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Association between a Forward Lag of Historical Total Accumulated Gasoline Lead Emissions and Contemporary Autism Prevalence Trends in California, USA

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Abstract : In California between the late 1920's and 1986 the lead concentrations in urban soils and dust climbed rapidly following the deposition of greater than 387,000 tonnes of lead emitted from gasoline. Previous research indicates that when children are lead exposed around 90% of the lead is retained in their bones and teeth due to the substitution of lead for calcium. Lead in children's bones has been shown to accumulate over time and is highest in inner-city urban areas, lower in suburban areas and lowest in rural areas. It is also known that women's bones demineralize during pregnancy due to the foetus's high demand for calcium. Lead accumulates in women's bones during childhood and the accumulated lead is subsequently released during pregnancy – a lagged response. This results in calcium plus lead to enter the blood stream and cross the placenta to expose the foetus with lead. In 1970 in the United States, the average age of a first-time mother was about 21. In 2008, the average age was 25.1. In this study, it is demonstrated that in California there is a forward lagged relationship between the accumulated emissions of lead from vehicle fuel additives and later autism prevalence trends between the 1990's and current time period. Regression analysis between a 24 year forward lag of accumulated lead emissions and autism prevalence trends in California are associated strongly (R2=0.95, p=0.00000000127). It is hypothesized that autism in genetically susceptible children may stem from vehicle fuel lead emission exposures of their mothers during childhood and that the release of stored lead during subsequent pregnancy resulted in lead exposure of foetuses during a critical developmental period. It is furthermore hypothesized that the 24 years forward lag between lead exposures has occurred because that is time period is the average length for women to enter childbearing age. To test the hypothesis that lead in mothers bones is associated with autism, it is hypothesized that retrospective case-control studies would show an association between the lead in mother's bones and autism. Furthermore, it is hypothesized that the forward lagged relationship between accumulated historical vehicle fuel lead emissions (or air lead concentrations) and autism prevalence trends will be similar in cities at the national and international scale. If further epidemiological studies indicate a strong relationship between accumulated vehicle fuel lead emissions (or accumulated air lead concentrations) and lead in mother's bones and autism rates, then urban areas may require extensive soil intervention to prevent the development of autism in children.

Keywords : autism, bones, lead, gasoline, petrol, prevalence
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