

# Skin Cancer:

## A Review and Atlas for the Medical Provider

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### Abstract

Skin cancer is increasing in prevalence and is the most common form of cancer in young individuals. Descriptions of the clinical presentations of the most common skin cancers were derived from the author's clinical experience and a review of the literature. Photographs depicting the typical appearance of these lesions were collected, to facilitate recognition. Unique clinical characteristics of skin malignancy are described in the text and illustrated with photographs of the most typical presentation(s) of each of the common skin cancers. Early recognition leads to cure in most cases.

**Key Words:** Skin cancer, basal cell carcinoma, squamous cell carcinoma, actinic keratosis, melanoma, 5-fluorouracil, Mohs', micrographic surgery, curettage, electrodesiccation, Hutchinson sign, cryotherapy.

THE PREVALENCE OF SKIN CANCER in the United States is increasing at an alarming rate. Since 1974, about 1.2 million cases of nonmelanoma skin cancer (1) and more than 27,000 cases of melanoma (2) have been diagnosed each year. More recently, this latter figure has been shown to be an underestimate. An American Academy of Dermatology survey suggested that a more probable number of cases of melanoma might be close to 80,000 per year (3). Although some of this increase may be due to earlier detection or previous underreporting of melanoma cases, it is unlikely to be due to changes in diagnostic criteria by pathologists and probably represents a real increase in melanoma cases (4). The 1.2 million prevalence figure for non-melanoma skin cancer approximates the frequency of all other cancers combined. By the year 2001, the lifetime risk of an individual for developing malignant melanoma will be 1:75 (3).

The greatest cause of this increase hinges on the positive social attitude toward sun exposure during the last half century. This is a more important factor than any decrease in the ozone layer (5). Fair-skinned individuals with red or blond hair and blue eyes, and with Irish, Scottish, English or Welsh background are particularly susceptible. Rarely, inherited syndromes, such as xeroderma pigmentosum, epidermodysplasia verruciformis, familial atypical mole syndrome and Gorlin-Goltz (basal cell nevus)

syndrome and others, predispose individuals to skin cancer, but sun exposure remains a significant co-factor.

The great majority of skin cancers could be prevented if better sun protection techniques were used.

### Basal Cell Carcinoma

Basal cell carcinoma (BCC), the most prevalent type of skin cancer, develops *de novo* without a precursor clinical stage. Eighty percent of these skin cancers occur on the head and neck, and the prevalence is roughly equal in men and woman. Twenty percent of individuals having a BCC are less than 50 years of age. A Caucasian person has a 33% lifetime risk of acquiring a BCC. Basal cell carcinoma is extremely uncommon in darker skinned individuals but does occur occasionally. An African study found a race-specific mean annual incidence rate per million population of 58.5 in Caucasians and 0.065 in native Africans (6).

Basal cell carcinoma rarely metastasizes (approximately 1:100,000). The few that do are those that have recurred repeatedly following treatment or those that have been present for several decades. Fatalities are very rare and usually occur at an average age of 85, with refusal of treatment as the cause in 40% these cases (7).

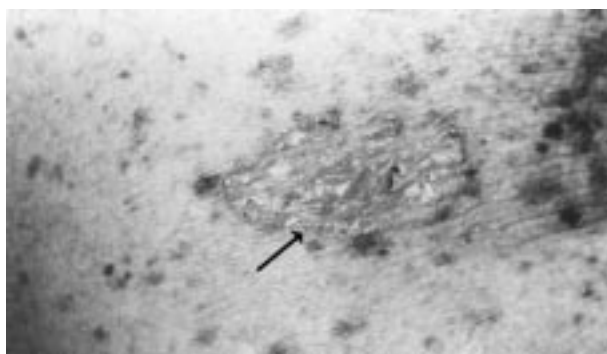
### Clinical Characteristics of BCC

The superficial type of BCC usually occurs on the trunk as an erythematous macule or patch that may be mistaken for eczema. A

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pathognomonic finding is a translucent border, often with telangiectases (Fig. 1). Histologically, one finds nests of basaloid cells lined up at the periphery in a palisading array. Often there is a retraction artifact of the stroma beyond the neoplasm, creating a clear space. Superficial BCCs located on the face may have more of an infiltrative pattern histologically, with strands of neoplasm interspersed in the stroma. They are often larger than is clinically apparent. Nodular BCCs demonstrate translucency and telangiectases, and often have a central indentation (Fig. 2). These neoplasms his-



