

Contact angioedema and conjunctivitis caused by *Lumbricus terrestris*: cross-reactivity with *Anisakis simplex*

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Key words: *Anisakis simplex*; contact angioedema; cross-reactivity; *Lumbricus terrestris*.

The common earthworm (*Lumbricus terrestris*) is classified in the phylum Annelida, class Oligochaeta. Despite the fact that it is frequently used as a fishing bait, hypersensitivity reactions have exceptionally been described. Many allergic reactions to other species included in the phylum Annelida have been communicated, and so have happened with other kind of fishing baits, such as insect larvae or maggots. But isolated skin reactions are infrequent.

A 51-year-old amateur fisherman, previously diagnosed of contact dermatitis to niquel and subclinic allergy to *Anisakis simplex*, suffered from several episodes during 2 months of intense facial edema and conjunctival hyperemia and pruritus immediately after rubbing his eyes while handling earthworms. He did not develop respiratory symptoms. He required emergency medical attention, and the symptoms resolved after 24 h with corticosteroids and antihistaminics. He had been using common earthworms (*Lumbricus terrestris*) weekly for more than 20 years as fishing baits with good tolerance.

We describe a patient with contact angioedema to *Lumbricus terrestris* and we demonstrate the presence of cross-reactivity between this worm and *Anisakis simplex*.

Allergologic study. Skin prick tests with common pneumoallergens were negative, and positive to *A. simplex* (wheal diameter: 5 mm). A prick-prick test with *L. terrestris* produced a 40-mm diameter wheal with pseudopodes (Fig. 1). Two atopic and two nonatopic control subjects tested negative.

Total immunoglobulin (Ig)E measured 344 kU/l, and specific IgE to *A. simplex* was 6.50 kU/l (Pharmacia CAP System™). *Lumbricus terrestris* proteins were extracted in phosphate-buffered saline (protein concentration: 6.4 mg/ml). A peroxidase-linked immunosorbent assay was performed, detecting specific IgE antibodies to *L. terrestris* in the patient's sera.

The *L. terrestris* and *A. simplex* extracts were run in a 12% sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE) according to the discontinuous method described by Laemmli and co-workers (1). Coomassie Brilliant Blue dyeing revealed six protein bands ranging from 100 to 20 kDa. These proteins were electrophoretically transferred to polyvinylidene fluoride (PVDF) membranes, according to the method of

Towbin et al. (2). Later, the membranes were incubated with serum from the patient and two controls, and next with peroxidase-linked antihuman IgE antibodies. Two allergenic bands were shown of >100 and 20 kDa in *L. terrestris* and an IgE reacting band of 46 kDa was detected in *A. simplex*.

Further, we performed an immunoblot IgE inhibition assay using a commercial extract of *A. simplex*. The 20 kDa *L. terrestris* allergen was totally inhibited by *A. simplex*.

Despite our recommendations, the patient kept on using *L. terrestris* as fishing baits. He avoided direct contact with the nematodes by wearing latex gloves which, so far, have prevented from the development of symptoms.

Discussion. We report a case of contact angioedema and conjunctivitis caused by allergy to a common earthworm *L. terrestris*. A type I hypersensitivity mechanism has been demonstrated by *in vivo* and *in vitro* studies. Many different species are used as natural fishing baits, including crustaceans, insect larvae, maggots, and worms. Although sensitization to fishing baits is not a common

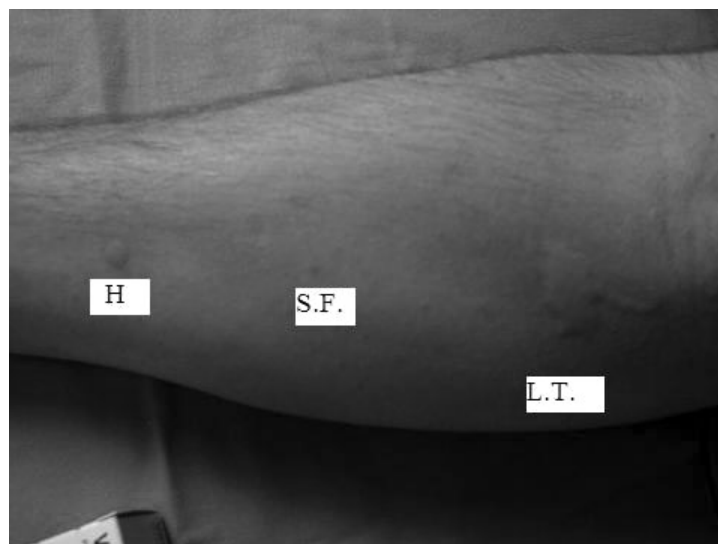


Figure 1. Positive prick-prick test with *Lumbricus terrestris*.

