King Saud University

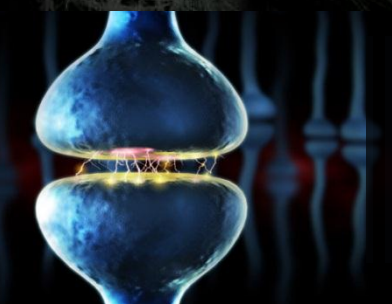
College of Medicine

2nd Year, 1st Block

PHARMACOLOGY 433

MED 433 Teams

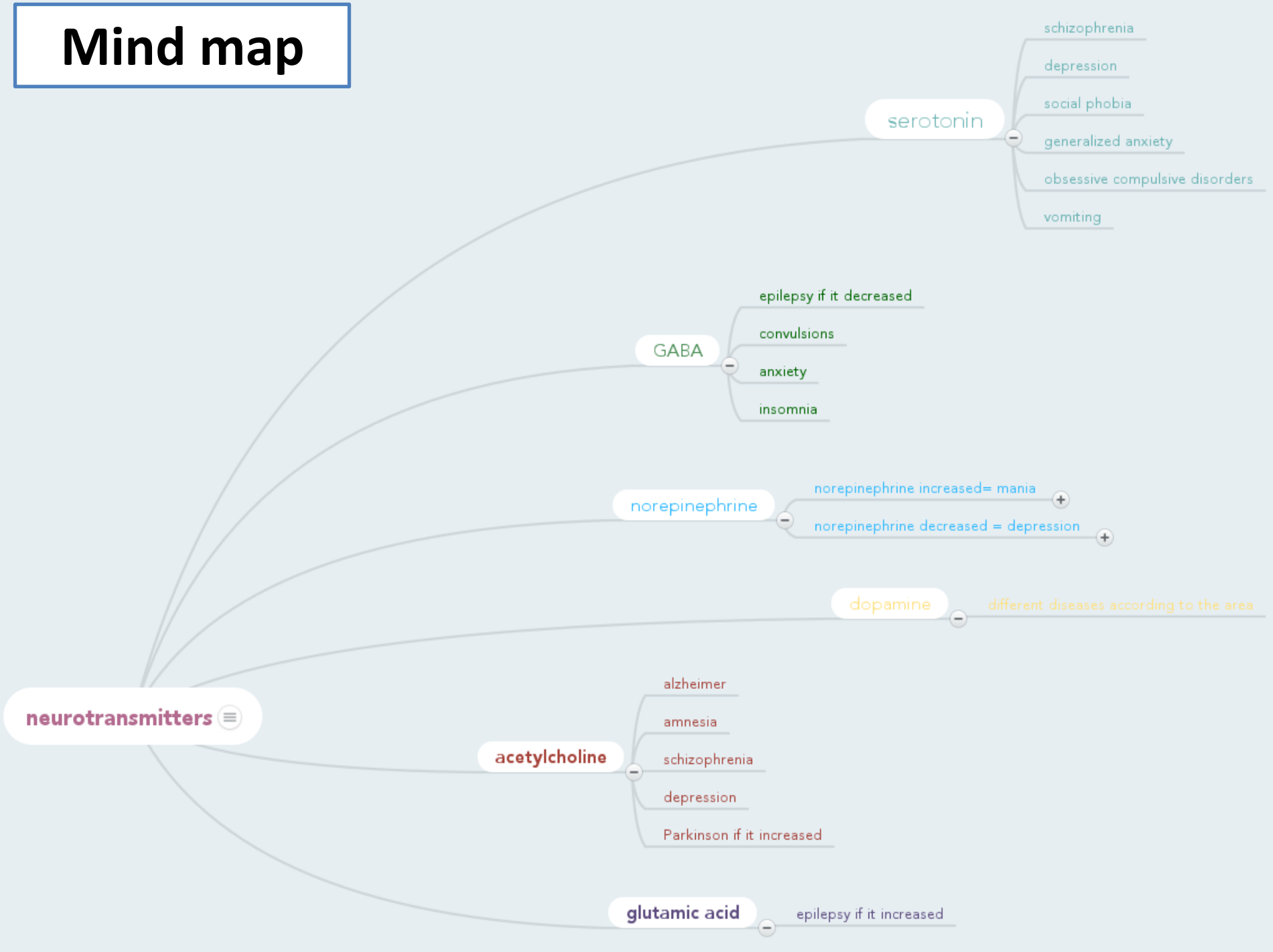
