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Body Temperature Regulation, Hypothermia Due to Lesions Involving Vestibular Nuclei of Rabbit.

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In a previous communication it was shown that localized lesions in the midbrain produce a fall of body temperature from a normal of 39-40°C. to 28-26° C. within about 5 hours.[1] Accompanying the hypothermia is a gradual decrease in muscular tonus and at 26° C. almost complete atonia. The following example will illustrate the rate of change in both:

Time	Temp. of rabbit in ° C.	Tonus symptoms
9:30 a. m.	40.0	
10:45 a. m.	Injection of chromic acid	
11:30 a. m.	35.5	Relaxed
11:50 a. m.	34.0	Relaxed
12:00 m.	32.5	Marked hypotonia, no reflexes.
12:20 p. m.	32.0	
1:30 p. m.	30.0	
3:00 p. m.	29.0	
3:30 p. m.	28.0	
6:00 p. m.	28.8	Complete atonia.
9:00 p. m.	26.0	Complete atonia.

The similarity between the temperature and the tonus changes suggests the dependence of the former upon the latter. This suggestion is strengthened by the fact that the effective lesion is very limited in extent and exact in location and always involves the posterior longitudinal bundle with its fibers from the vestibular nuclei. This tract is probably partially responsible for normal tonus, because of the relationship of most of its fibers to the vestibular nuclei which are necessary for normal tonus. These nuclei seem to maintain an inhibition to the normal myotatic inhibition within the muscle itself, and their dysfunction or perhaps a break at any point in the reflex arc, as for example in the posterior longitudinal bundle, may release the tonic inhibition in the muscle with subsequent atonia. The atonia causes a decrease in heat production probably of sufficient magnitude to bring the body temperature down to the abnormally low level attained in these experiments.

An attempt was made to destroy the vestibular nuclei by chromic

[1] Moore, PROC. SOC. EXP. BIOL. AND MED., 1928, xxvi 48.

acid injections similar to those made in the midbrain. It is extremely difficult to localize lesions in this region of the brain, and so far only 2 partially satisfactory results have been obtained. In the example given the left nuclei were completely destroyed:

Time	Temp. ° C.	Tonus symptoms
9:30 a. m.	39.5	
10:00 a. m.	Injection of chromic acid	
10:10 a. m.	36.4	Relaxed, nystagmus.
10:20 a. m.	35.6	Very relaxed.
10:50 a. m.	34.4	Cannot stand.
11:15 a. m.	33.9	
11:45 a. m.	33.0	Marked hypotonia.
12:15 p. m.	32.7	
12:45 p. m.	32.3	Hypotonia.
1:15 p. m.	32.5	
2:30 p. m.	33.0	
5:00 p. m.	34.2	Slight increase in tonus.
9:00 p. m.	34.2	

The rate of the change in temperature and in tonus very exactly corresponds to that obtained by many midbrain lesions and it is possible that if both the right and left nuclei are destroyed the profound effects of the extreme midbrain cases will be found. The parallelism is sufficiently exact to make plausible the hypothesis that the hypothermia following the midbrain lesions is due to injury of the fibers from the vestibular nuclei which run in the posterior longitudinal bundle and not to dysfunction of a hypothetical heat center. Many more cases are needed, however, before a definite conclusion can be drawn.