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OBSERVATION

Black Dermographism

Black dermographism, meaning “black writing on the skin,” is the phenomenon in which stroking certain metals on the skin creates a black line. This phenomenon was first reported in 1879, and several causes have since been postulated within the medical and metal industries.¹

Report of a Case | A 40-year-old woman reported an asymptomatic black smudge that would occasionally develop on her finger under her wedding ring and on her face when rubbing it with this ring. She wore her ring every day, but the line on her finger appeared only sporadically; she recalled that the discoloration possibly coincided with her menstrual cycle. This reaction dated back as long as she could remember, was reproducible with jewelry of 10- to 24-karat gold, and occurred no matter the brand of cosmetics or medication she applied. She was able to create the black line when her skin was devoid of topical agents, such as immediately after stepping out of the shower. The black smudge lasted 10 to 15 minutes before disappearing without manipulation. She demonstrated this short-lived black dermographism, which lasted 10 minutes before quickly fading (Figure).

Discussion | Mechanical abrasion is the most widely accepted scientific explanation for black dermographism. Common powder compounds in cosmetics and medications (zinc oxide, titanium dioxide) are harder than metals used in jewelry (gold, copper, platinum, nickel). Mechanical abrasion occurs when these hard powder compounds applied to the surface of skin come into frictional contact with jewelry metals, forming a fine metallic residue. These metal particles are so small that they can absorb but cannot refract light, producing a jet black smear, no matter what the color of original bulk metal. This physical abrasion theory is proven by detection of metal particles by electron microscopy of the blackened skin.^{2,3} Black dermographism is easily demonstrated on anyone’s skin prepared with hard powder. Normally, the black line remains until it is washed off with soap and water.

However, the characteristics of the present case would seem to contradict the mechanical abrasion explanation: this patient had only periodic recurrence of the black smudge when wearing the same jewelry and using the same cosmetics each day; she could produce this effect with a clean face devoid of powders; and the black discoloration lasted only 10 minutes before spontaneously disappearing. Perhaps there is more than 1 mechanism to cause black dermographism.

In 1929, Hauck⁴ conducted a study that found “true” black dermographism, in which the black smudge appeared without any previous preparation of the skin, occurred in 2.7% of those studied.⁴ For this subset of people, a chemical theory has been postulated that black dermographism is a reaction of metal with labile sulfur compounds in the sweat, and that sulfur-containing amino acid concentrations are hormonally controlled.^{3,5} This chemical reaction could potentially explain historic reports correlating black dermographism with the menstrual cycle.⁶ More scientific data need to be col-

Figure 1. Black Dermographism of Unusually Short Duration

A Immediate reaction



B After 10 minutes



A, Rubbing her face with an 18-karat gold ring produces black smudges. Of note, the patient is wearing makeup in this photograph. However, this reaction occurred also when the patient’s face was devoid of any product. B, The black smudge lasted approximately 10 minutes before fading without washing or manipulation. Normally, black dermographism remains until washed off with soap and water.

lected, such as the excretion of amino acids in sweat and whether the amount changes in women during the menstrual cycle.

Still to be explained is how the present patient had black dermatographism that lasted 10 minutes and then disappeared without manipulation. To our knowledge, this phenomenon is unique to this patient; we conducted several informal experiments that found the discoloration always remained until removed with soap and water. If the reaction of metal with sulfur-containing amino acids in sweat is a viable theory, then perhaps changing concentrations of amino acids on the skin as sweat evaporates, and the resulting impact on gold dissolution, could explain the quick resolution of the black smudge. This observation leads to the reasonable conclusion that black dermatographism has additional unexplained mechanisms that are perhaps innate to the physiology of certain persons.

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Prurigo Pigmentosa in White Monozygotic Twins

Prurigo pigmentosa (PP) is a rare acquired inflammatory dermatosis with peculiar clinical and histological features. The disease, which predominantly occurs in young women, has been most frequently reported in Japan. In a review of the literature, we found only a few cases of PP in non-Japanese patients compared with more than 300 in Japanese patients.¹ Although ethnicity and environmental factors have been claimed to play a role in the pathogenesis of PP, so far no cause has been identified for this striking eruption. We describe monozygotic white twins who both developed PP.

Report of Cases | Twin 1 was referred in her late 20s for evaluation of a 10-year history of chronic relapsing highly pruritic dermatosis affecting predominantly the upper chest and

back. She was previously treated with topical corticosteroids without improvement. She had a medical history of atopic dermatitis. Her family history was unremarkable except for her twin sister (twin 2), who had a 4-year history of a similar eruption.

Physical examination of twin 1 revealed symmetrically distributed erythematous papules and papulovesicles and confluent pigmented macules with a netlike reticular pattern on her chest in the intermammary cleft (Figure 1A) and on the upper and lower back (Figure 1C). Light microscopy studies of a skin biopsy specimen obtained from the upper back showed an epidermis with spongiosis, focal lichenoid changes with few necrotic keratinocytes, and a superficial perivascular infiltrate of lymphocytes, eosinophils, and few neutrophils (Figure 2). The patient was given doxycycline, 50 mg/d, which resulted in a rapid improvement of the acute lesions, whereas the postinflammatory reticular pigmentation persisted.

Twin 2 (Figure 1, B and D) presented some months later for evaluation of a 4-year history of relapsing eruption associated with severe itching. On examination, she had macular reticular pigmentation symmetrically distributed on her lower and upper back and chest. The most recent eruption, which started while the patient was abroad for some months, predominantly relapsed in spring and autumn. In the absence of acute lesions and based on the clinical presentation identical to that of her twin sister, no skin biopsy was performed.

Discussion | Monozygotic twins each presented with a similar pruritic relapsing eruption, the clinicopathological features and evolution of which were characteristic for PP. As observed in these cases, PP is characterized by itching erythematous and urticarial papules and papulovesicles arranged in a reticular pattern and distributed symmetrically on chest, back, posterior neck, and shoulders. The lesions usually resolve in few days or weeks. Recurrences are frequent and finally result in postinflammatory reticulated netlike hyperpigmentations. Light microscopy findings depend on the stage of the disease, showing early, fully developed, and late changes. They variably encompass superficial perivascular neutrophilic infiltrate, lichenoid changes, necrotic keratinocytes, and vacuolar alterations. In late stages, there is often a hyperpigmented epidermis with dermal melanophages.² As previously reported, minocycline and doxycycline are often effective in PP,³ as in our patients.

The cause of PP is unknown. Several triggering factors have been discussed, including sunlight, nutritional factors including dieting, diabetes, and ketonuria.⁴ There was no evidence for such putative triggers in these 2 patients. The development of PP 6 years apart in 2 monozygotic white twins is striking, especially since there was no family history, and to our knowledge, it is unique. Our observation in monozygotic twins thus raises the question of the importance of genetic factors for the development of PP. The idea that genetic predisposition is involved in PP is further supported by recent reports describing 3 cases of PP with segmental distribution suggesting a genetic cutaneous mosaicism.^{5,6} The presence of neutrophils in the inflam-