Protective Action of Lemon Juice and Ascorbic Acid Against Lethality and Convulsive Property of Strychnine

We have observed that acetyl radical [1a,b]) is the functional group of strychnine (indoline) and Kopsine (indole) alkaloids. This observation has prompted to investigate whether the process of deacetylation can occur in the biological kingdom enzymatically or non-enzymatically as a normal process of the metabolism of strychnine. Incidentally, it has been observed [2]) that ascorbic acid plays some role in the metabolism of indole compound. Hence the role of ascorbic acid on the metabolism of strychnine has also been evaluated.

Enzymatic deacetylation of strychnine was effected by incubating solution of strychnine with lemon juice. Initially, strychnine soln. was added to lemon juice and the whole mixture was divided into four equal parts, A, B, C and D which were then incubated accordingly as follows: A-incubated at room temp. (25° C) for 15 min, B-incubated at 37°C for 15 min, C-incubated at 3/°C for 45 min, D-incubated at 50° C for 15 min. As a control study, strychnine soln. *pev se* was heated at 50° C for 45 min. Then the lethality and convulsive property of strychnine of each sample were tested in mice by subcutaneous administration of incubated mixture containing 2 mg/kg of body-weight of strychnine.

Similarly, strychnine soln. was incubated with plasma of cat, rat, pigeon and toad's blood for 20 min at 37° C. The lethality and convulsive property of strychnine of each plasma sample was then tested as stated above. Ascorbic acid was given intraperitoneally in the dosage of 1 gm and 2 gm per kg body-weight respectively in groups of mice. After 15 min following ascorbic acid administration, strychnine (2 mg/kg body weight) was given subcutaneously and the lethality and convulsive activity were noted.

Table. *Results of the experiments*
No. of mice used: in the experiment with strychnine without lemon juice 20, in all other cases 10.

Samples	mean survival time	mortality (%)
strychnine*) without lemon juice	5	100
A (10 ml/kg)	8.3	60
B (10 ml/kg)	11.0	20
C (10 ml/kg)	33.0	20
D (10 ml/kg)	11.6	100
strychnine*) per se heated at 50° C	6.0	100
cat plasma (10 ml/kg)	12.0	100
rat plasma (10 ml/kg)	10.0	100
pigeon plasma (10 ml/kg)	6.0	100
toad's plasma (10 ml/kg)	9.0	100
ascorbic acid (1 gm/kg)	—	nil
ascorbic acid (2 gm/kg)	—	nil

*) strychnine soln. 2 mg/kg.

The convulsion was absent or very feeble with ascorbic acid and lemon juice in survived animals. It appears from above that incubation of strychnine with lemon juice (containing acylase enzyme and ascorbic acid) at 37° C leads to profound loss of lethal and convulsive property of strychnine but heating of the mixture at 50° C retains the lethal and convulsive property of strychnine completely. Incubation of strychnine with plasma of various species could not exhibit any protection against strychnine. It thus appears that deacetylation of strychnine is most probably the chief pathway of metabolism of strychnine. Ascorbic acid in very high doses shows protection against strychnine which perhaps manifests its biologic action by combining with some enzyme system in central nervous system and ascorbic acid may considerably protect that enzyme system from strychnine binding.

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[1]) MUKHERJEE, S. R., A. MAITI and P. K. DEY: a) Nature 180, 916 (1957); — b) J. Expt. Med. Sc. 1, 179 (1958). — [2]) HOFFER, A. in: Psychotropic Drugs, Ed. S. Garattini and V. Ghetti, p. 10. New York: Elsevier Publisher C. (1957).

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