

Elderly and sun-affected skin

Distinguishing between changes caused by aging and changes caused by habitual exposure to sun

Robert Jackson, MD, FRCPC

abstract

OBJECTIVE To review and distinguish between skin changes produced by aging and changes produced by habitual exposure to sun.

QUALITY OF EVIDENCE The literature was searched from 1969 to 1999 for articles on dermatoheliosis and sun-damaged skin. Surprisingly few were found comparing the difference between elderly skin and sun-damaged skin. A few articles focused on certain small aspects of sun-damaged skin. Many excellent articles described particular changes (eg, actinic keratosis), but few covered all the changes due to aging and to sun.

MAIN MESSAGE Skin changes due to aging can be distinguished from those due to sun damage. All changes due to sun exposure can be grouped under the term dermatoheliosis; five parts of the skin are involved: epidermis (actinic keratosis), dermis (solar elastosis), blood vessels (telangiectasia), sebaceous glands (solar comedones), and melanocytes (diffuse or mottled brown patches). Habitual exposure to sun and a white skin are prerequisites for developing these changes. Knowing the difference between changes caused by sun and by aging can help physicians predict which patients are most likely to get skin cancers.

CONCLUSION Knowledge of these common skin changes will help physicians diagnose and manage the skin abnormalities of elderly people and of people with dermatoheliosis.

résumé

OBJECTIF Examiner et différencier les changements dermatologiques produits par le vieillissement et ceux causés par une exposition habituelle au soleil.

QUALITÉ DES DONNÉES Une recension a été effectuée dans les ouvrages scientifiques entre 1969 et 1999 pour cerner des articles portant sur la dermatohéliose et la peau endommagée par le soleil. Il est étonnant de constater le nombre restreint d'articles trouvés par rapport à ceux comparant la différence entre le vieillissement de la peau à cause de l'âge et celui attribuable au soleil. Quelques articles se concentraient sur des aspects très restreints des dommages causés à la peau par le soleil. Plusieurs excellents articles décrivaient des changements particuliers (comme la kératose sénile), mais très peu parlaient de tous les changements associés au vieillissement et au soleil.

PRINCIPAL MESSAGE Il est possible de distinguer le vieillissement de la peau causé par l'âge et celui attribuable au soleil. On peut regrouper tous les changements causés par l'exposition au soleil sous le terme de dermatohéliose; cinq couches de la peau sont en cause: l'épiderme (la kératose sénile), le derme (l'élastorrhexie solaire), les vaisseaux sanguins (la télangiectasie), les glandes sébacées (les comédons solaires) et les mélanocytes (les taches brunes diffuses ou précises). Une exposition coutumière au soleil et une peau blanche sont des conditions préalables à la survenance de tels changements. Il est utile aux médecins de connaître la différence entre le vieillissement de la peau causé par l'âge et par le soleil pour identifier les patients davantage susceptibles de développer un cancer de la peau.

CONCLUSION Les connaissances entourant ces changements dermatologiques fréquents peuvent aider les médecins à diagnostiquer et à prendre en charge les anomalies de la peau chez les personnes âgées et chez celles présentant une dermatohéliose.

This article has been peer reviewed.

Cet article a fait l'objet d'une évaluation externe.

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People with fair complexions, particularly in the more affluent parts of the world, now expose themselves much more to the sun than they did 50 years ago. There are many reasons for this. People are living longer; they are healthier, which allows them to participate in more outdoor activities; they have more money to spend on recreational activities and travel to sunny climates; and, when they get to the tropics, they wear less protective clothing. Also, in recent years, the ozone layer has been greatly depleted.

The sequelae of sun exposure are both cosmetic and medical. Cosmetic changes include leathery skin, increased wrinkling, and reddening. By 50 years old, people can be severely cosmetically damaged. Medical changes include more frequent development of melanoma and nonmelanoma skin cancer, development of innumerable keratoses of various sorts, and the tendency of sun-damaged skin to get more easily irritated and bruised. Both types of sequelae are much more frequent and severe in those who are immunosuppressed. Sequelae can be ameliorated by covering agents, such as clothes, wide-brimmed hats, umbrellas, and sunscreens, and by reducing exposure to the sun between 10:00 and 15:00 hours.

