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Effects of P2-purinoceptor antagonists on degradation of adenine nucleotides by ecto-nucleotidases in folliculated oocytes of Xenopus laevis

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Abstract

The aim of the present study was to examine the effects of a number of P2-purinoceptor antagonists on degradation of adenine nucleotides by Xenopus laevis oocyte ecto-nucleotidases. Folliculated oocytes readily metabolize all three naturally-occurring nucleotides, the order of preferential substrates being ATP > ADP > AMP. The degradation of ATP and ADP was decreased significantly in the presence of several P2X- and P2Y-purinoceptor antagonists, including suramin, PPADS, Cibacron blue, Coomassie Brilliant blue, Evans blue, Trypan blue, Congo red, and PIT (each compound was used at 100 μM). All these compounds inhibited the degradation of ATP by up to 60%, whereas the hydrolysis of ADP was inhibited by Congo red and PIT by 75-80%. In addition, DIDS (100 μM) and TNP-ATP (100 μM) selectively inhibited the breakdown of ATP, and sodium azide (10 mM) selectively inhibited the breakdown of ADP. The enzymatic breakdown of either ATP or ADP was unaffected by 8-pSPT (100 μM), an antagonist of P1-purinoceptors, or by oxidized ATP (100 μM), an antagonist of P2Z-purinoceptors. The degradation of AMP was prevented completely by PIT (100 μM) and inhibited significantly by Congo red (100 μM). In conclusion, the present study shows that most of currently available antagonists of P2-purinoceptors inhibit the enzymatic breakdown of extracellular ATP and ADP. The inhibitory effect on ecto-nucleotidase activity should be taken into account when these antagonists are used in pharmacological experiments.

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Keywords

ecto-nucleotidase, P2-purinoceptor antagonists, Xenopus oocytes