



# **Beta-Adrenergic Receptor Antagonists**



## *Necessary To Knows:*

- Pharmacology of BARAs.
- Mechanism of action
- Applications
- Major side effects
- Interaction
- Clinical presentation
- Differential diagnosis
- Diagnosis
- Treatment



<i>Agent</i>	<i>? , selective</i>	<i>Lipid Solubility</i>	<i>Elimination Half- Life</i>
<b>Acebutolol</b>	yes	low	3-4 hours
<b>Atenolol</b>	yes	low	6-9 h.
<b>Esmolol</b>	yes	low	<b>10 minutes</b>
<b>Metoprolol</b>	yes	moderate	3-4 h
Labetolol	No	moderate	5 h
Nadolol	No	low	<b>14-24 h</b>
Pindolol	No	moderate	3-4 h
<b>Propranolol</b>	No	<b>High</b>	3-6 h
Sotalol	No	low	<b>12 h</b>
Timolol	No	moderate	4 -5 h

**Table 1-1\* B-Adrenergic Receptor Antagonist Pharmacologic Profile**



# Mechanism of action:

- Blockade of ? receptors
- G proteins
- cAMP
- Protein kinase
- L- channels
- Ca<sup>++</sup> entry
- Ryanodine
- Catecholamines



# Applications

- Cardiovascular system
- Pulmonary system
- Thyroid
- CNS
- Others



# Major side effects

## ■ *Cardiac Effects Due to Beta Blockade:*

Congestive heart failure

Negative chronotropic effects

Bata blocker withdrawal

continued...



- ***Noncardiac Effects Due to Beta Blockade:***

Increased airway resistance

Exacerbation of peripheral vascular diseases

Facilitation of hypoglycemia

Hyperkalemia

Depression, Fatigue, Sexual dysfunction

continued...





## ***Effects Unrelated to Beta blockade:***

Drug interactions

Antinuclear antibodies

Overdose



<i><b>System</b></i>	<i><b>Manifestations</b></i>
<b>Cardiovascular</b>	<b>Brady cardia, conduction delays, decreased contractility with systemic hypotension</b>
<b>Central Nervous System</b>	<b>Coma, seizures</b>
<b>Pulmonary</b>	<b>Bronchospasm(unusual)</b>
<b>Metabolic</b>	<b>Acidosis, hypoglycemia(rare)</b>

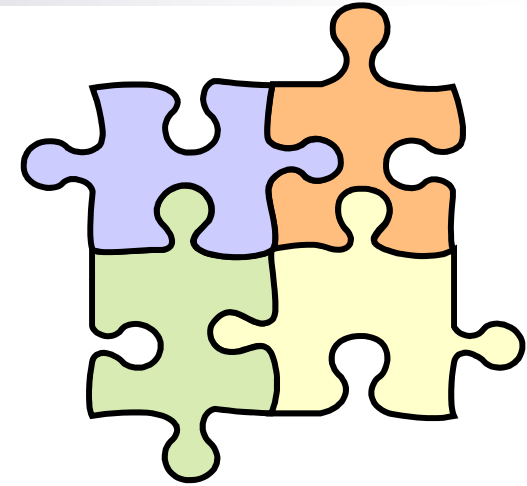
**Table 6-1 \*Clinical Manifestations of B-Adrenergic Antagonist Toxicity**

# Differential diagnosis

Toxin	Distinguishing features
<b>Medications:</b> <b>Calcium channel blockers</b> <b>Clonidine</b> <b>Digoxin (acute)</b> <b>Sodium channel blockers:</b> <b>cocaine, cyclic antidepressants</b>	
<b>Natural toxins</b>	
<b>Chemicals:</b> <b>Organophosphate,</b> <b>Carbamate,</b> <b>Cyanide,</b> <b>Hydrogen sulfide</b>	

# Diagnosis

- History
- Clinical presentation
- ~~Laboratory testings~~





# Management:

- Initial evaluation
- Glucagon:
  - Dose
- Calcium
- Insulins and glucose
- Catecholamines
- Phosphodiesterase inhibitors
- Others



## Treatment Essentials

**Glucagons bolus(3.5-5 mg)followed by infusion (1-5mg/hr)**

**Epinephrine infusion(1 $\mu$ g/kg/min) and titrate isoproterenol infusion(2 $\mu$ g/min)and titrate**

**Amrinone infusion(5 $\mu$ g/kg/min) and titrate**

**Electrical pacing. Consider aortic balloon pump**



# Treatment end points

- HR>60
- SBP>90mmHg
- Evidence of good organ perfusion



# References:

- Up to date 2005 ( Ellen Safir, Fermin Barrueto)
- Ford chapter 42 ( William Kerns )
- Medical pharmacology  
(Adib A,Ghafghazi T,Hajhashemi v)





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