum concentration of digoxin**
- b- Increase ventricular rate**
- c- Slow A.V. conduction**
- d- Both (a-c)**

3- A patient come to the clinic with severe ventricular tachycardia. History investigations shows that suffers from acute myocardial infarction recently

What is the drug of choice in this patient's condition?

- a- Mexiletine**
- b- Lidocaine**
- c- Procainamide**
- d- Quinidine**

4- The drug of choice for supraventricular tachyarrhythmia is :

- a- Flecainide**
- b- Lidocaine**
- c- Quinidine**
- d- Digoxin**

5- A patient brought to the emergency department unconscious.

His relatives said the he have complained recently of hypotension, nausea and vomiting

ECG is immediately performed and it shows torsades de pointes.

What is the most likely drug to cause those symptoms?

- a- Flecainide**
- b- Propafenone**
- c- Quinidine**
- d- Lidocaine**

Answer Key:

(Q1-d) (Q2-d) (Q3- b) (Q4- a) (Q5- c)