化学学报 2007 65 (5): 415-420 ISSN: 0567-7351 CN: 31-1320/06

研究论文

应用^{1}H NMR弛豫观察石杉碱戊与乙酰胆碱酯酶的结合

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收稿日期 2006-6-19 修回日期 2006-7-20 网络版发布日期 2007-3-6 接受日期 2006-11-24

摘要 为筛选更好的乙酰胆碱酯酶抑制剂, 应用^{1}H NMR的方法研究了石杉碱甲的一个类似物——石杉碱戊与乙酰胆碱酯酶的结合性质, 获得了加乙酰胆碱酯酶([配体]∶[蛋白]=1∶ 0.005)和不加酶时石杉碱戊部分质子的非选择性、单选择性和双选择性的自旋晶格弛豫速率. 加酶后质子的选择性弛豫速率变化较大, 在T=298 K时石杉碱戊的H-1a/H-1b质子对的分子运动相关时间$\tau_{1a,1b}$由不加酶时的27.7 ps变化到结合酶后的11.7 ns, H-2/H-3质子对的分子运动相关时间$\tau_{2,3}$由35.2 ps变化到9.46 ns, 由此得出石杉碱戊与乙酰胆碱酯酶有较强的结合作用.

关键词 石杉碱戊 乙酰胆碱酯酶 质子自旋-晶格弛豫速率 分子运动相关时间 核磁共振

分类号

^{1}H NMR Relaxation Investigation of Huperzine E Binding to Acetylcholinesterase

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Abstract In order to search for better acetylcholinesterase (AchE) inhibitors, the binding properties of AchE with huperizine E, which is a derivative of huperzine A, were investigated by ^{1}H NMR methods. The nonselective, selective and double-selective spin-lattice relaxation rates of some protons in huperzine E were acquired in the absence and presence of AchE at a concentration ratio of [ligand]∶[protein]=1∶ 0.005. The enhancements of selective relaxation rates of these protons were obvious after adding AchE. The molecular motional correlation times of two pairs of protons, H-1a/H-1b and H-2/H-3, in the bound state at T=298 K were 11.7 and 9.46 ns respectively, while they were 27.7 and 35.2 ps in the free state. All of these show that Huperzine E has high binding affinity with AchE.

Key words huperzine E acetylcholinesterase proton spin-lattice relaxation rate molecular motional correlation time NMR

DOI:

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