The Effects of Bisphenol S on Glial Cells of the Peripheral Nervous System

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Introduction

Schwann cells are glial cells in the peripheral nervous system that maintain nerve function and myelination. Nerve myelination is necessary to create quick electrical impulses. Peripheral nerve myelination is dependent on intact Schwann cell proliferation. Schwann cell proliferation can be adversely affected by environmental pollutants such as Bisphenol A (BPA). BPA is an endocrine-disrupting chemical found in plastic water bottles, receipt paper, containers, and many everyday products (1). Studies on BPA exposure showed that it stimulated cellular proliferation in neural stem cells (2). A commonly used manufactured derivative of BPA, Bisphenol S (BPS), has posed similar concerns. Previous research has found that BPS promotes the proliferation of MCF-7 breast cancer cells by accelerating the cell cycle (3). Based on these studies, it was hypothesized that ***BPS treatment would stimulate Schwann cell proliferation in a dose-dependent manner.***

Methods

S16 immortalized Schwann cell line was aseptically cell culture in Dulbecco's Modified Eagle Medium (DMEM). Cells were treated with a variety of concentrations of BPS (0.1-100 µM) in chamber slides for 24 hours. Cell proliferation was determined by using an EdU incorporation assay that attaches to the thymidine base during the S phase of cell proliferation. Proliferating cells were quantified using the ZEN software on the ZEISS Axio Observer Z1 inverted Fluorescent Microscope.

Results

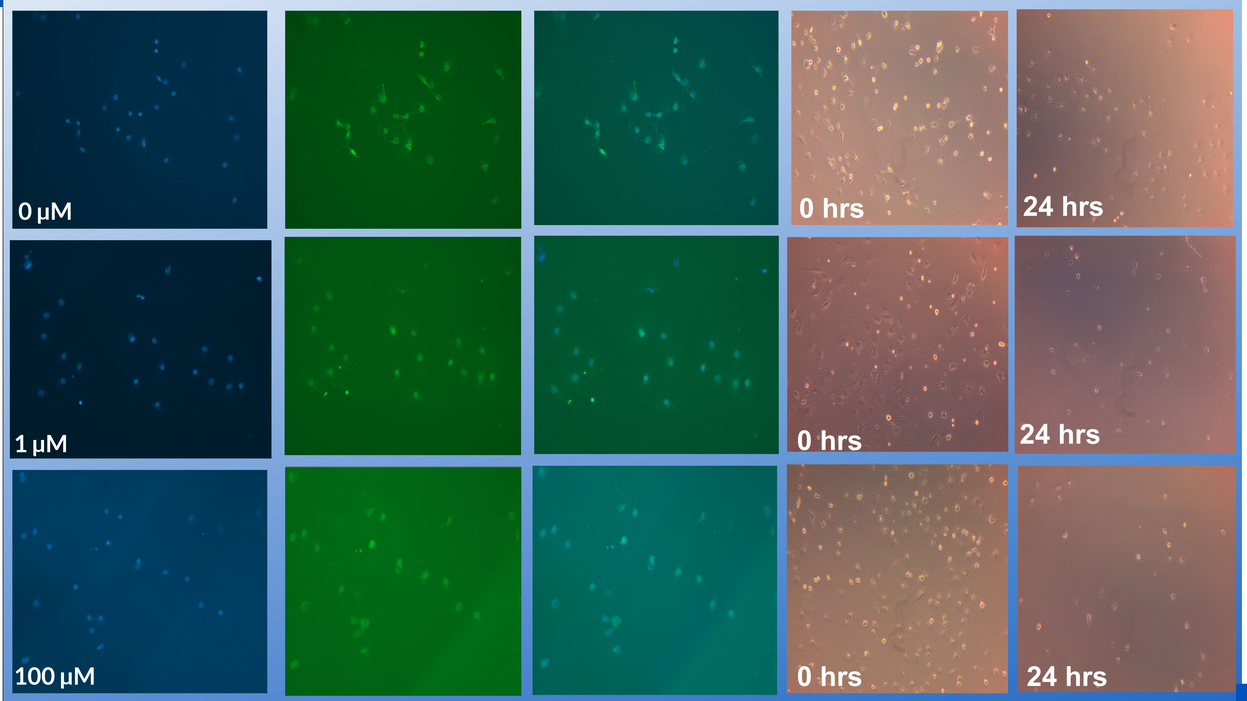

Figure 1. Immunofluorescent incorporation for 0 µM, 1 µM, and 100 µM BPS treated S16 Schwann cells. Images were visualized using the ZEN software on the ZEISS Z1 inverted fluorescent microscope. Panel 1 represent Schwann cells stained with DAPI, panel 2 represents Schwann cells stained with EdU, and panel 3 represents the overlay of Schwann cells with DAPI and EdU. Panel 4 represents Schwann cells in control media at 0 hr of BPS treatment while panel 5 represents Schwann cells after 24 hrs of BPS treatment.

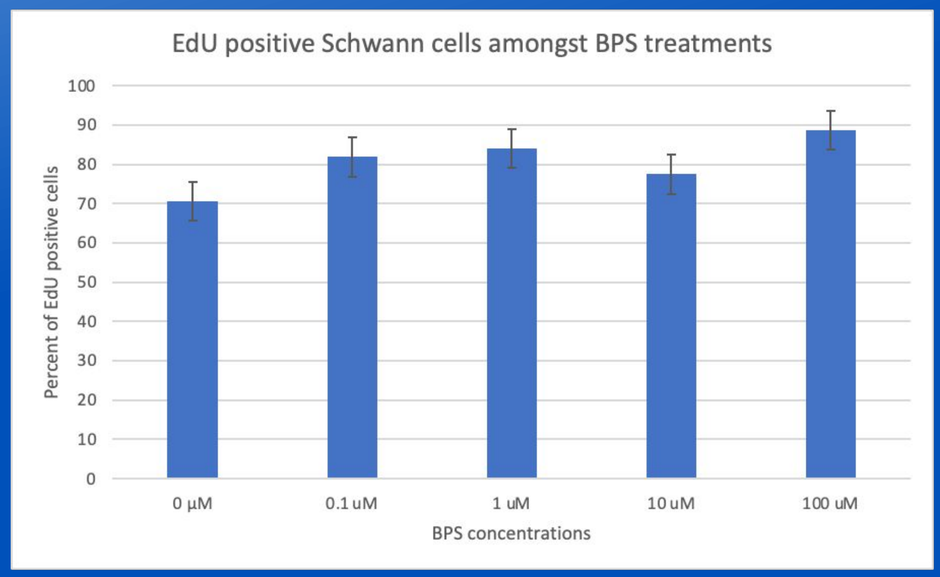

Figure 2 . EdU positive Schwann cells amongst BPS treatments. Using the EdU proliferation assay, the S16 immortalized rat cell line was was treated with 0, 0.1, 1, 10, and 100 µM of BPS in an 8 well chamber slide for 24 hours in control media (N2).

Conclusion

Cell proliferation increased with treatments of BPS as compared to the controls treatments. For instance, the percentage of cells proliferated to 81.9% ±0.0379 at 0.1 µM, 84%±0.0322 at 1 µM, 77.5%±0.0239 at 10 µM, and 88.7% ±0.0927 at 100 µM in comparison to the control at 70.6%±0.1245 implying an increase in proliferation for all treatments. The proliferation is dose-dependent, showing the highest increase of proliferation at the highest BPS concentration of 100 µM. An overproduction of Schwann cells due to the use of BPS has the potential to cause cancer, autoimmunity, and limit their capacity to support endogenous repair.

References

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