Nonmelanoma Skin Cancer of the Head and Neck: Prevention

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KEYWORDS

• Nonmelanoma skin cancer • Head-neck • Tanning • Photoprotection • Summer season • UV

KEY POINTS

- Ultraviolet B (UVB) radiation is the main cause of photocarcinogenesis, sunburn, and immunosuppression.
- The amount of UVB is affected by geography (equatorial latitude, high altitude), season (spring, summer), meteorology (a sunny day without clouds), environment (ground reflections such as beach sand and sea), and time of day (midday between 10:00 AM and 4:00 PM).

INTRODUCTION

Nonmelanoma skin cancers (NMSCs) are the most commonly diagnosed cancers especially in the white race. The major etiologic factor for the development of NMSCs is the exposure to ultraviolet (UV) radiation (especially UVB and UVA radiation), which may cause DNA damage and genetic mutations in skin (**Fig. 1**).[1] Because of the detrimental effect of UV radiation, sun exposure is a high risk factor, especially for individuals who have phenotypic factors such as white or cream-white skin type, blue/green eyes, red or blond hair, or have freckles and moles. In addition, human papilloma virus, ionizing radiation, arsenic exposure, and genetic predisposition (such as xeroderma pigmentosum, albinism, or Muir-Torre syndrome) are the other important risk factors.[2]

A recent epidemiologic review about NMSCs has demonstrated that the incidence of NMSCs is increasing, and NMSCs are becoming a health care problem worldwide.[3] The investigators also highlighted that prevention and early detection are of paramount importance. The American Cancer Society emphasized that approximately 80% of all skin cancers are preventable.[4] The prevention of skin cancers can be managed by primary, secondary, and tertiary prevention strategies.

Primary prevention strategies include all the personal, institutional, and governmental efforts that provide the protection of the healthy population from the development of skin cancers.

Secondary prevention strategies include the early detection of skin cancers by performing total-body skin examination and involves case finding (incidental detection of a skin cancer in individuals who were seen for another medical problem or during routine check-up), screening (regular examination of high-risk individuals or population), and surveillance (periodic examination of patients who have suspicious lesions).[5]

In tertiary prevention, a regular and routine total-body skin examination is performed on patients who formerly had a diagnosis of skin cancer; thereby, a secondary skin cancer can be

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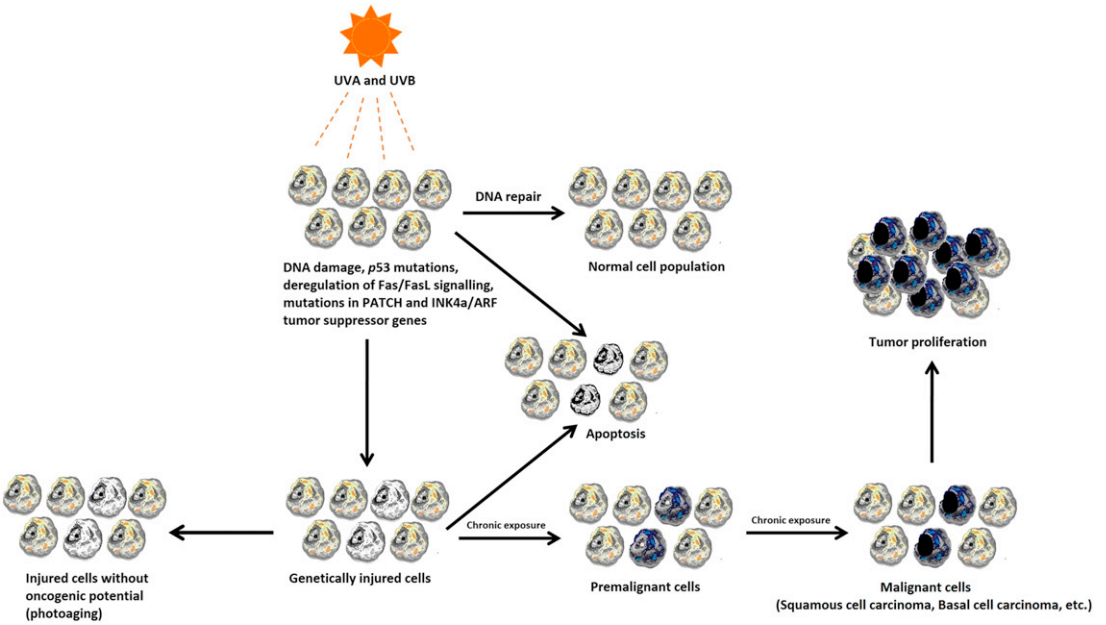

Fig. 1. The pathway of photocarcinogenesis.

detected and treated instantaneously, when it develops.

In this article, the importance and effectiveness of prevention efforts and strategies for skin cancers are reviewed.

PRIMARY PREVENTION STRATEGIES

Primary prevention strategies aim to avoid the development of NMSCs in the population and mainly include knowledge, behaviors, and attitudes about sun protection, chemoprevention, and public education programs.

Sun-Protection Behaviors and Clothing

The evidence has indicated that "intermittent" exposure to the sun increases the risk of development of basal cell carcinoma (BCC); however, squamous cell carcinoma (SCC) is strongly associated with continuing, chronic sun exposure. As solar UV radiation is the major etiologic factor for NMSCs, avoiding exposure to sunlight may lead to a remarkable reduction in prevalence. Sunlight includes different wavelengths, such as infrared and UV. The latter is part of the nonionizing electromagnetic spectrum and is divided into 3 spatial regions according to their wavelengths[6]:

1. Long-wave: UVA; 320–400 nm
2. Mid-wave: UVB; 290–320 nm
3. Short-wave: UVC; 200–290 nm

UV C is mutagenic for human skin; however, it does not reach the surface of the earth.

UV A comprises 90% to 95% of solar UV radiation and has a role in photoaging and immunosuppression; its role in photocarcinogenesis is controversial.[7–9]

UV B radiation is the main cause of photocarcinogenesis, sunburn, and immunosuppression.[9] The amount of UVB is affected by the following:

- Geography: equatorial latitude, high altitude
- Season: spring, summer
- Meteorology: a sunny day without clouds
- Environment: ground reflections, such as beach sand and sea
- Time of day: midday between 10:00 AM and 4:00 PM

The intensity of UV radiation (also called UV index) is forecasted daily to the public to warn of the hazardous effect of sun (**Fig. 2**). The UV index is an international standard measurement of the predicted UV radiation of a region and is presented on a scale between 1 and 11+ (**Fig. 3**). A high number indicates a greater risk of sunburn, especially for high-risk individuals.

Sun-protection behaviors and attitudes play an important role in the prevention of skin cancer. The recommendations about prevention from sun exposure are briefly presented in **Box 1**. Staying indoors to avoid midday sun, especially when the UV index is over 8, is very important for infants, children, adolescents, and even adults. In addition, seeking shade can be somewhat useful for sun protection; however, it does not provide