

Misericordia University

Misericordia Digital Commons

Student Research Poster Presentations 2024

Student Research Poster Presentations

2024

The Effects of BPF on RT4 Schwannoma Cancer Cells

Rachael Sennett
Misericordia University

Madeline Solomon
Misericordia University

Angela Asirvatham
Misericordia University

Follow this and additional works at: https://digitalcommons.misericordia.edu/research_posters2024



Part of the [Biology Commons](#), and the [Cell Biology Commons](#)

Recommended Citation

Sennett, Rachael; Solomon, Madeline; and Asirvatham, Angela, "The Effects of BPF on RT4 Schwannoma Cancer Cells" (2024). *Student Research Poster Presentations 2024*. 27.
https://digitalcommons.misericordia.edu/research_posters2024/27

This Poster is brought to you for free and open access by the Student Research Poster Presentations at Misericordia Digital Commons. It has been accepted for inclusion in Student Research Poster Presentations 2024 by an authorized administrator of Misericordia Digital Commons. For more information, please contact mcech@misericordia.edu.

The Effects of BPF on RT4 Schwannoma Cancer Cells

Rachael SENNETT, Madeline SOLOMON, and Angela ASIRVATHAM
Department of Biology, Misericordia University, Dallas, PA

BACKGROUND

Bisphenol A is a toxic chemical used in everyday plastic products (1, 2). The FDA has banned its use in certain products such as in baby bottles in 2012 and in infant formula packaging in 2013 (3). Despite the ban, a modified version of this compound with a similar structure, BPF, is being used as a substitute with its danger being unknown (3). BPA can cross the blood-brain barrier and the placental barrier, causing neurotoxicity and deleterious effects for a fetus. Long term effects of BPA include anxiety, depression, autism, cognitive deficits, and increased rates of neurodegenerative disorders, and with such a similar structure, BPF can cause neurotoxicity that consumers are not aware of (4). In a study by Lei et. al (5), low concentrations of BPF induced proliferation in human breast cancer MCF-7 cells. Studying the role of BPF on RT4 Schwannoma cancer cells will contribute to the field as more will be known about the effects of BPF on the peripheral nerve system and cancer cells. In another previous research study, rat fetal neural stem cells (rNSCs) were exposed to doses of BPA or BPF at different ranges. The results indicated that both BPA and BPF enhance the directed-differentiation process of rNSC into astrocytes, oligodendrocytes, neurons, and interfere with the development of their characteristic morphology. Further, neurons treated with BPA or BPF showed an increase in cell proliferation (6). As BPF influenced neuron proliferation and differentiation, it stands to reason that it may also stimulate Schwann cell division. Therefore, this study will test the hypothesis *that addition of BPF in incremental doses to RT4 Schwannoma cancer cells will increase cell proliferation in comparison to cells without BPF.*

REFERENCES

1. Fabrello J, Ciscato M, Moschin E, Vecchia FD, Moro I, Matozzo V. 2023. Can BPA Analogs Affect Cellular and Biochemical Responses in the Microalga *Phaeodactylum tricornutum* Bohlin? *Journal of Xenobiotics*. 13(3):479–491. doi: <https://doi.org/10.3390/jox13030030>. [accessed 2023 Oct 26]. <https://web.sciencedirect.com/ehost/detail/detail?vid=3&sid=e1598218-74fe-48a7-96b9-55bd5951133e%40redis&bdata=JnNpdGU9ZWhvc3QibGl2ZQ%3d%3d#AN=172392223&db=asn>.
2. Gu J, Zhu Y, Guo M, Yin X, Liang M, Lou X, Chen J, Zhou L, Fan D, Shi L, et al. 2022. The potential mechanism of BPF-induced neurotoxicity in adult zebrafish: Correlation between untargeted metabolomics and gut microbiota. *Science of The Total Environment*. 839:156221. doi: <https://doi.org/10.1016/j.scitotenv.2022.156221>. [accessed 2023 Oct 26]. <https://www.sciencedirect.com/science/article/pii/S0048969722033186>.
3. Center for Food Safety and Applied Nutrition. Bisphenol A (BPA): Use in food contact application. U.S. Food and Drug Administration. 2014 [accessed 2023 Dec 11]. <https://www.fda.gov/food/food-packaging-other-substances-come-contact-food-information-consumers/bisphenol-bpa-use-food-contact-application#summary>
4. Li D, Huang C, Liu Z, Ai S, Wang H. 2023. Decreased expression of Chrm4 by METTL3-mediated m6A modification participates in BPA-induced spatial memory deficit. *Environmental Research*. 236:116717–116717. doi: <https://doi.org/10.1016/j.envres.2023.116717>.
5. Lei B, Huang Y, Liu Y, Xu J, Sun S, Zhang X, Xu G, Wu M, Yu Y, Feng C. 2018. Low-concentration BPF induced cell biological responses by the ER α and GPER1-mediated signaling pathways in MCF-7 breast cancer cells. *Ecotoxicology and Environmental Safety*. 165:144–152. doi: <https://doi.org/10.1016/j.ecoenv.2018.08.102>.
6. Gill S, Kumara VMR. 2021. Comparative Neurodevelopment Effects of Bisphenol A and Bisphenol F on Rat Fetal Neural Stem Cell Models. *Cells*. 10(4):793. doi: <https://doi.org/10.3390/cells10040>

