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Canada to limit tap water aluminum

Links to memory, brain impairment

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Health Canada plans to set limits on aluminum in drinking water in light of research linking the element to brain damage and memory loss.

An Australian research team reported this week that aluminum, which is added to drinking water in treatment plants, can accumulate in the brain, where it may kill off cells and cause memory loss. Most Canadians living in cities drink water that has been treated with aluminum, although at levels that are considered safe.

The Sydney-based Australian Institute of Biomedical Research said inorganic aluminum, the type added to water during purification, collects in the brains of rats, damaging neurons.

Although the researchers did not say that aluminum in water causes Alzheimer's disease, they said the forms of memory impairment the substance causes is characteristic of symptoms of the illness.

Institute researcher Judie Walton noted there has been a worldwide surge in Alzheimer's over the past 70 years, as many people's water has been treated with aluminum.

Some researchers continue to link high levels of aluminum in the brain with Alzheimer's, while other studies have cast doubt on the connection.

"Based on what we've seen of the research, the correlation [of aluminum to memory loss] is conclusive," Dr. Barry Thomas said yesterday.

Dr. Thomas, head of the criteria section of Health Canada's Environmental Health Directorate, said the Department will ask a committee of federal and provincial officials to set health limits for aluminum within the next year.

Although water accounts for only a small fraction of the amount of aluminum people consume in food, the type of aluminum that enters water during purification is the most likely to reach the brain, the Australian study found.

The finding, reported Tuesday in the journal *NeuroToxicology*, draws conclusions that are similar to those in a study of 2,000 Ontario men reported in January in the *Canadian Journal on Aging*. "Generally you get a risk almost 10 times as big in areas that have high aluminum levels in the drinking water," said the study's author, Dr. William Forbes, distinguished professor emeritus of the University of Waterloo.

Dr. Forbes said his research shows that a level above 300 micrograms per litre is definitely harmful. He said there is no evidence of harm from long-term use of water with aluminum levels below 100 micrograms per litre, a level common in Canadian water supplies.

Most treated water in Canada is kept below 100 micrograms per litre because any more than that affects its look and taste, said Metro Toronto water-supply director Hiroshi Taniguchi.

Dr. Thomas said that "no country currently has a health standard for aluminum in water. We're in the forefront on this." Health limits have been under discussion for at least two years, he said, and "as is often the case, there is a wide range of opinion."

At a conference in Burlington, Ont., last year, some experts argued for a health limit as low as 50 micrograms while others said 100 is necessary to avoid compromising the purifying effect of the aluminum salts in the water.

"This is not just added for no reason," Dr. Thomas pointed out. The process removes bacteria and protozoa that are serious health risks.

Water in some areas of Canada, especially the Prairies, is naturally high in aluminum, but that is not considered a health risk, Dr. Thomas noted. The organic form of aluminum in food and ground water doesn't readily enter the blood system, he said. It is the inorganic aluminum salts used to clarify water in treatment that are the concern.

Hydrated aluminum sulphate, also known as alum, is used to remove fine particles from water, said Peter Chisholm, associate professor of engineering at the University of Guelph. The compound or a related aluminum salt is used across Canada, anywhere where there is pre-treatment of water extracted from lakes and streams."

The chemical forms snowflake-like clusters known as floc. The positively charged floc attracts negatively charged mineral particles in the water as it settles to the bottom of a treatment tank. However, some aluminum remains in the purified water.

REFERENCES: Walton, J., Tuniz, C., Fink, D., Jacobsen, G. and D. Wilcox: Uptake of trace amounts of aluminum into the brain from drinking water. *NeuroToxicology* **16**(#1): 187-190 (1995). [DC Library call number: PER RC321.N437]

Forbes, W. F. and N. Agwani: Geochemical risk factors for mental functioning, based on the Ontario Longitudinal Study of Aging (LSA) III. The effects of different aluminium-containing compounds. *Canadian Journal on Aging* **13**(#4): 488-498 (1994). [DC Library call number: PER HV1475.A1C3X]

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