QUANTIFICATION OF THE “PERCEIVED AGE” OF A FACE BY IMAGE ANALYSIS ON CALIBRATED PHOTOGRAPHS

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INTRODUCTION

Lot of researches and works were performed to innovate in the biometry of the skin to demonstrated, objectively, the action of treatment of active molecule onto the skin. Over the confirmation of their activities, the most important objective for the dermo-cosmetology remains that this effect is perceived by the user of these skin care products. In consequence, we developed for many years some new approaches by image analysis of standardized photographs to quantify the perception of the effect of the cosmetic product, mainly on the face signs of the ageing : wrinkles an heterogeneity of the pigmentation. These analyses on a large number of subjects allowed to defined various parameters as the “Age equivalent” and “Visibility index of wrinkles” based on a database containing more than 2000 women.

MATERIALS & METHODS

Acquisitions images : Professional Nikon camera on a dedicated bench with polarized Xenon flashes and standardized positioning of the head of subjects (HeadScan or Dynamics benches, OrientechnoLab, France). Acquisitions were performed in Crossed and Parallel polarized lighting.

Quantification of wrinkles on calibrated photographs:
- On crow’s feet, forehead, peri-ocular, wrinkles.
- Backgroung correction of grey levels gradients (LF)
- Definition of mask of wrinkles
- Calculation of their density, surface, number. Calculation of the «Visibility of wrinkle Index» and «Equivalent Age of the Skin» from these parameters.

Quantification of the Pigmentation heterogeneity:
- Calculation of the « Pigmentary image » (pigmentation only)
- Backgroung correction of grey levels gradients (LF)
- Detection hyperpigmented area (3 levels of density vs skin)
- Calculation of parameters : number of « spots » or macula, average size, occupancy rate, contrast vs surrounding skin, density of pigmentation, global heterogeneity (Haralick algorithms). Calculation of the corresponding «Equivalent Age of the Skin» from these parameters and the database.

A correlation with the clinical evaluation of the age of the skin was studied on a panel of 44 caucasian women, aged from 22 and 69 years. Two trained clinicians evaluated the age of the subjects from signs of ageing onto the face (Mainly wrinkles and pigmentation heterogeneity). Scores and parameters quantified from photographs were compared.

RESULTS

This work allowed to determine with a high accuracy, some new parameters correlated to the clinical evaluation and perception : “Age equivalent” calculated from the heterogeneity of the pigmentation and the “visibility of the wrinkles”. These parameters were calculated directly from quantitative information extracted from native or reconstructed images. The correlation with the clinical evaluation reached 0.91. Of course the « Perceived age » do not correspond to the real age of te subject depending to her level of the photo ageing. (See table1)

CONCLUSION - DISCUSSION

Based on this database and the statistical relationship between the objective quantification of the ageing signs extracted from calibrated photographs, we can obtain other parameters directly linked to the appearance and the clinical perception of the quality of face. This methodology is currently in progress to define the skin complexion and radiance by the calibrated image analysis.