

Occupational psoriasis after exposure to rockwool

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Rockwool belongs to the class of manmade vitreous fibers (MMVFs) or synthetic vitreous fibers (SVF), that are made primarily of glass, rock, slag, or clay and are classified in four general groups: glass filaments, mineral wool, refractory ceramic fibers, and fibers for special purposes.¹ Mineral wool, including rockwool, glass wool, and slag wool, contains masses of entangled vitreous fibers with no visible three-dimensional order, of diameters ranging from 0.2 to about 10 μm . In some situations, SVF materials can release airborne fibers, some of which are small enough to be respirable. Thus, workers may be exposed to SVFs by skin contact and/or by inhalation.² Rockwool fibers, like the other SVFs, are used widely as insulating materials in residential and industrial settings. They may irritate the skin of workers engaged in manufacturing, fabricating, or installing SVF products through direct handling and contact with contaminated clothes and personal protective equipment.³ This irritation is a mechanical reaction to sharp, broken ends of fibers that rub against, or become embedded in, the outer layer of the skin.⁴ Typically, the irritation can be relieved by washing exposed skin gently with warm water and mild soap, and disappears in a few days. In 2009, the EU changed the classification of MMVF products, and removed the old risk definition for chemical substances R38 (irritating to the skin) and the new hazard statements H315 (causes skin irritation), without considering the mechanical hazard linked to the exposure to these fibers.⁵ To our knowledge, we describe the first case of occupational psoriasis induced by rockwool.

CASE REPORT

A 46-year-old male worker was referred to our dermatology department complaining of an itchy, diffuse papulopustular dermatitis. The skin lesions started to appear on his face, neck (inside the collar), wrists, forearms, and hands, and then spread to his trunk, limbs, and feet. He had been employed since 2007 at a production and assembly plant of insulating panels containing rockwool, assigned to the coordination and quality control of the production. The insulating panels were cut in a closed cabin using numerically controlled machine tools and then

assembled in an open area. Of note, he reported the use of a new insulating material during the last year, consisting of 96% of rockwool (EC number: 926-099-9) and 4% of a resin made of hardened phenolic formaldehyde. He reported that the skin lesions had started a few days before consultation, right after he had worked in the closed cabin, for exceptional reasons, during the cutting operations without any personal protective equipment due to the temporary absence of another operator. He also revealed that he had been affected by psoriasis during childhood. We initially prescribed systemic therapy with cetirizine once daily and asked him to come back to our attention in 10 days.

The subsequent physical examination revealed that the skin lesions had evolved into psoriasiform lesions (Figure 1). Dermoscopic examination of one lesion on his trunk revealed glomerular vessels, suggesting a psoriasiform eruption.⁶ Patch tests performed on healthy skin with the Italian Society of Allergological, Occupational and Environmental Dermatology baseline series (Euromedical, Calolziocorte, LC, Italy) and phenol formaldehyde resin 5% petroleum were negative.⁷ Histological examination of the trunk lesions was suggestive for psoriasis, revealing parakeratosis, thickened projections of the prickle cell layer of keratinocytes, and no granular layer.

A stripping technique from 10 different sites (identified by a code) affected by the skin lesions showed the presence of rockwool fibers: At the time of the first visit, samples were taken at five sites where the lesions started to appear, located in the palmar and dorsal regions of the right and left hands; at the second visit the samples were taken at five sites to which the lesions had spread, located in the left carpal region, right scapular region, epigastric region, and in the dorsal region of the right and left feet. For scanning electron microscope (SEM) observation the specimens (standard glass slides with the double-sided adhesive) were fixed on aluminum stubs with conductive adhesive tape. Samples exploration was performed with an Zeiss (model LEO) SEM, coupled with an X-max (80 mm²) Silicon drift Oxford detector equipped with a Super Atmosphere Thin Window. Back-scattered electron (BSE) images revealed the



FIGURE 1 Psoriasiform lesions of the trunk

presence of many elongated fibers, sometimes more than one per pick-up point, the morphology of which (Figure S1) and the quantitative chemical analyses made by ED detector definitively indicated their rockwool fibers nature (Figure S2).^{8,9}

DISCUSSION

SVFs are well-known to be mechanically irritant due to the penetration of the fiberglass particles into the skin. According to the Finnish Register of Occupational Diseases, 20% of all the occupational dermatoses in insulation workers were caused by irritant contact dermatitis caused by SVFs.⁵ The mechanical irritation is usually characterized by scratch marks and small excoriated papulopustules, and occasionally by erythema, scaling, vesicles, and hyperkeratosis.¹⁰ The wrists, the forearms, the neck, and the face are the most commonly affected areas.² Fiberglass microfibers, being coated with epoxy resins and formaldehyde, may also induce allergic contact dermatitis.¹¹ SVFs may also exacerbate eczema in people with atopic dermatitis.¹²

To our knowledge, we report the first case of occupational psoriasis presenting as a Koebner phenomenon after exposure to rockwool. The diagnosis was made based on the clinical history; on physical, dermoscopic, and histological examination; and on the stripping tape tests.

