

MODULE 10 : Nervous System

Biochemistry – Undergraduate Programme

Faculty of Medicine and Allied Sciences

Rajarata University of Sri Lanka

Broad Objectives

At the end of this course, the student is expected to know the,

1. structure and function of a typical neuron, synapse and myelin sheath.
2. structure, function, synthesis and disposal of neurotransmitters involved in signal transmission, and the effect of nutrients, chemicals and drugs on neuronal activity and nerve transmission.

Specific Objectives

1. Functional Unit of the CNS

- 1.1 Illustrate and explain the structure and functions of a typical a) neuron, b) synapse and c) myelin sheath.

2. Neurotransmission

- 2.1 Describe the mechanisms available to transmit a signal via the neurotransmitter a) acetyl choline and b) dopamine.
- 2.2 Recall that levels of Gln, Asp, Tyr and Phe in the brain is higher than that in the blood and explain the likely advantage of the difference.
- 2.3 Recall the steps involved in the synthesis of a) epinephrine, b) norepinephrine, c) serotonin, d) dopamine and e) acetylcholine.
- 2.4 List the known neurotransmitters and explain the biochemical mechanisms available to dispose them at the synapse.
- 2.5 State the action of monoamine oxidase in the metabolism of serotonin.
- 2.6 Recall that MAO inhibitors are used in the treatment of depression and their mode of action.
- 2.7 Illustrate the role of a) myelin sheath, b) vitamin B₆, c) vitamin B₁ and d) vitamin B₁₂ in neurotransmission.
- 2.8 Discuss the effect of a) alcohol, b) high carbohydrate diet and low protein diet c) high protein diet and low carbohydrate diet, d) deficiencies of vitamins B₁, B₆ & B₁₂ on neurotransmitter levels and neurotransmission.
- 2.9 Describe the action of a) organophosphorus compounds, b) L-dopa and c) lecithin, on the nervous system.
- 2.10 Explain the biochemical mode of action of morphine as a pain killer.
- 2.11 Explain the roles of NO and Ca²⁺ in signal transduction.
- 2.12 State the likely biochemical changes in Parkinson's disease and the mode of action of nutrients and drugs used to overcome this condition.

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