AIS

SUN SAFE SPORTS:

The Australian Institute of Sport, Cancer Council, Paddle Australia, the Australian Radiation Protection and Nuclear Safety Agency and Melanoma Institute Australia Position Statement to reduce the risks of skin cancer in sport

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GLOSSARY

UV - Ultraviolet

ASC - Australian Sports Commission

AIS - Australian Institute of Sport

ARPANSA - Australian Radiation Protection and Nuclear Safety Agency

MIA - Melanoma Institute of Australia

KC - Keratinocyte Cancers

NMSC - Non-Melanoma Skin Cancer

BCC - Basal Cell Carcinoma

SCC - Squamous Cell Carcinoma

SPF - Sun Protective Factor

SED - Standard Erythema Dose, 1 SED = 100 Joules per metre squared or 100 $J/m^{2.}$

MED - Minimum Erythemal Dose1 MED is the minimum amount of energy required to generate an erythema response and is dependent on skin phototype for sunlight, typically 1 MED = 250 J/m2 for a fair skin phototype or Fitzpatrick skin phototype II.

UPF - Ultraviolet Protection Factor

NCF - Normalised Clothing Factor

PPE - Personal Protective Equipment

EXECUTIVE SUMMARY

Australia has the highest skin cancer rates globally with more than two in three Australians diagnosed with skin cancer in their lifetime. Sport is an integral part of Australian culture. Athletes, coaches, officials, volunteers, spectators and other personnel involved in sport spend prolonged periods of time outdoors. Consequently, participation in outdoor sport exposes athletes and support staff to increased levels of ultraviolet (UV) radiation from the sun with associated increased risk of sun damage, sunburn, and skin cancer. The more an individual is exposed to UV radiation, the greater their risk of developing skin cancer. Sporting organisations have a duty of care to ensure a safe environment including reducing solar UV radiation exposure. Thus, prevention strategies across all levels of the sport are needed to help protect those involved year-round.

As the high-performance arm of the Australian Sports Commission (ASC), the Australian Institute of Sport (AIS) functions as a resource for sport organisations, providing expertise and education as required.

This position statement, initiated by the Paddle Australia Athlete Commission, was developed as a collaboration between the AIS, Paddle Australia, Cancer Council, Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) and the Melanoma Institute Australia (MIA). It highlights the risk that UV radiation presents in Australia for athletes and support staff; current skin cancer epidemiology in athletic populations; the effectiveness of prevention strategies; and practical recommendations for how Australian sporting codes can act to safeguard their athletes, coaches, officials, volunteers, spectators, and other personnel involved in sport.

The goal of this position statement is to assist sporting organisations to recognise the inherent risk of UV radiation exposure in their sport and provide guidance on how to implement sun safe practices. It should not be interpreted as a guideline for clinical practice or legal standard. Recommendations will evolve to reflect evidence and advances in science.

INTRODUCTION

Sport is an integral part of Australian culture. Despite its relatively small population, Australia is renowned for its participation and success in international sporting events, including the summer and winter Olympic and Paralympic, and Commonwealth Games. Further, Australia has successfully staged events like the 2000 Sydney Olympic and Paralympic Games, the 2006 and 2018 Commonwealth Games, the 2015 ICC Cricket World Cup and the 2023 FIFA Women's World Cup (with New Zealand). During the upcoming Green and Gold decade that leads into the Brisbane Olympics and Paralympics in 2032, Australia will also host the 2027 Men's and 2029 Women's Rugby World Cups. The hosting of these high-profile events in Australia over the next decade will provide impetus for all Australians to get involved and participate in sport.

Sport delivers social and economic benefits while contributing to health and wellbeing. Over 90% of Australian adults are interested in sport. Each year 3 million children and 8.4 million adults participate in sport[1] and 8 million Australians attend live sports events. The sport sector contributes 2-3% of national gross domestic product (GDP), employing more than 220,000 individuals and attracting 1.8 million volunteers.

Participating in outdoor activities is not without risk. Those who spend all or part of the day regularly working outdoors are at increased risk of skin cancer. The sun's ultraviolet (UV) radiation is the most significant risk factor for skin cancer, including melanoma.[2-4] All skin tones can be damaged by exposure to UV radiation. Damage is permanent, irreversible and increases with each exposure. Athletes, coaches, officials, volunteers, spectators, and others involved in sport spend prolonged periods of time outdoors. Consequently, participation in outdoor sport during preparation and training exposes athletes to increased levels of radiation from the sun with an associated increased risk of sun damage, sunburn, and skin cancer. The more an individual is exposed to UV radiation, the greater their risk of developing skin cancer. Sporting organisations have a duty of care to ensure a safe environment for athletes and support staff including reducing solar UV radiation exposure. Prevention strategies need to be implemented year-round across all levels of sport to protect those involved from sun damage, sunburn, and skin cancer.

The Australian Sports Commission (ASC) is the Australian Government agency responsible for supporting and investing in sport at all levels. The ASC's strategic vision is to ensure sport has a place for everyone and delivers results that make Australia proud. The ASC also plays a critical leadership role in guiding sporting organisations and the sport sector in relation to a range of issues impacting sport. The ASC is not a regulatory authority and has no power to enforce compliance or regulations. As the high-performance arm of the ASC, the Australian Institute of Sport (AIS) functions as a resource for high performance sport organisations, providing expertise and education as required.

This position statement, initiated by the Paddle Australia Athlete Commission, was developed as a collaboration between the AIS, Paddle Australia, Cancer Council, Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) and the Melanoma Institute Australia (MIA). It highlights the risk that UV radiation presents to Australian participants; the harms to skin health caused by solar UV radiation; the effectiveness of prevention strategies; and practical measures that Australian sporting codes can implement to safeguard athletes, coaches, officials, volunteers, spectators, and others involved in sport. It aims to guide sporting organisations understand how best to apply these principles in their unique sporting environment. This position statement should not be interpreted as a guideline for clinical practice or legal standard of care.

Owing to differences in risk profiles, rules, settings and resources, guidelines need to be adopted for individual sport specific regulatory environments with the aim for continuous improvement of sun protection effectiveness over time. This position statement contributes to the establishment of strong fundamental conditions for success throughout the national high-performance system as well as the Australian Government's vision for ensuring Australia is the world's most active and healthy sporting nation.

In February 2022, MIA launched its Report, State of the Nation, A Report into Melanoma – a National Health Priority, which, among other things, provided recommendations for prevention and awareness of melanoma. One recommendation centered on a national strategy to treat sun-safety in Australian sports and other outdoor clubs in a manner consistent with other sport safety and inclusion issues. In September 2022, representatives from MIA addressed the National Press Club of Australia. Included in the address was a request for government to kick start a Sun-Safe Sports Initiative, raising the importance and treatment of sun-safety across all sports and all levels of participation, to the same level as other safety measures in sport.

