PROCEDUR MANUAL LABORATORY

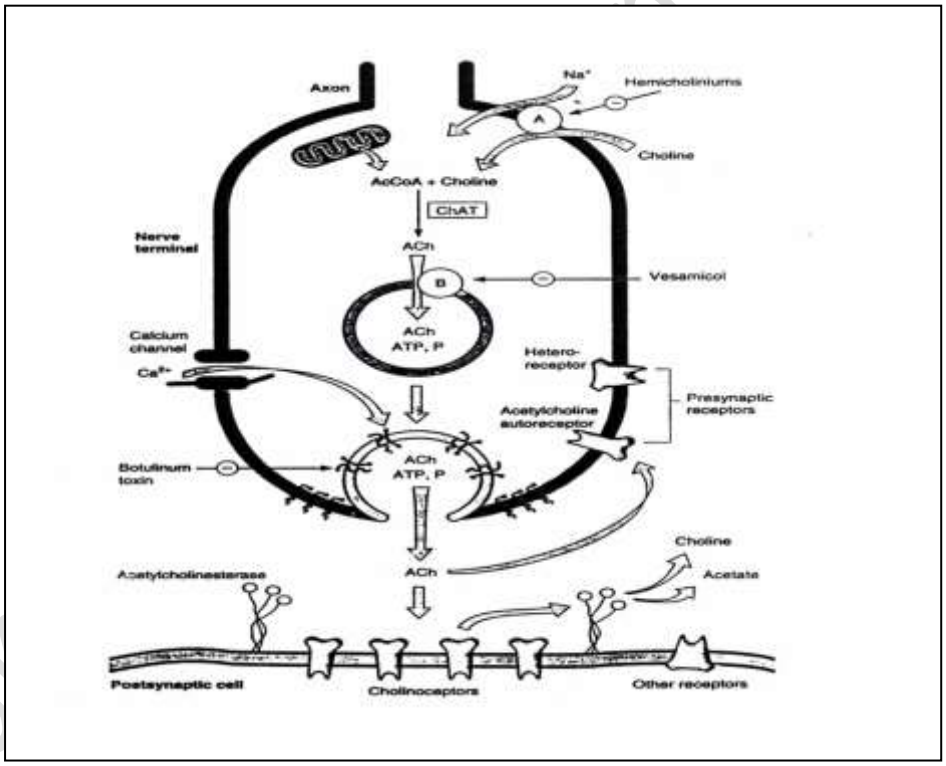
NEUROBEHAVIOUR SYSTEM

SECTION: PHARMACOLOGY

NEUROBEHAVIOUR SYSTEM

LAB. ACTIVITY OF PHARMACOLOGY & THERAPY

PHARMACOLOGICAL PROPERTIES OF AUTONOMIC DRUGS



LABORATORY ACTIVITY PHARMACOLOGY

FOR STUDENT

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Resource Person : Yuke Andriane,dr.,M.Kes
Subject : Pharmacological Properties of Autonomic Drugs
Department : Pharmacology

A	Sequent			
	I	Introduction	:	40 menit
	II	Pretest	:	5 menit
	III	Laboratory activity	:	125 menit
	IV	Post test	:	-
B	Topic : Pharmacological Properties of Autonomic Drugs			
	Date: October 2019			
	1. Discussion about pharmacological properties of autonomic drugs 2. Poster 3. Case Discussion		: : :	30 menit 50 menit 45 menit
C	Venue			
	Biomedical Laboratory, Faculty of Medicine, Unisba, Jl. Tamansari No.22 Bandung 40116			
D	Equipment			
	1	Discussion about pharmacological properties of autonomic drugs	1. Task 2. Text book 3. Modul 4. MIMS	
	2	Poster	1. Posters	
	3	Case Discussion	1. Cases 2. Text book 3. MIMS	
E	Pre-requisite/ Pretest and Task			
	Before laboratory activity students should have initial knowledge about: **Task To be collected to your tutor at the day of Lab. Activity** 1. Explain the adrenergic and cholinergic transmission! 2. Explain the cellular effects and the distribution of each adrenoceptors! 3. Explain the pharmacological properties of adrenergic agonist and adrenergic antagonist! 4. Explain the cellular effects and the distribution of each cholinoceptor! 5. Explain the pharmacological properties of cholinergic drug!			
	Note: If the pre-test score less than 50, the student will get additional assignments.			
F	Implementation			
	1. Students are divided into 17 groups 2. Each group is supervised by one tutor			
Activity 1 : Discussion about pharmacological properties of autonomic drugs				

