

1. Vera-Kellet C, Peters L, Elwood K, Dutz JP. Usefulness of Interferon- release assays in the diagnosis of erythema induratum. *Arch Dermatol*. 2011; 147 (8):949-952.
2. Milstone LM, Waksman BH. Release of virus inhibitor from tuberculin-sensitized peritoneal cells stimulated by antigen. *J Immunol*. 1970;105(5): 1068-1071.
3. Mazurek GH, Jereb J, Vernon A, LoBue P, Goldberg S, Castro K; IGRA Expert Committee; Centers for Disease Control and Prevention (CDC). Updated guidelines for using interferon gamma release assays to detect *Mycobacterium tuberculosis* infection—United States, 2010. *MMWR Recomm Rep*. 2010;59(RR-5):1-25.

VIGNETTES

Resolution of Skin Maladies of the Trapped Chilean Miners: The Unplanned Underground Copper-Impregnated Antifungal Socks “Trial”

Report of a Case. In August 2010, a collapse occurred in a mine in Chile, trapping 33 miners about 700 m below ground. The miners were discovered 17 days later via a drilled borehole. The underground conditions were very harsh, with high temperatures (34°C) and high humidity (approximately 85%). Within 2 weeks, most miners were experiencing skin problems, mostly in their feet. An antifungal cream, clotrimazole, was delivered to the miners through the borehole, but their skin maladies did not improve.

Thirty-six days after being trapped, each miner received 3 pairs of socks containing copper oxide particles. The potent antifungal and antimicrobial properties of copper are very well documented.¹ When the

polyester yarn component of socks is permanently impregnated with copper oxide particles, the socks are imbued with copper’s potent biocidal properties² and have been shown to successfully treat fungal infections.³

When rescued, after being 69 days underground, 3 miners had tinea pedis; 7 had plantar xerosis; 2 had pityriasis versicolor; 3 had dyshidrotic eczema; and 1 had onychomycosis. Overall, their skin condition, especially on their feet (**Figure 1**), was extremely good despite 69 days of exposure to an environment that promoted the growth of skin-damaging microbes. The miners reported that a significant improvement in their skin diseases had occurred while they were still underground after they began to use the socks.

To understand the effect of the Cupron socks (Cupron Inc), a questionnaire was completed by 19 miners, most of whom had experienced significant discomfort, skin irritation, dry skin, and/or skin scaling in their feet (**Figure 2**) after they were trapped underground. These are all characteristics of fungal infections but may be a component of irritant dermatitis. Remarkably, after beginning to use the socks while still underground, the miners reported that these skin maladies disappeared, in most cases within 4 to 7 days. Based on the severity scores given by the miners, there was a statistically significant reduction ($P < .001$) in these parameters and in the general discomfort they felt after using the socks (**Figure 2B**). Almost all miners reported that they had also experienced a bad smell from their feet, which also disappeared a few days after they began to use the socks.

Comment. While this was not a planned experiment, and no diagnosis was conducted prior to treatment, the relief of the foot skin maladies experienced by the miners while they were trapped underground in conditions



Figure 1. Representative pictures of the feet of 2 miners 1 day after they were rescued from the mine.

