

Contact dermatitis caused by salami skin

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Casings of salami-like sausages are commonly sprayed with *Penicillium* starter cultures to promote flavour development and to inhibit the growth of undesirable moulds. Occupationally exposed workers may develop respiratory and skin symptoms.

Case Report

A 21-year-old female presented in 2003 with chronic recurrent dermatitis on the medial aspect of the lower arms, with dry, extremely pruritic papules. Her face and hands were free of lesions. The symptoms became worse in the evening and during the night, and declined at the weekend. On vacations, her dermatitis completely resolved within 1 week. The patient worked in a delicatessen store, cutting and selling sausages, and suspected that her gloves were the cause of the dermatitis. Patch testing gave a positive reaction to fragrance mix I and thimerosal, but not to rubber accelerators. The total IgE level was normal, and prick testing was not performed. She never experienced respiratory symptoms.

Six years later, the patient presented again and reported that she had continued to work in the delicatessen and that the eczema had persisted. When her symptoms deteriorated over the subsequent months, despite intensified treatment with various steroid creams, she left her job. After cessation of work, the dermatitis completely resolved within 2 weeks.

Test Results

Prick testing with a standard series containing common inhalant and food allergens (ALK-Abello, Copenhagen, Denmark) showed positive reactions to dust mites and a weakly positive reaction to *Penicillium chrysogenum* (Table 1). ImmunoCAP (Phadia, Uppsala, Sweden) to *Penicillium* was positive. The patient confirmed having spent a lot of time handling, peeling and cutting salami. Subsequent prick-to-prick testing with the skin of two salami products and crude aqueous extracts prepared from mould layers gave strongly positive results (Fig. 1, Table 2). In addition, an atopy patch test with salami skin was positive at 24 hr.

In western blots, the patient's IgE reacted with several proteins between 30 000 and 90 000 MW in skin extracts from both salami species, but did not bind to a *Penicillium oxalicum* extract and other moulds (Fig. 2). Testing with recombinant allergens was negative for rPen o 18 (*P. oxalicum* vacuolar serine protease) and rPen ch 13 (*P. chrysogenum* alkaline serine protease) (Fig. 2) as well as for allergens from *Aspergillus* (rAsp f 18), *Cladosporium* (rCla h 6, rCla h 8, and rCla h 9), and *Alternaria* (rAlt a 1) (data not shown). The serum from a control patient with respiratory *Penicillium* allergy recognized similar bands in the salami extracts, and additionally bound to rPen ch 13 and a 20 000-MW *P. oxalicum* protein.

Table 1. Prick test and IgE results from routine allergy diagnosis

	Prick test	Specific IgE
House dust mite	3-mm wheal	0.80 kU/l
Storage mites	3-mm wheal	—
<i>Penicillium chrysogenum</i>	2-mm wheal	1.12 kU/l
<i>Alternaria alternata</i>	Negative	<0.35 kU/l
<i>Cladosporium herbarum</i>	Negative	—
<i>Aspergillus fumigatus</i>	Negative	—
<i>Mucor mucedo</i>	Negative	—

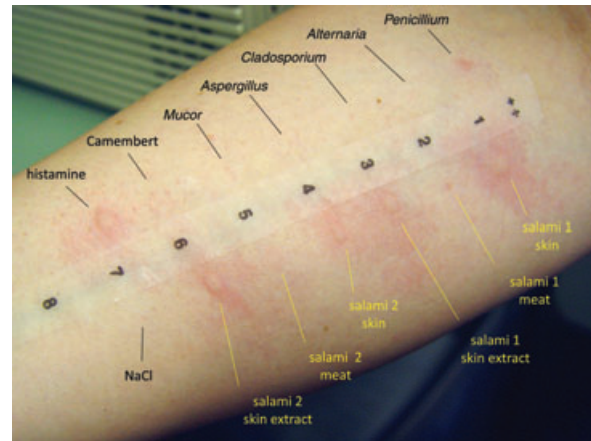


Fig. 1. Prick-to-prick test with two salami products and prick test with commercial mould extracts.