RESULTS

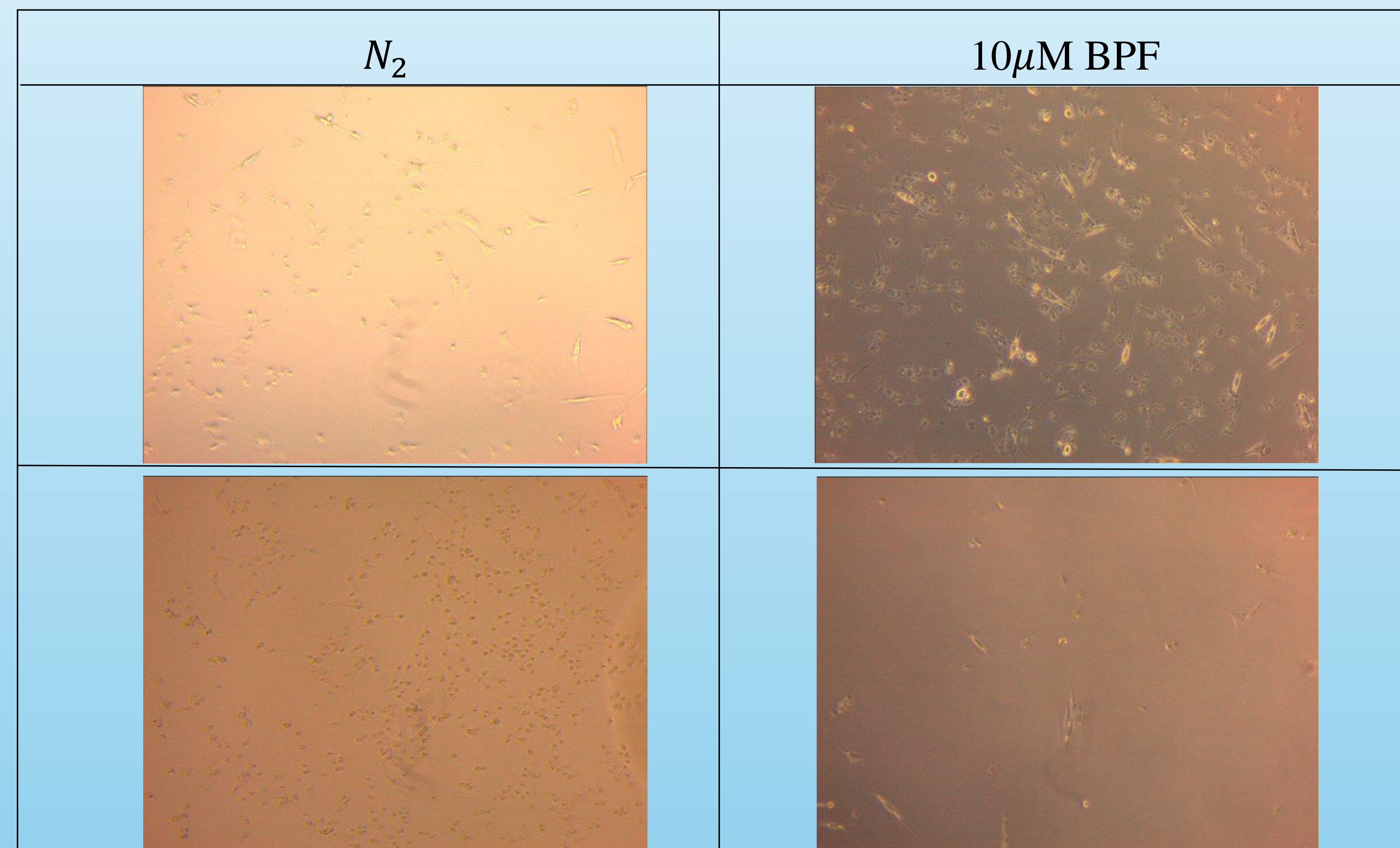


Fig. 1- N_2 control and $10\mu\text{M}$ BPF treatment before and after 24 hours. RT4 cells were plated at a density of 25,000 cells per well in DMEM media and incubated for 24 hours. Cells were then treated in N_2 media and incubated for 24 hours. They were then treated in BPF for 24 hours.

