Functional Control by Modulating the Nucleic Acid Structure Based on Mismatch Base Pair Stabilization

Kazuhiko Nakatani

(Osaka University, The Institute of Scientific and Industrial Research, Professor)

【Outline of survey】

The scientist has strongly considered the possibility of using DNA as a functionality material because of highly accurate molecular recognition and the exquisite spiral structure of B-form duplex DNA. The research environment for studying DNA functional material was ready by the spread of the automatic nucleic acid synthesis technology and the maturity of the chemical modification technique. The research creating DNA functionality material greatly depends on "highly accurate molecular recognition" and "double helices formation" of DNA. That is, various functional groups are installed on a complementary DNA chain that voluntarily forms double helices, and new physical properties are made to emerge by an environmental change around the functional group by the double helix formation. However, in the present functionality DNA, the device for controlling the double helix formation was not installed at all. The technique for freely controlling a double strand formation and dissociation is indispensable to DNA functional material development. This research focuses on the development of molecules controlling the nucleic acid structure and modulating the function of nucleic acids.

【Expected results】

If the technique for freely controlling the double helix formation of the nucleic acid is established, an optical switching of the nucleic acid nano structure, association of the molecule to the nucleic acid restriction space, and an optical control of the transcript translation of the gene become possible. In addition, by using the nucleic acids as a molecular tag and the molecules developed by these researches as a molecular glue, the technique that can freely control dissociation and association of homogeneous or the different kind of biological macromolecules can be achieved.

【References by the principal researcher】

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【Term of project】 FY2006－2010

【Budget allocation】23,700,000 yen

【Homepage address】 http://www.sanken.osaka-u.ac.jp/labs/rbc/index-e.html