

**Title of Research:**

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## **Development of Novel Analytical System of Biological Responses to Chemicals by Deep Phenotyping Method**

**Principal Investigator:**

Hiroyuki Kusuhara (Professor, University of Tokyo, Graduate School of Pharmaceutical Sciences, Department of Molecular Pharmacokinetics)

7-3-1 Hongo, Bunkyo, Tokyo, 113-0033, Japan

(Tel) +81-3-5841-4770, (E-mail) kusuhara@mol.f.u-tokyo.ac.jp

**Collaborators:**

Tadahaya Mizuno (Assistant Professor, University of Tokyo, Graduate School of Pharmaceutical Sciences, Department of Molecular Pharmacokinetics)

7-3-1 Hongo, Bunkyo, Tokyo, 113-0033, Japan

(Tel) +81-3-5841-4771, (E-mail) tadahaya@mol.f.u-tokyo.ac.jp

Setsuo Kinoshita (Contract Research Student, University of Tokyo, Graduate School of Pharmaceutical Sciences, Department of Molecular Pharmacokinetics)

7-3-1 Hongo, Bunkyo, Tokyo, 113-0033, Japan

**Summary of Research:**

Today, organisms are always exposed to chemicals in every situation to some extent. Wide variety of chemicals exist around us and the chemicals affect organisms not one by one but simultaneously like a complex. The fact prompts us to care "multiple exposure". To achieve the appropriate and correct prediction of multiple exposure of chemicals, it is necessary to comprehend the effects of chemicals even if those are hidden and difficult to be detected. In this study, we tackle with the theme by omic approaches with innovative techniques in both data acquisition and data analysis method.

This study consists of two pillars: (1) a novel acquisition method of proteome profile data by 2-dimensional electrophoresis (2DE) and (2) a new analysis method of profile data. In the 5<sup>th</sup> term, we carried out fine-tuning of these two. As for the novel data analysis method, aiming the establishment and the operation, performance tests were conducted by employing data obtained from public database (GEO dataset, CMap, etc). The data were mainly transcriptome data and were subjected to the novel method, "Orthogonal Liner Separation Analysis", OLSA, followed by literary survey, gene ontology analysis, gathering information from compounds database (PubChem, Drugbank, etc.) and so on. The results indicate the following: (a) OLSA enables the separation and the extraction of cellular responses as vectors, (b) a vector generated by OLSA may be possible to be added or subtracted the others, and (c) the prediction by OLSA was confirmed experimentally to some extent. Of note, (b) is quite curious since it supports our hypothesis that cellular responses (, at least a part of them,) can be linearly separated and described with the separated vectors, which is essential in the prediction and evaluation of multiple exposure. Although, as for 2DE, a problem existing in fluorescent dye due to contaminants delayed the progress, the problem was already solved. Therefore, we believe our progress in the establishment of the prediction and the evaluation method of multiple exposure.

**Timeline:**

1/4/2017-

**Topics:**

2017 LRI annual meeting, "Development of Novel Analytical System of Biological Responses to Chemicals by Deep Phenotyping Method"

**Publications:**

Nothing