

EFFECT OF RESERPINE ON ADENOSINE
PHOSPHATE CONCENTRATIONS
IN THE BLOOD VESSEL WALL

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Experiments on rabbits showed that reserpine (2.5 mg/kg) reduces the concentration of catecholamines in the aortic wall but causes no change in the concentration of ATP, ADP, and AMP. Repeated doses of reserpine (0.25 mg/kg daily for 10 days), however, reduce the total concentration of adenosine phosphates and cause a tendency for the ATP concentration to fall.

An important link in the mechanism of the hypotensive action of reserpine is its ability to lower the catecholamine concentration in the blood vessel wall [2, 4]. Catecholamines are stored in adrenergic neurons, partly in the "nucleotide-independent" labile depot and partly, firmly bound with ATP, in the "nucleotide-dependent" stable depot [8, 10]. Data in the literature on the effect of reserpine on the content of adenosine phosphates in the tissues are few in number and contradictory in nature. For instance, reserpine has been shown to reduce the ATP concentration in the adrenals [12]. Meanwhile, no change in the level of adenosine phosphates or inorganic phosphorus could be found in the myocardium of rats after administration of reserpine [9].

In the investigation described below the effect of reserpine was studied on the concentration of catecholamines and adenosine phosphates in the aortic wall of rabbits.

EXPERIMENTAL METHOD

Experiments were carried out on 40 rabbits weighing 1.7-2.3 kg. The concentration of catecholamines in the aortic wall was determined by fluorescence analysis by Osinskaya's method [3] with certain modifications [4] and expressed in μg noradrenalin base/g wet tissue. ATP, ADP, and AMP were separated by high-voltage electrophoresis on paper [11]. Adenosine phosphates were estimated quantitatively with the SF-4A spectrophotometer by measuring the extinction at wavelengths of 260 and 290 nm. The results were expressed in $\mu\text{moles/g}$ wet tissue. Inorganic phosphorus was determined by a colorimetric method [1, 7] and expressed in mg \%g tissue.

Reserpine (Rausedil, 0.25% solution) was injected intramuscularly in a dose of 2.5 mg/kg 3 h before the experiment or 0.25 mg/kg daily for 10 days.

EXPERIMENTAL RESULTS AND DISCUSSION

The results given in Table 1 show that a single injection of reserpine (2.5 mg/kg) led to a decrease in the catecholamine concentration in the aortic wall by 67.1%. The concentrations of ATP, ADP, and AMP, and the total concentration of adenosine phosphates and inorganic phosphorus, however, showed no significant change.

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TABLE 1. Effect of Reserpine on Concentrations of Adenosine Phosphates, Inorganic Phosphorus, and Noradrenalin in Aortic Wall of Rabbits

Experimental conditions	in $\mu\text{moles/g tissue}$			Total adenosine phosphates	Inorganic phosphorus (in mg %/g tissue)	Total concn. of catecholamines (in $\mu\text{g noradrenalin/g wet tissue}$)
	ATP	ADP	AMP			
Control	0.38 ± 0.03	0.34 ± 0.03	0.33 ± 0.03	1.06 ± 0.06	17.32 ± 0.8	0.85 ± 0.14
Reserpine 2.5 mg	0.47 ± 0.04	0.3 ± 0.03	0.24 ± 0.02	0.97 ± 0.07	18.87 ± 0.3	0.28 ± 0.03
P	>0.1	>0.25	>0.1	>0.25	>0.5	<0.001
Control	0.29 ± 0.01	0.28 ± 0.05	0.28 ± 0.04	0.86 ± 0.08	17.85 ± 0.6	—
Reserpine 0.25 mg/kg daily for 10 days	0.22 ± 0.01	0.19 ± 0.01	0.22 ± 0.02	0.63 ± 0.04	20.24 ± 0.04	0.21 ± 0.08
P	>0.05	>0.1	>0.25	<0.05	<0.01	<0.001

Repeated administration of reserpine (0.25 mg/kg daily for 10 days), superposed on a decrease in the catecholamine concentration (by 75.3%), led to a decrease of 26.8% in the total concentration of adenosine phosphates. This decrease was evidently due to a deficiency of ATP, for a tendency for the concentration of this compound to fall (by 24.2%; $P > 0.05$) was observed in these experiments. Meanwhile, the inorganic phosphorus concentration rose by 13.4%. Reserpine has a similar effect on these parameters in the rabbit myocardium [5, 6].

A single injection of reserpine, while reducing the catecholamine level, thus does not affect the concentrations of adenosine phosphates or of inorganic phosphorus in the blood vessel walls.

The fact that changes in the concentrations of adenosine phosphates and inorganic phosphorus are observed, in conjunction with a marked decrease in the catecholamine level, only after repeated injections of reserpine, giving rise to prolonged pharmacological desympathization, suggests that the bond between catecholamines and ATP in the "nucleotide-dependent" stable depot of the vessel wall is broken under these conditions.

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