**Fig. 1.** Superficial basal cell carcinoma on the trunk. Note translucent edge (arrow).



**Fig. 2.** Nodular basal cell carcinoma of the suprabrow with central indentation and telangiectases within the translucent lesion.

tologically involve the dermis and can invade more deeply at times. They can become large in size, usually as a result of patient neglect (Fig. 3). Ulceration may be limited, or in some cases more extensive, especially in larger lesions (Fig. 4). It is not uncommon for early lesions to erode and bleed, only to heal sponta-



**Fig. 3.** Neglected exophytic basal cell carcinoma of the medial canthus and palpebral margin.



**Fig. 4.** Large, neglected ulcerated basal cell carcinoma misdiagnosed as squamous cell carcinoma by several physicians who did not note the translucent border (arrow).

neously. This may support the patient's denial and create a longer delay before treatment is sought.

Keratotic BCCs demonstrate milia and have a rougher surface than the typical nodular BCC. BCCs can be pigmented (Fig. 5) and may suggest a diagnosis of malignant melanoma. Such pigmented BCCs occur more commonly in dark-complected Caucasian individuals.

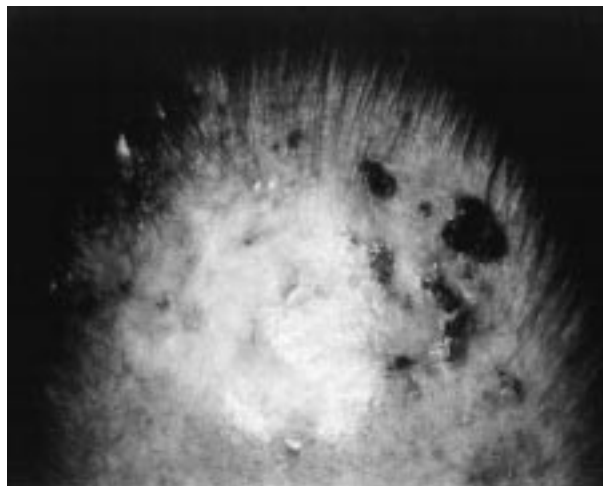
Basal cell carcinoma may display aggressive growth patterns, including infiltrative micronodules with squamous differentiation (metatypical or basosquamous cell carcinomas) and morpheaform (morpheic or sclerosing BCC). Sclerosing BCCs typically grow as one- or two-cell thick strands in a sclerotic stroma and are difficult to detect clinically. Diagnosis is often delayed until a secondary change, such as bleeding, occurs (Fig. 6) many years later. The dermis is invaded for a considerable distance beyond the normal-appearing, overlying epidermis. Surgical defects after complete extirpation of sclerosing BCC are often quite extensive (Fig. 7), but reconstruction can provide a satisfactory result.

Aside from the above histologic patterns, other criteria such as large size, ill-defined border(s), young age of the patient, immunocompromised host, recurrence, locally persistent "H- zone" (ears, eyelids, nose, lips) and scalp lesions, and dysesthesia indicative of perineural or intraneural invasion, may indicate that a BCC will be more aggressive. While less than 2% of BCCs occur in sun-protected areas such as the axilla (Fig. 8) or groin, these lesions often display more aggressive behavior than those in sun-exposed locations.

Although most BCCs are caused by ultraviolet damage, some develop within congenital



**Fig. 5.** Pigmented basal cell carcinoma with black coloration and translucent edge.



**Fig. 6.** Large, undetected basal cell carcinoma which involved most of the scalp. It was diagnosed only after the lesion bled. This was found to be a morpheaform basal cell carcinoma.



**Fig. 7.** Recurrent sclerotic basal cell carcinoma of the upper lip — Mohs' micrographic surgical defect.

precursor lesions such as nevus sebaceous of Jadassohn (Fig. 9). This yellowish, shiny plaque occurs on the scalp, head, and/or neck of neonates, or develops within the first few years of life. Because there is about a 3% risk of developing BCC within a nevus sebaceous during the lifetime of the individual, elective prophy-



**Fig. 8.** Axillary basal cell carcinoma.

lactic excision is usually recommended after puberty. Other neoplasms that can develop in a nevus sebaceous include squamous cell carcinoma and syringocystadenoma papilliferum, a sweat gland tumor.

Patients with the autosomal, dominantly inherited basal-cell nevus syndrome (Gorlin-Goltz syndrome) often develop hundreds of BCCs (Fig. 10). Extracutaneous findings include characteristic facies, odontogenic keratocysts, calcification of the falx cerebri, bifid ribs and palmar pits. Basal cell carcinomas in this syndrome usually have their onset in adolescence.

