PHARMACOLOGY

EFFECT OF PROCAINE ON TOLERANCE OF WHITE RATS TO HIGH ALTITUDES

PART II. EFFECT OF p-AMINOBENZOIC ACID

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We showed in our previous communication [7] that administration of procaine raised the tolerance of animals to high altitude conditions. The view was expressed that procaine not only exerts a local blocking action on nerve endings of interoceptors, but also has a generalized effect on the central nervous system. It was thought, in this connection, to be desirable to investigate the effects on organisms exposed to such conditionsof substances having a structural resemblance to procaine.

Procaine is the hydrochloride of the diethylaminoethyl ester of p-aminobenzoic acid. It is readily broken down in the organism to p-aminobenzoic acid and diethylaminoethanol [3]. p-Aminobenzoic acid is a vitamin, which according to the findings of N. I. Leporskii and T. T. Karakulina [4] has a similar physiological action on the central nervous system to procaine. Moreover, restoration of the color of grey hair is observed with large doses of procaine, and this is characteristic of the action of p-aminobenzoic acid, as a vitamin.

Thus procaine and p-aminobenzoic acid are similar in their chemical structure and in their action on the organism.

EXPERIMENTAL METHODS

We applied the same methods to the study of the action of p-aminobenzoic acid as we used previously with procaine. The animal material used consisted of adult white rats. Some of the rats were housed in separate cages, and were fed the same diet as the control group, with the addition of 200 mg of p-aminobenzoic acid per 100 g of food. This dosage level has been reported in the literature [5] as not having toxic effects. Both groups of animals were placed in a pressure chamber after the lapse of a day, and the pressure was lowered to that of an altitude of 11,000 m, at a rate of 30 m per second, and maintained at that level for 10 minutes. In all, we used 114 rats, 58 of which received p-aminobenzoic acid, and 56 served as controls.

The results obtained are presented in the table.

Effect of p-Aminobenzoic Acid on the Survival Rate of White Rats at a Barometric Pressure Corresponding to an Altitude of 11,000 m

Experimental conditions	Number of animals	Number surviving	
		in absolute figures	in %
Rats not receiving p-aminobenzoic acid (controls)	56	23	41
Rats receiving p-aminobenzoic acid	58	48	82

The results show that the survival rate of animals receiving p-aminobenzoic acid is double that of the controls, at an altitude of 11,000 m. This finding is of some practical importance, since it shows that p-aminobenzoic acid can be given, together with other vitamins, for the purpose of raising the tolerance of organisms to oxygen lack [2, 6].

SUMMARY

It was experimentally established that para-aminobenzoic acid increases the survival of rats raised to high altitudes. Experiments performed on 114 rats with the addition of para-aminobenzoic acid to their food (200 mg per 100 g) demonstrated that the mortality rate of these animals decreased by half. A conclusion was drawn that para-aminobenzoic acid increases the resistance of the body to oxygen insufficiency.

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