The motor (efferent) portion of the nervous system can be divided into two major subdivisions: **autonomic** and **somatic**. **The autonomic nervous system (ANS)** is largely autonomous (independent) in that its activities are not under direct conscious control. It is concerned primarily with visceral functions such as cardiac output, blood flow to various organs, and digestion, which are necessary for life. The somatic division is largely concerned with consciously controlled functions such as movement, respiration, and posture. Both systems have important afferent (sensory) inputs that provide information regarding the internal and external environments and modify motor output through reflex arcs of varying size and complexity.

The nervous system has several properties in common with the endocrine system, which is the other major system for control of body function. These include high-level integration in the brain, the ability to influence processes in distant regions of the body, and extensive use of negative feedback. Both systems use chemicals for the transmission of information. In the nervous system, chemical transmission occurs between nerve cells and their effector cells. Chemical transmission takes place through the release of small amounts of transmitter substances from the nerve terminals into the synaptic cleft. The transmitter crosses the cleft by diffusion and activates or inhibits the postsynaptic cell by binding to a specialized receptor molecule.

By using drugs that **mimic** or **block** the actions of chemical transmitters, we can selectively modify many autonomic functions. These functions involve a variety of effector tissues, including cardiac muscle, smooth muscle, vascular endothelium, exocrine glands, and presynaptic nerve terminals. Autonomic drugs are useful in many clinical conditions. However, a very large number of drugs used for other purposes have unwanted effects on autonomic function.

TABLE-ADRENERGIC AGONIST

	EPINEFRIN (A)	**NE (B)**	**PHENYL EFRIN (C)**	**DOPAMINE (D)**	**TERBUTALIN/ ALBUTEROL (E)**
Affinity/ Selectivity	$\alpha_{1,2}$-$\beta_{1,2}$ β dominant	α,β_1>> β_2 α dominant	α_1>α_2>>>>β	D_1=D_2>> β>> α	β_2>β_1 >>>> α
BP: **Systolic** **Diastolic**	↑ (β_1) ↓ slightly	↑ (β_1) ↑	- ↑(?)	↑ (β_1) ?	- ↓
Heart	▪ Ino (+) ▪ Chrono (+)	Ino (+) Chrono (+)	-	Ino (+) Chrono (+)	Palpitation +/-
Bronchus	▪ Dilatation	Dilatation	-	-	Dilatation
Urinary tract	▪ Sphincter int constriction	Sphincter int constriction	Sphincter int constriction	-	-
Mtbl :CH/lipid	▪ Blood gluc ↑	-	-	-	Blood gluc ↑
Pupil	▪ Mydriasis ▪ IOP ↓ (β)	-	mydriasis	-	-
Adverse reaction	▪ CNS disturbances: anxiety, fear, tension,	= epinefrin	Hypertension	Sympathetic stimulation	Palpitation

	headache, tremor ▪ Cerebral hemorrhages ▪ Arrhytmias ▪ Pulmonary edema				
Indication	▪ Bronchospasm ▪ Anaphylactic shock ▪ Glaucoma ▪ Local anesthetic :↑DOA	Shock	Decongestant Tachycardia (?)	Cardiac stimulant	Bronchospasm Uterine contraction
Contraindication	▪ Hypertension ▪ Tachycardia ▪ Etc.	Hypertension	Hypertension	-	Hypotension

