

Zusammenfassung. Im transkorneal mit Fluorescein gefärbten Kammerwasser verteilt sich der Farbstoff unter anderem durch Augenbewegungen gleichmässig. Aus der Pupille herausfliessendes, neugebildetes Kammerwasser ist ungefärbt. Photoelektrische Messung der Fluoreszenz einer kleinen, die Pupille einschliessenden Region ergibt Absinken der Fluoreszenz durch neugebildetes Kammerwasser. Mittels Kalibrierung lässt sich die Geschwindig-

keit der Fluoreszenzminderung zur Berechnung der Minutenvolumina auswerten.

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Blood-Brain Barrier Damage and Prolonged Cerebral Hyperemia Following Changes in Cerebral Perfusion Pressure; an Experimental EEG Study

An adequate reduction of the cerebral perfusion pressure is usually followed by prolonged cerebral hyperemia¹. The factors eliciting the hyperemia are still unknown. The duration of the hyperemia, however, far exceeds the calculated flow debt, indicating a damage to the autoregulatory mechanisms.

The aim of the present study was to evaluate a possible relationship between the reactive hyperemia and changes in the EEG and/or the blood-brain barrier function.

Methods. The experiments were performed on adult mongrel dogs under light nembutal anaesthesia. Cerebral blood flow was measured according to LASSEN et al.². Cerebral perfusion pressure was varied by infusion of a mock cerebrospinal fluid into the cisterna magna through a two-channel needle, allowing continuous registration of the induced CSF pressure. The animals were mechanically ventilated and had normal values of PCO₂ and O₂ saturation. In some animals the systemic arterial pressure and, accordingly, the cerebral perfusion pressure was raised by the i.v. injection of epinephrine and metaradrine (aramine). EEG was registered by means of 6 bipolar or monopolar leads via gold-plated stainless steel electrodes screwed into the calvarium. The EEG registration was carried out with an eight-channel Kaiser EEG apparatus. The blood-brain barrier function (BBB) was tested by i.v. injection of benzyl penicilline and of vital dyes (EVAN's blue, fluoresceine)^{3,4}.

Results. Figure 1 presents a typical experiment from a series performed on 6 dogs. (A) shows the resting EEG at normal systemic arterial blood pressure and cerebrospinal fluid pressure. 1,000,000 IU of penicilline/kg body-weight was injected i.v. with no obvious effect on the EEG during an observation period of 30 min (B). The cerebrospinal fluid pressure was then increased to 100 mm Hg, giving a marked reduction of the cerebral perfusion pressure, resulting in an isoelectric EEG during 2 min (C). After normalization of the cerebrospinal fluid pressure and thus also of the cerebral perfusion pressure in the EEG activity, when reappearing, was of a paroxysmal type (D), which continued for a considerable time. In non-immobilized animals symptoms of generalized seizures could be observed.

Another series of experiments, comprising 8 dogs, is represented by Figure 2. After i.v. injection of penicilline no effect was observed on the EEG during 30 min (B). Norepinephrine was then injected i.v., causing a rapid increase of the systemic arterial pressure. When the blood pressure reached a level of 240 mm Hg, paroxysmal

activity appeared in the EEG (C), accompanied by generalized convulsions. The same effect was obtained after elevation of the systemic arterial pressure with aramine. Raising of the systemic arterial pressure without previous injection of penicilline did not cause convulsions or changes in the EEG.

Normally penicilline does not pass through an intact BBB⁵⁻⁶. The present findings suggest that an impairment of BBB function was the result of the reduction of the perfusion pressure. A further support for this suggestion was obtained by a diffuse staining of the cerebral parenchyma after intravital injection of EVAN's blue and fluoresceine.

It seems that a gross reduction of cerebral perfusion pressure as well as an adequate increase of the systemic blood pressure are of importance for producing lesions of the BBB in dogs and thus, in the presence of an epileptogenic factor like penicilline, for producing epileptic mani-

