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Brief Note on Neurotoxicology and Brainstorming Disorder with Clinical Evidence for Neurotoxicity

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DESCRIPTION

A wide range of compounds target the nervous system as their target organ. For example, lead exposure has been linked to lower intelligence scores in children, and manganese (an essential nutrient) has been linked to neurotoxic effects similar to Parkinson's disease at sufficiently high doses. Although organophosphate insecticides are intended to target the nervous systems of insect pests, the signalling pathways involved are generally conserved across organisms, including humans; thus, these chemicals may have unintended consequences in humans. Chemical toxicity on the brain or peripheral nervous system can have far-reaching consequences. Some neurotoxic effects are reversible, while others may be long-lasting or permanent. There is also growing concern about the possibility of chemicals and pharmaceuticals causing more subtle neurodevelopmental effects, such as autism and attention deficit disorders. Assessing the potential neurotoxic effects of agrochemical, veterinary medicine, and pharmaceutical agents after developmental or adult exposure is an important component of safety evaluations. Exposure to substances used in chemotherapy, radiation treatment, drug therapies, and organ transplants, as well as heavy metals such as lead and mercury, certain foods and food additives, pesticides, industrial and/or cleaning solvents, cosmetics, and some naturally occurring substances, can all cause neurotoxicity. The prognosis is determined by the length and degree of exposure, as well as the severity of neurological injury. Neurotoxicant exposure can be fatal in some cases. Patients in other cases may survive but not fully recover. In other cases, many people recover completely after treatment. The direct or indirect effect of chemicals on the nervous system of humans or animals is referred to as neurotoxicity. Numerous chemicals can cause neurotoxic disease in humans, and many more are used in animal experiments to disrupt or damage the nervous system. Some act directly on neural cells, while others disrupt metabolic processes on which the nervous system is particularly reliant. Some interfere with neural function, while others cause maldevelopment or damage to the adult nervous system.

In laboratory models, three factors appear to induce AIDN: susceptibility during a critical period of development, a large dose of the anaesthetic, and a prolonged duration of exposure. It is difficult to extrapolate these laboratory results to the human neonate. A rat's brain develops in weeks, whereas a human brain develops over years. Six hours of anaesthesia in a neonatal rat pup could be the equivalent of weeks in a human neonate. This extreme condition is uncommon in clinical practise, with the exception of sedation in intensive care patients. As a result, determining the effect of a comparable exposure on neurologic outcome in a human neonate is difficult. The evidence that general anaesthesia is harmful to children is based solely on retrospective epidemiologic studies. The effects of surgery, as well as the effects of the underlying comorbid conditions, may confound this evidence. Although control for obvious confounders has been attempted, the retrospective nature of these studies makes controlling for all known and unknown confounders impossible. The Mayo Clinic has been the source of several epidemiologic studies. Olmsted County, Minnesota, has a stable population, and researchers have access to their medical records as well as their school records. A retrospective cohort study of over 5000 children born between 1976 and 1982 discovered that 593 of the 593 patients had more reading, written language, and math learning disabilities.Using New York State Medicaid billing codes, a database of over 200,000 children was created. Initial research from this database revealed that children under the age of one year who underwent inguinal hernia repair had a nearly threefold increase in diagnoses relating to developmental and behavioural issues. Even after controlling for gender and birth weight, there was a nearly twofold increase in these issues in this group. A follow-up

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study that matched exposed twins with nonanesthetic exposed twin siblings discovered no link between general anaesthesia receipt and later neurologic and developmental problems. A small retrospective cohort paper of children under the age of four years was published. Eighty-five exposed children and the same number of control children were matched. Another prospective study compared a smaller group of children who had received anaesthesia before the age of one year to a similar number of age- and gender-matched children who had not. The study found that anaesthetized children had lower levels of long-term recognition memory, but no differences in familiarity, IQ, or Child Behavior Checklist scores.

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CONFLICT OF INTEREST

The author's declared that they have no conflict of interest