

4349

The Glycogen Content of Muscles in Tetanus Contracture.

H. A. DAVENPORT AND S. W. RANSON.

From the Institute of Neurology, Northwestern University Medical School, Chicago.

Local tetanus was produced in one hind limb of experimental animals (rats, guinea pigs and rabbits), and the glycogen content of flaccid and contracted gastrocnemii compared. Time intervals of 2 to 58 days were allowed to elapse from time of injection of tetanus toxin to sacrificing the animal.

In general, less glycogen was found in the shortened muscle than in the flaccid gastrocnemius from the opposite (uninjected) side. Two rabbits were allowed to survive for over six weeks and when sacrificed the tetanus gastrocnemii although still in contracture contained more glycogen than their functioning companions. Guinea pigs which survived for seven weeks still showed reduced glycogen in tetanus muscles unless they had regained function. In the latter case (one animal) the glycogen content was the same on both sides. Rats showed very little change in glycogen from the normal.

In view of the variability of results it was concluded that the changes in glycogen were indirectly associated with the phenomenon of contracture. This view was strengthened when it was found that contractures produced in the hind limbs of cats by section of the dorsal roots of spinal nerves were not associated with changes in glycogen content of the shortened muscles.

Our observations on the glycogen changes in tetanus muscles are in agreement with those made by Wertheimer¹ on guinea pigs.

4350

Reaction of Gall-Bladder to Faradic Stimulation of Stomach.

C. L. BIRCH AND E. A. BOYDEN.

From the Departments of Medicine and Anatomy, University of Illinois, College of Medicine, Chicago.

In a previous publication attention was called to a case of spontaneous emptying of the human gall bladder during fasting, in which the patient reported the occurrence of hunger pangs during the in-

¹ Wertheimer, E., *Arch. ges. Physiol.*, 1928, cexxi, 139.

terval in which cholecystograms were recording a marked reduction in size of the gall bladder.¹ This was interpreted as being in harmony with Boldireff's observations that during fasting, bladder bile is discharged into the duodenum synchronously with gastric hunger contractions.

Very recently, we have observed rhythmic tonus changes of the gall bladder, in fasting cats, that are concurrent with rhythmic peristaltic contractions of the stomach. These observations, made on unanesthetized animals 7 to 10 hours after operation, were recorded by series of x-rays taken at intervals of 30 seconds—the gall bladder being visualized by roentgen-opaque oil, and the stomach by its content of air. The intervals between phases, as well as the duration of the contraction waves (1 to 3 minutes), seem to correspond to the periods of gastric hunger contractions described in the literature.

That these tonus waves of the gall bladder are induced by successive contractions of the stomach would seem to be verified by the following experiments. If insulated electrodes be sewed to the greater curvature of the *pars pylorica*, and the cat be allowed to recover from the operation, weak faradic stimulation of the stomach ($\frac{1}{2}$ milliampere) causes ring contraction of that organ and simultaneous contraction of the gall bladder. If a stronger current be used ($6\frac{1}{2}$ milliamperes) the lipiodol in the gall bladder may be shot up into the cystic duct, the contractile cycle of the gall bladder lasting from 1 to 3 minutes, depending on the strength of the contraction. This seems to indicate that the mammalian gall bladder is directly under control of reflexes originating in the gastro-intestinal tract.

But if the cat be given a meal of egg-yolk, and it be ascertained by x-rays that contraction and emptying of the gall bladder is taking place, then faradic stimulation of the stomach inhibits emptying of the gall bladder. This observation suggests the possibility that dysfunction and stasis of the human gall bladder may be induced by chronic inhibitory reflexes originating in a diseased gastro-intestinal tract, and that certain types of biliary pathology may be merely part of a syndrome involving interrelated portions of the digestive system.

¹ Boyden, E. A., PROC. SOC. EXP. BIOL. AND MED., 1926, xxiv, 157.