Note: - : not directly affected

TABLE-ADRENERGIC ANTAGONIST

	FENTOL-AMIN (F)	**PRAZOSIN/ TERAZOZIN (G)**	**PROPRA-NOLOL (H)**	**ATE-NOLOL (I)**	**PIN-DOLOL (J)**	**LABETALOL/ CARVEDILOL (K)**
Affinity/ Selectivity	$\alpha_1 = \alpha_2$	$\alpha_1 >>>> \alpha_2$	β	β_1 (Cardio-selectif)	β ISA (+)	$\beta + \alpha_1$
BP:						
Systolic	-	↓	↓	↓	↓	↓
Diastolic	-	↓	↓	-	↓ slightly	↓
Heart	-	-	↓	↓	↓ slightly	↓
Bronchus	-	-	constriction	-	Slightly constriction	-
Uterus	-	-	-	-	-	-
Urinary tract	Sphincter int dilatation	Sphincter int dilatation (?)	-	-	-	Sphincter int dilatation
Mtbl : CH/lipid	-	-	Hypo glycemia			hypoglycemia
Pupil	constriction	constriction	-	-	-	?
Adverse reaction (AR)	▪ Tachycardia ▪ Postural	▪ Nasal – congestion ▪ Fluid-retention	Bronchoconstriction Increased Na+ retention Hypoglycemia	<	<	Orthostatic hypotension Dizziness

	Hypotension ▪ GI – stimulation	▪ GI – Hypermotility ▪ Postural Hypotension	Hypotension Bradycardia Fatigue Drowsiness Sexual impairment			
Indication	Frostbite	Hypertension	Hypertension Glaucoma: ↓↓ IOP Migraine Hyper thyroidsm Angina pectoris Myocardial infarction	Hypertension	Hypertension	Hypertension
Contraindication	= AR	=AR	=AR	?	?	AR

Note: - : not directly affected

TABLE – CHOLINERGIC AGONIST

Affinity/ Selectivity	**Bethanechol (L)**	**Physostigmine (M)** Ach esterase inhibitor	**Neostigmine (N)** Ach esterase inhibitor	**Endrophonium (O)** Ach esterase inhibitor
Muscarinic Nicotinic	+	+ + :ANS & NMJ		
NM junction	-	Tonus ↑ Depolarization ↑	Tonus ↑ Depolarization ↑	Tonus ↑ Depolarization ↑
BP	Neg (th/dose)	Neg (th/dose)	(th/dose)↓	(th/dose) ↓
Heart	≠ : Chrono + ino (-)	Chrono (-) Inotropic (-)	Chrono (-) Inotropic (-)	Chrono (-) Inotropic (-)
Bronchus	Constriction	Constriction	Constriction	Constriction
Urinary tract	Ureter cont	Ureter cont	Ureter cont	Ureter cont (?)
GIT **- Motility** **- Secretion**	↑ Stimulation	↑ Stimulation	↑ Stimulation	↑ Stimulation
MTBL	-	-	-	-
Pupil	Miosis	miosis	miosis	miosis

Adverse reaction	Nausea-vomit Diarrhea Abdominal pain Sweating Salivation Broncho-constriction ↓ BP	Contraction skeletal muscle M) Cholinergic intoxication Muscle weakness, cramps, fasciculation (N) HR ↓	Contraction skeletal muscle (M) Cholinergic intoxication Muscle weakness, cramps, fasciculation (N) BP ↓	Contraction skeletal muscle (M) Cholinergic intoxication Muscle weakness, cramps, fasciculation (N)
Indication	Atonic bladder	Glaucoma UT-GI atony Overdoses of atropine, TCA, phenotiazin (enter CNS)	Myasthenia gravis Glaucoma GI & UT atony Antidote for neuromusc blocker	Myasthenia gravis
Contra indication	Peptic ulcer Asthma Cardiac dis. Parkinsonian Hyperthyroid (predispose to arrhytmia) Obstruction of GI & UT	**Convulsion (high dose)** Peptic ulcer Asthma Cardiac dis. Parkinsonian Hyperthyroid (predispose to arrhytmia) Obrstuction of GI & UT	Peptic ulcer Asthma Cardiac dis. Parkinsonian Hyperthyroid (predispose to arrhytmia) Obstruction of GI & UT	Peptic ulcer Asthma Cardiac dis. Parkinsonian Hyperthyroid (predispose to arrhytmia) Obstruction of GI & UT

