

Botanical Briefs: Tulipalin A

Kevin P. Lee, MD; Dirk M. Elston, MD

PRACTICE POINTS

- Tulips are a common cause of contact dermatitis among floral workers.
- Tulipalin A is the primary sensitizer in tulips causing allergic contact dermatitis.
- The best preventative for tulip contact dermatitis is avoiding the inciting plants.

Contact dermatitis is a common issue for many floral employees. Tulips are one of the most common causes of hand dermatitis. Tulipalin A is the main sensitizer in tulips and also is found in the Peruvian lily. "Tulip fingers" is the most typical clinical presentation of hand dermatitis from tulips and is characterized by erythematous scaling seen in periungual skin and between the first and second fingertips of the dominant hand. The best prevention for tulip contact dermatitis is to avoid exposure to the inciting plants or use nitrile gloves.

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Cutaneous Manifestations

Contact dermatitis is a common problem for individuals who work in the floral industry. Hand dermatitis has been reported in as many as 26% of floral employees.¹ *Tulipa* species have been identified as one of the most common causes of hand dermatitis. Tulipalin A (α -methylene- γ -butyrolactone) is the main sensitizer in tulips (Figure 1) and its precursor tuliposide A also occurs both in tulips and the Peruvian lily (*Alstroemeria*).

In a 1996 study, 18% (9/51) of tulip workers were found to be allergic to tulipalin A.² In a more recent study of 164 tulip workers, 48 (29.3%) had clinical evidence of contact dermatitis and subsequently underwent patch testing; 17 (35.4%) showed a positive reaction to either tulipalin A or to tulip-bulb extract.³ Itching was the most common symptom (39 workers [81.3%]) and hand eczema at the tip of the thumb and index finger was the most common finding. In 9 (18.8%) workers, eczema had spread to other body parts including the forearm, face, legs, and abdomen.³

Peruvian lily is widely used in floral arrangements and has become a leading cause of hand dermatitis in florists (Figure 2). Large amounts of free tulipalin A are present in bulb scales of tulips, along with a small amount of tuliposide A. In young developing shoots, the situation is reversed: Both compounds are found in all parts of the plant to some degree, though tulipalin A is the major allergen, and more mature parts of the plant and bulb are most allergenic.

Cultural Considerations

In traditional Kurdish cuisine, raw herbs are part of snacking or are served as a side dish (*sawza*). Snacks often are consumed raw on the spot. *Tulipa montana*, *Tulipa armena*, and possibly other *Tulipa* species are consumed as a snack.⁴ Traditionally, *Tulipa systola* is consumed by the Kurds as an anti-inflammatory medicine and for pain relief. It also has been proposed that *T systola* has antioxidant properties.⁵ Cooked tulip also has been consumed in time of famine in Europe, though none of these dietary practices are recommended.⁴

Clinical Presentation

"Tulip fingers" describes the most common presentation of contact dermatitis caused by tulip bulbs. Erythematous scaling plaques are seen in the periungual skin and first and second fingertips of the dominant hand. Other



FIGURE 1. Tulip (genus *Tulipa*).

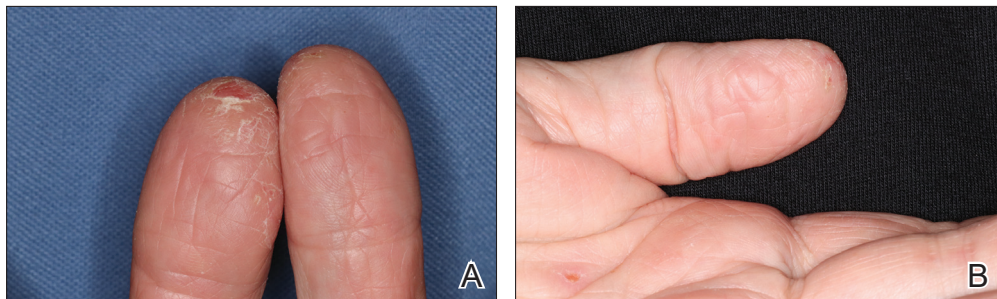
Dr. Lee is from the McGovern Medical School, Houston, Texas. Dr. Elston is from the Department of Dermatology and Dermatologic Surgery, Medical University of South Carolina, Charleston.

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Correspondence: Kevin P. Lee, MD, McGovern Medical School, 6431 Fannin St, Houston, TX 77030 (kevin.p.lee3@gmail.com).

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FIGURE 2. A and B, Dermatitis of the hand characterized by erythema and hyperkeratosis caused by tulipalin A in Peruvian lily (*Alstroemeria*) and resembling so-called tulip fingers caused by *Tulipa* species and cultivars.



manifestations include diffuse dry dermatitis of the hand; paronychia; pulpitis; and secondary spread to the face, neck, arms, and genitalia, with eczematous papules and plaques.⁶ Clinical signs include erythema, vesicles, hyperkeratosis, and exfoliation of the fingertips. The allergen also can cause airborne contact dermatitis and manifest as conjunctivitis, rhinitis, and asthma.² A considerable number of tulip workers develop paresthesia and tenderness in the fingertips within several hours after working with tulip bulbs, known as “tulip fire.”⁷

Plant Facts

There are approximately 250 genera of bulbous plants. Tulips are members of the genus *Tulipa* and family Liliaceae. Tulips often are thought of as native to southwest central Asia and Turkey⁸; however, *Tulipa sylvestris* is native to Portugal, Spain, and North Africa.

Etymology and Symbolism—The word *tulip* is derived from the Turkish word *türbent* meaning a turban, possibly because the flower is compared to turbans worn by men of the Ottoman Empire in the 16th century. In Turkish culture, the tulip is a symbol of paradise on earth and can have divine status. In the Netherlands, on the other hand, the tulip represents the brevity of life.

History—By 1562, tulip bulbs had already been introduced to Holland by merchants. However, the first shipment of tulip bulbs was mistaken by the Dutch for onions and were either roasted over a fire or perished when planted in gardens with vegetables. Carolus Clusius—botanist, director of the imperial medical garden in Vienna and recipient of many plants through diplomatic channels—was particularly fond of flower bulbs and contributed to the popularity of the tulip in Europe by sending bulbs and seeds to other European countries.

In the early 17th century, the tulip craze began in France, fueled by a viral disease of tulips that produced variegated color patterns on the petals; entire properties were sold in exchange for a single tulip bulb. The tulip craze drifted from France to Holland in 1634 for 3 years before the tulip market collapsed.

More recently, in 2003 investors started a multimillion-euro tulip fund in the Netherlands to develop new varieties of tulip. Tulip bulbs were used to create money with high percentages over the selling price. With exorbitant pricing and ever-changing ownership of bulbs—bulbs were bought and sold as many as 10 times—the tulip fund

collapsed 1 year later and investors lost their money. Bulb speculators then took their profit abroad. In 2006, bulb owners were charged with fraud; the tulip craze often is cited as one of the early major stock market collapses.

Tulips continue to grow in popularity. Today, nearly 6000 cultivars are registered, with 40 new cultivars registered every 5 years.⁹

Identifying Features

At the base of the erect tulip plant is a cluster of 2 or 3 thick bluish-green leaves. Three petals and 3 sepals make up the solitary bell-shaped flower. Many tulips can propagate only by means of their scaly bulbs. The flowers arise from the tips of stems in different solid colors, except true blue—from pure white to all shades of yellow, red, and a deep purple that is almost black. Solid-color tulips are called “self-colored.” So-called broken tulips are individual flowers with multiple colors, a condition caused by a viral disease transmitted by aphids.¹⁰

Tulip Allergen

Tuliposide A is found in many species of the genera *Tulipa*, *Alstroemeria*, and *Erythronium*.⁶ So far, 7 analogs have been identified: 1-tuliposide A and B; 6-tuliposide A and B; and tuliposides D, E, and F. 6-Tuliposide A and B are the principal tuliposides found in tulip cultivars.¹¹ With trauma and maturation, tuliposides A and B are hydrolyzed to tulipalin A and tulipalin B, respectively.

Tulipalin A and tulipalin B have antimicrobial properties against bacteria and fungi; tulipalin A is mostly an antifungal agent, and tulipalin B has mostly bacteriostatic characteristics.¹² The highest concentration of tulipalin A is found in the outer layer of the bulb, followed by (in descending order) the stem, leaves, and petals.¹³

The prevalence of tulipalin A allergy led the German Federal Institute for Risk Assessment to assign tuliposide A and tulipalin A to category B, which is a “solid-based indication for contact allergenic effects”; both chemicals also are considered skin sensitizers, defined by the Globally Harmonized System of Classification and Labelling of Chemicals of the United Nations as a substance that will induce an allergic response following skin contact.¹⁴ Patients who are allergic to tulips have cross-sensitivity to *Alstroemeria* because tuliposide A and its metabolites are found in both plants.¹⁵

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Symptoms of an allergic response to tulipalin A can be immediate or delayed.¹⁴ The most common allergic contact dermatitis caused by tulip bulbs is type IV hypersensitivity, though type I reactions can occur. Symptoms of a type I reaction including contact urticaria, rhinitis, hoarseness, and dyspnea have been reported.¹⁴

The variety of tulip handled also contributes to the severity of dermatitis. Handling bulbs of Rose Copeland variety tulips and cutting the flowers of Preludium tulips have been associated with more severe allergic dermatitis presentations, whereas the Red Emperor tulip was found to have less tuliposide A and thus provoke a weaker patch-test reaction.⁷

A Word About Garlic—Garlic is in the subfamily Alliioideae (formerly Alliaceae) taxonomically related to the tulip family (Liliaceae). Garlic also can cause hand dermatitis in cooks, with a similar clinical appearance as tulip fingers. Gas chromatography has shown that garlic contains predominantly tuliposide B, which has been found to be much less allergenic than tuliposide A.^{7,16}

Prevention of *Tulipa* Dermatitis

Tuliposide A and its metabolites can be found in storehouses and trucks used to transport tulips, in clothing, and in any other place where dust containing the allergen has settled. The best prevention against contact dermatitis is to avoid the inciting plants. Gloves may prevent contact dermatitis due to tuliposide A, which penetrates vinyl but not nitrile gloves. Barrier creams have been proposed, but data are scant.¹

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