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Chemical Genomics: a New Approach for Drug Development

Yeon Gyu Yu

Structural Biology Center, Korea Institute of Science and Technology, Seoul Korea

Due to the success of human genome project the elucidation of the function of a large number of uncharacterized genes will be the main task of life science. Functional study of human genes will identify a large number of disease-causing or disease-related genes, and these newly identified drug-target genes will boost up drug development. In this regards, several new strategies including chemical genomics are currently pursued to utilize genomic information for drug development. Chemical genomics can be defined as a systematic approach that identify the proteins or genes from a whole gene product that interact with specific chemical compounds, such as therapeutic drugs, secondary metabolites or other bioactive molecules. Affinity selection method has been used for the identification of proteins which specifically bind to a target molecule, and was successful for the detection of proteins specific to bioactive natural compounds. Display library on which peptides of random sequence or proteins encoded by cDNA are exposed on the surface of phage particle have been used for the biopanning against a surface immobilized natural compound.

We have tested affinity selection method using various kinds of phage display library as a tool for the chemical genomics. The set of clones that have considerable binding affinity to the tested small molecules had been obtained. Sequence analysis of these genes revealed potential targets proteins that interact with the bait compounds. The implication of these preliminary results and the future direction of chemical genomics will be discussed.