

- [4] Story SK, Petrov AA, Geskin LJ. Successful desensitization to brentuximab vedotin after hypersensitivity reaction. *J Drugs Dermatol*. 2014;13:749–751.
- [5] Arora A, Bhatt VR, Liewer S, Armitage JO, Bociek RG. Brentuximab vedotin desensitization in a patient with refractory Hodgkin's lymphoma. *Eur J Haematol*. 2015;95:361–364.
- [6] Fizesan M, Boin C, Aujoulat O, et al. Successful rapid desensitization to the antibody-drug conjugate brentuximab vedotin in a patient with refractory Hodgkin lymphoma. *J Oncol Pharm Pract*. 2016;22:188–192.
- [7] Ebo DG, Hagendorens MM, Bridts CH, Schuerwegh AJ, De Clerck LS, Stevens WJ. In vitro allergy diagnosis: should we follow the flow? *Clin Exp Allergy*. 2004;34:332–339.
- [8] Hoffmann HJ, Santos AF, Mayorga C, et al. The clinical utility of basophil activation testing in diagnosis and monitoring of allergic disease. *Allergy*. 2015;70:1393–1405.
- [9] Nucera E, Pecora V, Buonomo A, et al. Utility of Basophil Activation Test for monitoring the acquisition of clinical tolerance after oral desensitization to cow's milk: pilot study. *United European Gastroenterol J*. 2015;3:272–276.
- [10] Vila L, Moreno A, Gamboa PM, Martínez-Aranguren R, Sanz ML. Decrease in antigen-specific CD63 basophil expression is associated with the development of tolerance to egg by SOTI in children. *Pediatr Allergy Immunol*. 2013;24:463–468.

A case of green tea (*Camellia sinensis*) imbibement causing possible anaphylaxis



Tea is one of the oldest produced beverages and has been consumed since 2700 BC.¹ Green tea's popularity is increasing among consumers with its production expected to increase to 2.97 million tons a year by the year 2023.¹ Anaphylaxis caused by tea produced from the Compositae family has been reported in the literature.² To date, no cases of anaphylaxis from green tea, which is produced from *Camellia sinensis*, have been reported. We describe the first possible case of IgE-mediated anaphylaxis caused by imbibement of green tea.

A 20-year-old woman with no history of asthma, anxiety, or occupational exposure to green tea presented as an outpatient to our allergy clinic with a constellation of symptoms after consuming brewed green tea. She has imbibed green tea in the past without any reaction. Approximately 15 minutes after consuming green tea, she began to experience throat swelling, throat pruritus, sore throat, hoarse voice, shortness of breath, and nasal congestion. Her symptoms were more severe during subsequent consumption of green tea. The patient had a total of 2 episodes. She first noticed these symptoms 6 months before she presented to our clinic, and her symptoms would last up to 3 hours during each episode. She tried taking acetaminophen during 1 episode without any relief from her symptoms. She denied ingesting any alcohol, medications, or exercising before drinking the green tea. She never activated emergency medical services or went to the emergency department for her symptoms. She denied any reactions to other foods, including caffeine. The patient was given an epinephrine auto-injector for use during any subsequent anaphylactic reaction caused by green tea.

A Celestial brand green tea pod was used for skin prick tests (SPTs). Dry green tea leaves from the pod were weighted on an analytical balance. Two milliliters of sterile diluent was added to 200 mg of dry green tea leaves and allowed to cold steep for 10 minutes before use. The resultant is a 1/10 (wt/vol) heterogeneous solution of green tea. SPTs of the solution, sterile diluent, and histamine were performed on 5 healthy individuals without known green tea allergies to determine and verify nonirritant concentrations. All participants tested positive only to the histamine +4 (4- to 6-mm wheals) after 15 minutes. No irritation was reported by the participants or seen on examination around the 3 sample sites.

A SPT in the patient elicited a 6-mm wheal with a 61-mm flare (Fig 1). The SPT was performed to food allergens based on her history, and the results were nonreactive, including chocolate and coffee. The results of ImmunoCap for tea (f222) IgE, an in vitro assay for IgE to fermented black tea or blend of several black teas, were negative.

The patient had respiratory symptoms after each subsequent imbibement of green tea. The presentation fits the one-system category of anaphylaxis or other category of anaphylaxis as

discussed in the most recent practice parameters for anaphylaxis.³ As such it supports the possible diagnosis of anaphylaxis to green tea, especially with positive SPT results.

Cases of anaphylaxis from the ingestion of caffeine have been reported with supportive history and positive SPT results.⁴ Caffeine is a known component of green tea, and our patient had a nonreactive SPT result to caffeine and a history of consuming caffeine-containing products, other than tea, without developing any symptoms.

Herbal teas, such as peppermint tea, are prepared from various parts (roots, leaves, flowers, and fruits) of herbs.⁵ In contrast, green and black teas are prepared based on the level of fermentation from leaves from the same tea shrub, *Camellia sinensis*.⁶ Shirai et al⁷ describe food allergy to green tea in patients with a history of occupational asthma and question whether occupational exposure was necessary for sensitization in these cases. Tanaka et al⁸ describe one case of occupational hypersensitivity pneumonitis.



Figure 1. Skin prick test result for green tea with 6-mm wheal and 61-mm flare.

All the patients in these studies were workers at green tea factories, and none experienced anaphylaxis.^{7,8} The patient described here had no occupational exposure to green tea and thus answers a question previously raised in the literature by Shirai et al.⁷

The prevalence of allergies to consumable goods has been steadily increasing during the past 20 years throughout the world. As the imbibement of green tea becomes more popular, the potential for incidences of allergic sensitization without occupation exposure is also likely to increase. We report the first possible case of anaphylaxis attributable to imbibement of green tea.

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References

- [1] Food and Agriculture Organization of the United Nations. *World Tea Production and Trade: Current and Future Development* 2015. Rome, Italy: Food and Agriculture Organization of the United Nations:1–13, <http://www.fao.org/3/a-i4480e.pdf>. Accessed January 5, 2017.
- [2] Reider N, Sepp N, Fritsch P, Weinlich G, Jensen-Jarolim E. Anaphylaxis to camomile: clinical features and allergen cross-reactivity. *Clin Exp Allergy*. 2000; 30:1436–1443.
- [3] Lieberman P, Nicklas RA, Randolph C, et al. Anaphylaxis: a practice parameter update 2015. *Ann Allergy Asthma Immunol*. 2015;115:341–384.
- [4] Sugiyama K, Cho T, Tatewaki M, et al. Anaphylaxis due to caffeine. *Asia Pacific Allergy*. 2015;5:55–56.
- [5] Prchalová J, Kovářik F, Rajchl A. Evaluation of the quality of herbal teas by DART/TOF-MS. *J Mass Spectrom*. 2017;52:116–126.
- [6] Shirai T, Sato A, Hara Y. Epigallocatechin gallate. The major causative agent of green tea-induced asthma. *Chest*. 1994;106:1801–1805.
- [7] Shirai T, Hayakawa H, Akiyama J, et al. Food allergy to green tea. *J Allergy Clin Immunol*. 2003;112:805–806.
- [8] Tanaka Y, Shirai T, Enomoto N, Asada K, Oyama Y, Suda T. Occupational hypersensitivity pneumonitis in a green tea manufacturer. *Respirology*. 2016;4: e00152.