

Abstract

Uptake of Ca^{2+} by rat brain mitochondria causes an inhibition of respiratory stimulation by ADP, and the inhibition is relieved upon Na^{+} -induced release of Ca^{2+} from the mitochondria, in accordance with earlier reports. We show that simultaneous uptake of Ca^{2+} and Mn^{2+} results in no inhibition of ADP-stimulated respiration, indicating that Mn^{2+} prevents the Ca^{2+} -induced inhibition of ATP synthesis, without preventing Ca^{2+} accumulation in the mitochondria. The results are discussed in relation to a possible involvement of the mitochondrial ATPase-inhibitor protein in the observed effects of Ca^{2+} and Mn^{2+} .