CORRESPONDENCE

The Health Effects of Aluminum Exposure

by Dr. rer. nat. Katrin Klotz, Dr. med. Wobbeke Weistenhöfer, PD Dr. med. Frauke Neff, Prof. Dr. rer. nat. Andrea Hartwig, PD Dr. rer. nat. Christoph van Thriel, and Prof. Dr. med. Hans Drexler in issue 39/2017

Additional Information

The occurrence of aluminum-induced encephalopathy in dialysis patients was first reported in the mid-1970s, based on case reports from Canada and the Netherlands. Significantly increased levels of aluminum in patient plasma were found to be caused by using aluminum-coated anodes for preheating raw water for use in dialysate production. It was not until later that the so-called reverse osmosis process was implemented for water treatment, after which aluminum intoxication in dialysis patients has only rarely occurred.

However, the authors of the article (1) must be corrected when they state that aluminum salts were added to "dialysate as a phosphate binder". Such a process is impossible in the preparation of dialysate, and it is also completely illogical, as aluminum salts inhibit enteral phosphate reabsorption. DOI: 10.3238/arztebl.2018.0098a

References

1. Klotz K, Weistenhöfer W, Neff F, Hartwig A, van Thriel C, Drexler H: The health effects of aluminum exposure. Arztebl Int 2017; 114: 653–9.

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Conflict of interest statement
The author declares that no conflict of interest exists..

In Reply:

We thank Dr. Kingreen for his valuable input. As stated in our article (1), clinically relevant neurotoxic effects such as confusion, memory and speech impairments as well as—at advanced stages—dementia and both focal and generalized seizures were described for dialysis patients in the past with increased levels of aluminum detected in plasma and brain tissue. The reason for this was the aluminum content of the tap water used for dialysis. Transfer of aluminum via dialysate is also influenced by the type of aluminum compounds present and the pH levels (2). In a specific case in the Netherlands, as detailed by Dr. Kingreen, water used for dialysis was heated in a boiler with two aluminum anodes to prevent corrosion, resulting in high concentrations of aluminum in the water. Dialysis encephalopathies and three deaths were observed. After the boiler use was discontinued, the condition of all patients improved significantly (3). From the end of the 1970s, the process of reverse osmosis was increasingly used for water treatment, leading to significantly lower aluminum concentrations in the dialysate (2). Almost no cases of dialysis encephalopathy have occurred since then.

Oral aluminum-containing phosphate binders are among the most potent phosphate binders, have relatively few side effects, and have been used in particular in the past for dialysis patients (4). Aluminum exposure due to their use should be monitored by determining serum aluminum levels, but this appears to play a minor role in encephalopathy for most dialysis patients. DOI: 10.3238/arztebl.2018.0098b

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1. Klotz K, Weistenhöfer W, Neff F, Hartwig A, van Thriel C, Drexler H: The health effects of aluminum exposure. Dtsch Arztebl Int 2017; 114: 653–9.
2. Wills MR, Savory J: Aluminum and chronic renal failure: sources, absorption, transport, and toxicity. Crit Rev Clin Lab Sci 1989; 27: 59–107.
3. Flendrig JA, Kruis H, Das HA: Letter: Aluminum and dialysis dementia. Lancet 1976; 7971: 1235.
4. Floege J: Phosphatbinder. Nephrologe 2017; 12: 183–91.

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Conflict of interest statement
The authors are involved with the Senate Commission on the Investigation of Health Hazards of Chemical Compounds in the Work Area.

Erratum

In the article by Ulrich A. Dietz et al., entitled "The Treatment of Incisional Hernia" in issue 3 of *Deutsches Ärzteblatt International* (19 January 2018), items C and D in the legend of *Figure 2* were switched. The correct legend to the figure should read "With retromuscular mesh repair of midline incisional hernia, it is crucial to ensure a mesh overlap extending underneath the xiphoid to prevent recurrence". A) Xiphoid process; B) Posterior rectus sheath closed in the midline. Because of the midline xiphoid process insertion of the rectus sheath, a so called fatty triangle is created during the release of the posterior rectus sheath from the xiphoid. At the end of the mesh repair, this triangle is secured only by the synthetic mesh (**C**). With proper dissection, the mesh overlap underneath the xiphoid process extends several centimeters in cranial direction. **D**) Anterior rectus sheath. MWR