Quality of evidence

A MEDLINE search from 1986 to 1999 using the term "dermatoheliosis" turned up 11 articles; only one is relevant to this paper. Under the term "sun-damaged skin," a search from 1969 to 1999 found 244 citations. These report on treatment, histopathologic features, and investigations. Many deal with the skin cancers that form on sun-damaged skin.

MEDLINE literature on detailed comparisons between the clinical finding of sun-damaged skin and normal aging skin is sparse. Some of the most informative papers were not in indexed journals, and many were written before electronic recording. Few articles of note focused on specific aspects of the various clinical patterns.

For 40 years I have been following the effects of sun on the skin of my patients. The literature I have used to keep up-to-date has come from a wide spectrum of journals. No one source has been more useful than another. Articles I recommend¹⁻⁷ contain detailed information on all clinical findings; references to articles dealing with specific conditions can be found in my article entitled "Solar and senile skin. Changes caused by aging and habitual exposure to the sun."⁸

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Dr Jackson is a Professor Emeritus at the University of Ottawa in Ontario.

Background

A century ago, it was considered vulgar by the middle and upper socioeconomic classes to have sun-tanned skin. Bodies were covered, and hats were worn to prevent sun damage. The only people who showed the effects of habitual exposure to the sun were outdoor manual workers.

After World War II, all this changed. Starting in the late 1940s, society decided that tanned skin looked healthy. The healthy tanned look was considered socially desirable. As a result, skin changes from habitual exposure to sunlight are now more common and more extensive and appear at an earlier age than they did in the 1940s. Elderly people now seldom exhibit skin changes associated solely with aging; some changes have been caused by habitual exposure to the sun.

Assumptions for this paper

The term elderly will be used to refer to people 60 years old and older. Habitual exposure to sunlight means frequent day-to-day exposure continuing over many years. Such exposure can result from an outdoor occupation (farmer, rancher) or, more likely now, from recreational activities. Exposure is greater on some days than others and is usually greater in areas with sunny climates, such as Texas or Australia. People with very fair skin living in these areas could develop sun damage at an early age.

Among white people, sun damage is most extensive in those with blue or green eyes, blond or red hair, and fair complexions, features that are often characteristic of people of northern European, Irish, or Scottish ancestry. These people have skin types I and II (**Table 1**). Although skin types V and VI show some sun damage histologically, in most cases, damage is minor and clinically unapparent. Because white people usually consider sun damage in estimating age, the lack of changes is probably one of the reasons many white people have difficulty judging the age of non-whites.

Table 2 lists changes seen in chronically sun-damaged skin. These changes have been given many names. The best overall term is dermatoheliosis.

Effects of sun damage

Epidermis. By the time a person reaches age 60, the epidermis has undergone a general thinning (**Figure 1**). This is especially noticeable on the backs of the hands, where prominent blue veins and yellow tendons can be seen through the semitranslucent skin.

In habitually sun-exposed skin, numerous sharply demarcated, irregular, maplike thickenings of the

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Table 1. Skin types and propensity for developing dermatoheliosis

SKIN TYPE	REACTION TO SUN	ABILITY TO TAN	HAIR AND EYE COLOURING
I	Always burns	Rarely tans	Red-blond; blue
II	Sometimes burns	Sometimes tans	Fair; blue, green, or hazel
III	Rarely burns	Always tans	Light brown; brown
IV	Never burns	Always tans	Black or dark brown; brown
V	Never burns	Moderately darkens (eg, Mongoloid races)	Black; dark brown
VI	Never burns	Slightly darkens (eg, Negro races)	Black; dark brown

Figure 1. Thin, inelastic skin of an elderly person: A) Back of the hand, B) Forearm.

