

## Prevalence of metal sensitization in a dermatologic patient collective and in patients with symptomatic metal implants

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**INTRODUCTION:** Patients with implanted metal devices may experience a variety of adverse reactions. Complaints include pain, swelling, inflammation, wound healing complications, and more rarely eczema. Possible causes are, apart from technical and mechanical problems, infections mainly by bacteria, toxicity to the foreign materials, e.g. polyethylene, granulomatous foreign body reactions, and possibly hypersensitivity reactions to alloy metals, resulting in the above-mentioned symptoms or even loosening of the implant. Contact sensitization to Ni, Co and Cr is frequent in the general population. Due to the increasing use of metallic alloys other potential metal contact allergens are of interest. There is little information on the prevalence of sensitization in the general population and in affected patients. In this study the prevalence of contact sensitization to 14 metal salts was prospectively investigated by patch tests in 1051 dermatologic patients and in 141 patients with symptomatic metal implants.

**METHODS:** 15 Swiss dermatology centres participated in the first study. 1051 patients undergoing routine patch testing, incl. Ni, Co, Cr, Pd salts and thiomersal, were additionally tested with ten metals. Tests were read at 48 and 72 h. In a separate study 164 symptomatic patients were tested in Basel only, i.e. 18 hip prosthesis HTP, 100 knee prosthesis KTP, 20 with osteosynthesis material OS, 3 shoulder prosthesis STP, 23 preoperative patients (pre-op) without any implants as controls, with up to 47 metals and bone cement components.

**RESULTS:** Sensitization rates to most metals were lower in patients with implants than in patients without. Surprisingly, high sensitization rates were found in symptomatic patients for PdCl, Pd, Mn, rhodium chloride (Rh). This does not imply relevance of the sensitization. Some metals tend to evoke atypical pustular test reactions (Mn, Rh) of unknown significance. Bone cement components were found to be test positive in eight KTP, two HTP and one OS and STP, each, benzoylperoxide being the most important component. Analysis of probable relevance of patch test results is shown in the tables.

Table 1. Number of subjects tested with each allergen and the respective outcome

Metal	Negative test	Positive irritant	Positive questionabl	Positive allergic
	n	n	n	n
<b>Ni</b>	841	8	12	182
<b>Pd</b>	789	37	52	171
<b>Mn</b>	697	78	140	151

<b>Au</b>	914	27	25	83
<b>Cu</b>	912	36	44	58
<b>PdCl</b>	816	0	20	47
<b>Co</b>	977	12	6	49
<b>Hg</b>	974	27	14	35
<b>Nb</b>	977	29	18	25
<b>Thio</b>	867	0	6	19
<b>Cr</b>	966	51	9	17
<b>Al</b>	1007	11	16	6
<b>Pt</b>	1025	14	7	4
<b>Mo</b>	1028	12	7	3
<b>Ti</b>	1027	16	5	2

Table 2. Patients of part 2 sensitized to any metal with regard to type of implant (p-Value 0.0682 Fisher's exact test only for HTP and KTP).

	All sampl e	Pre-op	HTP	KTP	OS	STP
No pos	75	11	11	40	11	2
Any pos	87	11	6	60	9	1

**Conclusion:** Testing of rare allergenic metals in routine patch test patients reveals, as expected, nickel to be the most common contact allergen, followed by palladium with sodium tetrachloropalladate being the more sensitive test compound. Some metals with particular pustular test reactions need further investigations.

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