Patients with hyperkeratotic hand dermatitis (HHD) have chronic, sharply demarcated, fissure-prone plaques on the palms and/or soles without evidence of other skin diseases such as atopic dermatitis or psoriasis. Although HHD has a distinct clinical picture, the histologic pattern of HHD is nonspecific, showing “spongiotic psoriasiform” type changes. The cause of HHD is unknown, and whether it is a chronic eczematous process or a variant of localized psoriasis is controversial.

Recent evidence suggests that type 17 helper T (T<sub>h</sub>17) cells, which are CD4<sup>+</sup> T cells that produce interleukin (IL) 17A, are major contributors to psoriasis pathogenesis. Characteristically, T<sub>h</sub>17 cells express IL-23 receptors, which makes them responsive to IL-23, a cytokine that promotes survival and proliferation of T<sub>h</sub>17 cells. Although chronic psoriatic plaques have demonstrated elevated levels of IL-23, IL-23 expression has not been evaluated in palmoplantar psoriasis or HHD. Thus, we sought to compare IL-23 expression patterns in chronic plaque psoriasis, palmoplantar psoriasis, and HHD.

**Methods.** The Oregon Health and Science University institutional review board approved all aspects of this study, and informed consent was obtained from each participant. Patients were diagnosed as having HHD if they demonstrated well-demarcated, symmetric, fissure-prone, painful, indurated, and hyperkeratotic plaques on the palms and/or soles.

**Table. Comparison of IL-23–Positive Immunohistochemical Reactions Across Studied Diseases**

<table>
<thead>
<tr>
<th>Measurement</th>
<th>HHD</th>
<th>Palmoplantar Psoriasis</th>
<th>Psoriasis</th>
</tr>
</thead>
<tbody>
<tr>
<td>IL-23–positive cells/HPF, mean (range of means)</td>
<td>24.3 (10.9-29.7)</td>
<td>15.9 (6.3-27.8)</td>
<td>16.4 (9.1-29.1)</td>
</tr>
</tbody>
</table>

Abbreviations: HHD, hyperkeratotic hand dermatitis; HPF, high-power field; IL-23, interleukin 23.

**Figure.** Biopsy specimens from study patients. A-D, Representative interleukin 23 immunohistochemical analysis of palmoplantar psoriasis (A), hyperkeratotic hand dermatitis (B), chronic lesional plaque psoriasis from the body (C), and nonlesional psoriasis from the body (D). E, Representative isotype control background staining in chronic lesional plaque psoriasis from the body. Scale bars in all panels represent 50 µm. Vector VIP peroxidase substrate kits were used for antibody visualization (Vector Laboratories, Burlingame, California), and the counterstain was hematoxylin-eosin.
with a sharp cutoff at the wrist. In addition, there could be no personal or family history of typical chronic plaque psoriasis lesions elsewhere on the body, no history of atopic dermatitis, and no relevant positive findings on patch testing. Patients were considered to have palmoplantar psoriasis if they presented with well-demarcated, symmetric, indurated, and hyperkeratotic plaques on the palms with a sharp cutoff at the wrist. Patients were considered to have typical chronic plaque psoriasis if lesions were distributed on the extensor elbows, knees, scalp, nails, or trunk. All patients had chronic disease present for at least 6 months and all had not had topical therapy for at least 2 weeks and systemic therapy for at least 4 weeks.

Tissue samples were obtained by 4-mm punch biopsy specimens taken from lesional skin of patients with HHD (n=4), palmoplantar psoriasis (n=4), and chronic plaque psoriasis (n=6) and nonlesional skin of patients with psoriasis (n=6). Frozen tissue sections were prepared, and slides were incubated in 10% methanol for 10 minutes, in 3% hydrogen peroxide for 10 minutes, and then in blocking solution for 1 hour. Antibodies directed against human IL-23 (Biolegend, San Diego, California) were then applied at a concentration of 1:50 overnight at 4°C. Vectastain Elite ABC Peroxidase kits and Vector VIP peroxidase substrate kits (Vector Laboratories, Burlingame, California) were used for visualizing cells. Positive cells were counted in 8 high-power fields, and the average number of labeled cells was calculated. A 1-way, between-subject analysis of variance was conducted to compare the expression level of IL-23 in the 4 groups. A paired t test was used in post hoc analysis to individually compare each of the 4 groups against one another.

**Results.** There was a significant difference in the number of IL-23–positive cells in the 4 groups of patients (F<sub>3,16</sub> = 6.68) (P < .05 for each group). Post hoc comparisons showed markedly increased IL-23–staining cells in HHD, palmoplantar psoriasis, and lesional psoriasis compared with nonlesional psoriasis (Figure and Table) (P < .05 for each disease type). There were no significant differences in the number of IL-23–positive cells between the 3 disease groups (data not shown). Positively stained cells were found in the tips of the dermal papilla, and they demonstrated dendritic morphologic characteristics (Figure).

**Comment.** Our data demonstrate that IL-23 is upregulated in both HHD and palmoplantar psoriasis, similar to what has been previously reported in chronic plaque psoriasis. Palmoplantar psoriasis and HHD are diseases associated with considerable morbidity and are often difficult to treat. Topical therapy is notoriously inadequate, and patients often move to other therapies such as acitretin or biological agents with varying success. Ustekinumab is a new biological drug that targets the shared p40 subunit of IL-23 and IL-12 and has shown excellent clinical responses in patients with chronic plaque psoriasis. We predict that by targeting IL-23, these agents may be effective in individuals with HHD or palmoplantar psoriasis.

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**A Cost-effectiveness Comparison of Liquor Carbonis Distillate Solution and Calcipotriol Cream in the Treatment of Moderate Chronic Plaque Psoriasis**

The cost of medications for the treatment of chronic conditions such as psoriasis can be overwhelming to patients and the health care system. Patients with mild to moderate psoriasis are generally offered topical medications, ranging in cost from $0.80/g for clobetasol propionate to $7.45/g for the betamethasone dipropionate/calcipotriol ointment Taclonex (Leo Pharma A/S, Ballerup, Denmark) as first-line and often second-line therapy.