DEVELOPMENT OF TRAUMATIC SHOCK ACCOMPANIED BY INCREASED ACTIVITY OF POLYSPECIFIC ANTIBODIES REACTING WITH DNA AND ENDOTOXINS

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In the sera of healthy animals, globulins possessing the properties of polyspecific antibodies (they react with polyanions of varied origin) are found in combination with other proteins in the latent state [3, 5]. In all probability these globulins can be classed as "natural" antibodies [7, 8]. Their function has not yet been explained. Do situations exist in which these antibodies may exhibit their activity?

In the investigation described below the behavior of "natural" antibodies was studied at different periods of development of traumatic shock.

EXPERIMENTAL METHOD

Experiments were carried out on male Wistar rats weighing 180-200 g. A model of traumatic shock was produced by Cannon's method, by applying series of blows to the soft tissues of the thigh. The animals were killed by decapitation. The tests were carried out before and 1 and 3 h after trauma. The animals were prepared for the experiments under ether anesthesia. Antibodies were determined by enzyme immunoassay, by the method adopted in the writers' laboratory [1, 3]. Native DNA (nDNA) and denatured DNA (dDNA), obtained by heating at 100°C (10 μg/ml), were fixed to planchets and irradiated overnight in a radiation source [1]. Antibodies to rat immunoglobulins, conjugated with horseradish peroxidase ("Amersham," England) were used in the sandwich method. Antibodies to dextran sulfate were determined as in [9]. Antibodies to glycolipid of the Re chemotype and to lipid A of *E. coli* were determined by our own method [2], circulating immune complexes (CIC) by a turbidimetric method [6], total protein by the biuret reaction, and the hematocrit by the standard method.

EXPERIMENTAL RESULTS

Development of traumatic shock was accompanied by a significant increase in activity of antibodies reacting with native and denatured DNA, dextran sulfate, and glycolipid (Table 1).

With what can the increase in activity of these antibodies be connected? Simple consideration of the temporal characteristics is enough to dismiss any suggestion of their synthesis. The raised antibody level likewise cannot be explained either by a sudden loss of fluid or by the result of such a loss, namely an increase in protein concentration: the hematocrit was unchanged and there was no significant rise of the protein concentration (Table 2). We propose the following explanation. Polyspecific antibodies reacting with DNA and with various polyanions have been shown to be present in considerable

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TABLE 1. Content of Antibodies (AB) Reacting with Glycolipid of Re-Chemotype of *E. coli* and with Dextran Sulfate in Blood Serum of Traumatized Rats

Period of testing	AB to nDNA	AB to dDNA	AB to glycolipid of Re-chemotype in I	AB to dextran sulfate
Before trauma	0,291±0,02 (7)	0,668±0,06 (7)	0,47±0,2 (12)	0,092±0,01 (8)
Immediately after trauma	0,861±0,12*** (7)	1,240±0,1** (7)	3,42±0,08*** (10)	0,327±0,1* (7)
3 h later	0,304±0,02 (6)	0,821±0,1 (6)	(10)	0,150±0,03 (6)

Legend: Significance compared with content of AB before trauma: *p < 0.05, **p < 0.05-0.01, ***p < 0.01. Here and in Table 2, number of animals used in experiments indicated between parentheses.

TABLE 2. Levels of Total Protein, Hematocrit, CIC in Blood Serum of Rats in Course of Traumatic Shock

Period of testing	Total protein, g/liter	Hematocrit, %	CIC
Before trauma	85,1±1,76 (9)	42,8±0,81 (8)	44,0±3,84 (7)
Immediately after trauma	97,8±3,4 (8)	43,88±0,80 (8)	30,0±8,1 (6)
3 h later	65,07±1,56*** (7)	35,0±2,8* (6)	15,8±2,6*** (6)

Legend. Significance compared with state before trauma: *p < 0.05; **p < 0.05-0.01; ***p < 0.01.

amounts in a latent state in healthy human blood serum [3-5]. These antibodies are components of globulin aggregates and dimers. In an acute extremal situation associated with the development of traumatic shock, and characterized by marked disturbances of hormone—mediator balance, amounts of antibodies reacting with DNA, dextran sulfate, and glycolipid increase.

Under these conditions they are probably released from complexes and perform a protective function. It will be recalled that in model experiments they were released from complexes during interaction with an anion-exchanger [3, 4].

The proposed hypothesis may be confirmed by changes observed in the CIC content in the course of the traumatic syndrome (Table 2). In a group of animals with a relatively high CIC level, that level fell in the early stage of traumatic shock.

"Latent" antibodies found in the serum of healthy individuals are thus released during traumatic shock and are able to exhibit their properties, and this may probably be one of the most important mechanisms of homeostasis.

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SEASONAL CHANGES IN CARDIOVASCULAR PARAMETERS AND BRAIN MONOAMINE LEVELS IN RABBITS

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A characteristic of the cerebral blood flow (CBF) is its mosaic pattern [2]. Previous studies [6, 7] showed not only differences in blood flow at different depths and in different cortical formations, but also differences in CBF of different experimental rabbits and in the same animal from one experiment to another. Monoamine levels in the animal brain also have been shown to be variable [4, 5]. We were interested to discover correlation between changes in CBF, the systemic arterial pressure (SAP), heart rate (HR), and brain monoamine levels, and dependence of these parameters on the time of year.

EXPERIMENTAL METHOD

Experiments were carried out on 300 rabbits (male and female) under 1 year old over a period of 13 years. There were three series:

In series I, SAP was measured by a mercury manometer under urethane anesthesia (1 g/kg, intramuscularly), by means of a cannula introduced into the femoral artery. SAP and HR were measured in each experiment for 5 min.

In series II the local CBF (LCBF) was measured by the hydrogen clearance inhalation method. A platinum monopolar electrode was implanted stereotaxically in each of the test structures (hypothalamus, thalamus, septum) to measure LCBF, and a nichrome bipolar electrode was similarly implanted for electrical stimulation. During the postoperative period the experimental animals became adapted to the experimental conditions. The experiments began 7-10 days after the stereotaxic operation and were conducted on conscious rabbits without any premedication. The reference electrode for measurement of LCBF was an Ag/AgCl plate measuring 0.5 × 0.5 cm, secured by clips to the rabbit's ear. LCBF was measured simultaneously in one deep structure and in the neocortex, before and after stimulation. The parameters of the pulsed current used for stimulation were: 0.5 msec, 60 Hz, 2-4 V, 33 sec. Blood flow was calculated by the method based on the initial slope of the clearance curve.

In series III concentrations of biologically active monoamines were determined by the same method in 1972, 1973, 1981, and 1982. Concentrations of noradrenalin (NA), dopamine (DA), and serotonin (5-HT) were determined in the central cerebral cortex and in deep structures (hypothalamus, striatum). Concentrations of NA, of DA, and of its chief

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