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THE METABOLISM OF SHEEP GINGIVA, *by L. Zar and J. T. Irving (Joint Dental Research Unit of the C.S.I.R. and the University of the Witwatersrand, Johannesburg).*

In contrast to other tissues such as liver or muscle, oral tissues have been little investigated in so far as respiration and metabolic changes are concerned. In 1949, Glickman *et al.* determined the oxygen quotient, QO_2, (μl. O_2 taken up/mg. dry tissue/hour) of normal human gingiva and found it to be $1{\cdot}6 \pm 0{\cdot}37$. In normal dogs the quotient was $1{\cdot}3 \pm 0{\cdot}07$ [Glickman *et al.*, 1950]. Eichel and Swanson [1957] studied some of the enzymes of the oral tissues of the rabbit and found that gingiva possessed a low enzyme activity as compared to liver. To the best of our knowledge it has not been shown that a complete citric acid cycle exists in gingiva.

A sheep's head was obtained from the abattoirs, the gingiva dissected out and placed in Kreb's solution. Some of the material was used immediately and the rest stored at 4° C up to 4 days. The direct method of Warburg, the procedure and solutions being as described by Umbreit *et al.* [1957], was used to determine the oxygen uptake of the gingiva. The respiration of the tissue was measured for 2 hours. As a check on possible bacterial contamination, the tissue was sometimes removed from the flask and the respiration of the medium determined for another hour. In no case was a further oxygen uptake detected.

The effect of glucose, all the intermediates of the citric acid cycle (pyruvate, oxaloacetate, citrate, aconitate, isocitrate, oxalosuccinate, α-ketoglutarate, succinate, fumarate and malate) as well as a known inhibitor of the cycle, malonate, was determined. Only a 30% change in the QO_2 as compared to the control was taken as being significant.

It was found that the QO_2 of sheep gingiva was $1{\cdot}46 \pm 0{\cdot}33$ and that it dropped linearly on storage to a value of 0·57 after 4 days.

Glucose, and all the intermediates of the citric acid cycle did not change the QO_2 of fresh gingiva, but malonate inhibited the oxygen quotient even when the tissue was fresh. After storage of the gingiva, however, glucose and all the intermediates of the citric acid cycle significantly increased the QO_2, the effect persisting for up to 4 days' storage. Appropriate amounts of malonate inhibited the increased respiration caused by succinate.

The QO_2 values of fresh sheep gingiva were of the same order as those reported in the literature for man and dog. The stimulating effect of the succinate on stored gingiva was not seen when liver was similarly treated. The reason why the QO_2 of fresh gingiva is unaffected by the metabolites studied, whereas stored gingiva responds to them, is at present obscure, but it may be due to some permeability change in the tissue.

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