

Nicotinic activity of choline

In recent years a number of reports from this laboratory noted that cholinergic effects in plant extracts were due to choline (Das & Sanyal, 1964; Gambhir, Sanyal & others, 1966; Sanyal, Dasgupta & others, 1966; Bhattacharya, Lal & others, 1969). The presence of choline was characterized by physico-chemical studies like paper chromatography, determination of melting point and mixed melting point. We found that the presence of choline in a plant extract could be predicted with certainty if a comparison of the muscarinic and nicotinic effects of the extract, or the base isolated from it, was compared with acetylcholine. A definite and differential relation was found to exist between the muscarinic and nicotinic actions of acetylcholine and choline used as their chloride salts. Our findings are summarized in Table 1.

Table 1. *Comparison of the muscarinic and nicotinic activities of acetylcholine chloride and choline chloride*

Experimental Parameter	Acetylcholine	Choline chloride	Relative Potency
<i>Muscarinic action</i>			
(a) Depressor response in anaesthetized dog (pentobarbitone sodium 35mg/kg, i.p.)	1 μ g/kg, i.v.	3.5 mg/kg, i.v.	1 : 3500
(b) Spasm of isolated ileum of rabbit	0.005 μ g/ml	25 μ g/ml	1 : 5000
<i>Nicotinic action</i>			
(a) Pressor response in atropinized (1 mg/kg, i.v.) anaesthetized dog	100 μ g/kg, i.v.	2 mg/kg, i.v.	1 : 200
(b) Spasm of isolated rectus abdominis muscle of frog	1 μ g/ml	0.2 mg/ml	1 : 200

Doses represent a mean of 20 experiments

The results clearly indicate that though choline chloride is approximately 3000 to 5000 times less potent than acetylcholine chloride in terms of muscarinic activity, its nicotinic action is only about 200 times weaker. Thus choline has a relatively more potent nicotinic action. This is equally true at both ganglionic and neuromuscular junctional sites. We feel that the nicotinic activity of choline should be better appreciated. A quantitative assessment of the muscarinic and nicotinic actions of a plant product showing cholinergic activity with standard acetylcholine can give the investigator a good lead as to whether he is dealing with choline or not.

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