

Anaphylactic shock induced by *Codonopsis lanceolata*, traditional Chinese medicine in a patient with allergic rhinitis

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Key words: anaphylaxis; *Codonopsis lanceolata*; food allergy.

Codonopsis lanceolata (CL) contains various active components including tannins, saponins, polyphenolics, alkaloids, essential oils and steroids. Therefore, it has been prescribed as a traditional folk medicine to treat several inflammatory diseases (1, 2).

To date, there have been no published reports of allergic reactions to CL.

In this report, we present a serious anaphylactoid reaction following ingestion of CL roots in an 18-year-old student who had suffered from allergic rhinitis symptoms including runny nose, nasal itching, sneezing and nasal obstruction from childhood. He visited our clinic after he had experienced serious systemic reactions following the ingestion of raw CL roots. His symptoms included dizziness, sweating, chest tightness, angioedema and generalized urticaria. The results of a skin prick test (SPT) showed strong positive reactions to numerous common inhalants and food allergens including CL extract. The extract used was prepared in our laboratory as described previously (3). Results are expressed as the ratio of the mean wheal diameter of allergens to histamine: *Dermatophagoides pteronyssinus*, 5.0; birch, 3.5; mugwort, 9.12; carrot, 1.17; celery, 1.8; and CL, 2.0. Based on our SPT results, the patient may have 'mugwort–celery–carrot syndrome' (4, 5). Although he was sensitized to other food allergens such as celery and carrot, he had never experienced any allergic reactions

after ingesting celery or carrot roots. Enzyme-linked immunosorbent assay (ELISA) results showed high serum specific IgE level to mugwort pollen; however, specific IgE levels to CL, celery, and carrot root extracts were undetectable compared to 11 nonatopic healthy controls (data not shown). A basophil histamine release (HR) test was performed in order to further clarify the mechanisms regulating his response. We found that HR was remarkably increased when the patient's basophils were incubated with 15 µg/ml of CL extract (72.1%, Fig. 1). In contrast, minimal HR was noted in basophils from three normal healthy controls. Increased HR was also noted when the basophils were incubated with anti-IgE antibodies (69.57% at 10 µg/ml) and calcium ionophore (82.35% at 3 µM). An open oral challenge with CL root was also performed. The dosage of CL root began at 5 g and then was doubled until

an allergic reaction occurred. Severe systemic reactions including hypotension (90/40 mmHg), chest discomfort, dyspnea, diaphoresis and generalized urticaria developed within 30 min following ingestion of 20 g of CL. Therefore, the patient was confirmed as having an anaphylactoid reaction due to CL root ingestion, probably through a direct histamine releasing mechanism.

Codonopsis lanceolata belongs to the Family *Campanulaceae*. Mugwort is in the same family; therefore, the patient may be displaying cross-reactivity with mugwort pollen. However, when we performed an IgE-ELISA inhibition test using mugwort pollen as an antigen and CL extract as an inhibitor, no cross allergenicity was suggested (data not shown). Open oral challenge tests with 25 g of celery and 25 g of carrot showed negative responses. Therefore, we speculate that CL itself can lead to a severe