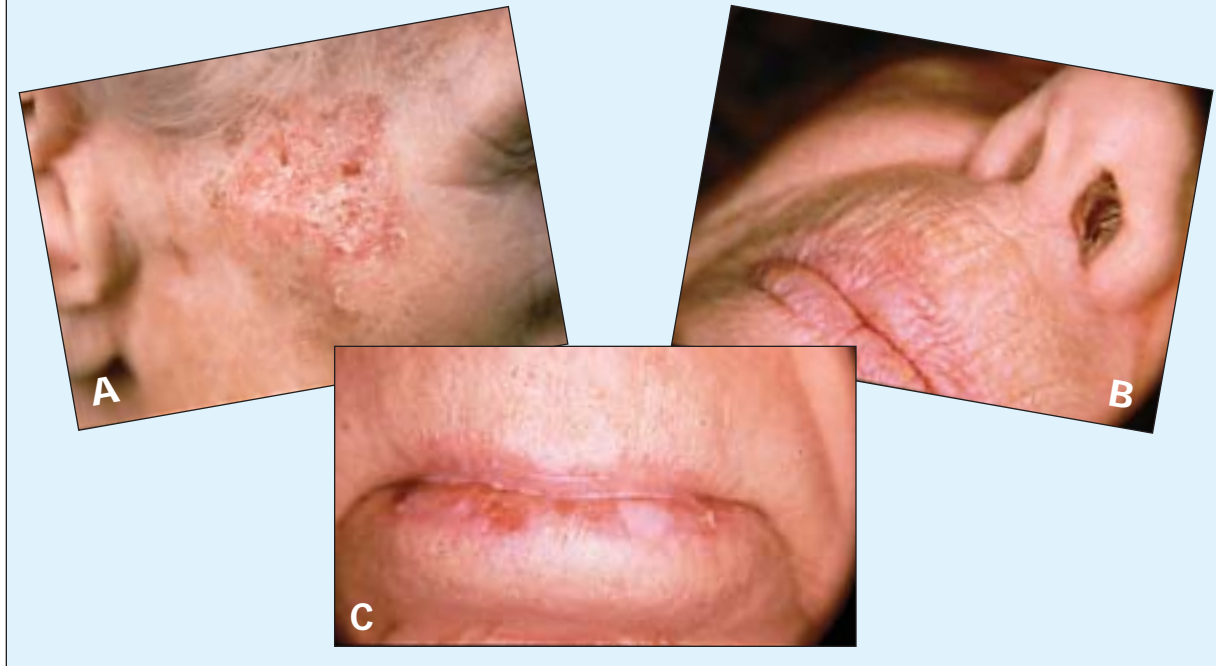


Table 2. Clinical findings in skin due to aging and to habitual exposure to sun

STRUCTURE	ELDERLY SKIN	CHRONICALLY SUN-DAMAGED SKIN
Epidermis	Thin	Keratosis <ul style="list-style-type: none"> • Solar (actinic) • Cheilitis • Disseminated superficial actinic porokeratosis
Dermis	Thin, inelastic, wrinkled	Yellowish-brown dotted or plaquelike thickening (solar elastosis) Pseudocicatrix Elastotic nodules of the pinna
Hypoderm	Fold formation	None
Blood vessels	Cherry angiomas, venous lakes	Diffuse telangiectasia, erythema, brown pigmentation on side of neck, Bateman's (solar) purpura
Melanocytes	"Solar" lentigo (flat seborrheic keratosis)	Mottled irregular areas of hypopigmentation and hyperpigmentation Brown solar keratosis
Hair	Gray, alopecia	None
Sebaceous glands	Senile sebaceous hyperplasia	Solar comedones, nodular cutaneous elastoides
Eccrine glands	Dry skin	None
Nails	Splitting into layers distally (onychoschizia) Linear striations (onychorrhexis) Onychogryphosis	None

horny layer are common (**Figure 2**). These horny thickenings (solar or actinic keratosis) vary from having an atrophic, telangiectatic, slightly scaly surface to having a thick central keratotic horn. Lesions are always more easily felt than seen. Scale is extremely adherent; forced removal will cause bleeding from small capillaries. Sometimes, large areas of sun-exposed skin (eg, on the cheeks) are involved in this keratotic process. Severe changes can be seen on pates that have been bald for a long time, and the lower vermilion lip often shows wrinkling, scaliness, and fissuring.

Figure 2. Solar or actinic keratosis: A) Malar area, B) Upper lip at junction of vermilion border, and C) Lower vermilion lip.