### Treatment of BCC

Therapy for BCCs includes curettage and electrodesiccation, liquid nitrogen cryotherapy, excision with standard histopathologic margin analysis, modified frozen analysis, and radiation therapy. Mohs' micrographic excision is reserved for aggressive BCCs in all sites, or smaller lesions in areas where tissue conservation is crucial, such as eyelids, nose, lips, ears, digits and genitalia. Mohs' micrographic surgery is an in-office procedure that provides the highest chance of local cure. Surgical mar-



**Fig. 9.** Nevus sebaceous of Jadassohn in an adolescent.

gins are examined by frozen section, and the location of any residual focus of tumor is mapped out. In this way, the entire neoplasm may be removed precisely without removal of excessive, uninvolved surrounding tissue.

### Actinic Keratosis

Although not a malignancy per se, an actinic keratosis (AK) is a potential precursor lesion to squamous cell carcinoma (SCC). AKs are the most common lesions found on photo-damaged skin. They may resolve spontaneously, especially if sun-screen is used, but 6–10% of patients with AKs may develop an SCC within ten years (8).

### Characteristics of AK

AKs appear as small, erythematous, keratotic papules, often more readily detected by palpation than by their visual appearance. Fair-skinned individuals may have hundreds of such lesions. Because progression to SCC can occur in some cases, persistent and enlarging lesions should be treated. The epidermis of an AK demonstrates



**Fig. 10.** Basal cell nevus syndrome (Gorlin-Goltz).

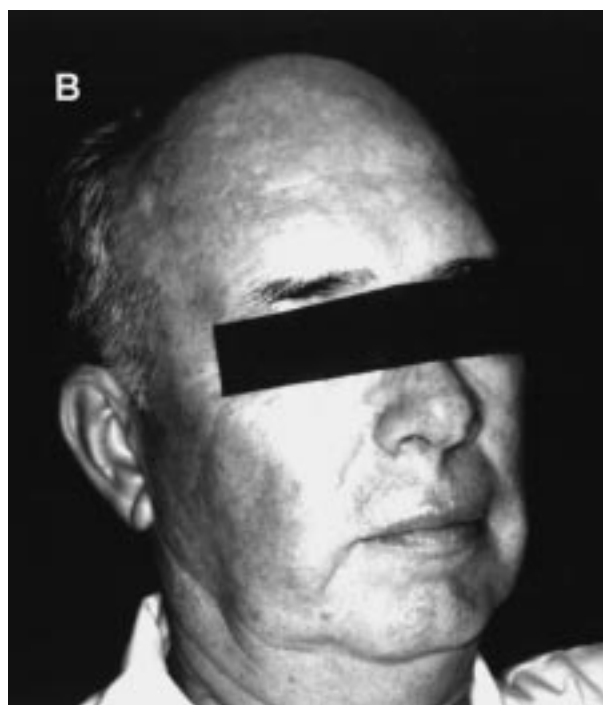
partial thickness atypia of keratinocytes, beginning at the basal layer but not reaching the stratum granulosum. There is usually focal parakeratosis (retained nuclei in the stratum corneum).

#### **Treatment of AK**

AKs are commonly treated using liquid nitrogen cryotherapy or curettage and electrodesiccation. Topical 5-fluorouracil (5-FU) solution or cream may also be used to chemically remove visible keratoses, as well as those that exist microscopically but are not yet clinically apparent. This is an excellent treatment for patients with myriad lesions for which cryotherapy would be impractical or too painful (Fig. 11). The marked erythema, vesiculation, and crusting, as well as possible discomfort that occurs with topical 5-FU, should be explained to the patient prior to initiating therapy.

#### **Squamous Cell Carcinoma, *In Situ***

Intraepidermal squamous cell carcinoma (Bowen's disease) can be viewed as the next step



**Fig. 11.** **A.** Multiple actinic keratoses highlighted by the use of 5-fluorouracil (5-FU) for two weeks. **B.** One month after completion of a four-week course of 5-FU.

in the progression of atypia before a lesion develops into a frankly invasive SCC. This lesion sometimes may be located on the sun-exposed areas of the head, neck, trunk, and legs. "Erythroplasia of Queyrat" refers to Bowen's disease occurring on the genitalia. In some instances, periungual Bowen's disease has been demonstrated to harbor human papilloma virus similar to the subtypes that have been implicated as the cause of cervical carcinoma. Bowen's disease on non-sun-exposed areas has been noted to occur with previous arsenical ingestion and may also be associated with internal malignancy (9).

