Nonmelanoma skin cancer
an update on management

Nonmelanoma skin cancer is a common problem in Australia, affecting two-thirds of our population at some stage in their lives. The availability of new nonsurgical therapies has expanded the management options for affected patients.

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More than 1% of the Australian population seek treatment annually to have at least one squamous cell carcinoma (SCC) or basal cell carcinoma (BCC) removed. Nonmelanoma skin cancers kill about 300 Australians each year and cost the community over $232 million annually. Difficulty in managing these tumours may arise from atypical or unusual presentations as well as a poor understanding of their histological variants. This article will assist GPs in identifying nonmelanoma skin cancers and describes current options in management, including the new nonsurgical therapies that have recently been developed.

What is nonmelanoma skin cancer?

The term 'nonmelanoma skin cancer' refers to BCCs and SCCs. In Australia, nonmelanoma skin cancer occurs three times more frequently than all other cancers combined, and the annual incidence is increasing. Nonmelanoma skin cancer occurs more commonly in men than in women (1.5:1). BCCs occur three times more frequently than SCCs, but deaths are most often due to the latter.

Aetiology

Sunlight

Exposure to sunlight was identified as a cause of nonmelanoma skin cancer in susceptible people more than 100 years ago. It is still the greatest single environmental factor.

It is important to explain to patients that sun exposure (and exposure to artificial sources of ultraviolet light) has a latency of some decades before tumours arise. Therefore, their 'sins of youth' may not be apparent until maturity and may continue even after they start taking precautions. A suntan does not protect against skin cancer.

Other environmental causes

SCCs may occur in people exposed to other environmental causes. These include arsenic (which also causes BCCs), human papillomavirus

IN SUMMARY

- **In Australia, nonmelanoma skin cancer occurs three times more frequently than all other cancers combined. Exposure to sunlight is the greatest single environmental cause.**
- **Adequate lighting and magnification are needed to identify subtle lesions.**
- **Depending on their location and subtype, BCCs and SCCs can cause considerable patient suffering. The tumours can be far more extensive than is visible clinically.**
- **Imiquimod and photodynamic therapy are newer effective treatments for superficial and thin nodular BCCs with superior cosmetic results. However, they are not effective for other histological subtypes of BCC, which continue to grow and will require surgery.**
- **Surgery requires appropriate facilities, equipment and assistance for safety and optimal outcomes. It has the lowest rates of recurrence; Moh's serial excision has the least recurrence of all techniques.**
- **Simple excision provides histological confirmation of a nonmelanoma skin cancer and of completeness of excision margins.**

Table 1. Causes of SCCs

Environmental factors

Ultraviolet light
SCCs – latency is 20 years

Human papillomavirus
Types 16 and 18 are most often associated with SCCs

Arsenic
Latency is 18 to 25 years

Polycyclic aromatic hydrocarbons
Fuel oil, petroleum oils and tars
Latency is up to 50 years

Patient characteristics

Skin type
Fair, type 1

Genetic disorders
Xeroderma pigmentosa
Albinism

Immunosuppression
After organ transplantation
Drug-induced
HIV infection

Pre-existing skin disease
Solar keratoses (60% of SCCs arise in solar keratoses; 0.5 to 10% of solar keratoses may progress to SCCs in time)[1]

Marjolin's ulcer
SCC that arises in chronic ulcers, sinuses and after radiation injury, a burn or thermal injury
Latency is 8 years – aggressive

(especially perianal, periungual and genital) and polycyclic aromatic hydrocarbons.

Fair skin

Nonmelanoma skin cancer most often occurs in individuals with fair skin (i.e. type 1 skin) who always burn and never tan. These people very often have solar keratoses, and it is estimated that between 0.5% and 10% of solar keratoses can progress to SCCs.[1] Formation of SCCs is more likely in areas of dense solar keratoses.

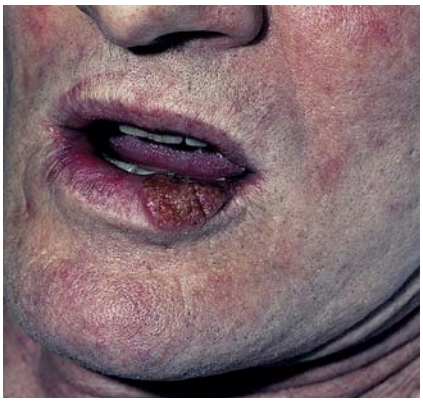


Figure 1. An SCC of the lip has greater metastatic potential than a cutaneous SCC of the same size.

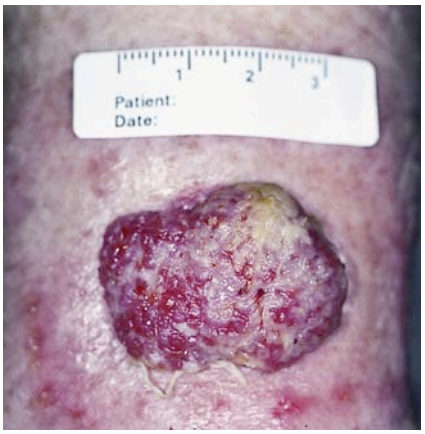


Figure 2. A large, rapidly growing exophytic SCC on the arm.

Photosensitive genetic diseases

People with photosensitive genetic diseases such as xeroderma pigmentosa and albinism are more likely to develop nonmelanoma skin cancer if they are not photoprotected. The cancers can even occur in childhood.

Immunosuppression

Immunosuppression may result in rapid development of nonmelanoma skin cancer, especially SCCs, which may be aggressive. This is not only true for patients after organ transplantation but also for patients with HIV infection or drug-induced immunosuppression.

Squamous cell carcinomas

SCCs are composed of malignant cells that resemble those epidermal cells usually present above the basal layer of the epidermis. They have a metastatic potential, and it is important to identify patients who are at risk. Causes are listed in Table 1.

