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Repeated hand urticaria due to contact with fishfood

by Rauno J Harvima, MD,¹ Leena Tuomisto, MD,² Tuula Husman, MD³

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Background The etiology of urticaria is often difficult to determine. However, in case of repeated circumstance-connected urticaria, the reason may be easily clarifiable.

Case A 51-year-old healthy woman repeatedly experienced occupational hand urticaria when handling fish food. An unexpected reason for the urticaria was found in that the fishfood contained histamine as a "contaminant".

Conclusions In fishfood batches, biological degradation can produce histamine and possibly other toxic substances that can lead to occupational health problems.

Key terms contamination, histamine.

Case

A 51-year-old healthy woman handled and fed fish and crabs at work. After some months, she experienced itchiness, edema, and redness on her hands and, to a smaller extent, also on her face and trunk. Wearing protective gloves was not practical, and her hands got wet very often. The symptoms disappeared when she was unemployed and the exposure had ceased. She never experienced symptoms when handling fish nonoccupationally or when eating fish.

Allergy skin prick and radioallergosorbent tests

The patient was prick-tested for common allergens (birch, alder, grasses, pets, plants, dust mites, fungi, latex, fish, and crab). Two different fishfood products (Vextra Mini 2.5 from Suomen Rehu Oy, Turku, Finland, and Aqua Win from Kerox Oy, Kuopio, Finland), and shrimp pellets (Wardley Corp, Secaucus, NJ, USA) were dissolved in 10% [weight/volume (w/v)] 0.9% sodium chloride and filtered through a 0.22 µm Millipore filter.

Laboratory assays

Histamine release from blood basophils was studied as described earlier (1). Briefly, 50 µl of antigen solution (in a 10-fold dilution series) and 1.0 ml of heparinized fresh blood in 1.5 ml Eppendorf polypropylene tubes were incubated for 30 minutes at 37°C, followed by

centrifugation at 900 g for 10 minutes. The clear plasma was carefully separated to avoid leucocyte contamination, and plasma histamine was assayed by 2 different methods: radioenzyme assay with standards of up to 500 nM (2) and high-performance liquid chromatography (HPLC) with a postcolumn derivatization detection system (3).

Results

All the prick tests for common allergens were negative. The radioallergosorbent (RAST) tests for fish, shrimp, and Daphne fish food were negative.

In the prick tests, all the extracted fish food and shrimp samples induced strong reactions, at least the size of the positive test control (7 mm by histamine 10 mg/ml). However, the negative control (0.9% sodium chloride) also repeatedly gave a small 3-mm wheal reaction.

The radio enzyme assay of histamine indicated that high amounts of histamine were liberated (up to 1770, 504, and 617 nM) when blood samples were exposed to Vextra Mini 2.5, Aqua Win and Wardley, respectively. However, there was no correlation between the liberated histamine and the sample dilution, and this finding suggests the presence of some interfering factor(s) in the fishfood samples.

Therefore, the samples were analyzed also with HPLC, and the results were >14 000 nM for Vextra Mini

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2.5, 253 nM for Aqua Win, and 273 nM for Wardley shrimp pellets. Similar results were obtained also with the blood of a control person: >14 000, 267, and 307 nM, respectively.

The histamine content of the fish food and shrimp pellet extracts [10% (w/v) in 0.9% sodium chloride solution] was measured directly by HPLC, and the results were 311 200 nM (=34 580 ng/ml) for Vextra Mini 2.5, 3890 nM for Aqua Win, and 4930 nM for the Wardley shrimp pellets.

Discussion

The results of the basophil histamine release tests were unexpected both in the case of the patient and the control. For comparison, in severe allergic or anaphylactic reactions, plasma histamine levels are within the range of about 200–500 nM (4, 5). In addition, the total blood histamine levels were within the range of about 400–600 nM (2, 4). Thus the extremely high level of released histamine in the case of Vextra Mini 2.5 seemed impossible and unbelievable.

The presence of a high histamine content in the fishfood and shrimp pellets suggested an explanation for our patient's symptoms. The patient's hands were wet almost all the time, which promotes hand drying and the development of microwounds. Thus, practically, the patient kept her hands in "arbitrary histamine solutions", even though, originally, the fishfood had been dry pellets.

These fishfoods are easily spread into air and inhaled during handling, and thus respiratory symptoms could also be expected. However, our patient did not complain about such symptoms. The patient could not continue to work and became unemployed.

The histamine formation is very likely associated with biological degradation processes, and, therefore, fishfood

batches may differ considerably in their histamine content. Other toxic substances can be expected to be present as well, although they were not studied in the present case.

In conclusion, fish foods create a potential risk of work-related or occupational health problems. Thus personal protection through the use of gloves and respiratory protection is recommended.

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