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Lowered Resistance to Heat in Adrenal Insufficiency.*

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Gautrelet and Thomas[1] observed that the rapid breathing usually produced by exposure to high temperatures was absent or very much reduced in the late stages of adrenal insufficiency. In our care of adrenalectomized animals in the laboratory, we have found that high temperatures affect these animals easily. When accidentally overheated, they die before the normal animals.

A study has been made of the effect of heat on adrenalectomized rats. When placed in a temperature of 37-40°C. at first both normal and adrenalectomized rats move about the cage. A little later, however, the adrenalectomized animals become quiet and try to sleep, only occasionally moving about. As time goes on the adrenalectomized animals become prostrate while the normal animals show discomfort only by continually moving about the cage and washing themselves with saliva. Frequently the adrenalectomized animals die in a temperature which is not serious for the normals exposed the same length of time. The adrenalectomized animals easily pass into convulsions. At this time convulsions can be brought on by a slight stimulus.

Cortical extract can protect adrenalectomized animals to a considerable degree. If cortin injected and sodium chloride injected (0.5 cc. twice daily of extract and isotonic NaCl solutions respectively) rats which have been adrenalectomized are placed in the same high temperature, the difference between the 2 is much like that between normal animals and untreated adrenalectomized animals except that it is not quite so striking. We are unable at present to explain this increased resistance brought about by cortin.

We have studied the water content of various tissues in the body after exposure to heat.

It will be noted that the water content of the blood and muscle shows the least difference in the various groups. The liver comes next while the skin shows the widest differences. In all instances the cortin treated adrenalectomized rats show a water content between that of normal values and the values of the sodium chloride

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[1] *Compt. rend. Soc. de biol.*, 1909, **67**, 386.

TABLE I.
% Water in Tissue after Exposure to 38°C.

Group		Blood	Skin	Muscle	Liver	All Tissues	Colonic Temp.	Duration (min.)	Loss wt. (gm.)
Normal	(3)	77.9	65.8	76.5	70.7	72.7	40.0°C.	98	5.0
Cortin	(7)	79.4	69.8	76.2	71.1	74.1	39.8°C.	110	6.0
NaCl	(6)	79.6	72.3	77.6	74.9	76.1	40.6°C.	78	3.6

treated rats. The sodium chloride treated rats were exposed to heat on the average of 78 minutes as compared to 98 minutes for the normals and 110 for the cortin treated. The much shorter period for the sodium chloride rats was due to their inability to resist the heat longer. The higher colonic temperature (40.6°C.) of these rats compared with that of the cortin treated and normals may indicate that they were unable to lose heat as effectively. This may be due in part to a failure of the shift of water through the membranes, because the skin, one of the reservoirs, still retains more water than is found in the normals. Liver likewise contains more. It would seem from these limited observations that less effective mobilization of water is in part responsible for the lowered resistance to heat in adrenal insufficiency.