THE INFLUENCE OF FACIAL EXPRESSION ON THE AGE-DEPENDENT CHANGES IN FACIAL WRINKLING

G G Hillebrand and K Miyamoto
P&G Beauty, Kobe, Japan

INTRODUCTION

Facial expressions cause the skin to repeatedly fold and crease in the same location. With age, these dynamic expression wrinkles progress into persistent wrinkles visible without expression. Despite the essential role facial expression plays in the evolution of facial wrinkling, little has been done to understand the temporal relationship between dynamic and persistent wrinkles.

OBJECTIVE

The purpose of this work was to characterize the influence of facial expression on the age-dependent changes in facial wrinkling using objective measures in a cross-sectional population survey. We also set out to develop novel clinical test protocols and methods that leverage dynamic wrinkling to best evaluate the acute and chronic wrinkle reduction efficacy of topical treatments.

METHODS

Digital images of 452 Chinese females (age 10 to 70) living in Beijing, China were collected with and without a smiling expression (Figure 1). Wrinkles around the eye and on the cheek were objectively quantified with commercial (VISIA) image analysis software. For the clinical efficacy studies, the wrinkle reduction efficacy of an acute (n=10) or chronic (n=100) topical treatment was assessed with and without smiling (Figure 2).

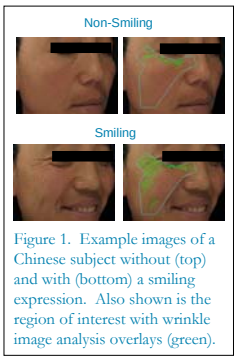

Figure 1. Example images of a Chinese subject without (top) and with (bottom) a smiling expression. Also shown is the region of interest with wrinkle image analysis overlays (green).

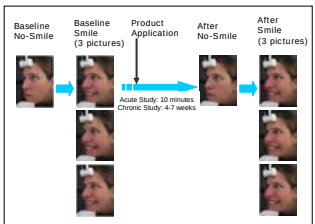

Figure 2. General protocol for measuring the efficacy for treating dynamic and persistent facial wrinkling. Since images with smiling are not as reproducible as non-smiling, the average wrinkling of the three smiling images is used for statistical analysis.

RESULTS

Figure 3 shows facial wrinkling with and without smiling in each 10-year age group. Temporary facial wrinkling (observed with smiling) begins to show in the 20's when there is little if any visible persistent wrinkling (observed without smiling). Persistent wrinkling begins to show in the 30's. There is a 10-15 year lag between dynamic and persistent wrinkling.

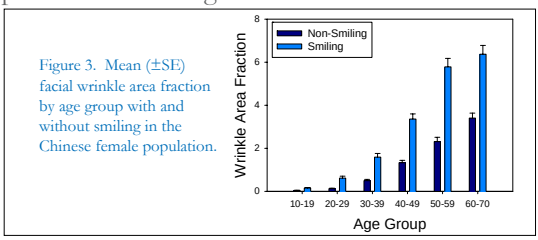

Figure 3. Mean (±SE) facial wrinkle area fraction by age group with and without smiling in the Chinese female population.

Figure 4 shows the effect of a single moisturizer treatment on reducing the appearance of facial wrinkles. There was no detectable effect of the moisturizer on facial wrinkling when measured without smiling (persistent wrinkling). However, with smiling, a significant 11% reduction in the appearance of facial wrinkles was observed.

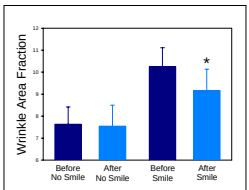

Figure 4. Change in facial wrinkling before and 10 minutes after a single application of a commercial facial moisturizer. *Significantly ($p<0.01$) different than "Before Smile".

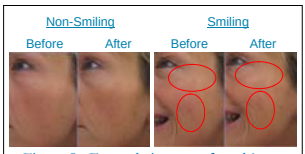

Figure 5. Example images of a subject before and 10 minutes after moisturizer treatment without smiling (left two images) and with smiling (right two images). The red circled areas highlight regions of the face most noticeably affected by the moisturizer treatment.

Figure 5 shows the reduction in facial wrinkling after acute moisturization is clearly visible when the subject smiles.

Figure 6 shows facial wrinkling before and 7 weeks after twice-a-day use of a skin care regimen (cleanser, essence and moisturizer). Improvement in facial wrinkling was observed both without and with a smiling expression. The magnitude of improvement was more apparent with expression.

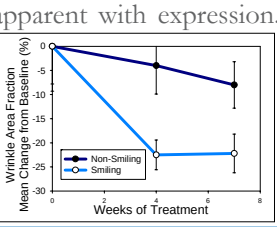

Figure 6. Percent change from baseline in facial wrinkling with and without facial expression (smiling) during 7 weeks use of a skin care regimen containing yeast fermented filtrate (Pitera®). Error bars are standard error.

CONCLUSIONS

- The onset of dynamic wrinkling (eye/cheek area) precedes that of persistent wrinkling by 10-15 years.
- The sensitivity for detecting changes in facial wrinkling can be improved by measuring dynamic wrinkles in addition to persistent wrinkles.
- Acute moisturizer treatments may be more effective for reducing dynamic wrinkles while chronic treatments can provide benefits for both persistent and dynamic wrinkling.

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