



Skin sensitivity and barrier recovery of young and aged people in the tape stripping

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Introduction:

As a kind of stimulation for painless, uncontrollable and simulated physiological conditions, tape stripping technique, repeating the steps of tape stripping with the limit of TEWL of 15 g/h·m², is used for studying skin sensitivity. Skin barrier function can be repaired with cell renewal[1].

Age is generally considered to be one of the factors that affect the function of skin barrier. The sensitivity and short-term recovery ability of different age groups to the stripping model, such as skin water content, skin water barrier and skin redness, are different, but the suitable age group for stripping model remains to be proved.

In this study, we used tape stripping technology to break the water barrier and initiate a steady-state repair response. To evaluate the skin barrier function of human skin model, we compared the skin barrier function (skin sensitivity and barrier repair function) between young people (20-30 years old) and the aged (50-60 years old). In addition to the impairment of skin barrier's ability to repair itself, we studied the moisturizer repair function of the young and aged group.

Materials & Methods:

1. Volunteers

22 volunteers were involved in the test and divided into two groups (young and aged). 11 volunteers were involved in young groups (20~29 years old) and 11 volunteers are involved in aged groups (50~59 years old). The study was approved by the local medical ethical committee and conducted according to the Declaration of Helsinki principles.

2. Evaluation methods

1) Baseline measurements are made at each of the test areas. The measurements on day 1, 2, 3, and week 4 were performed at the same time each day to minimize variations.

2) The model of acute skin barrier disruption was established by continuous adhesive tape. Every 3 pieces were waiting for 2 minutes. Water content, transepidermal water loss and redness measurements were determined at every 3 pieces. The gray level of the tape, calculated as the protein removed by tape stripping, was measured. [2]

3) Moisturizer was applied following the usage instruction. Water content, TEWL, skin color of the control area and moisturizer were measured immediately (10 mins) after application, 2 hours after application, 4 hours after application, day 1, day 2 and day 3

4) The volunteers applied the moisturizer to one of the forearms twice a day for four weeks following the usage instruction. After 4 weeks application, the tape stripping was repeated as the first day.

Conclusions:

In the process of barrier disruption, the TEWL/water content of the aged group is lower than that of the young group, while the change of TEWL/water content of the aged group is higher than that of the young group. In addition, the degree of skin redness in the aged group is significantly higher than that in the young. The water content of young group and aged group increases and TEWL decreases after short-term and long-term barrier repair. There are great differences in barrier repair skin parameters between young and old people. The skin sensitivity and barrier recovery rate of moisturizers are different between the young group and the old group. The selection of the young group as a barrier injury model is more suitable for evaluating the effect of moisturizer on improving skin moisture barrier in short-time and long-term repair, while the aged group is more suitable for evaluating the effect of the moisturizer on improving skin redness in short-time repair. The young and aged group are both suitable for studying SC cohesion. These findings indicate that the human skin model can be used for studying skin barrier.

Results & Discussion:

