A COMPARATIVE STUDY OF CHANGES IN DIURESIS DURING EXPERIMENTAL CONVULSIVE ATTACKS

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Translated from Byulleten' Éksperimental'noi Biologii i Meditsiny, Vol. 51, No. 3, pp. 52-54, March, 1961
Original article submitted January 18, 1960

Researchers studying the effect of a convulsive attack on diuresis have used Pyramidon [3], camphor [1], Corazol [2], electric current [1, 4], etc., as convulsivants.

The variety of methods which have been employed leads one to wonder whether the nature and degree of the diuretic changes which have been observed depend solely on the convulsive attack or whether the diuretic changes depend to some extent on the type of agent used to provoke convulsions.

To answer this question, we decided to study the diuretic changes which occur under conditions of chronic experiments with convulsions induced by various methods in dogs with ureters exposed through a section in the anterior abdominal wall according to the method of Orbeli and Pavlov.

EXPERIMENTAL METHODS

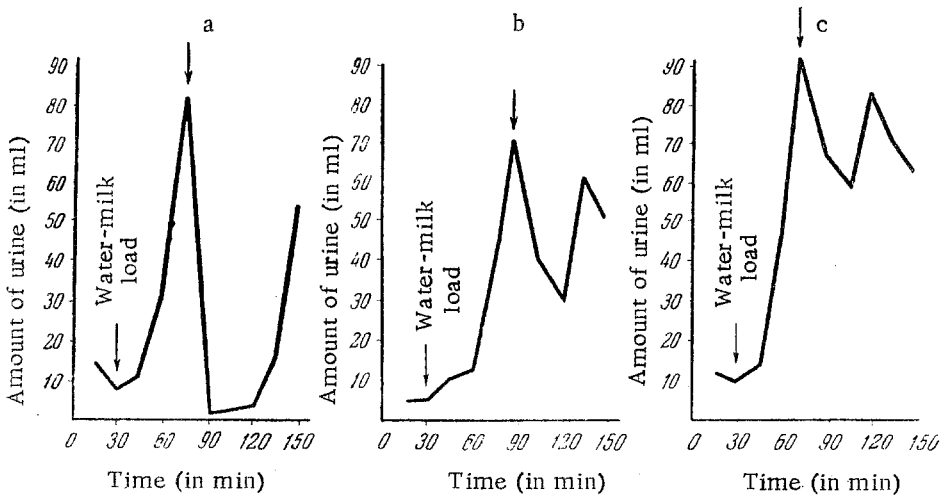
Convulsions were induced by Pyramidon (0.05 g of the substance per 1 kg weight intravenously injected in a 4% solution), an ether-camphor mixture (1.5 ml intravenously) and alternating 100-110 volt electric current passed through the animal's head for 1-2 seconds. The convulsive attack was reproduced on a background of high diuresis induced by the introduction of water into the dog's stomach through a probe (50 ml per 1 kg weight). The urine was collected at 15 minute intervals.

EXPERIMENTAL RESULTS

The nature and phasic course (tonic, clonic and "running in place") were the with all the agents used, the strongest and most lasting convulsions being those induced by camphor and Pyramidon. The convulsive attacks induced by the alternating electric current were milder and of shorter duration than those induced by the pharmacological agents.

The use of camphor and Corazol over a long period did not lead to any reduction in the strength of the convulsive attack or any change in its phasic course. A different picture was observed in the case of the Pyramidon injections. When injected for the third and fourth times within a period of one to two months, Pyramidon ceased to induce a convulsive attack, even when a double dose of the solution was administered or when its concentration was increased to 10%.

All the experimental convulsivants inhibited diuresis up to complete anuria for 5-20 min, after which diuresis began to increase, approximating the original after 45-60 min (see figure, a). The diuretic inhibition observed depended in degree and duration on the strength of the convulsive attack; the greatest inhibition of



Change in water diuresis in dogs following administration of Pyramidon in convulsive doses. a) March 8, 1958 experiment (convulsions developed); b) March 16, 1958 experiment (no convulsions); c) March 25, 1958 experiment (no convulsions). Arrow (↓) shows injection of Pyramidon solution.

diuresis was observed during the convulsions induced by camphor, Pyramidon and Corazol. Diuretic inhibition was less pronounced during the convulsive attack provoked by the electric current. The diuretic inhibition observed in the experiments in which Pyramidon failed to induce convulsions was slight and variable (see figure, b, c). The hydration level of the organism can be regarded as the second factor determining the duration and degree of diuretic inhibition. A high degree of hydration in the animal evidently prevents diuretic inhibition.

By chance, one of the dogs in our laboratory provided full corroboration of the experimental results obtained. For no apparent reason, this dog developed periodic epileptiform convulsive attacks, although no convulsivants had been previously administered to this dog (the animal evidently suffered from some kind of brain disease). During the experimentation on this dog, it developed a typical convulsive attack, thus enabling us to trace the changes occurring in diuresis during spontaneous convulsions. This established that experimentally induced convulsions are identical to the convulsions which develop spontaneously under conditions of brain disease, and that the changes in diuresis are determined only by the strength and duration of the convulsive attach and the original level of diuresis, not by the agent used to induce the convulsions.

SUMMARY

A study was made of the effect on diuresis of spasmodic attacks, provoked by various methods. To induce these, substances differing by their chemical nature and pharmacological action were used (camphor, Corazol, Pyramidon), along with electric current.

As established, camphor and Corazol lead to a strong prolonged spasmodic attack, since no habituation to these preparations develops. Although Pyramidon is capable of inducing a spasmodic attack of adequate length and strength, it is not very useful in chronic experiments, since habituation to this drug is rather rapid. Spasmodic attacks provoked by electric current passed through the animal's head are somewhat less strong and prolonged in comparison with the convulsion caused by pharmacological agents.

Thus, the character of diuretic changes occurring in spasmodic attack does not depend on the agent provoking the convulsions; inhibition of diuresis was observed in all of the experiments. The duration and the depth of this inhibition depended on the strength of convulsive attack and the initial diuresis background.

LITERATURE CITED

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All abbreviations of periodicals in the above bibliography are letter-by-letter transliterations of the abbreviations as given in the original Russian journal. *Some or all of this periodical literature may well be available in English translation.* A complete list of the cover-to-cover English translations appears at the back of this issue.
