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Summary of Research:

In recent years, basic research in the field of neuroscience has revealed many molecules involved in neurite outgrowth and neuronal reorganization, but there have been few attempts to evaluate the toxicity of chemical substances using these molecules as indicators. The purpose of this study was to identify better indicators of developmental neurotoxicity of chemicals from key molecules in neurodevelopment and to clarify their usefulness in assessing developmental neurotoxicity of chemicals.

The third year of the study, mRNA expression changes encoding 12 molecules that play important roles in neurodevelopment, mainly acrylamide and tributyltin, were examined up to day 21 of culture. The results suggested that the expression of three genes, Dlg4, Syp, and Bdnf, changed at the same time as in the methylmercury-exposed group, although some genes showed different expression patterns from those in the methylmercury-exposed group. Considering the possibility that gene expression may be altered by other suspected developmental neurotoxicants, we examined the effects of suspected developmental neurotoxicants on Dlg4 gene expression in DIV10, 14, and 21, and found that Dlg4 gene expression was suppressed in some cases. Dlg4 expression in DIV14 was shown to be sensitive to chemical substances and may be a good indicator of developmental neurotoxicity. In addition to the 12 gene markers, we performed a comprehensive gene expression analysis using RNA-Seq to investigate the possibility that there are other genes that may be indicators of developmental neurotoxicity. The results revealed the existence of genes that were significantly up-regulated in common with the three developmental neurotoxicants and, conversely, genes that were significantly down-regulated in common with the three substances.

Timeline:

March 1, 2020-February 28, 2023

Topics:

Publications: