



Allergy to tree-of-heaven pollen in Germany: detection by positive nasal provocation

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To the editors

The European Union recently (25 July 2019) added the tree-of-heaven (*Ailanthus altissima* (Mill.) Swingle) in the Simaroubaceae family to the “list of invasive alien species of EU concern”. Therefore, this tree is now under observation and the import, trade, and planting of tree-of-heaven in public areas are prohibited [1]. As a result, an earlier (2012) recommendation of ours on the planting of this tree in public areas must be withdrawn [2].

This deciduous broad-leaved tree (Fig. 1) is indigenous to parts of China and Vietnam and can already be found on all continents, with the exception of the Antarctic [3]. In Germany, it favors warm, sunny locations and is therefore found in particular within urban heat islands. The tree is expected to increasingly spread beyond these heat islands as a result of global warming [4]. The tree-of-heaven’s growth rate is remarkable and it already produces seeds from the age of 3 years. It flowers in June and July (Fig. 2) and is primarily insect-pollinated. However, its pollen (Fig. 3) can also be spread by wind [5].

The allergenic effect of the pollen is known in Asia and the Middle East [6]. Thus, for example, approx-



Fig. 1 Female (left) and male (right) tree-of-heaven on the grounds of the Charité, Campus Mitte, Berlin, Germany (© Karl-Christian Bergmann)



Fig. 2 Tree-of-heaven blossom with male flowers (© Matthias Werchan)

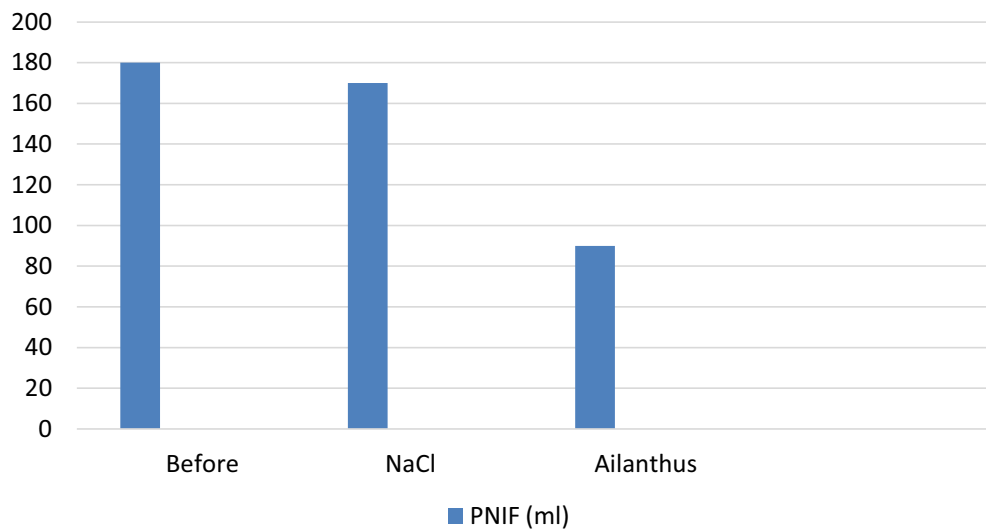
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Fig. 3 Tree-of-heaven (*Ailanthus altissima*) pollen grain in two different focal planes at 400× magnification under a light microscope, stained with safranin (© Barbora Werchan)



Fig. 4 Reduction in nasal flow upon nasal provocation with *Ailanthus* pollen. Positive nasal inspiratory flow (PNIF) is shown before, 10 min after NaCl, and 15 min after *Ailanthus* pollen in both sides of the nose



imately 30% of 44,994 patients of all age groups in Beijing, China, tested positive to skin prick testing for suspected allergic rhinitis (≥ 5 mm) [7].

After we also found specific IgE antibodies to *Ailanthus* in the blood of adults with allergic rhinitis in Berlin, Germany, the question arose as to whether we were dealing with clinically silent sensitization or whether nasal provocation testing could also elicit positive reactions.

The first of our patients to test positive (male, 172 cm, 90 kg, born in 1961 in Sri Lanka and living in Germany, Berlin-Tiergarten, since 1985) presented with rhinoconjunctivitis in the summer months and allergic asthma. In view of a high total IgE of 2685 kU/L and the detection of multiple specific IgE antibodies (laboratory: Berlin-Charité Vivantes GmbH) to tree-of-heaven (Rt300, Thermo Fisher Scientific GmbH, Dreieich, Deutschland)) at 6.8 kU/l and other trees (oak t7 = 4.1 kU/l; elm t8 = 19.2 kU/l; plane t11 = 3.4 kU/l; linden t208 = 3.4 kU/l), the patient gave informed consent to nasal provocation testing with *Ailanthus altissima* pollen (origin, Bonapol, a.s., České Budějovice, Czech Republic). At 15 min following bilateral nasal provocation with the pollen, the patient developed itching, sneezing, and nasal congestion, as well as a 51% reduction in peak nasal inspiratory flow

(PNIF) as a manifestation of a local allergic reaction (Fig. 4), which ceased after a further 30 min without medication.

The authors believe that this is the first patient in Germany to test positive to nasal provocation for allergic rhinitis due to tree-of-heaven pollen. The patient's Sri Lankan origin is undoubtedly relevant to his sensitization, which would have occurred during the first 24 years of his life spent in Sri Lanka. It is also not possible to definitively conclude from the patient history whether his symptoms in Berlin are indeed caused by *Ailanthus* pollen. Positive nasal provocation can be considered as evidence that individuals that have become sensitized to *Ailanthus* pollen in their countries of origin also react to tree-of-heaven in Germany.

We will investigate in a targeted manner symptoms in any other adults (born in Germany) with proven sensitization.

Anyone interested in new sensitizations and potential new allergies as a result of climate change should keep an eye on the spread of this tree in their area.

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