The impact of PCBs on thyroid hormone directed brain development in rats

Eric A Iannacone, *University of Massachusetts - Amherst*

Abstract

Polychlorinated biphenyls are one type of organic pollutant. Although they are no longer produced due to their resistance to degradation they have persisted in the environment and have become globally distributed. They have been found within the tissues of nearly every organism that has been tested for their presence. Because they are capable of interacting with biological systems their effect on environmental and human health have become a topic of interest and research. ^ It is known that PCBs alter the function and levels of thyroid hormone. This is significant because of the importance of properly regulated thyroid hormone levels during development. To gain a better understanding of the specific effects of PCBs on thyroid hormone function and to better assess the risks associated with PCB exposure I set out to identify mechanisms by which PCBs alter thyroid hormone-directed brain development. ^ I used a number of approaches to identify impacts of PCBs on thyroid hormone-directed brain development. I first looked at gene expression and identified new targets of thyroid hormone, the cofactors N-CoR and SRC-1. I next looked at the effects of PCB exposure on these genes. I found that PCBs did not affect the expression of these genes. I next went on to look at cell and death and proliferation in the cerebellum and found that PCBs did not alter these processes. When I tried an *in vitro* approach to look at the impact of PCB exposure on receptor-independent effects of thyroid hormone on actin polymerization I found that my cultures did not respond to thyroid hormone as reported. ^ In the last experiment I used a differential display screen to identify targets of PCB exposure and identified number of genes whose expression is putatively affected by PCB exposure. These genes included Stathmin, BESH, and Zic-1 all of which are associated with the cytoskeleton. It has also been shown that the effects of thyroid hormone can alter neuronal migration. These data suggest that

PCBs may be altering neuronal migration and that the genes identified in this screen are downstream consequences of the thyroid hormone receptor -independent effects of thyroid hormone. ^

Subject Area

Biology, Molecular|Biology, Neuroscience|Biology, Cell