Appendix S1.

MATERIALS AND METHODS

This study was approved by the Institutional Review Board of Shinshu University Hospital. Dermoscopic images of LM in 15 children and adolescents (13 Japanese, designated as cases 1–13, and 2 Caucasian, designated as cases 14 and 15) were retrospectively collected and analysed. None of the lesions was believed to be congenital, as none of the parents could recall having similar lesions. With the exception of 3 Japanese adolescents (cases 10–12), all patients were less than 14 years old at first clinic visit. Twelve of the 15 patients returned for regular follow-up, the duration of which ranged from 26.7 to 103.4 months (mean 59.0 months, median 48.0 months; Table SI[1]). As of August 2014, no biopsies had been performed for any of the lesions.

All images were taken with a non-polarized oil-immersion dermoscope and saved in JPEG format. The DI proposed in our previous publication (13) was calculated for each dermoscopic image. The DI represents variegation in colour included in a dermoscopy image of the nail plate. In adult patients, it is known that greater colour variegation in the image is associated with higher suspicion of melanoma. Details of the calculation method have been presented previously. Briefly, each pixel of a colour image contains information on the 3 primary colours, R, G and B, which may be considered as independent variables. Therefore, a 3-dimensional vector consisting of R, G and B as its components was defined as the pixel colour vector. Variegation in a colour image was measured by the variety of directions of pixel colour vectors. The DI was calculated as follows: $\mathbf{p}_i = (R_i, G_i, B_i)$ for the *i*-th pixel in a colour space. To express the direction of $\mathbf{p}_i$ explicitly, we introduce latitude, θ_i, and longitude, ϕ_i, which may be defined as follows:

$$\theta_i = \cos^{-1}\left(\frac{\sqrt{R_i^2 + G_i^2}}{\sqrt{R_i^2 + G_i^2 + B_i^2}}\right), \phi_i = \cos^{-1}\left(\frac{R_i}{\sqrt{R_i^2 + G_i^2}}\right).$$

Here, θ_i and ϕ_i are measured from the plane and from the R axis in the plane, respectively. Throughout this paper, angles are given in units of radians. As the root mean square (RMS) of a set of (ϕ_i, θ_i) represents variation in the direction of $\mathbf{p}_i$, the RMS value is used as a DI. The DI is defined according to the following formula:

$$DI = \sqrt{\frac{1}{N}\sum_{i=1}^{N}\left[\left(\phi_i - \bar{\phi}\right)^2 + \left(\theta_i - \bar{\theta}\right)^2\right]}$$

In calculating the index, we paid special attention to ensuring that the spatial resolution of each image was the same.