RISK FACTORS FOR SKIN CANCER

Solar UV radiation is the most significant risk factor for skin cancer; and is responsible for at least 95% of all skin cancers in Australia.[2-5] The amount of damage to skin caused by UV radiation depends on UV intensity, innate skin colour and duration of exposure. Several factors affect UV radiation intensity including the time of the day, time of the year, cloud cover, altitude, hemisphere, proximity to the equator, scattering and reflection. Therefore, the UV radiation exposure can significantly vary across geographical locations within Australia. Further, altitude can increase UV radiation by about 4% per every 300 m gain.[6, 7] This means that an athlete training or competing 1200m above sea level experiences 20% more UV radiation exposure, compared to an athlete training at sea level (Figure 1). Both cumulative and intense intermittent UV radiation exposure are important factors for skin cancer development. Skin cancers most commonly develop in habitually-exposed body parts like the face, neck and scalp, where the UV radiation exposure is high compared to sun-protected body parts like the buttocks.[4] For instance, in one study all melanomas in ultra-marathon runners were on body parts that were not, or only partially, covered by their clothing.[8]

Genetic predisposition is another risk factor for developing skin cancer.[9] People with fair/lighter skin tones have a high risk of sunburn, sun damage and skin cancer.[10, 11] For example, Australian competitive and recreational surfers with fair (43%) and medium (47%) skin reported the highest frequency of skin cancers (86% keratinocyte cancers (KC) and 14% melanoma).[12] However, prolonged exposure and skin damage from UV radiation can increase the risk of skin cancer even for individuals without risk factors or who do not get sunburnt. Additionally, delay in detection or presentation of skin cancer in people with darker skin may lead to poorer prognosis.[13] An increased number of moles (melanocytic nevi) is a strong risk factor for developing melanoma, as is a family history of melanoma.[14]

Children's skin is more sensitive to UV radiation. Their thinner skin with high density of short and fine vellus hair follicles increase the percutaneous UV radiation absorption.[15, 16] Children spend an average of 1.5 to 5.1 hours per day outdoors during their childhood.[16] Therefore, 50% of the total lifetime UV radiation exposure is estimated to occur before an individual is 18 years old.[16, 17] There is strong evidence that high UV radiation exposure in the first 10 years of life increases lifetime melanoma risk.[18] Risk of skin cancer in adult athletes who participate in outdoor sports in particular, can be heightened from greater UV exposure during childhood. Decreased childhood UV radiation exposure therefore is vital to lowering skin cancer risk in adulthood.[19]

Athletes participating in outdoor sports may be at greater risk for skin cancer because of high cumulative sun exposure,[20] inadequate use of sun protection,[21, 22] and low skin cancer health literacy.[23, 24] Sporting organisations have a duty of care to provide and maintain a safe environment for athletes, including children, as well as spectators and paid and volunteer workers who contribute in many different ways to Australia's diverse sporting organisations and clubs.

Table 1: Risk factors for increased UV radiation exposure in athletes and support staff

- Time spent outdoors from an early age
- Time spent outside during peak UV radiation hours
- Chosen sport requires them to train & compete in unshaded settings/sporting venues
- Sun-sensitive phenotype (fair skin, freckles, red or fair-hair etc)
- Lack of/inadequate use of protective gear (e.g., UPF 50+ brimmed hats and sunglasses)
- Lack of/inadequate use of high UPF sun protective clothing that covers as much of the body surface as practical
- Lack of/inadequate use of broad-spectrum (UVA and UVB protection), water-resistant SPF 50+ sunscreen
- Skin photosensitivity, which may be sweat related or due to other factors
- Altitude-related increase in UV radiation
- Reflection of UV radiation by water, snow, sand and other high albedo surfaces

SKIN CANCER EPIDEMIOLOGY IN AUSTRALIA

Australia has the highest rates of skin cancer in the world,[5, 25, 26] with two out of three Australians being diagnosed with skin cancer in their lifetime,[27] leading to approximately 2,000 deaths annually.[28] The three main types of skin cancer occurring in Australians are basal cell carcinoma (BCC), squamous cell carcinoma (SCC) and melanoma.[25, 26, 29] Basal cell carcinoma and SCC are grouped into keratinocyte cancers (KC), formally known as non-melanoma skin cancers (NMSC).

KC is the most common cancer diagnosed in Australia.[30] KC is also the most expensive and preventable cancer in Australia.[31]

Melanoma is the most commonly diagnosed cancer in Australian adolescents and young adults.[32] Although melanoma is less common than KC, if not treated early, melanoma is more dangerous because it is more likely to metastasise into other organs leading to higher mortality rates. In 2021, 1,315 Australians died from melanoma compared to 760 deaths from KC.[33]

SKIN CANCER EPIDEMIOLOGY IN ATHLETES

Athletes who train and/or compete outdoors have an increased risk of melanoma and KC. For example, 11% of 210 (166 men and 44 women; median age 37 years) participants of the annual Graz marathon (Austria) were referred to a local dermatologist for surgical treatment of skin lesions suggestive of BCC, SCC, and actinic keratoses (a pre-cancerous skin lesion). Athletes training at the highest training volume (i.e. more than 70 hours per week) were more frequently referred to the dermatologist compared to those with lower training volumes.[8]

The incidence of skin cancer is particularly high among participants in some water sports. UV can penetrate water to depths of 50 cm, so water sport athletes are still at risk of high UV exposures even when in the water. The point prevalence of melanoma is 76 times higher in surfers and swimmers compared to the general Australian population.[34] 14% of Australian surfers (n=96 competitive, mean age 37 years and n=87 recreational, mean age 35 years, out of a cohort of 1,348) reported a history of skin cancer. In this group, BCC (7%), melanoma (1%) and SCC (1%) were the most common.[12] 74% out of 49 American surfers who completed beachfront skin cancer screening had atypical moles and 37% had at least one mole with at least one of the following criteria: asymmetry, irregularity of borders, variations in colour, or diameter >6 mm. Further, 21% of surfers had actinic keratoses (mean age 32 years), and 6% had BCCs (mean age 38 years).[35] This is a very young age to have these pathologies and places these individuals at much higher long-term risk. The face (24%), back (16%) and arms (12%) were the most common locations of skin cancer.[12] The relative risk of skin cancer was 74% higher in competitive surfers than recreational surfers (OR 1.74 CI 1.28–2.31 $P < 0.001$) and more skin cancers were reported in males (15% males vs 9% females $P < 0.001$).[12] Although data is lacking for high-performance winter sport athletes, Swiss skiers have an increased risk of SCCs.[36] Pre-cancerous skin lesions and skin cancer are also high in mountain climbers with 53% experiencing solar cheilitis, 25% solar keratosis and 7% BCCs.[20]

ULTRAVIOLET RADIATION EXPOSURE IN ATHLETES

Sports participants are exposed to high levels of UV radiation.[37-42] High performance athletes participating in both summer and winter sports outdoors have high long-term repeated UV radiation exposure.[43] On average, Australian competitive surfers spend 9 (± 7) hours per week surfing compared to 5 (± 4) hours spent by recreational surfers. Competitive surfers frequently train during the peak UV radiation times, in contrast to recreational surfers (51% vs 39%).[12] Further, athletes who participate in summer sports may train and compete in the middle of the day (i.e. when solar UV radiation exposure is at its peak) to stimulate physiological and thermoregulatory adaptations to reduce heat-induced performance impairments. A Standard Erythemal Dose (SED) is a standard measure of UV dose with just one SED per day being considered safe for most people. Tennis players compete in 'extreme' UV index in the Australian Open where they are exposed to up to 9.9 SED/hour of ambient UV radiation.[41] Athletes training and competing in certain environments also face additional UV radiation exposure. Participating in high altitude training/competition exposes athletes to higher UV radiation than those training at sea level (Figure 1). Snow and water

sport athletes may also experience increased UV radiation exposure through reflections from water, snow and other surfaces. Coaches, support staff and others involved in sport are also exposed to these same risk factors as part of their roles.

