REFERENCES

1. Ekiz O, Sen BB, Rifaioglu EN, Balta I. Trichoscopy in paediatric patients with tinea capitis: a useful method to differentiate from alopecia areata. *J Eur Acad Dermatol Venereol*. 2014;28:1255-1258.
2. Higgins EM, Fuller LC, Smith CH. Guidelines for the management of tinea capitis. British Association of Dermatologists. *Br J Dermatol*. 2000;143:53-58.
3. Head ES, Henry JC, Macdonald EM. The cotton swab technic for the culture of dermatophyte infections—its efficacy and merit. *J Am Acad Dermatol*. 1984;11:797-801.
4. Friedlander SF, Pickering B, Cunningham BB, Gibbs NF, Eichenfield LF. Use of the cotton swab method in diagnosing tinea capitis. *Pediatrics*. 1999;104:276-279.

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Principal components analysis as a tool to identify lesional skin patterns in cutaneous lupus erythematosus

To the Editor: Principal components analysis (PCA) has the potential to objectively identify clinical patterns of disease expression in dermatologic diseases and help with subgroup classification. PCA is a multivariate analysis that reduces a large set of variables into a smaller group while preserving the original data set. PCA has previously been used to identify significant combinations of clinical signs of Behçet disease as a prominent pattern of disease expression.[1]

We sought to test PCA in cutaneous lupus erythematosus (CLE), which has well-described clinical subtypes.[2] We applied PCA on individual features of the Cutaneous Lupus Disease Activity and Severity Index (CLASI) activity and damage scores (eg, erythema, scaling, dyspigmentation, scarring)[3] in a cohort of patients with CLE to characterize patterns of disease expression. We hypothesizes that PCA would identify significant groupings of disease activity and damage at certain body sites corresponding to known CLE subtypes.

In this cross-sectional study, we recruited 303 patients with CLE who presented consecutively at their initial visits at outpatient dermatology clinics at University of Texas Southwestern Medical Center and Parkland Hospital in Dallas, Texas. One dermatologist (B.F.C.) completed all CLASI scores. We conducted a PCA of CLASI activity and damage component scores using SPSS 25 software (IBM, Armonk, NY). CLE subtypes were not included in the analysis.

Table I summarizes the clinical and demographic characteristics of all patients. For the PCA we extracted 5 factors (F1-F5), which are unobserved constructs formed by sets of observed, correlated variables, using the sum scores method (Fig 1).[4] F1 represented lesions on the anterior neck, chest, abdomen, arms, and back/buttocks, with high CLASI activity scores. Based on the preference for trunk and arms, F1 resembled patients with subacute CLE.[5] F2 showed lesions on the ears and face, with higher CLASI damage scores, whereas the posterior neck, back/buttocks, arms, and legs lesions with high damage scores characterized F3. Because of the predilection for high skin damage, we deduced that F2 and F3 described patients with localized and generalized discoid lupus, respectively.[2] F4 represented hands and feet lesions with disease activity and damage, which favored chilblains lupus clinically. F5 had disease activity and damage in the scalp, as measured by recent scarring and nonscarring

Table I. Demographic and clinical characteristics of patients with cutaneous lupus erythematosus

Characteristic	All patients (N = 303)
Age, mean (SD), y	46 (14.1)
Sex, No. (%)	
Female	256 (84)
Male	47 (16)
Race/ethnicity, No. (%)	
African American	157 (52)
Hispanic	29 (10)
White	101 (33)
Asian	10 (3)
Others	6 (2)
Cutaneous lupus erythematosus subtypes, No. (%)	
Acute	23 (8)
Subacute	45 (15)
Chronic	235 (77)
CLASI component score, mean (SD)	
Activity	6 (6.8)
Damage	6 (6.7)
Disease duration, mean (SD), y	11 (16.3)
Treatment at initial visit, No. (%)	
Topical/intralesional treatment only	100 (33)
Oral antimalarial ± topical/intralesional treatment	40 (13)
Oral immunosuppressants ± antimalarials ± topical/intralesional treatment	163 (54)
Systemic lupus erythematosus diagnosis, No. (%)	
Yes	153 (50)
No	150 (50)
Smoking status, No. (%)	
Current	101 (33)
Past	49 (16)
Never	153 (50)

CLASI, Cutaneous Lupus Erythematosus Area Severity Index; *No.*, number; *SD*, standard deviation.

