P2

Enzymatic and Energetic Properties of the NADH:Ubiquinone Oxidoreductase in the Marine Bacterium *Pseudomonas nautica*

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Abstract

Each oxidoreductase activity of the aerobic respiratory chain-linked NADH oxidase system in the marine bacterium *Pseudomonas nautica* was stimulated by both Na^+ and K^+. In the presence of NADH or deamino-NADH as electron donors, QH_2 formation was approximately 1.3 fold higher in Na^+ than K^+ at a concentration of 0.08 M, whereas the other reductase activities were not significantly higher in Na^+ than K^+. The optimal pH of NADH (or deamino-NADH):ubiquinone-1 oxidoreductase was 9.0 in the presence of 0.08 M NaCl. The activity of NADH (or deamino-NADH):ubiquinone-1 oxidoreductase was about 33% inhibited by 60 μM 2-heptyl-4-hydroxyquinoline-*N*-oxide (HQNO). The activity of NADH (or deamino-NADH):ubiquinone-1 oxidoreductase was about 32 to 38% inhibited by 80 μM rotenone, whereas the activity was highly resistant to capsaicin. On the other hand, electron transfer from NADH or deamino-NADH to ubiquinone-1 generated a membrane potential ($\Delta\Psi$) which was larger in the presence of Na^+ than that observed in the absence of Na^+. The $\Delta\Psi$ was almost completely collapsed by 5 μM carbonylcyanide *m*-chlorophenylhydrazone (CCCP), and approximately 50% inhibited by 100 μM rotenone, or 60 μM HQNO. HQNO, also, made the $\Delta\Psi$ very unstable.