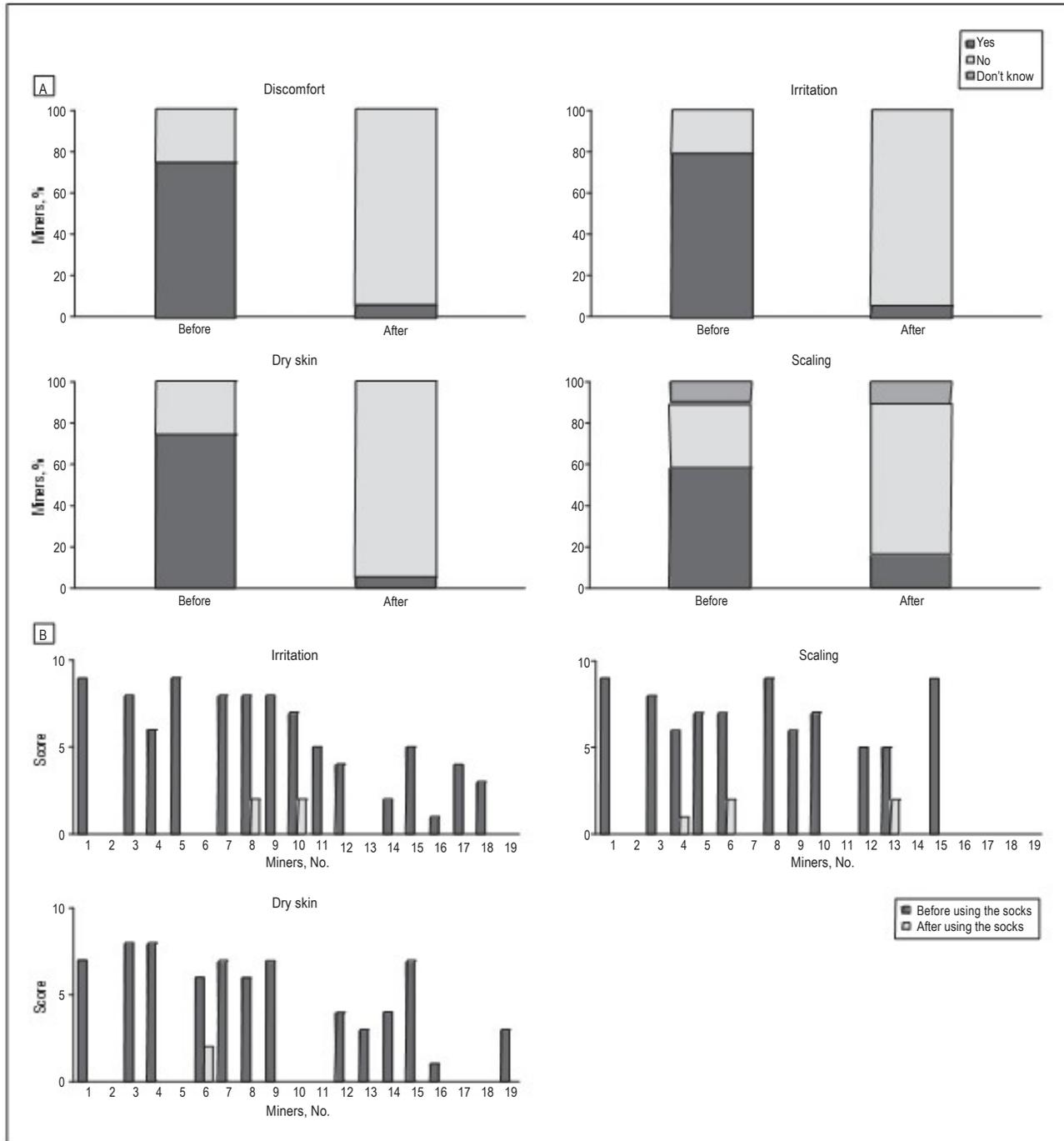


Figure 2. Miners' self-reported scores of whether (A) and to what degree (B) they experienced indicated skin conditions before and after they received the copper oxide-containing socks. 0 Indicates absent condition; 10, most severe condition. Rank sum *t* tests were conducted to compare between scores for the various attributes before and after using the socks.

very favorable for fungal and bacterial growth is probably the best clinical trial possible to demonstrate the high efficacy of Cupron socks in treating foot skin infections. Socks are universally used. The copper oxide-containing socks feel exactly like any regular sock. Thus, using such a simple, widely used “device” may be extremely useful in protecting the feet of about 20% of the world’s population who experience athlete’s foot,⁴ and miners in particular, who have high rates of athlete’s foot infections (80%-90%).⁵ Many other individu-

als who are regularly exposed to very harsh conditions might also benefit, including policeman, sailors, and soldiers.

Gadi Borkow, PhD
Juan Carlos Mellibovsky, MD

Author Affiliations: Cupron Inc, Modi’in, Israel (Dr Borkow); Department of Dermatology, Regional Hospital of Copiapo, Atacama, Chile (Dr Mellibovsky).

Correspondence: Dr Borkow, Hameyasdim 44, Gibton 76910, Israel (gadi@cupron.com).

Financial Disclosure: Dr Borkow is employed by Cupron Inc. Cupron owns the patents for the technology used to impregnate polymeric materials with copper oxide. The socks were donated to the trapped miners by Cupron's agent in Chile.

1. Borkow G, Gabbay J. Copper as a biocidal tool. *Curr Med Chem*. 2005;12(18):2163-2175.
2. Borkow G, Gabbay J. Putting copper into action: copper-impregnated products with potent biocidal activities. *FASEB J*. 2004;18(14):1728-1730.
3. Zatzoff RC, Smith MS, Borkow G. Treatment of tinea pedis with socks containing copper-oxide impregnated fibers. *Foot (Edinb)*. 2008;18(3):136-141.
4. Havlickova B, Czaika VA, Friedrich M. Epidemiological trends in skin mycoses worldwide. *Mycoses*. 2008;51(Suppl 4):2-15.
5. Seebacher C, Bouchara JP, Mignon B. Updates on the epidemiology of dermatophyte infections. *Mycopathologia*. 2008;166(5-6):335-352.