Prognostic factors

Site

An SCC developing on a mucosal site such as the lip (Figure 1) has a much greater metastatic potential than does a cutaneous SCC of the same size (3.7% risk compared with 0.3%). The ear is also a site of greater metastatic potential – SCCs in this location should be managed carefully.

Size

Most metastasising SCCs are larger than 2 cm in diameter (Figure 2). A patient with a tumour of this size needs to be watched regularly, even after the tumour is completely removed. Some SCCs also have the capacity to grow very rapidly, even doubling their size in weeks. These types of SCCs need surgical treatment (to provide margins of clearance) as soon as can be practically arranged.

Histological features

Histopathological analysis of all skin tumours is essential. Indicators of SCC aggressiveness include the pattern and depth of the tumour, degree of inflammation and perineural invasion.

Well differentiated SCCs (Figure 3a) have abnormal keratinocytes but are not as bizarre, incompletely formed and aggressive as poorly differentiated SCCs (Figure 3b), which are much more likely to metastasise. SCCs deeper than 6 mm have a 75% risk of metastasis. Tumours reaching below sweat coils and into muscle are of great concern.

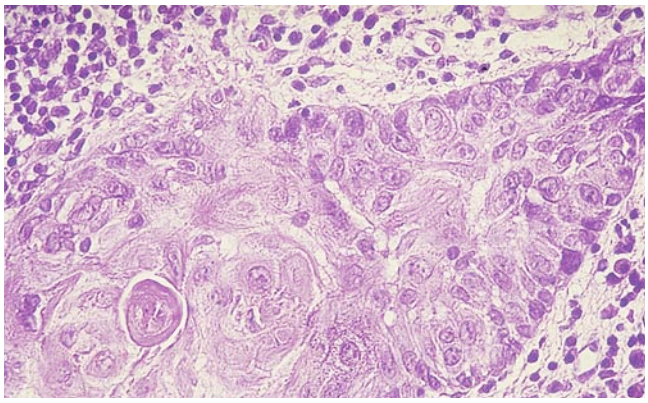


Figure 3a. A well differentiated SCC, in which tumour cells bear some resemblance to keratinocytes.

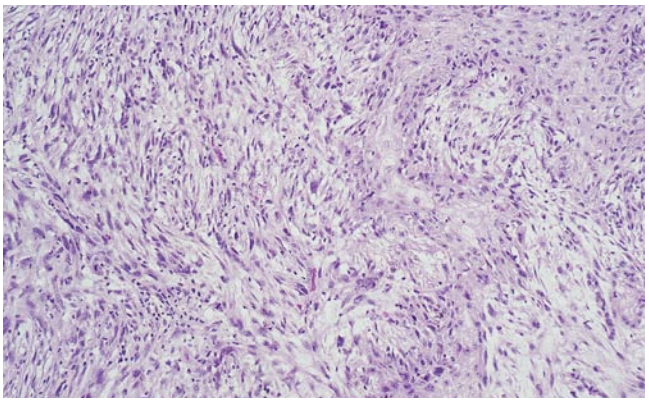


Figure 3b. A poorly differentiated SCC, in which tumour cells are wildly diverse in appearance and have many mitoses.

These microscopic features assist the clinician in flagging patients who may need closer follow up and so should be included, when present, in the pathology report. Margins (lateral and deep) should always be commented on for excision specimens. Incomplete removal of the tumour may result in recurrences. Recurring SCCs have a greater metastatic incidence than the initial SCC, so the best chance of cure is complete removal of the primary lesion.

Aetiological factors

Most SCCs in Australia are the result of sun exposure. Overall actinic damage carries a risk of metastasis of perhaps 0.5%. SCCs arising in chronic scars,

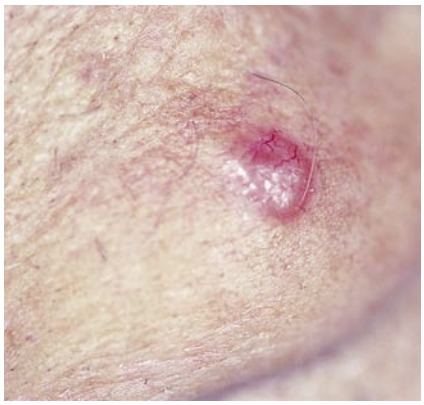


Figure 4. A typical BCC with pearly edges and telangiectases on the cheek.

Differential diagnoses of superficial BCCs

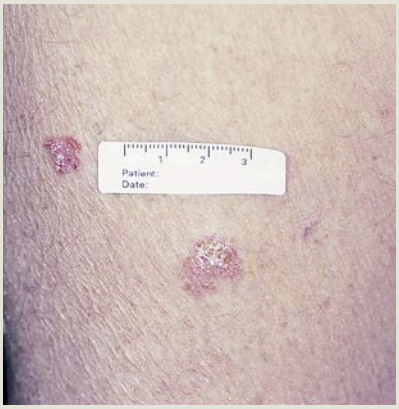


Figure 5a. Superficial BCCs.

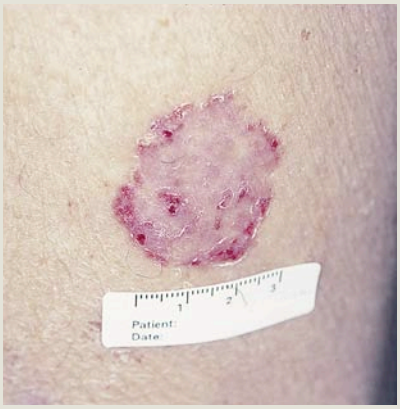


Figure 5b. A superficial SCC (Bowen's disease).

