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金黄色葡萄球菌核酸酶C末端去9肽对酶蛋白溶液构象的影响

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通过多维异核核磁共振方法, 结合运用荧光和圆二色等光谱方法, 比较研究了V8菌株金黄色葡萄球菌核酸酶(含149个氨基酸残基), 酶蛋白1~140片段(SNase140)以及在TMP (thymidine 5'-monophosphate)和Ca²⁺存在下的SNase140的溶液构象状态。探讨了酶蛋白C末端去9肽后对酶蛋白构象和活力的影响。研究指出, 远离酶蛋白活性部位残基间相互作用的变化, 将通过酶蛋白两个亚结构域之间所形成的氢键, 影响酶蛋白活性部位的空间构象, 从而影响酶蛋白的活力。

THE INFLUENCE OF DELETION OF 9 RESIDUES AT THE C-TERMINAL OF STAPHYLOCOCCAL NUCLEASE ON THE CONFORMATION OF THE ENZYME

Combining the multidimensional NMR with CD and fluorescence methods, the solution conformations of staphylococcal nuclease from V8 strain (SNase) and its N-terminal 1~140 fragment (SNase140) as well as the ternary complex of SNase140, TMP (Thymidine 5'-monophosphate), and Ca²⁺ have been studied. The experimental data reveals that deletion of the nine residues at the C-terminal of SNase has influenced the enzyme conformation and activity. Inspection of 3D structure of staphylococcal nuclease indicates that the hydrogen bonds formed between α and β subdomains of the enzyme must be disturbed by the deletion of the amino acid residues succeeding Trp140 of SNase. In consequence, the changes in the interaction between amino acid residues located away from enzyme active site will disturb the conformational state of enzyme active site, and thus influence on the activity of enzyme protein.

关键词

金黄色葡萄球菌核酸酶(Staphylococcal nuclease); 多维核磁共振(Multidimensional NMR); N端140片段(N-terminal 140 fragment)