DH 250
Lecture 2

Lecture Outline - Autonomic Drugs Chapter 4

Autonomic Nervous System

Anatomy

PANS

SANS

PANS

1. Cholinergic Agents (parasympathomimetic, "P +") **pilocarpine**

Direct –

Indirect –

Effects: ("SLUD")

CV -
GI -
Eye -
Lung-

ADR's

Toxic - overdose, extension of pharmacologic effects
too much direct-acting cholinergic drug: treat with antagonist (**atropine**)
too much cholinesterase inhibitor: treat with *pralidoxime* and atropine

Contraindications

Hyp**ER**thyroidism
Bronchial asthma
Peptic ulcer
GI / urinary obstruction
Severe CV disease

Uses

Direct-acting cholinergics (receptor agonists)

Tx **xerostomia**: pilocarpine (Salagen)
Tx glaucoma: pilocarpine (IsoptoCarpine)

Indirect-acting cholinergics (cholinesterase inhibitors → build-up of ACh)

Tx glaucoma: physostigmine**,** neostigmine
Tx myasthenia gravis: physostigmine, neostigmine
insecticides: Malathion
chemical warfare: Sarin, Tabun

2. Anticholinergic Agents (parasympatholytic, antimuscarinic, "P-") **atropine ipratropium**

Competitive antagonists of ACh at postganglionic PANS.
Muscarinic receptor is competitively (reversibly) blocked
Block action of ACh at smooth muscle, glandular tissue, heart

Effects

CNS -
Exocrine glands -
Smooth muscle
blood vessels -
bronchioles -
Eye - my**d**riasis (**d**ilation)
CVS -

ADR's

Xerostomia
Blurred vision

GI & urinary stasis
CNS stimulation (with high dose atropine)

Contraindications
Glaucoma (narrow angle)
BPH
GI & Urinary retention
CV disease

Uses
Pre-op meds
Tx GI disorders (see contraindications)
Ophthalmic exam (see contraindications)
Tx motion sickness
asthma / COPD
Tx excessive salivation

SANS

SANS receptors

α_1 - smooth muscle contraction
vasoconstriction in blood vessels of **skin**, GI, kidney, brain, skeletal muscle

β_1 - ↑ heart
↑ inotropic (↑ force of contraction)
↑ chronotropic (↑ rate of contractions)
↑glycogenolysis (glycogen formation)

β_2 - smooth muscle relaxation
bronchodilation in bronchi
vasodilation in blood vessels of skeletal muscle

SANS neurotransmitters = norepinephrine, epinephrine

Direct-action: stimulate receptor directly
epinephrine (major neurotransmitter of SANS)
norepinephrine (major neurotransmitter of SANS)
isoproterenol (Isuprel)

Indirect-action: release endogenous norepinephrine
amphetamine salts (Adderal)
methylphenidate , (Ritalin, Concerta)
Vyvanase

Mixed- action: (stimulate receptor AND release norepinephrine)
ephedrine

Termination of action
1. reuptake into presynaptic nerve terminal
2. MAO (mono amine oxidase)
3. COMT (catechol ortho-methyl transferase)

3. Adrenergic Agents (sympathomimetic, "S+") **epinephrine**

Effects - depends upon proportion of α and β activity of each agent

CVS

epinephrine - (α & β),

heart:

blood vessels: α = constrict, β = dilate, net result = ↑BP "spread"

norepinephrine - (α) vasoconstriction → ↑BP, then vagal reflex → bradycardia

isoproterenol - (β) vasodilation → ↓ BP, then vagal reflex → tachycardia

Eye - ↓ intraoccular pressure, **d**ilation (my**d**riasis)

Respiratory - relax smooth muscle, bronchodilation

Metabolism - hyperglycemia (glycogenolysis)

Saliva - **xerostomia**

ADR's

CVS - arrhythmias, ↑ BP (**use** with caution w/ angina, ↑bp, arrhythmias, hyperthyroid)

Uses

Vasoconstriction - (α effect) **epinephrine** (Adrenalin), norepinephrine, **levonordefrin**

Bronchodilation - (β_2 effect) **albuterol**, Proventil, Ventolin

CNS stimulation – Tx ADHD amphetamine (Adderal), methylphenidate (Ritalin)

Cardiac emergency (asystole) - epinephrine

Allergy emergency (systemic anaphylaxis) – epinephrine

4. Adrenergic Blocking Agents (sympatholytic, "S-") **propanolol** **metoprolol**

Effects

Can block (competitively inhibit):

all andrenergic receptors (α & β)

just α receptors, α_1 only, α_2 only,

just β receptors, β_1 only, β_2 only,

ADR's,

Uses:

We will study Adrenergic Blocking Agents extensively in chapter 15 (cardiovascular drugs)

5. Neuromuscular Blocking Agents (function at nicotinic receptor at neuromuscular junction - not a part of autonomic nervous system, but same neurotransmitter [acetylcholine])

Nondepolarizing (competitive antagonist) drugs

combine w/ nicotinic receptor, block action of ACh

example: **curare**

Depolarizing (agonist, *not* an antagonist or "blocker agent")

constant stimulation causes muscle fatigue/paralysis

example: **succinylcholine**