Response paper 3

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Environmental Agents

Environmental toxicants are an absolutely terrifying aspect of the world. We as human beings live in symbiosis with our environment, and if even a small part of the environment is altered, it can alter us as well. One of the most fascinating aspects of neurotoxicology is that it can alter the human body at almost any level in many different systems. It can disrupt signaling pathways through action as an agonist or antagonist, or negatively impact the thyroid by altering the conversion of T4 to T3. It seems as though the human body is nothing more than a series of weak points waiting to be exploited by the power-hungry neurotoxicants of the world.

Sadly, the body of a child is even more exploitable than the body of an adult. In fact, many neurotoxicants have the unfortunate ability to cross the placenta. For example, the synthetic monomer bisphenol A (BPA) is used in the production of plastics and ingested by humans in huge amounts. In fact, the nbc news video discussing hormone disruptors in the home identifies countless possible sources of BPA or other hormone disruptors, such as cups, cans, beauty products, toys, and antibacterial soup. Although there are no reports of toxicity in human adults, high BPA levels in gestating mothers has been linked to future hyperactivity and aggression in the child. BPA binds to the thyroid hormone receptor and antagonizes its activation by T3, which alters the balance of the endocrine system, evidently enough to produce neurological changes in the developing system.

One of the biggest neurotoxicant disasters was the mass poisoning of Minamata by methylmercury, causing what is now called Minamata disease in those exposed. The wastewater discharge of an industrial plant containing methylmercury contaminated marine life in the surrounding areas and subsequently poisoned those who ingested the affected fish. Methylmercury is able to pass through the blood brain barrier, and once it is in the brain it concentrates in areas of the cerebellum and occipital cortex. There, it disrupts protein synthesis, signaling pathways, and neural cytoarchitecture and migration. Interestingly, the major symptoms of Minamata disease perfectly correlate with the areas of the brain disrupted. 100% of people suffering from the disease displayed constriction of the visual field, while 93.5% of people displayed some form of ataxia and gait disturbance (Harada 1995).

Evidently, the reach of neurotoxicants is far and wide, and the potential effects are devastating. In current years, people have become aware of the possible dangers in their homes and environment. However, it is unclear whether this increased awareness is helping people change their lifestyle to something safer, or simply increasing panic over something that cannot be changed without a global initiative. In the upcoming years there will likely be more panic and more awareness, but the major question is, will there be something done about the presence of these harmful substances in our lives?

References

Harada, M. (1995) Minamata Disease: Methylmercury poisoning in Japan caused by environmental pollution. *Critical Reviews in Toxicology, 25*(1), 1-24