Disseminated superficial actinic porokeratosis (**Figure 3**) is characterized by a smooth somewhat depressed area surrounded by a slightly raised, hyperkeratotic, sharply defined ridge. This condition occurs only on sun-exposed areas of the body and is particularly common on the anterior portion of women's legs.

Dermis. Elderly people's skin is thin and inelastic and has decreased tone. Excessive wrinkling on the forehead, around the eyes (especially the lateral angles), around the mouth, and on the cheeks and

neck can result in dermatochalasis, where the skin hangs in folds (**Figures 4** and **5**) and the lips become thin and their vermilion areas small.

Changes brought about by sunlight are thickening, excessive pebbling, corrugation, wrinkling, and coarse rhomboidal cross-hatching, with flattening of the intervening skin lines (**Figure 6**). The skin feels

Figure 3. Disseminated superficial actinic porokeratosis on the shin



Figure 4. Wrinkling on outer canthus, cheek, lower pinna, and preauricular area due to age



Figure 5. Excessive wrinkling on and about the pinna due to age



like leather and has a pale yellow, straw brown, or old ivory colour. Stellate, oval, or round scars are sometimes present on the backs of the hands and forearms of those with sun-damaged skin (**Figure 6C**). These scars are often seen with senile purpura (**Figure 6D**).

Hypoderm. Considerable loss of subcutaneous fat in elderly people causes skin folds to form in the periorbital, preauricular (**Figure 5**), circum-oral, and neck areas. The sun has no effect on the hypoderm.

Blood vessels. In elderly people, bright red angiomas up to 5 mm in diameter and usually compressible are scattered mainly on the torso (senile ectasia or De Morgan spots). Purplish angiomas of similar size are occasionally seen on the vermilion lip and on the pinna (**Figure 7**).

Sun-damaged skin often has a symmetrical diffuse telangiectasia, particularly prominent on the cheeks, sides, and wings of the nose and the neck

Figure 6. Sun-damaged skin: A) Note yellowish change of solar elastosis, particularly evident on the nose. Hypopigmented areas on cheeks are scars from removal of skin cancers; B) Note semilinear arrangement of pinhead-sized yellowish dots and dirty brown pigmentation on side of neck; C) Pseudocicatrix on forearm; D) Solar (Bateman's) purpura with pseudocicatrix.