### Appearance of SCC *In Situ*

SCC *in situ* appears as a velvety, erythematous, slightly keratotic and barely elevated papule or plaque. When located on the glans penis it usually lacks a significant keratotic surface (Fig. 12). The absence of translucency in Bowen's disease is helpful in differentiating it from the superficial type of BCC. Bowen's lesions are usually greater in diameter than AKs and tend to persist for months or years before diagnosis. They are sometimes misdiagnosed as localized eczema. Histologically, there is full thickness atypia, in contrast with AKs. The pathology may extend down into the epithelium of the adnexa.

### Treatment of SCC *In Situ* (Bowen's Disease)

Cryotherapy, 5-FU, curettage and electrodesiccation, laser ablation and dermabrasion have been used, but are superficial in their effects and may not remove deeper extensions of disease in the epithelium of the adnexa, e.g., hair follicles. Surgical excision, radiation therapy, and Mohs' micrographic excision are alternatives to the more superficial treatments and



**Fig. 12.** Squamous cell carcinoma *in situ* of the glans penis does not display as much of the keratotic surface as it does in non-glabrous skin.

are preferable. Mohs' micrographic surgery is especially helpful for tissue conservation when the digits or genitalia are involved.

### Squamous Cell Carcinoma

Approximately 50% of squamous cell carcinomas (SCC) develop on the head and neck. They are much less prevalent than BCC (1:5) and are approximately four times more common in men than in women. Most lesions occur in individuals over 50 years of age. Caucasians may have as much as a 10% lifetime risk of developing SCC. The mortality rate from this type of carcinoma is approximately 1:100,000 (7). Forty-seven percent of these mortalities occur in patients whose SCC arose on the ear. Higher risk of metastasis occurs with lesions located on the scalp and lip regions as well as on the ear.

### Characteristics of SCC

SCCs are keratotic papules or nodules (Fig. 13) which may ulcerate. Histologically, these skin cancers demonstrate invasion of atypical keratinocytes into the dermis. Nests of atypical keratinocytes may be well- or poorly-differentiated. Should there be extensive hyperkeratosis, a cutaneous "horn" may develop (Fig. 14).

### Treatment of SCC

Once the diagnosis of squamous cell carcinoma is established, it is important to examine the regional lymph nodes to check for possible metastases. The modalities of therapy for SCC are similar to those used in treating BCCs, except that wider margins are generally used. Abolative therapy such as curettage and electro-



**Fig. 13.** Squamous cell carcinoma of the lower vermilion lip.



**Fig. 14.** Cutaneous horn of the digit surprisingly proved to be only a hypertrophic actinic keratosis and not a squamous cell carcinoma.

desiccation or cryosurgery may not eradicate deeper pathology and may increase the risk of persistent disease and eventual metastasis. Should cryotherapy or curettage and electrodesiccation be employed in treating SCCs, follow-up is mandatory. Radiation therapy may be used as a solitary treatment in patients whose medical condition precludes surgery, or if the lesion is inoperable. Aggressive SCCs, especially those with perineural or intraneural invasion, can be treated with postoperative radiation as an adjunctive therapy after Mohs' micrographic surgery.

### Melanoma

Malignant melanoma is the most dangerous skin cancer, and if not detected early may metastasize with fatal consequences. Prior to the development of invasive melanoma, a forerunner or *in-situ* phase may occur, in which horizontal extension occurs at or above the dermoepidermal junction. In one form, lentigo maligna, this may manifest as a large tan or brown patch on the face, enlarging very slowly for one or two decades, before being diagnosed. It is not unusual for such lesions to have been biopsied several years previously without revealing definitive pathology (Fig. 15). Lentigo maligna, or Hutchinson's freckle, is a melanoma *in situ* that may become invasive at any time. It often presents a difficult management problem, as surgical treatment may replace a precursor lesion with a disfiguring scar. Moreover, the adjacent facial skin is similarly photodamaged and may harbor atypical hyperplastic melanocytes, which may eventually give rise to new melanoma-*in-situ* lesions. This possibility should not lead the physician to excise too widely to eradicate this field effect, since much of the exposed facial skin may harbor such atypical cells.



**Fig. 15.** Melanoma *in situ* of the cheek present for more than ten years. Biopsies on two occasions previously failed to disclose its presence.

