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"Detailed study of Acetylcholine (ACh) wsr to Physiology – A Literature Review."

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Abstract:

Acetylcholine (ACh) is an important neurotransmitter that plays a role in brain functions, such as memory, and body functions, such as muscle contractions to move muscles. An enzyme called choline acetyltransferase causes a reaction between choline and the acetyl group to create acetylcholine. It's made at the end of nerve cells.

Acetylcholine (ACh) is a neurotransmitter, a chemical that carries messages from brain to body through nerve cells. It's an excitatory neurotransmitter. Acetylcholine is involved in many important functions in body.

Key Words: **Acetylcholine (Ach)**.

INTRODUCTION:

Naturally occurring acetylcholine was first isolated in 1913 by English chemist Arthur James Ewins, at the urging of his colleague, physiologist Sir Henry Dale, who in 1914 described the chemical's actions. The functional significance of acetylcholine was first established about 1921 by German physiologist Otto Loewi.[1]

Acetylcholine is the chief neurotransmitter of the parasympathetic nervous system, the part of the autonomic nervous system (a branch of the peripheral nervous system) that contracts smooth muscles, dilates blood vessels, increases bodily secretions, and slows heart rate. Acetylcholine is an autocrine or paracrine hormone synthesized and secreted by airway bronchial epithelial cells.[2]

Acetylcholine, an ester of choline and acetic acid that serves as a transmitter substance of nerve impulses within the central and peripheral nervous systems. Acetylcholine is the chief neurotransmitter of the parasympathetic nervous system, the part of the autonomic nervous system (a branch of the peripheral nervous system) that

contracts smooth muscles, dilates blood vessels, increases bodily secretions, and slows heart rate. Acetylcholine can stimulate a response or block a response and thus can have excitatory or inhibitory effects.

Acetylcholine is stored in vesicles at the ends of cholinergic (acetylcholine-producing) neurons. In the peripheral nervous system, when a nerve impulse arrives at the terminal of a motor neuron, acetylcholine is released into the neuromuscular junction.[3]

AIMS AND OBJECTIVES:

1. To explain in detail of Acetylcholine (ACh) wsr to Physiology**.**

2. To highlight the importance of Acetylcholine (ACh) in body function wsr to Physiology.

MATERIALS AND METHODS:[4]

Acetylcholine (**ACh**) is an organic compound that functions in the brain and body of many types of animals (including humans) as a neurotransmitter.[1] Its name is derived from its chemical structure: it is an ester of acetic acid and choline.[2] Parts in the body that use or are affected by acetylcholine are referred to as cholinergic. Substances that increase or decrease the overall activity of the cholinergic system are called cholinergics and anticholinergics, respectively.

It is the chemical that motor neurons of the nervous system release in order to activate muscles. This property means that drugs that affect cholinergic systems can have very dangerous effects ranging from paralysis to convulsions. Acetylcholine is also a neurotransmitter in the autonomic nervous system, both as an internal transmitter for the sympathetic nervous system and as the final product released by the parasympathetic nervous system.[4]

Function:[5]

Acetylcholine functions in both the central nervous system (CNS) and the peripheral nervous system (PNS). In the CNS, cholinergic projections from the basal forebrain to the cerebral cortex and hippocampus support the cognitive functions of those target areas. In the PNS, acetylcholine activates muscles and is a major neurotransmitter in the autonomic nervous system.

DISCUSSION:[6]

Factors that decrease release of acetylcholine (and thereby affecting P-type calcium channels):

1. Antibiotics (clindamycin, polymyxin)

2. Magnesium: antagonizes P-type calcium channels
3. Hypocalcemia
4. Anticonvulsants
5. Diuretics (furosemide)
6. Eaton-Lambert syndrome: inhibits P-type calcium channels
7. Myasthenia gravis
8. Botulinum toxin: inhibits SNARE proteins

Disease & disorder:

Myasthenia gravis: The disease myasthenia gravis, characterized by muscle weakness and fatigue, occurs when the body inappropriately produces antibodies against acetylcholine nicotinic receptors, and thus inhibits proper acetylcholine signal transmission.

Acetylcholine is known to play an important role in memory and learning and to be inadequately available in Alzheimer's disease.[7]

Pharmacology:

Blocking, hindering or mimicking the action of acetylcholine has many uses in medicine. Drugs acting on the acetylcholine system are either agonists to the receptors, stimulating the system, or antagonists, inhibiting it. Acetylcholine receptor agonists and antagonists can either have an effect directly on the receptors or exert their effects indirectly, e.g., by affecting the enzyme acetylcholinesterase, which degrades the receptor ligand. Agonists increase the level of receptor activation; antagonists reduce it.

Conclusion:

1. Acetylcholine receptor agonists are used to treat myasthenia gravis and Alzheimer's disease.
2. Acetylcholine itself does not have therapeutic value as a drug for intravenous administration because of its multi-faceted action (non-selective) and rapid inactivation by cholinesterase.

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