Thus, the results obtained, together with earlier data demonstrating a decrease in the frequency of afferent impulses in taste reactions, indicate that under chronic alcogolization the neurophysiological mechanisms involved in the functioning of the taste receptor organ become impaired, ultimately leading to distortion, or errors, in the coding of primary sensory information.

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PATHOLOGICAL PHYSIOLOGY AND GENERAL PATHOLOGY

Relationship between Inflammation and the Stress Reaction

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It is well known that the inflammatory process is accompanied by a change of the level of glucocorticoids and catecholamines in the blood [1,10]. But there is no consensus as to whether these changes are typical for the stress reaction. If there is an interrelation between these processes, then some aspects of inflammation pathogenesis appear in a different light. Considering the tissue damage inducing an inflammatory process to be a stress factor, it is also necessary to take into account such well-known consequences of the stress reaction as secondary alteration of cells [5,13], the development of which can exacerbate an inflammatory process, prolong its course, and even result in chronic inflammation.

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The aim of the present investigation was to establish whether an inflammation is accompanied by a stress reaction and how these processes interconnect dynamically.

MATERIALS AND METHODS

Ninety male albino rats were used in the experiments. An inflammation was induced by placing a celloidin plate 5×1 mm in size in the subcutaneous connective tissue of the shank of ether-narcotized animals. To assess the dynamics of the cell reaction in the inflammatory focus, the thickness of the cellular swelling, the density of neutrophils, macrophages, and fibroblasts in it, and the number of layers of fibroblasts in the capsule were measured on the histological preparations [3]. The duration of the inflammation stages was determined

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by standard criteria. For a study of the dynamics of the stress reaction and determination the duration of its stages [4], in blood samples from the rat caudal vein the number of eosinophils was counted every 2 h after introduction of the foreign body [6]. The concentration of corticosterone and insulin was determined in parallel in the blood serum at intervals of 6 h using the radioimmune technique.

RESULTS

The data obtained showed that the dynamics of the number of eosinophils in the peripheral blood is consistent with the standard stress reaction (Fig. 1). The induction of inflammation is followed by a 1.5-fold decrease of the number of eosinophils over 2 h. Eosinopenia lasts for 24h and characterizes the alarm stage of the stress reaction [4]. By 27 h it gives way to a sharp twofold increase ($p<0.05$) of the number of eosinophils. This peak of eosinophilia corresponds to the swith from the alarm stage to the stage of resistance of the stress reaction. A gradual normalization of the eosinophil biorhythm in the blood is subsequently noted.

The dynamics of corticosterone and insulin in inflammation is also typical for the stress reaction and correlates negatively with the dynamics of the number of eosinophils in the peripheral bed ($r = -0.42$). As is shown in Fig. 1, the alarm stage of the stress reaction is characterized by a twofold rise of the level of corticosterone ($p<0.001$) and by a more than 2.5-fold elevation of the concentration of insulin ($p<0.01$). At the moment when the alarm stage is superseded by the stage of resistance, the level of the hormones abruptly plummets to the initial values, namely, corticosterone by the 24th h, and insulin by the 18th h. At the stage of resistance the amplitude of variations of the hormone concentration gradually diminishes, approximating the natural circadian biorhythm. Thus, in the alarm stage of the stress reaction the changes of the concentrations of corticosterone and insulin exhibit a positive correlation ($r=0.62$), while in the stage of resistance the fluctuations of the level of these hormones are connected by a moderately pronounced negative correlation ($r=-0.53$).

Comparison of these data with the dynamics of cell reactions in the inflammatory focus revealed that the increase of the concentration of corticosterone and insulin in the alarm stage of the stress reaction coincides with the period of development of the leukocytic phase of inflammation (Fig. 1). This elevation of the corticosterone and insulin level probably supplies the neutrophils, macrophages and fibroblast precursors in the inflammatory focus with the energetic material necessary to perform their specific functions [7,9]. It is well known that the main function of neutrophils is the secretion of lysosomic enzymes, achieving the most complete degradation of the damaged tissues in the inflammatory focus up to the point where the tissue detritus can be phagocytized by macrophages [11,14]. On the other hand, activation of the

