ON THE RELATIONSHIP BETWEEN THE EXCITATION OF NON-ADRENERGIC INHIBITORY NERVE AND THE RELEASE OF ADENINE NUCLEOTIDES

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An attempt was made to clarify whether ATP or a related adenine nucleotide is the transmitter substance of the non-adrenergic inhibitory nerve. Isolated preparations of guinea-pig stomach-vagus nerves were perfused with a nutrient media via the coeliac artery. A quantitative measurement of adenine nucleotides (ATP, ADP and AMP) in the perfusate following vagal stimulation was made using the firefly luminescence method.

1) Vagal stimulation invariably caused a significant ($P<0.05$) increase in the adenine nucleotides release associated with gastic contraction, and some correlation between the release and the frequency of the stimulation could be found. After the addition of atropine (5×10^{-7} g/ml) to the media, only a small increase in the nucleotides was found with gastic relaxation, and there was no relationship between the release and the frequency of the stimulation.

2) Under perfusion with a solution containing hemicholinium-3 (2×10^{-5} g/ml) and hexamethonium (1×10^{-6} g/ml), vagal stimulation elicited neither contractions nor an increase of ATP, while ACh (10^{-5} g/ml) infusion caused both effects.

3) When the stomach was perfused with a hypertonic solution, the contractile response to ACh and vagal stimulation was abolished or greatly reduced. At this time, any increase in the adenine nucleotides could not be detected.

4) From these results, the most part of the increase in the adenine nucleotides can not be attributed to a nervous origin, and therefore, the hypothesis that ATP or a related compound is the transmitter substance of the non-adrenergic inhibitory nerves can not be supported.