

Stephen Z. Fadem, MD, FACP, FASN

Synopsis from the article:

Fadem SZ. Can aluminum in antiperspirants harm me?
*aakpRENALIFE** 2005;21:20.

Updated to November 2005

*Stephen Z. Fadem, MD, FACP, FASN
Clinical Professor of Medicine, Baylor College of Medicine, Houston, Texas
Medical Director, Houston Kidney Center/DaVita Integrated Service Network
<http://nephron.com>*

We constantly stretch the limits of our environment. New developments and advances in technology bring convenience to our lives, but create new challenges as well. Take aluminum as an example. From cooking utensils, “tin” foil, beverage cans to antiperspirants and airplanes, we come in contact with this important element every day. Thus, thousands of people are exposed to aluminum on a regular basis—as a raw material, a product, or a toxin—in factories, plants and mines, and as users or consumers. The thought that it may play a role in Alzheimer’s disease, a very common cause of dementia, is very frightening.

Although long implicated in the pathogenesis of Alzheimer’s disease, the exact mechanism has never been identified. Nonetheless, extensive literature reviews cast no doubt that it is neurotoxic, and may play a factor in Alzheimer’s disease¹.

A multivariate analysis of elderly women in France failed to show that the aluminum content in drinking water was associated with Alzheimer’s². But, larger quantities of exposure may be necessary for toxicity to appear. In animal studies, aluminum administration to old rats increased toxic effects. It may be that the aging brain is susceptible to the oxidative stress caused by the metal³. Studies of usual aluminum use in the non-dialysis population have failed to establish the link⁴. However, cognitive defects have been identified in welders exposed to aluminum though not on dialysis⁵.

Dialysis patients have a sustained inflammatory state⁶. There are several reasons why, and addressing this is a major effort in our profession. Dialysis patients who are exposed to the same doses of aluminum as the regular population accumulate it more easily, and are more susceptible to any untoward effects. It was for this reason that the renal community has all but stopped recommending aluminum’s use as a phosphate binder, even though it was excellent in binding phosphorus and keeping levels under control. It was strongly suggested to play a role in dialysis dementia⁷, and was a major cause of osteomalacia in dialysis patients using aluminum binders^{8,9}.

Aluminum is the major ingredient in a popular form of antiperspirants, and works by blocking the pores that release sweat. Aluminum absorption through the skin from

antiperspirants has been suggested, though never proven to be related to breast cancer and Alzheimer's disease¹⁰⁻¹². Hyperaluminumemia has been reported with antiperspirant use¹³. Given differences both in causing pathology and in rates of excretion, the same burden of aluminum could have different effects on a population of kidney patients or young children with immature kidney function, compared with the normal population. In 2003, the FDA established conditions where antiperspirants (often containing aluminum) are safe and not misbranded¹⁴. Although in December, 2004, the FDA stayed part of the misbranding rule showing concern that antiperspirants are effective as claimed, (<http://www.fda.gov/OHRMS/DOCKETS/98fr/04-23106.htm>), they continued to require that aluminum-containing antiperspirants carry a warning of potential hazards, and a reminder to keep this product out of reach of children. Patients with decreased kidney function and children, because they have immature renal function, are at higher risk when exposed to these products. Patients are warned to "Ask a doctor before use if you have kidney disease." This FDA rule can be read in its entirety at <http://a257.g.akamaitech.net/7/257/2422/14mar20010800/edocket.access.gpo.gov/2003/03-14140.htm>

Although there has been no public warning regarding the use of soft drink packaging, tissue levels of aluminum in rats fed soft drinks packaged in aluminum cans had a 69% higher bone aluminum concentration when compared with distilled water¹⁵. The corrosion of aluminum in colas containing orthophosphoric acid may be greater than in citrate-based drinks¹⁶.

*You can get *aakpRENALIFE* as a member benefit if you join the American Association of Kidney Patients for just \$25/year. Learn more at <http://www.aakp.org>.

References

1. Gupta VB, Anitha S, Hegde ML, et al. Aluminium in Alzheimer's disease: are we still at a crossroad? *Cell Mol Life Sci* 2005;62(2):143-58.
2. Gillette-Guyonnet S, Andrieu S, Nourhashemi F, de La Gueronniere V, Grandjean H, Vellas B. Cognitive impairment and composition of drinking water in women: findings of the EPIDOS Study. *Am J Clin Nutr* 2005;81(4):897-902.
3. Fattoretti P, Bertoni-Freddari C, Baliotti M, Giorgetti B, Solazzi M, Zatta P. Chronic aluminum administration to old rats results in increased levels of brain metal ions and enlarged hippocampal mossy fibers. *Ann N Y Acad Sci* 2004;1019:44-7.
4. Graves AB, White E, Koepsell TD, Reifler BV, van Belle G, Larson EB. The association between aluminum-containing products and Alzheimer's disease. *J Clin Epidemiol* 1990;43(1):35-44.
5. Giorgianni C, Faranda M, Brecciaroli R, et al. [Cognitive disorders among welders exposed to aluminum]. *G Ital Med Lav Ergon* 2003;25 Suppl(3):102-3.
6. Stenvinkel P. Inflammation in end-stage renal disease--a fire that burns within. *Contrib Nephrol* 2005;149:185-99.
7. Mach JR, Korchik WP, Mahowald MW. Dialysis dementia. *Clin Geriatr Med* 1988;4(4):853-67.

8. Savory J, Bertholf RL, Wills MR. Aluminium toxicity in chronic renal insufficiency. *Clin Endocrinol Metab* 1985;14(3):681-702.
9. Mayor GH, Lohr TO, Sanchez TV. Aluminum metabolism and toxicity in renal failure: a review. *J Environ Pathol Toxicol Oncol* 1985;6(1):43-50.
10. Yokel RA, McNamara PJ. Aluminium toxicokinetics: an updated minireview. *Pharmacol Toxicol* 2001;88(4):159-67.
11. Johnston CT, Hem SL, Guenin E, Mattai J, Afflito J. Potentiometric/turbidometric titration of antiperspirant actives. *J Cosmet Sci* 2003;54(2):113-8.
12. McGrath KG. An earlier age of breast cancer diagnosis related to more frequent use of antiperspirants/deodorants and underarm shaving. *Eur J Cancer Prev* 2003;12(6):479-85.
13. Guillard O, Fauconneau B, Olichon D, Dedieu Gv, Deloncle R. Hyperaluminemia in a woman using an aluminum-containing antiperspirant for 4 years. *Am J Med* 2004;117(12):956-9.
14. Antiperspirant drug products for over-the-counter human use; final monograph. Final rule. *Fed Regist* 2003;68(110):34273-93.
15. Kandiah J, Kies C. Aluminum concentrations in tissues of rats: effect of soft drink packaging. *Biometals* 1994;7(1):57-60.
16. Seruga M, Hasenay D. Corrosion of aluminium in soft drinks. *Z Lebensm Unters Forsch* 1996;202(4):308-12.

© 2005, Stephen Z. Fadem, M.D., FACP, FASN – All rights reserved. Used with permission.

Commentary by Todd S. Ing, MD

Dr. Fadem has successfully answered the often-asked and highly pertinent question depicted in the title of the present communication.