Note: - : not directly affected

TABLE – CHOLINERGIC ANTAGONIST & NEUROMUSCULAR BLOCKERS

	Atropine/scopolamine (P)	**Tubocurarine / Succinylcholine (Q)**
Affinity/ Selectivity	**Antimuscarinic (central-peripheral)**	**NM blockers**
NM junction	-	+ : skeletal musc. :↓ constraction → paralysis
BP	-	-
Heart	Dose <: ↓ HR (vagal activation) Dose >: ↑ HR (M)	- tachycardia?? - Contractility↓
Salivary gland	↓	-
Urinary tract	Reduced motility	-

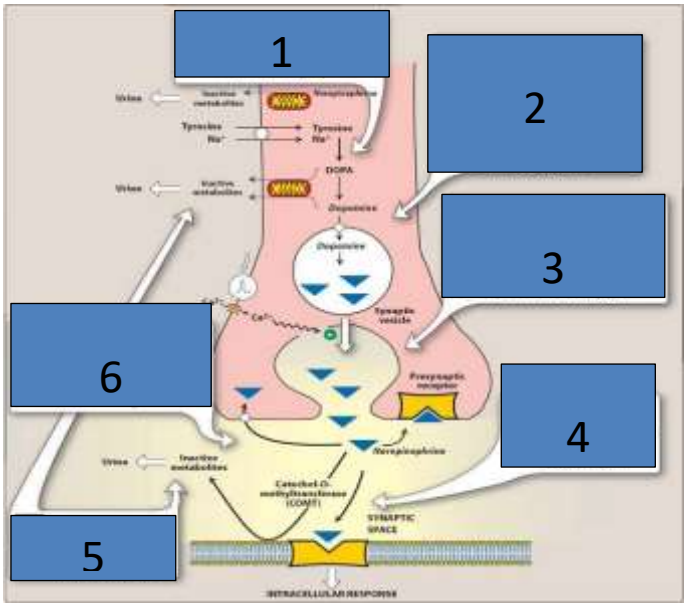
GIT - Motility - Secretion	Reduced - (exc. Pirenzepine: M_1 antagonist)	-
MTBL	-	-
Pupil	Mydriasis	Unpredictable: loss of vision, moderate dilation
Adverse reaction	Dry mouth Blurred vision /mydriasis Tachycardia Constipation, urinary retention CNS: confuse, delirium, hallucination Glaucoma	Malignant hyperthermia (succinylcholine) Muscular rigidity
Indication	Cyclopegic Antispasmodic (GI/UT) Overdose of organophosphate Mushrooms poisoning Antisecretory prior to surgery Scopolamine: motion sickness Parkinson dis.	Muscle relaxant in general anesthesia Facilitate intubation
Contra indication	Glaucoma Others related to AR	Related to its AR

Note: **Ganglionic blockers:** Trimethaphan, Mecamylamine → ↓ BP instantly

- : not directly affected

Activity 2: Poster

POSTER 1



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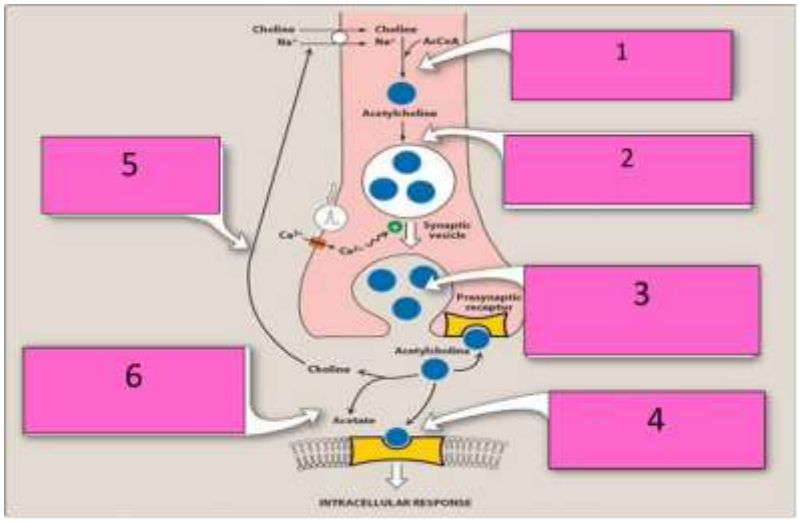

