Allergy to inorganic mercury in patients without amalgam fillings – sensitization in utero?

E. Valentine-Thon[1], S. Kreisel[2], M. Staeudinger[3], F.Witzig[4]

[1]Laboratory Center Bremen, Bremen, Germany

[2]Joint Practice for Dermatology and Allergology, Ansbach, Germany

[3]Practice for General Medicine and Classical Homeopathy, Staufen, Germany

[4]Practice for General Medicine and Classical Homeopathy, Dettingen, Germany

INTRODUCTION

High concentrations of inorganic mercury (HgCl) can cause toxicological effects, whereas chronic exposure to low concentrations of HgCl, especially in genetically susceptible individuals, can induce type IV hypersensitivity (allergic) reactions. Such reactions can be diagnosed conventionally with skin tests (“patch test”) or, alternatively, with lymphocyte transformation tests (LTT), which measure the specific proliferative response of memory T lymphocytes in vitro. The major source of HgCl exposure in humans is through amalgam fillings (50 % Hg). In this study we report on 5 symptomatic patients with no current or past amalgam fillings but with HgCl sensitivity confirmed by strong positive patch testing and/or strong proliferative responses in an optimized LTT called MEmory Lymphocyte ImmunoStimulation Assay (LTT-MELISA®).

MATERIAL & METHODS

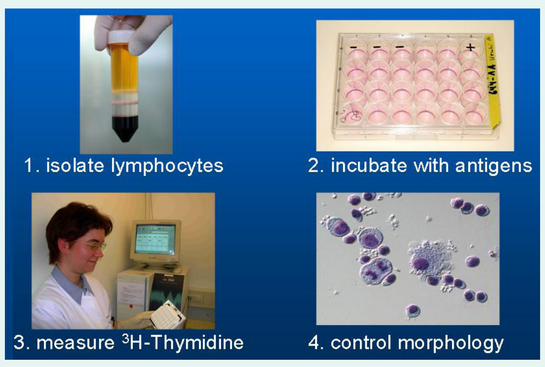
Patients

Five patients (age 17 to 25 years) were tested in the Patch Test and/or in LTT-MELISA® for sensitivity to several metals including HgCl, EtHg, MeHg, and PhHg. Two patients (Patient 4 and Patient 5) are siblings.

LTT-MELISA®

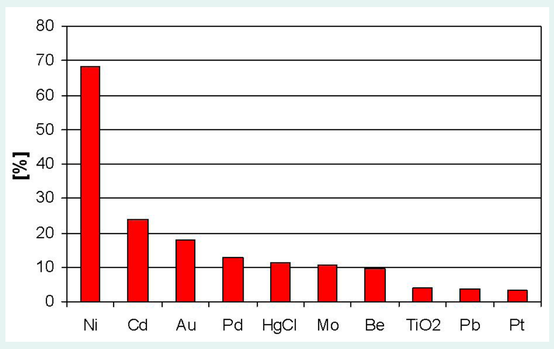
The LTT-MELISA® Test was performed as previously described1,2 and depicted schematically in Fig.1.

Figure 1: LTT-MELISA® procedure



Briefly, peripheral blood lymphocytes were isolated and co-cultured for 5 days with metal salt solutions in various concentrations. Proliferation was measured by incorporation of 3H-thymidine and confirmed by a morphological control of lymphoblasts. Results were expressed as Stimulation Index (SI) calculated as the quotient of test cpm and the average cpm of 3 negative controls. SI ≥ 3 is considered positive, SI ≥ 10 is strong positive. In a previous study3 (Fig. 2), sensitivity to HgCl was found in 11.4 % of 700 symptomatic patients with suspicion of metal allergy.

