

Sequence Complementarity-Independent Functional RNAs

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【Outline of survey】

Recent achievements in human genome sequence project uncovered, to our great surprise, the existence of a large amount of protein-noncoding RNAs (ncRNAs). These ncRNAs can be classified into two types: one, like antisense and microRNA, those function with the sequence complementarity to the target mRNA or DNA, while the other, like aptamer, those function independent of the sequence complementarity. In this study, we aim to: 1) uncover the natural aptamers encoded in human genome; and 2) create artificial aptamers to target proteins of therapeutic interest. By studying these natural and artificial RNA aptamers, we hope to clarify superior potential of RNA, which would be highly beneficial to the development of RNA medicine and the comprehensive understanding of human genome RNA function.

【Expected results】

- 1) Development of novel RNA medicine: RNA aptamer, like antibody, is able to capture target molecule and modulate its activity. Moreover, aptamer has superior potential compared to antibody. This study leads to the development novel RNA aptamer medicine, "RNA-made super antibody".
- 2) Understanding of life driven by RNA: Function of enormous ncRNAs predicted in human genome is completely unknown. This study will facilitate the comprehensive understanding of ncRNA function in life.
- 3) Establishment of concept of molecular mimicry between protein and RNA.

【References by the principal researcher】

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- Ito, K., Uno, M., Nakamura, Y.: A tripeptide 'anticodon' deciphers stop codons in messenger RNA. *Nature*, **403**: 680-684 (2000)

【Term of project】 FY2006 - 2010

【Budget allocation】 18,200,000 yen

【Homepage address】

<http://www.ims.u-tokyo.ac.jp/molbiol/H0.html>