L3:Pharmacology of neurotransmitter

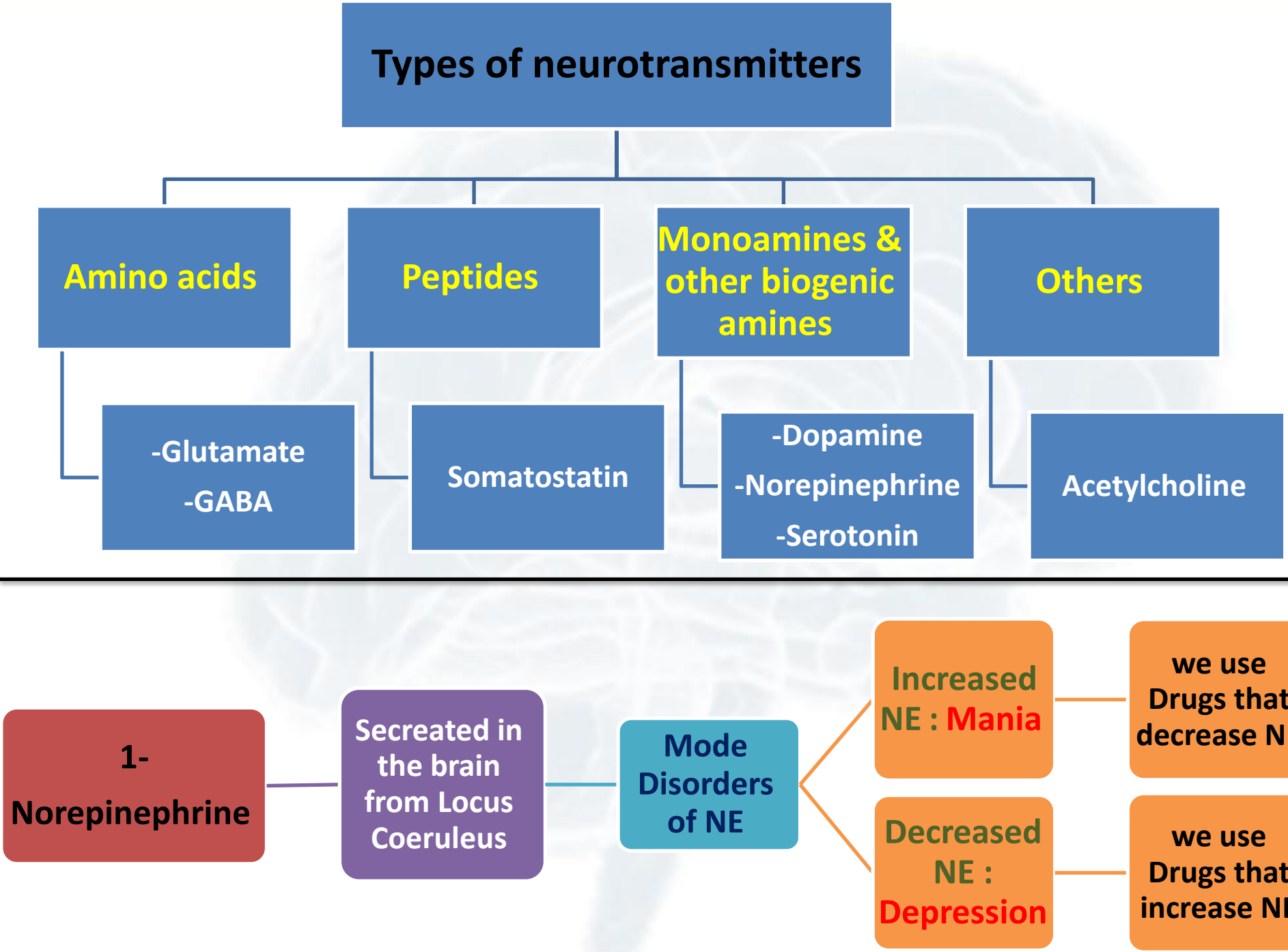


CNS Block

Objectives : to understand the role of any neurotransmitter in the etiology and treatment of CNS diseases.