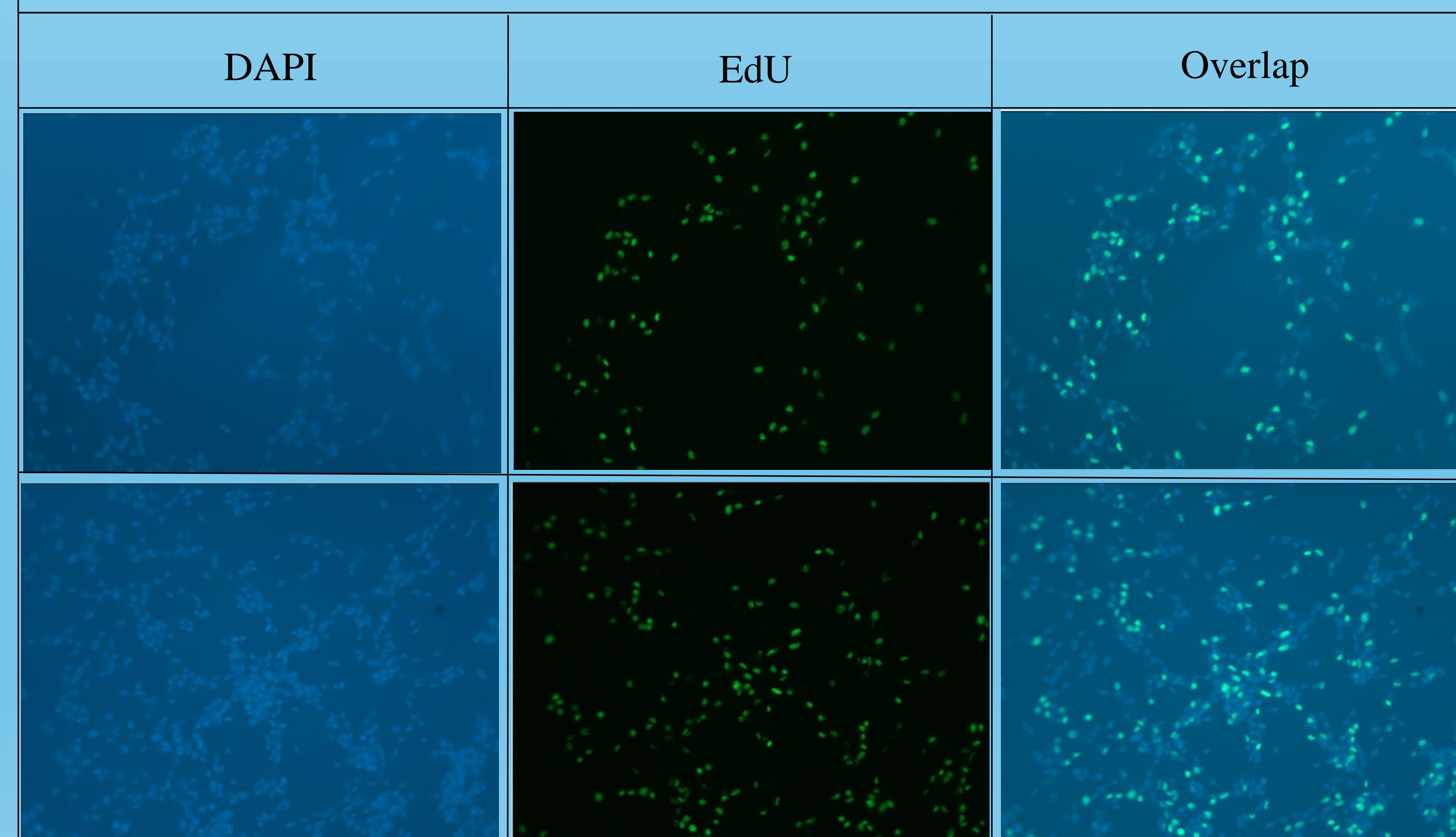


Fig. 2- N_2 control (top row) and $10\mu\text{M}$ BPF treatment (bottom row). Cells were assayed for growth using the Edu proliferation assay (2). The slides were processed for fluorescence microscopy using the Zeiss ZI Axio Observer. Cells were quantified using Zeiss Zen Cell Counting Software.