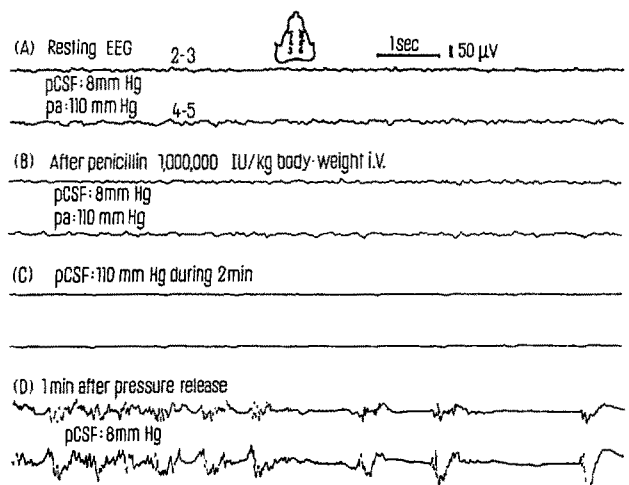


Fig. 1

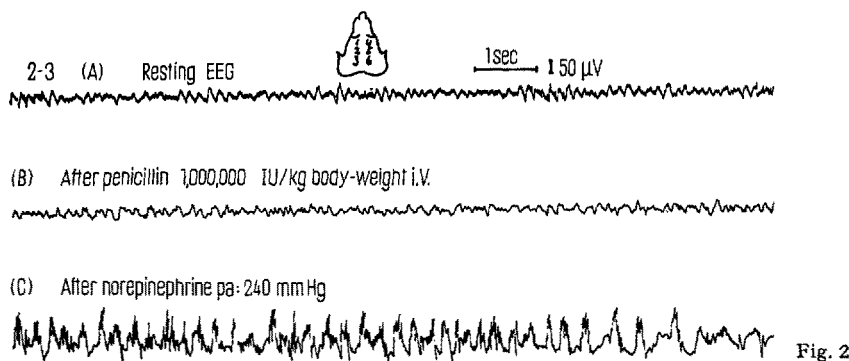
¹ E. HÄGGENDAL, J. LÖFGREN, N. J. NILSSON and N. ZWETNOW, Verh. Int. Neurochirurgen-Kongress, Bad Dürkheim (1966).

² N. A. LASSEN, K. HØEDT-RASMUSSEN, S. C. SØRENSEN, E. SKINHØJ, S. CRONQUIST, B. BODFORSS and D. H. INGVAR, Neurology, Minneap. 13, 719 (1963).

³ S. FLODMARK and O. STEINWALL, Acta physiol. scand. 57, 446 (1963).

⁴ S. FLODMARK and O. STEINWALL, Acta physiol. scand. 58, 368 (1963).

⁵ R. GONSETTE, Acta neurol. psychiat. belg. 5, 313 (1956).



festations. We have observed clinical correlates to the experimental findings in certain cases with generalized epileptic fits, following periods of reduced perfusion pressure during penicilline administration, where the seizures ceased after cessation of the penicilline administration.

Résumé. En expérimentant sur le chien, l'on peut produire des lésions de la barrière hémencéphalique aussi bien en diminuant qu'en élevant la pression de perfusion cérébrale. Ainsi l'administration d'un produit épi-

leptogène tel que la Pénicilline déclenche des crises comitiales alors que celle-ci est normalement arrêtée par la barrière hémencéphalique lorsque cette dernière est intacte. En clinique, des cas d'épilepsie de même mécanisme ont été démontrés.

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Effect of Selenium and Type of Diet on the Pattern of Food and Water Intake in the Rat

The results of several studies, reviewed elsewhere^{1,2}, have indicated that the trace element selenium is capable of enhancing the susceptibility to dental caries particularly when consumed during the developmental period of the teeth. For a better understanding of this relationship, it was thought advisable to investigate the effect of selenium and type of caries-producing diet consumed on the pattern of feeding and drinking habits of rats. No such studies have been reported previously.

Materials and methods. Male, weanling albino rats of the Sprague-Dawley-strain were used. They were housed individually in metal cages with raised screen bottoms. The animals were maintained on 2 caries-producing diets, designated as diet (A) and diet (B), commonly used in experimental caries research^{3,4}. The % composition of the diets was as follows: diet (A) sucrose 66, dried skim milk powder 32, liver substance 2; diet (B) ground corn 64, powdered whole milk 32, alfalfa meal 4.8, sodium chloride 1, irradiated yeast 0.2.

A total of 19 rats were assigned to each of the 2 diets. Of those, 10 animals were placed in the experimental group and 9 served as controls. The study lasted for 21 days and 3 rats did not finish the experimental period. Selenium, as sodium selenite, in the amount of 3 ppm was added to the drinking water of the animals assigned to the experimental group of each diet. The controls consumed tap water. Food and water were provided ad libitum. The daily consumption of food and water was measured accurately by methods described in previous works^{5,6}.

Results and discussion. The findings of the study appear in Table I. Normal control rats fed diet (B) gained more

weight than their counterparts on diet (A), although animals in both diets ate the same amount of food. As was anticipated, the mean weight gain of the animals ingesting selenium in both diets was significantly less, as determined by the *t* test, than that of their controls. The food and water intake of rats ingesting selenium was considerably reduced compared with their controls. The differences in food and water consumption between the control and selenium group of rats fed diets (A) and (B) were analyzed by the *t* test and were found to be statistically significant.

The data regarding the ratio of food to water intake shown in Table I revealed that in the normal control rats fed diet (A) the physiological relation of food to water consumption has been reversed, that is, more food than water was consumed. Such an observation has not been reported previously. For the selenium group of rats given the same diet the ratio of food to water remained similar to that of the controls. However, administration of selenium to rats consuming diet (B) resulted in a ratio of food to water lower than that of the controls. The proportion of food to water ingested by the control rats fed diet (B) was in the order of 1:1.53 which is appreciably

¹ D. M. HADJIMARKOS, *Archs envir. Hlth* 10, 983 (1965).

² D. M. HADJIMARKOS, *Borden's Rev. Nutr. Res.* 27, 1 (July-Sept. 1966).

³ R. S. STEPHEN and M. R. HARRIS, *Advances in Experimental Caries Research* (Ed. R. F. SOGNAES; Am. Ass. Adv. Sci. Washington, D.C. 1955), p. 47.

⁴ J. C. MUHLER and H. G. DAY, *J. Am. dent. Ass.* 41, 528 (1950).

⁵ D. M. HADJIMARKOS, *Experientia* 22, 117 (1966).

⁶ D. M. HADJIMARKOS, *Archs envir. Hlth* 14, 881 (1967).