

TABLE I. Fel d 1 concentrations of sandpits with detectable levels

Sand sample no.	Fel d 1 $\mu\text{g/g}$
1	3.18
2	3.63
3	3.93
4	4.25
5	5.22
6	5.26
7	5.37
8	6.96
9	8.06
10	8.07
11	8.31
12	10.76

Carolina, detectable levels of Fel d 1 were commonly found in indoor areas of children's day-care facilities.¹

A feature of many child-care centers is a sandpit for young children to play in. We hypothesized that sandpits are a source of Fel d 1, either through transfer of Fel d 1 from children's clothing, a known source of Fel d 1,² or from cats straying inadvertently into sandpits. Thus, we determined the Fel d 1 content of sand from sandpits in child-care centers in Wellington, New Zealand.

A random sand sample was obtained from sandpits from 18 kindergartens and 18 day-care centers. Portions of the sand samples, 100 mg, were extracted at room temperature with PBS and the Fel d 1 levels determined in the supernatant by double mAb ELISA (Indoor Biotechnologies, Cardiff, United Kingdom). Because of non-normal distribution, results are expressed as geometric mean μg Fel d 1/g sand.

Twelve out of the 36 sand samples had measurable Fel d 1 levels ranging from 3.18 $\mu\text{g/g}$ to 10.76 $\mu\text{g/g}$. Sand samples with undetectable Fel d 1 levels were assigned a value of 0.1 $\mu\text{g/g}$ to calculate the geometric mean Fel d 1 level of all the sandpit samples, which was 0.39 $\mu\text{g/g}$. Table I shows results of the 12 sand samples with detectable Fel d 1 levels.

This study has shown that some child-care center sandpits are a source of Fel d 1, which could be of importance to children with cat allergy. Four of the sandpits had Fel d 1 levels greater than 8 $\mu\text{g/g}$, a level suggested to cause symptoms in individuals with cat allergy.³ A limitation of our study is that we sampled only a small portion of the sandpits, and it may be that there is a wide variation of Fel d 1 levels throughout the entire sandpit.

The detectable amounts of Fel d 1 in some of the sandpits most likely come through either passive transfer of Fel d 1 from children's clothing or from cats straying into the sandpits. Regarding the latter, all the child-care centers in Wellington have a policy of discouraging cats from sandpits, and they are covered when not in use. However, it may be that at times, covering of sandpits may have been overlooked, because some of the sandpits had high levels of Fel d 1, suggesting cats as the source.

Apart from the indoor environment, Fel d 1 has also been detected in permanently cat-free areas such as the

Antarctic,⁴ where it is thought to have been dispersed from clothing. Fel d 1 has even been detected in human hair,⁵ airplanes,⁶ and automobiles.⁷ To those potential exposure sources we can now add sandpits from child-care centers. This may be of relevance for cat-sensitized children.

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Benzocaine anaphylaxis

To the Editor:

This is the first case report of anaphylaxis to topical benzocaine in the English literature.

A 46-year-old woman, while preparing for orofacial cosmetic surgery, developed burning and tingling of the mouth approximately 2 minutes after being swabbed inside her upper and lower lips with topical benzocaine (Hurricane gel; Beutlich Inc, Niles, Ill). While experiencing these symptoms, her lower lip was injected with prilocaine. She immediately experienced a "burning and fiery sensation" in the chest, vomiting, lightheadedness, respiratory distress, and loss of consciousness. She was resuscitated, intubated by emergency personnel, and hospitalized for 1 week (requiring assisted ventilation for 3 days). No other drugs (ie, antibiotics) were administered in preparation for the procedure. No other medications were given before her mouth was swabbed with benzocaine and while she was having the reaction. Further, she had not started any new medications. Latex gloves were used by the surgeon during the procedure. She had undergone 1 similar orofacial cosmetic surgical procedure in the past and received topical and injectable anesthetics (unknown drug) without incident. She has no history of asthma or atopy on the basis of negative skin testing to common

aeroallergens 2 years earlier. She has no history of latex allergy.

