

S05-2 **Research and development of combinatorial bioengineering using zebrafish and its application for drug discovery**

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One of the main strategies in the post-genomic era is to search for the function of genes identified by the genome sequencing projects. On the other hand, the concept of “Combinatorial Bioengineering” is that new functional molecules and cells are established by bioinformatics and molecular libraries, and consists of “3-D” including “Diversity”, “Display”, and “Directed selection”. In addition, in order to investigate the function of genes, model organisms are also an essential tool and indispensable for this demanding task. Since zebrafish (*Danio rerio*) has been successfully incorporated into large-scale genetic screens due to the optical clarity of the embryos and their accessibility to various experimental techniques throughout development, the attractiveness of the zebrafish as a model organism is enhanced by the availability of continuously improving genomic tools and methodologies for functional characterization of the gene. In this symposium, we would like to introduce the development of gene expression system in zebrafish and show a couple of recent data that have succeeded to express several membrane-associated proteins. Furthermore, we have developed fully automatic high-throughput microinjection system with zebrafish embryos that could be observed in not only the interactions between protein-protein by FRET (Fluorescence Resonance Energy Transfer) but also the posttranslational modification by saturated fatty acid such as myristic acid. Finally, we expect that zebrafish will offer a high-quality, high-throughput bioassay tool for determining the biological effect of functional molecules as well as for dissecting biological pathways.