New genome medicine and drug discovery based on the comprehensive transcriptome analysis

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【Outline of survey】

The Human Genome project made comprehensive comparison of genome and cDNA possible. Also, by the development of high-resolution DNA chip, such as tilling array, whole image of all the gene transcript products (transcriptome) is being clarified, which eventually disclosed unique characters. Hence, there exists more complex and more various transcripts than those speculated, and more over they may have biological function. Of particular, RNAs which do not code protein (non-coding RNA: ncRNA) is paid much attention. Bioinformatic analysis estimates more than several to ten thousand ncRNA existing in human as well as mouse. ncRNA can work as antisense DNA and/or siRNA for RNAs that code proteins (coding RNA: cRNA). In this project, we first generated a novel microarray DNA chip which includes ncRNA as well as cRNA which function can be predicted by bioinformtics, and by utilizing the chips we will perform the comprehensive transcriptome analysis of disease and drug effects, and identify disease- or drug- related transcripts.

【Expected results】

The disease to be targeted by this research project is“multi-factorial”one,of particular we will attack the growing health care problems, such as kidney disease. Also, we are very much interested to clarify the molecular mechanism for the drugs which target molecules are not certain. Our research group has rich history and accomplishments of comprehensive transcriptome analysis, and has succeeded in identifying a gene that relates the development as well as treatmentof immunogenic nephritis. Also, we had identified an important gene for glucocorticoid-induced apoptosis in a human acute leukemia. Utilizing the comprehensive transcriptome analysis which includes ncRNA, we aim to clarify the unknown molecular mechanisms of pathophysiology as well as of drug action.

【References by the principal investigator】

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Proc. Natl. Acad. Sci. U S A. 102: 7736-7741, 2005.

・Handbook of Experiments in Genome Research (edited by G.Tsujimoto and Toshio Tanaka) Yodosha Publisher 2004.

【Term of project】 FY2007－2011	【Budget allocation】 54,400,000 yen (2007 direct cost)

【Homepage address】 http://gdds.pharm.kyoto-u.ac.jp/