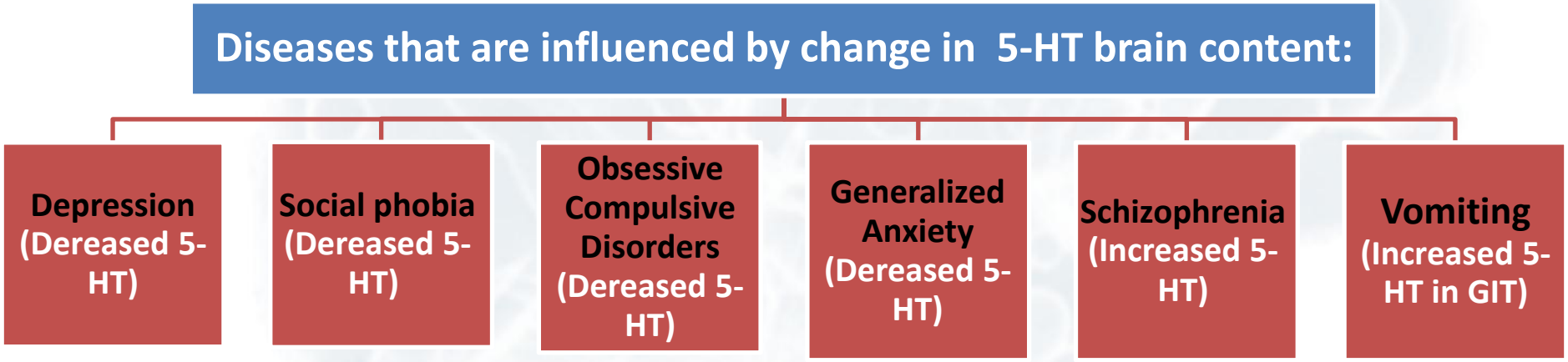
Mind map


neurotransmitters
serotonin
schizophrenia
depression
social phobia
generalized anxiety
obsessive compulsive disorders
vomiting
GABA
epilepsy if it decreased
convulsions
anxiety
insomnia
norepinephrine
norepinephrine increased= mania
norepinephrine decreased = depression
dopamine
different diseases according to the area
acetylcholine
alzheimer
amnesia
schizophrenia
depression
Parkinson if it increased
glutamic acid
epilepsy if it increased


Types of neurotransmitters
Amino acids
Peptides
Monoamines & other biogenic amines
Others
-Glutamate
-GABA
Somatostatin
-Dopamine
-Norepinephrine
-Serotonin
Acetylcholine
1- Norepinephrine
Secreated in the brain from Locus Coeruleus
Mode Disorders of NE
Increased NE : Mania
we use Drugs that decrease NE
Decreased NE : Depression
we use Drugs that increase NE

2- Serotonin (5-HT) :

- Secreated in the brain from Raphe Nuclei.
- Primarily found in the GIT, platelets, C.N.S.
- It is responsible for feeling of well-being & happiness.
- It plays an important role in regulation of : Mood, sleep, appetite & Pain.



3- Dopamine

"Blockade of postsynaptic"
Block of Dopamine receptors

Act in Chemoreceptor Trigger Zone

treatment of vomiting *1
(Antiemetic effect)

Act in Mesolimbic System

Used to treatment of Schizophrenia*2
(Psychiatric effect)

Act in Tuberoinfundibular Pathway (hypothalamus – Anteriro pitutart)

↑Release of prolactin
→Lead to Hyperprolactinemia
(harmful, Endocrinal effect)

Act in Nigrostriatal system (Basal Ganglia)

Predispose to parkinsonism
(harmful, neurologic effect)

*1 Dopamine cause vomiting at high level ,so block of dopamine receptor at chemoreceptor trigger zone lead to stop of vomiting.

*2 High level of dopamine is one of the resones that cause Schizophrenia , So Block of receptor at mesolimbic will decrease dopamine then treatment of Schizophrenia

4- Acetylcholine

Role of Acetylcholine in the CNS

ACH is thought to be involved in cognitive functions such as :

memory, arousal & attention.

CNS diseases linked to ACH derangement	
Alzheimer's disease	**Damage to cholinergic receptors (muscarinic) is associated with memory deficits.**
Amnesia فقدان الذاكرة الجزيء	**Muscarinic antagonists ex. hyoscine cause amnesia.**
Shizophrenia	**due to imbalance between Ach & dopamine brain levels (↓Ach ↑Dopamine).**
Depression	**may be a manifestation of a central cholinergic predominance (↑Ach).**
Parkinson's disease	**predispose by Increase brain level of ACH.**

5- Glutamic acid

Is an excitatory neurotransmitter

Increase in its level predispose to epilepsy

SO ,
Potential therapeutic effect of glutamate antagonists:

-Reduction of brain damage following strokes & head injury.

