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Enzymatic Properties of Low Affinity Vanadate-sensitive ATPase in the Microsomes of Tracheal Epithelial Cells

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Previously, we reported two types of vanadate-sensitive ATPases in the microsomes of tracheal epithelial cells, a high-affinity one and a low-affinity one. The low affinity vanadate-sensitive (LAVS) ATPase was sensitive to thapsigargin and cyclopiazonic acid, specific antagonists of ER-type Ca^{2+} -ATPase, and mediated microsomal $^{45}\text{Ca}^{2+}$ uptake, implying that the LAVS-ATPase is an ER/SR-type Ca^{2+} -ATPase. In order to compare the enzymatic properties of LAVS-ATPase with those of ER-type Ca^{2+} -ATPase, we have investigated the pH and ATP dependences of LAVS-ATPase activity. The pH optimum of LAVS-ATPase was observed at pH 7~8. In the ATP dependence of activity the maximal activity of 313 nmol/min/mg protein and K_m of 146 μM were obtained for LAVS-ATPase. These characteristics of the LAVS-ATPase were in fair agreement with previously published data of ER-type Ca^{2+} -ATPase. However, the effect of Mg^{2+} appeared to be different. Although Mg^{2+} was required for the activities of both LAVS- and HAVS-ATPases, high concentration of Mg^{2+} inhibited only the activity of LAVS-ATPase and the activity of HAVS-ATPase remained ~20% of total ATPase activity at whole range of Mg^{2+} concentration. The Mg^{2+} -dependence of LAVS-ATPase appeared as a bell-shaped curve and the maximal activity was obtained at 1 mM Mg^{2+} .