Title of Research:

23-1-03
Development of an alternative method for teratogenicity using zebrafish

Principal Investigator:

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Summary of Research:

We performed whole genome sequencing of 15 zebrafish strains including AB, TU, RW and WIK and determined genetic tree. We used these strains for developmental toxicity tests and found that there were no strain difference of susceptibility to chemicals. In addition to teratogenicity, which is evaluated by appearance, gene expression changes by RNA-Seq were also examined as a hazard identification. We confirmed that the differences by strains were smaller than the differences by exposure concentration. These results suggest that it is not necessary to use specific strain when conducting developmental toxicity tests using zebrafish and that any strain can be used in the tests. We also found a correlation between changes in gene expression and teratogenicity that could explain the characteristics of teratogenicity. This suggests the possibility of using gene expression changes by RNA-Seq as a useful strategy to identify the AOP of developmental toxicity.

Timeline:

March 1, 2023 -

Topics:

1. "Development of an alternative method for teratogenicity using zebrafish" at the 2023 LRI Research report meeting of the Japan Chemical Industry Association. August 25, 2023.

Publications:

1. Kenichiro Sadamitsu, Fabien Velilla, Minori Shinya, Makoto Kashima, Yukiko Imai, Toshihiro Kawasaki, Kenta Watai, Miho Hosaka, Hiromi Hirata and Noriyoshi Sakai. Establishment of a zebrafish inbred strain, M-AB, capable of regular breeding and genetic manipulation. Scientific Reports. (Under revision)
2. Hiromi Hirata. Investigation of strains in toxicity testing of chemicals using zebrafish. Japan Pharmaceutical Manufacturers Association "Current status of alternative methods for reproductive and developmental toxicity" Symposium. Nihonbashi life science building, Tokyo. February 8, 2024. (Invited symposium speaker)
3. Kota Ujibe, Makoto Kashima, Rintaro Shimada, Masanari Okamoto, Seiji Wada, Hiroki Matsuda, Akira Sakamoto and Hiromi Hirata. Zebrafish lacking Werner syndrome gene wrn cause early nutritional deficiency. The 9th Zebrafish and Medaka-based Drug Discovery Meeting. MEXT research exchange center, Tsukuba. November 6, 2023. (Oral presentation)
4. Kenichiro Sadamitsu, Minori Shinya, Makoto Kashima, Noriyoshi Sakai and Hiromi Hirata. Establishment and whole genome analysis of zebrafish inbred strain M-AB," The 96th Annual Meeting of the Japanese Biochemical Society. Fukuoka International Conference Hall, Fukuoka. November 1, 2023. (Poster presentation)