

World's First International Validation Underway for Zebrafish Embryo New Approach Methodologies

- National Institute of Environmental Research launches official OECD test guideline project
- Cuts costs to one-fiftieth and speeds up testing tenfold, easing the burden on industry

The National Institute of Environmental Research (NIER, President Park Yeon Jae), under the Ministry of Climate, Energy and Environment (MCEE), announced that new approach methodologies (NAMs) for developmental neurotoxicity using embryos of the zebrafish*, a tropical and subtropical freshwater fish, will be launched on August 20 as the world's first official project of the Organisation for Economic Co-operation and Development (OECD).

* A fish widely used in life sciences research, the zebrafish is named for its distinctive blue and silver stripes. Its transparent embryos make it well suited for observing developmental processes.

The NAMs using zebrafish embryo proposed by the NIER is the world's first case of NAMs for developmental neurotoxicity (systemic toxicity), which requires the identification of complex mechanisms in vivo, to be adopted as an official project of the OECD.* This represents a significant advancement over the NAMs approved by the OECD to date, which have focused primarily on localized toxicity assessments such as skin irritation, eye irritation, and phototoxicity.

* At the 38th Working party of the National Coordinators for the Test Guidelines Programme (WNT) meeting held in Paris, France, from April 21–24, 2026, the joint validation study of the domestically developed NAMs for developmental neurotoxicity was

unanimously approved.

The NAMs using zebrafish embryo involves exposing embryos to test substances after fertilization and observing tail coiling, stimulus responses, free-swimming behavior, brain tissue, and other indicators. Its key feature is that it eliminates the need for conventional mammalian (rodent) animal testing.

In conventional neurodevelopmental toxicity testing using rodents (OECD Test Guideline No. 426), evaluating a single substance typically requires the sacrifice of approximately 1,000 animals and costs more than KRW 1 billion over a period of three years in developed countries.

By contrast, using zebrafish embryos is expected to reduce costs to approximately one-fiftieth of those of conventional animal testing and accelerate toxicity screening by more than tenfold.

The NIER plans to conduct validation studies, in collaboration with a group of developmental neurotoxicity experts, to verify the accuracy, sensitivity*, and reproducibility of the NAMs using zebrafish embryo for developmental neurotoxicity, with the goal of having the method included in the OECD Test Guidelines by 2031.

* Accuracy in detecting toxic substances

This research project also involves international standardization efforts, jointly carried out by the NIER and the Korea Institute of Toxicology.

NIER President Park Yeon Jae said, “The NAMs for developmental neurotoxicity being developed through this project will significantly reduce the time and costs required to assess the toxicity of tens of thousands of chemicals distributed in Korea, ease the regulatory burden on industries both domestically and internationally, and provide a practical alternative for rapidly screening chemical toxicity and protecting the public from potential harm.”