**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) | <15 000  (n=111) | 15 000 –  30 000  (n=378) | >30 000 (n=42) |
| 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) | 9.6 ±6.1  (n=111) | 10.5 ±6.5  (n=378) | 14.0 ±7.7 (n=42) |
| EASI\* | 7.4 ±8.8 (n=324) | 8.9 ±9.8 (n=179) | 12.9 ±11.4 (n=28) | 5.8 ±7.1  (n=111) | 8.3 ±9.3  (n=378) | 13.8 ±12.7 (n=42) |
| IgE level | 6425 ±11954 (n=84) | 6900 ±8137 (n=57) | 6173 ±5236 (n=12) | 8133 ±19966 (n=24) | 5900 ±7002 (n=115) | 9528 ±8831 (n=19) |
| Categorical variables (number/count (%)) | | | | | | |
| Male | 137/324 (42.3%) | 79/178 (44.4%) | 12/28 (46.4%) | 54/111 (48.6%) | 163/377 (44.2%) | 14/42 (33.3%) |
| History of food allergy | 132/323 (40.9%) | 85/179 (47.5%) | 13/28 (46.4%) | 41/111 (36.9%) | 172/377 (45.6%) | 19/42 (45.2%) |
| History of asthma | 77/323 (23.8%) | 44/179 (24.6%) | 13/28 (46.4%) | 23/177 (20.7%) | 95/377 (25.2%) | 16/42 (38.1%) |
| History of hayfever | 96/322 (29.8%) | 58/179 (32.4%) | 11/28 (39.2%) | 21/110 (28.2%) | 113/377 (30.0%) | 21/42 (50.0%) |

\*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 | 74.4% (±3.1) | 52.4% (±6.4) | 89.6% (±7.3) | 76.9% (±9.3) | 70.7% (±5.2) | 48.7% (±5.2) | 70.7% (±5.2) | 74.2% (±6.4) |
| Support vector machine (linear) | 74.4% (±3.1) | 52.0% (±6.7) | 89.3% (±7.5) | 76.9% (±4.5) | 70.4% (±5.0) | 48.1% (±5.3) | 70.4% (±5.0) | 74.3% (±6.3) |

For thenar images, in logistic regression:

* Odds ratio for hyperlinearity score: 7.9 (per 10 000 hyperlinearity score) (95% CI 5.5-14.2)
* Odds ratio for age: 0.96 (95% CI 0.93-1.0)

For palmar images, in logistic regression:

* Odds ratio for hyperlinearity score: 5.8 (per 10 000 hyperlinearity score) (95% CI 4.11-9.73)
* Odds ratio for age: 0.98 (95% CI 0.94-1.0)

**Table S3.** Sensitivity analysis whereexpanded variable set (hyperlinearity score, age, sex, Eczema Area and Severity Index (EASI), presence of asthma, presence of hayfever, and presence of food allergy) is used for 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

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Classifier | Thenar images | | | | Palmar images | | | |
| Accuracy | Sensitivity | Specificity | Area under curve (AUC) | Accuracy | Sensitivity | Specificity | Area under curve (AUC) |
| Logistic regression | 74.8% (±6.3) | 52.3% (±11.9) | 89.1% (±5.9) | 76.6% (±9.7) | 71.0% (±8.4) | 48.7% (±13.3) | 85.1% (±8.8) | 74.3% (±11.5) |
| Support vector machine (linear) | 74.5% (±6.6) | 52.3% (±11.9) | 88.8% (±6.1) | 76.7% (±9.6) | 71.4% (±8.4) | 49.8% (±12.9) | 85.1% (±8.8) | 74.3% (±11.6) |

Presented as percentage (standard deviation)

For thenar images, in logistic regression:

* Odds ratio for hyperlinearity score: 8.8 (per 10 000 hyperlinearity score) (95% CI 5.9-16.0)
* Odds ratio for age: 0.96 (95% CI 0.93-1.0)
* Odds ratio for gender: 0.65 (95% CI 0.40-0.96)
* Odds ratio for EASI: 1.0 (95% CI 0.98-1.02)
* Odds ratio for asthma history: 1.31 (0.77-2.36)
* Odds ratio for food allergy history: 1.12 (0.71-1.77)
* Odds ratio for hayfever history: 0.91 (0.52-1.50)

For palmar images, in logistic regression:

* Odds ratio for hyperlinearity score: 6.3 (per 10 000 hyperlinearity score) (4.43-10.9)
* Odds ratio for age: 0.97 (0.94-1.0)
* Odds ratio for gender: 0.72 (0.46-1.08)
* Odds ratio for EASI: 1.0 (0.98-1.0)
* Odds ratio for asthma history: 1.23 (0.73-2.1)
* Odds ratio for food allergy history: 1.14 (0.73-1.8)
* Odds ratio for hayfever history: 0.97 (0.58-1.6)