alcohol of a similar chain-length to demonstrate secondary alcohol dehydrogenase; and thirdly, furfuryl alcohol.

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IMMUNOLOGY

Mucolipids of the Brain in the Process of Formation of Post-vaccinal Antirabic Immunity

THE biochemical changes which develop in the brain during the process of forming post-vaccinal antirabic immunity are of considerable importance.

We have recently investigated the mucolipids of the brain. Neuraminic acid is a characteristic compound of these substances and, as has been shown by some investigators, can provide protection against certain infections¹⁻³.

White mice were used in the experiments. The animals were immunized with live rabies virus fixe (*L.D.₅₀* 10^{-6.5}). The virus was injected intraperitoneally six times on alternate days (0.25 ml. suspension per injection). The concentration of the virus was gradually increased by decreasing the dilution factor from 10⁻⁶ to 10⁻³. Groups of animals (with corresponding controls) were killed on the eighth, fourteenth, thirtieth and fortieth day after the beginning of immunization. Mucolipids in the brain were determined by Klenk's⁴ and Svennerholm's⁵ method using Promyslov's⁶ modification. The antibodies present in the sera were determined by means of ordinary neutralization tests (Table 1).

The results presented in Table 1 show that on the eighth day after immunization the amount of mucolipids in the brain had not increased significantly. On the fourteenth day the quantity of mucolipids reached a maximal level. It remained high until the thirtieth day and then decreased, reaching normal levels by the fortieth day.

Table 1

Length of test (days)	Antibodies in serum (neutralization index)	Mucolipids in the brain of immunized animals ($\mu\text{g/g}$ wet wt.)	Mucolipids in the brain of control animals ($\mu\text{g/g}$ wet wt.)
8	0	177.71 $\pm$ 1.775	161.01 $\pm$ 5.423
14	0	236.46 $\pm$ 4.303	
30	1,047	218.89 $\pm$ 17.87	
40	4,571	159.84 $\pm$ 16.03	

It is of considerable interest that under the immunization scheme described here the antibodies in the serum were found comparatively late.

Thus, in the process of forming the post-vaccinal antirabic immunity, a stable increase in the contents of mucolipids in the brain was observed over a certain period, which preceded the accumulation of specific antibodies in the serum. This shows that the reaction of the organism after the inoculation of a vaccine preparation proceeds not

only in the so-called 'organs of immunogenesis', but also in the systems mainly affected in the course of the disease.

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PATHOLOGY

Intracellular Plasma Protein: a Manifestation of Cell Injury in Myocardial Ischaemia

THE recognition of early cell injury poses an important problem in the study of disease, namely, the certain diagnosis of early myocardial infarcts. A variety of chemical and histochemical techniques have been tested for use in the identification of early myocardial ischaemia in experimental animals as well as in man^{1,2}. The search has been only partially successful.

The interstitial fluid that surrounds cells *in vivo* contains plasma proteins of varying size and shape³. Thus the permeability of cell membranes is constantly being tested by a spectrum of protein molecules ranging from β_1 -lipoproteins (molecular weight 1,300,000) to albumin (molecular weight 69,000). Under normal conditions the concentration of plasma proteins in interstitial fluid is low as compared with plasma. This is particularly true for large molecules such as β_1 -lipoprotein and fibrinogen. Increased capillary permeability, which is common to many pathological conditions, including ischaemia, may result in a concentration of intercellular fluid protein comparable to that of plasma³. Cell injury associated with increased permeability of cell membranes may be marked by the intracellular diffusion of one or more types of plasma proteins. Labelled antibody to plasma proteins which are either commercially available or readily produced provides a sensitive way of specifically identifying these proteins in interstitial tissue and within cells.

The anterior descending branch of the left coronary artery of eight mongrel dogs was ligated as previously described². The animals were killed from 1 to 24 h after the onset of ischaemia (Table 1). Blocks of myocardium were taken from the ischaemic anterior wall and from the normal myocardium of the posterior wall of the left ventricle. The tissue was fixed in 95 per cent ethanol at 4° C and processed for paraffin embedding as described by Sainte-Marie⁴. Serial sections were cut at 4 μ . Slides of the ischaemic and control tissue from each animal were stained by the haematoxylin and eosin, periodic acid-Schiff (PAS) and diastase-periodic acid-Schiff (D-PAS) methods⁵.

Table 1. INTRACELLULAR PLASMA PROTEINS AND D-PAS MATERIAL IN EXPERIMENTALLY PRODUCED MYOCARDIAL ISCHAEMIA IN THE DOG AS A FUNCTION OF TIME*

No. of animals	Period of ischaemia (h)	D-PAS material	Albumin	γ -Globulin	Fibrinogen
2	1	0	++	+	0
2	3	+	++	+	0
2	6	++	+++	+++	+++
1	12	++++	++++	++++	++++
1	24	++++	++++	++++	++++
8	0	0	0	0	0

* The maximum staining observed by the D-PAS and fluorescent antibody methods was designated + + + +. + + +, + + and + indicate approximately 75, 50 and 25 per cent of the maximum staining.