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AN OVERVIEW: THE DISCOVERY OF WORLDS FIRST NEUROTRANSMITTER

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ABSTRACT

Acetylcholine is one of the most important and essential neurotransmitters of human nervous system. Its actions are more and more important for our vital organs for living. This chemical will maintain all the basic function of our body. So how does it discover and by whom is another important point when we study such neurotransmitter. This overview is generally based on how world's first neurotransmitter discovered. The studies and experiments by sir henry dale and otto Lowie(co-workers) will contribute to discovery of acetylcholine.

KEYWORDS: acetylcholine, neurotransmitter, nervous system, vital, experiments.

1. INTRODUCTION

Acetylcholine is a chemical that will be secreted from the pre and post synaptic neurons and function in human or animal as a neurotransmitter. A major neurotransmitter in human body essential for neuronal and muscular functions. Acetylcholine shows their effect on central nervous system as well as peripheral nervous system and maintain the body's autonomic functions.

The interesting thing with acetylcholine is its discovery. That will be done by the Sir henry dale and a German scientist otto Loewi. Otto Loewi describes acetylcholine as 'VAGUSSTOFF'.

2. THE DISCOVERY PROCESS

2.1 Phase I

Early studies by Sir Henry Dale and coworkers

Firstly in 1913 the naturally occurring acetylcholine was isolated by dale and Arthur Ewins by WPRL technique.[1] In some interview of dale, he could talk about their discovery of acetylcholine is been accidental when dale and his coworkers work upon an ergot alkaloid.[2] The action of such chemical would be as same to the muscarine and later on the muscarinic action of acetylcholine has been found. The important effects of acetylcholine would be produced by injection of nicotine and muscarine.[3]

2.2 Phase II

The frog's heart experiment by Otto Lowie.

Austrian pharmacologist Otto Lowie performed an experiment in 1921 on isolated frog's heart and that experiment will be regard as classic experiment. He performed his experiment on isolated beating heart of frog. He dissected out two hearts from frog, one is connected with the Vagus nerve and other one on its own. Both the hearts placed in saline solution/ringer solution. Then he electrically stimulates the vagus nerve and see the first heart response in which the heart rate is slows down and then he collects some of fluid from the surrounding from first heart. Then he applied that liquid to the second heart and the response was same. He concluded the chemical from vagus nerve can control the rate of heart and he called this chemical as 'VAGUSSTOFF'. But till he doesn't consider it as acetylcholine because acetylcholine was not obtained from any human body till the experiment.[4] After some of the of time period dale and his collogue Harold Dudley find the acetylcholine in mammals.[5]

2.3 Phase III

The leech muscle experiment by Fuhner

The leech muscle test is one of the recognized tests for analysis for functions of acetylcholine. The problem is raised during experiment is hydrolysis of acetylcholine by acetylcholinesterase (enzyme which is responsible for degradation of acetylcholine).[6]

The German pharmacologist fuhner used eserine in an organ bath and tested on suspended leech muscle to see the activity of acetylcholine. He noted that eserine inhibit the effect of acetylcholinesterase and increase the activity of acetylcholine. Then he tested the eserine in

In vivo an In vitro to animal and also the results are same acetylcholinesterase activity is decreased and level of acetylcholine increase and that experiment will help to identify and measures the possible acetylcholine in mammals.[7,8]

2.4 Phase IV

Dale and his co-workers' studies between 1933-1937

Later dale and his co- workers found the effect of acetylcholine on ganglionic transmission, parasympathetic postganglionic junction and at neuromuscular junction. On the basis of their work when the nervous system is stimulated then the acetylcholine is released it was not release in such condition when nervous stimulation was absent.[9-11]

2.5 Phase V

The scientist John Eccles, he jocularly called the neural transmission and electrical stimulation as 'soup verses spark' (chemical verses electrical transmission).[12]

In late 1951 the eserinised leech muscle experimentation was much recognizable for identifying and quantifying studies on acetylcholine. Until 1960s that more accurate and sophisticated methods were developed.[13]

3. CONCLUSION

All studies by Sir Dale, O. Lowie and their colleagues expands the knowledge in autonomic transmission and significance of acetylcholine. In 1936 Sir dale shared noble prize with otto Lowie in physiology and medicine for their discoveries associated with chemical transmission of nerves.

4. REFERENCES

1. A.J. Ewins, Acetyl-choline, a new active principle of ergot, Biochem. J., 1914; 8: 44–49.
2. H.H. Dale, Memorable experiences in research, Diabetes, 1954; 3: 20–22.
3. H.H. Dale, The action of certain esters and ethers of choline, and their relation to muscarine, J. Pharmacol, 1914; 6: 147–190, especially pp. 183–184.
4. Loewi, O. (1924). "Über humorale Übertragbarkeit der Herznervenwirkung". Pflügers Archiv für die Gesamte Physiologie des Menschen und der Tiere, 204: 629–640.
5. A.S.V. Burgen, Dale and Dudley's discovery of acetylcholine in mammals, Trends in Neurosciences 2 (1979) xii.

6. O. Loewi, E. Navratil, Über humorale Übertragbarkeit der Herznervenwirkung. X. Mitteilung: Über das Schicksal des Vagusstoffs, Pfluger's Arch, 1926; 214: 678–688.
7. H. Fühner, Ein Vorlesungsversuch zur Demonstration der erregbarkeitssteigerndend Wirkung des Physostigmins, Archs Exp. Path. Pharmak, 1918; 82: 81–85.
8. W.S. Feldberg, The early history of synaptic and neuromuscular transmission by acetylcholine: reminiscences of an eye witness, in: The Pursuit of Nature, The Physiological Society, London, 1979; pp. 65–83, quote on p. 71.
9. W. Feldberg, J.A. Guimarais, The liberation of acetylcholine by potassium, J. Physiol, 1936; 86: 306–314.
10. H.H. Dale, W.S. Feldberg, The chemical transmitter of the gastric vagus, J. Physiol, 1934; 80: 16–17.
11. W. Feldberg, B. Minz, H. Tsudzimura, The mechanism of the nervous discharge of adrenaline, J. Physiol, 1934; 81: 286–304.
12. J.C. Eccles, Synaptic and neuro-muscular transmission, Physiol. Rev, 1937; 17: 538–555. [29] D. Nachmansohn, Biochemistry.
13. D.J. Jenden, Chemical methods of acetylcholine and choline analysis, in: P.G. Waser (Ed.), Cholinergic Mechanisms, Raven Press, New York, 1975; 87–98.