

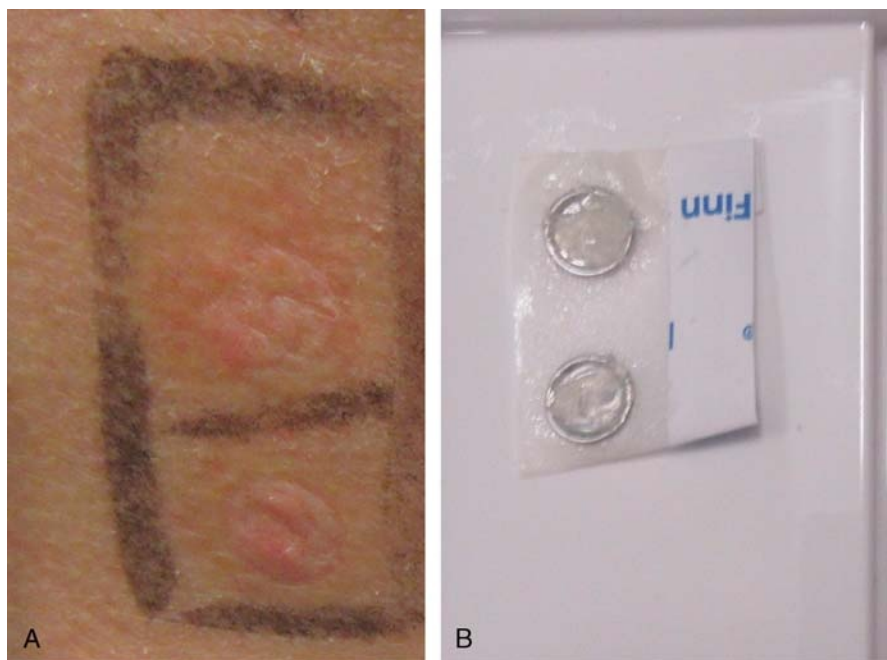


Figure 2. A, 2+ positive reactions to 2 separate Invisalign clear aligners in petrolatum. B, Two separate aligners in petrolatum affixed to a Finn chamber used in patch testing.

our patient.⁵ Additional reports include nausea, headaches, muscle cramping, and anaphylaxis.⁵ Recently, the conditional probability of having an adverse event (such as inflammation/swelling of the oral and pharyngeal mucosa) with Invisalign was found to be increased by 10-fold compared with the general population.⁵ Given the increasing use of clear aligners in orthodontics, it is prudent for practitioners to be aware of the potential for isocyanate allergic reactions associated with these products.

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Invisalign is composed of polyurethane plastic, and persistent contact of the oral mucosa with this plastic may lead to contact sensitization to isocyanates.

Lichen Planus Pigmentosus Inversus Caused by Occupational Systemic Sensitization to Metals in a Semiconductor Factory Worker

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PRECÍS

Lichen planus pigmentosus inversus is an uncommon variant of lichen planus and has never been reported with occupational systemic sensitization to metals.

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DISCUSSION

Lichen planus pigmentosus inversus (LPPI) is a variant of lichen planus characterized by subtle onset of asymptomatic or mildly pruritic hyperpigmented macules affecting the intertriginous areas. Up to date, approximately 50 cases of LPPI have been reported.¹

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Figure 1. Lichen planus pigmentosus inversus distributed over the neck, axillae, inframammary folds, waist, groins, intergluteal cleft, and popliteal fossae.

Although LPPI has been described in association with external physical stimuli and wearing tight clothes,² it has never been described with systemic sensitization to metals.

A 39-year-old woman presented with a 2-year history of progressive pruritic pigmented eruptions in the intertriginous areas with preceding erythema. She first noticed the rash after she started working as a circuit-board-cleaning technician in a semiconductor factory using copper-interconnect technology. She wore only cotton gloves and regular disposable mask during her work. After repeated exposures to metals through skin contact and inhalation of metal dusts and fumes within the factory, she developed diffuse erythema on the trunk and proximal limbs with intense itch. Brownish speckles were noted afterward, and the affected area gradually spread. Physical examination revealed 5- to 10-mm annular gray-brown macules with ill-defined erythema and scaling, which coalesced into symmetric patches over the neck, axillae, inframammary folds, waist, groins, intergluteal cleft, and popliteal fossae (Fig. 1). Histopathology showed hyperkeratosis, exocytosis, dense lichenoid infiltration, and conspicuous pigment incontinence in the upper dermis. Diagnosis of LPPI was made based on the clinical presentation and histopathologic findings. She was treated with topical corticosteroids, nonsteroidal anti-inflammatory drugs, and keratolytic agents for more than 2 months but failed to respond to treatments.

Heavy metals, including chromium, cobalt, copper, and nickel, are generally used in copper-interconnect processing in semiconductor factories. According to the patient's history, her exposures to these heavy metals preceded her skin rash, and the rash worsened as the duration of exposures increased. On the basis of temporality, patch testing of standard series and all identifiable

allergens in her working environment was performed to rule out skin diseases caused by occupational exposures. The results were positive only for nickel, cobalt, and potassium dichromate, which were all relevant to her exposures. Serum levels for the heavy metals related to copper-interconnect technology were within normal limits. The final diagnosis of LPPI caused by occupational systemic metal sensitization was thus made. Because of the skin condition, she resigned from her position. After resignation, the itchy and ruddy skin improved dramatically without treatment in 1 month; however, the annular pigmented macules remained.

Infiltration of cytotoxic CD8⁺ T lymphocytes at the dermo-epidermal junction is crucial in pathogenesis of both LPPI¹ and metal-induced contact sensitization.³ Chronic metal sensitization via continuous exposures to dental fillings or dental braces has been proposed to associate with lichen planus or lichenoid contact reactions on the oral mucosa.³ We suggest that LPPI, as a variant of lichen planus, may relate to metal sensitization similarly. Hard metal powder can rarely induce systemic contact dermatitis.⁴ The unique intertriginous distribution of our patient's rash mimicked that of Baboon syndrome and symmetric drug-related intertriginous and flexural exanthema,⁵ suggesting that she underwent a systemic sensitization. Fortunately, the lesions rapidly regressed without medication after her resignation, further supporting that LPPI was associated with occupational exposures.

ZEBRA

Lichen planus pigmentosus inversus is rare and previously unreported in association with occupational systemic sensitization to metals.

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