

Skin ageing and wrinkles: clinical and photographic scoring

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Summary

Sunlight induces clinical, histological and physiological changes in the skin that are known as photoageing. As the population ages, prevention and treatment of photoageing is a growing challenge because of its association with skin cancer as well as for cosmetic reasons. Therefore, it is of interest to assess the degrees of photoageing by developing valid and comprehensive grading systems. Several different methods have been proposed. These include descriptive grading scales, visual analogue scales and photographic grading scales. The merits and inconveniences of these different approaches are discussed.

Keywords: clinical grading systems, photoageing, skin, wrinkle formation

Introduction

A variety of factors are involved in the process of skin ageing. Photodamage is the main component, although other sources, e.g. cigarette smoking, aggravate the histological and clinical changes in skin ageing.¹⁻⁴ These risk factors contribute to extrinsic ageing as an additive process to intrinsic or rather chronologic cutaneous ageing.^{5,6} Photodamaged skin is prone to skin cancer. Moreover, public awareness grows as the population ages. This increases the medical and cosmetic demand for prevention and treatment options which rely on proper assessment and evaluation of the underlying skin changes. Although the criteria for clinical evaluation are difficult to quantify objectively, efforts to establish a standardized, quantitative method would be of great value in assessing photoageing and clinical follow-up of patients over a longer period. In addition, the quality of epidemiologic and clinical studies on photodamage, categorizing groups and studying the efficacy of skin repair agents would improve, respectively.⁷⁻⁹

Evaluating photodamage

Noninvasive and invasive techniques such as histological, instrumental and biochemical tests have been developed to assess photoageing.¹⁰⁻¹² Structural skin changes have been visualized preferably by histology or by ultrasound techniques. Moreover, a variety of mechanical measurements have been applied to evaluate the skin profile, attempting to overcome regional variations and complexity.^{11,13} The most expenditure of technical equipment is made in computerized image-analysis methods.^{10,14,15} Although computerized digital image processing is highly accurate in measuring fine and coarse wrinkles, the method is not suitable for routine use. The glucose-6-phosphate dehydrogenase (G6PDH) reaction in the granular cell layer of the epidermis has been used as a biochemical indicator of photodamage.^{16,17} Invasive techniques, however, are not always practical as a significant amount of tissue is needed for serial measurements.

Several clinical grading systems for evaluating the severity of photodamage visually have been introduced. To assign a clinical score, characteristic macroscopic lesion types have to be defined first. The overall appearance of photodamage is composed of a combination of various changes. Intrinsic ageing is recognized by characteristic signs, such as fine and coarse wrinkles, cherry haemangiomas, benign growth and seborrhoeic keratoses. Roughness,

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Table 1 Johnson's wrinkling scale. A descriptive scale (according to the R. W. Johnson Pharmaceutical Research Institute, Raritan, N⁷) Each variable is assessed and the category of photodamage selected according to overall severity (0 = none, 1–3 = mild, 4–6 = moderate, 7–9 = severe).

Signs	Description
1 Fine wrinkling	Number and depth of superficial wrinkles; fine wrinkles typically appear in periorbital and perioral regions and are usually found further from the eyes and mouth than coarse wrinkles
2 Coarse wrinkling	Number and depth of coarse wrinkles; coarse wrinkles appear on the forehead, glabella, chin, nasolabial and periorbital areas and tend to be located closer to the eyes and mouth than fine wrinkles
3 Mottled hyperpigmentation	Light, patchy, mottled hyperpigmentation and solar freckling (including melasma) based on quantitative and qualitative criteria such as the area/density of pigment, colour intensity, and uniformity of distribution; lentigines, naevi, and other pigmented lesions are not to be included
4 Yellowing (sallowness)	Colour tone from very pink or rosy to very sallow or pale

Table 2 Weiss's photodamage grading. A descriptive scale with photographic examples (according to Weiss *et al.*).²⁰

Grade	Manifestation of photodamage
1	Mild photoageing with fine wrinkling of the facial skin
2	Moderate photoageing with fine and coarse wrinkling and some hyperpigmentation of the facial skin
3	Severe photoageing with fine and coarse wrinkling, sallowness and some hyperpigmentation of the facial skin

sallowness, hyper and hypopigmentation, purpura and telangiectasia also indicate photodamage.^{18,19} In general, fine wrinkles, coarse wrinkles and hyperpigmentation are considered the most striking clinical changes of photoageing. Therefore Weiss *et al.* suggested including at least these three parameters in a clinical grading scheme.²⁰

Clinical scoring systems are technically the easiest to perform and therefore of special value in practice. However, it is difficult to assess and interpret objectively the clinical significance of even characteristic lesions. Criteria such as interobserver agreement and intraobserver repeatability affect the quality of a scoring system and have to be considered.^{21,22}

In general descriptive grading scales, visual analogue scales and photographic grading scales have all been described. Descriptive grading scales have been extensively used in clinical assessment and in the evaluation of photoageing (Table 1, Table 2). Each grade is defined by a descriptive phrase characterizing the clinical status.^{7,20,23} Although these fixed-interval grading scales offer a clear evaluation scheme, intervals are nonequal and interpretation may not be reproducible. In visual-analogue scales a defined cm-interval scale is proposed to estimate the clinical state subjectively. This scaling system has proved surprisingly reproducible and much more sensitive than descriptive grading scales.¹¹ Lever *et al.*²⁴ scored the signs of photoageing on 0–10 visual-analogue scales with separate scores for each side of the face and each hand (Table 3). Analogous to prior acne assessments,⁸ stand-

Table 3 Lever's visual analogue scale is assessed on each side of the face and each hand (according to Lever *et al.*).²⁴

Scale	Manifestation of photodamage
1–10	Fine wrinkling around eyes
1–10	Crease lines around mouth and cheeks
1–10	Wrinkling on dorsum of hands
1–10	Yellow discoloration

ardized photographs have been used in the grading of photodamage.^{7,25} Larnier *et al.*²⁵ developed a six-point photographic scale to assess photodamage severity. Each of the six grades is illustrated by three standardized photographs of representative photodamage. Each series gives an overall impression of a severity grade and consists of a composite of independently variable elements (e.g. wrinkles, pigmentation). According to the literature, photonumeric grading is regarded superior to descriptive scales, as interobserver agreement could be demonstrated to be significantly higher in photonumeric than in descriptive assessment while repeatability was similar.⁷ However, the technical requirements in adequate lighting conditions, patient positioning and standardization of quality photographs are high and special equipment is needed.⁷

A standardized grading system of skin photodamage has to consider the differences of Caucasian, Asian and

African skin condition. Visible signs of ageing may differ. While wrinkling and coarseness are common features of photoageing in Caucasian skin, they used to be less apparent in Asians. Mottled hyperpigmentation can be an early and prominent expression of cutaneous damage instead.^{7,26,27}

Discussion

Despite the variety of published scoring and scaling systems for assessing photodamage, none has become established as the standard.^{9,28} The aim remains an easy to use and visually accessible scoring system for daily purposes.^{10,15,20} Although clinical grading scales do not entirely overcome subjectivity,²⁵ a series of photographs defining certain degrees of photodamage through a diversity of appearances as well as the combination of both photographic and descriptive scales might be an option to evaluate cutaneous ageing more accurately.²³ Different ethnic types need to be considered when developing an overall grading scale for photoageing.

Conclusions

Photoageing lends itself to being assessed by a photographically-based grading scale.

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