

## LETTERS TO THE EDITOR

## Urticaria Due to Occupational Exposure to Glyceryl Monothioglycolate Permanent Wave Solution

Sir,

The search for the cause of a case of chronic urticaria takes one down trails that criss-cross such areas as foods, drugs, and disease. Given a detailed history, at least a dozen suspects may appear at one time or another. We report a case in which the true cause of urticaria was doubted, indeed dismissed by many, because it has never been reported in the medical literature.

## CASE REPORT

A 30-year-old woman was referred to us on October 2, 1996, for evaluation of chronic idiopathic urticaria. She had worked as a hairdresser for 9 years with no skin or health problems other than insulin-dependent diabetes. The hives appeared 3 years ago, a few days after a permanent wave solution container accidentally ruptured spraying her face, chest, and arms with an 80% aqueous solution of glyceryl monothioglycolate (GMTG). Emergency care for chemical burns, severe conjunctivitis, and corneal abrasions resulted in healing, but 4 days later generalized hives appeared. These persisted daily, except when she was away from work. Economic pressures forced her to continue to work while control of the hives was achieved with daily antihistaminics and courses of systemic corticosteroid therapy. The relentless severity of the hives and associated arthralgias finally led the patient to stop work after 2 years. During that period she made approximately 100 office visits and phone calls to physicians, and was hospitalized once. She has also noted that certain inhalants outside the beauty shop trigger attacks of hives, including perfumes, household cleaning materials, and xerox paper fumes. Long-term steroid therapy has been necessary.

The following diagnostic studies were normal: general physical examination, blood chemistries (except for episodes of elevated glucose 300–600 mg%), urinalysis, chest X-ray, sedimentation rate, immunoelectrophoresis, immune complexes, rheumatoid factor, IgG, IgA, IgM, IgE levels, ASO, ANA, complement screen, hepatitis screen, serum histamine and serotonin, and antibodies for EBV, herpes 1, 2, CMV, and *Coccidioides immitis*. Scratch tests to 22 danders, pollens, and dusts were negative, as were patch tests to 13 chemicals used in her work and 24 standardized contact allergens, and intradermal tests to trichophyton and candidal antigens. Two skin biopsies revealed changes consistent with urticaria. No leukocytoclastic vasculitis was present.

A definitive demonstration of the specific cause of her chronic urticaria was achieved by scratch tests to GMTG. She had positive urticarial responses (>10 mm) to saline dilutions of GMTG 1:12,500. Saline controls were negative. Control scratch testing of 10 normal individuals showed no response to GMTG at these concentrations. Patch tests to 1% GMTG in petrolatum were repeatedly negative in the patient.

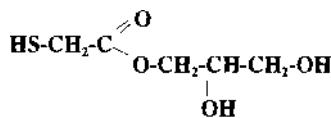


Fig. 1. Glycerol monothioglycolate structural formula. Note presence of a sulfhydryl (SH) group.

## DISCUSSION

The “why” of chronic urticaria is the queen of dermatologic diagnostic challenges, with scores of possible causes ranging from autoimmunity to stress (1). A Sherlock Holmesian review of the likely, the unlikely, and even the unheard of causes is often necessary. Our patient proved to have hives due to this last group. The most likely cause, yeast infection, was eliminated when oral ketoconazole and fluconazole were without effect (2). The usual suspects of foods, additives, and drugs also seemed innocent. Such unlikely causes as auto-immune progesterone and estrogen sensitivity were dismissed, since the hives showed no menstrual periodicity. Viral and bacterial causation seemed unlikely when we found antiviral and antibiotic therapies were without effect (3).

The singular clue was the onset of the hives within days after her accidental mucosal and pulmonary exposure to the hair wave activator, glyceryl monothioglycolate. Their persistence was due to continuing daily exposure to GMTG for two further years. The only respite in the hives came when she was away from work. Since hives associated with occupation are usually due to an inhalant (4), the fumes of GMTG were among the suspected causes. Although GMTG commonly causes an eczematous contact dermatitis in hairdressers (5), it has not been reported to cause urticaria. Fragrances were seemingly a much more likely cause. However, the diagnostic clinch was supplied by elicitation of hives at the sites of scratch tests with GMTG in very low concentrations. Inhalant provocative testing and scratch tests with higher strengths of GMTG were not done due to fear of inducing anaphylaxis.

We believe that GMTG can be added to the list of inhalant allergens causing chronic urticaria. Awareness of this is of especial importance in the study of cases of chronic idiopathic urticaria in cosmeticians. It is noteworthy that despite 7 years of exposure to GMTG as a hairdresser our patient never developed a delayed (Type IV) eczematous response to GMTG either clinically or by patch testing. This is in contrast to the combined urticarial and eczematous responses reported with chlorhexidene (6) and rubber latex (7).

Since experimental induction of urticaria in man and animals has never been achieved, this case suggests that massive inhalant antigen exposure might provide a pathway to success. The site and type of allergen exposure could very well determine the site and type of immunologic response.

## REFERENCES

1. Sabroe RA, Greaves MW. The pathogenesis of chronic idiopathic urticaria. *Arch Dermatol* 1997; 133: 1003–1008.
2. Tharp MD. Chronic urticaria: pathophysiology and treatment approaches. *J Allergy Clin Immunol* 1996; 98: 325–330.
3. Shelley WB, Shelley ED, Talanin NY, Santoso-Pham J. Estrogen dermatitis. *J Am Acad Dermatol* 1995; 32: 25–31.
4. Key MM. Some unusual allergic reactions in industry. *Arch Dermatol* 1961; 83: 57–60.

5. Storrs FJ. Permanent wave contact dermatitis: contact allergy to glyceryl monothioglycolate. *J Am Acad Dermatol* 1984; 11: 74–85.
6. Bergqvist-Karlsson A. Delayed and immediate-type hypersensitivity to chlorhexidine. *Contact Dermatitis* 1988; 18: 84–88.
7. Placucci F, Vincenzi C, Ghedini G, Piana G, Tosti A. Coexistence of type I and type IV allergy to rubber latex. *Contact Dermatitis* 1996; 34: 70.

*Accepted May 4, 1998.*

Walter B. Shelley, E. Dorinda Shelley and Nickolai Y. Talanin  
Department of Medicine, Division of Dermatology, Medical College  
of Ohio, Toledo, Ohio 43614, USA.