Figure 2: Frequency of metal sensitivity in 700 symptomatic patients



RESULTS

Table 1, Fig. 3

Patient 1: facial acne, eczema on hands; strong positive Patch Test to HgCl; repeatedly strong positive response to HgCl in LTT-MELISA® (SI 21.3 – 48.6), negative to EtHg, MeHg, and PhHg (SI < 1.3), negative to Ni

Patient 2: severe eczema after application of mercurochrome following implantation of a metal plate in leg; strong positive Patch Test to HgCl; in LTT-MELISA® initially strong positive to HgCl (SI = 63.9) and Ni (SI = 31.1), weak positive to MeHg (SI = 3.15), PhHg (SI = 5.77), and Mo (SI = 3.94), negative to EtHg, Co, Cr, and TiO2. Metal plate removed without application of mercurochrome, repeat LTT-MELISA® showed reduced reactivity; eczema cleared.

Patient 3: extreme fatigue, frequent infections, frequent painful tears on lower lip and tongue; Patch Test not performed; LTT-MELISA® initially strong positive for HgCl, Ni, and Mo, negative for Et-, Me-, and PhHg (SI < 1.5); treated homeopathically; follow-up LTT-MELISA® showed reduced lymphocyte reactivity; symptoms improving.

Patient 4: severe acne; patch Test not performed; LTT-MELISA® strong positive for HgCl and Ni, negative for Et-, Me-, and PhHg (SI < 0.86).

Patient 5: chronic infections, joint pain; Patch Test not performed; LTT-MELISA® strong positive for HgCl and Ni, negative for Et-, Me-, and PhHg (SI <1.81).

ACKNOWLEDGMENT

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3) **Valentine-Thon E et al:** Clinical relevance of the optimized lymphocyte transformation tet (LTT-MELISA®) for detecting and monitoring metal sensitivity. *Neuroendocrinol Lett, in press.*
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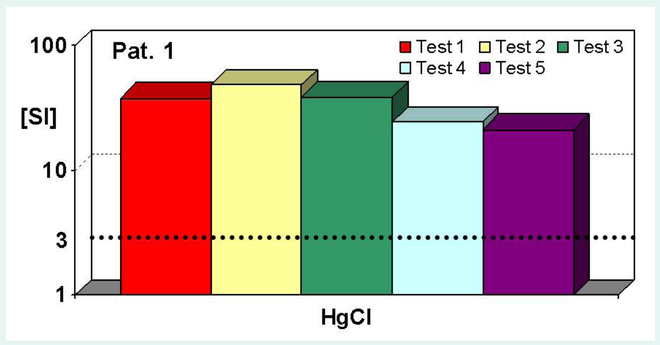
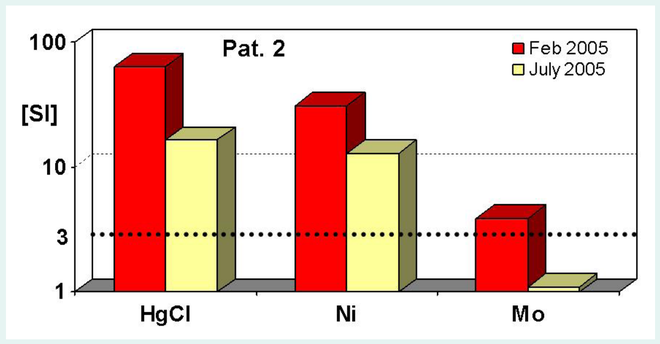
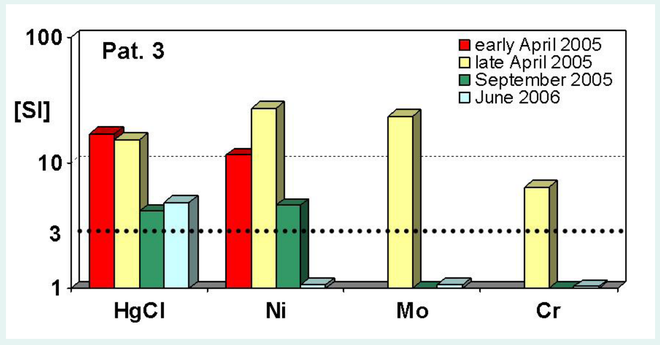
Table 1: haracteristics of 5 patients sensitive to inorganic mercur

