**Supplementary**

**Table S1.** Baseline characteristics by filaggrin mutation status and thenar hyperlinearity score (computational).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Filaggrin (*FLG*) gene mutation status | | | Thenar hyperlinearity score (computational) | | |
| Wild type  (n=324) | *FLG* -/+ (n=179) | *FLG* -/- (n=28) | <10 000  (n=178) | 10 000 –  20 000  (n=290) | >20 000 (n=63) |
| Continuous variables (mean ±standard deviation (count)) | | | | | | |
| Age | 10.8 ±6.6 (n=324) | 10.1 ±6.2 (n=179) | 12.5 ±8.4 (n=28) | 9.9 ±6.0  (n=178) | 10.7 ±6.7  (n=290) | 12.4 ±7.1 (n=63) |
| EASI\* | 7.4 ±8.8 (n=324) | 8.9 ±9.8 (n=179) | 12.9 ±11.4 (n=28) | 6.2 ±8.1  (n=178) | 8.4 ±9.0  (n=290) | 13.2 ±12.2 (n=63) |
| IgE level | 6425 ±11954 (n=84) | 6900 ±8137 (n=57) | 6173 ±5236 (n=12) | 6769 ±14638 (n=46) | 6074 ±7590 (n=88) | 8483 ±8360 (n=19) |
| Categorical variables (number/count (%)) | | | | | | |
| Male | 137/324 (42.3%) | 79/178 (44.4%) | 12/28 (46.4%) | 86/178 (48.3%) | 123/289(42.3%) | 22/63 (34.9%) |
| History of food allergy | 132/323 (40.9%) | 85/179 (47.5%) | 13/28 (46.4%) | 74/177 (41.8%) | 130/290 (44.8%) | 28/63 (44.4%) |
| History of asthma | 77/323 (23.8%) | 44/179 (24.6%) | 13/28 (46.4%) | 41/177 (23.2%) | 73/290 (25.2%) | 20/63 (31.7%) |
| History of hayfever | 96/322 (29.8%) | 58/179 (32.4%) | 11/28 (39.2%) | 47/176 (26.7%) | 88/290 (30.3%) | 20/63 (47.6%) |

\*Eczema Area and Severity Index

**Table S2.** Prediction of filaggrin gene loss-of-function mutation (homozygous, compound heterozygous, or heterozygous) for both thenar eminence and palmar images using hyperlinearity scores and age with logistic regression and linear support vector machine classification

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Classifier | Thenar images | | | | Palmar images | | | |
| Accuracy | Sensitivity | Specificity | Area under curve (AUC) | Accuracy | Sensitivity | Specificity | Area under curve (AUC) |
| Logistic regression | 65.6% (±6.4) | 57.7% (±10.5) | 70.9% (±10.3) | 76.9% (±4.5) | 62.7% (±7.8) | 51.5% (±10.1) | 70.3% (±9.8) | 62.8% (±8.8) |
| Support vector machine (linear) | 74.2% (±3.1) | 52.0% (±6.7) | 89.3% (±7.5) | 70.3% (±6.7) | 70.2% (±4.8) | 47.7% (±4.5) | 85.5% (±7.4) | 74.5% (±6.2) |

Presented as percentage (standard deviation)

Average effect size in logistic regression (thenar images): hyperlinearity score (0.00012) age (-0.081)

Average effect size in logistic regression (palmar images): hyperlinearity score (0.000075) age (-0.067)

**Table S3.** Prediction of filaggrin gene loss-of-function mutation (homozygous, compound heterozygous, or heterozygous) for both thenar eminence and palmar images with logistic regression and linear support vector machine classification using expanded variable set (hyperlinearity score, age, sex, Eczema Area and Severity Index (EASI), presence of asthma, presence of hayfever, and presence of food allergy)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Classifier | Thenar images | | | | Palmar images | | | |
| Accuracy | Sensitivity | Specificity | Area under curve (AUC) | Accuracy | Sensitivity | Specificity | Area under curve (AUC) |
| Logistic regression | 72.0% (±7.8) | 57.2% (±11.6) | 81.0% (±10.2) | 74.1% (±10.9) | 64.6% (±9.6) | 46.2% (±12.1) | 76.3% (±8.7) | 63.8% (±12.5) |
| Support vector machine (linear) | 74.8% (±6.3) | 52.7% (±11.9) | 88.8% (±6.1) | 76.8% (±9.6) | 70.5% (±9.2) | 50.4% (±16.1) | 83.4% (±8.1) | 72.6% (±11.1) |

Presented as percentage (standard deviation)

Average effect size in logistic regression (thenar images): hyperlinearity score (0.00018) age (-0.065), sex (-0.62), EASI (-0.0017), history of asthma (0.24), history of food allergy (-0.12),

Average effect size in logistic regression (palmar images): hyperlinearity score (0. 0.000074) age (-0.061), sex (-0.28), EASI (0.0035), history of asthma (0.14), history of food allergy (-0.027), history of hayfever (0.054)