

Shiitake Dermatitis: A Report of 3 Cases and Review of the Literature

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Practice Points

- Ingestion of shiitake mushrooms may induce a characteristic flagellate erythema.
- The eruption typically is self-limited and resolves within days to weeks.

Shiitake mushroom–induced toxicoderma, or shiitake dermatitis, is a widely recognized phenomenon in Japan, China, and Korea but only recently has been reported outside of Asia. Affected individuals develop a characteristic pattern of whiplike, linear, erythematous wheals within 1 to 2 days after consumption of raw or cooked shiitake mushrooms. Lentinan, a polysaccharide component of shiitake mushrooms with antitumor properties, is thought to instigate a toxic reaction, resulting in the appearance of a rash. Shiitake dermatitis is self-limited and typically resolves within days to weeks of its appearance.

Cutis. 2013;91:287-290.

Shiitake mushroom–induced toxicoderma, or shiitake dermatitis, represents a nonallergic distinctive pattern of flagellate erythema caused by ingestion of raw or cooked shiitake mushrooms (*Lentinula edodes*). Shiitake dermatitis has been commonly reported in patients from eastern Asia, most often Japan, China, and Korea. More recently, it has been noted to occur in European patients.¹ We present 3 cases of shiitake dermatitis in patients living in the United States, which is rare in this region.

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The authors report no conflict of interest.

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Case Reports

Patient 1—A 46-year-old woman presented to the emergency department with abrupt onset of a pruritic eruption that had started on her left arm and subsequently extended to the rest of her body, including the face and scalp. She denied history of a similar rash and stated that she had not recently taken any new medications or supplements. Physical examination revealed extensive flagellate urticarial lesions scattered on the neck, abdomen, flanks, arms, and legs (Figure 1). The patient was not dermatographic. A biopsy was performed, which showed dermal hemorrhage and the presence of a superficial and mid dermal perivascular mixed inflammatory infiltrate composed of lymphocytes with occasional eosinophils and neutrophils (Figure 2). Focal perivascular fibrin deposition suggestive of vascular injury also was observed without full-blown vascular destruction. The patient's transaminases and complete blood cell count with differential, including eosinophil count, were within reference range. Further questioning of recent exposures revealed that the patient had eaten in a Chinese restaurant 2 days before the development of the rash. A discussion with restaurant staff revealed that a dish the patient had consumed contained reconstituted dried shiitake mushrooms. The patient previously was unaware that she had eaten mushrooms. Based on her medical history and the characteristic rash, a clinical diagnosis of shiitake dermatitis was made. The patient's rash resolved within 4 weeks after its onset.

Patient 2—A 46-year-old man presented to our clinic with a minimally pruritic rash on his upper back and neck of 2 days' duration. His medical history



Figure 1. Streaky urticarial papules and plaques on the leg of a 46-year-old woman following consumption of shiitake mushrooms (*Lentinula edodes*).

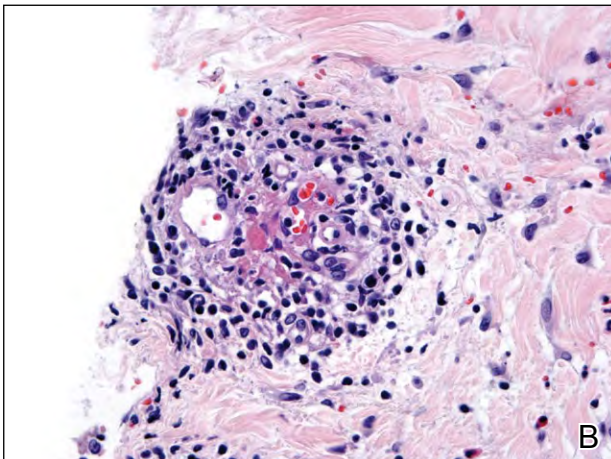
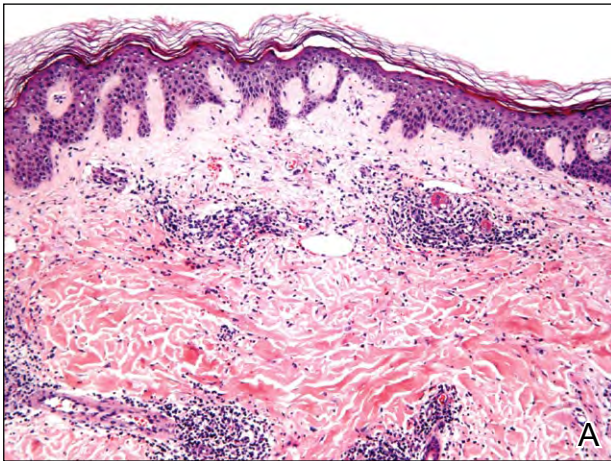