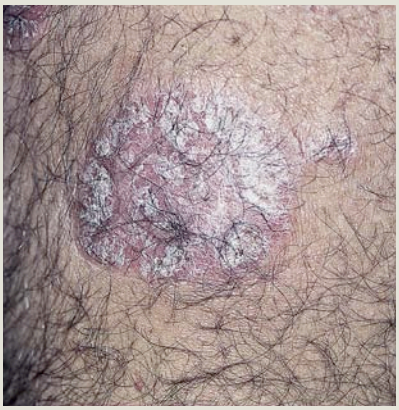


Figure 5c. Psoriasis.

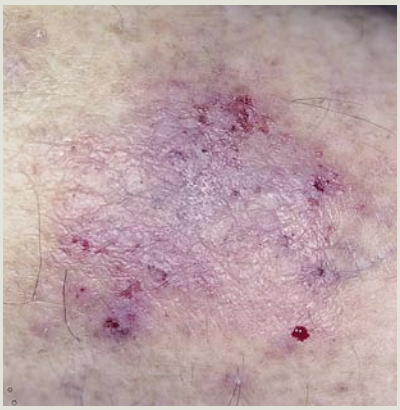


Figure 5d. Discoid eczema.

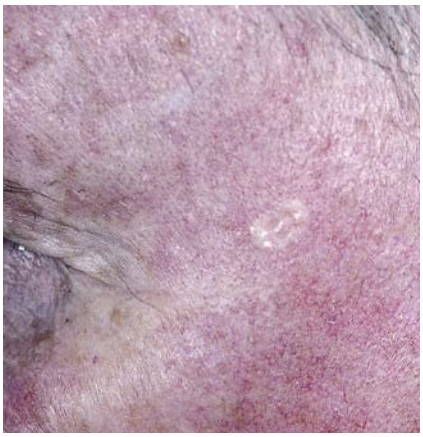


Figure 6. Morphoeic BCCs may resemble scars.

x-ray therapy sites or Marjolin's ulcer carry a 20% or greater risk of metastasis.

Phototherapy delivered by dermatologists in a controlled environment using UVB light for treating psoriasis has been shown to have a low chance of nonmelanoma skin cancer development. The type of SCC that occurs has a less aggressive nature.

Basal cell carcinomas

BCCs are malignant tumours arising in the lowest cell layer of the epidermis and are the most common type of skin cancer in Australia (1500 tumours per 100,000 population). Interestingly, they harbour mutations of genes that direct follicular morphogenesis.

Table 2. Differential diagnosis of common BCC subtypes

BCC subtype	Benign	Malignant
Superficial*	Eczema,* psoriasis*	Bowen's disease*
Nodular BCC	Dermal naevus	SCC, amelanotic melanoma
Pigmented	Compound naevus, angioma	Melanoma
Morphoeic	Scar	Spindle SCC, microcystic adnexal carcinoma

* Shown in Figures 5a to d.

Appearance

The typical appearance of a BCC is a papule with a pearly edge and telangiectases (Figure 4). In time, it may ulcerate and form a chronic, nonhealing ulcer.

Often, however, BCCs do not follow this pattern. They may appear as persistent scaly plaques that look similar to eczema or psoriasis but do not respond to the usual corticosteroid creams, and they may bleed. Differential diagnoses of superficial BCCs are shown in Figures 5a to d – when clear clinical identification is not possible, biopsy is the best policy. A BCC may also appear as a white scar-like plaque (morphoeic, see Figure 6) or cystic nodule. Some important benign and malignant differential diagnoses of common BCC subtypes (superficial, nodular, pigmented and morphoeic) are listed in Table 2.

Management planning

When the subtype of BCC is known, various patient factors must be considered before treatment can be selected. The factors that may influence the choice of therapy include:

- general health (cardiovascular conditions, respiratory disease, immunosuppression)
- skin health (venous stasis, age, atrophy, actinic damage)
- medications (oral corticosteroids, immunosuppressive drugs, aspirin and salicylates, warfarin)
- mobility
- cosmesis.

The location of the tumour needs to be assessed. The presence of a superficially lying nerve or blood vessel, for example, may make surgery more hazardous. Accurate knowledge is required about the

Table 3. Anatomical risk factors

Head and neck lesions

Cosmetic result

Nerve damage, e.g. to temporal nerve, accessory nerve, marginal nerve

Vessel damage, e.g. to temporal artery

Lesions below the knee

Venous hypertensive changes

Peripheral vascular disease

Taut skin

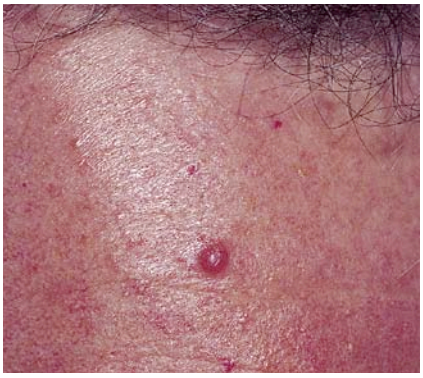


Figure 7a. A suspicious papule on the forehead.

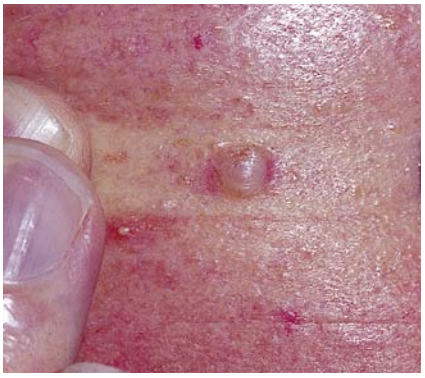


Figure 7b. Stretching the skin helps in identifying the features of a BCC.

course of nerves and vessels as well as skin mobility in different anatomical locations. Table 3 lists some of the anatomical risks present in dermatological surgery. The availability of equipment (e.g. surgical instruments, suction machine and lighting) and assistance from another doctor or nurse needs to be considered if surgery is contemplated.

Diagnosis

When a nonmelanoma skin cancer is suspected, the key to diagnosis is examination under adequate lighting and magnification (7 to 10 times), which can be achieved with inexpensive loops or a magnifying lens. The skin should be stretched around the lesion to flatten it and reveal its features more clearly (Figures 7a and b).