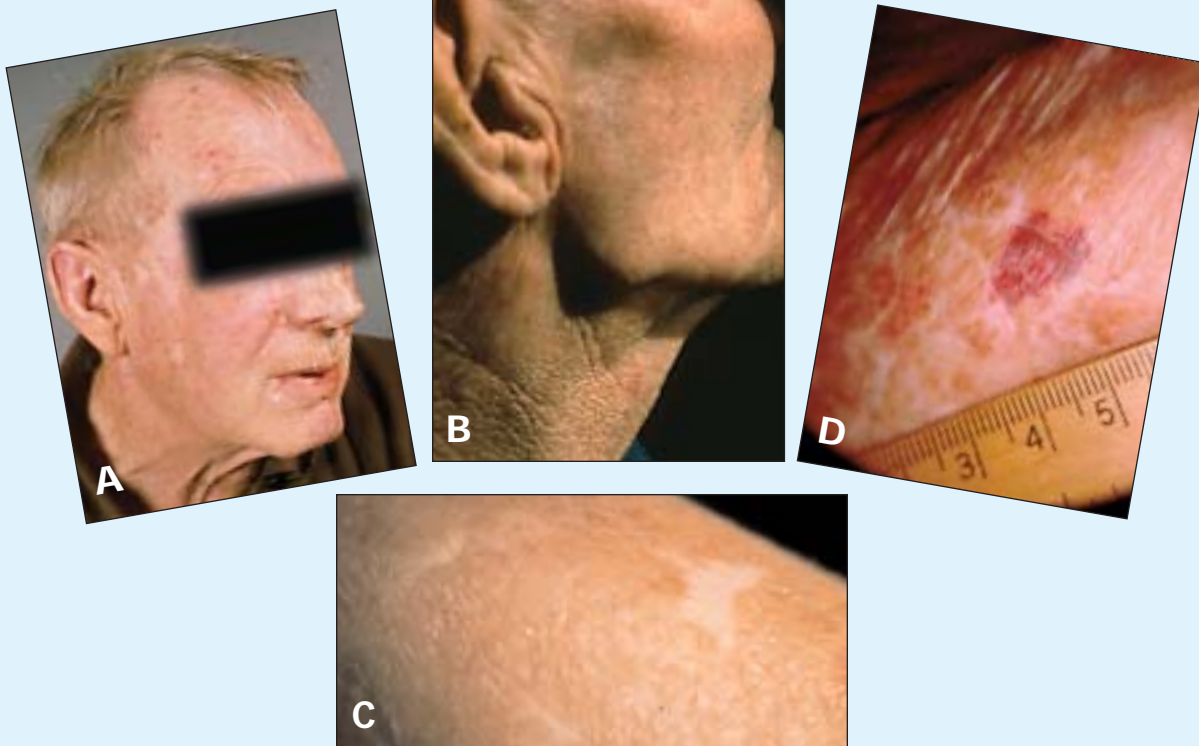


Figure 7. Senile ectasia on the pinna



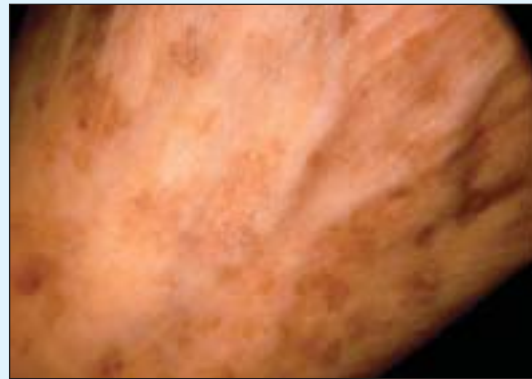
(**Figure 8**). These telangiectatic changes sometimes appear quite suddenly (over 6 to 12 months). Patients often have a hard time believing they are from habitual exposure to the sun years ago.

Melanocytes. Numerous brown and tan freckles of varying size appear on the backs of the hands,

Figure 8. Sun-damaged skin: A) *Telangiectasia on face. Note sparing in fold at jawline and in perioral area;* B) *Telangiectasia on anterior portion of neck. Note sharp boundary at junction of sun-protected and sun-exposed areas on upper posterior neck.*



Figure 9. Senile lentigines on the back of the hand



forearms, and faces of elderly people (senile lentigo) (**Figure 9**).

Chronically sun-damaged skin can be a diffuse brown leather colour or have light brown freckles (**Figure 10**) amid areas of hypopigmentation. Sometimes melanocytes overproduce melanin and give solar keratoses a dirty brown colour.

Hair. Usually, by age 60, hair turns gray, particularly on the scalp. Frontotemporal and occipital non-scarring alopecia occurs more prominently in men than in women (male pattern alopecia). Fine downy hairs sometimes regrow in these areas, but eventually loss of hair is complete. Localized areas of alopecia occur on the outer aspects of men's legs. Both men's and women's eyebrows become bushy and their ear and nasal vibrissae are more prominent. Women's facial hair (particularly in the moustache area) becomes more prominent. The sun has no effect on the roots of the hair.

Sebaceous glands. Elderly people's sebaceous glands can be patulous and overactive on the bald pate, causing oiliness. An oily scaliness sometimes occurs in the retroauricular folds, on the glabella, and in the nasolabial folds. On the face and elsewhere, the skin is dry or xerotic, particularly on the lower legs. Yellowish translucent perifollicular papules up to 3 mm in diameter with central umbilication at each follicular orifice are frequently present on the forehead and cheeks (senile sebaceous hyperplasia) (**Figure 11**). Large (up to 1 cm) blackheads sometimes occur on the abdomen.

Figure 10. Sun-damaged skin:

A) Irregular freckles seen on telangiectatic skin;
B) Irregularly shaped solar keratoses are a dirty brown.

