Amiloride inhibits protein synthesis and lowers the intracellular pH in exponential growing Yoshida rat ascites hepatoma (AH 130) cells: evidence for a role of the Na+/H+ exchanger.


Abstract

We have previously demonstrated in a rat ascites hepatoma cell line (Yoshida AH 130) the presence of a glucose-activatable and amiloride sensitive Na+/H+ exchange (Cell Biol. Int. Rep., 1984, 8, 297-307). Amiloride is known to inhibit this exchange and to cause a cytoplasmic acidification, with inhibition of protein and DNA synthesis, in cells induced to grow. Amiloride appears also to penetrate the cells and to inhibit directly protein synthesis. In the present report we describe experiments in which the activity of amiloride (0.1, 0.4 and 3.0 mM) on protein synthesis and the internal pH of cells was compared in exponential growing and stationary phase Yoshida ascites cells. In phosphate buffered medium and Na+ out = 147 mM no inhibition of protein synthesis (3H-leu incorporation into total cell protein) and no internal acidification (14C-DMO distribution between intra- and extracellular volume) were produced by 0.1 and 0.4 mM amiloride in exponential growing cells. In stationary phase cells, on the contrary, 0.4 mM amiloride inhibited protein synthesis by 60% without decreasing the internal pH. When the Na+ out was lowered to 25 mM, to reduce competition with amiloride, and/or all Na+ out was substituted with choline, 0.1 and 0.4 mM amiloride markedly inhibited protein synthesis and decreased the internal pH in exponential growing cells. No apparent inhibition occurred in stationary phase cells under the same conditions, possibly due to a preexistent internal acidification, with severe decrease of protein synthesis. Fluorimetric studies of amiloride "binding" to ascites cells showed that a reduced number of amiloride receptor sites could exist in Yoshida hepatoma cells at the stationary phase of growth.(ABSTRACT TRUNCATED AT 250 WORDS)

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