A biopsy is a simple and quick method not only for confirming clinical suspicion but also for identifying the BCC subtype in preparation for selecting the best therapy for the patient. A biopsy may be achieved using a shave of the top of an exophytic lesion or a curette of friable tissue. A punch biopsy provides the best specimen because it is a core of tissue – preferably into the subcutaneous fat – demonstrating the subtype and depth of the tumour. A 4 mm biopsy is ideal but 3 mm will suffice.

Histology will confirm a diagnosis and allow for selection of the best treatment offering the highest chance of cure (see

The main BCC histological subtypes

It is critical when planning treatment for a BCC to know the subtype involved and to respect that if surgery is required wider margins may be necessary for certain subtypes. A pathology report that does not comment on the BCC or SCC) subtype denies the clinician critical information and so I believe this to be inadequate.

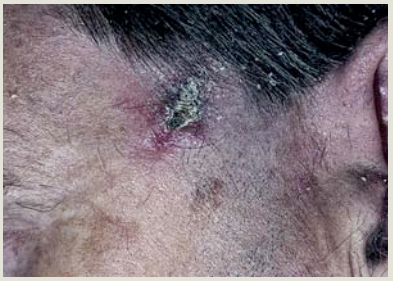


Figure 8a. A morphoeic BCC prior to Moh's micrographic surgery.

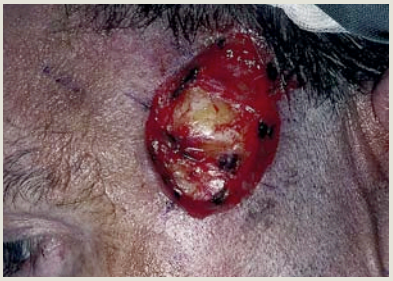


Figure 8b. On Moh's surgery, this BCC was demonstrated to be much more extensive than previously suspected.

Morphoeic BCC

A morphoeic BCC can be far more extensive than clinical examination suggests, with histology showing a diffuse pattern of carcinoma extending much like roots of a tree. An example is shown in Figure 8a, which was demonstrated by Moh's serial excision (Figure 8b) to be much more extensive than previously suspected. Histology is shown in Figure 8c .

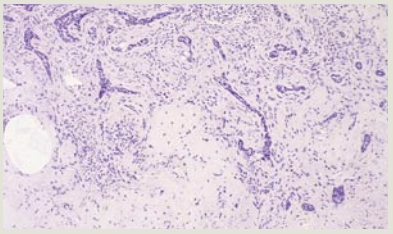


Figure 8c (left). Histology shows a poorly circumscribed tumour with strands of BCC cells extending throughout the dermis.

Nodular BCC

Clinical margins are more accurately estimated for nodular BCCs than for morphoeic BCCs. A well circumscribed nodular BCC with easily identified margins is shown in Figure 9a, with the clear lobules of the tumour resembling a bunch of grapes (Figure 9b).

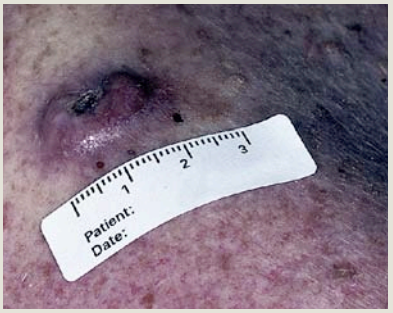


Figure 9a. A nodular BCC – the margins are easy to identify.

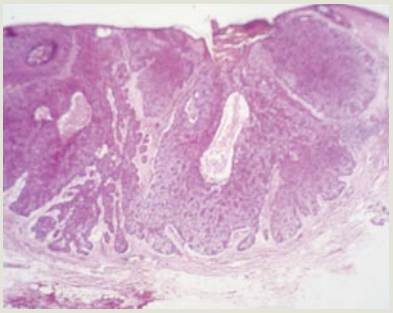


Figure 9b. The clear lobules of the tumour resemble a bunch of grapes.

the box below). Inadequate treatment results in recurrences.

Therapeutic options

Table 4 outlines the current treatment options for nonmelanoma skin cancer. Cure rates and cosmetic results for BCC treatments are compared in Table 5.

A BCC can be cornflake thin or deep and extensive. An SCC may be just at the base of a solar keratosis or large, wide and aggressive. Low risk superficial BCCs or superficial *in situ* SCCs (Bowen's disease) are readily treated by cryosurgery in cyclical freezing; they can also be curetted or excised. They are sensitive to radiotherapy and can be removed using a carbon dioxide laser. Newer treatments for thin skin cancers are revolutionising our treatment paradigm. Wide excision or use of serial excision and immediate frozen section histological assessment by a dermatologist (Moh's technique) is not necessary for low risk nonmelanoma skin cancer.

The major advantage of photodynamic therapy and imiquimod (Aldara), which are two nonsurgical treatments, is the excellent cosmetic outcome. Post-treatment complications such as pigmentation, erythema or scar formation are rare. The selection of nonsurgical treatment options for BCC or field treatment of solar keratoses is now competitive. The advantages and disadvantages of topical cream therapies are reviewed in Table 6.

Superficial multifocal BCC

The superficial multifocal BCC is very common, with the multifocal component making it difficult to be certain of the completeness of excision. The superficial multifocal BCC shown in Figure 10a has a noncontiguous histological appearance (Figure 10b), and a focus of tumour cells could still be present, peripheral to an excision, which the pathologist is unable to see. Therefore, a report of this type of BCC should alert the clinician to the fact that a focus of cells may remain (especially with a narrow excision margin), even after the pathologist comments on a complete excision.

