

ABSTRACT

1. 1. Aerobic carbohydrate metabolism necessitates a hydrogen shuttle mechanism. 2. 2. This mechanism must supply glyceraldehyde 3-phosphate dehydrogenase with NAD and must not, in itself, detract from the long-term nature of the aerobic metabolic process. 3. 3. There are four known shuttle mechanisms; all are relatively complex, involving reducing equivalents crossing the mitochondrial membrane. 4. 4. However, at least two completely cytoplasmic mechanisms can be theoretically designed which would adequately supply NAD for glyceraldehyde 3-phosphate dehydrogenase. 5. 5. It is concluded that the mechanisms involving the mitochondria were selected as only these, by incorporating cytochrome oxidase as the terminal reaction of the shuttle, ensure that neither the hydrogen acceptor, nor the reduced end-product, are ever limiting.