Rec Introduction to Autonomic Drugs NO Date . .

Nervous System

Central

Peripheral

Motor

Sensory

Autonomic

Somatic

Sympathetic (SNS)

Parasympathetic (PNS)

α1 α2 β1 β2

Nicotinic Muscarinic

- preganglionic neuron is short
- postganglionic neuron is long

Acetylcholine

Norepinephrin

- preganglionic neuron is Long
- postganglionic neuron is short

Ach

Ach/NO

Fight / flight Response

Rest + Digest Response

NO Date

- Types of the autonomic nerve fibers according Chemical mediator:

① Cholinergic nerve fiber (Ach)

② Adrenergic nerve fiber (NE)

- Parasympathetic (PS)

1- Synthesis, Storage, Relase + Metabolism of Acetylcholine

(1) Synthesis

Coline + Acetyl Co.enzyme Active acetate

Choline Transferase Enzyme → Acetylcholine

(2) Storage

inside vesicles

(3) Relase

Influx of Ca^{2+} ions ⇝ Exocytosis of Ach from vesicles

(4) Metabolism be 2 Enzymes

1- Acetyl Cholinestrase (True) in neurons + NMJ - Hydrolysis of Ach

2- Butyryl Cholinestrase (Pseudo) in plasma + Liver

- Inhibition of this Metabolism can be done by (Anticholinestrase) as (Neostigmine)

(PS) Parasympathetic Nervous system :- miosis + bronchospasm + ↑ Bronchial secretion + ↓ Heart rate + VD + ↑ GIT secretion + Salivation + Lacremial gland + Bladder Contracts + erection

NO Date . .

2_ Types of Cholinergic Receptors :-

(1) Muscarinic Receptors

M1 : Autonomic ganglia

M2 : in heart

M3 : in smooth muscles + secretory glands

M4 + M5 in CNS

(2) Nicotinic Receptors (N)

N_M : Nicotinic muscle . NMJ

N_N : Nicotinic neuronal . in ganglia, adrenal medulla, CNS

3_ Molecular mechanisms + Signal transduction of Cholinergic receptors:

① Nicotinic Receptor : Ligand gated Ion channel Receptors

↑ permeability of Na^+

② Muscarinic Receptor: G protein _ coupled receptor

M1 ; Gq

stimulate phospholipase c → ↑ 2° messenger

DAG IP_3 Ca^{2+}

M2 ; Gi → opening of K^+ channels

Gi inhibit Adeny Cyclase → ↓ cAMP

M3; Gq

NO Date

Sympathetic:

1_ Synthesis, storage, relase + Termination of the action of catecholamine

Tyrosine —tyrosine hydroxylase→ Dihydroxyphinylalanine DOPA

DOPA —DOPA decarboxylase→ Dopamine

* ∝ - methqadopa —DOPA decarboxylase→ ∝ -methyldopamine

* Dopamine is transported into vesicle by carrier inside it will be hydroxylated → NE

_ in adrenal medulla + Brain: (NE) —N methytransferase→ EP

_ (NE) is stored in granules at nerve ending

_ ↑Ca^{2+} intracellular → vesicles exocytosis

—expulsion→ cotransmitter (ATP + polypeptides) + dopamine hydroxylase + (NE) → Ionic conductance

_ Termination:

① Active Reuptake

- Uptake 1 into sympathetic nerve terminal
- Uptake 2 into post junctional cell

metabolism by COMT Catechol_O_methyHransferase

② Enzymetic Metabolism: done by MAO+COMT

[ ] high in liver + Kidney

[ ] little or no in adrenergic neurons

NO Date . .

Adrenergic receptors

- ∝1+∝2
- β(1+2+3) Gprotein coupled receptor
- Dopamine (D1,2,3,4,5)

∝1 similar to M1 — activate

∝2 similar to M2 — G_s

↓

Adenyl Cyclase

↑ cAMP

∝1 stimulation
V.C + Mydriasis
+ Contract of S..
+ HyperKalemia
+ ejaculation

∝2 stimulation
inhibit EP, NE
+ ACh + sympathetic
flow + Insulin release

β1 stimulation
stimulator.
properties of
Heart + ~~Kidney~~ (renin)

β2 stimulation
VD + bronchodilat
HypoKalemia
Hyperglycemia

β3 stimulation Lipolysis

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