

In summary, this is the first report of an anaphylactic reaction to dimenhydrinate attributed to 8-chlorotheophylline. Anaphylactic reactions to either theophylline or dimenhydrinate have not been previously reported. Moreover, SPTs seem to be a reliable method for detecting immunoglobulin E-mediated anaphylaxis to theophylline. Therefore, even though anaphylaxis to dimenhydrinate is very rare, the possibility of such a reaction should be kept in mind, especially for patients with high exposure in the past presenting with compatible symptoms. Finally, patients who develop anaphylactic reactions to dimenhydrinate should be instructed to avoid xanthine derivatives without prior testing.

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## Allergy to Crayfish

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Crayfish, also known as crawfish or crawdad, are crustacean members of the Astacoidea and Parastacoidea superfamilies. Distributed throughout the world, there are more than 500

reported species. More than half of these species occur in North America. Europe, however, is home to just 7 species and most of them are currently endangered species. Crayfish is a very popular food worldwide but few cases of adverse reactions after its ingestion have been reported.

An 18-year-old woman presented with chest tightness, wheezing, headache, and hives on the abdomen that had appeared within minutes of eating *Procambarus clarkii*, a crayfish belonging to the Cambaridae family. She said that she had never developed symptoms after eating crustaceans or molluscs on previous occasions. As the only additional atopic background, she reported a history of pollen-induced seasonal rhinoconjunctivitis.

Protein extracts from raw and boiled *P clarkii* shell (PCSr and PCSb, respectively) and flesh (PCFr and PCFb) were prepared by homogenization in phosphate buffered saline, dialyzation, and lyophilization. Skin prick tests (SPTs) to common commercial aeroallergens, crustaceans, molluscs, and *Anisakis simplex* were performed, with positive results (wheal diameter  $\geq 3$  mm) only to grass and olea pollen. Prick-by-prick tests with PCFr and PCFb yielded a wheal of 3 mm in both cases. Serum-specific immunoglobulin E (sIgE) against commercial crab extract (Pharmacia CAP system) was  $<0.35$  kU/L, and sIgE determinations against PCSr, PCSb, PCFr, and PCFb (enzyme allergosorbent technique) yielded 0.4 kU/L for PCSr (total IgE of 90 IU/mL) and were negative for the rest of the extracts. All the extracts were analyzed by sodium dodecyl sulfate polyacrylamide gel electrophoresis

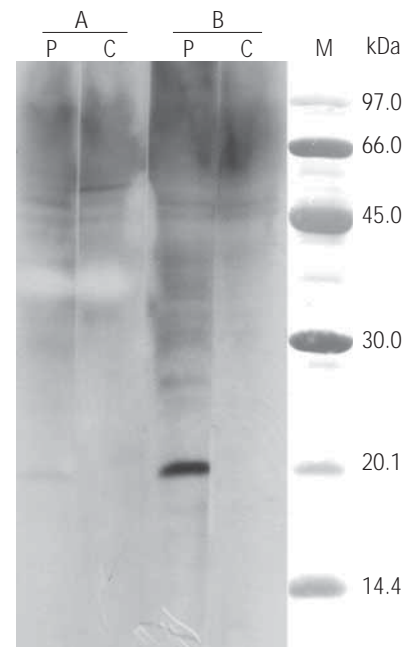


Figure. Immunoglobulin (Ig) E-binding proteins in crayfish extracts. A, sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE) IgE-immunoblotting of raw *Procambarus clarkii* flesh. B, SDS-PAGE IgE-immunoblotting of raw *P clarkii* shell. Lane P, patient serum; lane C, control serum (pool of sera from nonatopic individuals); lane M, molecular mass marker.

(SDS-PAGE) as described by Laemmli [1], showing protein bands ranging between 14 and 99 kDa for the PCFr and PCSr extracts. SDS-PAGE IgE-immunoblotting assays revealed IgE-reactivity with a 21-kDa protein in both extracts, but with stronger labeling in PCSr (Figure). In order to identify this IgE-binding protein, the 21-kDa band from the PCSr extract was manually excised from the gel, digested with trypsin, and analyzed by MALDI-TOF (matrix-assisted laser desorption/ionization-time-of-flight mass spectrometry) and LC-ESI-IT [liquid chromatography electrospray ionization tandem mass spectrometry/LC-MS/MS]), as described by Pastor et al [2]. Protein identification was performed by searching a nonredundant protein sequence database (NCBI) using the Mascot program (<http://www.matrixscience.com>). To identify the 21-kDa protein, we performed MS/MS and obtained the sequence of an internal peptide with the sequence AGTSGLGFLFDKELK. Research conducted with protein databases identified the sequence as ferritin.

Ferritin is a globular protein complex consisting of 24 protein subunits that is present in all cell types [3]. It is the primary intracellular iron-storage protein in prokaryotes and eukaryotes and maintains iron in a soluble, nontoxic form. In vertebrates, these subunits can be light-type (L) or heavy-type (H) subunits, with a molecular weight of 19 kDa and 21 kDa, respectively [3]. An additional subunit resembling *Lymnaea* soma ferritin is associated with shell formation in the pearl oyster and its primary sequence is similar to that of the vertebrate H-type [4]. Because of the importance of iron in mineralization, ferritin is employed in the shells of organisms such as molluscs and crustaceans to control the concentration and distribution of iron, and to sculpt shell morphology and coloration. The function and structure of ferritin vary by cell type and are controlled by an RNA-binding protein (iron-regulatory protein). Ferritin sequences have been obtained in molluscs [5], and a ferritin subunit in the hepatopancreas of the freshwater crayfish *Pacifastacus leniusculus* has also been described [6]. To the best of our knowledge, however, no cases of allergy to ferritin or crayfish have been reported.

In this report, we present a case of IgE-mediated allergy to *P. clarkii*, a crayfish belonging to the Cambaridae family, and suggest that the allergen involved was a 21-kDa protein.

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## Successful Rapid Rituximab Desensitization for Hypersensitivity Reactions to Monoclonal Antibodies in a Patient With Rheumatoid Arthritis: A Remarkable Option

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Rheumatoid arthritis (RA) is an inflammatory disease characterized by disturbances in T-cell and B-cell functions [1]. Rituximab is a chimeric monoclonal antibody (mAb) against CD20 that induces a profound depletion of B cells in the peripheral blood of patients with RA [2]. The infusion of this mAb may cause transient hypotension or hypertension, cough, pruritus, and rash [3]. In 5% to 10% of cases, the reactions are clinically consistent with immediate hypersensitivity (IHS) reactions [4]. Desensitization to rituximab has been described in case reports and small series of patients with hematologic malignancies and certain connective tissue diseases [5,6].

We report the case of a 32-year-old woman followed by our rheumatology department for RA for 7 years. In 2007, she had been given adalimumab (Humira, 40 mg/0.8 mL), an anti-tumor necrosis factor (TNF) mAb, in another medical center. After the second dose (15 days after the first dose), she developed labial angioedema and tongue swelling within 2 hours of injection. The following month, the medication was replaced by twice-weekly etanercept (Enbrel Pen, 50 mg), an anti-TNF fusion protein. After the fourth injection, she developed tingling in her lips, syncope, dizziness, and headache. Three months later, the drug was withdrawn following epistaxis and bleeding in the mouth. Skin prick and intradermal tests with adalimumab