The gluconic acid-producing enzyme of acinetobacters

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The capacity to produce an aldonic acid from aldose sugars is widespread among acinetobacters. The enzyme responsible for this reaction is a membrane-bound, pyrrolo-quinoline quinone (PQQ)-dependent aldose dehydrogenase (E.C. 1.1.99.17). Fermentor studies with *Acinetobacter calcoaceticus* strain LMD 79.41 showed that the aldose dehydrogenase is synthesized constitutively. Preliminary results obtained with carbon-limited chemostat cultures of this organism revealed that the cell yield on mixtures of acetate and glucose was significantly higher than on acetate alone (molar growth yield ($\text{g} \cdot \text{mole}^{-1}$) for acetate 14.6 versus 21.3 for acetate plus glucose). Since glucose is almost quantitatively oxidized to gluconic acid it follows that the aldose dehydrogenase may play a role in energy metabolism of acinetobacters.

The activity of the enzyme and the rate of acid production from aldose sugars by whole cells show large differences in various *Acinetobacter* strains, cultivated under the same conditions. However, a low activity of aldose dehydrogenase is not necessarily due to a low level of apo-enzyme. In various strains the addition of PQQ to cell suspensions resulted in an instantaneous enhancement of the rate of glucose oxidation. Efficient recombination of apo-enzyme and PQQ in such strains was also observed in vitro. It is concluded therefore that the apo-enzyme and coenzyme are not always synchronically synthesized in acinetobacters. Preliminary results show that this may also be true for a number of other genera including *Pseudomonas* and *Rhodopseudomonas*.