Zinc Deficiency and Canities: An Unusual Manifestation

Zinc is an essential trace element in health and disease. It chiefly functions as a cofactor to various metalloproteins and enzymes and is involved in transcription and gene expression. In contrast to Western countries, acquired zinc deficiency is common in South Asian countries principally in infants and young children due to poor diet and malnutrition. Herein we describe an infant with canities due to acquired zinc deficiency, which to our knowledge has not been described previously, and also briefly discuss the role of zinc in melanogenesis.

Report of a Case | A 5-month-old boy born to a nonconsanguninously wed couple presented to the dermatology outpatient clinic with erythematous, eczematous scaly plaques and erosions involving the perioral, perianal, and acral sites and diarrhea of 7 days’ duration. The infant had an uneventful birth history, a birth weight of 2.3 kg, and was exclusively breastfed. The child’s weight at the time of presentation was 7 kg. His scalp hair was sparse and depigmented (Figure, A). The serum zinc level was 40 μg/dL, and serum alkaline phosphatase level was 120 IU/L.

Based on these findings, a diagnosis of acquired zinc deficiency was made, and treatment was started with 3 mg/kg/d of oral elemental zinc. The mother was also given oral zinc supplements. One week after starting treatment, there was marked improvement in skin lesions, and perioral and perianal lesions had subsided with postinflammatory hypopigmentation. Zinc supplementation was continued, and 3 months after initiation of treatment, there was complete regrowth of darkly pigmented hair over the scalp (Figure, B).

Discussion | Zinc plays a vital role in health and disease of skin and its appendages. Its deficiency characteristically presents with eczematous, crusted plaques in perioral, perianal, and acral sites. Hair involvement is common and can present as total alopecia, alternative light and dark bands on polarized microscopy, and structural hair changes.1 Diarrhea, photosensitivity, lethargy and poor growth are usual associated features. Premature canities is rarely seen in infants, usually in association with autoimmune diseases like pernicious anemia, premature aging syndromes, protein-energy malnutrition, and micronutrient deficiencies.2 These were excluded by relevant history, physical examination, and laboratory investigations. Furthermore, regrowth of darkly pigmented hair after zinc supplementation suggested zinc deficiency as the probable cause of canities in our patient.

Skin contains approximately 6% of total body zinc.3 At the subcellular level, melanosomes act as a storehouse for zinc, and its concentration in human hair melanosomes is the highest zinc concentration attained in a structural element of the human body.4 Zinc plays a major role in melanogenesis by virtue of its catalytic function in the synthesis of 5,6-dihydroxindole derivatives and increasing its incorporation into the pigment polymer.4 Zinc inhibits the activity of tyrosinase and glutathione reductase in vitro, enhances the activity of dopachrome tautomerase, and has agonistic effects on melanocortin receptor signaling.5 In addition, because of its antioxidative property, zinc protects the melanocytes from free-radical damage.4 Hence, zinc deficiency may adversely affect melanogenesis.

Inamadar and Palit6 reported in 2 siblings with acrodermatitis enteropathica vitiligolike depigmented lesions over the acral parts of the body. The patients had thin, lusterless scalp hair broken at the distal ends, but depigmentation was not noted. Paradoxically Plonka et al5 in their mouse experiments found that high-dose zinc supplementation induced a bright brown lightening of new hair shafts due to potent down-regulation of eumelanin content. It is possible that zinc is essential for melanogenesis because of its antioxidant action and regulatory function of metalloproteins, and its deficiency may...
lead to pigment lightening or complete loss of pigment as seen in our case. Zinc excess can also downregulate melanogenesis because of the inhibitory action of zinc on tyrosinase. Thus zinc homeostasis is essential for optimal melanogenesis.

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Published Online: July 9, 2014. doi:10.1001/jamadermatol.2014.368.

Conflict of Interest Disclosures: None reported.

Exogenous Pigmentation Mimicking Acral Melanoma: A Case of Talon d’Oyer
We report the case of a patient with a history of malignant melanoma who presented to our clinic with a “new brown spot” on her heel.

Report of a Case | A white woman in her 60s with a history of melanoma on her left back, Breslow thickness 0.40 mm, presented with a new brown spot on the left plantar heel that had developed within the past month. The new lesion was not brought to her attention during a pedicure appointment 3 weeks prior to presentation. The patient denied pain, pruritus, and bleeding associated with the lesion. She also denied changes in appetite, unexpected weight loss, lymphadenopathy, nausea, vomiting, and diarrhea. The patient had a history of multiple melanocytic nevi on the head, neck, trunk, and extremities.

Physical examination of the left plantar heel revealed a discrete, tan, asymmetrical, poorly demarcated 1.0-cm patch (Figure 1). A shave biopsy specimen was obtained (Figure 2A).

Histopathologic examination demonstrated no significant changes on routine hematoxylin-eosin-stained sections. Fontana staining confirmed absence of melanin hyperpigmentation; Perl’s stain was nonreactive for hemosiderin. Periodic acid-Schiff, Steiner, and Giemsa preparations were nonreactive for infectious microorganisms. Review of an ex vivo dermoscopic image (Figure 2B) obtained at the time of tissue trimming demonstrated an irregular patch of yellow-brown discoloration with slight accentuation at sweat duct openings; no parallel ridge pattern was evident. Exogenous tissue dyeing was suggested. After further investigation, the patient reported exposure to black walnuts. We diagnosed exogenous staining by tannins from black walnuts.

Discussion | Native to the Eastern United States, the black walnut tree (Juglans nigra) is used for its timber, deep stain, and edible nuts. To our knowledge, this case of talon d’oyer, or “walnut heel,” is the first report of exogenous staining mimicking acral lentiginous melanoma (ALM). We selected talon d’oyer to describe the findings in this patient in tribute to another melanoma mimicker, talon noir (black heel).

Reports of exogenous staining mimicking ALM are rare. Lacarrubba and coworkers described a case attributed to black rubber sandals. A second case in a chemical industry employee was attributed to para-phenylenediamine exposure through the workboot.

Acral lentiginous melanoma is the most common form of melanoma in the nonwhite population. The poor prognosis associated with ALM has been attributed to delayed diagnosis. Dermoscopy allows expeditious identification of suspect features in the differentiation of benign and potentially malignant acral lesions. The dermoscopic parallel ridge pattern found in ALM is the result of atypical melanocytes within the crista profunda intermedia (epidermal rete ridges). Oguchi et al found that acral melanomas exhibited pigmentation of the