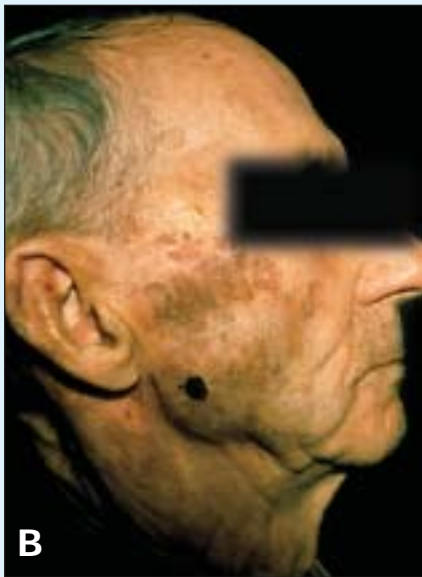
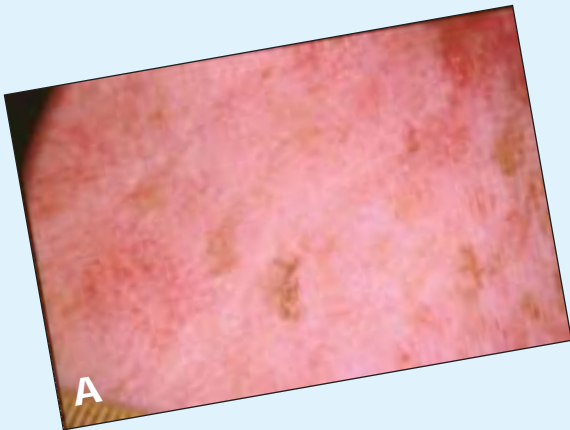


Figure 11. Elderly skin showing senile sebaceous hyperplasia on the forehead



Figure 12. Sun-damaged skin: Large comedones in outer canthal skin. Formation is related to severe, extensive solar elastosis.



Sun damage produces no visible changes in the sebaceous glands. The dryness of sun-damaged skin is caused by damage to the epidermis and dermis and decreased function of the eccrine and sebaceous glands attributable to aging (**Figure 12**). Occasionally, there are prominent blackheads on the temples.

Eccrine and apocrine glands. These glands are fewer, smaller, and less active in the elderly, causing dryness. They are not affected by the sun.

Nails. Elderly people's toenails can be thickened, yellow, brittle, and, occasionally, long and clawlike (onychogryphosis). Longitudinal ridges on the fingernails become coarsened, and the distal ends split. Exposure to the sun does not cause changes to the nails.

Conclusion

There are readily discernible differences between skin changes brought on by age and skin damaged by habitual exposure to sunlight. Differences described in this article can be used when examining patients to distinguish between the two and allow physicians to give appropriate counsel to their patients. ❁

Acknowledgment

This paper is based on a presentation given during a refresher course for family physicians and other health professionals entitled "Challenging Issues in Geriatrics" on November 27, 1998, at the Ottawa Civic Hospital.

Competing interests

None declared

Correspondence to: Dr Robert Jackson, 1081 Carling Ave, Suite 508, Ottawa, ON K1Y 4G2; telephone (613) 725-3747; fax (613) 725-3409; e-mail robertj@istar.ca

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Editor's key points

- Fifty years of sun worship has resulted in many elderly people with seriously sun-damaged skin. These people are at increased risk of skin cancer.
- Sun damage affects all layers of the skin: epidermis (solar or actinic keratosis), dermis (thickening and wrinkling), blood vessels (telangiectasia) sebaceous glands (solar comedones), and melanocytes (diffuse or mottled brown patches).
- Sun damage can be distinguished from the normal changes of aging and should alert family physicians to increased risk of skin cancer.

Points de repère du rédacteur

- Les conséquences de 50 années de prédilection pour le soleil apparaissent chez de nombreuses personnes âgées dont la peau est sérieusement endommagée par le soleil. Ces personnes présentent un risque élevé de développer un cancer de la peau.
- Le soleil endommage toutes les couches de la peau: l'épiderme (la kératose sénile ou solaire), le derme (l'épaississement et les rides), les vaisseaux sanguins (la télangiectasie), les glandes sébacées (les comédons solaires) et les mélanocytes (les taches brunes diffuses ou précises).
- Les dommages à la peau causés par le soleil se distinguent facilement des changements normaux attribuables à l'âge et ils devraient alerter les médecins de famille des risques accrus de développer un cancer de la peau.