Table 2. Results from prick-to-prick and atopy patch testing

	20 min	24 hr
Salami 1 (made in Austria)		
Prick-to-prick test with skin	7-mm wheal	Pruritic papule
Prick test with skin extract	5-mm wheal	Negative
Prick-to-prick test with meat	Negative	Negative
Atopy patch test with skin	Negative	Erythema, itch
Salami 2 (made in France)		
Prick-to-prick test with skin	4-mm wheal	Negative
Prick test with skin extract	5-mm wheal	Negative
Prick-to-prick test with meat	Negative	Negative
Atopy patch test with skin	Negative	Negative
<i>Penicillium chrysogenum</i>		
Commercial extract	—	—
Prick test	2-mm wheal	Negative
Atopy patch test	Negative	Negative

Discussion

We report a female with contact dermatitis caused by *Penicillium* derived from salami skin. The puzzling aspects are the long case history and the unusual presentation of symptoms. To our knowledge, contact urticaria from

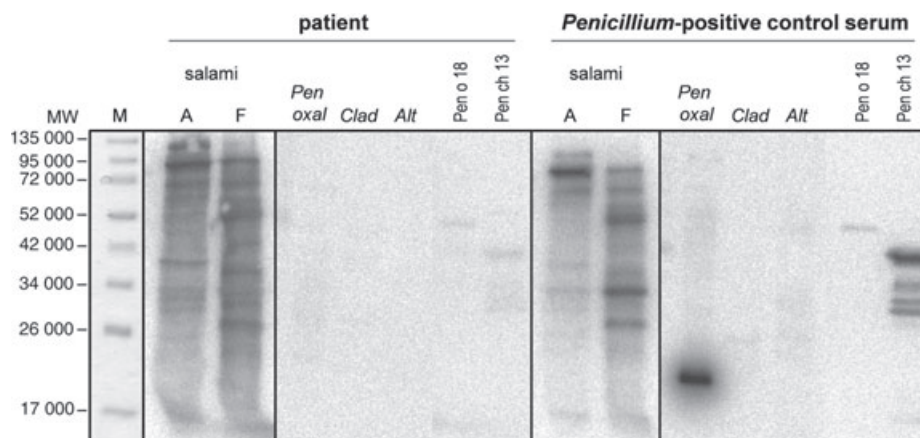


Fig. 2. Western blot IgE reactivity with extracts from salami skin, mould extracts, and recombinant *Penicillium* allergens. M, marker lane; A, Austrian salami; F, French salami; *Pen oxal*, *Penicillium oxalicum*; *Clad*, *Cladosporium herbarum*; *Alt*, *Alternaria alternata*.

salami skin has been described only twice (1, 2). In contrast to these earlier cases, our patient showed restricted sensitization to *Penicillium* without reactivity to other moulds. Western blotting showed IgE-binding to several *Penicillium* proteins, but component-resolved diagnosis with a set of recombinant mould allergens did not identify the responsible allergens.

Despite clear evidence for type 1 sensitization in our patient, the pathogenic role of IgE-mediated histamine release is uncertain. She denied any occupation-related respiratory symptoms, and her recent skin problems consisted of chronic eczema rather than immediate urticarial lesions. We assume that the *Penicillium*-specific IgE antibodies were clinically active by mediating IgE-facilitated antigen presentation by antigen-presenting cells expressing the high-affinity or the low-affinity IgE receptor, such as Langerhans cells, dendritic cells, and macrophages (3). Even minute amounts of mould allergen penetrating the epidermal barrier would have been sufficient to activate T-cells and perpetuate allergic contact dermatitis. The finding of a positive atopy patch test reaction to salami skin and the development of a delayed papule at the prick test site confirm the strong T-cell activation by *Penicillium* allergens in our patient. Similar cases of chronic

eczema have been described in occupationally exposed patients with type 1 allergy to red meat (4, 5). We have recently observed another young woman in the same profession presenting with similar reactions to salami skin. Unfortunately, she declined further testing.

In rare cases, handling or ingestion of salami may also provoke angio-oedema (2, 6). A more common finding is hypersensitivity pneumonitis caused by *Penicillium nalgioense* as an occupational disease in salami factory workers (7–9). In addition, mould exposure in salami and Camembert factories may also cause occupational IgE-mediated asthma (10, 11).

In conclusion, we report a rare case of IgE-mediated delayed-type protein contact dermatitis caused by occupational exposure to *Penicillium* moulds on salami skin.

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