fact in the general population, when studying workers in factories in which insect larvae for fishing baits are processed for commercial purpose, up to 31.6% of them have shown sensitization to at least one of the species they manipulated (determined by positive prick test or specific IgE antibodies; 3). Hypersensitivity reactions to the species belonging to the phylum Annelida are less common even in subjects frequently exposed.

In a review of 84 cases of allergy to fishing baits (including insect larvae, crustaceans, and species from the phylum Annelida; 4), it was revealed that 72% of the patients referred rhinitis and/or conjunctivitis, 60% asthma and 45% skin lesions (84% urticaria and/or angioedema, 16% contact dermatitis). Isolated skin lesions without other kind of symptoms were observed only in eight patients, only two of them suffered urticaria and/or angioedema. The rest developed contact dermatitis. When referring to species of the phylum Annelida, isolated skin lesions were found only in one case (contact dermatitis). It is of note that, in this patient, no respiratory symptoms were developed.

Lumbricus terrestris is one of the most common species of *Lumbricus* and it is native to Europe. It can reach a 30-cm long. It is one of the most commonly used fishing baits in Spain.

Only three cases of hypersensitivity to *L. terrestris* proteins have been communicated. McMorro et al. described the case of a man who suffered rhinoconjunctivitis and developed urticarial lesions while handling common earthworms. Nasal and ocular symptoms were also developed when performing skin prick test (5). Tripodi et al. reported a 14-year-old patient who developed rhinitis, asthma, and facial angioedema after handling *L. terrestris*. The diagnosis based on the skin prick test and serum-specific IgE (6). Recently, Porcel et al. communicated a new case of allergy to *L. terrestris*, clinically expressed as rhinitis, asthma, and contact urticaria. Skin prick-prick test was positive, and specific IgE antibodies were detected by enzyme-linked immunosorbent assay. An SDS-PAGE immunoblot revealed a 20 kDa IgE-fixing band. It was suggested that this allergen corresponded to Bla g 1 (major allergen from *Blattella germanica*), but both skin prick test and specific IgE were

negative to cockroach (7). Félix-Toledo et al. found cross-reactivity among the different nematode species used as fishing baits. *Sipunculus nudus* and other species classified in the phylum Annelida, such as *L. terrestris*, *Nereis diversicolor*, *Glycera dibranchiata*, and *Perinereis cultrifera* were studied (8).

Our patient reacted to the same 20-kDa allergen and a new allergenic molecule of > 100 kDa. It was demonstrated that only the 20-kDa allergen had cross-reactivity with the fish parasite *A. simplex*, a frequent cause of allergic reactions in Europe. Our patient had not revealed clinical allergy to this fish nematode. This subclinical sensitization was probably due to the primary sensitization to the fishing bait *L. terrestris*. Patient with allergy to *A. simplex* frequently develop IgE to multiple molecules. Nevertheless, this patient may react in the future on contact with *A. simplex*.

Although there are a few cases reported of allergy to earthworms, we recommend that they should be kept in mind when exposure is present, and the possibility of cross-reactivity with other species not related to fishing activities.

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Accepted for publication 24 July 2006
Allergy 2007; 62:84–85
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Munksgaard
DOI: 10.1111/j.1398-9995.2006.01235.x

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Are there shrimp allergens exclusive from the cephalothorax?

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Key words: food allergy; food hypersensitivity; shrimp.

Crustaceans are a frequent cause of immunoglobulin E (IgE)-mediated food allergy. Tropomyosin, a 34- to 36- kDa protein found in muscular tissue of vertebrates and invertebrates, is the major allergen in shrimp (1, 2). Arginine kinase, a 40-kDa protein also found in muscle and other tissues, has been identified more recently as another shrimp allergen (3, 4).

The shrimp can be divided into two main anatomic regions: the abdomen, which is usually considered to be the edible part, and encloses the intestine and abdominal muscle, and the cephalothorax, which is covered by a carapace and contains the brain, the heart, the stomach and the bladder. In our country it is not

There might be allergens in the shrimp cephalothorax that can be specific for that structure.