

Properties of $\text{Ca}^{2+} + \text{Mg}^{2+}$ -ATPase from Rat Brain and its Inhibition by Pyrethroids

Deifalla H. AL-Rajhi

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ABSTRACT

$\text{Ca}^{2+} + \text{Mg}^{2+}$ -ATPase from microsomal fractions of rat brain was studied. The enzyme was activated by either Ca^{2+} or Mg^{2+} reaching the peak at the Ca^{2+} concentration of 0.3 mM. Maximal activation occurred at an ATP concentration of 5 nM with an apparent K_m of 0.66 mM, a V_{max} of 62.5 μmol inorganic phosphate/mg protein/hr, and a pH between 8.1 and 8.5 . The enzyme was found to be ouabain insensitive but was inhibited by ruthenium red and lanthanum with I_{50} values of 10^{-5} and 10^{-6} M, respectively . The enzyme was highly sensitive to the actions of certain pyrethroid insecticides under *in vitro* conditions . The cyano-containing pyrethroids, karate and baythroid, exerted a greater inhibitory effect on the enzyme ($K_i = 1.7$ and $2 \mu\text{M}$) than the non-cyano-containing pyrethroids, permethrin and bioallethrin ($K_i = 7$ and $8.5 \mu\text{M}$).