### Characteristics of Melanoma

Malignant melanoma occurs mostly on the upper trunk, forearms, and legs, usually as an oval or polycyclic, irregularly bordered, variegated and often asymmetric patch (Fig. 16). Approximately 75% of melanomas are superficial. Clinical regression can occur as a result of a localized immunologic reaction. When this occurs, the lesion may develop areas of clearing or whiteness (Fig. 17). Regression is thought by some to indicate a poorer prognosis, but this is controversial.

Lentigo maligna melanoma, representing approximately 5% of melanomas, refers to a Hutchinson's freckle (lentigo maligna) which has developed an invasive component. Fourteen percent of melanomas are of the nodular type. They may develop from the vertical growth phase that occurs after horizontal extension in a preexisting lesion (Fig. 18), or *de novo*. The depth of invasion can be considerable in advanced disease.

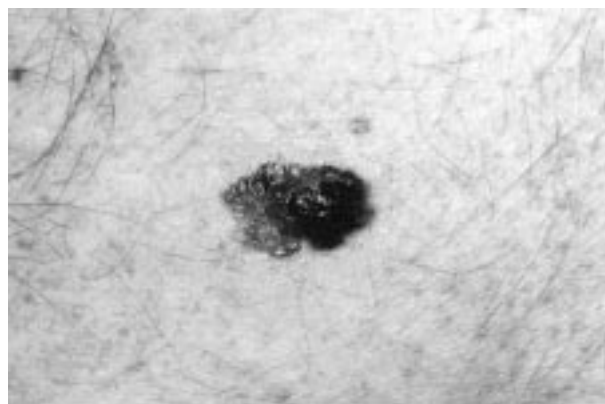


**Fig. 16.** Asymmetry of a melanoma *in situ*.



**Fig. 17.** Regression of a melanoma displaying whitenized areas (arrow). (Courtesy of Stuart Salasche, M.D., Tucson, AZ.)

Acral-lentiginous melanomas comprise 5% of all melanomas and arise most commonly in patients aged 55–60. Although melanoma is less common in African Americans, 50% of melanomas which do occur in African Americans or Asians are of the acral-lentiginous type. There is usually significant delay in diagnosis, as these lesions are often initially misdiagnosed as subungual fungal disease, eczema, or infection. When they are finally diagnosed correctly, they may have developed nodules and a deeper level of invasion, and have a worse prognosis (Fig. 19). Pigmentation usually seen on the proximal and infrequently seen on the lateral nail fold has been considered by some to be pathognomonic of subungual melanoma, and is often designated “Hutchinson’s sign.”



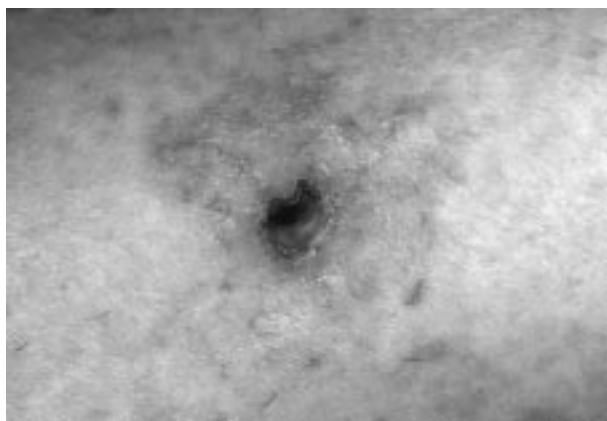
**Fig. 18.** Nodular melanoma.



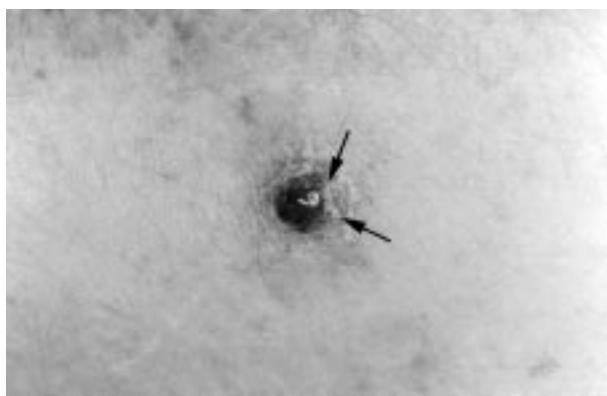
**Fig. 19.** Subungual melanoma misdiagnosed as osteomyelitis.