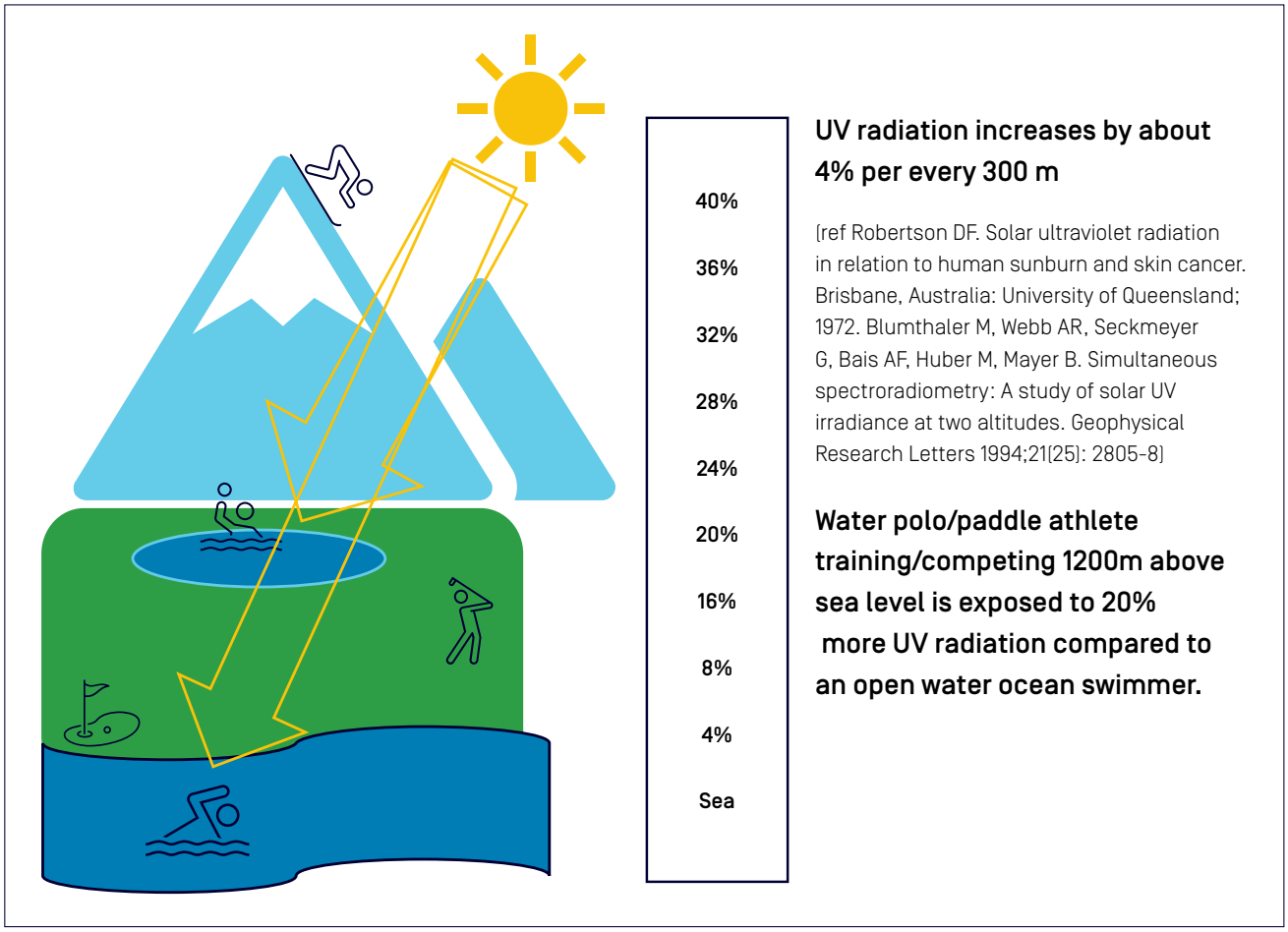

Figure 1: Altitude-related increase of ultraviolet radiation exposure at the same latitude

Athletes participating in the 1999 Ironman Triathlon World Championships (3.9km swim, 180.2km cycling, 42.4km run) in Hawaii spent between 8:44 h to 9:44 h competing. The mean personal UV radiation exposure was 8.3 MED/h (6.9–9.7 MED/h).[44] The UV detector was covered during the swim by the swimsuit, thus the UV exposure data for the swim was not available.

Modelling for the Tokyo Summer Olympics indicated a high UV exposure for gold medallists participating in tennis, golf, cycling, beach volleyball and field hockey events because of the long daytime schedules. The highest and most harmful UV radiation exposure was for women's tennis singles (1,680 Jm^2) followed by men's golf (1,530 Jm^2) and men's cycling road race (941 Jm^2) (typically 250 J/m^2 = 1 MED for a fair skin phototype).[45] The Normalised Clothing Factor (NCF: the relative proportion of the body protected by clothing - (NCF = 1 full-body clothing-coverage; NCF = 0 no effective clothing-coverage) for the 2016 the Rio Olympics men's tennis gold medallist was 0.4 due to a cap he wore.[46] In contrast, NCF was 0.2 for the 2016 Rio women's gold medallist because the clothing she wore only protected the navel site from sun exposure and no protective headwear was worn. Based on clothing at the 2016 Rio Games, the South Korean athletes competing in tennis had the highest level of sun protection and consequently the most significant relative reduction in UV radiation exposure.[45] Data for winter sport athletes are not available, however the mean UV radiation for ski instructors in Vail, Colorado (latitude, 39°N; elevation, 2500-3500m above sea level) for one month during November or December 2000 was 0.5 to 7.6 MED (1.3-19.0 MED per day) with two-thirds of them receiving more than 2 MED per day.[47]

SUNBURN EPIDEMIOLOGY IN ATHLETES

Several factors contribute to sunburn risk in athletes. The biggest risk factor for athletes is individual episodes of sun over-exposure from outdoor training and competition coupled with inadequate sun protection behaviours. There is limited data on the incidence of sunburn in Australian athletes; however, Queensland based research identified that 69% of young adults participating in hockey, tennis, soccer and surf sports experienced sunburn during their previous sporting season.[48] Australians aged 18-24 years are seven times more likely to get sunburned than those aged >65 years.[49] Internationally, one in four (28%) elite surfers, windsurfers and Olympic sailors from 30 different countries (n=240) experienced three or more sunburns that lasted at least one day over the past year, with 77% having experienced at least one episode of sunburn.[21] Sunburn was visible in many Ironman athletes despite using water-resistant sunscreen (sun protective factor (SPF) 25+) with more intense sunburns on the shoulders and thighs where sunscreen application was prohibited.[44] Although data is lacking for high-performance winter-sports athletes, 58% of the 226 recreational skiers and snowboarders interviewed in New Zealand (included 74 Australians) reported being sunburned while engaging in this activity.[50]

WHAT CAN BE DONE TO PREVENT SKIN CANCER?

