

# Allergic Contact Dermatitis Caused by White Petrolatum on Damaged Skin

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**Petrolatum rarely causes hypersensitivity reactions. We report a case of a 51-year-old white man with allergic contact dermatitis due to white petrolatum on damaged skin. The patient, who presented with a history of hand dermatitis and intolerance to ointments for years, was patch-tested with white petrolatum on scratched skin. Patch tests with the European Standard series, preservatives, steroids, vehicles, and emulsifiers were also performed. The patch-test reaction to white petrolatum on scratched skin was positive at 48 and 96 hours. All other patch-test results were negative.**

PETROLATUM is virtually nonsensitizing and non-irritating. Because of these properties, it is considered the best patch-test vehicle for most substances<sup>1</sup> and is widely used in cosmetics and topical pharmaceuticals. Few cases of hypersensitivity reactions to petrolatum have been reported.<sup>1-9</sup> We report a case of allergic contact dermatitis from white petrolatum.

## Case Report

A 51-year-old white man presented with a history of hand dermatitis that for years had been exacerbated by petrolatum and petrolatum-containing ointments. Topical treatment with triamcinolone acetonide cream over the previous 4 years had been minimally effective. For 3 months prior to his presentation, he was treated with clobetasol propionate 0.05% cream once to twice a day under nightly occlusion, with significant improvement. Previous courses of oral prednisone also led to improvement and resulted in complete (although temporary) resolution of his dermatitis. Our patient had never been patch-tested.

Physical examination revealed extensive erythema and scaling on both hands, especially involving the fingers, and fissuring of the fingertips. Hypopigmentation and atrophy (likely induced by steroid) were present on the dorsa of both hands.

Initial scratch tests at three sites were performed on the patient's back. An 18-gauge needle was used to make three superficial scratches without drawing blood. Natural white

petrolatum (E. Fougere & Co, Melville, NY) in a Finn Chamber (Epitest Ltd Oy, Tuusula, Finland) was applied to one site, an empty Finn Chamber was applied to another site, and nothing was applied to the third site. None of the sites reacted after 30 minutes. Patch-test panels for the European Standard series, preservatives, steroids, vehicles, and emulsifiers were applied to adjacent skin. The patch-test and scratch-test sites were then covered with Hypafix adhesive dressings (BSN Medical GmbH & Co. KG, Hamburg, Germany). The petrolatum scratch-test site showed a ++ indurated reaction at 48 hours and 96 hours (Fig 1) whereas the control scratch-test sites were negative at both readings. The remaining patch tests were all negative at 48 and 96 hours. After the 96-hour reading, more scratch tests at three sites were performed on the left volar forearm in a manner identical to that of the prior scratch test, to confirm the absence of a contact urticarial reaction. Again, there was no demonstrable reaction after 1 hour. The sites were not covered, and follow-up examinations of the sites were not performed on the second occasion.

## Discussion

Petrolatum ( $C_nH_{2n+2}$ ) is a mixture of semisolid hydrocarbons. There are four main types of petrolatum: natural, artificial, gatsch, and synthetic. Natural petrolatum is obtained from the purification of petroleum to remove odors and modify the color. White and yellow petrolatums are both natural petrolatums. The purification process is extended further in white petrolatum than in yellow petrolatum, so that practically all of the former's yellow color is removed. Artificial petrolatum is a mixture of natural hydrocarbon waxes and refined paraffin oils.

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**Figure 1.** A ++ reaction at a petrolatum scratch-test site after 48 hours (*left*) and 96 hours (*right*).

Gatsch petrolatum is derived from mixing the by-products of petroleum distillates with paraffin oil. Finally, synthetic petrolatum is made from synthetic hydrocarbons obtained by carbon monoxide hydrogenation.<sup>1,2,10</sup>

The allergens present in petrolatum have been found to most likely be polycyclic aromatic hydrocarbons. These are impurities whose quantities vary depending on the source of the petroleum and the purification procedures performed.<sup>11</sup> Thus, there is often marked variation in allergenicity between brands of petrolatum produced by different manufacturers. Because of the extension of its purification process, white petrolatum contains fewer sensitizing contaminants than yellow petrolatum contains.<sup>12</sup> White petrolatum has become the primary petrolatum used today.<sup>9</sup>

Past reports of sensitivity reactions to petrolatum include a case of immediate and long-lasting urticaria and dermatitis due to petrolatum,<sup>3</sup> a case of chronic dermatitis and hyperpigmentation caused by yellow and white petrolatum,<sup>4</sup> and several cases of allergic contact dermatitis caused by yellow and white petrolatum.<sup>1,2,5-9</sup> On general patch testing, patients in these cases reacted to many allergens that were dispersed in the petrolatum. Petrolatum allergies were then confirmed by specific patch tests.<sup>1,2,5-9</sup> In one case report, the patient reacted to one batch but not to another batch of the same brand of petrolatum; the authors concluded that the amount of sensitizing contaminants not only varies between brands but may also vary between different batches of the same brand of petrolatum.<sup>9</sup>

In one particular study involving three patients with leg ulcers, Doooms-Goossens and Degreef discovered that the patients reacted to petrolatums on their leg ulcers despite having negative patch-test reactions to the same petrolatums on intact skin. The authors concluded that

even if a petrolatum does not elicit a reaction on healthy skin, it may cause an eczematous reaction on damaged skin.<sup>12</sup>

Like the leg ulcer patients in the aforementioned study, our patient had a positive reaction to petrolatum only on damaged skin. He had negative patch-test results for the whole battery of allergens applied to healthy back skin, including the many allergens dispersed in white petrolatum. Only patch testing with white petrolatum on scratched skin yielded a positive delayed hypersensitivity reaction.

## Conclusion

We report a case of allergic contact dermatitis caused by white petrolatum on damaged skin. Allergic hypersensitivity reactions to petrolatum are rare; few cases have been reported despite the widespread (if not universal) use of petrolatum. Such patients are often recognized by intolerance to many topical agents and numerous positive results on patch testing. Since petrolatum may cause a reaction only on damaged skin, patch testing on scratched skin should be considered for patients with suspected petrolatum allergy if regular patch testing yields negative results. Should petrolatum allergy become more common in the future, synthetic petrolatum, which does not contain polycyclic aromatic hydrocarbons, may be a useful substitute for natural petrolatum if it can be made to possess qualities and benefits similar to those of natural petrolatum.

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