Melanoma case based learning resource

Overview of the melanoma case based learning resource: Jenny's story

This case study recounts the experience of Jenny, a 55-year-old female diagnosed with melanoma.

The case study contains four sections:

1 Reduce risk.
2. Find the condition early.
3. Have the best treatment and support during active treatment.
4. Have the best treatment and support between and after active treatment.

It is recommended that you complete the sections and their related activities in order. This is because each section and each activity includes information that will help you complete the sections and activities that follow.

Learning activities

At times, you will have learning activities to complete. Click on the learning activities button and a list of questions will pop up. The questions will relate to the content you've just read or the video you've just watched.

Videos

There is a video component to this case study that is presented in five parts. You can watch the video clips when prompted throughout this case study or at any time by clicking on the video icon in the right-side menu. Learning activities throughout the case study will discuss the video and ask questions about it.

Resource links

Resource links are included throughout the resource. These links lead to interesting articles or websites, and are designed to encourage you to explore other available resources.

PDF of melanoma module
You can download a PDF version of the melanoma module.

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Aim of the melanoma case study

This case study aims to facilitate the development of competencies that reflect the role of the Specialist Cancer Nurse (SCN) in managing disease and treatment related care for a person at risk of or diagnosed with melanoma across the cancer journey.

Rationale

Australia currently has the world's highest rate of skin cancer. Rates in the USA are a third less and rates in the UK are a quarter less than in Australia.[4]

Melanoma was the fourth most common cancer in both men and women in Australia in 2009, representing 10.1% of all cancer cases.[2]

There are many points along the cancer journey when the SCN can improve outcomes for people at risk of or affected by melanoma. These include:

Section 1: Reduce risk

There are clearly defined risk factors associated with the development of melanoma. Ultraviolet (UV) radiation exposure through sun exposure or artificial means such as solariums, especially in the first 25 years of life, is the major environmental risk factor associated with melanoma. Genetic and geographic factors are also linked to increased risk of developing melanoma.[4, 5]

The SCN plays an important role in population specific public health efforts to reduce exposure to lifestyle and occupational risk factors linked to melanoma.[6]

Section 2: Find the condition early

Morbidity and survival outcomes are improved when melanoma is detected and diagnosed early. Five-year survival rates are 92-97% for Stage I melanoma, 53-80% for Stage II, 40-78% for stage III and 10-28% for Stage IV.[7]

The SCN can facilitate early detection through education related to the signs and symptoms of melanoma and promoting review of suspicious lesions.

Section 3: Have the best treatment and support during active treatment

Primary localised melanoma is treated exclusively by surgery, but advanced and recurrent disease may involve the administration of biological and targeted therapies, antineoplastic agents and radiotherapy.[4] Given the rapid developments in novel molecular, targeted and immunotherapy treatment approaches, individuals may be given the opportunity to enter a clinical trial or access to treatments through compassionate circumstances.[4, 8]

The SCN can have an important role in providing information and support to people during treatment, and in preventing and managing adverse effects from treatments.

Section 4: Have the best treatment and support between and after active treatment

People treated for melanoma may require life-long follow up care, as the individual diagnosed with melanoma has an increased risk of developing future melanomas.

The SCN provides targeted education and resources to enable individuals to detect recurrent disease and new primary melanomas early. Education and support may also be required to manage the psychological and physical morbidity associated with melanoma and its treatment.

Section 1: Reduce risk

Objectives

On completion of this section, you should be able to:

1. Interpret key epidemiological trends in incidence, mortality and survival from melanoma.

2. Explain current evidence regarding risk factors associated with the development of melanoma.

3. Discuss the role of national skin cancer prevention programs and public health education messages in reducing the risk of melanoma.

4. Explain key factors which influence an individual's engagement in cancer risk reduction behaviours.

Skin cancer in Australia

Non melanoma skin cancer, including basal cell carcinoma (BCC) and squamous cell carcinoma (SCC) are not invasive cancers. However, they represent a large public health problem among the Australian population through direct costs of screening and treatment and to an individuals' quality of life due to associated disfigurement.[9] Non melanoma skin cancer is Australia's second most expensive cancer.[10]
The incidence of treated BCC and SCC is more than five times the incidence of all other cancers combined.11 Solar radiation is the major environmental cause of basal cell carcinoma and squamous cell carcinoma. Incidence of BCC and SCC increases with age.[9]
BCC is the most common cancer affecting Australians. In both sexes, a high proportion of BCC lesions occur on the head or neck (52%), followed by the trunk (27%), upper limbs (13%) and lower limbs (8%), corresponding with the most heavily sun-exposed sites. The head and neck are the most common sites of occurrence for SCC in men, while the upper limbs followed by head and neck are the most common sites in females.[9]
Melanocytic skin cancers differ to non-melanocytic cancers in their pathogenesis, and associated morbidity and mortality. While melanoma is the least common form of skin cancer, it is the most life threatening of the skin cancers.[12] In 2017, the estimated risk of developing melanoma to age 85 is one in 13.[54] It is estimated that it will be the third most commonly reported cancer in 2017, with an estimated 13,941 cases.[54] In 2012, the average age of diagnosis was 63 years.[54]
The highest age-standardised incidence rate for melanoma (2005-2009) occurred in Queensland (66.7 cases per 100,000 persons), followed by Western Australia (49.1), New South Wales (49), Tasmania (48.9), the Australian Capital Territory (42.3), Victoria (41.2), South Australia (37.9), and the Northern Territory (32.3).[56]
The number of new cases of melanoma skin cancer diagnosed increased from 3,527 (1,733 males and 1,794 females) in 1982 to 12,744 in 2013. Over the same period, the age–standardised incidence rate increased from 27 cases per 100,000 persons (28 for males and 26 for females) in 1982 to 50 cases per 100,000 persons in 2013. [57]
The number of deaths from melanoma skin cancer increased from 315 (178 males and 137 females) in 1968 to 1,467 in 2014. Over the same period, the age–standardised mortality rate increased from 3.3 deaths per 100,000 persons (3.9 for males and 2.8 for females) in 1968 to 5.5 deaths per 100,000 persons in 2014. [57]
At the end of 2012, melanoma had the second highest five year prevalence in men (29,561) and third highest five year prevalence in women (22,130).[54] The relative percentage of melanoma prevalence rises significantly at 1, 5, and 23 years in both males and females. The increasing prevalence of melanoma over time is a result of: [2, 13]

- high incidence rate
- the disease being more commonly diagnosed in younger people than other cancers
- comparatively high survival rates

In 2009–2013, individuals diagnosed with melanoma skin cancer had a 90% chance (88% for males and 93% for females) of surviving for 5 years compared to their counterparts in the general Australian population. [57]
Between 1984–1988 and 2009–2013, 5-year relative survival from melanoma skin cancer improved from 86% to 90%. [57]
Survival rates are significantly lower than this when melanoma is diagnosed in advanced stages.[4, 5]
Melanoma develops less commonly in non-Caucasian populations, but in these groups it often presents in acral sites and in general has a poorer clinical outcome. Melanoma comprised only 3% of all Indigenous cancer cases compared to 10% for the non-Indigenous population in NSW.[4]

Learning activities	
Completed	

☐	1	Access the Summary card for General Practitioners (GPs)[14] for an overview of GP management of BCC and SCC. Compare and contrast the following in relation to melanoma, SCC and BCC: • incidence in Australia • geographical patterns of incidence in Australia • prevalence in Australia • associated risk factors • five-year disease free survival rates.
☐	2	Access Cancer in Australia: an overview, 2014[2] and ACIM (Australian Cancer Incidence and Mortality) Books - melanoma of skin.[15] Summarise information relating to the melanoma on the following criteria: • projected incidence rates • risks by age 75, and by age 85 • annual change in incidence and mortality projections between 2010 and 2012 • trends in five-year survival.
☐	3	Explain possible reasons for geographical variations in incidence rates of melanoma nationally.

