body burden of mercury and disease state, indicating a possible role for mercury as triggering factor.

Exposure to mercury in the general population mainly results from dental amalgams, with mercury concentrations in urine and blood associated with amalgam exposure.[2,3]

Health problems caused by mercury released from dental amalgam have been subjects of controversial debates. However, extensive scientific risk evaluations could not demonstrate a clear-cut relationship. In contrast, toxic and immunomodulatory effects of mercury compounds are well-known.[3,4] $HgCl_2$ directly activates murine mast cells and enhances mediator release, including IL-4, thereby facilitating T_H2-lymphocyte development and polyclonal IgE production.[4,8] In addition, $HgCl_2$ enhances anti-IgE–induced secretion of histamine, leukotriene C4, IL-4, and IL-13 from human basophils in a dose-dependent fashion. These effects were observed at mercury concentrations comparable with those measured in the children of this study.[5]

Nonlethal exposure to various forms of mercury is known to induce autoimmunity (HgIA) in susceptible rats, which is characterized by significant increases of IL-4 and IL-10 and hypergammaglobulinemia predominantly of the T_H2-related IgG1 and IgE isotypes.[8,9] Recent findings provided evidence that HgIA is also dependent on IFN-γ, and that the immunomodulatory effects of mercury strongly depend on the host's genetic background.[10]

In conclusion, we observed a clear-cut relation between body burdens of mercury and acute but not chronic AE. Children with amalgam fillings exhibited significantly higher urinary mercury concentrations than children without, and there was a significantly higher risk for acute eczematous lesions with higher urinary mercury concentrations.

In addition, there was a positive and linear association between exposure to mercury and serum levels of total but not specific IgE. It might be speculated that mercury exacerbates allergic disorders by promoting a T_H2-cytokine profile and facilitating production of IgE against yet unknown antigens, such as autoantigens.

Further investigations are necessary to elucidate the interrelation among amalgam fillings, body burdens of mercury, and the formation of acute eczematous lesions in AE, its underlying mechanisms, and its clinical significance.

Stephan Weidinger, MD[a,b]
Ursula Krämer, PhD[a,c]
Lothar Dunemann, PhD[d]
Matthias Möhrenschlager, MD[a]
Johannes Ring, MD, PhD[a,b]
Heidrun Behrendt, MD, PhD[b]
[a]*Department of Dermatology and Allergy*
Technical University Munich
Biedersteiner St 29
80802 Munich
Germany
[b]*Division of Environmental Dermatology and Allergology*
Research Center for Environment and Health (GSF)
Technical University Munich
[c]*Institut für umweltmedizinische Forschung*
Düsseldorf, Germany
[d]*Hygiene-Institut des Ruhrgebiets*
Gelsenkirchen, Germany

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Is glucosamine safe in patients with seafood allergy?

To the Editor:

Glucosamine, an aminomonosaccharide that plays a role in cartilage formation and repair, has been shown to restrict the progression of knee osteoarthritis.[1-5] This product, which is sold as a dietary or nutritional supplement, has been withheld from patients with arthritis who are allergic to shellfish because it is derived from crab, lobster, or shrimp shells.[6,7] The warning on the label instructs patients allergic to shellfish to consult a physician. Of course, without any clinical trials, most physicians would advise patients with shellfish allergy to avoid this therapy. Glucosamine is often sold in combination with chondroitin sulfate, which is derived from either cattle or shark cartilage.[7]

Shellfish allergy is caused by IgE antibodies to antigens in the flesh of the shellfish and not the shell; therefore it should be safe for patients with shellfish allergy to take glucosamine supplements. With approval from the Saint Louis University Institutional Review Board, patients with shellfish allergy were identified on the basis of history and positive skin test responses on chart review.

After informed consent was obtained, subjects underwent skin prick testing to appropriate shellfish, a positive histamine control (10 mg/mL), a negative saline control, and glucosamine. Standard commercially available extracts for shellfish scratch testing are provided as

TABLE I. Skin prick test results

Subject	Sex	Age (y)	Histamine	Saline	Shrimp	Crab	Lobster	Glucosamine
1	F	39	+	−	−	−	+	−
2	M	45	+	−	+	−	+	−
3	F	26	+	−	+	−	−	−
4	F	70	+	−	+	−	−	−
5	M	53	+	−	−	+	−	−
6	F	25	+	−	+	+	+	−

+, Wheal ≥3 mm in diameter on skin test.

sterile solutions at a concentration of 1:20 wt/vol in 50% glycerin and 50% saline. A 500-mg capsule of glucosamine was dissolved in 5 mL of normal saline and diluted with an equal part of glycerin to make a 1:20 wt/vol extract (50 mg/mL) that was then sterile filtered to produce the glucosamine extract. Three control subjects had negative skin prick test responses with the extract.

Negative glucosamine skin test responses in the 6 subjects were followed by checking vital signs and pulmonary function tests. The patients then received an oral challenge with a dose of 500 mg of glucosamine. The patients were observed for an hour, with vital signs checked every 15 minutes and spirometry surveillance results checked every half hour after the oral challenge.

Six subjects participated in the study. All 6 had a history consistent with a systemic reaction to shellfish. All 6 had positive skin prick test responses to shrimp, crab, lobster, or a combination of these. All 6 had negative skin test responses to the glucosamine extract (Table I) and uneventful oral challenges with glucosamine, with no change in skin, vital signs, or spirometry.

Approximately 600 patients must be recruited to ensure that the chance of rejecting an allergy rate of at least 0.5% is less than 0.05. This pilot study, which indicates that glucosamine is probably safe for patients with shellfish allergy, emphasizes the need for further investigation, with larger studies looking at different shellfish allergens and the consistency of glucosamine formulations.

Heather C. Gray, MD
Patricia S. Hutcheson, BA
Raymond G. Slavin, MD
Division of Allergy and Immunology
Department of Internal Medicine
Saint Louis University School of Medicine
1402 S Grand Blvd, Rm 209
St Louis, MO 63104
E-mail: slavinrg@slu.edu

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