

LATENT PERIOD OF THE REFLEX REACTION  
TO THERMAL CONTACT STIMULATION IN MAN  
IN PHYSIOLOGICAL CONDITIONS

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The constantly acting environmental factors, among which is included the temperature, are of great importance in the life of man, as of other organisms. It is therefore interesting to study the reflex activity of that part of the nervous system through which the organism receives its information about the temperature of the external environment. In the present investigation, the latent period of the sensorimotor reaction to thermal stimulation was taken as index.

EXPERIMENTAL METHOD

The latent period was determined by the method developed by S. I. Gorshkov, P. I. Gumener, and S. A. Poltorak [2] and modified by S. I. Gorshkov and V. E. Mitrofanov [3]. The device used to detect the thermal stimulus was a thin manganin ribbon mounted on a plate (measuring  $2 \times 1$  cm) made of insulating material. Because of the small mass of this pick-up, its inertia during heating was reduced to a minimum; according to calculations made at threshold intensity of stimulation it was less than 10 msec. The strap of the pickup was fixed in the region of the wrist. By means of a special device, the temperature stimulus could be graded in strength and duration. Since the pickup was worn before the investigation, the effect of tactile stimulation was excluded and the subject reacted only to thermal stimulation. The latent period of the reaction was taken to be the time from the beginning of application of the stimulus until the moment when the subject, having felt the heat, took his finger from a button.

The investigation was conducted in conditions of comfort ( $19-23^{\circ}$ ) after the subject had become adapted to the surrounding conditions (30 min). The velocity of the reaction was measured during thermal stimulation of different intensity: threshold (a weak sensation of warmth), superthreshold (a moderate sensation of warmth), and painful (the stimulus felt like a hot pinprick).

EXPERIMENTAL RESULTS

The magnitude of the threshold thermal stimulus varied within wide limits from subject to subject, from 0.33 to  $0.80 \text{ J/cm}^2$ . The magnitude of the superthreshold stimulus was  $0.40-1.01 \text{ J/cm}^2$ . An increase in the intensity of stimulation above these limits was interpreted by the subjects as "warm" and then as "hot". A sensation of a strong pinprick localized to one point appeared if the thermal stimulus was strengthened to  $1.67-2.15 \text{ J/cm}^2$ .

The latent period of the reaction to thermal threshold stimulation was measured in 62 persons aged between 18 and 45 years. Altogether 3753 measurements were made. The results showed that the mean latent period to threshold thermal stimulation was 831 msec ( $\sigma = 184$ ). With more intensive stimulation at the superthreshold level, when the subject had a sensation of moderate warmth, the latent period of the reaction was shorter. Measurements made on 28 persons (1556 measurements) showed that its mean value in this case was 700 msec ( $\sigma = 137$ ). A sharper fall in the latent period was observed in response to painful temperature stimulation (1451 measurements on 21 persons); the mean duration was 344 msec ( $\sigma = 81$ ).

Analysis of the results shows that the investigated subjects may be subdivided into three groups with respect to their latent period. The difference in the latent period was especially noticeable during threshold and superthreshold stimulation. With an increase in the intensity of temperature stimulation to the painful level, these differences became much smaller although they did not disappear completely.

The differences between the latent period of the reaction to threshold thermal stimulation were also observed in children of preschool (6 years) and school age (10-12 years).

The above mentioned groups differed not only in their latent period, but also in relation to the doses of thermal stimulation. In subjects with a short latent period, the doses of threshold, superthreshold, and painful temperature stimulation were smaller than in persons with a long latent period. Of the limits of the magnitudes of thermal stimulation given above, the lower was characteristic of persons with a short latent period and the upper of persons with a long latent period. The intermediate values were characteristic of the middle group.

Some authors [1,4], who have studied individual differences in the body temperature, a relatively constant index of thermoregulation, have concluded that three groups of persons can be distinguished by means of this criterion. According to data obtained by I. S. Vainberg [1], for example, in 90% of persons the body temperature varies between 36 and 37°, in 7.5% it lies below this level (between 35 and 36°), and in 2.5% it is above this level (between 36.5 and 37.5°). The results of the present investigation cannot be used to give reliable limits of variations of the latent period of the reaction for the different groups and to correlate these groups. As an estimate, however, it can be stated that most persons belong to the middle group.

Measurement of the latent period of the reaction in the same subjects over a period of 2-3 months showed that it may vary quite considerably from day to day (measured at the same time of day).

#### LITERATURE CITED

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