Risk factors

Risk factors for the development of melanoma are multifactorial and include environmental, genetic/familial and geographical factors.

UV radiation

- The main environmental factor contributing to melanoma is exposure to UV-B from the sun. A history of blistering sunburn leads to a two and a half-fold increase in relative risk of melanoma.[4, 5] Occupational exposure to UV rays means a range of outdoor workers are particularly at risk of melanoma, including construction workers, farmers, and postal workers.[16] The evidence is very clear - individuals should avoid being sunburned, even once.[17]
- UV-A acts synergistically with UV-B to promote carcinogenesis in the skin. Solariums, which produce predominantly UV-A, increase the risk of melanoma if the solarium user:[4]
    - has sun-sensitive skin
    - uses the solarium regularly
    - receives regular exposure prior to age 35.

Familial / genetic risk

- A familial risk for development of melanoma is present if a person has one first-degree relative with melanoma. This risk is more than doubled if three or more first-degree relatives are affected by the disease.[5]
- Genotype factors predisposing a person to sun sensitivity increase the relative risk for melanoma by 1.6-2.5 fold. Characteristics include skin type 1 (which burns without tanning), freckling, blue eyes, and red hair.[5] Skin type may partly account for the dramatic variation in incidence of melanoma based on ethnicity, but genetic, behavioural and environmental factors also play a part.[4]
- It has been estimated that less than 2% of all melanomas are due to the presence of identifiable, heritable mutations in highly penetrant genes.[5] Inherited mutations in the genes encoded by the CDKN2A locus, p16INK4A and p14ARF are strongly associated with melanoma risk, especially in the context of a family history of melanoma.[4]

Individual health factors

- Previous melanoma increases the risk of developing a second melanoma ten-fold. A history of other forms of skin cancer increases the risk four-fold.[4]
- The presence of multiple naevi, particularly dysplastic ones, is a strong marker for melanoma risk.[4, 5]
- Immunosuppression increases the relative risk, with transplant recipients at a three-fold greater risk and people with AIDS at a one and a half-fold greater risk of developing melanoma.[5]
- Age is a very strong risk factor for melanoma, with the incidence rising markedly after age 70.[4]

Clinical assessment of an individual's future risk of melanoma should take into account:[4]

- age and sex
- history of previous melanoma or non-melanoma skin cancer
- number of naevi (common and atypical)
- family history of melanoma
- skin and hair pigmentation
- response to sun exposure
- evidence of actinic skin damage.

Learning activities	
Completed ☐	1 Access Cancer Council Australia's Melanoma and Skin Cancer Wiki 18. • Outline the three categories of risk for skin cancer. 2 Outline your response to an individual of non-Caucasian lineage who states that they can't get skin cancer.

Case study: meet Jenny

Case study: meet Jenny
Jenny is 55-years old. This case study follows Jenny's journey. Watch Jenny's first video and then work through the learning activities. Jenny reflects on her history of sun exposure and expresses concern for her risk of melanoma. Jenny's story 1: risk factors

Learning activities		
Completed		
☐	1	Based on current screening recommendations and epidemiological data, discuss how you would advise Jenny on her risk status.
☐	2	Outline the risk reduction measures you could discuss with Jenny and her daughters in response to Jenny's concerns about developing melanoma. Include reference to current guidelines regarding solarium use.

Prevention strategies

Environmental and lifestyle factors play a large role in the initiation and growth of melanoma, therefore this type of cancer is viewed as one of the most preventable. Prevention is the most effective way to reduce the burden of melanoma on the community and mortality rates.[19]

Many initiatives focus on young Australians in the hope of increasing awareness of sun protection behaviours within this group and reducing lifetime risk. Skin cancer prevention has been described as a 'lifelong effort' that should begin in infancy.[20] The National Skin Cancer Awareness Campaign, launched in 2007, is an example of a primary cancer prevention strategy intended to promote sun protection behaviours so they become socially acceptable and part of the norm.[21]

Melanoma primary prevention initiatives focus on reducing exposure to UV radiation. Prevention strategies include media campaigns and written education initiatives targeting school-aged children through to adults in community-based health education.[22]

Changes in attitude and behaviour towards sun protection in Australia have been attributed to the success of widespread public education programs. The effectiveness of such programs is demonstrated through a reduction in the rate of rise of melanoma incidence in Australian birth cohorts since the 1960s.[5] Research continues to confirm that prevention strategies, like the regular use of sunscreen, can reduce incidence of melanoma significantly.[23] Evidence of the effectiveness and cost-efficiency of public health programs in Australia and overseas is accumulating.[19] It is estimated that the maintenance of the SunSmart program at $0.24 per capita per annum will yield a $2.32 saving in return for every dollar spent on the program.[24]

Resource links

Cancer Council Australia's Skin Cancer Committee position statements:

- Eye protection
- Fake tans
- Risks and benefits of sun exposure
- Solariums
- Sun protection and infants (0-12 months)
- Sun protection in the workplace
- Tinted windows

Learning activities		
Completed		
☐	1	Access the Cancer Council's list of skin cancer campaigns[25] or your state Cancer Council website. List examples of current prevention and early detection campaigns and strategies at local and national levels.
☐	2	Explain how current melanoma prevention initiatives are based on knowledge of the pathogenesis of the disease and the gender, age and race distribution of melanoma.
☐	3	Discuss how risk reduction education would differ for an individual in their fifties compared to that of an adolescent or primary school child.
☐	4	Access the NSW Cancer Council's Skin Cancer Prevention Evidence Summary[22], and describe the factors reported to reduce or encourage adherence to recommended risk reduction strategies related to melanoma.

Section 2: Find the condition early

Objectives

On completion of this section, you should be able to:

1. Discuss recommendations of key cancer organisations in Australia regarding early detection strategies for melanoma.

2. Explain strategies the SCN may use to promote early detection of melanoma.

3. Identify valid self-detection tools available for individuals and groups within the community and advocate for their appropriate use.

4. Describe common concerns and reactions of people with signs and symptoms associated with melanoma.

5. Implement strategies to provide information, education and support for people undergoing investigations to detect melanoma.

