So-called natural models, namely, lines of rats with a high arterial blood pressure (BP), are of great interest from the standpoint of the study of neurohumoral mechanisms maintaining self-regulation of cardiovascular functions during emotional stress. An extensive literature is devoted to the spontaneously hypertensive line, rats of which develop stable hypertension during postnatal development. The Koletsky line [2], bred by crossing rats of the spontaneously hypertensive and Sprague-Dawley lines, has received less study. The Koletsky line contains a population of hypertensive rats of the ordinary size and obese rats.

This paper gives data on BP and plasma catecholamines (CA) levels and plasma renin activity (PRA) in control rats and in hypertensive and obese Koletsky rats during immobilization, with corresponding data for Wistar rats for comparison.

**EXPERIMENTAL METHOD**

Experiments were carried out on nine male Wistar rats and on nine hypertensive and two obese Koletsky rats; seven obese Koletsky rats did not survive the operation of introduction of a catheter.

On the day before the experiment a polyethylene catheter was introduced into the caudal artery of the rats for direct measurement of BP and for blood sampling [1]. Next morning a control blood sample (0.6 ml) was taken and the initial BP measured. The rats were then immobilized with the limbs and head securely fixed [3]. Blood samples were taken after 20 and 120 min of immobilization; BP was measured after 60 and 120 min of immobilization. The rats were decapitated after 120 min of immobilization. PRA was determined radioimmunologically using the REN Kit from Sorin (Italy); the plasma adrenalin and noradrenalin concentrations were measured by a radioenzymatic method [5, 6].

**EXPERIMENTAL RESULTS**

BP in the control, hypertensive, and obese Koletsky rats was significantly higher than in Wistar rats (Fig. 1A). The dynamics of BP during immobilization in Koletsky rats differed in principle from that in Wistar rats: In Koletsky rats BP fell during emotional stress whereas in Wistar rats it was higher after 1 h of immobilization but then returned to its initial level.

Individual analysis of the dynamics of BP in the rats (Fig. 1B, C, D) demonstrates more clearly than analysis of mean values the differences between Wistar and Koletsky rats. In most hypertensive Koletsky rats BP fell sharply during immobilization. In two rats (Nos. 12 and 34) a fall in BP was observed only after 2 h of immobilization, and only in rat No. 13 did the curve of changes in BP resemble that for Wistar rats.

In obese Koletsky rats the dynamics of BP during immobilization showed the same tendency...
as that for hypertensive Koletsky rats, but the range of the changes was smaller.

The plasma adrenalin level in the control was similar in both Koletsky and Wistar rats, and its changes during the first 20 min of immobilization also were similar (Fig. 2A). However, by the end of the second hour of immobilization the adrenalin concentration was raised in the obese rats.

Individual changes in the adrenalin level during immobilization (Fig. 2B, C, D) also were similar in the rats of all groups, but among the Koletsky rats there were some (Nos. 16, 29, 31, and 32) in which the adrenalin level was higher than in the Wistar rats.

The noradrenalin level in the control was significantly higher for obese than for hypertensive Koletsky rats (Fig. 3A). After 2 h of immobilization the noradrenalin level differed significantly in the Wistar and Koletsky rats and also in the two populations of Koletsky rats.

The dynamics of individual changes in noradrenalin during immobilization differed significantly in the Wistar and Koletsky rats (Fig. 3B, C, D). Only in Wistar rats Nos. 8, 9, and 27 was the plasma noradrenalin level after 2 h of immobilization similar to that characteristically observed in most Koletsky rats.

Changes in the noradrenalin level in Koletsky rat No. 13 were similar in their course to those in Wistar rats. It will be noted that, with respect to BP and plasma adrenalin levels and to their changes in the course of immobilization rat No. 13 also showed the greatest similarity to Wistar rats (see Figs. 1 and 2).

In the control, PRA in hypertensive Koletsky rats was significantly higher than in the Wistar rats (Fig. 4A). After 20 min of immobilization the difference still remained—in Koletsky rats PRA rose by a greater degree during the first minute of immobilization than in Wistar rats. During the next period of immobilization (20-120 min) a sharp increase in

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**Fig. 1.** Dynamics of BP in Wistar and Koletsky rats in control test and during immobilization. A) Mean value (I — Wistar rats; II — obese Koletsky rats; III — hypertensive Koletsky rats). B) Individual curves of changes in BP during immobilization of Wistar rats. Numbers (in this and subsequent figures) correspond to identification numbers of rats on records. C) The same for hypertensive Koletsky rats. D) The same for obese Koletsky rats. Abscissa, duration of immobilization (in min), C) control; ordinate, BP (in Pa).