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Influence of Potassium Concentration on Temperature of Cold Standstill in the Turtle Heart.

GEORGE H. ZWIKSTER AND T. E. BOYD.

From the Department of Physiology and Pharmacology, Loyola University School of Medicine.

In 1934 Ets and Boyd¹ reported that frog nerves, soaked in modified Ringer solutions containing an excess of potassium, are thereby rendered abnormally susceptible to block by local cooling. Nerves kept in ordinary Ringer solution invariably continued at low temperatures to conduct until they were frozen.

We have investigated the effects of varied concentrations of potassium on the behavior of the turtle heart at low temperatures. The excised atria of *Pseudemys elegans*, with sinus attached, were suspended in an aerated bath containing the solution to be tested. The preparations were left in the solution for 30 minutes at constant temperature—in winter at 20°C., in summer at 28°—and then gradually cooled. The temperature of stoppage was determined from the graphic record made with a light isotonic lever. Both sinus and atrial beats ceased abruptly, and not by gradual fading. Sino-atrial block appeared first, but as a rule only a few sinus beats occurred thereafter.

Unbuffered Ringer solutions were used. They were modified

TABLE I.

Solution, % KCl	No. and type of preparations	Stoppage temp. (sinus) ° C.
Frog Ringer		
NaCl .650		
KCl .014	12, summer	Below 1
CaCl ₂ .012		
Same, KCl .056	20, "	5 to 8
Turtle Ringer		
NaCl .700	8, "	4 to 6
KCl .040		
CaCl ₂ .025	20, winter	0 or lower
Same, KCl .02	5, summer	Below 1
Same, KCl .12	3, "	14, 14, 6
	9, winter	3 to —1
Same, KCl .16	2, summer	28, 23
	4, winter	10, 10, 10, 11

¹ Ets, Harold N., and Boyd, T. E., *Am. J. Physiol.*, 1934, **108**, 129.

by changing the concentrations of KCl and NaCl in opposite directions, keeping the osmotic pressure constant.

It is evident that the low limit of temperature for spontaneous beats varies according to the potassium content of the solution in which the heart has been kept. Martin² found this to be true of the beats of the turtle ventricle, but since he stated that the auricles were relatively resistant to cooling, he was presumably dealing with an atrio-ventricular block rather than a complete stoppage.

The relatively high susceptibility of summer preparations, indicated in the table, is apparently due to an actual seasonal variation in the condition of the tissue, and not to the higher initial temperature from which the cooling was started. Preliminary immersion at 20° instead of 28° does not render such a preparation appreciably more resistant to cooling. Regardless of seasonal variations and initial temperature, however, any preparation can be cooled to 0° without stopping, if it has been kept for a time in a sufficiently low concentration of potassium.

The effect of the higher concentrations of KCl is reversible. A preparation kept in Ringer solution containing 0.160% KCl shows, on repeated cooling, a progressively higher temperature of stoppage until beats finally cease at room temperature. On transferring the preparation to normal frog or turtle Ringer the process is reversed, beats eventually continuing at 0°. Balancing the original solution, by adding a corresponding excess of calcium, is not effective in causing such recovery.

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Cytological Studies on Experimental Rat Tumors.

E. VON HAAM, H. ALEXANDER AND H. BEARD.

From the Departments of Pathology and Bacteriology and Biochemistry, Louisiana State University Medical Center, New Orleans, Louisiana.

The present investigation is the first attempt at an experimental approach to the problem of nucleolus size in cancer cells. In a previous publication, von Haam and Alexander¹ reported studies on nuclear and nucleolar measurements in fixed and unfixed cells of malignant tumors in man. After examining 10,000 cells, 5,000 of

² Martin, E. G., *Am. J. Physiol.*, 1904, **11**, 370.

¹ von Haam, E., and Alexander, H. G., *Am. J. Clin. Path.*, 1936, (in press).