SUMMARY

The aim of this work is to find out the effect of NaCl concentration on the oxygen consumption of the mammalian pituitary and also on its cholesterol contents. Another feature of this work is to investigate the influence of 24 amino acids on these two processes. Correlation and regression studies of the data have been carried out to correlate the process of oxygen uptake with the cholesterol contents of the pituitary. The thesis is supported by 123 x 2 Tables of experimental data, 52 tables of correlation and regression studies and 55 graphs. Oxygen consumption was studied with the help of Warburg apparatus and estimation of cholesterol was done by the Liebermann-Burchard method.

2. The oxygen uptake of the homogenated pituitary is higher than that of intact pituitary.

3. The rate of oxygen uptake by the rat pituitary homogenates increases as the concentration of sodium chloride is enhanced in the medium. The increase rate of oxygen uptake points to the fact that sodium ion does influence the metabolism in the pituitary. The table below shows the oxygen uptake in µl/mg dry weight of pituitary/30 minutes with S.D. (standard deviation) and S.E. (standard error of the mean).
Concentration of NaCl  µl/mg dry weight of pituitary/30 minutes

7 gm o/oo NaCl          0.9865 S.D. 0.4263 ± 0.0499
8 gm o/oo NaCl          1.3499 S.D. 0.5418 ± 0.0638
9 gm o/oo NaCl          1.5488 S.D. 0.5280 ± 0.0622
10 gm o/oo NaCl         1.8089 S.D. 0.3988 ± 0.0469
11 gm o/oo NaCl         2.2097 S.D. 0.5090 ± 0.5998

4. The cholesterol contents of the pituitary follow a similar course as the oxygen uptake with respect to sodium concentration. The table below shows the cholesterol contents of the adrenal with respect to NaCl concentration.

Concentration of NaCl          Average quantity of cholesterol in mg/mg dry weight of pituitary/30 minutes with standard deviation (S.D.) and S.E. (standard error of the mean)

7 gm o/oo 0.00033 S.D. 0.000074 ± 0.0000087
8 gm o/oo 0.00037 S.D. 0.000070 ± 0.0000082
9 gm o/oo 0.00043 S.D. 0.000013 ± 0.000015
10 gm o/oo 0.00049 S.D. 0.000069 ± 0.000081
11 gm o/oo 0.00057 S.D. 0.000080 ± 0.000094

5. Lysine, Proline, Glutamic acid, Aspartic acid, Cysteine, Cystine, Histidine, Tryptophan, Iso-leucine, DOPA, Phenylalanine, Alanine, Glycine, Arginine, Threonine and Leucine have a stimulating effect on the oxygen consumption of the rat pituitary homogenates. The range of stimulation is 16.9068% in the case of leucine to 52.8257% in the case of Lysine.
6. Valine, Serine, Tyrosine, Ornithine, Hydroxyproline, Nor-leucine, \( \alpha \)-amino-butyric acid and Methionine have a depressing effect on the oxygen consumption of the rat pituitary homogenates. The range of depression is 12.9693\% Methionine to 49.2966\% Valine.

7. The oxygen consumption of rat pituitary is stimulated as the concentration of sodium chloride is increased. Therefore the increase in the oxygen consumption is directly proportion to to saline concentration.

8. The oxygen consumption of the rat pituitary homogenate is considerably depressed as the concentration of sodium chloride is increased in the case of the amino acids - Valine, Serine, Tyrosine, Ornithine, Hydroxyproline, Nor-leucine, \( \alpha \)-amino-butyric acid and Methionine. Maximum depressing effect is generally in the sodium chloride concentration which is lower than the normal physiological saline.

9. The cholesterol contents of the rat pituitary homogenate in the normal mammalian physiological saline are increased by the addition of Lysine, Alanine, Proline, Glutamic acid, Cysteine, Histidine, DOPA, Iso-leucine, Arginine, Aspartic acid, Tryptophan, Leucine, Threonine, Cystine, Glycine and Phenylalanine.

10. The amino acids Valine, Methionine, Serine, Ornithine, Nor-leucine, Hydroxyproline, Tyrosine and \( \alpha \)-amino-butyric acid reduce the cholesterol contents in the normal
physiological saline.

11. The cholesterol contents of the rat pituitary are increased by the amino acids. Lysine, Alanine, Proline, Glutamic acid, Cysteine, Histidine, DOPA, Iso-leucine, Arginine, Aspartic acid, Tryptophan, Leucine, Threonine, Cystine, Glycine and Phenylalanine. The per cent increase indirect proportion to saline concentration.

12. Since the cholesterol contents of the pituitary homogenates are increased by sodium chloride concentration in the media, it is presumed that the enzymes responsible for the biosynthesis of cholesterol are present in the rat pituitary and they are stimulated by sodium chloride.

13. There appears to be no structural basis for the effect of the amino acids on oxygen consumption. Thus sodium chloride appears to control the membrane permeability and acts as a stimulant for some enzymes.

14. The pituitary was found to contain seven free amino acids - proline, iso-leucine, methionine, glycine, threonine, leucine and alanine out of these seven amino acids six amino acids (Glycine, Iso-leucine, Leucine, Alanine, Threonine, Proline) stimulate the oxygen consumption and cholesterol production while the remaining one Methionine have depressing effect on both these processes. It appears the free amino acids act by stimulating and depression of the oxygen consumption through change in pH (Table No. 196).
13. There is no correlation between the different types of amino acids (glucogenic and ketogenic) as regards the oxygen consumption and cholesterol contents of the pituitary.

16. The amino acids which stimulate the oxygen consumption of the homogenate also increase the cholesterol contents. Similar behaviour is also seen in the case of the depression of the above processes by some amino acids.

17. One of the most interesting conclusions which emerges from the present study is that the oxygen consumption and cholesterol formation are correlated processes in the pituitary.

18. Statistical evaluation of the data fully confirms the experimental results. High correlation and regression values have been obtained between the oxygen uptake and cholesterol contents of the rat pituitary.

19. The pH of different homogenates in various saline concentrations has been determined before and after addition of amino acids. The pH, however, is not the only factor in the results obtained for example, Glycine and Serine both have pH higher than isoelectric point but one (Serine) depress oxygen consumption and cholesterol production while the other (Glycine) increase the two processes.

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