A natural red pigment as a hidden allergen in delayed idiopathic anaphylaxis: carmine-induced food allergy

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Background: Carmine (E120) is a red dye extracted from dried female cochineal arthropods (Dactylopius coccus cacti) commonly used in foods, drugs and cosmetics. Reports of IgE-mediated carmine allergy are limited.

Report: A 56-year-old female experienced 2 anaphylactic reactions after eating chicken tikka masala and after a croissant with wild berries topping. She showed immediate nausea, vomiting and diarrhea followed by urticarial rash and facial edema several hours later. Afterwards, patient had, with exception of the wild berries topping, the same food again but without complaints. Skin and immunoCAP (Thermofisher-Phadia) testing were negative with all food allergens relevant to the history, including Tri a19 and galactose-alpha-1,3-galactose. Idiopathic anaphylaxis was diagnosed and an adrenalin auto-injector was prescribed. Several months later, after performing an urea breath test for Helicobacter pylori with a Fortimel® energy strawberry (Nutricia) drink, which contains as potential allergens milk, rape seed oil, sunflower seed oil, soy lecithin and carmine acid, patient experienced immediate epigastric pain followed by dyspnea, facial edema and generalized urticaria. Skin testing with Fortimel® energy strawberry was clearly positive (negative in 5 controls) and negative for milk and soy milk. Specific IgE showed positivity for cochineal extract (2.77 kU/L) (retrospective serum analysis one month before: IgE 1.92 kU/L). Flow cytometric analysis of activated peripheral blood basophils (CD63+CD123+HLA-DR), including a positive control (anti-IgE), a negative control (without allergen), carmine (Sigma-Aldrich) and fast green (E143), showed clear CD63 positivity after stimulation with carmine and not with fast green (see Figure). This response was absent in the control patient.

Clinical Relevance of the Report: A rare case of carmine-induced food allergy is described and confirmed by sIgE, skin prick test and basophil activation test. Carmine, used as a natural red dye, can cause severe allergic reactions at very low concentrations, with an uncharacteristic time delay between exposure and clinical manifestations, potentially hours later. Unclear episodes of anaphylaxis may be due to sensitization to carmine. Carmine should be included in the allergy work-up of idiopathic (food-induced) anaphylaxis as it can act as a hidden allergen.

Figure 1

Statement of Consent for Presentation and Publication: Informed consent of the patient is obtained.