

S05-3 Applications of motif-programmed proteins in a medical field

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"Motifs" are short amino acid sequences associated with particular biological functions. They are often identified from natural proteins as parts of their structures. In some cases, they exert their functions as isolated peptides, or they can endow other molecules with their associated functions by grafting the peptides to foreign molecules. "Motif programming" is a method for constructing artificial proteins by embedding peptide motif(s) within artificial protein sequences. To embed motifs, we are using our MolCraft system. In MolCraft, we first design a small gene, which we call a microgene, so that it encodes the desired motifs in different reading frames. Then, this designer microgene is tandemly polymerized to form microgene polymers. In these polymerization reactions, we use special reaction conditions that allow the random insertion or deletion mutations at junctions of the microgene units. Because of these mutations, the translational products of the polymers make up a library composed of combinatorial polymers of three peptides encoded by the single microgene. From the library, we select the clones that have expected functions. I will describe our efforts of creating artificial proteins from motif-programmed proteins that would be used in medical areas.