

Adrenergic agonists

Adverse effects of Beta1 activation:

- results from activating beta1 receptors in the heart
- tachycardia and dysrhythmias
- Angina pectoris

Clinical Consequences of Beta2 activation:

- ❑ Asthma: promote bronchodilation.
Adrenergic agonists that are selective for beta2 receptors (terbutaline)
By inhalation: to minimize systemic effect.
Warn patient against inhaling too much
- ❑ Delay of preterm labor: beta2 receptor in the uterus → relaxes uterine smooth muscle

Adverse effects of Beta2 activation:

- ❑ Hyperglycemia in patients with diabetes: by promoting breakdown of glycogen in the liver and skeletal muscle
- ❑ Tremor: most common side effect. Activation of beta2 receptors in muscle

Clinical Consequences of dopamine receptor activation:

- dilation of the vasculature of the kidneys → improve renal perfusion → reduce risk of renal failure in shock
- dopamine

Epinephrine:

□ alpha1, alpha2, beta1, beta2

□ Catecholamine

Therapeutic uses:

□ Alpha1-mediated vasoconstriction:

- delay absorption of local anesthetics
- control superficial bleeding
- reduce nasal congestion
- elevate blood pressure

Epinephrine:

Therapeutic uses:

- Mydriasis during ophthalmic procedures
- Overcome AV heart block
- Restore cardiac function
- Bronchodilation in asthma

Epinephrine:

- ❑ Therapeutic uses:
- ❑ Treatment of choice for anaphylactic shock:
 - manifestation of severe allergy
 - hypotension, bronchoconstriction, and edema of the glottis
 - bee venom, certain drugs (e.g. penicillin)
 - Epinephrine SC

Epinephrine:

Pharmacokinetics:

- topically, by injection, by inhalation
- No oral??

Epinephrine:

Adverse effects:

- ❑ Hypertensive crisis: parenteral epinephrine
→ continuous cardiovascular monitoring
- ❑ Dysrhythmias: high risk in hyperthyroid patients
- ❑ Angina pectoris: especially in patients with coronary atherosclerosis
- ❑ Necrosis
- ❑ Hyperglycemia: in diabetic patients

Epinephrine:

Drug interactions:

- ❑ MAO inhibitors: used to treat depression. Prolong and intensify epinephrine's effects.
- ❑ Tricyclic antidepressants: block uptake
- ❑ General anesthetics
- ❑ Alpha adrenergic blocking agents: phentolamine treat toxicity caused by excessive epinephrine- induced alpha activation
- ❑ Beta adrenergic blocking agents: propranolol can reduce adverse effects caused by epinephrine

Isoproterenol:

- ❑ beta1 and beta2
- ❑ catecholamine
- ❑ beta selective

Therapeutic uses:

- ❑ help overcome AV heart block
- ❑ restart the heart following cardiac arrest
- ❑ increase cardiac output during shock
- ❑ treatment of bronchospasm during anesthesia

Isoproterenol:

Adverse effects:

- ❑ fewer than NE and epinephrine
- ❑ dysrhythmias and angina pectoris
- ❑ hyperglycemia in diabetic patients
- ❑ Drug Interactions (identical to epinephrine)

Dopamine:

- ❑ dopamine, beta1, and at high doses alpha1
- ❑ low doses → dopamine receptors only
- ❑ moderate doses → dopamine and beta1 receptors
- ❑ high doses → dopamine, beta1, and alpha1 receptors
- ❑ catecholamine

Dopamine:

Therapeutic uses:

□ shock:

- beta 1 in heart → increase cardiac output → improve tissue perfusion
- dopamine receptors in kidney → dilate renal blood vessels → improve renal perfusion (monitor output of urine to evaluate success)

□ heart failure: increase cardiac output

Dopamine:

Adverse effects:

- ❑ tachycardia, dysrhythmias, and anginal pain
- ❑ high concentrations → activate alpha1 → extravasation → necrosis

Drug interactions:

- ❑ MAO inhibitors: the dosage of dopamine must be reduced by at least 90%

Administration:

- ❑ Continuous IV infusion: bec of rapid inactivation by MAO and COMT. Monitor CV status and extravasations. If extravasations occur stop infusion and infiltrate area with phentolamine

Phenylephrine:

- alpha1
- noncatecholamine
- locally to reduce nasal congestion
- parenterally to elevate BP
- eye drops to dilate the pupil
- co-administered with local anesthetics to retard absorption of anesthetic

Terbutaline:

- ❑ beta2
- ❑ Noncatecholamine

Therapeutic uses:

- ❑ Asthma: patients should not exceed the recommended dose → undesired cardiac stimulation
- ❑ Delay of preterm labor: beta2 receptors in the uterus

Adverse effects:

- ❑ tremor
- ❑ tachycardia in excessive dosage

Ephedrine:

- ❑ alpha1, alpha2, beta1, beta2
- ❑ noncatecholamine
- ❑ mixed-acting drug

Therapeutic uses:

- ❑ Nasal congestion: alpha1 mediated vasoconstriction. Topically is preferred over orally.
- ❑ Narcolepsy: sudden and irresistible attacks of sleep. Benefits from activation of adrenergic receptors in the brain

Adverse effects:

- ❑ Same as epinephrine
- ❑ In addition to insomnia