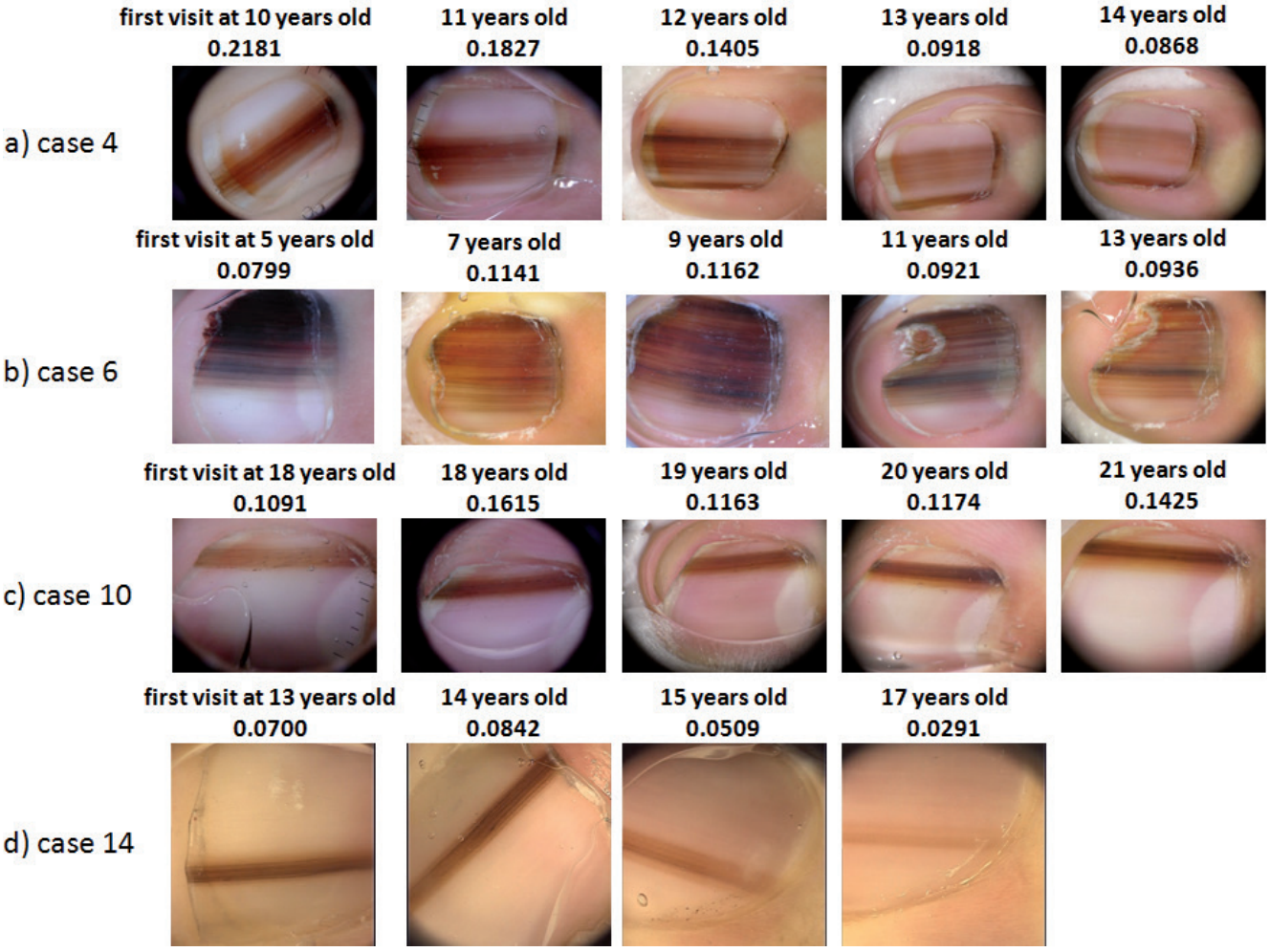

Fig. S1. Changes in dermoscopic features of longitudinal melanonychia (LM) over time in cases (a) 4, (b) 6, (c) 10 and (d) 14. The discrimination index (DI) value at each observation time is also shown. In cases 4 and 6, dermoscopic images showed broad, irregular LM, mimicking that found in nail apparatus melanoma *in situ* in adults. This could cause difficulties in diagnosis. The use of the DI to monitor changes over time provides objective data that can be used to guide diagnosis. (a) Case 4. A 10-year-old Japanese girl presented with light-brown LM of the right fifth fingernail that had been present since the age of 7 years. Although the DI at the first visit far exceeded the threshold value, as she grew older, it decreased steadily, finally reducing to below the threshold value at the age of 13 years. (b) Case 6. A 5-year-old Japanese girl presented with dark-brown LM of the right first fingernail that had been present since she was 2 years old. The DI at the first visit was below the threshold value. Thereafter, it increased to a maximum value far above the threshold before gradually decreasing to a value near the threshold. (c) Case 10. An 18-year-old Japanese boy presented with light-brown LM of the right first fingernail, present since he was 16 years old. The DI fluctuated between observations, but consistently stayed above the threshold value. (d). Case 14. A 13-year-old Swiss boy presented with LM of a fingernail. The DI remained below the threshold, but initially increased before gradually decreasing, showing a pattern of change similar to that of case 6.

Table SI. *Values of discrimination index (DI) derived from dermoscopic images of lesions taken at the first and final visit and the follow-up period*

Case	Sex/race	Location of affected nail	Age at first visit, years	DI at the first (→and final) visit	Follow-up period, months
1	F/J	Right big toe	5	0.1293→0.1233	42.5
2	M/J	Left ring finger	12	0.1157→0.0706	69.6
3	F/J	Right thumb	8	0.0782→0.0566	81.5
4	F/J	Right thumb	10	0.2181→0.0868	46.5
5	M/J	Right big toe	9	0.1012→0.0779	69.7
6	F/J	Left thumb	5	0.0799→0.0936	103.4
7	F/J	Right thumb	5	0.0983→0.1380	41.6
8	F/J	Right thumb	2	0.1509→0.1572	97.7
9	F/J	Left big toe	5	0.0486→0.0622	26.7
10	M/J	Right thumb	18	0.1091→0.1425	33.6
11	F/J	Right thumb	18	0.0848→0.1266	30.6
12	F/J	Right index finger	17	0.0997	–
13	F/J	Left big toe	5	0.1235	–
14	M/C	Unknown finger	13	0.0700→0.0291	48.0
15	M/C	Unknown finger	3	0.0523	–

F: female, M: male, J: Japanese, C: Caucasian.