Author's response to reviews

Title: Trace elements in hemodialysis patients: A systematic review and meta-analysis

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To the Editor

Although the high rates of morbidity and mortality in hemodialysis patients have been well publicized, several recent high profile trials have found no benefit of interventions aimed at improving outcomes. New approaches are therefore needed for testing in future trials.

In theory, hemodialysis patients are at high risk for deficiency of essential trace elements (due to removal by dialysis and/or dietary restriction) and excess of toxic trace elements (due to lack of renal clearance and/or direct infusion during the dialysis procedure). The latter is best exemplified by the case of aluminum, which caused disabling encephalopathy and bone disease until it was identified as the culprit. Although careful monitoring for aluminum toxicity is routine in modern hemodialysis units, blood levels of other trace elements are measured rarely, if ever.

Since disordered trace element status is a potentially reversible cause of illness in the general population, the possibility that abnormal trace element status is common in hemodialysis patients deserves investigation.

We did a systematic review of studies comparing the mean blood levels of trace elements in hemodialysis patients with those of healthy controls. We identified 128 eligible studies, which collectively suggested that levels of cadmium, chromium, copper, lead, and vanadium were higher and that levels of selenium, zinc and manganese were lower in hemodialysis patients, compared with controls.

Both deficiency and excess of trace elements are potentially harmful yet amenable to therapy. However, the fact that trace element levels are substantially different among hemodialysis patients than in controls has received little attention to date, despite the large number of published studies.

We believe that this study is of interest to the readership; would stimulate further research; and would be suitable for publication in BMC Medicine. The work has been seen and approved by all authors and is not under consideration elsewhere.

Thank you for considering our manuscript.

Sincerely,
Marcello Tonelli for the authors