

Acknowledgments

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Meat reintroduction in a patient with α -gal allergy



A 56-year-old woman presented to a drug allergy clinic for evaluation of a possible allergic reaction to acetaminophen. Two months before presentation, the patient took 1,000 mg acetaminophen for pain relief and 5 hours later awoke with pruritic hives that resolved with diphenhydramine. Two weeks later, she took acetaminophen and developed pruritic hives 4 hours later, this time with vomiting, cramping, pruritic mouth, and sensation of throat closure. These symptoms resolved with diphenhydramine. Her medical history was noncontributory. There were no known food allergies, nor systemic reactions to insect bites/stings.

The patient underwent graded-oral challenge to a cumulative dose of 850 mg acetaminophen in the clinic without reaction. With the possibility of delayed anaphylaxis, diet was questioned. She recalled consuming meals with large amounts of red meat 4 hours before the reactions, with a larger quantity (10 oz beef) before the second. She had abstained from animal meat for religious reasons the 2 weeks preceding the first reaction. She typically consumes a diet rich in chicken, fish, and eggs; however, she likely consumed smaller amounts of red meat infrequently between these episodes without reaction. The patient also recalled a tick bite in New York State 1 year before these episodes, with a local reaction including erythema and pruritus lasting 6 months. Therefore, specific serum galactose- α -1,3-galactose (α -gal) immunoglobulin E (sIgE) was checked and found to be elevated to 46 kU/L. Total serum IgE was 264 IU/mL (Fig 1). The patient was diagnosed with α -gal allergy and advised to abstain from red meat.

On 3-year follow-up, she had avoided red meat and had not experienced any additional reactions. She had continued ingesting other animal products, including dairy. The patient wished to reintroduce meat into her diet. Repeat α -gal testing was 3.5 kU/L, total IgE 60.8 IU/mL, and beef IgE 0.30 kU/L. She underwent an oral challenge with red meat; she was given a cumulative amount of 220 g prosciutto (70 g, then 150 g after 2 hours) and observed for a total of 5.5 hours. She remained asymptomatic. The patient began ingesting modest amounts of meat regularly without reaction. On follow-up 8 months later, α -gal decreased to 1.6 kU/L, total IgE to 49 IU/L, and beef IgE to 0.2 kU/L.

One year after reintroduction, she presented after 1 episode of burning sensation of palms and feet after eating beef. This occurred after a week of increased exercise and sun exposure. She denied additional tick bites. Alpha-gal increased to 3.14 kU/L. Patient self-resumed red meat consumption and has not had any additional reactions. Alpha-gal again decreased to 1.47 kU/L 5 months after this episode. We believe that this is the first reported case of successful, unrestricted reintroduction of red meat for a patient with α -gal allergy.

Alpha-gal is a carbohydrate moiety abundantly expressed on cells and tissues of all mammalian species except primates.¹ The naturally occurring IgG to α -gal was a known cause of hyperacute organ rejection in xenotransplantation.¹ Immunoglobulin E antibodies specific to α -gal have been found to be capable of eliciting serious reactions.

These were initially described after patients receiving cetuximab, a monoclonal antibody chemotherapy for colorectal and squamous-cell carcinoma, developed immediate hypersensitivity reactions.² Analysis of the IgE antibodies to cetuximab demonstrated specificity to α -gal residues on the heavy chain portion.² High prevalence of hypersensitivity reactions to cetuximab were reported in the southeastern United States.² This distribution was similar to that of Rocky Mountain spotted fever and ehrlichiosis.³ Within this geographic distribution, individuals (both taking cetuximab and not) were reporting history of tick bite and red meat sensitivity.^{1,3} The hypersensitivity reactions included anaphylaxis, angioedema, and urticaria.⁴ Thus, the α -gal allergy was defined.¹

The exact mechanism of this allergy and its natural history remain unknown.¹ Significant evidence supports the role of tick bites in the development of sIgE response to α -gal.¹ Total serum IgE and sIgE to α -gal increased in response to tick bites.¹ Apparently, α -gal sIgE rises by more than 20-fold after a tick bite, with a similar rise in total IgE level.¹ Some evidence suggests that sIgE to α -gal decreases in some patients over time.⁵

Although some foods (eg, egg, peanut, milk) have established threshold sIgE levels for 95% positive predictive values for allergic reactions, such levels have not been well standardized for α -gal allergy.⁶ The challenge to red meat was performed in our patient to evaluate safe consumption of red meat. This decision was made after her α -gal levels were found to have decreased from 46 to 3.5 kU/L. Although challenges to red meat have been done with

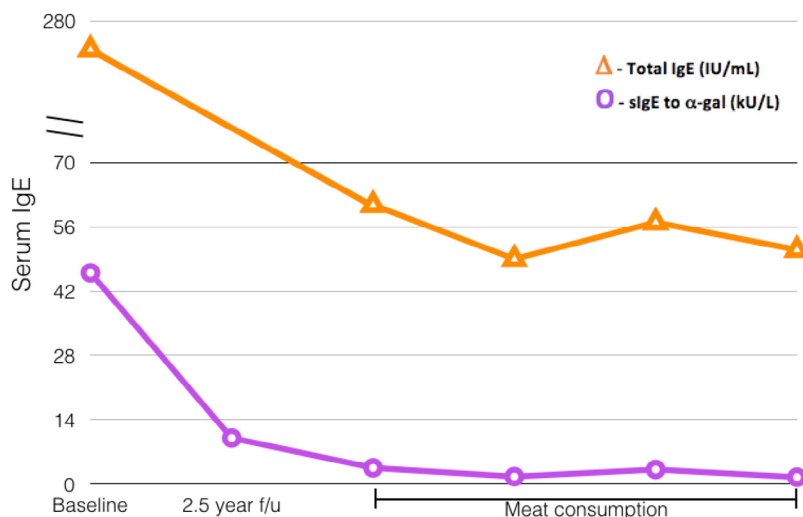


Figure 1. Time vs total IgE and sIgE to α-gal at baseline, 2.5-y follow-up (f/u), and after resuming meat consumption. Ig, immunoglobulin.

similar methods, they have not been done for the purpose of reintroduction.⁴

A lack of booster effect from the absence of additional tick bites as well as red meat avoidance could play a role in diminishing sIgE to α-gal and beef. There also could be a natural decrease in allergic reactivity with time, as people tend to “outgrow” allergies to foods and medications.⁷ After 3 years of not eating red meat, the individual in this case was able to consume meat without reaction. Of note, the mild reaction (burning sensation of palms) could have been in the setting of an increased amount of red meat, sun exposure, and exercise. Cofactors may contribute to hypersensitivity reactions, including exercise, heat, infections, and nonsteroidal anti-inflammatory drugs.⁸ Acetaminophen could have been a cofactor in initial presentation, supported in that the patient did not have additional reactions between these episodes.

To our knowledge, no reports have been made of successful meat reintroduction in patients with α-gal or of potential mechanisms for this possibility. We present the first case of successful meat reintroduction in a patient with α-gal allergy in the clinical setting. Food challenges in the setting of suspected food allergy have been shown to increase patient overall quality of life.⁹ Studies that evaluate α-gal sIgE over time in absence of exposures and the results of meat challenges after α-gal sIgE has decreased need to be performed to standardize when meat can be safely reintroduced in patients with α-gal allergy.

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