Title of Research:

19_R01-01

Development of rapid, accurate, and low-cost AI drug hazard assessment method by human stem cell test

Principal Investigator:

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Summary of Research:

We developed a new method "hEST", which has more than 95% accuracy predicting neurotoxicity, and genotoxic/non-genotoxic carcinogen categories, using machine learning of gene network data obtained from exposure of human embryonic stem cells to chemicals. This first year, we 1) selected 4 Japanese male/female ES/iPS cell lines as the test cells for 10 hepatotoxic substances. Surprisingly, cell death occurred with 8 hepatotoxic substances when ES cells were used, however, the sensitivity of iPS cells to chemical substances was low. In order to improve iPS cells' sensitivity and standardize the test cell lines, we 2) tested 24 existing naïve cell transformation methods, and 3) developed our own culture method. Although iPS cells' sensitivity increased, it has decreased again as cells were passaged. We will continue to develop more stable, high sensitivity iPS cells, and will obtain gene expression data from ES cells as well.

Timeline:

March 1, 2019 - February 29, 2020

Topics:

Poster presentation at JCIA LRI Annual Workshop 2019 "Development of rapid, accurate, and low-cost AI drug hazard assessment method by human stem cell test" (Tokyo, August 30th, 2019)

Publications:

1. Wataru Fujibuchi "代替法としてのヒト幹細胞への大きな期待-その驚くべき潜在能力" The 32nd Annual Meeting of the Japanese Society for Alternatives to Animal Experiments (Tsukuba, November, 2019)
2. Panina Yulia, Junko Yamane, Kenta Kobayashi, Wataru Fujibuchi "Development of a fast, reliable and low-cost toxicity prediction system using AI and reset iPS cells." Kyoto University Medical Innovation Graduate School Program Medical research exchange salon, Poster presentation (Kyoto, January, 2020)