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ZnSO₄ treatment of NiSO₄-positive patients

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The humoral and cellular factors involved in irritant and allergic contact dermatitis are still poorly understood (1, 2). Nickel may interact with essential divalent ions with similar chemical properties at ionic sites of important biomolecules (3–5). Some effects of nickel may be abolished or reduced by supplementing animals with divalent essential metals (3, 4). Weissmann & Menné (6) reported cases of nickel dermatitis improving following oral administration of ZnSO₄.

Patients and Methods

15 patients (3 male and 12 female, mean age 27.8 years), with varying patterns of contact dermatitis (mean duration 72.5 months) and a variable degree of itching, gave their consent to this pilot study. They had all previously given positive patch test reactions to NiSO₄ 5% pet. (Hermal) only and, subsequently, to 8 μ l of aq. solutions containing NiSO₄ 0.1 M and NiSO₄ 0.05 M. In addition, their positive patch test reactions to NiSO₄ 0.1 M had been inhibited by 8 μ l of aq. solutions containing NiSO₄ 0.1 M mixed with ZnSO₄ 0.3 M.

ZnSO₄ was administered to them in 100 mg tablets, 3 $\times$ a day, for 30 days, with meals. Clinical evaluation was performed every 10 days. The treated patients were all repatch tested with 8 μ l of aq. solutions containing NiSO₄ 0.1 M and 0.05 M on the 30th day. Routine blood tests were made pre- and post-treatment. Urine Ni concentrations were evaluated at baseline and at on the 30th

day in 5 consecutive patients, determined by a Perkin Elmer 3100 atomic absorption spectrophotometer equipped with HGA 400 graphite furnace and As 60 Autosampler, sensitivity being down to 0.1 mcg/l of Ni. 3 measurements were carried out on each sample, with a variation of nearly 2%.

2 subjects who had previously given positive patch test reactions only to p-phenylenediamine (Hermal) 1% pet., and to 8 μ l of aq. solutions of p-phenylenediamine 0.05 M and 0.025 M, were also treated with ZnSO₄, as previously described, for 30 days.

Patch tests were carried out with Finn Chambers on Scanpor for NiSO₄ pet. and Al-test on Leucotest for all solutions. Panels containing the solutions were arranged in a vertical row and applied to the back: the distance between patches was 3 cm. Readings were made in all subjects at D 2 and scored in accordance with ICDRG guidelines. Visual scoring was used in comparing the differences between the positive reactions found to NiSO₄ 0.1 M and those to the mixed solutions.

Results

ZnSO₄ treatment improved the clinical manifestations and abolished or reduced the majority of patch test reactions (Table 1). Itching disappeared within a few days of the start of treatment. Clinical manifestations subsided progressively at the end of the 1st week of treatment, first papular then nummular and dyshidrotic patterns. Intolerance of ZnSO₄ was not observed. All blood par-

Table 1. Clinical characteristics and therapeutic response to ZnSO₄

Patient no.	Age (years)	Sex	Duration of dermatitis (months)	Pattern	Itching	Clinical dermatitis	Response itching	Patch test response			Ni level in urine	
								baseline NiSO ₄ 0.1 M	30th day NiSO ₄ 0.05 M	30th day NiSO ₄ 0.05 M	baseline	30th day
1	22	f	60	papular	diffuse	cleared	-	++	++	-	NT	
2	19	f	7	nummular	local	cleared	-	++	+	-	NT	
3	27	f	18	papular	diffuse	cleared	-	++	++	-	NT	
4	31	m	30	papular	diffuse	cleared	-	++	++	+	NT	
5	20	f	24	nummular	local	75% improvement	-	++	+	-	NT	
6	21	f	48	nummular	diffuse	cleared	-	++	++	-	NT	
7	29	f	120	papular	diffuse	cleared	-	++	++	-	NT	
8	42	f	136	dysidrotic	local	50% improvement	-	++	+	-	NT	
9	38	m	240	dysidrotic	diffuse	75% improvement	-	++	++	+	14.80 mcg/l	6.40 mcg/l
10	34	m	96	papular	diffuse	cleared	-	++	++	+	11.70 mcg/l	4.50 mcg/l
11	37	f	120	nummular	local	cleared	-	++	-	-	8.50 mcg/l	4.30 mcg/l
12	23	f	60	dysidrotic	local	cleared	-	++	+	+	16.90 mcg/l	6.50 mcg/l
13	26	f	48	nummular	local	75% improvement	-	++	++	-	10.50 mcg/l	3.80 mcg/l
14	26	f	72	papular	diffuse	cleared	-	++	++	+	NT	
15	23	f	9	nummular	local	cleared	-	++	++	+	NT	

- = negative; NT = not tested.

ameters remained within normal limits. Urine nickel concentrations on the 30th day had decreased in all patients examined (Table 1). The positive patch test reactions to p-phenylenediamine 0.05 M and 0.025 M did not show any significant diminution post-treatment.

Discussion

Our pilot study suggested that ZnSO₄, at the doses given, combines efficacy with safety. The possible mechanisms of action of ZnSO₄ can only be a matter of speculation: (i) ZnSO₄ supplementation might prevent complete antigen formation; (ii) ZnSO₄ supplementation might enhance removal of nickel or decrease its intestinal absorption (7); (iii) transition metals produce oxygen species (8) and Zn is reported to act as a free radical scavenger (9, 10); (iv) ZnSO₄ may modulate by unknown mechanisms (11) the immunoresponse to nickel.

Our results are preliminary and need to be verified more formally, but they do raise interesting therapeutic possibilities for allergic contact dermatitis from transition metals.

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