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Are mercury and Alzheimer's disease linked?



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HIGHLIGHTS

- Mercury seems to be a risk factor for Alzheimer's disease.
- Analysis suggests a link between mercury and neurotoxicity microtubule-associated.
- Elevated blood mercury levels in patients with Alzheimer's disease

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To the Editor:

In his Commentary [2017], Dr. Chakraborty stresses the potential hazards of low-level long-term exposure to mercury and the increase of prevalence of Alzheimer's disease in the general population of India, a view we wholeheartedly endorse. We applaud the tenor of the piece

(Chakraborty, 2017) and we have some additional points to make as well.

We share the concern expressed by Dr. Chakraborty (2017) through his excellent Commentary, since a previous clinical study estimated that there was a two-to-threefold increase of mercury levels in blood of patients with Alzheimer's disease, as compared to control patients (Hock et al., 1998).

Researchers have also hypothesized that exposure to mercury may, in part, explain the hippocampal zinc loss in brain tissue from patients with Alzheimer's disease (Constantinidis, 1991). The postulated mechanism is the molecular mimicry (Corrigan et al., 1993). In fact,

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nonessential metal toxicants act primarily and additively through molecular ionic mimicry, replacement of essential metals, and competition for metabolism in biological systems (Constantinidis, 1991; Corrigan et al., 1993). It has been demonstrated that there is a mercury deposition in human brain regions (i.e.; hippocampus and amygdala), which are involved in memory and other cognitive functions, suggesting that mercury may have a possible role in Alzheimer's disease pathophysiology (Wenstrup et al., 1990).

Mercury is neurotoxic *in vitro* and the effects reported of this neurotoxicant on mature neurons as well as adult neuronal stem cells have been assessed (Cedrola et al., 2003). Others have suggested that such neurodegenerative conditions as Alzheimer's disease are associated with the accumulation of mercury - which causes oxidative stress - in the brain of pre-exposed animals, involving delayed neurotoxic effects (Monnet-Tschudi et al., 2006). Research in a rat model has shown that neuronal beta-tubulin defects may be induced by inorganic mercury (Duhr et al., 1993; Pendergrass et al., 1997), with a suspected connection between exposure to this metal and Alzheimer's disease.

Accordingly, there are sufficient data to conclude that mercury may interfere with assembly of microtubules from tubulin in the nervous system. There is a possible association between brain tissue levels of mercury and Alzheimer's disease. Finally, there is initial evidence of elevated levels of blood mercury in individuals with Alzheimer's disease. An extrapolation of such results suggests that mercury seems to be a risk factor for Alzheimer's disease. These studies have enormous

implications for Alzheimer's disease and therefore deserve future investigation.

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