$\frac{B}{cfu_S} < 100$ a suppressor effect of the B lymphocytes was observed, but when $100 < \frac{B}{cfu_S} < 400$ a helper effect was observed, and with even higher numbers of B lymphocytes, suppression was again observed. Zones of suppression and helper activity coincide in the case when lymphocytes from LN and spleen are used, and the degree of regulation in both cases, moreover, depends entirely on the ratio between B lymphocytes and cfu_S. This is a further argument in support of our previous hypothesis that allogeneic hematopoietic stem cells are the target for B lymphocytes. By interacting with them, perhaps screening or inducing additional expression of certain receptors through which HSC interact with T lymphocytes, the B lymphocytes evidently exert a regulating effect.

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REACTION OF BIOLOGICALLY ACTIVE POINTS OF THE SKIN TO IMMUNIZATION WITH TYPHUS VACCINE

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Modern views on immunological reactivity was based on the role of the cellular and humoral factors of immunity, which are functionally linked with the nervous system. The nervous system has been shown to participate in immunological and leukocytic responses of adaptation. Meanwhile attempts to determine correlation between types of higher nervous activity and immunological reactivity have yielded ambiguous results [1, 4].

One of the trends in the study of functions of the autonomic nervous system in recent years is the electrophysiological study of cutaneous zones of increased activity (acupuncture points – APP), in order to evaluate adaptation by method of reflex therapy [6, 9, 12].

There is reason to suppose that adaptive mechanisms, revealed by responses of APP, can be used in addition to other methods of immunodiagnosis and immunocorrection [2, 10, 11]. Research in this direction must include two stages: determination of the principles of correlation between responses of APP and immunological reactivity and the study of the possibility of using methods of action directed toward APP to correct the immune response.

The aim of this investigation was primary evaluation of the response of APP to immunization with typhus vaccine in man.

EXPERIMENTAL METHOD

Combined vaccination was carried out in accordance with the principle of blocking residual virulence of a live vaccine [8] in two stages: primary injection of a chemical vaccine from Rickettsia prowaczeki in a dose of 16 fixation units and secondary (10 days later) injection of live vaccine from rickettsias of subline 288 of

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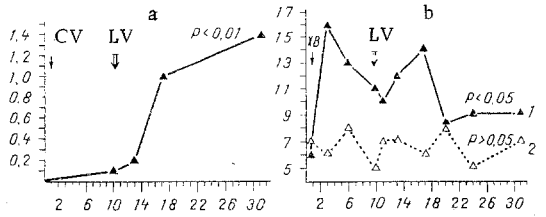

Fig. 1. Dynamics of seroimmune and electro-acupuncture parameters for persons vaccinated with chemical and live typhus vaccines (CV and LVC respectively). a) change in antibody titer. Abscissa, time of observation τ (in days); b) change in values of dispersion of relative electrical conductance of APP system in experimental (1) and control (2) groups. Abscissa, time of observation τ (in days); ordinate: a) number of times antibody titer is increased (log V), b) dispersion of values of APP in group (S, %). Each point corresponds to results obtained for six or seven persons.

strain E in a dose of $10^{4.5}$–$10^{5.0}$ ED_{50}. Vaccines were injected subcutaneously into the subscapular region. The vaccinated subjects were kept under medical observation, and their blood serum was tested in the complement fixation (CFT) and indirect hemagglutination (IHAT) tests by the usual methods. Altogether seven persons aged 20-30 years were immunized.

The electro-acupuncture investigation of the vaccinated subjects was carried out in accordance with existing recommendations [5, 7, 13], using an instrument of PEP-1 type. Measurements were made in a zone of 12 symmetrical APP, characterized by average values for each meridian, and the most informative for use in acupuncture diagnosis [5, 13]. A parallel study was carried out on a control group of unvaccinated subjects (six persons), and also on two persons receiving a subcutaneous injection of physiological saline.

The magnitude of the seroimmune response during the period of observation was estimated by the integral function $F(\tau)$:

$$F(\tau) = \sum_{i=1}^{n-1} [\lg \sqrt{V_{i+1} \cdot V_i^-} \cdot (\tau_{i+1} - \tau_i)],$$

where V_i denotes the number of times by which the titer increased according to data of the CFT and IHAT (mean value); τ_i the time of observation (i = 1, 2, 3, ..., n).

From the results of electrophysiological measurements in the zone of APP, the following parameters were calculated: relative electrical conductance A_i, relative electrical potential E_i, and dispersion (standard deviation) of the set of electro-acupuncture parameters S.

$$A_i = (x_i/\bar{x} - 1) \cdot 100, \ \%,$$

$$E_i = x_i^+/x_i^- \cdot 100, \ \%,$$

where x_i denotes electrical conductance in the zone of APP (mean value for symmetrical meridians) for current of negative (−) and positive (+) polarity on the measuring electrode (in μA); x the mean electrical conductance of all APP (in μA); i the index of the meridian (i = 1, 2, ..., 12).

EXPERIMENTAL RESULTS

Calculated values of the electrophysiological parameters of the state of APP were subjected to statistical analysis in order to analyze the significance of changes in the characteristics relative to the background, and also differences between the experimental and control groups. Correlation of the parameters of the state of APP with the parameter of the seroimmune response also was estimated.

The serologic investigation of members of the control group revealed an increase in the titer of specific antibodies with a characteristic trend (Fig. 1) for the combined method of analysis. The calculated parameters of the immune response varied from 4.7 to 23.8.

Changes in the relative electrical conductance of APP were complex in character. Autocorrelation analysis of dynamic series of data using Neyman's criterion [3], shows a significant tendency for the electrophysiological parameters of APP to change after immunization ($P < 0.05$) and also the random character of distribution of the data for subjects of the control group (Fig. 1). The most marked change in relative electrical conductance of APP was recorded on the 1st-3rd day after injection of the inactivated vaccine and on the 3rd-7th day after immunization with the live vaccine; this can evidently be associated with the presence of the maximal concentration of the killed antigen or of reproducing rickettsias of the E strain in the body during this period. The less marked second wave of changes in the parameters of APP in response to immunization with live vaccine concurs with data on the blocking effect of the chemical vaccine, preliminary injection of which prevents the clinical response to residual virulence of the E strain [8].

The closest correlation with the seroimmune changes was found for values of relative electrical conductance of the skin zones of APP: X-4 ($r = 0.58$, I-9 ($r = 0.55$), and II-4 ($r = 0.46$) – positive correlation, and also APP VIII-3 ($r = -0.72$), III-42 ($r = -0.70$), and XI-40 ($r = -0.64$) – negative correlation.

During the period of observation the relative value of the electrodermal potential remained unchanged in the subjects, with a level of significance of $P < 0.05$. Nevertheless, the results of correlation analysis of the data show a significant increase in the seroimmune shifts in subjects with a higher electrodermal potential ($P < 0.01$). Positive correlation of potential with the seroimmune response ($r = 0.63, \ldots, 0.95$) was established for all APP tested. This tendency was adequately described by a generalizing regression function of the type:

$$\lg F=(-4.86\pm0.18)+(0.076\pm0.057)\,\bar{E};\ r=0.992.$$

The results thus indicate significant correlation between the state of APP, as reflected in the results of electrophysiological measurements, and the mechanism of the protective immune response of the body to injection of an antigen. This is evidence that the results of electro-acupuncture measurements can be used, in principle, to investigate the mechanisms of the immune response of the body and to establish an optimal scheme for influencing the immune process through the APP system.

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