Early detection

Screening and early detection programs work on the potential to diagnose and treat melanoma earlier in the disease process, with the purpose of increasing the success of treatment within the community.[6]

Theoretical studies based on statistical models in Australia have concluded that the cost effectiveness of skin screening, with whole body skin examination, is comparable to that of other screening modalities, and that screening is more cost efficient when conducted in those older than 50. Population-based screening, though, is not currently recommended as available evidence does not show such screening to be effective in reducing melanoma morbidity and mortality.[19]

About half of all melanomas are detected by the individual presenting with a history of a new or changing lesion.[4] Information on self-detection strategies for Australians is available on a number of websites:

- The Melanoma Foundation: early detection[27]
- Australasian College of Dermatologists' A to Z of skin: how to check your skin and moles[28]
- Melanoma Patients Australia website – Early detection[29]

GPs may detect melanoma during routine examination of an individual or at skin examinations for the purpose of detecting skin cancer.[5] Through careful examination with good lighting and magnification, most melanomas can be identified clinically. Dermoscopy allows viewing of morphological features not seen with the naked eye[5] and improves accuracy of diagnosis.[19]

Clinical features of melanoma are summarised with an ABCDE rule:[4]

- Asymmetry
- Border irregularity (scalloped or notched)
- Colour variation
- Diameter greater than 6mm
- Evolution

Some melanomas do not show the ABCDE signs of melanoma. A new sign has been added to this list to help aid melanoma detection. The 'Ugly Duckling Sign' is based on the idea that melanomas look different from the moles that surround them. A patient's 'normal' moles often look like each other; a potential melanoma often looks, feels, or changes differently than the patient's other moles.[30, 31]

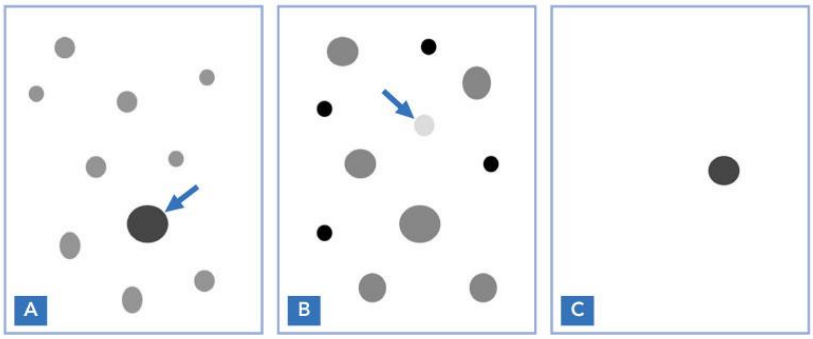

Figure 1. Three Examples of an Ugly Duckling

These three different scenarios depict "ugly duckling" moles that should prompt suspicion. Squares A, B, and C each represent a body area such as the back.[31]

- In **A**, there is a dominant mole pattern with slight variation in size. The "ugly duckling" is clearly darker and larger than all other moles.
- In **B**, there are two main patterns, one of larger moles and the other of smaller, darker moles. The "ugly duckling" is small but lacks pigmentation.

- In **C**, there is only one lesion on the back. If this lesion is changing, symptomatic, or deemed atypical, see a doctor and have this "ugly duckling" examined.

This figure and its explanation are taken directly from www.skincancer.org and are used with permission from the Skin Cancer Foundation.

Resource link:

Screening for melanoma. National Cancer Prevention Policy. Ultraviolet radiation, 2014[32]

Cancer Council Australia. Melanoma and Skin Cancer Wiki. Cancer Council Australia, 2014.18.[18]

Learning activities		
Completed		
☐	1	Access the following resources and complete a skin self-examination. • Australasian College of Dermatologists: A to Z of skin: how to check your skin and moles[28] • Clinical practice guidelines for the management of melanoma in Australia and New Zealand[4]
☐	2	Based on best available evidence, outline how you would advise a person who asks where and how often they should have their skin checked by health professionals.

Screening for people at increased and high risk

Expert opinion suggests that high risk individuals may benefit from regular clinical surveillance for new melanomas and education to undertake skin self-examination. There is no evidence to compare the relative effectiveness of specific surveillance techniques in high-risk persons, as opposed to those at average risk.[4, 33]

Current recommendations suggest that:[4]

- High risk individuals may benefit from regular clinical surveillance for new melanomas and education to undertake skin self-examination based on expert opinion. There is no evidence to compare the relative effectiveness of specific surveillance techniques in high-risk individuals, as opposed to those at average risk.
- Individuals at high risk of melanoma and their partner or carer are educated to recognise and document suspicious lesions, and to be regularly checked by a clinician with six-monthly full body examination supported by total body photography and dermoscopy as required.
- Screening for a mutation such as the CDKN2A gene be contemplated only after a thorough clinical risk assessment (the person is at personal high risk of melanoma), confirmation of a strong family history of melanoma (there is a significant probability of a family mutation), and appropriate genetic counselling.

Responding to a new symptom

The GP has been identified as key to early diagnosis of melanoma. The following list provides a summary of practice points within the document Melanoma- An Aide Memoire to Assist Diagnosis, developed to support effective early diagnosis.[34]

- The history of a skin lesion is very important.
- High-quality illumination should be used to detect lesions of which an individual is unaware.
- Not all melanomas are black.
- A period of observation may be appropriate for clinically doubtful pigmented skin lesions. Photography of the lesion is recommended to be used as a baseline to observe/compare any changes.
- Surgical excision biopsy, with a 2mm margin is the procedure of choice if signs suggestive of early melanoma are present. Shave, punch or incisional biopsies are only appropriate under certain circumstances e.g. the lesion is too big to excise completely or is in a difficult to access position.
- Locally advanced melanoma should be referred to a specialist surgeon or where possible, to a specialist melanoma clinic, without biopsy.

Learning activities		
Completed		Access the following resources to provide responses to these learning activities: • Chapters 5 and 6 in the Clinical Practice Guidelines for the Management of Melanoma in Australia and New Zealand 2008[4] • Melanoma is not what it used to look like[35] • Melanoma: An Aide Memoire to Assist Diagnosis[34]
☐	1	Define the following aids for the diagnosis of melanoma and discuss their role in early detection: • dermoscopy • sequential digital imaging • total body photography
☐	2	Outline current recommendations related to diagnostic biopsy of suspicious pigmented lesions and the health care providers involved.
☐	3	Describe how you, as the SCN, would provide education to a community group who has asked for information about how to observe for signs of skin cancer.

Case study
Jenny's story 2: new symptoms

Learning activities		
Completed		
☐	4	Describe the concerns a single parent such as Jenny may have when faced with a possible diagnosis of cancer.
☐	5	Outline strategies that could be used to reduce Jenny's anxiety at this point in her cancer journey.

Section 3: Have the best treatment and support during active treatment

Objectives

On completion of this section, you should be able to:

1. Describe the underlying biological mechanisms associated with the development of melanoma.

2. Discuss the implications of staging and grading of melanoma for a person's cancer journey.

3. Discuss key supportive care needs for people diagnosed with and undergoing treatment for melanoma.

4. Discuss current treatment approaches for the management of different stages and grades of melanoma.

5. Describe evidence based pre-and post-operative nursing care for people undergoing surgery for melanoma.

6. Identify the possible early and late effects associated with modalities used in the treatment of melanoma.

7. Implement evidence-based interventions to respond to the health needs of people undergoing the various treatments for melanoma.

