Lead ion chelated conformation characterization in DNAzyme structure by EXAFS

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Abstract

DNAzyme is a nuclease which can cleavage single strand DNA with the help of lead ions chelation. The nuclease mechanism has been proposed and verified indirectly. However, the exactly conformation of lead ion of this DNAzyme is unclear. In order to reveal the lead ion chelating conformation of DNAzyme, a pair of specific DNA sequences has been designed and synthesised by solid-state synthesis. One is the enzymatic strand (E-strand) cross-linkage with one base of RNA, and the other one is the substrate strand, which can bind to the E-strand in lead ions containing buffer solution. The DNAzyme structure has been established via a modified RNA tertiary conformation prediction program and the lead ion chelating conformation can be characterized by EXAFS. The conformation is similar to the other DNAzyme which was analysed by crystallography. Therefore, the nuclease mechanism can be revealed.

Keywords – DNAzymes, EXAF, lead ion, RNA tertiary conformation prediction program***.***