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8431 P

Recovery of Mammalian Nerve Fibres in Vivo.

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An isolated nerve fibre, as it recovers from the condition of absolute refractoriness which follows activity, is known under suitable conditions to pass through 3 successive phases, relative refractoriness, supernormality, and subnormality.[1, 2, 3] We have attempted to determine the course of recovery of nerve fibres in as nearly as possible physiological conditions, *i. e.*, those conditions existing in the body of a healthy, intact animal. Etherized or decorticated rabbits were used, and induction shocks were applied either to the oculomotor nerve *in situ*,[4] or to the sciatic nerve at the level of the trochanter major of the femur. The greatest care was taken to prevent hemorrhage, tissue injury or temperature change. Responses were recorded by means of a cathode ray oscillograph from the internal rectus muscle, the nerve to the inferior oblique muscle, the tibialis or gastrocnemius muscle or the deep peroneal nerve, according to the nerve stimulated. Thirty experiments were performed.

The recovery curves obtained often included the three phases of relative refractoriness, supernormality and subnormality, but there was considerable variation from nerve to nerve, and in the same nerve from time to time. Apparently the nerve fibers are extremely sensitive to metabolic changes taking place in the body, so that the recovery curve varies continuously. The relatively refractory period usually ended 2-5 msec. after the conditioning shock, and

[1] Adrian, E. D., and Lucas, K., *J. Physiol.*, 1912, **44**, 68.

[2] Graham, H. T., PROC. SOC. EXP. BIOL. AND MED., 1933, **31**, 193; *Am. J. Physiol.*, 1935, **111**, 452.

[3] Gasser, H. S., *Am. J. Physiol.*, 1935, **111**, 35.

[4] Lorente de Nó, R., *Am. J. Physiol.*, 1935, **112**, 595.

was succeeded by a supernormal period lasting until 10-20 msec. after the shock, with a peak of excitability at 4-7 msec. At the peak, the maximum change in excitability (as measured by the change in strength of stimulus required to bring the response to normal height) was 5-10%. There was no striking difference between the oculomotor and the sciatic nerves in regard to the refractory and supernormal periods, but the subnormal period was much more prominent in the latter. This period did not outlast 35 msec. with the oculomotor nerves, and was sometimes apparently absent altogether, while with the sciatic nerves it usually lasted 50-100 msec. (minimum excitability 3-4% below normal, occurring at 20-30 msec.) and was present all or part of the time in every experiment.

When the preparation was made rapidly so that the recovery curve could be obtained within an hour after fastening the rabbit to the board, and when the nerve was stimulated as few times as possible before observing the recovery at the shock intervals where supernormality ordinarily occurs, instead of supernormality prolonged refractoriness was found. This refractoriness then disappeared, usually very promptly, and supernormality or at least a peak of excitability developed at these intervals. The supernormal phase is therefore not present normally. On the other hand, it is also not present in moribund rabbits. As to how it is produced, our experiments are not conclusive. Since it has been found in freshly prepared nerves of rabbits of which other nerves had been under experimentation for some time, it can hardly be attributed to a local change in the nerve being stimulated. It was sometimes decreased by forced hyperventilation of the lungs; and following (though not during) asphyxia by rebreathing, it may increase very markedly. Ether does not seem to have a specific effect.

Of special interest is the fact that while the excitability of the motor fibres to induction shocks was supernormal at certain intervals, the excitability of the motoneurones to synaptic stimuli was subnormal at these same intervals; the recovery of excitability to synaptic stimuli always was as previously described.[4] One might be tempted to explain this difference by the assumption that, although kept under identical conditions, the axon but not the soma of the motoneurones had been modified so as to manifest supernormality; however, when the excitability of the soma of the motoneurones was tested by induction shocks applied directly to the oculomotor nucleus,[5] the recovery of normal excitability was as prompt

[5] Lorente de Nó, R., *J. Cell. Comp. Physiol.*, 1935, **7**, 47.

as in the nerve fibre. Evidently at intervals at which the soma of the motoneurones has subnormal excitability for synaptic stimuli, it has normal and even possibly supernormal excitability for induction shocks.

8432 C

Use of Liver Extract Intramuscularly in the Course of Acute Amebiasis in Dogs.*

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Previous communications from this laboratory[1, 2, 3] have demonstrated the amebostatic and possibly amebacidal properties of whole raw liver and of powdered liver extract administered orally to dogs which had been experimentally infected with human strains of *Endamoeba histolytica.* The present investigation deals with dogs, similarly infected and suffering from acute amebic enteritis, treated with liver extract intramuscularly. In 6 such animals a commercial product, generously furnished us by Parke, Davis and Co., was used; in a parallel series of 8 dogs we prepared our own sterile fresh liver extract. In both series 1 cc. of the extract represented 5 gm. of fresh pig's liver. Alternately 2 cc. of the extract was injected respectively into the right and left gluteus muscles. The results of the investigation, together with the clinical history of the animals and brief autopsy reports, are presented in the following protocols. In all cases the same human strain of the organism, previously passed through several dogs, was utilized. We are indebted to Col. Chas. F. Craig for certain complement fixation tests on these dogs.

Dog 211

Nov. 2, 1934	Inoculated intracecally with trophozoites (T) of *E. histolytica* obtained from dysenteric exudate of dog 210; animal healthy, about one year old.
" 5	*E. histolytica* T+ first recovered by intracecal aspiration; stool diarrheic.

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1 Kagy, E. S., and Faust, E. C., PROC. SOC. EXP. BIOL. AND MED., 1930, **28**, 252.

2 Faust, E. C., and Kagy, E. S., *Am. J. Trop. Med.*, 1934, **14**, 235.

3 Faust, E. C., Scott, L. C., and Swartzwelder, J. C., PROC. SOC. EXP. BIOL. AND MED., 1934, **32**, 540.