*Proceedings of the 11th World Congress on Electrical Engineering and Computer Systems and Sciences (EECSS'25)*
*Paris, France – August, 2025*
*Paper No. ICBES 179*
*DOI: 10.11159/icbes25.179*

# Neurotoxic Effects of Perfluorooctanoic Acid (PFOA) on Mouse Cortical Neurons: A Quantitative Imaging Study

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## Extended Abstract

Per- and Polyfluoroalkyl Substances (PFAS) are environmental pollutants that are suspected to be neurodevelopmental toxicants, produced and found in products including: nonstick cookware, firefighting foams, and water-repellent clothing[1-3], however evidence of PFAS exposure increasing neurotoxicity is inconsistent. We aim to investigate the neurotoxic effects of PFAS, particularly in Perfluorooctanoic acid (PFOA), on neuronal development and function. Understanding the extent to which (PFAS) impacts human health, specifically neurotoxicity, is important for finding ideal public health policies.

In this study, cortical neurons of mice were incubated for 7 days in-vitro. 2.5µM Ethidium Homodimer III was used to label dead cells. Images were taken on Zeiss Axiovert 200M prior to treatment and 44 hours post treatment with and without 100µM of PFOA. Prior to the last imaging, cells were incubated with Nucblue to label live and dead cells in order to calculate the percent cell death. Images were analyzed using ImageJ/FIJI. The percent cell death was calculated by subtracting the pre-treatment dead cells from 44 hr total of dead cells and then dividing by all the nuclei stained in Nucblue. For time lapse imaging, cells were incubated in 100µM PFOA and imaged every 30 minutes for 8.5hrs using an Axiovert 200M microscope.

Results demonstrated that time lapse imaging of control and PFOA treated cells did not show a significant difference within an eight-hour viewing window. Therefore, cells were exposed for a longer time range. Forty-four-hour exposure to PFOA caused a greater percent of cell death compared to controls treated the same way. The mean percent cell death for nine fields of views on a control dish was 33% with a standard error mean(SEM) of 0.06. For cells treated with 100 µM PFOA, the percent cell death was 48% with a SEM of 0.03.

The findings demonstrated the neurotoxicity of PFOA chemicals, emphasizing the need for additional research, regulation, or public health approaches to reduce exposure, particularly among vulnerable populations, such as children or infants, whose developing nervous systems may be more susceptible to the effects of PFAS. Future studies will evaluate the ability of cells to withstand stress in the presence of hydrogen peroxide and PFOA.

**Keywords:** PFAS, Neurotoxicity, Neuronal Development, Cell Viability, Calcium Signaling

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