Staging and grading of melanoma

The clinical subtypes of melanoma include:[4]

- **Superficial Spreading Melanoma (SSM)**: most common subtype and characterised by an initial flat phase that shows changes in size, shape or colour. May occur as early as teenage years. The mean age for SSM is in the 40s.
- **Nodular melanoma (NM)**: accounts for about 15% of melanomas. It presents as a symmetrical, raised, firm, often uniformly coloured and frequently non-pigmented nodule that is enlarging and becoming more raised. Bleeding and crusting are common. Occurs more often in older people.
- **Lentigo melanoma (LM) and lentigo maligna melanoma (LMM)**: Accounts for 10-15% of melanomas. It has an initial flat phase that may be prolonged. It presents as an atypical pigmented macule that is changing. Linked to large cumulative doses of UV light. Is more common in outdoor workers and older people.
- **Acral lentiginous melanoma (ALM)**: Accounts for 1-3% of melanomas. Occurs on the acral skin of the palms and soles.
- **Subungual melanoma**: A variant of ALM, arises within the nail matrix and usually presents initially as longitudinal melanonychia (brown to black stripe throughout the full length of the nail).
- **Desmoplastic melanoma**: may arise within a lentigo maligna or present de novo as a firm, evenly skin-coloured or pink nodule that is progressively enlarging.
- **In Situ melanoma/Hutchinson's Melanotic Freckle**

The histopathology report based on the biopsy of a primary cutaneous melanoma provides the clinician with the information necessary for the optimum management of the individual. The most important components of the report are the correct diagnosis of primary melanoma, the microscopic assessment of completeness of excision, and the microscopic measurement of tumour thickness (Breslow score).[4] Most Histopathology reports of melanoma use synoptic reporting where comments on breslow thickness, mitotic rate, excisional margins and ulceration are seen. The Clark Level has been previously used to classify how invasive a melanoma is. Clark Level was replaced in 2010 by more reliable predictive features (mitotic rate and ulceration). It is now only used for non-ulcerated tumours <1 mm.

The American Joint Committee on Cancer (AJCC) staging system for melanoma was introduced in 2002, and is now in international use.[5] The AJCC staging system was based on an analysis of staging and survival data. Staging groupings for cutaneous melanoma are based on clinical stage grouping and pathologic stage grouping according to the tumour-node-metastases (TNM) classification scale.[4]

Current Australian classification and staging of melanoma can be found in 'Chapter 4: Classification and staging of melanoma' of the Clinical Practice Guidelines for the Management of Melanoma in Australia and New Zealand.[4]

Learning activities		
Completed		
☐	1	Review the anatomy and physiology of the skin.
☐	2	Describe the pathogenesis of melanoma, including the development of metastasis.

☐	3	Access the Clinical Practice Guidelines for the Management of Melanoma in Australia and New Zealand 2008[4]
		• Discuss the characteristics of the most common forms of melanoma:
		  ○ superficial spreading melanoma
		  ○ nodular melanoma
		  ○ lentigo melanoma
		• Outline the key components of histopathological reporting of melanoma, and the rationale for reporting each of these components.
		• Describe your response when a person with melanoma asks what the Breslow thickness score means.
		• Outline the clinical features of stages 1-4 melanoma according to the AJCC staging system

Diagnostic investigations

Evidence to support or exclude the routine use of investigations following the diagnosis of primary cutaneous melanoma is inconclusive.[4]

In people with disease confined to the primary site on the skin, extensive staging investigations are inappropriate because of the extremely low detection rate of distance metastases.[4, 5] Investigations after the diagnosis of primary cutaneous melanoma are aimed at the detection of occult regional or systemic disease.

The most accurate method for the identification of occult regional lymph node metastases is sentinel lymph node biopsy (SLNB).[4] The SLNB indicates the presence or absence of micrometastases in that node field, and has a key role in accurately determining prognosis and staging. If the SLNB is positive, it may indicate the need for therapeutic lymph node dissection.[4] It is recommended that people with melanoma greater than 0.75mm in thickness have a SLNB. The justification for this change from the previous recommendation of 1.0mm includes:[36]

- Low morbidity associated with sentinel node biopsy in experienced hands
- Reduced anxiety and expense of intense clinical follow-up when a negative sentinel node is found

Investigations, including serum LDH, CT, MRI, and/or PET scan, are indicated for symptoms suggestive of metastatic melanoma.[4]

Resource link:

Imaging for melanoma and non-melanoma skin cancers. Cancer Forum, 2012[37]
Recent advances and important issues in melanoma pathology: an update for oncologists. Cancer Forum, 2012[38]

Learning activity	
Completed ☐	1. Outline the information you would provide to a person prior to a sentinel lymph node biopsy.

Prognostic indicators

Prognosis is poorer with increasing stage.[4] There are significant differences in the five and 10 year survival rates of stages I-IV melanoma, highlighting the importance of early detection and treatment.[5]

Five-year survival rates have been reported at 92-97% for Stage I melanoma, 53-80% for Stage II, 40-78% for stage III and 10-28% for Stage IV. [7]
Other factors that have been shown to influence prognosis include the following:[4, 5, 39]

- the Breslow thickness of the primary tumour is the strongest predictor of outcome, with thinner lesions (less than 1.0mm) having better prognosis
- the risk of death due to melanoma is greater in older people (60+ years of age) than it is in younger people, and greater in men than in women
- presence of ulceration and/or high mitotic rate confers poorer prognosis
- improved prognosis associated with lesions of the extremities compared with head, neck, and truncal melanomas
- in individuals with metastatic disease, those with subcutaneous spread or distant lymph nodes are associated with better prognosis than those with lung or other visceral organ involvement
- elevated lactate dehydrogenase (LDH) serum level is an indicator of disease progression and poorer prognosis.

Learning activities		
Completed		
☐	1	Discuss why there may be large variations in prognosis between individuals with a diagnosis of Stage III melanoma.
☐	2	Discuss information relating to the following topics that may be provided to a person with a 1.2mm thick melanoma considering whether or not to have an SLNB. • indication • role in disease management • post-procedural care and considerations.

Case study
Jenny's story 3: prognostic indicators

Learning activities		
Completed		
☐	3	Outline the likely process of referral by a GP for people such as Jenny diagnosed with melanoma.
☐	4	Access the Clinical practice guidelines for the psychosocial care of adults with cancer[40], and: • Outline the specific advice you would provide to Jenny when accessing information on the internet • Outline strategies for reducing Jenny's anxiety and uncertainty at this time.

Multidisciplinary care

A multidisciplinary approach to care for the person with melanoma is advocated due to its highly variable clinical course.[4, 41] As increased understanding of the molecular pathogenesis of melanoma is achieved, the critical role of pathology as a key component of multidisciplinary care is becoming apparent. Pathologists play a key role in the triage and selection of appropriate tumour tissue and tumour cells to test for various molecular markers which are used to select individuals who may benefit from targeted therapies.[38]

Specifically, MDT discussion may be required for:[41]

- tumour thickness greater than 1mm
- presence of histologic ulceration
- pregnant women with melanoma
- lesions of uncertain biological potential
- peri-neural invasion
- desmoplastic melanoma
- SLNB positive status
- Extracapsular extension of lymph node clearance
- amelanotic melanoma
- other issues defined by treating doctor, which may include:
- very anxious individuals
- contentious pathology
- strong risk factors for further primary, or difficult primary (for example, periocular large tumour).

Learning activities		
Completed		
☐	1	Outline the role of key MDT members involved in the management of a person affected by melanoma.
☐	2	Provide examples of the role that the SCN would have as a member of the MDT involved in the care of people affected by melanoma.

Treatment approaches for melanoma

The standard treatment for primary melanoma and positive regional lymph nodes is surgical excision. Surgery can also be valuable for individuals with disseminated disease beyond the regional nodes to improve local disease control.[4]

Systemic adjuvant treatment options, including antineoplastic agents, biological and targeted therapies, and combinations of these, have demonstrated little effect on disease behaviour in multiple clinical trials.[5] Targeted therapy, designed to target specific genes or proteins implicated in disease progression, is a major area of research in the treatment of melanoma. Therapeutic approaches to managing melanoma are rapidly changing with the development of novel agents which have demonstrated better efficacy than traditional antineoplastic agents.[42]

Radiotherapy may benefit:[4, 41]

- individuals with specific types of primary melanoma (for example, desmoplastic melanoma with neurotropic spread, lentigo maligna when an individual is unsuitable for surgery - approximately less than 1% of cases)
- individuals with loco-regional recurrent melanoma and disseminated disease which is unresectable
- those requiring palliative therapy for locally recurrent or metastatic disease such as palliation of multiple cerebral metastases and non-resectable bone metastases.