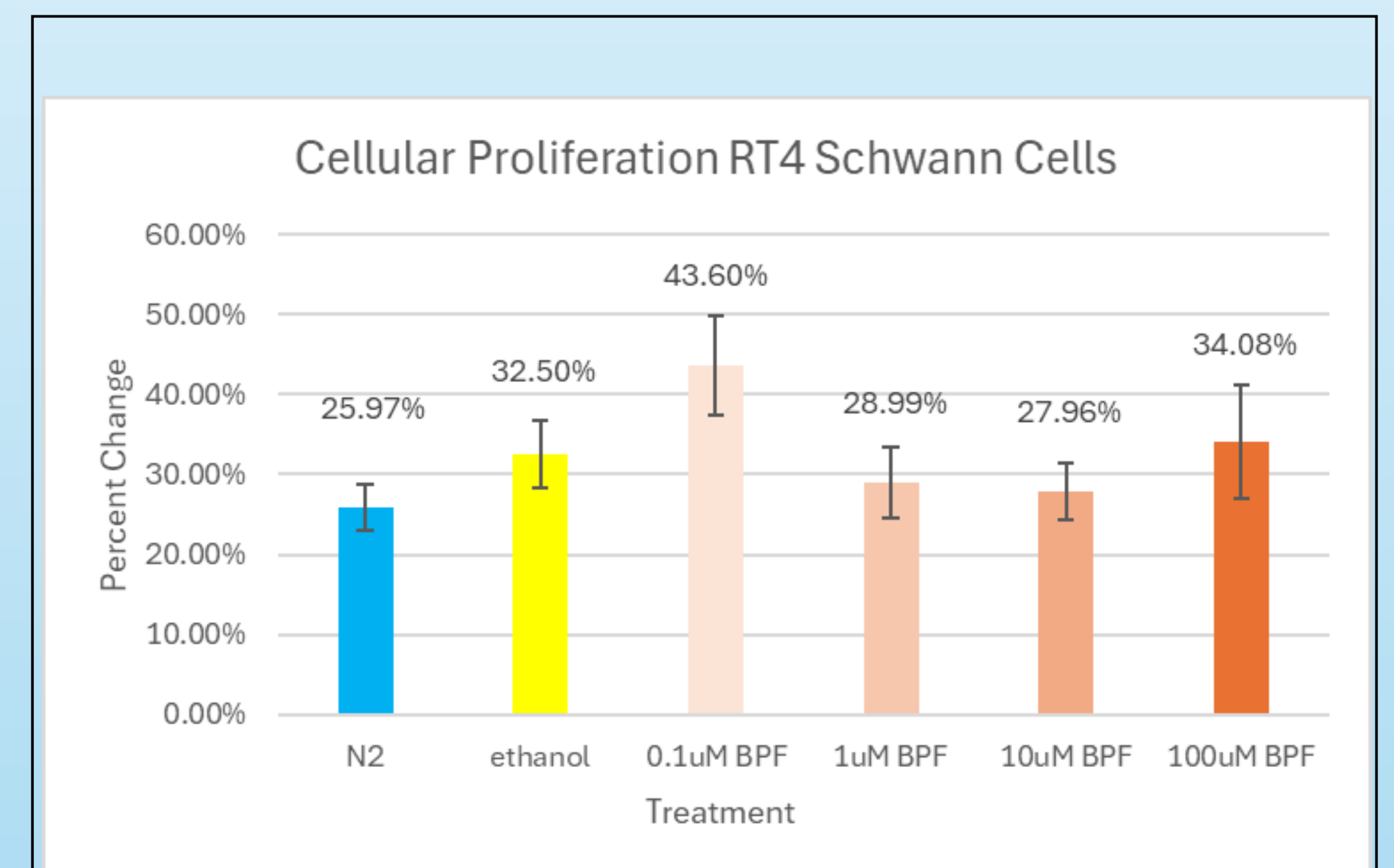


Fig. 3- Cellular Proliferation of RT4 Schwann Cells. Percent change was used to quantify proliferation and is calculated as the total number of EdU positive cells over the number of DAPI cells.

CONCLUSION

Higher dosages of BPF beyond $1 \times 10^{-6}\text{M}$ ($28.99\% + 0.108$) did not elicit an increase in proliferation, although a concentration of $1 \times 10^{-4}\text{M}$ ($34.08\% + 0.123$) slightly increased growth. The BPF treatment at a concentration of 10^{-7}M had the greatest percent change of ($43.6\% + 0.107$). Based on these results, it was concluded that that low concentrations ($1 \times 10^{-7}\text{M}$) of BPF were sufficient to increase cell proliferation which has implications in the health of the peripheral nervous system.

ACKNOWLEDGEMENTS

The researcher would like to thank the Misericordia University Summer Undergraduate Research Fellowship committee and the Misericordia University Student Research Grant committee for financial assistance. The researcher would also like to acknowledge Madeline Solomon, Leo Carr, Jill Dillon, Helen Bogdon, and the Misericordia University Biology Department for their assistance with research.