1. Skin sensitivity

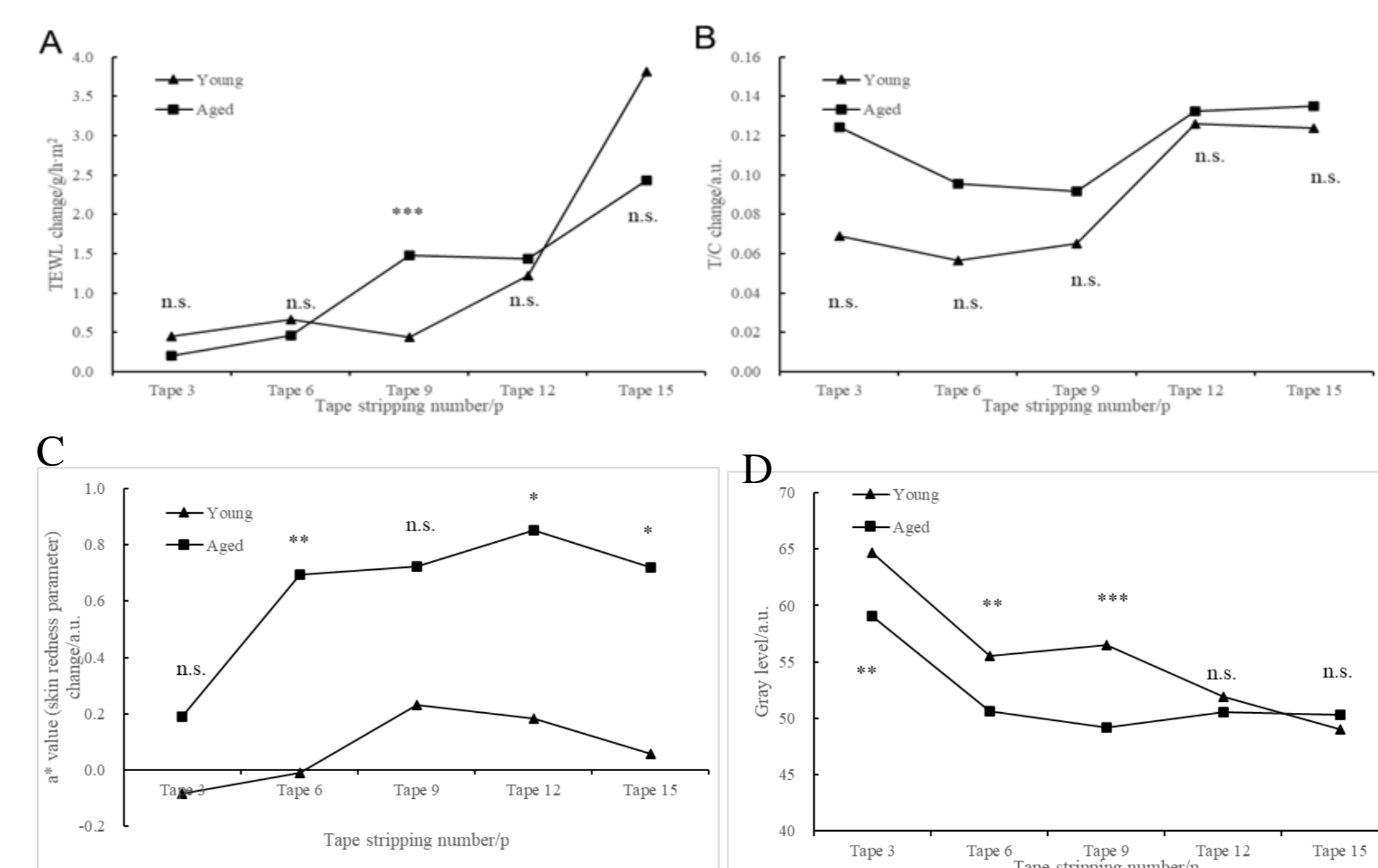


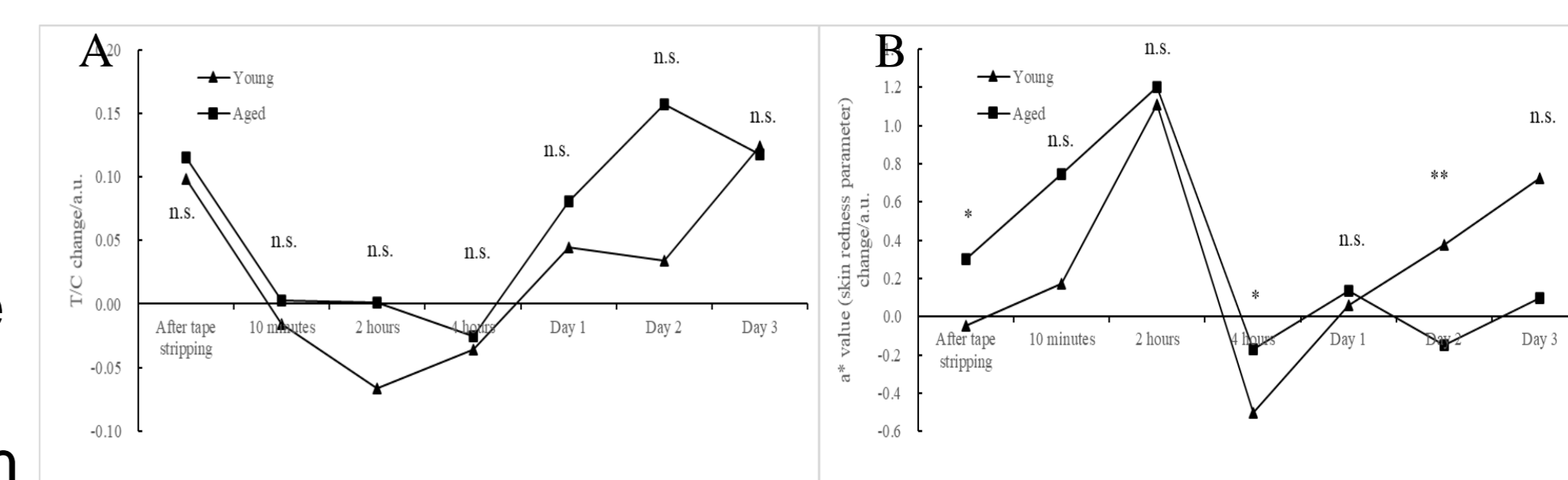
Figure 1 TEWL change (A) , T/C change (B) , a* value change (C) and gray level of the tape (D) following tape stripping