Resource link:

Management of loco-regionally recurrent melanoma. Cancer Forum, 2012[43]
Update: Radiation therapy for skin cancer. Cancer Forum, 2012[44]

Learning activities	
Completed	Access the NCCN Guidelines Melanoma.[42]
☐	1 Outline key recommendations related to the treatment and management of: • primary melanoma • regional lymph nodes in melanoma • loco-regionally recurrent melanoma • disseminated melanoma.
☐	2 Discuss how you would respond to a person newly diagnosed with melanoma who asks you how extensive their surgery will be.

Clinical trials

Clinical trials are rapidly contributing to evidence informing the treatment of melanoma. Current guidelines recommend that people with resected Stage I-III melanoma be considered for enrolment in clinical trials of adjuvant therapy.[4]

Current clinical trials involving individuals with melanoma are investigating the role of brain radiotherapy and local stereotactic radiotherapy, Vitamin D, and autologous peripheral blood T cells, and quality of life.[45]

Case study
Clinical trials discussion Jenny meets with the clinical trials nurse to discuss the possibility of enrolling in the MSLT-II trial. Jenny's story 4: clinical trials

Learning activities		
Completed		
☐	1	Access details of the MSLT-II at the Australian New Zealand Clinical Trials Registry (ANZCTR)[46] and: • assess the inclusion and exclusion criteria to identify Jenny's eligibility to participate in the trial • outline the interventions being studied • describe the primary and secondary outcomes of the trial • outline the follow-up intervals for individuals in the trial • discuss possible roles of the SCN in the MSLT-11 trial.
☐	2	Review the evidence to develop a response to Jenny's concerns about being disadvantaged through participation in a clinical trial. Suggested reading: Outcomes of patients who participate in randomized controlled trials compared to similar patients receiving similar interventions who do not participate[47]
☐	3	Role play the rest of the meeting between Jenny and the clinical trials nurse as details of the MSLT-II trial are discussed.

Surgical approaches for melanoma

The aim of surgical excision is to remove all in situ and invasive melanoma components. This is confirmed by a pathologist through comprehensive histological examination of the entire excised specimen.[4] Where tissue flexibility is limited, a flap repair or skin graft is sometimes necessary subsequent to an adequate margin of removal.

Treatment of most melanomas can be achieved on an outpatient or day-surgery basis, under local anaesthesia, unless nodal surgery is required or the surgery is extensive. Potential complications of surgical excision include:[4]

- wound infection
- haematoma
- failure of the skin graft or flap
- wound dehiscence
- risk of numbness
- a non-cosmetic scar
- the possibility of further surgery
- lymphoedema if a nodal clearance is performed.

Approximately 15% - 20% of individuals with melanoma 1.2 - 3.5cm thick have positive sentinel lymph nodes confirmed through biopsy. Complete lymph node dissection of the affected nodal basin or participation in a clinical trial is indicated for individuals with positive SLN after excluding stage IV disease using appropriate investigations.[4, 48]

Complications from all forms of lymphadenectomy (the surgical removal of one or more lymph node) include infection, seroma, paresthesia, haemorrhage, and lymphoedema. Inguinal dissections are associated with skin edge necrosis, wound dehiscence, lymphocele and a 20% - 40% incidence of chronic lymphoedema in the lower extremities.[49] The rate of clinically significant lymphoedema following axillary or groin dissection is 5-10%.[4]

The outcome for a person with stage IV melanoma is poor. Individuals with resectable metastases have prolonged survival after resection. Surgery can improve survival where metastases are limited to skin, subcutaneous tissue, distant lymph nodes, lung, adrenal gland, liver, and/or gastrointestinal system. Surgery or radiosurgery for solitary or few brain metastases of any histology followed by whole brain radiotherapy is effective in reducing intracranial relapse but not improving overall survival.[4]

Learning activities		
Completed		
☐	1	Discuss the rationale for recommendations related to differing margins used for wide local excision (WLE).
☐	2	For the wound closure methods listed below following WLE for cutaneous melanoma: • primary closure • keystone flap • skin graft. a. describe the procedure b. outline indications for the procedure c. outline possible adverse effects d. describe pre- and post-operative nursing implications.
☐	3	For an individual undergoing a complete inguinal lymph node dissection, summarise key nursing interventions relating to: • preoperative preparation • post-operative assessment to detect adverse effects • prevention of adverse effects.

Systemic and regional therapy approaches for melanoma

Observation is acceptable management for individuals with resected stages I-III melanoma. Individuals with resected AJCC stage IIC, IIB and IIIC disease are at high risk of recurrence and eventual death as a result of their disease (less than 50% ten-year survival) and should be considered for adjuvant systemic therapy. Those at intermediate levels of risk (stage IIA, IIB and IIIA, with 51-64% 10-year survival) may be considered for clinical trials of adjuvant therapy.[4] Historically, the only drug with demonstrated efficacy as adjuvant therapy for high-risk melanoma has been interferon-alpha2b.[4]

Traditionally, melanoma was treated with various antineoplastic agents including dacarbazine, temozolomide, paclitaxel with or without carboplatin. Response rates have been reported between 10-20%. New targeted therapies have been developed which are offering improved survival compared with conventional antineoplastic agents for metastatic melanoma. Challenging advances are the issues of acquired resistance to therapy and significant toxicity profiles. In an effort to improve response rates and delay resistance, clinical trials are underway to explore combining novel therapies.[8]
Agents demonstrating promise include:

- Vemurafenib (selective BRAF inhibitor)
- Dabrafenib (selective BRAF inhibitor)
- Trametinib (MEK inhibitor)

Current treatment of metastatic melanoma is often guided by the genetic biology of melanoma.