Amelanotic melanoma, a rare non-pigmented variant of malignant melanoma, is frequently misdiagnosed as an inflammatory condition such as eczema (Fig. 20), as a benign pyogenic granuloma (Fig. 21), or as actinic keratosis or Bowen’s disease. Metastases of malignant melanoma may also be amelanotic. Another rare form of melanoma is the desmoplastic type, an aggressive variant that typically occurs on photodamaged facial skin, especially in women. It has an ill-defined border with gray-stippled dark papules. Histologically, the presence of spindle cells confuses the diagnosis, and special stains are often needed to identify the lesion as a melanoma.

The growth of some melanomas may be hormone-mediated. Normal nevi have been noted to change during pregnancy, and there is some question as to whether there is an increased risk of metastasis of primary melanoma in a pregnant woman. If a suspicious lesion is noted on examination of a pregnant patient (Fig. 22), the physician should not hesitate to



**Fig. 20.** Amelanotic melanoma misdiagnosed as eczema.



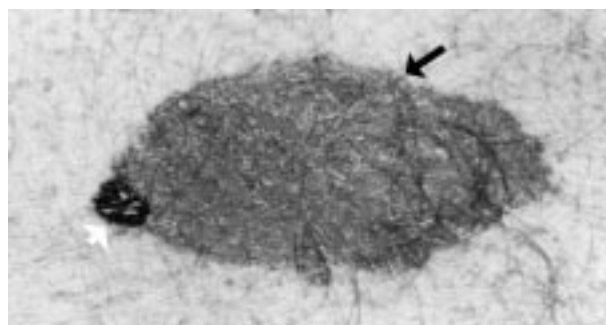
**Fig. 21.** Amelanotic melanoma appearing as a pyogenic granuloma, displaying a glistening capsule and a peripheral collarette (arrows).

remove it and should then consult with the patient's obstetrician.

Another difficult problem faced by dermatologists is the management of giant congenital nevi. Patients with giant, congenital, hairy "bathing trunk" nevi have a greater chance of developing malignant melanoma within such a lesion than do those with normal, acquired nevi. Local recurrences of giant congenital nevi have been observed even after extensive, multiple-stage excisions, since melanocytes may extend deeply, even into the underlying muscle. Superficial treatment with dermabrasion and laser ablation is not appropriate, since it will not remove pathology that extends deeply around the appendages and into the reticular dermis. Small congenital nevi usually do not pose a significantly greater risk of developing into melanoma (Fig. 23), and determining the necessity for excision should be based on the circumstances of the individual case.



**Fig. 22.** Melanoma *in situ* which developed in a pregnant patient.



**Fig. 23.** Melanoma, 1.0 mm (white arrow) deep, arising within a congenital nevus (black arrow).

### Treatment of Melanoma

The treatment of choice for malignant melanoma is excision, with clear margins that are based on the thickness of the lesion (Breslow depth). The standard of care for excision is a 0.5 cm margin for melanoma *in situ*, 1 cm for lesions less than 1.0 mm in depth and 2–3 cm for deeper lesions (10). Cosmetic considerations may dictate the use of margins less than 0.5 cm for facial *in-situ* melanomas. If histopathologic examination following initial excision reveals inadequate surgical margins, re-excision is performed.

Clark's levels, which grade the depth of a malignant melanoma by the anatomical level of the dermis to which it extends, are not as reliable a prognostic indicator as the Breslow's depth (11). Elective lymph node dissection is not indicated for thin melanomas and is not helpful in thick tumors. It may be useful in providing prognostic information in cases of moderately deep melanoma. Increasing use of the sentinel node biopsy is helpful in minimizing the morbidity associated with extensive lymph node resection. Adjunctive therapy, including hyperthermic limb perfusion, cryotherapy, radiation therapy, chemotherapy, and vaccination therapy, are still being explored.

### Conclusion

The easiest way to decrease the risk of skin cancer is to protect the skin from sun exposure. The 20–30 years of lag period that exists between exposure to harmful solar rays and the subsequent development of skin cancer can lull patients into a false sense of security regarding sunbathing. It is imperative that steps be taken to protect the skin at an early age, while ensuring that enough vitamin D is consumed in the diet. Such measures include sun avoidance between the hours of 10 A.M. and 3 P.M., the wearing of protective clothing, and the use of sunscreens that block both UV-A and UV-B solar rays.

Most skin cancer, even melanoma, may be fully curable, provided that the diagnosis is made

at an early stage. Everyone should perform self-examinations for suspicious moles and other growths, and a full skin examination should be a part of the general physical examination.

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