

# EFFECT OF LOW-FREQUENCY VIBRATION ON BLOOD HISTAMINE LEVELS IN ALBINO RATS

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The blood histamine concentration in rats immediately after the end of exposure to vibration (20 Hz, 22 g) for 10 or 30 days is considerably increased, especially after exposure for 10 days. Restoration of the blood histamine level to the normal found in control animals of the same age occurs 5 months after exposure.

Vibration causes damage to various organs and tissues of the body and disturbs metabolism [1,3,6,7]. Physiologically active substances play an important role in the regulation of metabolism.

The object of this investigation was to study the blood histamine levels in rats after prolonged exposure to low-frequency vibration.

## EXPERIMENTAL METHOD

In experiments on 72 albino rats weighing  $120 \pm 10$  g the animals were wholly exposed to vertical sinusoidal vibrations with a frequency of 20 Hz and acceleration  $22 \text{ m/sec}^2$  for 2 h daily on the T = 3000 = RT bench for 10 or 30 days. Blood was taken 2 and 5 months after the end of these exposures. A control group of rats of the same age was provided for each group of experimental animals.

The blood histamine concentration was determined colorimetrically [2] and the results were subjected to statistical analysis by the Student-Fisher method.

## EXPERIMENTAL RESULTS

The blood histamine concentration in the animals after the end of exposure to vibration showed a statistically significant increase (Fig. 1): after exposure for 10 days to  $2 \mu\text{g/ml}$  (control  $1.28 \mu\text{g/ml}$ ) and after exposure for 30 days to  $2.72 \mu\text{g/ml}$  (control  $2.11 \mu\text{g/ml}$ ).

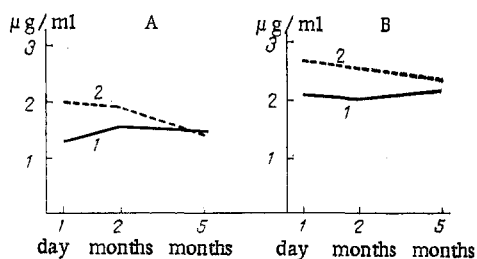


Fig. 1. Change in histamine concentration (in  $\mu\text{g/ml}$ ) in blood after exposure to vibration: A) 20 Hz, 10 days; B) 20 Hz, 30 days; 1) control; 2) experiment.

The blood histamine concentration in the experimental animals returned to normal 5 months after the end of exposure to vibration (Fig. 1). For instance, the blood histamine concentration in rats 2 months after the end of exposure to vibration for 10 days was reduced by a statistically significant degree to  $1.90 \mu\text{g/ml}$  (control  $1.55 \mu\text{g/ml}$ ) and 5 months after exposure it was reduced to  $1.43 \mu\text{g/ml}$  (control  $1.48 \mu\text{g/ml}$ ). Its values 2 months after the end of exposure for 30 days to vibration were reduced to  $2.59 \mu\text{g/ml}$  (control  $2.01 \mu\text{g/ml}$ ) and 5 months after exposure to  $2.35 \mu\text{g/ml}$  (control  $2.15 \mu\text{g/ml}$ ).

After short (10 days) and long (30 days) exposure to vibration with a frequency of 20 Hz the histamine concen-

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tration in the animals' blood was thus increased, more so after the short exposure. This result can be explained by changes in some of the enzyme systems which play an important role in the formation and breakdown of histamine: histidine decarboxylase, histaminase, and monamine oxidase [9]. The increase in the histamine concentration may be the result of a decrease in the histaminopexic effect of the blood serum, i.e., vibration may lead to the formation of a labile complex of histamine with the  $\gamma$ -globulin molecule. Changes in the blood histamine concentration can also be explained by degranulation of the mast cells [5] and an increase in the permeability of the blood vessels [4, 8].

The gradual restoration of the normal blood histamine level in the experimental animals was probably the result of activation of enzymes playing a fundamental role in histamine formation and blocked in the initial period.

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