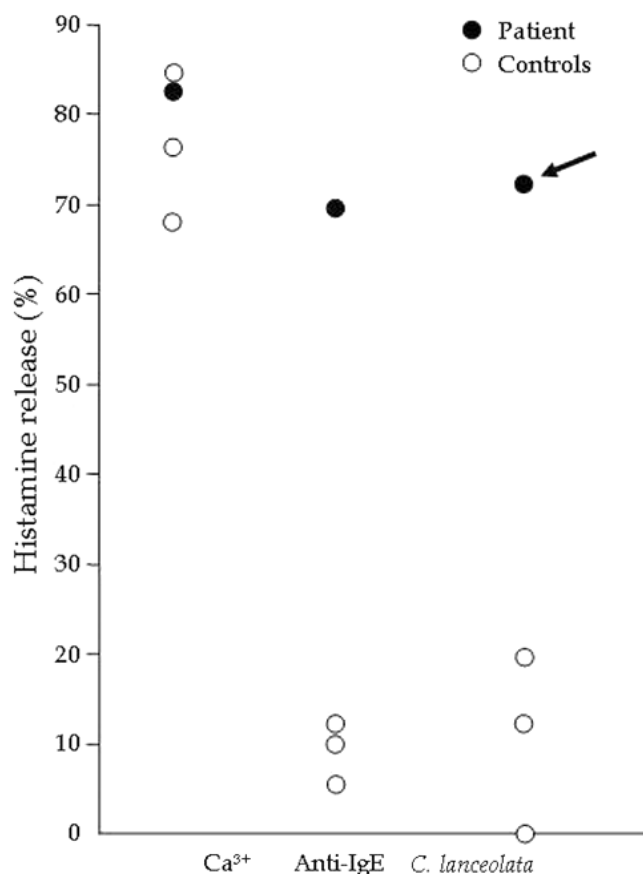


Figure 1. Comparison of histamine release (%) between our patient and three nonatopic controls following stimulation with calcium ionophore A2319 (3 µM; Sigma-Aldrich, St Louis, MO, USA), anti-human goat IgE antibodies (1 : 100 v/v; KPL, Gaithersburg, MD, USA) and *Codonopsis lanceolata* extracts (15 µg/ml).

systemic allergic reaction, independent of mugwort sensitization. Although a double-blind placebo-controlled food challenge is the gold standard for the diagnosis of a food allergy (6), open oral challenge was our best viable option in this study.

In conclusion, we report a case of severe anaphylactoid reaction caused by *C. lanceolata* root ingestion in a patient with allergic rhinitis. This reaction was not mediated by IgE, but rather by direct histamine releasing effects via basophils.

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Anaphylactic shock caused by silkworm pupa consumption in China

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Key words: anaphylactic shock; food allergen; silkworm pupa; tourist.

Materials derived from the bodies of the domesticated silkworm *Bombyx mori*, including silks, contain allergens which can trigger or aggravate allergic diseases such as allergic asthma, hyper-sensitivity pneumonitis, allergic rhinitis and atopic dermatitis

(1). The silkworm life cycle includes four distinct developmental stages: ova, larva, pupa, and imago.

Silkworm pupae are nutrient-rich, comprised of ~50% protein with abundant amounts of essential amino acids for humans (1). As a result of the cultural influences of traditional Chinese food and medicine, Chinese people often eat oil-fried pupa, water-boiled pupa or ground pupa powder. The use of silkworm pupa as food may be a custom unique to China.

Silkworm pupa can be allergenic (1). It is estimated that each year in China, there are over 1000 patients who suffer anaphylactic reactions after consuming silkworm pupa, 50 of whom received emergency room treatment for severe anaphylactic reaction. Hence, we previously purified protein allergens from a crude silkworm pupa extract through ion exchange chromatography, gel filtration and sodium dodecyl sulphate polyacrylamide gel electrophoresis. Our subsequent immunoblot analysis revealed an ~30-kDa protein as silkworm pupa's major allergen (1).

Severe allergic shock caused by silkworm pupa consumption.

Here we report the case of a French national visiting China who went into anaphylactic shock after consuming silkworm. A 37-year-old French man, with a history of allergic rhinitis, ate oil-fried silkworm chrysalis in his dinner during his visit to China in August, 2003. Thirty minutes later, he felt an itchy sensation in his mouth and on his face, accompanied by mild nausea and by flushing and swelling of his face. He proceeded to the Hospital Emergency Department, where he began to experience difficulty breathing. Upon physical examination, the emergency room physician noted cardiovascular signs of shock, including low blood pressure (70/40 mmHg) and an elevated heart rate 105/min. A diagnosis of anaphylactic shock caused by a silkworm pupa food allergic reaction was made and the patient was immediately treated with a hypodermic injection of epinephrine 1 mg. The patient was also given supplemental oxygen by mask and intravenous infusion of vitamin C 3 g and hexadecadrol 10 mg. He recovered within 3 days of the incident.

A summary of 13 prior cases of severe anaphylactic reaction caused by silkworm pupa consumption is provided in Table 1 (2–5). Treatment of this condition is consistent with the general principles of treating allergic shock generally (6). Following proper and timely therapy, patients who suffer an allergic reaction to silkworm do not exhibit sequelae (2–5).

In the absence of treatment, anaphylactic shock can lead to death within minutes. A portion of the increasing number of western tourists who visit China choose to try traditional Chinese foods. However, regulation of food allergen labeling has not yet to be achieved in China. The present case highlights the need for foreign nationals visiting China to be alerted to the allergenic risks of local foods, such as silkworm pupa, in order to reduce the risk of negative consequences on their health.

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