The aged group is more likely to be injured than the young group, and the SC cohesion of the young people is better than aged people.

2. Skin barrier recovery

Figure 2 T/C change (A) and a* change (B) in the young group vs aged group

The barrier impairment of skin barrier's ability of the young group is better than that of the aged group, and the young group is easier to recover from flushing.



3. Moisturizer

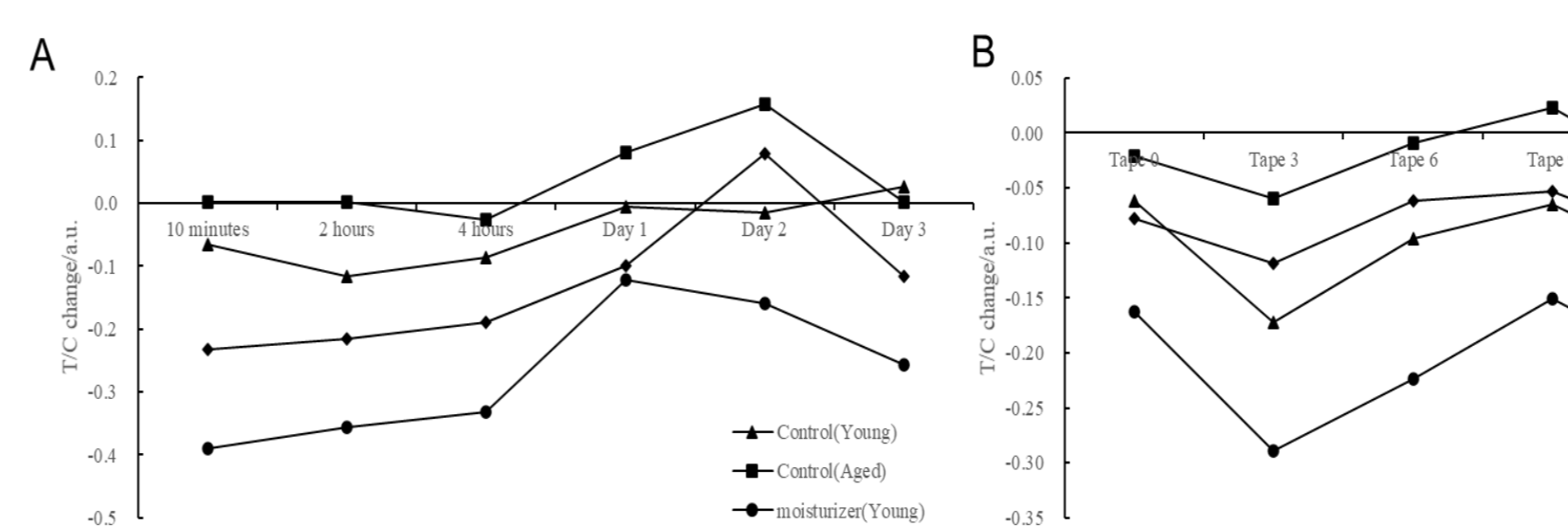


Figure 3 T/C change in the young group vs aged group of short-term repair (A) and long-term repair (B).

The selection of the young group as a barrier injury model is more suitable for evaluating the effect of moisturizer on improving skin moisture barrier

Figure 4 a* change in the young group vs aged group of short-term repair

The aged group is more suitable for evaluating the effect of the moisturizer on improving skin redness.