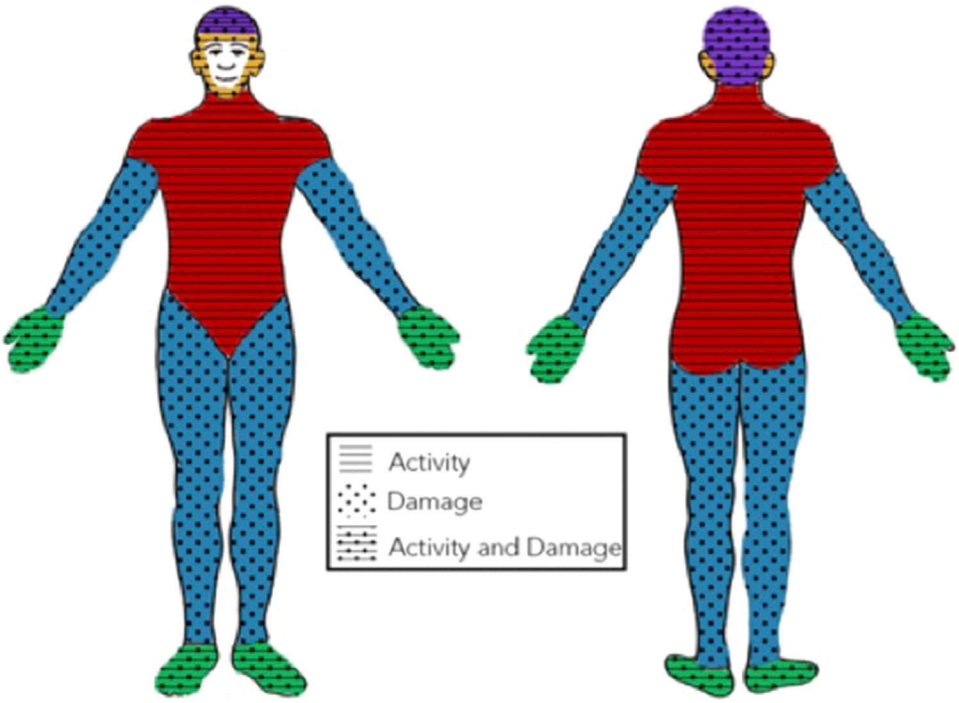

Fig 1. Cutaneous lupus erythematosus skin lesion patterns identified by principal components analysis. We extracted 5 factors with significant associations of body sites and clinical features in this cohort of patients with cutaneous lupus erythematosus. Each color corresponds to the distribution described by each factor: red, factor 1; orange, factor 2; blue, factor 3; green, factor 4; and purple, factor 5. The overlying patterns represent the Cutaneous Lupus Erythematosus Disease Area and Severity Index components that loaded highly for that factor—stripes for activity, dots for damage, and stripes and dots for both. Factor 1 also had involvement of arms, and factor 3 had involvement of posterior neck and shoulders, chest, back and buttocks, which are not depicted here.

alopecia, which correlate with patients with discoid lupus due to scalp preference and alopecia (Fig 1).[2]

We showed that PCA can use location and lesional data on CLE skin lesions to objectively characterize distinctive skin disease patterns. Although the analysis largely correlated with known subtypes of CLE, this can also be used as a starting point to propose classification criteria for specific CLE disease subtypes, such as subacute CLE, for clinical trials.

The limitations of this study include its cross-sectional nature, which could have missed disease flares, few patients with acute CLE, and the single-center design. Larger multicenter studies are planned to confirm the association of the factors described here and identify other clinical phenotypes. We also propose that PCA can be used in other skin diseases with undefined clinical subtypes to identify clinical patterns that will help providers with diagnosis.