-Treatment of epilepsy.

-Drug dependence.

-Schizophrenia.

6- GABA

Is the main inhibitory transmitter in the brain.

Present throughout the brain; there is very little in peripheral tissues

Decrease GABA brain content is associated with :

-Epilepsy.

-Anxiety.

-Convulsions.

-Insomnia.

No// Epilepsy : it cause due to high level of glutamic acid and low level of GABA ,There for the drug most be decrease of gultamic acid or increase GABA of both

SUMMARY

receptors	action by (Increased or Decreased)
Norepinephrine	Increased NE : Mania Decreased NE : Depression
Serotonin (5-HT)	Depression, phobia Social, Generalized Anxiety& Obsessive Compulsive Disorders. All happen by Dereased 5-HT Vomiting & Schizophrenia Increased 5-HT
Dopamine	Block of Dopamine receptors : treatment of Schizophrenia & vomiting Lead to Hyperprolactinemia & parkinsonism
Acetylcholine	Alzheimer's disease, Amnesia, Shizophrenia, Depression & Parkinson's disease.
Glutamic acid	glutamate antagonists: Reduction of brain damage following strokes & head injury, Treatment of epilepsy, Drug dependence & Schizophrenia. Increase in its level predispose to epilepsy.
GABA	Decrease GABA: Epilepsy, Anxiety, Convulsions & Insomnia.

SUMMARY

disease	happened by
Depression	↓NE ↓5-HT ↑Ach
epilepsy	↑glutamate acid ↓GABA
vomiting	↑5-HT in GIT ↑Dopamine
Anxiety	↓5-HT ↓GABA
Schizophrenia	↑5-HT ↓Ach ↑Dopamine ↓Glutamic acid
Parkinson's disease	↑ ACH ↓Dopamine
Alzheimer's disease	↓ ACH

Quiz yourself

Q1- Increase in NE cause :
A- Depression
B- Obsessive Compulsive Disorders
C- Mania
D- Vomiting

Q2- Depression is caused by decrease of :
A- NE
B- Acetylcholine
C- Serotonin
D- A&C

Q3- Increase Serotonin in GIT Cause :
A- Depression
B- Vomiting
C- Mania
D- Anxiety

Q4- Decrease Serotonin in brain cause :
A- Generalized Anxiety
B- Social phobia
C- Schizophrenia
D- A&B

Q5- We can treat Obsessive Compulsive Disorders by increase :
A- Dopamine
B- NE
C- Serotonin
D- Glutamate

Q6-Which one of the following is caused by decrease of Dopamine
A- Depression
B- Epilepsy
C- parkinsonism
D- Insomnia

Q7- Increase of which one of these neurotransmitter cause epilepsy
A-GABA
B-Acetylcholin
C- Serotonin
D-Glutamate acid

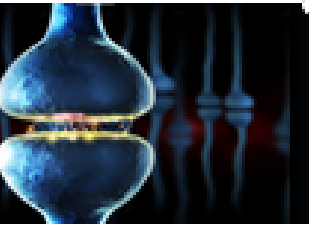
Q8- Amnesia is caused due to which one of the following
A-increase of Glutamic acid
B- muscarinic antagonists
C-decrease of GABA
D- Dopamine receptors

Q9-Which one of the following caused of Insomnia
A-Decrease GABA
B-Decrease Glutamic acid
C-Increase Ach
D-Serotonin

Q10-Imbalance of Ach and dopamine cause
A- Shizophrenia
B- Anxiety
C- Epilepsy
D- Hyperprolactinemia

Answers:

1:C . 2:D . 3:B . 4:D . 5:C . 6-C . 7-D . 8-B . 9-A . 10-A



CNS Block

PHARMACOLOGY 433

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Contact us for any questions or comments :

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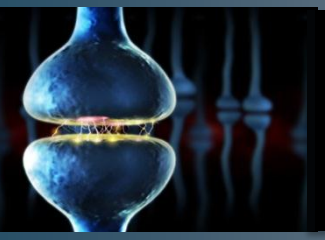
We hope that we made this lecture easier for you

Good Luck !



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