Despite the well-known irritant effects on skin and mucosal membranes of fibers with a diameter greater than 4 μm , the hazard classification of MMVFs as skin irritant was removed in 2009.¹³ Thus, it may be difficult for workers, safety managers, and physicians to recognize the risk of adverse skin effects related to occupational exposure to these fibers, which is actually on the increase owing to the large use of rockwool fibers in several products. Also important is the stripping tape test, a noninvasive, inexpensive, and easy technique that can be

very useful in all difficult cases of skin reactions related to occupational exposure to SVFs or other dusts.

CONFLICT OF INTEREST

All authors have no conflicts of interests to report.

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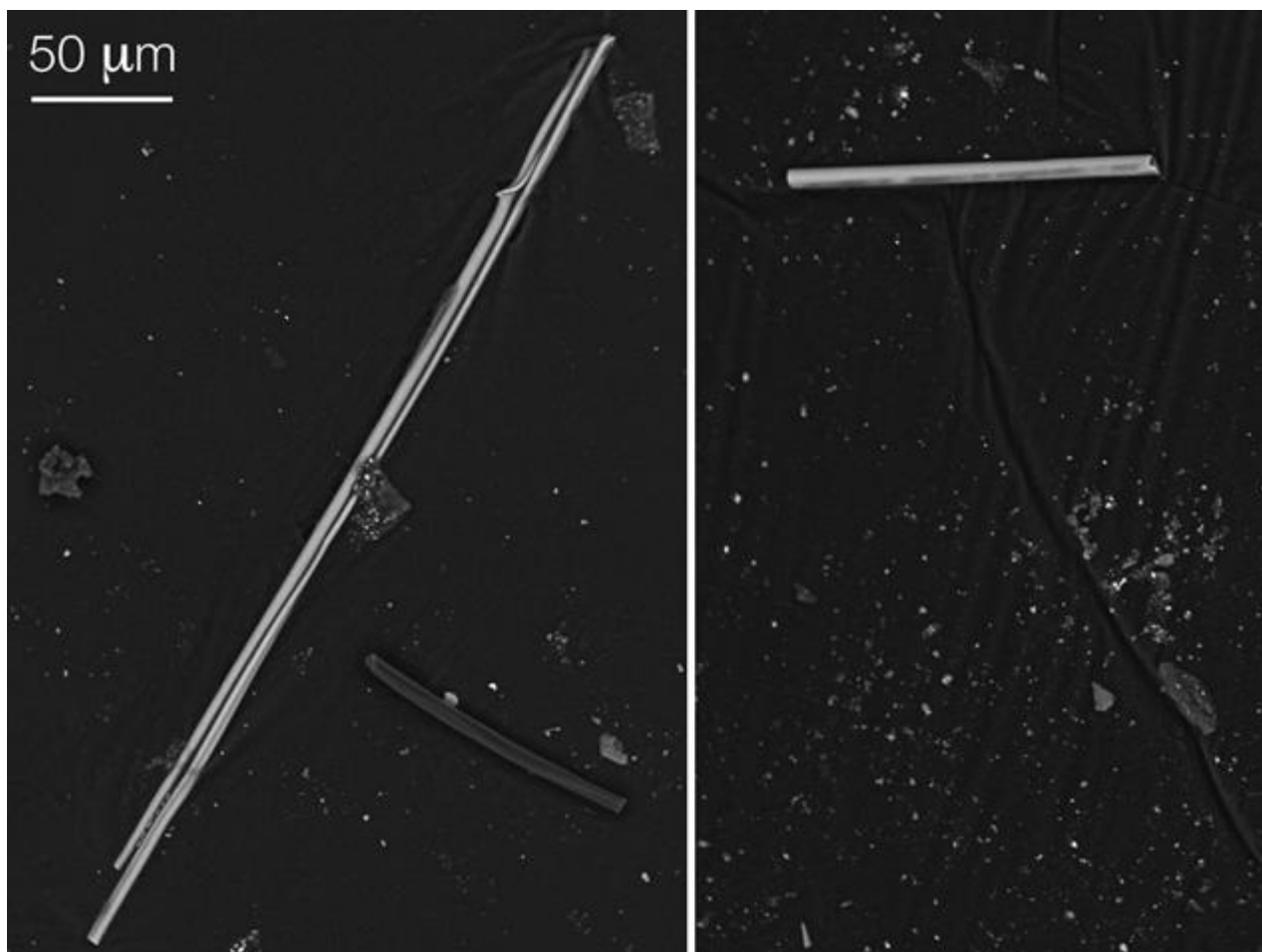
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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

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Online supplemental Figure 2. SEM back scattered images of the fibers collected from the patient's skin: left image, fibers sampled on the wrist of the left hand; right image, fibers sampled on the back of the right hand.



Online supplemental Figure 3. X-ray energy dispersive (ED) spectrum of one of the two fibers found on the back of the patient's right hand; the inset table shows the quantitative elemental analyses, expressed as oxide mass percentage, whose composition corresponds to that of a glass wool fiber.