The first line of defence: primary prevention

Solar UV radiation is the cause of at least 95% of melanoma and 99% of KC,[5, 51] making skin cancer a highly preventable disease. The aim of primary prevention is to prevent disease or injury before it occurs. In the context of skin cancer prevention, primary prevention means preventing the sun from harming unprotected skin, through the promotion of the Slip, Slop, Slap, Seek and Slide behaviours. These primary prevention messages have greatly contributed to improving awareness and sun protective behaviours across the settings where people live, work and play.[52] Mass media and social marketing campaigns in Australia have been particularly effective, supported by settings-based sun protection programs focused on positive behavioural change.[53]

Modelling suggests that daily sunscreen use by the Australian population would be more cost-effective in reducing new skin cancer cases and deaths compared to undertaking annual clinical skin examinations.[54]

Settings-based health promotion to prevent skin cancer

Settings-based health promotion approaches have been successfully applied in various contexts in Australia over many decades.[55] For example, strategies that improve sun protection practices in the school setting, workplaces and recreational settings have been shown to be effective.[56] An analysis of sun protection policies in sporting organisations across Australasia[57] found that when they are in place they can change practice.

Organisations must take a leadership role in preventing skin cancer in the settings where Australians live, work and play. Under Australian health and safety legislation, sporting organisations are responsible for providing and maintaining a safe working environment for their athletes, staff and volunteers.[58, 59] This includes the provision of measures to minimise UV exposure amongst all individuals defined as participants of that sport, including athletes, coaches, umpires and sporting officials. The Australian Sports Commission's Sporting Clubs guide to a Safe Workplace[58] was developed in 2013 in partnership with Safe Work Australia, NSW Sport and Recreation, the WorkCover Authority of NSW and the Qld Sport and Recreational Services. Sporting Clubs guide to a Safe Workplace also reflected the Commonwealth's Work Health and Safety Act 2012 and outlined the seven steps to implement work health and safety in a sport setting.

HOW CAN THE IMPACT OF SKIN CANCER BE REDUCED IN THE AUSTRALIAN SPORTING CONTEXT?

Unprotected exposure to solar UV radiation is the single most modifiable risk factor for melanoma and other skin cancers. Inadequate sun protection can increase the risk of excessive UV radiation exposure throughout an athlete's career.[60, 61] Further, high-profile athletes and coaches who have been diagnosed with skin cancer, have many challenges to face including disruptions in their ability to train and compete.[62-65]

Sun protective measures for high performance athletes are for the most part, the same as the principles that apply to any other Australians.[66, 67] The famous 'Slip, Slop, Slap, Seek and Slide' prevention message is ingrained in most Australian minds and highlights the need for using a combination of sun protection measures. Although the 'Slip Slop Slap' campaigns have been running for four decades, the sun protection measures adopted by most outdoor sports are not adequate to reduce skin cancer risk.[68]

Further, sport clothing may not meet the current Australian standards for sun protective clothing.[57] Clothing provides a physical barrier that reduces the UV radiation dose that reaches the skin. The Australian Standard (AS 4399:2020)[69] requires sun-protective clothing to meet minimum garment-coverage requirements and be made from a fabric that has an Ultraviolet Protection Factor (UPF) of at least 15 (i.e. blocks >93% UV). Upper-body garments must cover the entire torso from the base of the neck to the hips and across the shoulders with sleeves covering at least three-quarters of the upper-arms, while lower-body garments are expected to cover from the hips down to at least halfway between the crotch and knee (based on the inner-thigh measurement). The current Australian standard also requires bucket hats and children's broad brim hats to have a minimum brim width of 6 cm while a 7.5 cm brim is required for broad brim hats made for adults.

Athletic apparel is often primarily designed to increase cooling and avoid wind drag to provide a competitive advantage, with sun protection being only a secondary consideration. For example, shorts (97%), short-sleeved shirts (88%) and sleeveless shirts (11%) commonly used by marathon runners provide partial or no coverage of the back and extremities.[8] Therefore, shoulders, back of the hands and top of the head are high risk body sites.[39, 40, 42] Use of sun protective hats (by athletes, officials and coaches) is also reported to be low.[57] Wearing sunscreen may be seen as the most amenable form of sun protection, however actual sunscreen use is lower than ideal.

Inadequate sun protection can increase the risk of excessive UV radiation exposure throughout an athlete's career.[60, 61] Barriers to sun protection in athletes may include aesthetic desirability of suntan, influence of social and group norms, performance related concerns as well as lack of sun safe policy.[57] Therefore, it is important to consult with athletes to identify any potential or perceived barriers to the use of protective clothing and sunscreen. A health-survey questionnaire using a 1-4 point ordinal scale of 5 photoprotection practices, found that only 50% of elite athletes participating in water sports use adequate sun protection (greater than 50% of ordinal point total).[22] Similarly, only 56% of marathon runners regularly used sunscreen.[8] Sunscreen and lip balm were used by 66% and 78% respectively of skiers and snowboarders.[50] Elite watersport athletes who use adequate sun protection are older than those who do not (average age = 23.3 vs 20.7 years, p = 0.000).[22] It should be noted that some sports may prohibit the use of sunscreens.[22] It should also be recognised that sunscreen alone might not be able to be optimally used or provide adequate protection because of sweating, friction and water exposure in water sports and athletes may not be able to reapply sunscreen every 2 hours as per guidelines during the competition. Considerations may vary depending on the type of the sport, for example, water-based sports, those in hot conditions, team sports, or the inclusion of mandatory protective clothing and equipment. Where sunscreen use is not permitted by athletes during competition, then other forms of sun protection become more important.

The competition environment can impact athletic performance. The athletes' ability to seamlessly mitigate against factors such as heat exposure is important to success in competition. Athletes and coaches often replicate the conditions/environment they compete in to 'pre-condition' athletes (i.e., heat acclimatisation) to maximise performance but in doing so, can also potentially increase their UV exposure. Alternative methods (e.g., heat/environment chambers) to simulate competition conditions can reduce the exposure to UV radiation during training. However, given the potential risks (e.g., heat stroke), prescribing and periodising heat acclimation must be done under the guidance of qualified sport science staff.