Figure 2. A punch biopsy taken from a linear wheal demonstrated red cell extravasation in the dermis, focal perivascular fibrin deposition, and the presence of a superficial and mid dermal perivascular mixed inflammatory infiltrate (A)(H&E, original magnification $\times 100$). Higher magnification showed that the inflammatory infiltrate was composed of lymphocytes, eosinophils, and neutrophils; endothelial cell swelling also was present (B)(H&E, original magnification $\times 400$).

was unremarkable, and he denied recent changes in his medications. When prompted, he reported that he had eaten in a Chinese restaurant 2 days prior to the onset of the rash. Physical examination revealed linear urticarial plaques scattered on the upper back (Figure 3), neck, abdomen, and flank areas. The lesions could not be induced by scratching. A biopsy was performed, which demonstrated spongiotic and urticarial changes with features of a hypersensitivity reaction (Figure 4). Specifically, there were several small foci of epidermal spongiosis associated with lymphocyte exocytosis. In the dermis, there was a superficial and mid dermal perivascular and interstitial infiltrate of neutrophils, eosinophils, and mononuclear cells. Vasculitis was not observed.



Figure 3. Linear wheals on the upper back of a 46-year-old man that appeared 2 days after he ate shiitake mushrooms.

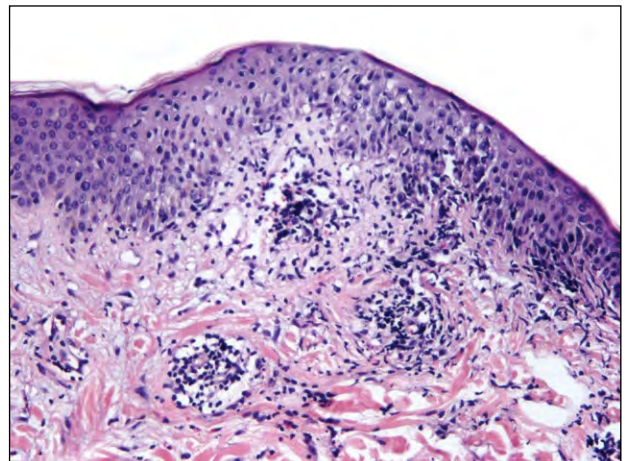


Figure 4. A punch biopsy specimen of a sample lesion on the back showed mild spongiosis and a mixed perivascular and interstitial infiltrate (H&E, original magnification $\times 200$).

The patient did not recall eating mushrooms at the restaurant; however, after contacting the restaurant, it was confirmed that one of the dishes he had consumed contained shiitake mushrooms. His rash was self-limited and resolved 3 weeks after initial onset without treatment.

Patient 3—A 55-year-old woman was referred to our clinic for evaluation of a widespread pruritic eruption of 1 week's duration. She reported that the rash started suddenly on the back, then spread to the upper chest, arms, and face. Although she noticed "scratches" on her skin, she denied inducing the lesions or any external trauma. On examination, there were well-defined, flagellate, red, linear plaques on the back (Figure 5), upper chest, arms, and face. After further discussion with the patient, she remembered that she consumed a salad containing raw shiitake mushrooms the day prior to the onset of the rash. She had already been prescribed triamcinolone ointment prior to her presentation in our clinic but did not apply it, as the rash was improving on its own without treatment. She did not return for follow-up evaluation.

