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Methylmercury Cytotoxicity on Developing Neuronal Lineages and Differences in Susceptibility Based on Media Type

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Methylmercury (MeHg) is an environmental neurotoxicant found in fish, polluting a food source essential to human fetal development. MeHg is associated with cognitive and motor deficits, creating controversies concerning fish consumption prenatally. During development, stem cells differentiate into neurons and astrocytes. MeHg targets this developmental process, yet the types of neurons and the stages of development that are most susceptible remain unclear. In vitro, differentiation is triggered by different types of cell culture media. The type of media used could alone impact MeHg cytotoxicity, necessitating an understanding of the effects of media type before proceeding with susceptibility studies. This study aimed to understand how media type plays a role in MeHg cytotoxicity and uptake. Using a mouse striatal cell model, we sought to determine the lethal concentration resulting in 50% cell death (LC_{50}) in different media. We exposed the cells to 0, 0.1, 1, 2, 4, 6, and 10μM of MeHg in a variety of media. Preliminary data suggests a range of cell survival from 40% to 80% with 2μM and 4μM, while 6μM showed cell survival from 20% to 60%, dependent on media type. Overall, there seem to be media type specific differences in cell survival. Future research will measure MeHg uptake in different media to determine if the differences in cell survival are due to differential uptake of MeHg in those media types. This will enable a more accurate assessment of media effects on MeHg sensitivity and a better understanding of the neuronal targets of MeHg.

Research advisor Aaron Bowman writes: "Madeline's research project is evaluating the potential of the different media types to impact the cytotoxicity and toxicokinetics of methylmercury (MeHg) in differentiating human neurons from stem cells. Her work is critical to better understand the basis of the selective sensitivity of different developing brain regions to MeHg poisoning."

Henley, M. (2020). Methylmercury cytotoxicity on developing neuronal lineages and differences in susceptibility based on media type. *Journal of Purdue Undergraduate Research, 10,* 96–97.

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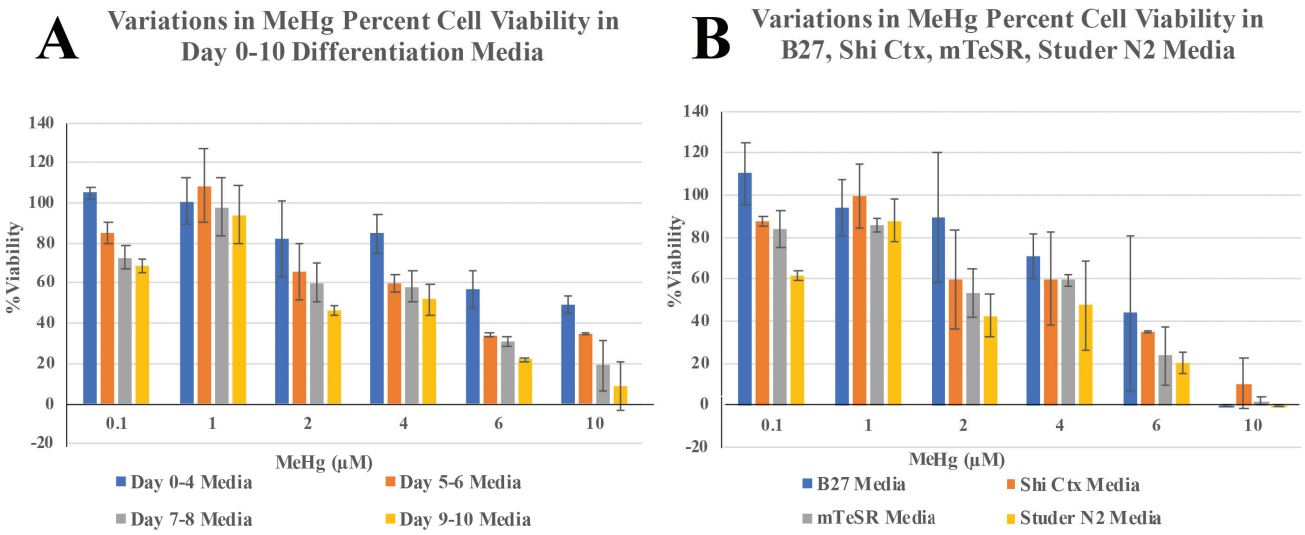

A. Combined data of all MeHg concentrations (0, 0.1, 1, 2, 4, 6, and 10µM) evaluated for LC_{50} in differentiation media types for days 0 to 4, 5 to 6, 7 to 8, and 9 to 10. Data is represented as mean +/- SD; n=2 with 5 technical replicates per experimental replicate.
B. Combined data of all MeHg concentrations (0, 0.1, 1, 2, 4, 6, and 10µM) evaluated for LC_{50} in B27, Shi cortical, mTeSR, and Studer N2 media. Data is represented as mean +/- SD; n=2 with 5 technical replicates per experimental replicate.

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