Where possible, training, events and activities must be scheduled to minimise exposure to UV radiation, for example, late in the afternoon, when the UV index is below 3, but the temperature is still high. The methods discussed above can be used to monitor UV radiation levels and to inform training schedules. If peak UV exposure periods cannot be avoided due to sport/competition requirements, then UV exposure should be minimised by limiting the duration and intensity of warm-up activities, increasing rest breaks, providing shade, wearing UPF 50+clothing that complies with the body-coverage specifications outlined in the current Australian standard for sun protective clothing (AS 4399:2020).[69] Employees and officials, coaches and senior athletes should be encouraged to act as role models by wearing sun-protective clothing and hats, applying sunscreen, and seeking/providing shade, wherever possible.

Competition rules for some sports which have periods of play during intense UV radiation periods may increase athlete exposure. For example, beach volleyball competitions are held during peak UV radiation exposure times, and the International Volleyball Federation official rules prescribe athletes to wear apparel with minimum skin coverage. Both National and International Sport Organisations should reconsider the competition times and uniform requirements of their sport, and consider whether athletes are being put at risk of harmful UV radiation and subsequent skin damage.

Developing and implementing sun protection policies with sporting organisations

As a key stakeholder, sporting organisations have an important role in leading and supporting settings-based strategies to improve sun protection across the participation pyramid to protect the health of all involved in sport.[57] The availability, visibility, and implementation of sun protection policies vary across sporting organisations with varying levels of success. For example, cricket player uniforms have a high-level of cover.[70] Sponsorship of sun-protection in sport can improve the sun safe behaviors, as demonstrated for surf lifesavers in Victoria.[71] The Queensland government's mandatory swim-shirt policy led to an increased number of students wearing shirts while spectating at inter-school swimming carnivals.[72] The sun protection policy for court staff at the Australian Open tennis championship provides sun protective clothing which reduces the amount of ambient UV radiation reaching their skin to 0.5-1.0 SED/hour compared to two or more SED/hour for athletes.[41]

To maximise uptake, sun protection policies need to be sport-specific and should be developed in consultation with their key stakeholders. Policies need to strike a balance between sun-protective measures and supporting optimal sporting performance, to increase compliance from the athletes and other end-users. The **sun protection policy** drafted by the Cancer Council NSW is a freely available resource that can be adopted by sporting organisations. If possible, sporting organisations are encouraged to develop their own sun protection/skin cancer prevention policy. This should include conducting a risk assessment for all events, and optimal use of clothing coverage, shade structures, hats, sunscreen, and sunglasses. Monitoring of the UV index, duration of UV exposure, skin type and age of participants, and time of day and season, should be considered in the policy. Further, the **Skin Cancer and Outdoor Work Guide** summarises the key issues regarding sun protection for employers.

While there is limited literature on how best to implement sun safety in the sporting sector, health promotion implementation research, including studies undertaken in school and workplace settings, have identified several strategies that are effective in creating supportive environments, including:

- Leadership engagement and buy-in to enhance successful adoption, scale-up, and sustainability of an intervention.[73-78] Management buy-in and workplace champions ensure UV radiation safety planning is prioritised, and that the initiative has sufficient momentum and support to progress as intended.[79-81]
- The use of champions and/or 'opinion leaders' to play a key role in advocating for and maintaining intervention support[73-77, 82] particularly those who are highly placed and strongly believe in the intervention.[73]
- Supportive resources that are easy to understand, visually attractive and aim to motivate, enable and prompt behaviour are catalysts for change[76, 83]
- Providing flexibility and tailoring the delivery through shared decision-making can allow organisations to select resources that suit their specific needs.[73, 78, 84, 85]

RECOMMENDATIONS

To achieve sustained performance and success in sport, wellbeing must be prioritized across the sport participation pyramid. The goal of this position statement is to help sporting organisations, including high performance sport, recreational and school sport, understand how to best put sun protection principles into practice in their environment.

The **AIS Wellbeing Health Check** measures the wellbeing culture of high-performance sport and can be used to identify how successfully sporting organisations have integrated sun protective strategies as part of their wellbeing initiatives and services into their high-performance programs. The hierarchy of control for UV radiation safety in organisations (Figure 2) can be used as a guide to help develop and implement context- specific strategies to reduce the risks of skin cancer, supported by the implementation guidance provided in the **ASC Sporting Club Guide to a Safe Workplace**. A combination of strategies from policy to individual level is needed to achieve meaningful change and promote a sun protective sporting system.

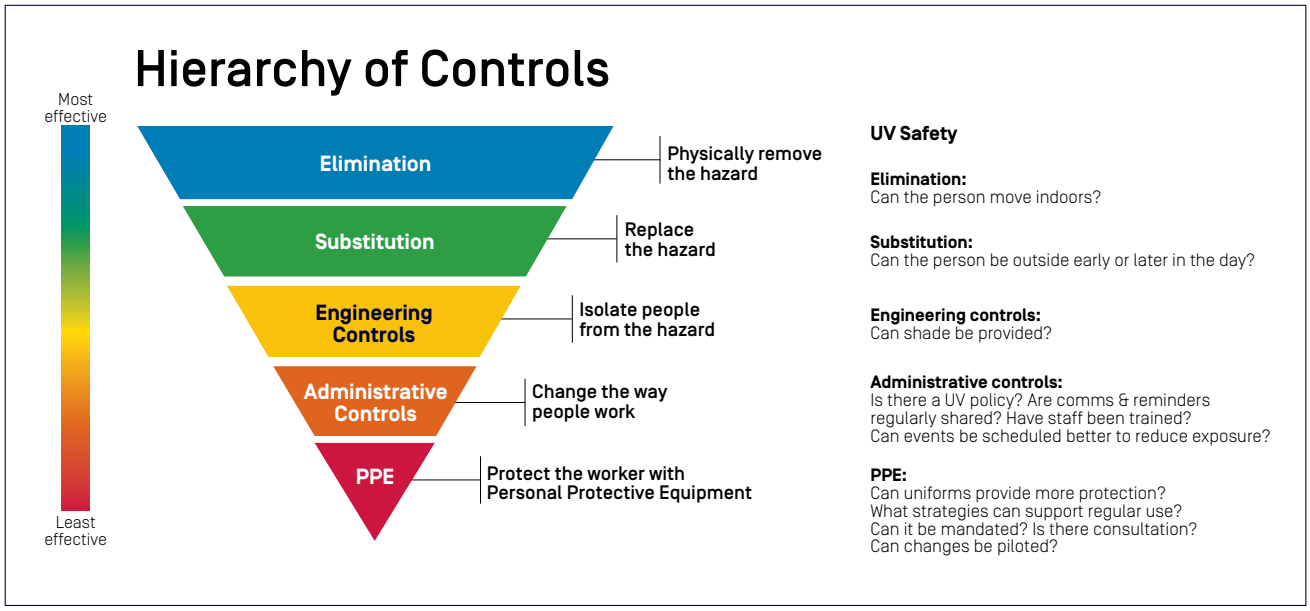

Figure 2: Hierarchy of Controls for UV radiation safety in organisations

Organisational sun protection measures to help reduce solar UV radiation exposure

Developing a positive sun protection culture

Behaviour is influenced by several factors including skin cancer risk perceptions, perceived barriers to sunscreen use, lower perceived benefits, and personal and group norms.[86] A sun protection policy can be the first step in demonstrating an organisation's commitment to sun safety, through the setting of clear guidelines endorsed by senior leaders. Setting up policy implementation support strategies requires broader organisation-wide engagement. For example, developing a suite of strategies to improve intention to use sunscreen among high-performance athletes should support more frequent sunscreen use. This can be achieved through a number of organisational practices including: increased education and awareness raising from the top down; increased access to sunscreen provided by the organisation; codesign strategies that identify athletes' perspectives and preferences; as well as sharing ongoing examples of implementation success.