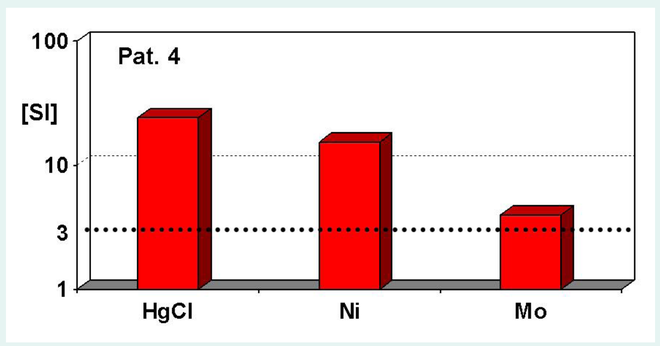
Patient	Age yrs.	Sex	Major clinical symptoms	Amalgam fillings	Maternal amalgam fillings	Patch Test HgCl	LTT-MELISA® HgCl
1	25	F	acne, eczema on hands	No	Yes	++	+++
2	17	F	Severe eczema	No	Yes	++	+++
3	20	M	fatigue, lip and tongue lesions	No	Yes	ND	++
4	19	M	severe acne	No	Yes	ND	++
5	18	F	chronic infections, joint pain	No	Yes	ND	++

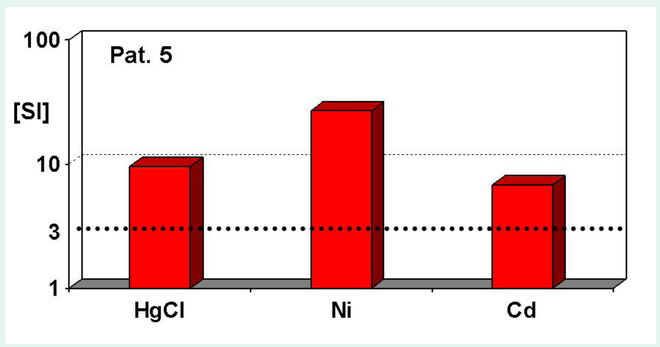
Figure 3: LTT-MELISA® results of 5 patients sensitive to inorganic mercury











DISCUSSION AND CONCLUSION

All 5 patients showed strong sensitivity to HgCl; specificity for inorganic mercury was supported in 4 patients by negative MELISA® results (SI < 2) against ethyl-, methyl-, and phenylmercury. Remarkably, no patient had current or past amalgam fillings. Other potential sources of HgCl (liguid Hg thermometers, gas meters, fluorescent lamps, old mirrors, old car batteries, etc.) could either be excluded or were unknown. As mothers of all 5 patients had amalgam fillings during their pregnancies, the most likely source of sensitization was transplacental exposure to maternal Hg in utero. Prenatally acquired HgCl sensitivity may have been boostered in these patients by postnatal exposure to inorganic or organic mercury compounds in vaccines (ethylmercury), fish (methylmercury), contact lens cleaning fluids (ethylmercury), mercurochrome (merbromin), or amalgam fillings (HgCl) of intimate partners.

While transplacental transfer of maternal Hg to the fetus is a recognized phenomenon4, the consequences of this form of fetal exposure have been poorly studied. The cases described here support the potential of this in utero exposure to induce clinically relevant hypersensitivity. More importantly, these cases support the discontinuation of the use of amalgam for dental restorations.

CONTACT INFORMATION

Dr. Elizabeth Valentine-Thon
MELISA Department
Laboratory Center Bremen
Bremen, Germany
Tel.: 0049 421 4307-305 • Fax: 0049 421 4307-199
E-mail: evt@lanisa.de