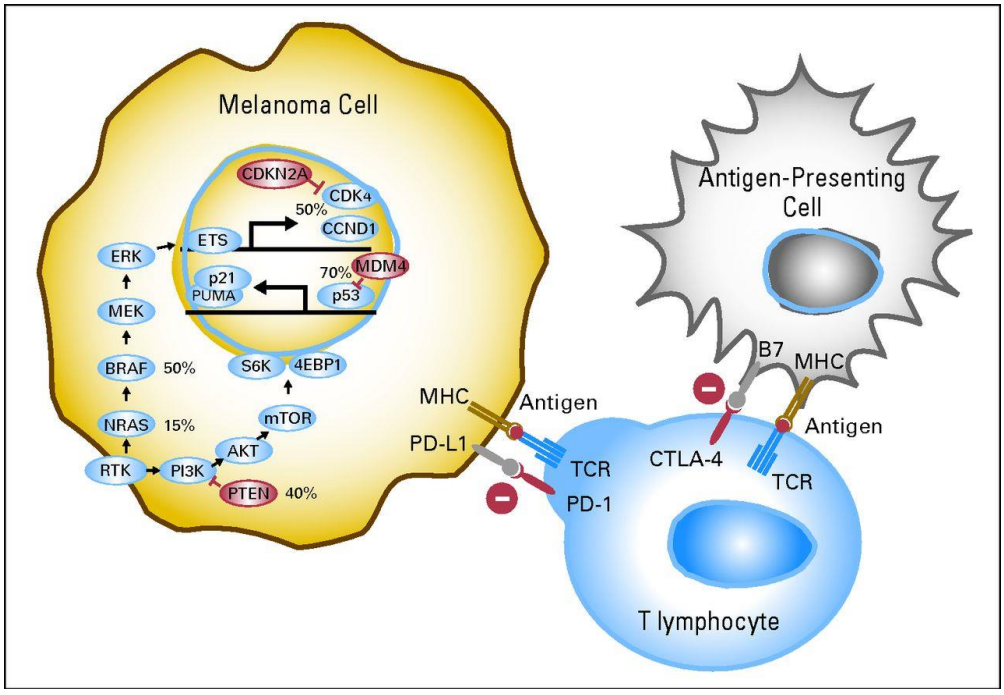

Figure 1: Therapeutic biology of melanoma. Schematic representation of frequent genomic changes in melanoma.
Numbers represent percentage of patients who have altered protein expression or mutation. Melanoma cells interact with T lymphocytes, where the activity of the T cells is controlled by a series of regulatory molecular interactions, including those between B7 and cytotoxic T-cell lymphocyte– associated antigen 4 (CTLA-4) and between programmed death 1 (PD-1) and its main ligand, PD-L1. CCND1, cyclin D1; CDK4, cyclin-dependent kinase 4; CDKN2A, p16INK4A inhibitor of CDK4; MHC, major histocompatibility molecule; TCR, T-cell receptor.

Source: McCarthur, G.A. & Ribas, A. (2013). Targeting Oncogenic Drivers and the Immune System in Melanoma. Journal of Clinical Oncology, 31(4): 499-506[50]

Imatinib as a targeted therapy has also been in use for melanoma with a c-KIT mutation, and modest response rates under 20% in first-line and second-line settings have been reported.[51]

It has been estimated at least 50% of patients with melanoma will have the presence of an activating mutation of the intracellular signaling kinase, BRAF. Individuals with BRAF positive disease will be treated with a BRAF inhibitor. Dabrafenib was added to the PBS this year. Venurafenib is another BRAF inhibitor and often these agents are given in conjunction with MEK inhibitor Trametanib either on trial or on special access programs.[42]

Immunotherapy remains a critical component of treatment of melanoma. Interleukin 2 and adoptive T cell therapy have demonstrated durable responses in a small subset of individuals. Recent advances have been made in developing specific agents which target critical components of T cell regulation. Ipilimumab is the first immune therapy shown to improve overall survival in a large group of individuals with metastatic melanoma. It received TGA approval in Australia as a second line treatment in mid-2011 and was added to the PBS in Australia in 2013.[8, 52]

A new class of immune agents in development aim to augment the anti-tumour T cell response by blocking the interaction of PD-1 and PD-L1, preventing T cell inactivation at a tumoural level. Early evidence from trials are suggesting response rate of over 50%.[8]

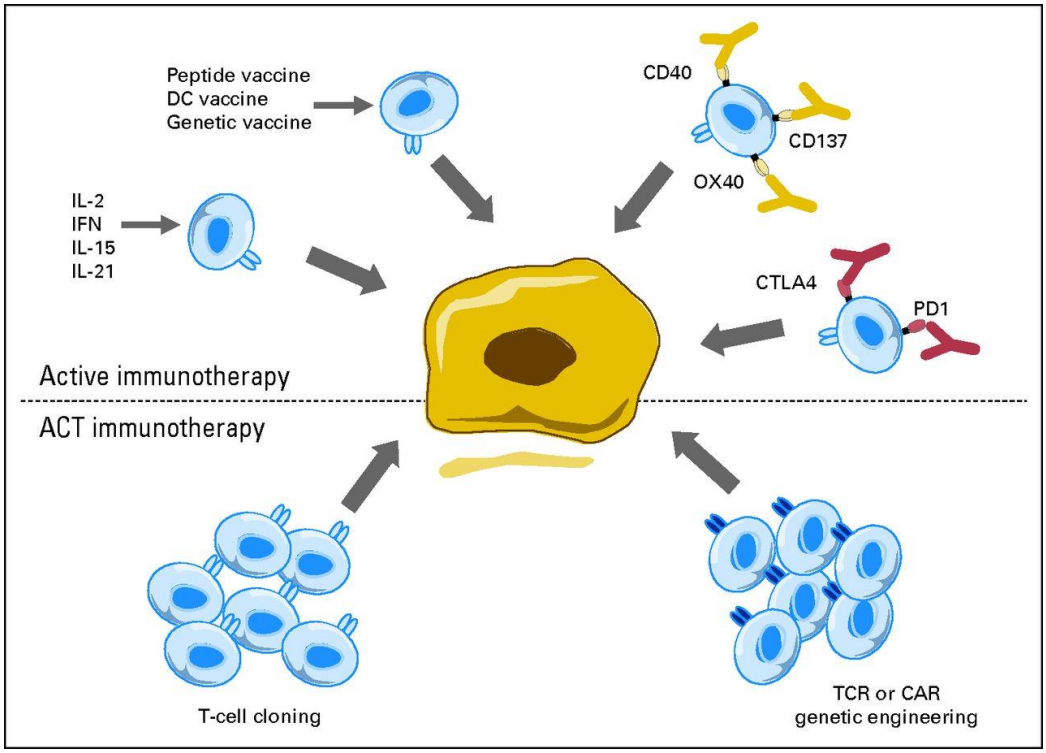

Figure 2: Immunotherapeutic approaches to treating melanoma.
Active immunotherapy with cytokines, vaccines, and antibodies targeting positive regulatory molecules (CD137, CD40, and OX40) and negative regulatory molecules (programmed death 1 [PD-1] and cytotoxic T-cell lymphocyte–associated antigen 4 [CTLA-4]). Adoptive cell transfer (ACT) therapies by T-cell cloning

or genetically engineered T cells with T-cell receptors (TCRs) or chimeric antigen receptors (CARs) to melanoma antigens. DC, dendritic cell; IFN, interferon; IL-2, interleukin 2.

Source: McCarthur, G.A. & Ribas, A. (2013). Targeting Oncogenic Drivers and the Immune System in Melanoma. Journal of Clinical Oncology, 31(4): 499-506{McArthur, 2013 #1617

Limbs with multiple, rapidly growing or rapidly progressive lesions may be treated with regional drug therapy. Isolated limb perfusion (ILP) using melphalan under hyperthermic conditions is the standard, but involves a high level of technical skill and experience to minimise complications. Isolated limb infusion (ILI), more commonly used in Australia, is a simpler method of regional drug delivery, and appears to provide a response rate and duration of response similar to that of ILP.[4] Response rates approaching 90%, including complete response rates of 60-70%, are routinely achieved with these methods, with low complication rates. Response rates may be sustained for periods approaching a year in approximately 50% of responders.[4]

Resource link:

New systematic therapies for metastatic melanoma – MAPK inhibitors and Immunotherapy. Cancer Forum, 2012.[8]

Learning activities		
Completed		
☐	1	You are asked by a person with melanoma if there is much evidence to support the use of interferon-alpha2b in treatment of melanoma. Discuss how you would respond.
☐	2	Develop a nursing care plan to support a person receiving Vemurafenib or Dabrafenib for melanoma.

Supportive Care needs

The person affected by melanoma faces a number of challenges, such as:[4]

- existential concerns related to diagnosis of a life-threatening disease
- pain and discomfort associated with treatment
- body image changes associated with disfiguring surgery.

Deeply indented or long scars may be particularly distressing.