Changing embedded individual and cultural behaviours can be overcome through the development of key messages, providing leadership and executive teams with the importance of the issue and need for improvements, supported by simple and tailored strategies to address their priority areas. Finding positive role models and champions within and across the sporting codes can support change and reinforce implementation. Building relationships and working with partner organisations (such as Cancer Council) can be a part of the solution in supporting organisational willingness to improve.

Working with and consulting various sport stakeholders within a sporting organisation can help to identify the opportunities and potential barriers to guide priorities. For example, procurement guidelines can help to improve the implementation and sustainability of quality sun-protective clothing and equipment that supports organisation-wide sun safe practices.

The following suggestions are aligned with the five Hierarchy of Controls used to guide prevention and control of exposure and risk in 'workers' within organisations, presented in order of effectiveness.

Elimination

- Sporting organisations and staff need to advocate for the removal of athletes and coaches from the outside environments during periods of peak UV exposure (i.e., between 10am and 3pm). For example, rowers could train indoors on rowing ergometers or complete gym training during this period rather than complete on-water sessions when the UV exposure is at its peak during the middle of the day.
- The complete elimination of UV as a hazard may not be practical if outdoor athletes are unable to train indoors, or at night.

Substitution

- The reality of most sports is that athletes need to train in the outdoor environment where they will be competing (often high-heat environments which also tend to be environments of high UV exposure).
- Substitution strategies could include encouraging athletes to train during periods of lower UV exposure (i.e., early morning or late afternoon).

Engineering controls

- Ensuring sufficient shade provision for competitors, spectators and officials is important for UV protection and thermal comfort. Quality shade can reduce UV exposure by up to 75%.[87] There are a number of options for providing shade. Sport organisations should consider what options are available and feasible for the location and conditions, including installation of appropriate natural and built (fixed or portable) shade structures for both regular and temporary outdoor sporting events.
- Increasing the accessibility of sunscreen to sporting participants and spectators can be enabled by placing free sunscreen dispensers at outdoor sporting venues, to encourage those present to apply sunscreen that is labelled broad spectrum, water-resistant and SPF 50 or above to any skin not covered by clothing. Placing sunscreen in easily available locations such as changing rooms and pitch-side can create 'right place-right time' synergies.

Administrative controls

Education and training

- Ensure training of coaches, staff, and club leadership in UV/sun protection.
- Educate stakeholders about the difference between UV radiation and heat (infrared radiation) and using the UV Index to support increased understanding about best times to train to reduce risk (e.g. sun protection required when the UV Index reaches 3).

- Use UV awareness apps such as the **SunSmart app**, including ongoing education and reminders (e.g. in newsletters, team communication and signage in common areas) that provide guidance on UV exposure risk by time of day and year.
- Align the sun safety prevention messaging with other safety and prevention systems within the organisation.

Leadership buy-in

- Sporting organisations to work with relevant stakeholders (e.g., local and state governments, corporate sponsors) to optimise sun protection opportunities, such as national and international sporting events and in planning future facilities and upgrades to existing facilities.
- Champions to implement - those involved in the sport (coaches, trainers etc.) encourage athletes to protect themselves against the sun.
- Encourage elite athletes to act as role models (ambassadors) to promote sun safety and lead by example.
- Strategies to drive implementation of sun/UV protection policies from a national peak sporting body to a state and local club level.

Communication

- Yearly sun safety campaigns amongst target populations. Working in partnerships with other relevant agencies to integrate campaigns (for example National Skin Cancer Action Week in November every year)
- Visual and verbal prompting to remind athletes to use and reapply sunscreen, seek shade, and maximise clothing coverage during training or competition. This can also be applied to inform users, participants, or spectators to apply sunscreen adequately and regularly.
- Visual and verbal prompting for athletes and education on daily UV levels.
- Organisers communicate to those attending sporting events to bring sunscreen and protective clothing (e.g., by email or text prior to the day, supported by text reminders during the event).

Evaluation and monitoring

- Measuring how practices are implemented and achieving outcomes, and understanding any ongoing barriers to implementation will be critical to success. Collecting good news case studies and working with other key stakeholders to share these, can support broader cultural change to occur. UV wearable technology is also available, to measure UV exposure risk across different sports and to help improve knowledge and sun protection practices.
- Regular reviews of the effectiveness of sun protection and potential opportunities for implementing additional sun protection due to facility upgrades, funding grants or changes of rules to permit better sun protective clothing, hats, sunglasses, or sunscreen use should occur.

Personal protective equipment (PPE)

- Clothing provides a physical barrier between a person's skin and the sun and provides an easier alternative to sunscreen in achieving consistent broad-spectrum protection. The goal is to cover as much skin as possible without hampering optimal sporting performance. Exploring improvements in clothing design and increased quality of fabrics that have the highest UPF rating (aim for UPF 50+) is key for athletes, support staff and volunteers.

- Given the complexities generated with competition environments, a twofold approach is recommended for uniform and clothing policies to ensure appropriate skin coverage and eye protection, and to meet Australian standards. Providing both in-competition sun protective advice (high performance policy driven), underpinned by an out of competition and support staff/spectator sun protection strategy would be appropriate that includes uniforms, broad brim hats, sunglasses, and sunscreen access.
- Sunscreens should be easily available in accessible locations such as changing rooms, pitch-side etc.
- Sunscreens designed for lip protection should be encouraged to be used.

Individual sun protection measures

- Regardless of their skin phototypes, all participants involved in sport **must** practice sun-safe behaviours.
- Use of sun protection irrespective of the UV index. While general advice has been for sun protection use on days when the UV Index is 3 or above, prolonged exposure at lower levels can still result in high UV radiation exposure and sunburn.
- Clothes with UPF ratings of 50+ and covering as much skin as possible. Athletes should take advantage of sport-specific clothing, such as rash vests for water activities.
- Protective hats, rated UPF 50+, adapted to the sport, are essential.
- Sunglasses that meet the Australian Standard (category 2 or 3) or outdoor rated Safety glasses (or goggles), when possible.
- Provide shade wherever possible for officials, athletes, and spectators, such as over training pools and sports facilities, warm up and cool down areas and waiting areas. Indoor options for some events are also to be encouraged.
- High SPF sunscreen use for all sports e.g., SPF 50+ broad-spectrum.
- Sunscreen, including sunscreens designed for lip protection, should be applied in sufficient amounts (approximately 2 mg/cm2), at least 30 min before exposure, then reapplied every 2 hours; reapplication is particularly important in water sports.
- Secondary performance attributes matter: sunscreens that are easy to spread, non-greasy, non-sticky, non-irritating to the eyes, water resistant, sweat resistant, and not causing loss of grip are more likely to be used consistently.
- Routine self-examination of the skin is very important. As well as protecting your skin, getting to know your skin, including skin not normally exposed to the sun is critical.
- Consult a doctor if you notice any new spots or changes to existing freckles or moles, including the shape, colour or size of a spot.

