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The Composition of Antiaging Scales for Facial Rejuvenation: Assessed with Artificial Intelligence

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Facial rejuvenation is usually patient-driven. Assessing the efficacy of these procedures is complex, with various subjective perceptions, leading to an obstacle for communicating between patients and physicians. We had designed four angular and six linear parameters for objective measurements. The four angles, consisting of one mobile point and two static points in each, are the eyebrow-peak, eyebrow-tail, pupil-eyebrow peak, and canthus-oral-nasal angles.[1,2] The deviation values postprocedure for each range from −10 to +10 degrees. Four linear lengths are used to describe the aging of periocular region: eyebrow–orbital, orbital–upper eyelid, vertical palpebral fissure, and eyebrow–iris lengths, which change rather subtly with the range from −3 mm to +3 mm. The remaining two linear lengths, tragus–oral and lower facial contouring lengths, indicate the aging or rejuvenation of the lower face with the deviation postprocedure ranging from −10 mm to +10 mm based on our previous experiences. (**See table, Supplemental Digital Content 1**, which shows the antiaging scale system. Index 5 is identified as "neutral" or "no significant changes." The total score for the entire face is 100. Scores lower or higher than 50 suggest "aging or rejuvenation respectively." °: degree; mm: millimeter, **http://links.lww.com/PRSGO/C656**.)

The range of maximal deviation postprocedure was established for each of the 10 measurements and was divided into 11 categories with equal intervals. The middle score is 5, which is situated across the deviation-zero, representing "no change" or "neutrality." Score 0 and score 10 are the categories with maximal deviation representing either aging or rejuvenation. Following the sequences, we score the aging categories as 1–4 and rejuvenation as 6–9, respectively. We summarize the scores from each of the

10 measurements for composition of the antiaging scales ranging from 0 to 100.
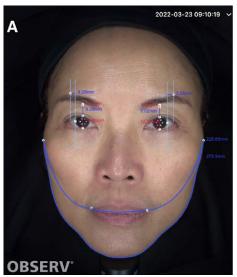
We applied the antiaging scales to a 54-year-old patient, whose standardized imaging facial photographs (OBSERV520x, Taiwan) were obtained 2 years ago without receiving any procedures, before (day 0), and 28 days after undergoing high-intensity focused ultrasound (HIFU) treatment (Fig. 1). (**See figure, Supplemental Digital Content 2**, which shows comparison photographs of a 54-year-old woman that show biological aging without aesthetic treatment. (2a) A photograph taken 2 years before the HIFU-treatment compared with (2b) a photograph taken 1 year before the HIFU. The antiaging scale was 46 points; aging was noted after 1 year. Standardized photography was taken and analyzed by OBSERV520x, Taoyuan, Taiwan, **http://links.lww.com/PRSGO/C657**.)

By assessing the metrics, the antiaging scales before the aesthetic procedure (day 0) in comparison of 2 years prior were 46 (**See figure, Supplemental Digital Content 2**, which shows comparison photographs of a 54-year-old woman that show biological aging without aesthetic treatment. (2a) A photograph taken 2 years before the HIFU-treatment compared with (2b) a photograph taken 1 year before the HIFU. The antiaging scale was 46 points; aging was noted after 1 year. Standardized photography was taken and analyzed by OBSERV520x, Taoyuan, Taiwan, **http://links.lww.com/PRSGO/C657**.), indicating the neutral aging process. Facial rejuvenation effects were clearly identified post-HIFU treatment from the artificial intelligence integrated image system. Antiaging scales between day 0 and day 28 after treatment were elevated to 53 (Fig. 1).

Our antiaging scales provided formative and comprehensive information for both patients and physicians. Rather than limiting the assessment of aesthetic efficacy to localized landmarks or regions,[3,4] we provide an objective, precise, and comprehensive evaluation of entire facial features posttreatment. Once the photographs were processed with the artificial intelligence–assisted standardized software filming system (OBSERV520x, Taiwan), the specific landmarks could be immediately and accurately identified for angle and length measurements and the

Disclosure statements are at the end of this article, following the correspondence information.

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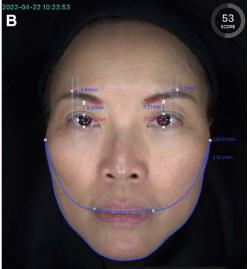
Fig. 1. Comparison photographs of a 54-year-old woman that show facial rejuvenation after 1 course of HIFU treatment. A, Photograph taken on day 0 pre-HIFU treatment compared with (B) 28 days post-HIFU treatment. The antiaging scale was 53 points, suggesting posttreatment rejuvenation. Standardized photography was taken and analyzed by (OBSERV520x, Taoyuan, Taiwan).

scales. Moreover, this scale can facilitate cohort studies of various aesthetic treatments, once continuingly inputting the antiaging profiles at any time from postprocedure. This system is currently limited by the small database, as it is not widely used for other aesthetic surgical procedures. Further clinical studies are required to validate the application.

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DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

PATIENT CONSENT

The patient provided written consent for the use of her image.

REFERENCES

1. Tsai LC, Lin ET, Chang CC, et al. Quantitative and objective measurements of facial aging process with anatomical landmarks. *J Cosmet Dermatol*. 2022;21:1317–1320.
2. Lio ML, Chang CC, Chuang AD, et al. Quantified facial rejuvenation utilizing high intense focus ultrasound with multiple penetrative depths. *Clin Cosmet Investig Dermatol*. 2022;15:489–496.
3. Hersant B, Abbou R, SidAhmed-Mezi M, et al. Assessment tools for facial rejuvenation treatment: a review. *Aesthetic Plast Surg*. 2016;40:556–565.
4. Alam M, White LE, Martin N, et al. Ultrasound tightening of facial and neck skin: a rater-blinded prospective cohort study. *J Am Acad Dermatol*. 2010;62:262–269.