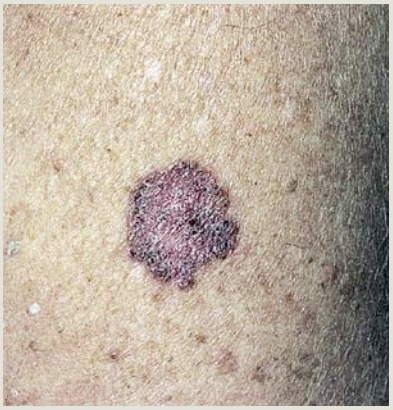


Figure 10a. A superficial multifocal BCC.

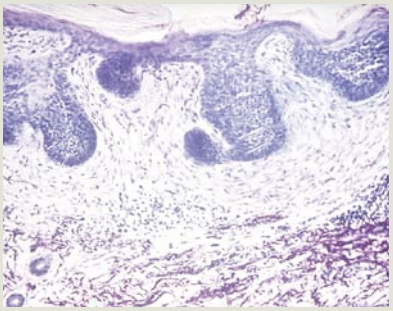


Figure 10b. The multifocal component of this BCC makes it difficult to be certain of the completeness of excision, especially if there are narrow margins.

Micronodular BCC

Micronodular BCCs extend like peas on a plate, and it may be impossible for the pathologist to see if some 'peas' lie outside the excision specimen. An example is shown in Figure 11a; the histology is shown in Figure 11b. This type of BCC needs careful scrutiny if a recurrence is suspected, and indeed it may be difficult to judge excision margins.

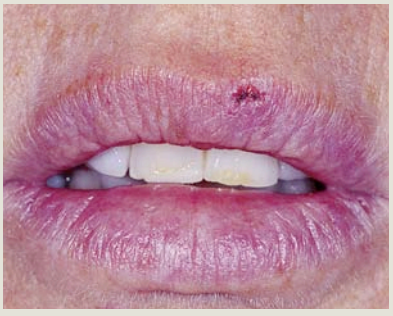


Figure 11a. A micronodular BCC of the upper lip.

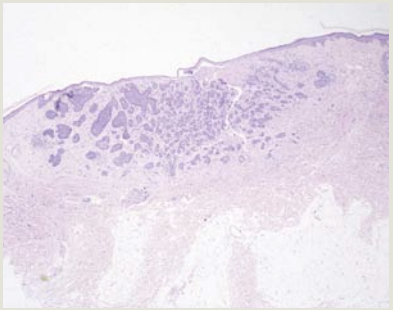


Figure 11b. It is difficult to be certain of excision margins with micronodular BCCs.

Mixed BCCs

BCCs can develop different pathological subtypes within the same specimen.

continued

Table 4. Treatment options for nonmelanoma skin cancer

Commonly used

Cryosurgery
Serial curettage and cautery
Photodynamic therapy
Imiquimod
Simple excision

Alternatives

Radiotherapy
Wide excision
Moh's micrographic surgery
CO_2 laser resurfacing

Table 5. Primary BCCs: treatment results*

Technique	Cure rate (%)	Cosmesis
Cryosurgery	60 to 80	Poor to good
Photodynamic therapy	80	Good to excellent
Imiquimod	80	Good to excellent
Serial curette and cautery	80 or less	Poor to fair
Simple excision	90 to 93	Good to excellent
Radiotherapy	80 to 90	Poor to good
Moh's micrographic surgery	99	Good

* Follow up times vary from three to five years (five-year data are not yet available for newer techniques).

Cryosurgery

Liquid nitrogen, cooled to -192°C and then sprayed from an appropriate container, freezes skin cells to -60°C, resulting in cell death. The cyclical freeze technique used by dermatologists is effective for destroying superficial BCCs and Bowen's disease, achieving cure rates of approximately 60 to 80% at five years. Blood contact is avoided, and this may be very useful for patients taking anticoagulants. Cosmesis may be quite acceptable but a flat, white mark can persist. It is worth explaining to patients that healing of lesions on the limbs may be prolonged. Poor technique or inappropriate instrumentation (e.g. applying liquid nitrogen with a cottonbud) may have the disastrous result of multifocal recurrence. Cryosurgery is not used for high risk nonmelanoma skin cancer.

Photodynamic therapy

Photodynamic therapy has been shown to treat superficial BCCs and thin nodular BCCs with effectiveness of approximately 80% or more, and it is approved by the TGA for this purpose. It does not appear to be effective for other BCC subtypes or BCCs of mixed histology. The procedure is described in the box on page 33.

Photodynamic therapy is especially useful for nonmelanoma skin cancers that

Table 6. A comparison of new topical therapies using creams

	Fluorouracil	Imiquimod	Photodynamic therapy
Application	Cream	Cream	Methyl aminolevulinate cream and light
Duration	Twice daily for four weeks	Once daily for six weeks	Two treatment sessions
Indications	Solar keratoses	Solar keratoses, superficial and thin nodular BCCs	Solar keratoses, superficial and thin nodular BCCs
Mechanism	Cytotoxic action	Immunomodulation	Selective destruction of abnormal keratinocytes
Advantages	Ability to treat a wide area Least expense No equipment requirement	Ability to treat a wide area High effectiveness No equipment requirement	Ability to treat a wide area High effectiveness Quick and convenient
Disadvantages	Treatment duration Infection Strong pain Redness for a month Limited indication	Treatment duration Infection Pain Redness for a month Expense	Equipment requirement Need for two treatment sessions Potential for pain Scabs for a week Expense

are flat and wide when surgery would result in a large or widened scar. In particular, it is excellent for elderly patients with multiple medical problems and polypharmacy in whom surgery can cause great disturbance. It is not necessary to cease anticoagulants prior to photodynamic therapy. The ideal treatment location in this age group is the lower limbs. Elderly patients often have poorer circulation in the lower limbs and changes of venous hypertension and lipodermatosclerosis and surgery is often fraught with complications such as infection, dehiscence and leg ulcer formation.

Photodynamic therapy is also useful when scars are to be avoided, such as in younger patients with facial nonmelanoma skin cancer. The forehead and cheek are good locations for this treatment, but it is best to avoid areas near the eyes, mouth and ears in case of recurrence.