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REFERENCES

1. Krause I, Leibovici L, Guedj D, Molad Y, Uziel Y, Weinberger A. Disease patterns of patients with Behcet's disease demonstrated by factor analysis. *Clin Exp Rheumatol*. 1999;17(3):347-350.
2. Chong BF, Werth VP. Dubois' Lupus Erythematosus and Related Syndromes. In: Wallace D, Hahn BH, eds. *Skin Disease in Cutaneous Lupus Erythematosus*. 9th ed. Elsevier; 2018:p 33-31 – 33-12.
3. Albrecht J, Taylor L, Berlin JA, et al. The CLASI (Cutaneous Lupus Erythematosus Disease Area and Severity Index): an outcome instrument for cutaneous lupus erythematosus. *J Invest Dermatol*. 2005;125(5):889-894.
4. DiStefano C, Zhu M, Mindrila D. Understanding and using factor scores: considerations for the applied researcher. *PARE*. 2009;14(20):1-11.
5. Sontheimer RD. Subacute cutaneous lupus erythematosus. *Clin Dermatol*. 1985;3(3):58-68.

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Association between uremic pruritus and long-term outcomes in patients undergoing dialysis

To the Editor: Uremic pruritus (UP) is common in patients receiving chronic dialysis and has been associated with unfavorable outcomes and survival. The cause of death among patients with UP has been controversial.[1,2] We designed this prospective open cohort study using retrospectively collected data from the Taiwan National Health Insurance Research Database (NHIRD). The NHIRD contains the deidentified information regarding diagnosis, prescriptions, examinations, operations, and expenditures in both inpatient and outpatient services of 99.8% (23 million) of residents in Taiwan since March 1995.

The diagnosis of UP was defined in patients who received more than 42 daily doses of antihistamine or who received ultraviolet B phototherapy within 1 year after dialysis initiation. To eliminate indications for antihistamine or phototherapy other than UP, we excluded patients who were diagnosed with allergic rhinitis (International Classification of Diseases, Ninth Revision, Clinical Modification [ICD-9-CM] code: 477.xx), urticaria (ICD-9-CM code: 708), psoriasis (ICD-9-CM code: 696), mycosis fungoides (ICD-9-CM code: 202.1), or Sezary disease (ICD-9-CM code: 202.2) during the first year of follow-up. The primary outcome was all-cause mortality, and the secondary outcomes were cardiovascular- and infection-related death. The clinical characteristics of UP and non-UP groups were balanced through propensity score matching.

Data were analyzed after 25,048 patients with UP and 50,096 patients without UP were matched (Table I). A mean follow-up of 5 years revealed that the UP group had a higher risk of all-cause mortality (hazard ratio, 1.05; 95% confidence interval, 1.03-1.07), cardiovascular death (subdistribution hazard ratio, 1.06; 95% confidence interval, 1.02-1.09), and infection-related death (subdistribution hazard ratio, 1.08; 95% confidence interval, 1.05-1.11) than the other group. The cumulative risk of all-cause mortality is presented in Fig 1.

UP contributes to worse long-term outcomes through several ways. The presence of UP is frequently associated with inadequate uremic toxin removal, hyperphosphatemia, and fluid overload.[3,4] Moreover, these factors can contribute to increased cardiovascular events. A high level of uremic toxin can impair immunity through the inhibition of granulocyte or lymphocyte function and activation. Frequent scratching may disrupt the skin barrier, which can lead to cutaneous infections.

The limitation of this study is that its claims database does not contain laboratory data or pruritus severity information. Our effort on using a treatment-based criterion to identify patients with UP can sort out the group with more intense pruritus, and this may be similar to those with a high visual analog score of itching. However, the previously reported association between a higher visual analog score regarding pruritus intensity and worse outcome was not observed in a recent cohort study in Taiwan.[1,2,5] This implies the need for developing a better scoring system.

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