Comment

The characteristic skin eruption of shiitake dermatitis was initially described in 1977 by Nakamura.² Affected patients typically display whiplike linear arrays of grouped erythematous papules that often appear on the face, trunk, and extremities. The lesions spontaneously appear and are not induced by scratching. The rash usually develops within 24 to 48 hours of consumption of shiitake mushrooms. Although previously believed to occur following the ingestion of raw or partially cooked mushrooms,^{3,4} shiitake dermatitis also has presented in patients who have eaten fully cooked mushrooms,⁵ as noted



Figure 5. Flagellate erythematous plaques on the back of a 55-year-old woman that developed 1 week after she ate a salad containing raw shiitake mushrooms.

in 2 of our patients. Shiitake dermatitis also was reported in 3 patients after consumption of a health drink containing dry shiitake mushroom extract.⁶

Notably, similar patterns of flagellate dermatitis have been observed in patients treated with the chemotherapeutic agent bleomycin, a sulfur-containing polypeptide derived from *Streptomyces verticillus*, as well as its semisynthetic analogue peplomycin.^{7,8} Scratching does not induce the linear wheals seen in these eruptions. A key clinical difference, however, is that in bleomycin-induced dermatitis, linear hyperpigmentation following initial erythema is commonly observed, while shiitake dermatitis generally resolves without pigmentary changes.⁹ Other associations with flagellate eruptions include dermatomyositis, adult-onset Still disease, breast cancer, and treatment with docetaxel.^{8,10-12}

The relatively nonspecific biopsy findings described in patients 1 and 2 are consistent with prior reports that include hyperkeratosis; parakeratosis; dyskeratosis; spongiosis; papillary dermal edema; and superficial and intermediate mixed perivascular inflammation composed of lymphocytes, neutrophils, and eosinophils.^{3,9,13,14} In comparison, histopathologic features such as epidermal hypermelanosis, hyperkeratosis, parakeratosis, spongiosis, perivascular inflammatory infiltrates with eosinophils and lymphocytes, acantholysis, basal layer liquefaction with subepidermal clefting, and dermal sclerosis have been associated with bleomycin-induced flagellate dermatitis.^{7,8}

The mechanism underlying shiitake dermatitis following consumption of shiitake mushrooms is unclear, but shiitake dermatitis generally is considered a nonallergic phenomenon, which stands in contrast to patients who develop bronchial asthma or allergic alveolitis following inhalation of shiitake mushroom spores and subsequently display positive skin prick and patch tests.^{1,3} Individuals who have eaten shiitake mushrooms most often display negative skin prick and patch tests, arguing against a type I or IV hypersensitivity reaction.¹⁴ Two cases of shiitake dermatitis have been associated with positive skin prick tests,^{13,15} with no known reports of positive patch testing.

It has been postulated that the ingestion of shiitake mushrooms leads to photosensitization, as the lesions frequently appear on sun-exposed areas of the skin; however, evidence for this phenomenon is limited. Sun exposure was not a factor in our 3 patients or in other known cases in the literature.^{4,8} A more likely explanation is that the eruption results from a toxic reaction to the thermolabile polysaccharide lentinan found in shiitake mushrooms.³ Lentinan is thought to have antihypertensive, cholesterol-lowering, and

immune-modulating effects, as well as antitumor properties. It is used as adjunctive therapy in Japan for gastric and colorectal tumors and has been documented to cause reactions resembling shiitake dermatitis.³

Shiitake dermatitis can be treated with topical steroids for symptomatic relief of pruritus. Otherwise, its course is benign and it typically resolves on its own within days to weeks.

Conclusion

Given the increasingly varied diets of Americans, it is no surprise that cases of shiitake dermatitis are beginning to appear. It is important for dermatologists to question patients about their history of shiitake mushroom ingestion when recognizing this distinctive clinical pattern, as it may not be initially revealed by the patient.

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