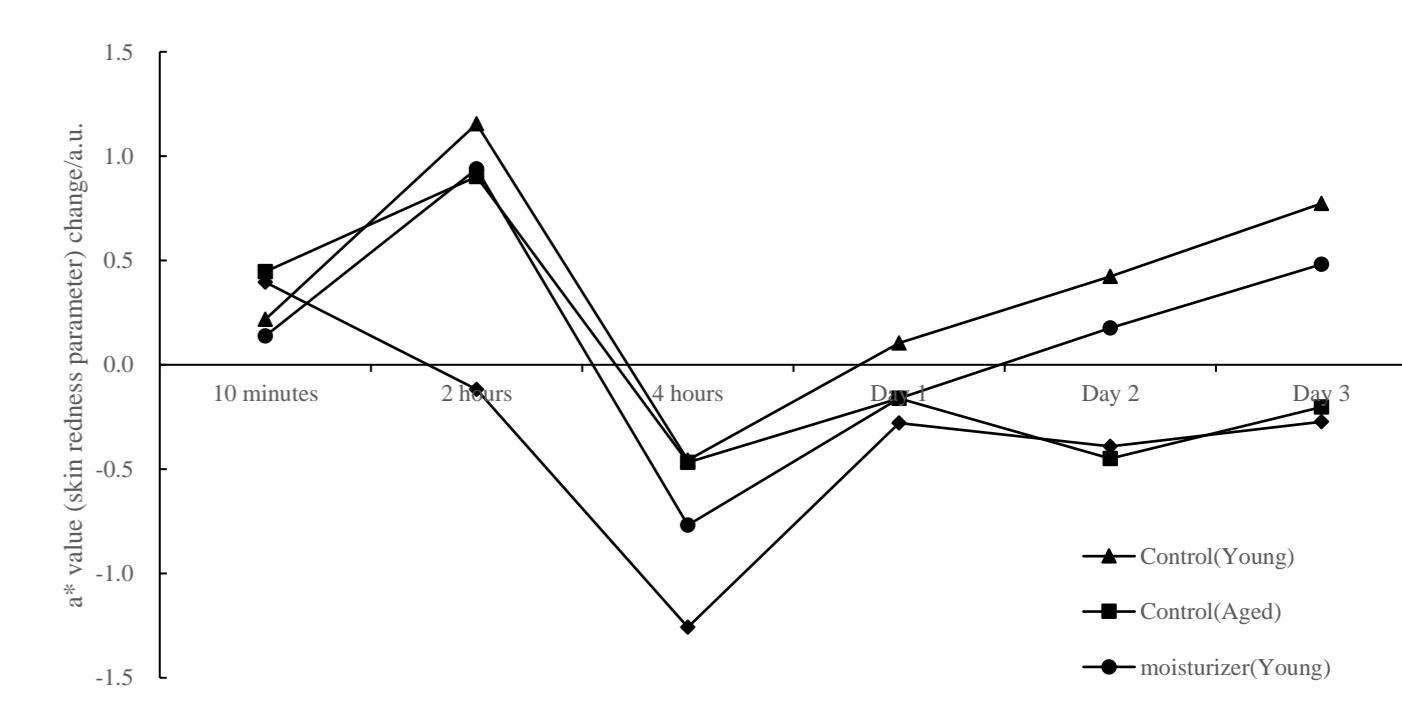


Table 1 Barrier recovery

| Barrier recovery % | Control(Young) | Control(Aged) | Moisturizer(Young) | Moisturizer(Aged) |
|--------------------|----------------|---------------|--------------------|-------------------|
| 10 minutes | 115.73 | 97.45 | 366.06 | 289.99 |
| 2 hours | 167.53 | 98.82 | 341.54 | 276.67 |
| 4 hours | 136.13 | 121.96 | 323.83 | 254.3 |
| Day 1 | 54.65 | 30.26 | 170.48 | 181.36 |
| Day 2 | 65.14 | -35.95 | 198.08 | 36.02 |
| Day 3 | -26.14 | -2.02 | 187.35 | 94.73 |
| 4 weeks | 162.86 | 117.93 | 218.66 | 164.03 |

There are great differences in barrier repair skin parameters between young and aged people. Whether in the process of short-term or long-term repair, the ability of barrier repair of young people is better than that of the aged group with/without treatment.

Aknowledgments:

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References:

[1] Pinkus H (1952) Examination of the Epidermis by the Strip Method: II. Biometric Data on Regeneration of the Human Epidermis - ScienceDirect. Journal of Investigative Dermatology 19(6):431-447.
 [2] Rawlings, A. V , Voegeli, et al. (2015) Human facial skin pigmentation is not related to stratum corneum barrier integrity and cohesion. International Journal of Cosmetic Science.,