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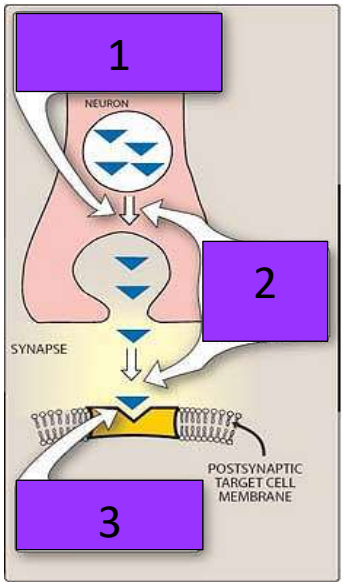

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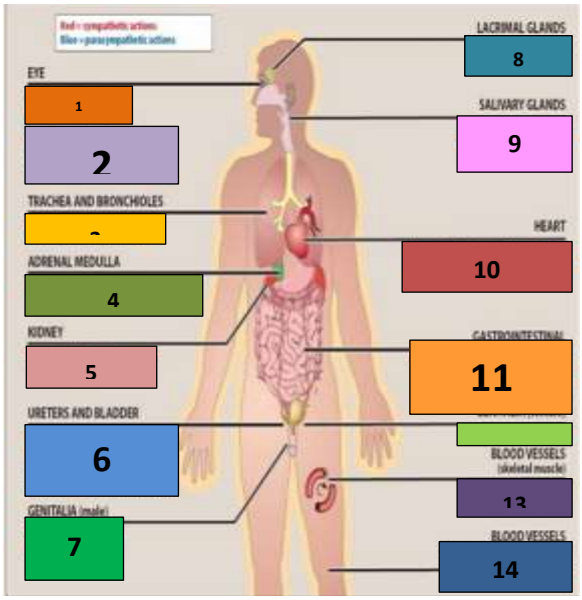

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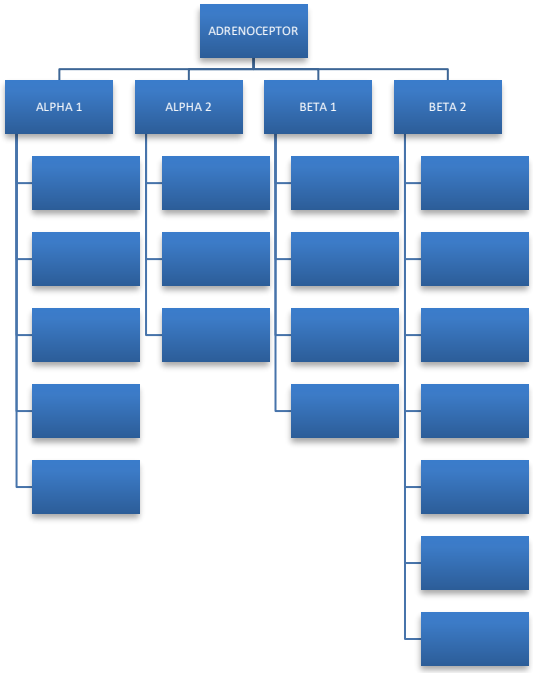

POSTER 6

Activity 3: Case Discussion	
	CASES
G	Refferences • Roger J. porter & Brian S. meldrum in Katzung BG. Basic and Clinical Pharmacology. 11th Edition. Lange Medical Books/McGraw-Hill. 2009. Chapter 6