Imiquimod

Imiquimod is a topical immunomodulating therapy, with effectiveness of 80% or more for superficial and thin nodular BCCs. It is important to note that imiquimod does not work for other histological subtypes of BCCs, which continue to grow and therefore will require surgery.

Imiquimod is a take-home therapy, applied by the patient for four to six weeks. Various regimens have been described – application may be three days per week or up to daily to achieve the response required. Review is mandatory because problems can occur with a brisk intense inflammation in the first week or two, with erythema and crusting by the second week and pain in most patients. Other patients fail to respond and need to increase the frequency of application. Infection occurs readily, especially in elderly patients, and can be identified by

What does photodynamic therapy involve?

The first step in photodynamic therapy involves application of a protoporphyrin, methyl aminolevulinate (Metvix; mALA), to the region affected (Figure 12a). Protoporphyrins occur naturally as part of the haem pathway and are particularly sensitive to light.

The mALA cream is left on the skin for three hours while it is selectively absorbed into abnormal keratinocytes; the area needs to be bandaged to prevent light exposure (Figure 12b). After three hours, a red light (635 nm) is used to stimulate a photochemical reaction. The Aktilite 128 machine can treat a region up to 8 by 18 cm in size (Figure 12c). This takes eight minutes, in which time the saturated keratinocytes are selectively damaged whereas surrounding keratinocytes are not.

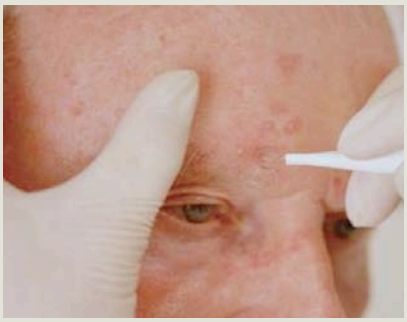


Figure 12a. A superficial BCC being prepared for photodynamic therapy.

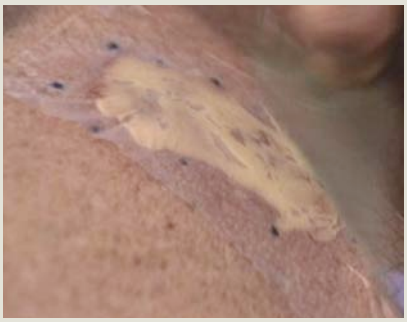


Figure 12b. Applied mALA cream under occlusion.

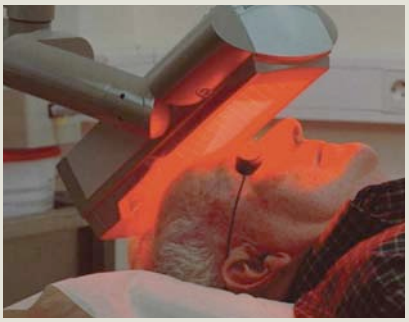


Figure 12c. Application of red light to the treated area.

The skin becomes red, slightly swollen and crusts. This normally resolves over seven to 10 days, as long as the patient protects the region from further sun exposure by using sunscreen. Otherwise, a prolonged erythema can result.

A single session of photodynamic therapy usually has 65% effectiveness for superficial BCCs; two treatments, spaced one or two weeks apart, have 80 to 85% effectiveness. A single session is sometimes used for field detects of solar keratoses, but two treatments are necessary for superficial and nodular BCCs.

Photodynamic therapy is fast and effective and, unlike imiquimod and flurouracil, is applied by a doctor or nurse as an office-based procedure. Resolution of the skin effects of treatment has usually occurred well before other treatments (such as imiquimod or fluorouracil) have been completed. However, the procedure can be painful. Most people experience a burning or stinging but unfortunately a small percentage, up to 10%, experience much more discomfort and local anaesthetic needs to be administered. This discomfort is usually on the forehead. Analgesics prior to treatment and ice afterwards are also useful.

PHOTOGRAPHS COURTESY OF GALDERMA

the second week. Therefore, review after two weeks of treatment is ideal. Treatment may proceed for four to six weeks, and review after completion is also recommended. Ideally, all patients should be followed up three months after completion of treatment.

A small percentage of patients, perhaps 5%, develop an acute intense reaction, usually in the first one or two weeks. The skin can even appear to turn black from intense inflammation, blood and crust. Patients should be prepared for this reaction and instructed to contact their doctor if it occurs – imiquimod should be ceased immediately, which will avoid scarring, and topical emollients and corticosteroids used to settle the reaction. Interestingly, patients with this response do not always have further responses of this nature if the drug is used elsewhere.

Serial curettage and cautery

Curettage and cautery is quick and removes tumours that may be more superficially extensive than they initially appear. Cure rates are approximately 80% in trained hands but cosmesis is often poor: the patient is left with an ivory white scar. The defect (ulcer) must heal by secondary intention, which may be prolonged if located on a limb. The ulcer may also pull on free margins (eyes, lips, nose) if this technique is used on the face.

Curettes come in various sizes and may be metal (requiring sterilisation) or disposable. Serial curettage requires local anaesthetic and repeated cycles of scraping out the tumour; the skin debris is sent for histological confirmation. The defect is then cauterised for haemostasis. Subcutaneous fat cannot be curetted so this technique is ineffective for deep nonmelanoma skin cancer. Serial curettage and cautery is not used for high risk tumours.

Simple excision

Simple excision provides histological confirmation of a nonmelanoma skin cancer and of completeness of excision margins. This approach provides a cure rate of 90 to 93% and can leave an excellent cosmetic result, with the final scar depending on the clinician's training and expertise. A thorough knowledge of skin anatomy is required. Local anaesthesia is necessary, and there is potential for blood contact.