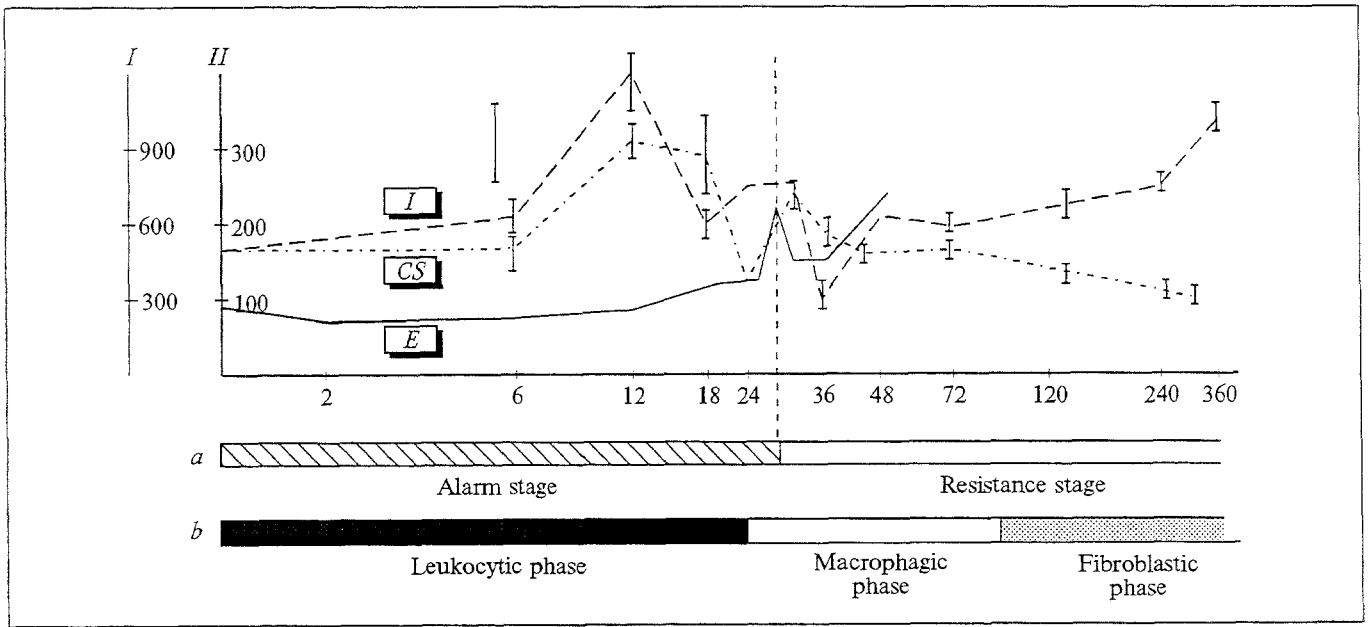

Fig. 1. Dynamics of the number of eosinophils (E), and of the concentration of corticosterone (CS) and insulin (I) in rat blood in the process of development of an aseptic inflammation.Abscissa: time elapsing from the introduction of a plate in hours (logarithmic scale); ordinate: *1*) number of eosinophils (in 1 μl); *2*) concentration of corticosterone (in nmoles/L) and of insulin (in pmoles/L); *a*) duration of stages of stress reaction; *b*) duration of stages of inflammation.

stress-realizing systems results in a stimulation of LPO, being a key component in the pathogenesis of the secondary alteration of cells [5]. Thus, toward the end of the leukocytic phase of inflammation and completion of the alarm stage of the stress reaction there is maximal damage of the tissue structures related both to the action of the enzyme systems of neutrophils and to the development of secondary post-stress alteration.

Further events in the inflammatory focus unfold against the background of the stage of resistance of the stress reaction. During the second day the macrophagic stage takes place in the inflammatory focus against the background of a rise of the corticosterone and a drop of the insulin level. An intensive phagocytosis of necrotized tissue by macrophages and proliferation of fibroblasts occur during this period in the inflammatory focus. According to published data, glucocorticoid hormones have an inhibitory effect on both these processes [8,12], and the effect of the hormones has a latent period [2]. The effect of a short-term elevation of the corticosterone content in this period of inflammation probably manifests itself in an inhibition of the proliferation of fibroblasts and stimulation of their differentiation [2], noted in the inflammatory focus during the third day.

The fibroblastic phase of inflammation is accompanied by a progressive decline of the concentration of corticosterone in the blood and by an increase of the insulin content, which is probably necessary for supporting an intensive synthetic activity of fibroblasts and collagenogenesis. Thus, the action of an alterative agent causes, together with an inflammation, an associated stress reaction which produces a direct effect on the dynamics of the inflammatory process.

In assessing the established correlation between the dynamics of inflammation and the accompanying stress reaction, we may assume that the lingering course of inflammation or its chronization often obtained in clinical practice may result either from a weakened adaptive capacity of the organism or from an excessively pronounced stress reaction accompanying an inflammation which is aggravated by some additional stress factor (shock, pain, emotional stress, and so on). Hence, the seemingly promising new approach for the correction of inflammation lies in limiting the stress reaction by adapting the organism to stress or by administering metabolites of stress-limiting systems.

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