Individuals and family members may fear relapse, treatment-related trauma and the impact of late-stage disease. Depression, potentially exacerbated by interferon-alpha therapy, may require specialised psychological support or referral to a psychiatrist for review.[41]

Based on analysis of available evidence, current guidelines recommend:[4]

- Communication skills training should be provided to health professionals treating people with melanoma to assist them in effectively providing information, person-centered care, shared decision-making where desired, and empathy and support.
- Structured psychosocial interventions, such as cognitive behavioural group therapy and psycho-education, as well as support groups, should be made available to all persons with melanoma to improve their quality of life.

Learning activities		
Completed		
☐	1	Discuss common psychosocial concerns experienced by a person undergoing treatment for melanoma.
☐	2	Describe key aspects of a psychosocial assessment for a person undergoing surgery for melanoma.

Case study

Jenny discusses her surgery.

Jenny's story 5: psychological issues

Learning activities		
Completed		
☐	3	Outline the nursing interventions in the post-operative period following a procedure such as Jenny's: • wound care • seroma • pain.
☐	4	Outline the psychosocial supports and services which may be accessed to meet the needs of a person such as Jenny.

Section 4: Have the best treatment and support between and after active treatment

Objectives

On completion of this section, you should be able to:

1. Explain the recommended follow up regimen after curative treatment for melanoma.

2. Describe the survivorship issues experienced by people after treatment for melanoma across all domains of health.

3. Implement evidence based interventions to promote optimal health across all domains for a person following treatment for melanoma.

Follow up treatment and care

Locoregional recurrence of melanoma refers to recurrence of melanoma in the anatomical region from the primary site to the regional lymph nodes, after apparently complete excision of primary melanoma.[4]

A structured follow up plan for melanoma may detect a recurrence early, allowing early treatment.[4, 48] Frequently, individuals rather than health professionals detect their own recurrence following thorough explanation of signs and symptoms of recurrences and new primary melanoma. In Australia, up to 75% of people with melanoma detect their own recurrences. Recommendations for current follow up schedules were developed in light of observations that 80% of recurrences develop in the first three years. Recurrences have occurred as late as 46 years after initial diagnosis.[4]

It has been suggested that concerns about melanoma recurrence may result in non-compliance with, or avoidance of, continued follow-up.[53] In addition to detecting subsequent second primary melanoma (lifetime risk 4%-8%), follow-up care may provide opportunities to provide ongoing psychosocial support and education, identification of familial kindreds, screening for second non-melanoma primary malignancies, and documentation of the results of treatment.[48] Distress across a number of domains of health can occur in individuals with deeply indented scars, such as those that occur with skin grafting, and/or with disfigurement, particularly of the face, head and neck.[34]

Current recommendations define that follow up appointments should occur:[4]

- six-monthly for five years for individuals with stage I disease
- three- or four-monthly for five years for individuals with stage II or III disease
- yearly thereafter for all individuals.

Ultrasound, to detect regional lymph node metastases, may be used in conjunction with clinical examination only in the follow up of people with more advanced primary disease. For individuals enrolled in clinical trials, the above recommendations may vary in accordance with trial protocols.[4]

Learning activities		
Completed		
☐	1	Outline information an SCN may provide to a person following primary treatment of melanoma to enable early detection of disease recurrence and/or new primary melanoma.
☐	2	Outline the health needs and concerns which may be faced by a person following primary treatment for melanoma given the unpredictable disease trajectory.

Managing lymphoedema

Upper or lower limb lymphoedema is a potential adverse effect of melanoma treatment depending on the location of the melanoma and the extent of the surgery required. Lower limb lymphoedema may impair mobility, especially when both legs are affected.[41]

The SCN has a role in helping to:[12]

- identify people at risk of lymphoedema
- refer to a physiotherapist or trained lymphoedema massage specialist
- provide information about activities to avoid or reduce the risk of developing lymphoedema
- provide information about early warning symptoms of lymphoedema that require further attention
- refer to lymphoedema associations and support groups for those who develop lymphoedema.

Learning activities	
Completed	Access the Lymphoedema[54], Cancer Australia Resource page to help answer the following:
☐	1 Outline the information and resources an SCN could provide to an individual to prevent lymphoedema.
☐	2 Describe the parameters and processes for diagnosis of lymphoedema.
☐	3 Discuss current evidence-based strategies for managing lymphoedema.

References for melanoma case based learning resource

1. Australian Institute of Health and Welfare and Australasian Association of Cancer Registries. *Cancer in Australia: an overview, 2010*. 2010 [cited Cancer series no. 60, Cat no. CAN 56; Available from: http://www.aihw.gov.au/publication-detail/?id=6442472459.
2. AIHW & AACR. *Cancer in Australia: an overview 2012*. 2012; Available from: http://www.aihw.gov.au/publication-detail/?id=60129542359&tab=3.
3. Cancer Council Australia. *National Cancer Prevention Policy*. 2013; Available from: http://wiki.cancer.org.au/prevention/National_Cancer_Prevention_Policy.
4. Australian Cancer Network Melanoma Guidelines Revision Working Party. *Clinical practice guidelines for the management of melanoma in Australia and New Zealand*. 2008.
5. Thompson, J.F., R.A. Scolyer, and R.F. Kefford, *Cutaneous melanoma.* The Lancet, 2005. **365**: p. 687-701.
6. Cancer Council Australia. *National cancer prevention policy 2007-2009*. 2007; Available from: www.cancer.org.au/File/PolicyPublications/NCPP/NCPP_Full_document.pdf.
7. American Cancer Society. *Survival rates for melanoma skin cancer*. 2014 1 July 2014]; Available from: http://www.cancer.org/cancer/skincancer-melanoma/detailedguide/melanoma-skin-cancer-survival-rates.
8. Menzies, A.M., *New systemic therapies for metastatic melanoma - MAPK inhibitors and Immunotherapy.* Cancer Forum, 2012. **36**(3).
9. Cancer Council Australia and Australian Cancer Network. *Basal cell carcinoma, squamous cell carcinoma (and related lesions) a guide to clinical management in Australia*. 2008.
10. Australian Institute of Health and Welfare. *Health system expenditure on cancer and onther neoplasms in Australia 2008-09*. 2013; Available from: http://aihw.gov.au/publication-detail/?id=60129545611.
11. Staples, M.P., et al., *Non-melanoma skin cancer in Australia: the 2002 national survey and trends since 1985.* Medical Journal of Australia, 2006. **184**(1): p. 6-10.
12. Australian Institute of Health and Welfare. Cancer in Australia: an overview, 2014; Available from: http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=60129550202...
13. Australian Institute of Health and Welfare, Cancer Australia, and Australasian Association of Cancer Registries. *Cancer in Australia: an overview, 2008*. 2008 [cited Cancer Series no. 46 Cat. no. CAN 42.
14. Australian Cancer Network and Cancer Council Australia. *A summary of management in clinical practice: basal cell and squamous cell carcinoma*. 2008 14.04.2011]; Available from: http://www.cancer.org.au/File/HealthProfessionals/NMSCGPsummarycardNov2008.pdf
15. Australian Institute of Health and Welfare. *Australian cancer institute and mortality (ACIM) books*. 2011 14.04.2011]; Available from: https://www.aihw.gov.au/reports/cancer/acim-books/contents/acim-books.
16. National Health Service and National Institute for Health and Clinical Excellence (NICE). *Skin cancer: prevention using public information, sun protection resources and changes to the environment. NICE public health guidance 32*. 2011 16.03.2011]; Available from: http://www.nice.org.uk/nicemedia/live/13310/52562/52562.pdf.
17. Marsden, J.R., et al., *Revised UK Guidelines for the management of cutaneous melanoma 2010.* British Journal of Dermatology 2010. **163** p. 238-256.