The best results are achieved by mapping out the nonmelanoma skin cancer (with a skin marker) and drawing up the excision ellipse prior to surgery. Instruments must be appropriate for this type of surgery and strict infection control and sterilisation need to be observed. Suture material and other disposable items vary in size, quality and cost. By anticipating complications and having appropriate equipment available, such as a surgical suction device, poor outcomes can be avoided and the surgical result optimised.

Complex closures using local flaps are indicated where a primary closure is not possible (Figures 13a to d). They are also used to avoid distorting a free margin (e.g. around the eye or nose). This type of surgery usually requires more formal operating facilities than are found in most general practices and should only be undertaken after appropriate training. Surgical outcomes are optimised when the operation is performed in a licensed facility and with the help of an assistant.

Excision of a nodular BCC on the face

Figure 13a. A nodular BCC below the right ala nasi – a primary closure could cause retraction of the upper lip.

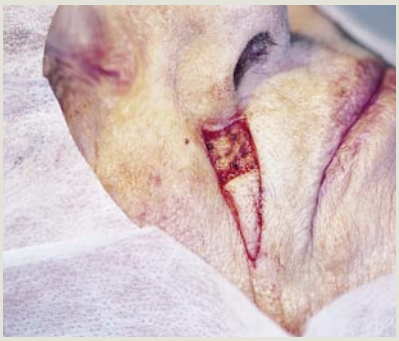


Figure 13b. A 'V to Y' island pedicle flap slides skin along the nasolabial fold.

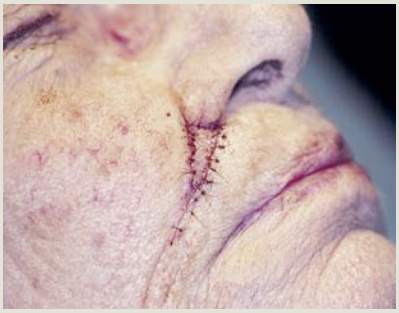


Figure 13c. The defect is closed without disturbing the lip margins.

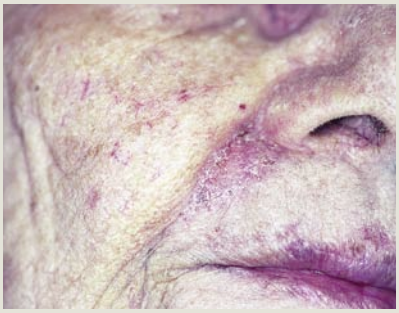


Figure 13d. The result at suture removal, one week later.

Radiotherapy

Superficial x-ray treatment is noninvasive and achieves a cure rate of around 90%. It provides good medium term cosmetic results, but the treatment area deteriorates over a decade to leave a mottled, brown, telangiectatic scar (Figure 14) with permanent loss of hair (Figure 15). Therefore, radiotherapy is not ideal for patients younger than 60 years or for treating lesions on the scalp. It is usually limited to treating tumours on the head and neck. Patients usually have multiple fractions over a few weeks so this treatment is not for the infirm.

Not all nonmelanoma skin cancers are radiosensitive (such as morphoeic BCCs); therefore, radiotherapy is not ideal for high risk tumours. Also, this treatment does not provide a specimen for margin review.

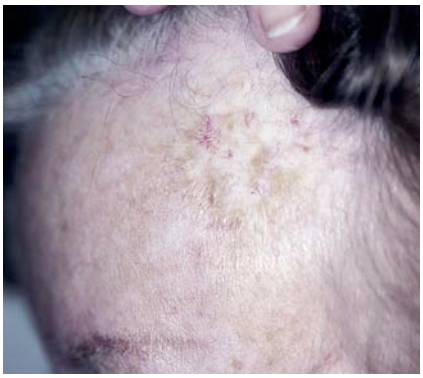


Figure 14. Radiotherapy-induced permanently mottled pigmentation and telangiectasia.

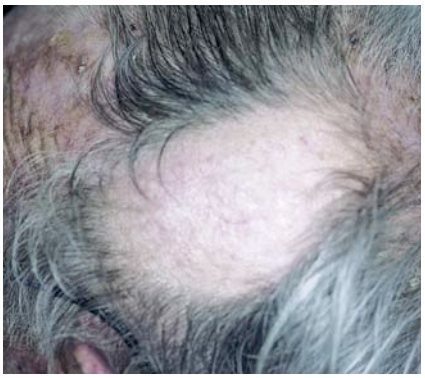


Figure 15. Radiotherapy-induced permanent alopecia after treatment for a diffuse BCC.

High risk lesions and Moh's micrographic surgery

High risk nonmelanoma skin cancers require caution and careful removal, and many doctors may feel more comfortable referring patients with these tumours for specialist attention. Tumour features that indicate a greater risk are listed in Table 7.

High risk nonmelanoma skin cancers should have histopathology performed for margin control, and surgery is therefore the treatment of choice. Wide excision, using a margin of up to 7 to 10 mm, achieves clearance in 95% of cases. This assumes that the nonmelanoma skin cancer has extended beyond the clinical margin that can be estimated by the clinician. Clearly, this is incomplete in 5% of cases, and it may be an overestimate in other cases. This approach is reasonable in anatomical sites such as the torso and limbs but a large margin makes for a large repair and may be a problem on the face, especially around structures such as the eyes, nose and superficial nerves and vessels. This is especially true for younger patients in their twenties to fifties.

Moh's surgery is a serial excision of nonmelanoma skin cancer under local anaesthesia using frozen section histoanalysis of the specimen. The box on page 37 lists the steps involved. A dermatologist performs the excision and then a pathology technician prepares a frozen section for immediate assessment (within an hour). Mapping of the tumour allows for identification of the area(s) where incomplete excision has occurred and directs the surgery for the next 'cut'. In this way excision is complete in more than 99.5% cases and there is maximum conservation of normal skin for the best repair.

Alfa interferon

Alfa interferon, which was approved for superficial and small nodular BCCs, was used for many years before being withdrawn by the manufacturer. Patients were treated intralesionally three times a week for three weeks (nine injections altogether). The cure rate was about 80% at one year.

