

Aluminum and Alzheimer's disease

Does aluminum play a role in causing Alzheimer's disease?

Thinking about whether aluminum plays any role in Alzheimer's disease has evolved over the 40 years that researchers have been exploring this question. The theory that aluminum might be involved emerged in the 1960s after scientists discovered that exposing rabbits' brains to aluminum caused nerve cell damage with some similarity to Alzheimer pathology. Physicians also noted that people undergoing long-term dialysis sometimes develop a non-Alzheimer form of dementia caused by a buildup of aluminum in the bloodstream. These observations raised the specter that aluminum might be one of the first substances implicated in triggering Alzheimer's.

However, studies since then have failed to document a clear role for aluminum in causing Alzheimer's. Every perspective from which researchers have explored the question has yielded contradictory data. For virtually every study suggesting that aluminum may be linked to Alzheimer's, there is another study failing to confirm those results.

The vast majority of mainstream scientists now believe that if aluminum plays any role at all in Alzheimer's, that role is small. If aluminum exposure had a major impact on risk, scientists would have gained a clearer picture of its involvement over the decades that they have been studying the issue, even though certain factors hamper research.

One such issue lies in the widespread occurrence of both aluminum and Alzheimer's, which complicates the effort to characterize their relationship. Aluminum is Earth's third most common element after oxygen and silicon, and Alzheimer's occurs frequently in older adults. Another factor is the lack of an animal model in which to study aluminum's effects.

The best animal models of Alzheimer's disease are mice that are genetically engineered to mimic human Alzheimer

pathology, but mice lack sensitivity to aluminum. Rabbits have the necessary sensitivity, but there is no transgenic Alzheimer rabbit model.

Although research into the Alzheimer's/aluminum connection continues, most mainstream health professionals believe, based on current knowledge, that exposure to aluminum is not a significant risk factor. Public health bodies sharing this conviction include the World Health Organization (WHO), the U.S. National Institutes of Health (NIH), the U.S. Environmental Protection Agency (EPA) and Health Canada. Further, it is unlikely that people can significantly reduce their exposure to aluminum through such measures as avoiding aluminum-containing cookware, foil, beverage cans, medications and other products. Even if aluminum were clearly implicated in Alzheimer's, these routes of exposure account for only a small percentage of the average person's intake. Most experts encourage people to focus wellness efforts with a proven impact on health or quality of life — avoiding smoking, exercising regularly, eating moderately, maintaining social connections, and remaining intellectually active.

What kinds of contradictory data have emerged over the years?

The following points summarize some of the conflicting findings about aluminum and Alzheimer's disease:

- Aluminum is known to be toxic to the nervous system, but its effects differ from those of Alzheimer's disease.
- Some studies show elevated aluminum levels in the Alzheimer brain, but others do not. These studies include both "bulk" investigations measuring amounts of aluminum by weight and advanced analysis using laser microprobes.
- There is some evidence that in laboratory cultures of nerve cells, aluminum promotes aggregation of the protein fragment beta-amyloid into the amyloid

plaques that are a hallmark of Alzheimer abnormality. However efforts to correlate aluminum levels with plaque density in people with Alzheimer's have been inconclusive.

- Research has failed to document a clear elevation of Alzheimer risk in individuals with occupational exposure to aluminum.
- Studies finding the most consistent link have examined elevated levels of aluminum in drinking water and increased incidence of Alzheimer's. However, there is no evidence that Alzheimer's disease is more prevalent in cultures that traditionally drink large amounts of tea, even though tea is one of the few plants whose leaves accumulate large amounts of aluminum that may leach into the brewed beverage.

Where can I get more information about aluminum and Alzheimer's?

The Alzheimer's Association Green-Field Library has compiled a comprehensive reading list on Aluminum and Alzheimer's Disease that offers five pages of relevant print and electronic citations. To request a copy, please contact the library at 312.335.9602.

The Alzheimer's Association, the world leader in Alzheimer research, care and support, is dedicated to finding prevention methods, treatments and an eventual cure for Alzheimer's.

24/7 Helpline **1.800.272.3900**

TDD Access **312.335.8882**

Web site **www.alz.org**

e-mail **info@alz.org**

Fact sheet updated **June 20, 2002**