

# INTENSIVE MOTOR EXCITATION AND PROTEINASE ACTIVITY IN THE RAT BRAIN

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During prolonged motor excitation, activity of acid and neutral cathepsins in the cerebral hemispheres of rats increases.

Excitation processes in the nervous system are accompanied by marked activation of protein metabolism, with predominance of catabolism over synthesis [2, 3]. However, most of the available data on proteolysis in nerve tissue has been obtained by the study of total autolytic changes only.

In the present investigation, activity of acid (pH optimum 4.0) and neutral cathepsins (pH optimum 7.0-7.4, within the physiological range) was studied in the same homogenates of the cerebral hemispheres of male Wistar albino rats during intensive motor excitation.

## EXPERIMENTAL METHOD AND RESULTS

The experimental animals were placed in a special chamber having a metal grate for its floor, through which an alternating current (60-80 V) was passed for 40-60 min. Initially the rats were in a state of extreme motor excitation, which then gradually weakened; by the end of the experiment, only relatively weak muscle twitches were observed in the animals which were in a state of almost complete exhaustion. The experimental and control rats were decapitated and the cerebral hemispheres were extracted and homogenized in 0.14 M NaCl solution. Activity of acid and neutral cathepsins in samples of homogenate were determined by Umaña's method [5]. The results were expressed in conventional units of activity, equal to a change of 0.125 in the spectrophotometric value of absorption of light during incubation for 60 min at 37°C and at the corresponding pH (corresponding to the absorption produced by 100  $\mu$ M tyrosine), and expressed per milligram protein.

The results (Table 1) show that electrodermal stimulation of rats under the experimental conditions used led to marked activation of both neutral and acid proteinases in the cerebral hemispheres. Exhausting motor excitation of this type thus not only activates protein metabolism in the CNS, but also autolysis, indicating the possibility of severe injury to the cells. The results obtained for neutral cathepsins are in agreement with those of Klein et al. [1] who, under similar experimental conditions, but by determining the activity of these rat brain proteinases by a different method (that of Anson [4]), found an increase of 42% during prolonged motor excitation.

TABLE 1. Effect of Prolonged Motor Excitation on Activity of Acid and Neutral Proteinases of Rat Cerebral Hemispheres (In conventional units,  $M \pm m$ ,  $n = 11$ )

Proteinases	Control	Expt.	P
Neutral	47,0 $\pm$ 1,2	62,3 $\pm$ 4,1	<0,01
Acid	29,0 $\pm$ 6,3	41,1 $\pm$ 2,7	<0,01

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