APPENDICES

APPENDIX 1

What is solar UV radiation?

The sun produces different types of energy: visible light which we see as sunlight; infrared radiation which we feel as heat; and ultraviolet (UV) radiation which we cannot see or feel. Solar UV radiation is the single most significant source of UV radiation. It is made up of three wavelengths: UVA, UVB and UVC. Both UVA and UVB can reach the earth's surface and can damage human skin. Solar UVC is completely absorbed by ozone in the atmosphere, but UVC may exist as an artificial germicidal lamp source used for disinfection of equipment and surfaces.

Solar UV radiation is the most significant risk factor for skin cancer.[2-4] It is classified as a Group 1 carcinogen by the International Agency for Research on Cancer (IARC) and in the same category as asbestos and tobacco.[88]

Several environmental factors influence the amount of solar UV radiation a person receives.[88]

Solar elevation	When the sun is higher in the sky (i.e., midday) there are higher levels of solar UV radiation (as illustrated in Figure 3).
Ozone	Ozone thickness changes daily. When the ozone layer is thicker, less UVB will reach the earth.
Cloud cover	Solar UV radiation can pass through and even reflect off light clouds so solar UV radiation levels on cloudy days may be similar to, or even higher than, those on a cloud-free day.
Surface reflectivity	Highly reflective surfaces can increase surrounding levels of solar UV radiation including concrete, snow, glass, water, and polished metals.
Altitude	Higher altitude means higher solar UV radiation.
Proximity to the equator	The Solar UV radiation varies with latitude and is higher close to the equator.

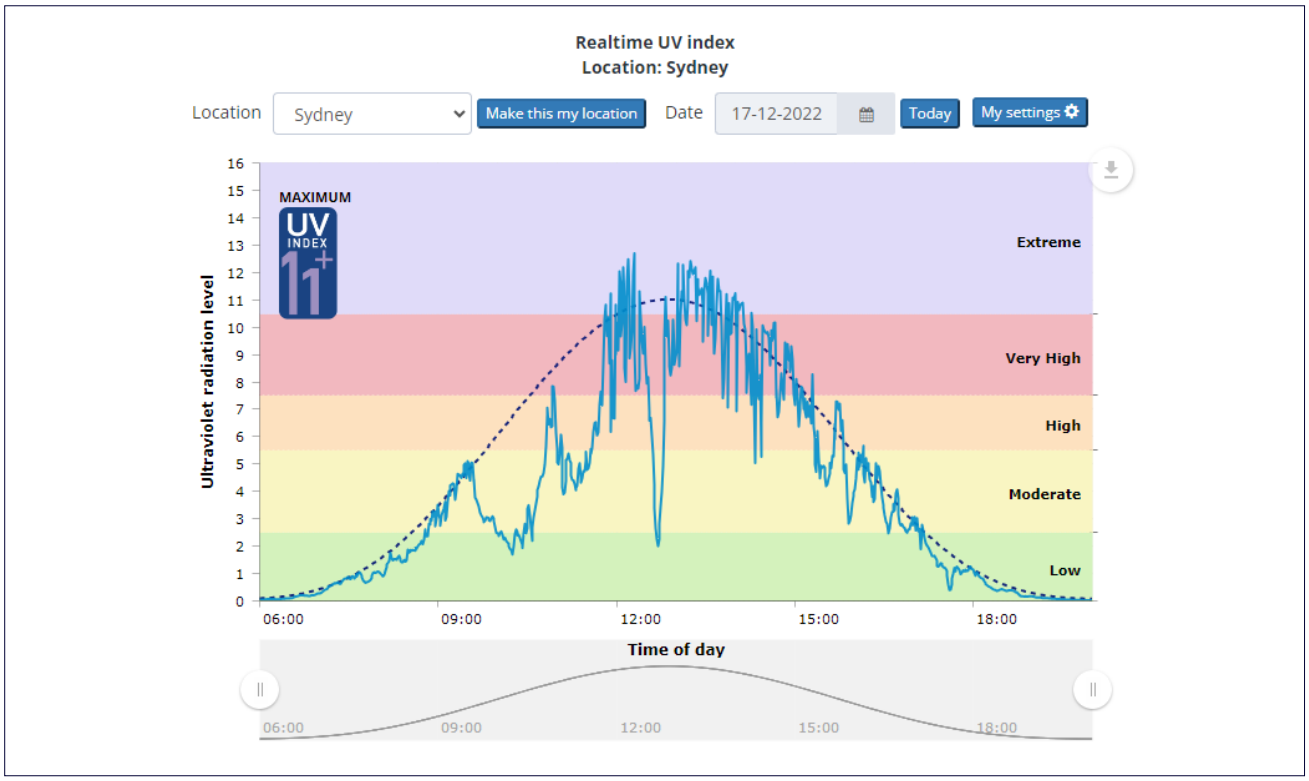

Figure 3: Calculated and real time UV radiation in Sydney on a cloudy sky day on 17 December 2022[89]

Solar UV radiation in Australia

Australia has one of the highest levels of solar UV radiation exposure in the world.90 This is due to Australia's proximity to the equator and the earth's tilt in relation to the sun, resulting in the southern hemisphere being closer to the sun during a southern hemisphere summer. As a result, UV radiation is 7% higher in the southern hemisphere compared to the equivalent latitude in the northern hemisphere. The maximum daily UV radiation levels during a UK summer are lower than many regions of Australia during an Australian winter (Figure 4).

