



# Monozygotic Twins with Multiple Tree Nut Allergies Documented by Skin Prick Test; It's Not All About Genetics

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## Abstract

- Tree nut (TN) allergies have a prevalence of up to 4.3% in the US
- TNs have been shown to cause anaphylaxis in up to 40% of cases.
- We present the first case of monozygotic (MZ) twin boys of Mediterranean descent who were found to have multiple TN allergies on SPT after they presented for evaluation at different ages in childhood

## Introduction

TNs include pistachio, cashew, pecan, hazelnut, macadamia, Brazil nut, walnut and almond. They are frequently added in baked goods, ice cream, candy bars, and cereals. TN allergies are becoming increasingly common in the United States (US), which is thought to be secondary to increased environmental exposure via more widespread availability and use in the American diet.

According to cross-sectional and cohort studies within the US, prevalence has been estimated to be up to 4.3% by the gold standard of oral food challenge test. The values were higher when compared to specific IgE blood levels, skin prick test (SPT), or history of self-reported allergy. Additionally, TN allergies are less likely to resolve later in life with a resolution percentage of approximately 9%.

MZ twins are a unique population that share identical genetics and most often a similar environment. To date, there are no studies published in the US describing multiple TN allergies or comparative TN SPT within sets of MZ or dizygotic (DZ) twins.

## Case Report

At 14 months of age, Twin A, who had a history of atopic dermatitis and family history of asthma, atopic dermatitis and allergic rhinitis presented for a TN hypersensitivity evaluation. Twin A had ingested a pistachio and shortly after exposure developed labored breathing and perioral erythema. He had a previous exposure to pistachios without reactions. He presented to the emergency department and received oral diphenhydramine with resolution of his symptoms. SPT was performed in the clinic which demonstrated reactions to multiple TNs: almond, cashew, English walnut, pecan, black walnut, hazelnut, and pistachio (Table 1).

**At the time of this evaluation, Twin B also had TN SPT with negative results.**

Approximately 4 years after Twin A developed TN hypersensitivity, Twin B, at 5 years of age presented for evaluation of the same after ingesting mashed potatoes with cashews. Prior to this, he had no identified past medical history of allergic reactions and had tolerated TNs without an issue. Within 5 minutes of exposure, he developed throat tightness, drooling and diffuse urticaria. In the emergency department, the patient was given intramuscular epinephrine, intravenous (IV) diphenhydramine and IV ranitidine. Upon subsequent SPT he was found to have reactions to cashew, black walnut, hazelnut and pistachio (Table 1).

## Discussion

TN allergies are important to identify so as to prevent adverse outcomes for patients. They have been shown to cause anaphylaxis in up to 40% of cases. Storage proteins such as Prolamin and the Cupin superfamilies, are strongly correlated with cases of anaphylaxis.

It has been demonstrated that allergies to cashew and pistachio are often concurrent. Studies have revealed substantial cross-reactivity between their allergens. This pattern has also been demonstrated for allergies to walnuts and pecans. Additional studies have shown that having one TN allergy correlates with a 12% chance of developing another TN allergy.

The START study in Canada compared the concordance rates (CRs) of MZ and (DZ) twins with different TN allergies. The researchers concluded that genetic factors contribute less of a role when compared to environmental factors. This was concluded based on low CRs and low variability of CRs among both MZ and DZ twins. Though this study did identify CRs in twins with respect to each family of TNs, it did not address a CR of multiple TN allergies within sets of twins or comparative TN SPT in MZ or DZ twins.

**Table 1: Comparative SPT in MZ twins.**

SPT	Nut/Peanut	Twin A Prick (mm)	Twin B Prick (mm)
1	Almond	5	3
2	Cashew	8	10
3	English Walnut	7	1
5	Pecan	5	1
6	Black Walnut	15	10
7	Hazelnut	14	6
8	Brazil Nut	2	1
9	Pistachio	16	10
10	Negative Control	0	0
11	Histamine	4+	4

## Conclusion

- Genetics do not play a singular role in TN hypersensitivity but exposure, timing and cultural considerations contribute as well.
- There are no studies published in the US describing multiple TN allergies within sets of twins or comparative TN SPT in MZ or DZ twins.
- Our case will influence the identification for potential development and management of TN allergies in MZ twins by assessing SPT to TNs, timing of exposure, and cultural background.

## References

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