18. Cancer Council Australia. *Melanoma and Skin Cancer Wiki* 2014 01.03.2016]; Available from: http://wiki.cancer.org.au/oncologyformedicalstudents/Melanoma_and_skin.
19. Cancer Council Australia. *National Cancer Prevention Policy. Ultraviolet radiation*. 2013; Available from: http://wiki.cancer.org.au/prevention/UV.
20. Council on Environmental Health and Section on Dermatology. *Policy statement: ultraviolet radiation, a hazard to children and adolescents*. 2011 16.03.2011]; Available from: http://pediatrics.aappublications.org/cgi/reprint/peds.2010-3501v1.
21. Australian Government and Department of Health and Aging. *Skin cancer: background on the campaign*. 2008 09.04.2009]; Available from: http://www.health.gov.au/internet/skincancer/publishing.nsf/Content/background-1.
22. NSW Skin Cancer Prevention Working Group. *Skin cancer prevention: evidence summary*. 2007 09.04.2009]; Available from: http://www.cancercouncil.com.au/html/prevention/sunsmart/downloads/skincancer_prevention_evidence_summary.pdf.
23. Green, A.C., et al., *Reduced melanoma after regular sunscreen use: randomized trial follow-up. .* Journal of Clinical Oncology 2011. **29**(3): p. 257-263.
24. Shih, S.T.-F., et al., *Economic evaluation of skin cancer prevention in Australia.* Preventive Medicine, 2009. **49**(5): p. 449-453.
25. Cancer Council Australia. Skin cancer campaigns and events. 2015 09.11.2015]; Available from: http://www.cancer.org.au/preventing-cancer/sun-protection/campaigns-and-events/.
26. Cancer Institute New South Wales. *NSW Skin Cancer Prevention Strategy 2012-15*. 2012; Available from: http://edcan.org.au/assets/edcan/files/2012-11-19_nsw-skin-cancer-prevention-strategy.pdf.
27. University of Sydney. *Melanoma Foundation*. 2010 14.04.2011]; Available from: http://sydney.edu.au/medicine/melanoma-foundation/.
28. Australasian College of Dermatologists. *A-Z of skin: how to check your skin and moles*. 2004 14.04.2011]; Available from: https://www.dermcoll.edu.au/a-to-z-of-skin/.
29. Melanoma Patients Australia. *Early detection*. ND 1 July 2014]; Available from: http://www.melanomapatients.org.au/how-to-prevent-and-detect/early-detection.
30. McCarthy, W., *Developments in melanoma management - success and failure.* Cancer Forum, 2005. **29**(2): p. 96-101.
31. Skin Cancer Foundation. *Melanoma*. 2011 11.03.2011]; Available from: http://www.skincancer.org/melanoma/All-Pages.html.
32. Cancer Council Australia. *National Cancer Prevention Policy. Ultraviolet radiation. Screnning for melanoma*. 2014 May 2014; Available from: http://wiki.cancer.org.au/prevention/UV/Effective_interventions/Melanoma_screening.
33. American Society of Clinical Oncology (ASCO). *Melanoma: current research*. 2011 16.03.2011]; Available from: http://www.cancer.net/patient/Cancer+Types/Melanoma?sectionTitle=Current%20Research.
34. Cancer Council Australia. *Melanoma - an aide memoire to assist diagnosis*. 2008 09.04.2011]; Available from: http://www.cancer.org.au/File/HealthProfessionals/Aide-memoireformelanomadiagnosis18Nov08FINAL.pdf.
35. Menzies, S., *Melanoma is not what is used to look like.* Cancer Forum, 2005. **29**(02).
36. Goydos, J.S., *Who should be offered a sentinel node biopsy for melanoma less than 1 mm in thickness?* Journal of Clinical Oncology, 2013. **31**(35): p. 4385-4386.
37. Emmett, L. and H. Bao, *Imaging for melanoma and non-melanoma skin cancers.* Cancer Forum, 2012. **36**(3).

38. Scolyer, R.A., et al. *Recent advances and important issues in melanoma pathology: an update for oncologists*. Cancer Forum, 2012. **36**.
39. Hosmi, J., et al., *Cutaneous melanoma: prognostic factors.* Cancer Control 2005. **12**(4).
40. National Breast Cancer Centre and National Cancer Control Initiative, *Clinical practice guidelines for the psychosocial care of adults with cancer*. 2003, National Breast Cancer Centre: Camperdown, NSW.
41. Victorian Government Department of Human Services. *Skin tumour stream: melanoma*. 2006.
42. National Comprehensive Cancer Network. *NCCN Guidelines Version 4.2014 Melanoma*. 2014 02 July 2014; Available from: http://www.nccn.org/professionals/physician_gls/PDF/melanoma.pdf.
43. Geere, S.L. and A.P. Barbour, *Management of loco-regionally recurrent melanoma.* Cancer Forum, 2012. **36**(3).
44. Stevens, G., *Update: Radiation therapy for skin cancer.* Cancer Forum, 2012. **36**(3).
45. Australia and New Zealand Melanoma Trials Group. *Current Trials*. 2014 2 July 2014]; Available from: http://www.anzmtg.org/trials.aspx?cat=1.
46. Australian New Zealand Clinical Trials Registry. *Trial details: MSLT-II*. 2007 09.04.2009]; Available from: http://www.anzctr.org.au/trial_view.aspx?id=1340.
47. Vist, G.E., et al., *Outcomes of patients who participate in randomized controlled trials compared to similar patients receiving similar interventions who do not participate* Cochrane Database of Systematic Review 2008(3).
48. National Comprehensive Cancer Network (NCCN). *NCCN Clinical Practice Guidelines in Oncology: melanoma, version 2 2011*. 2011 16.03.2011]; Available from: http://www.nccn.org/clinical.asp.
49. Hollis, G., A. Recio, and L. Schuchter, *Diagnosis and management of high-risk and metastatic melanoma.* Seminars in Oncology Nursing, 2003. **19**(1): p. 32-42.
50. McArthur, G.A. and A. Ribas, *Targeting Oncogenic Drivers and the Immune System in Melanoma.* Journal of Clinical Oncology, 2013. **31**(4): p. 499-506.
51. National Comprehensive Cancer Network, *Melanoma Version 3.2014*, in *NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines)*. 2014.
53. Boyle, D.A., *Psychological Adjustment to the Melanoma Experience.* Seminars in Oncology Nursing, 2003. **19**(1): p. 70-77.
54. Cancer Australia. *Lymphoedema*. 2012 July 2014; Available from: http://canceraustralia.gov.au/clinical-best-practice/lymphoedema.
55. Australian Institute of Health and Welfare (AIHW) 2017. Australian Cancer Incidence and Mortality (ACIM) books: Melanoma of the skin. Canberra: AIHW. Available from: **https://www.aihw.gov.au/reports/cancer/acim-books/contents/acim-books**
56. Australian Institute of Health and Welfare 2016. Skin cancer in Australia. Cat. no. CAN 96. Canberra: AIHW. Available from: http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=60129556026
57. Cancer Australia. Melanoma Statistics. 2017. Available from: https://melanoma.canceraustralia.gov.au/statistics