

Solar urticaria induced by visible light: successful treatment with omalizumab

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Summary

We report the case of a 53-year-old man with solar urticaria (SU) not responding to histamine antagonist therapy. Using intradermal testing with the patient's irradiated serum, we demonstrated that his SU was elicited by visible light only. This type of SU is uncommon, and makes preventive measures such as sun block largely ineffective. However, the patient had an extraordinary response to the treatment with omalizumab. This case report highlights the diagnostic process and the success of omalizumab for the treatment of SU after 16 months of follow-up.

Solar urticaria (SU) is a rare disease, which is possibly mediated by a yet unidentified photoallergen recognized by IgE.¹ This hypothesis is supported by reports describing the success and partial improvement of this photo-induced dermatosis after anti-immunoglobulin E therapy.^{2–4} However, some patients do not respond to this treatment.^{5,6} Homogenous case series are difficult to obtain because of the rarity of the condition and the diversity of the eliciting wavelengths among patients.

Report

A 53-year-old man presented with a 5-month history of burning erythema, which developed within a few minutes after exposure to sunlight. He reported that these symptoms appeared after 10 min of exposure to winter sunlight through his car window, and disappeared within 1 h without treatment. The symptoms had started in the autumn, persisted throughout winter, and had not responded to therapy with antihistamines, even at high doses. The patient was not taking any other medications. He had a history of chronic spontaneous urticaria with complete remission since 2000.

Laboratory investigations with an antinuclear antibodies panel and porphyrin profile were negative.

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Light provocation testing was performed on the patient's buttocks with ultraviolet (UV)A (exposure to five increasing doses, from 7 to 18 J/cm²), UVB (exposure to five increasing doses, from 32 to 80 mJ/cm²) and visible light (slide projector with cut-off filter at 411 nm, 250 W, 100 mm distance). Irradiation with visible light produced only a sharply demarcated erythema with several small weals, confirming the diagnosis of SU.

These results were further supplemented by intradermal tests with autologous serum irradiated *ex vivo* with UVA (9 J/cm²), UVB (100 mJ/cm²), and visible light. Again, only the test sites injected with serum irradiated with visible light were positive (Fig. 1).

Treatment with omalizumab (Xolair®; Genentech, San Francisco, CA, USA) as two subcutaneous injections of 150 mg each was successful; within 2 weeks after the first dose the patient experienced total remission of the SU. A repetition of the light provocation test (including the intradermal tests with autologous serum) 4 weeks after initiation of therapy was completely negative.

During the following 16 months, 13 injections of omalizumab at increasing intervals from 4 to 8 weeks, were administered to further maintain the effect. Despite this treatment, from about 4 weeks after the final injection, the patient started to feel the burning sensation again following sun exposure; however, he did not develop any skin lesions.

To our knowledge, only 11 cases of SU with improvement after omalizumab therapy have been

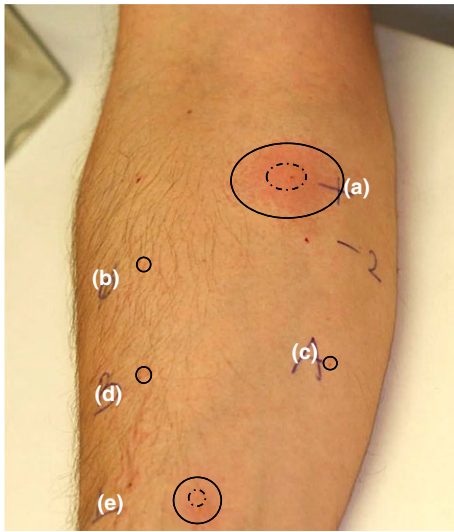


Figure 1 Results of intradermal tests: (a) histamine (positive control), (b) NaCl (negative control), (c) autologous serum irradiated with ultraviolet (UV)A, (d) autologous serum irradiated with UVB, and (e) autologous serum irradiated with visible light. Wheal and flare reactions are outlined.

published to date.^{2–4} There are also reports of treatment failure.^{5,6}

First-line therapy for SU beyond photoprotection consists of H1 antihistamines,⁷ but in several cases, as in ours, conventional therapy is insufficient. Other reported treatment options include skin hardening using phototherapy or photochemotherapy, as well as intravenous immunoglobulins, ciclosporin A and plasmapheresis.⁸ Omalizumab has a good safety profile compared with other medications such as ciclosporin A (risk of carcinogenicity and nephropathy), and it is less time-consuming than photohardening. However, the costs of anti-IgE therapy are still considerable.

Our case shows that even though light provocation tests are laborious, they are essential for the diagnosis and correct therapeutic advice for these patients. On the basis of recent literature, SU induced by visible light only is not as common as described in the past.⁹ It is a therapeutic challenge because current treatment strategies (sunscreen and oral H1 antihistamines) are largely ineffective. The condition has a negative impact on quality of life.

Our results support the hypothesis that SU is caused by mediators released after recognition of a light- or UV-induced photoallergen in the extracellular matrix, probably by antibodies bound to skin mast cells. Much is known about the effect of UV radiation

on the skin and about some of the UV chromophores, but little is known about the possible target molecules of visible light. Potential targets for the actions of visible light may include riboflavin, haemoglobin and bilirubin.¹⁰

It has been demonstrated by Liebel *et al.*¹⁰ that visible light exposure induces reactive oxygen species (ROS) in human epidermal equivalents, and that these in turn mediate the release of proinflammatory cytokines and matrix metalloproteinase (MMP) expression in the skin. However, it is not understood how this potential photoallergen results in sensitization and formation of specific IgE. The same authors¹⁰ studied the ability of broad UVA/UVB sun blocks to inhibit free radicals generated from visible light, and showed that sunscreens do not block the longer non-UV wavelengths from producing free radicals in the skin. This could be an explanation why sunscreens were not helpful in the treatment of our patient. However, Liebel *et al.*¹⁰ also showed that the use of UVA/UVB sunscreen with the addition of a potent antioxidant significantly reduced the formation and release of ROS, MMP and proinflammatory cytokines.

In conclusion, we report a patient with SU that was treated successfully with omalizumab. Future studies on this condition are warranted, and should include investigations into whether sunscreens containing potent antioxidants can decrease the formation of an as yet unidentified visible light-activated chromophore. This may be of additional value for patients with visible light-induced SU.

Learning points

- A notable variety of wavelengths can elicit SU.
- Our patient had SU induced by visible light only.
- Although light provocation testing is laborious, it is essential for the correct management of the disease.
- Intradermal testing using autologous serum irradiated with different wavelengths is an elegant method that supports the hypothesis that SU is caused by mediators liberated after recognition of a light-induced photoallergen in the extracellular matrix, most likely from mast cells.
- Our patient had an extraordinary response to the treatment with omalizumab and has been in remission for over 1 year.

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