Diffuse solar keratoses

Although solar keratoses are not skin cancers, they are precursor lesions and are often extensive in patients who require skin cancer treatment. Liquid nitrogen is adequate for treating individual lesions, whereas wall-to-wall keratoses can be treated with a regional approach or 'field treatment'.

Fluorouracil cream (Efudix) is effective for solar keratoses (Figures 16a and b, see also Table 6). The cream is applied twice daily for up to 28 days (depending on the site and degree of erosion). After two weeks of treatment, patients are reviewed weekly so that infection, pain control and adequacy of effect can be assessed. After two weeks, daily application of a potent topical corticosteroid cream, such as methylprednisolone (Advantan), helps reduce the intense inflammation caused

Table 7. Tumour features that indicate a high risk

Basal cell carcinoma

Recurrence
Incomplete excision
Size larger than 2 cm
Poor definition
Morphoeic, infiltrating subtype
Micronodular, perineural invasion
Special sites – nose, eyelids, temple, pre- and postauricular area, lower legs

Squamous cell carcinoma

Recurrence
Incomplete excision
Size larger than 2 cm
Depth of more than 6 mm
Primary mucosal SCC
Poorly differentiated SCC
Perineural invasion

Moh's micrographic surgery

Step 1
Long-lasting local anaesthesia of the tumour site is achieved.

Step 2
The tumour is mapped out on the patient's skin.

Step 3
The map is copied onto paper to identify the location of sections.

Step 4
A 'cut' is taken and sent for frozen section and slide preparation.

Step 5
A temporary dressing is applied over the wound and the patient is moved to a recovery area while awaiting the results.

Step 6
Sections of specimen are viewed by the dermatologist and correlated with any incomplete areas in the initial map.

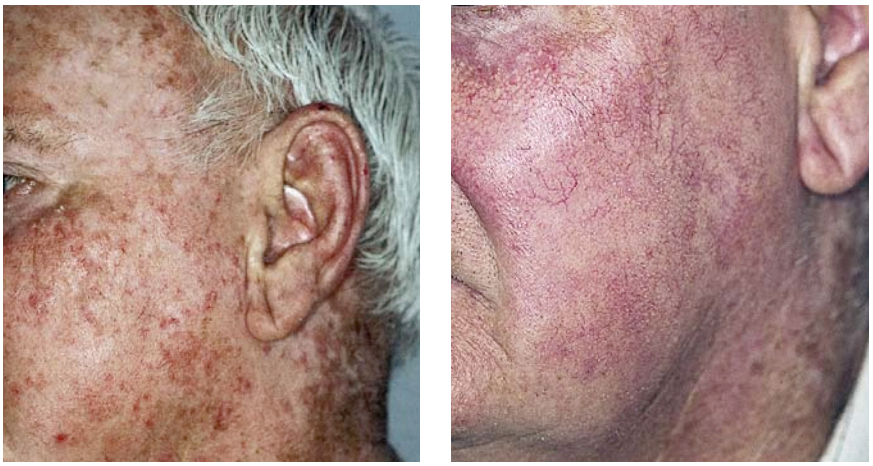
Step 7
The patient is returned for the next 'cut'.

Step 8
Steps 4 to 7 are repeated until all of the margins are clear.

Step 9
The wound is closed by the dermatologist using primary closure, a flap, graft or composite closure.

Step 10
Sections are then fixed in formalin and reassessed by the histopathologist to ensure complete excision.

by fluorouracil. After active treatment is stopped, the corticosteroid cream is weaned to 1% hydrocortisone cream until the erythema has settled. The patient must maintain sun protection to avoid postinflammatory hyperpigmentation. An important limitation of fluorouracil is that solar keratoses seem to return after three years.



Figures 16a and b. Diffuse solar keratoses before (a, left) and after (b, right) treatment with fluorouracil.

Fluorouracil cream has become a less popular therapeutic option, as technology has provided therapies with fewer side effects and greater patient acceptability. Imiquimod, an immunomodulating therapy that stimulates a lymphocyte-driven targeted removal of the solar keratosis, is effective. Photodynamic therapy is another new topical treatment for 'field defects'. It is ideal for treating large areas in either one or two sessions. It is also very effective for actinic cheilitis (solar keratoses over the lower lip). Imiquimod and photodynamic therapy are described in more detail earlier in this article.

Follow up

Patients with nonmelanoma skin cancer are usually reviewed after three months to look for early recurrence and assess wound healing. They have a risk of up to 35% of a new lesion within five years; therefore, annual follow up is indicated for five years.

For patients with high risk SCCs there is the added concern of lymph node spread. For this reason, examination of the regional nodes is part of the skin examination. More diligent follow up of patients with high risk SCCs should occur at six-month intervals.

Conclusion

Difficulty in managing nonmelanoma skin cancers may arise from atypical or unusual presentations as well as a poor understanding of histological variants. Therapy for BCCs and SCCs has evolved, with several options available depending on tumour subtype and location. MT

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1. Rosen RH, Studniberg H. Solar keratoses: analysis in a dermatological practice in Australia. Australas J Dermatol 2003; 44: 34-39.

Further reading

1. Clinical practice guidelines. Non-melanoma skin cancer: guidelines for treatment and management in Australia. Canberra: Commonwealth of Australia; 2003 (available at: www.nhmrc.gov.au/publications/synopses/cp87syn.htm).
2. MacKie RM, Quinn AG. Non-melanoma skin cancer and other epidermal skin tumours. In: Rook's textbook of dermatology, 7th ed. Burns T, Breathnach S, Cox N, Griffiths C, eds. Massachusetts: Blackwell Science; 2004. vol II, ch 36.

DECLARATION OF INTEREST: Dr Rosen has been a consultant advising the military, professional associations and pharmaceutical industry (3M, Galderma, Peplin, Pfizer and Allergan).