An Acrochordon-Like Melanoma Metastasis

Acrochordons are generally assumed to be benign and might not be submitted for pathologic analysis. One study of 1335 clinically diagnosed acrochordons found only 5 malignant tumors.¹ Both squamous cell carcinoma and basal cell carcinoma have been reported in acrochordon-like lesions.^{1,2} We report herein a case of acrochordon-like melanoma metastasis.



Video available online at www.archdermatol.com

Report of a Case. A 77-year-old white woman was diagnosed as having a melanoma in 1986. Although these medical records were unavailable for review, she self-

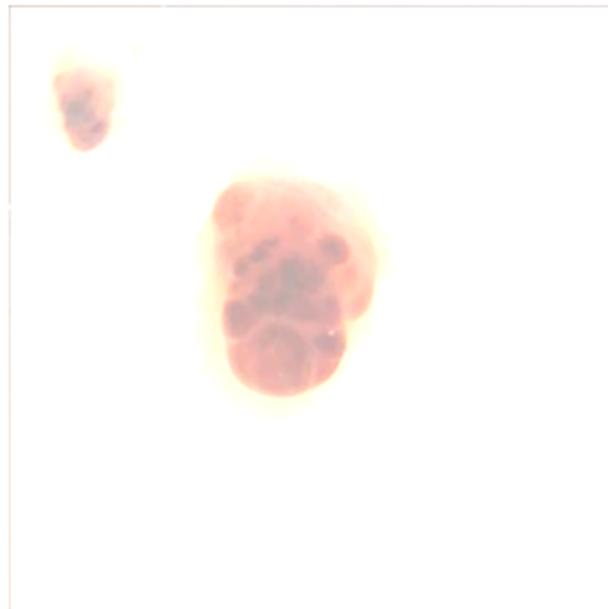


Figure 1. Clinical (inset) and dermoscopic images. Clinical image shows the hyperpigmented pedunculated metastatic melanoma lesion of the axillary vault to be similar in appearance to a pigmented acrochordon. Dermoscopic image of the pigmented saccular lesion without obvious vasculature (Canon Rebel SXi camera; 3Gen Dermlite FOTO Dermatoscope with 30-mm polarized lens) (original magnification $\times 8$).

reported receiving therapeutic excision with primary closure of the left arm and left back sites. Her skin condition remained within normal limits until December 2009, when she developed multiple-pinpoint blue-brown "blood blister" lesions on her trunk and extremities, which grew in diameter and number over the following 6 months. At this time a skin tag-like lesion of the right hip and blue subcutaneous nodules of the bilateral breasts were biopsied, revealing metastatic melanoma.

At presentation in 2010, the patient pointed out a new lesion of her anterior left axillary vault, which she believed was similar to the initial appearance of the right hip metastasis. The area of concern was a hyperpigmented 2-mm soft, pedunculated papule without surrounding macular erythema or pigmentation that clinically appeared consistent with a benign acrochordon (**Figure 1**, inset). Dermoscopy revealed a mobile, saccular lesion with globular architecture without discernible vascularity (**Figure 1**).

Reflectance confocal microscopy (RCM) examination of the epidermis revealed a slightly broadened honeycomb pattern without ulceration or pagetoid cells. The dermoepidermal junction and superficial dermis revealed rare, bright dendritic processes and extensive dense and sparse dermal nests with many large refractile atypical-bizarre cells consistent with melanocytes. Multiple horizontally oriented and convoluted vessels were also noted in close proximity to the tumor nests, consistent with the previously described vascular-tumor interface phenomenon³ (**Figure 2A** and **B**) (a video is available at <http://www.archdermatol.com>).

Histopathologic review demonstrated a well-circumscribed pedunculated lesion with overlying epidermal thinning and effacement of the rete. No ulceration or melanocytic proliferation was noted in the epidermis. Multiple discohesive nests of severely atypical melanocytes were noted in the papillary dermis with closely interposed vessels. The overall picture was consistent with metastatic malignant melanoma (**Figure 2C** and **D**).

A positron emission tomography (PET) computed tomography scan demonstrated multiple PET-avid areas; fine needle aspiration confirmed the presence of metastatic melanoma in the left axillary lymph node. The patient started oral temozolomide therapy and was subsequently lost to follow-up.

Comment. While it is widely believed that acrochordons are unlikely to be clinically significant and that they may be discarded instead of submitted for pathologic review, cutaneous malignancy may present as an acrochordon mimicker or arise within an existing acrochordon. Patients with Gorlin syndrome (basal cell nevus) may develop acrochordon-like basal cell carcinomas at a fairly young age; invasive squamous cell carcinoma has been reported to develop within an acrochordon; and there is 1 case report of melanoma presenting as an infarcted acrochordon-like lesion.^{4,5} While the medical history of the present patient prompted removal of the lesion in question, RCM revealed a concerning architecture that contrasted with the lesion's benign clinical features. Reflectance confocal microscopy may provide additional