Protein Engineering for Construction of Bio-interfaces

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【Outline of survey】

Human antibody genes are considered as a huge library of functional elements of proteins in nature. A major goal of this research is construction of technical basis for accelerated application of human antibodies to development of antibody medicine and nano-technology, which is based on our research advances as follows: 1. stable selection via molecular recognition of antibodies; 2. generation of artificial molecular structure; 3. efficient preparation system of antibodies selected. Especially, we would focus on the low-immunogenic targets, e.g. cell-surface antigens and surfaces of engineered materials. Antibodies for the targets are artificially selected, followed by functional characterization. On the basis of results obtained, we would construct the basis for designing the bio-interfaces of protein-cells and proteins-engineered materials. Recently, we have established an efficient refolding system of immunoglobulin-folded proteins from *E. coli* expressed inclusion bodies. In this research, refolding system would be further revised for preparation of useful antibody fragments selected, of which molecules prepared are attempted to utilize for therapy, diagnosis, and biomaterials.

【Expected results】

Artificial generation of human antibody fragments can directly lead to the development of therapeutics and biomaterials, which may maximize the range for utilization of proteins. For antibody molecules specific for surfaces of materials, an unexplored field, e.g. selection and/or design of proteins against various materials, may be developed, which is entirely distinct from the present viewpoints, i.e. development of materials for a certain protein. Fusion of selected and prepared antibody molecules in this research and preparation system in itself with medical engineering and/or material science would explore a novel field based on proteins.

【References by the principal researcher】

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【Term of project】 FY 2004 — 2008	【Budget allocation】 86,200,000 yen

【Homepage address】 http://www.che.tohoku.ac.jp/~kuma/