OVERCOMING LIMITATIONS OF ORGAN-ON-CHIP (OOC) TECHNOLOGIES TO ADVANCE THE CHARACTERIZATION AND MEDICAL MANAGEMENT OF CHEMICAL AND BIOLOGICAL (CB) THREATS

In Vitro Model Expressing Acetylcholinesterase For The Evaluation Of Neurotoxicity And Protection Against Nerve Agents

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Neurotoxicity is commonly associated with nerve agents intoxication. Neuronal death is linked to both acute life-threatening symptoms and subsequent long-term secondary damage. This research focuses on the development and validation of a cellular model of mature human neurons, which may serve for investigation of neurotoxicity and its prevention. This model was obtained by differentiating the neuroblastoma cell line SH-SY5Y. The protocol involves stimulation of the cell line with retinoic acid and brain-derived neurotrophic factor for 9-12 days. Observation of morphological signs of neurons using lighting microscopy confirmed characteristic synaptic connections, and a detection of specific neuronal markers (tau protein, microtubulle-associated protein (MAP), synaptophysin (SYN), post-synaptic density protein (PSD-95)) was confirmed by using fluorescence microscopy. The aim of the following experiment was to quantify acetylcholinesterase in differentiated and undifferentiated cells. As a result, it has been shown that the level of enzyme in the differentiated cells is significantly higher than in the original undifferentiated cells. Another planned use of the model is in vitro application on the assessment of neurotoxic effects of organophosphates and screening of potential neuroprotectants or drugs for the treatment of neurotoxicity.

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