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Trace element imbalances in hemodialysis patients: new data from a cohort of Portuguese patients

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Patients with end-stage renal disease undergoing hemodialysis (HD) therapy are at risk of developing deficiencies of essential trace elements and/or overload of toxic trace elements, both of which may significantly affect their clinical status. Those imbalances may result from the disease itself but also from the therapy, namely the hemodialysis process.

This work aimed at evaluate the current trace elements status in a cohort of patients under hemodialysis therapy. Serum (n=88) and whole blood samples (n=108) from HD patients, collected during the routine periodic control of Al levels, were analyzed for a wide panel of trace elements using inductively coupled plasma mass spectrometry (ICP-MS) (HD group). For comparison purposes, both serum (n=16) and whole blood samples (n=59) of individuals attending the same Clinical Laboratory but with no evidence of renal disease according to standard laboratory analytical criteria were also analysed (Control group).

The results showed significant differences among the hemodialysis patients group and the control group for several trace elements (Table 1):

Table 1. Trace element levels [µg/L; mean (sd)] in HD patients and control group

	SERUM		WHOLE BLOOD	
Element	**HD patients** (n=88)	Controls (n=16)	**HD patients** (n=108)	Controls (n=59)
Li	**2.9 (1.8)**	1.2 (0.8)	**2.7 (1.9)**	1.1 (0.8)
B	**89 (43)**	34 (17)	**133 (62)**	46 (23)
Mn	*0.40 (0.10)*	0.52 (0.11)	8.4 (2.3)	7.6 (1.5)
Co	**0.23 (0.11)**	0.13 (0.04)	*0.19 (0.06)*	0.23 (0.05)
Ni	**2.80 (0.95)**	1.09 (0.25)	**1.82 (0.46)**	1.53 (0.69)
Cu	*670 (151)*	812 (139)	*844 (138)*	955 (167)
Zn	*450 (86)*	681 (115)	5345 (766)	5767 (2249)
Se	*62 (13)*	82 (15)	*123 (20)*	138 (20)
Rb	*87 (23)*	115 (19)	*1145 (230)*	3510 (958)
Sr	**29.0 (3.7)**	22.3 (7.6)	**29.9 (4.0)**	17.6 (6.7)
Mo	**3.7 (1.5)**	1.11 (0.42)	**3.2 (1.6)**	0.81 (0.28)
Cd	**0.04 (0.02)**	0.01 (0.01)	**1.00 (0.32)**	0.24 (0.11)
Pb	**0.29 (0.15)**	0.10 (0.08)	**100 (24)**	21 (14)

[a] Results in bold are significantly ($p<0.001$) higher than in the control group. Results in italics are significantly lower.

This work provides further evidence on imbalances in trace element levels in hemodialysis patients. The results obtained for serum are generally in agreement with those found in previous studies [1]. Results obtained for whole blood samples (which are much scarcer in the literature) globally showed the same trend, except for Mn.

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