There Is No Aluminum Accumulation in the Skin of End-Stage Renal Failure Patients

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Dear Sir,

Aluminum (Al) overload is still a worrying problem in long-term dialysis patients. Data are lacking on Al accumulation in the skin of such patients and its relationship to bone overload. Skin biopsies would yet be a noninvasive method to assess Al intoxication. In their study, Ichimaru and Horie [1] found large amounts of Al in the skin of dialyzed patients with an energy-dispersive X-ray spectrometer. However, a number of artefacts may be due to the use of a spectrometer of low resolution, and Al was surprisingly found in all structures of the skin. Skin specimens were harvested from the buttocks, using the punch biopsy technique, of 3 hemodialyzed (60, 96 and 244 months respectively) patients, 1 end-stage renal failure, non-dialyzed patient, and 1 patient with normal renal function. Tape stripping of the skin was performed just before harvesting in order to clear out the stratum corneum contaminated by aluminosilicate deposits. The skin Al content was measured by electrothermal atomic absorption spectrometry. Another fragment was fixed in glutaraldehyde, postosmicated, and embedded in Epon. This fragment was studied by two microanalytical methods: (1) electron probe X-ray analysis using an instrument equipped with a four wavelength dispersive X-ray spectrometer of high resolution and with a transmission electron microscope which allows the distinction between cell accumulation and contamination by atmospheric dusts and (2) analytical electron microscopy [2], a highly sensitive method for the detection of Al (about 1,000-fold more sensitive than X-ray analysis).

Despite tape stripping, deep stratum corneum was still present in all biopsied fragments. Considerable variation in biochemical Al skin content was found from one patient to another (table 1). Values were greatly higher than in organs where Al is known to accumulate, i.e., liver or parathyroid glands. There was no correlation between skin Al content and dialysis duration, nor with bone intoxication: a patient with aplastic bone disease and

Table 1. Al content in skin and plasma with biochemical measurements related to bone Al staining and dialysis duration

88% of trabecular bone occupied by Al had the smallest amount of skin Al (13.3 mg/g). Moreover, no Al deposits could be detected in the skin structures of any patients by both X-ray analysis and ion microscopy, except for numerous aluminosilicate dusts on the section surfaces, probably accounting for the high rates of Al found with the quantitative method. Thus, with a strongly sensitive method we could demonstrate that is not Al accumulation in the skin of end-stage renal failure patients – at least in the population of this study. The discrepancy with biochemical measurements shows that exogenous contamination is a major problem when skin specimens are studied for Al.

References

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