She presented for evaluation and underwent skin prick tests (SPTs) to preservative free benzocaine and prilocaine, and the preservative, polyethylene glycol 400, NF (PEG). PEG was present in both benzocaine and prilocaine used in the initial surgical procedure. One drop each of the concentrated benzocaine (1 mg/2.5 mL), prilocaine (1 mg/mL), and PEG was placed on her skin (without prick) without any reaction. SPTs beginning with a 10^{-7} dilution to all 3 agents were negative. Intradermal testing to benzocaine (10^{-7}) resulted in a 4 mm $\times$ 4 mm wheal and 13 mm $\times$ 15 mm erythema; 10^{-6} dilution yielded a 7 mm $\times$ 7 mm wheal (with pseudopods) and 25 mm $\times$ 30 mm erythema (Table I). Prilocaine and PEG intradermals were negative to the full concentrate. The SPT histamine control (1 mg/mL) was positive (7 mm $\times$ 6 mm wheal and 37 mm $\times$ 30 mm erythema) and the normal saline negative. Both SPT and intradermal testing to benzocaine on a control subject were negative with positive histamine and negative saline controls. *In vitro* test for specific IgE to benzocaine was not available. RAST to latex was negative. A tryptase level was not obtained during her initial reaction. Despite having a severe reaction to benzocaine, the patient wishes to continue to have orofacial cosmetic surgery and would like to know what topical anesthetic she can tolerate. Lidocaine skin testing was performed (prick and intradermal) and was negative.

The patient's anaphylactic reactions began immediately after being swabbed orally with benzocaine gel, consistent with an immediate hypersensitivity reaction. Some of the topical benzocaine may have been swallowed as well, contributing to this life-threatening reaction.

Introduced as Anaesthesin in 1902, benzocaine was the first synthetic agent comprised of the ethyl ester of *para*-aminobenzoic acid to be used in clinical practice.¹ Because of its poor water solubility, its use was restricted to topical application in creams and powders. It is a common agent used by many health care professionals as a topical anesthetic for minor surgical procedures and is present in various over-the-counter preparations.² Benzocaine is the active ingredient in Hurricane gel. Hurricane comes in a spray, cream, gel, and powder. In many studies, Hurricane is tolerable and has very few side effects.²

In the literature, there are few reports describing reactions to topical anesthetics. The majority of the reactions are delayed hypersensitivity (type IV) reactions confirmed by positive patch tests.^{3,4} The incriminating topical anesthetic agents that have been reported are benzocaine, lidocaine, prilocaine, mepivacaine, and lignocaine. In a 10-year retrospective study of 5464 patients subjected to patch testing with mixes of numerous caine drugs, benzocaine accounted for 22 out of 91 patients whose reactions were deemed allergic, and therefore 22 of 5464 (0.4%) patients had positive type IV reactions to benzocaine.⁵ No patients reported symptoms consistent with immediate hypersensitivity (type I). In a review of 197 adverse reactions to local anesthetics, Gall et al⁶ found that only 1 patient had an immunologically mediated

TABLE I. Results of intradermal testing of each agent at various dilutions

Agent	Intradermal
Histamine (1 mg/mL)	7 mm $\times$ 6 mm (W), 37 mm $\times$ 30 mm (E)
Saline	Negative
Benzocaine* (1 mg/2.5 mL)	
10^{-7} Dilution	4 mm $\times$ 4 mm (W), 13 mm $\times$ 15 mm (E)
10^{-6} Dilution	7 mm $\times$ 7 mm (W), 25 mm $\times$ 30 mm (E)
10^{-5} Dilution to full concentration	Not done
Prilocaine* (1 mg/mL)	
10^{-7} Dilution to full concentration	Negative
PEG	
10^{-7} dilution to full concentration	Negative

E, Erythema; W, wheal.

*Preservative-free.

reaction to mepivacaine. This again was a delayed hypersensitivity (type IV) reaction. Positive skin test reactions to amide anesthetics (articaine, lidocaine) have been reported in 2 cases, but these patients received the injectable form and only had mild reactions (cutaneous without loss of consciousness).^{7,8} There have also been reports of anaphylaxis to lidocaine⁹ and lignocaine,¹⁰ but these agents were given intravenously.

This is the first report of a case of topical benzocaine (an ester anesthetic) anaphylaxis documented by a positive intradermal skin test.

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