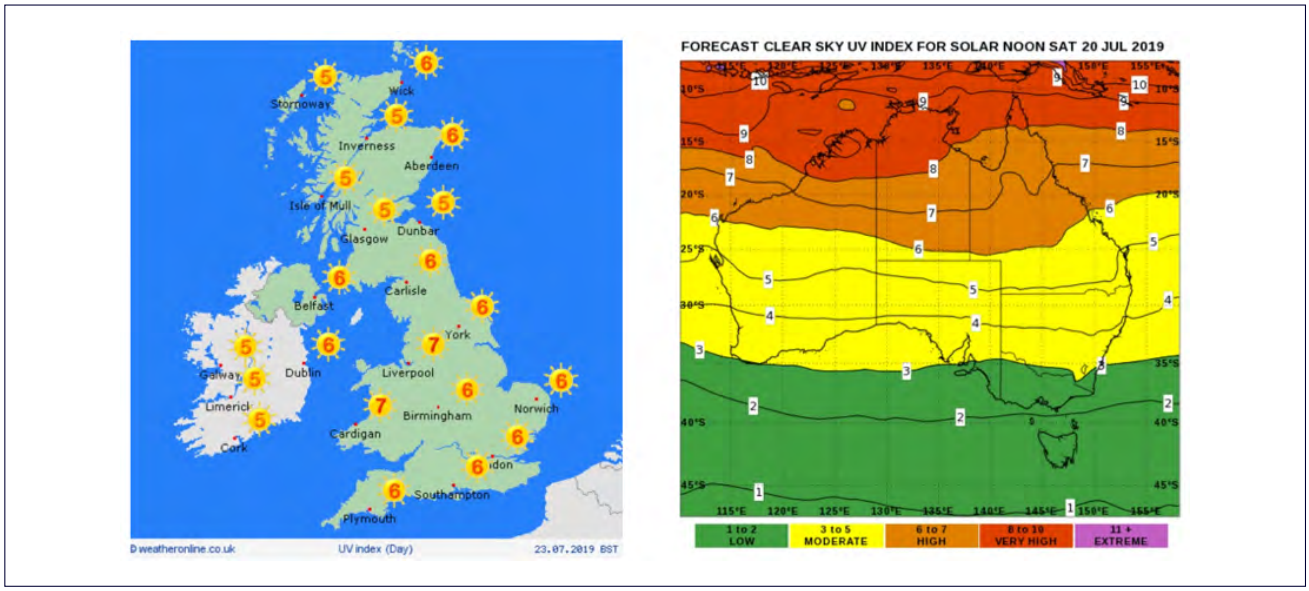

Figure 4: Comparison of the maximum UV radiation levels during summer in the UK and winter in Australia.[90, 91]

Skin damage, sunburn, and the role of skin type

There is strong evidence that solar UV radiation is the primary cause of skin cancer.[51, 92] For example, up to 95% of melanomas and 99% of non-melanoma skin cancers in Australia are caused by overexposure to UV radiation.[51, 92] Solar UV radiation has also been linked with cancer of the eye,[93-95] cataracts (clouding on the lens of the eye) and pterygium (a growth on the white of the eye).[96]

When unprotected skin is exposed to UV radiation, DNA damage can occur. If the body is unable to repair this damage the cell can begin to divide and grow in an uncontrolled way, leading to skin cancer. All skin types can be damaged, skin type however, determines the individual's susceptibility.[97] Skin damage can occur without any visible reddening and tanning is also a sign of skin damage.[98]

Sunburn is an acute skin inflammation following overexposure to UV radiation. For instance, a person with very fair skin can receive skin damage from only two SEDs, and the impact (e.g., sunburn) may not be immediately visible.[99] Compared with the amount of time required to induce sunburn in fair skin pigmentation, moderately pigmented skin requires 3-5 times the exposure, whereas darkly pigmented skin up to 30 times the exposure.[100] Skin types 4-6 of the Fitzpatrick skin phototype classification (Figure 8), are unlikely to experience sunburn following excess UV radiation exposure.[97] Factors such as skin hydration, age and anatomical site (skin thickness and previous UV exposure), environmental factors (UV wavelength and dose), geographical factors (altitude, latitude, time of day), presence of UV reflective surfaces (e.g. snow, water) and climatic factors (wind, temperature, humidity) can also influence acute visible skin damage from solar UV radiation.[100]

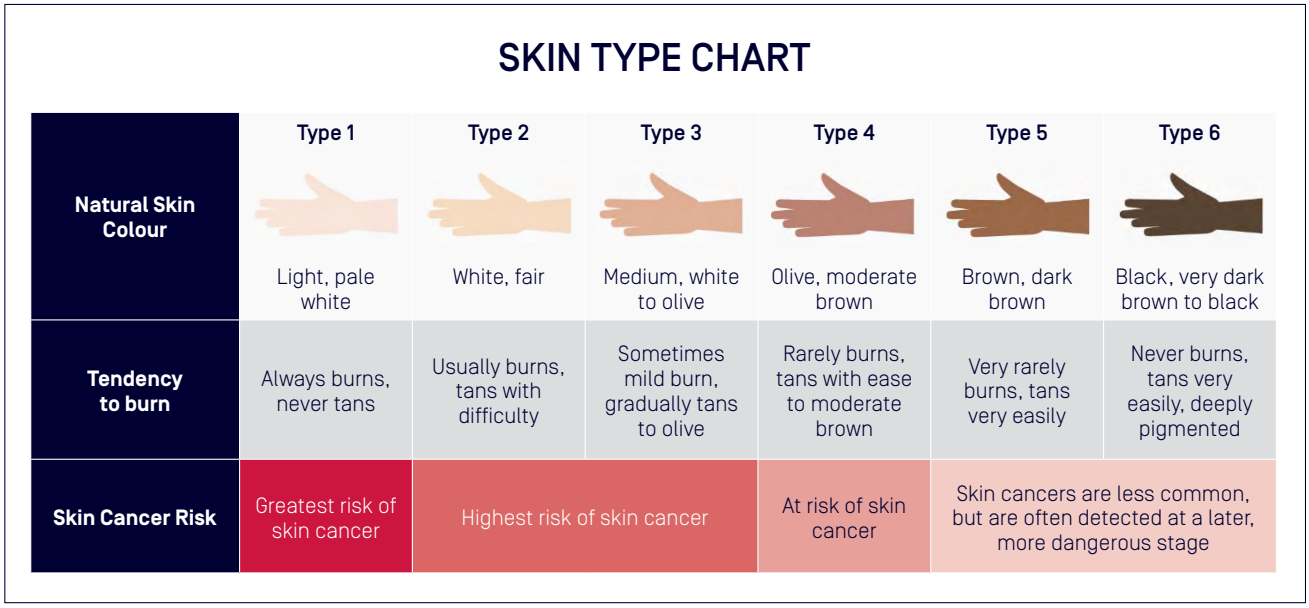

Figure 5: Fitzpatrick skin phototypes[1-6, 97]

It is important to note that sunburn does not cause skin cancer, rather it is a marker of exposure to harmful levels of UV radiation;[51, 101] and indicates skin damage has occurred. A history of sunburn is associated with increased melanoma risk.[102-105] For example, five blistering sunburns between the ages of 15 and 20 years can increase the risk of skin cancer by 68% - 80%.[106] Further, high solar UV radiation exposure in the first 10 years of life more than doubles melanoma risk.[107] As adults, the risk of skin cancer in athletes who participate in outdoor sports can be heightened from greater UV exposure during childhood exposure. Decreased childhood UV radiation exposure therefore is vital to lowering skin cancer risk in adulthood.[19]
It is estimated that more than 75% of all skin cancers could be prevented by practicing sun protective behaviors in childhood and adolescence.[108]

APPENDIX 2

Factors that influence UV radiation risk

The UV Index describes the strength of solar UV radiation. The higher the number, the stronger the solar UV radiation and the faster unprotected skin will be damaged.

Solar UV radiation can reach a person from three sources: directly from the sun; scattered in the atmosphere; and reflected from the environment. This means that even if a person is shaded from the direct sun, they can still receive substantial UV radiation exposure from the open sky. Some ground and building surfaces reflect UV radiation including white paint, window glass, light colored concrete and metallic surfaces (Figure 5). These surfaces can reflect UV radiation onto the skin and eyes and reduce the effect of protective measures.

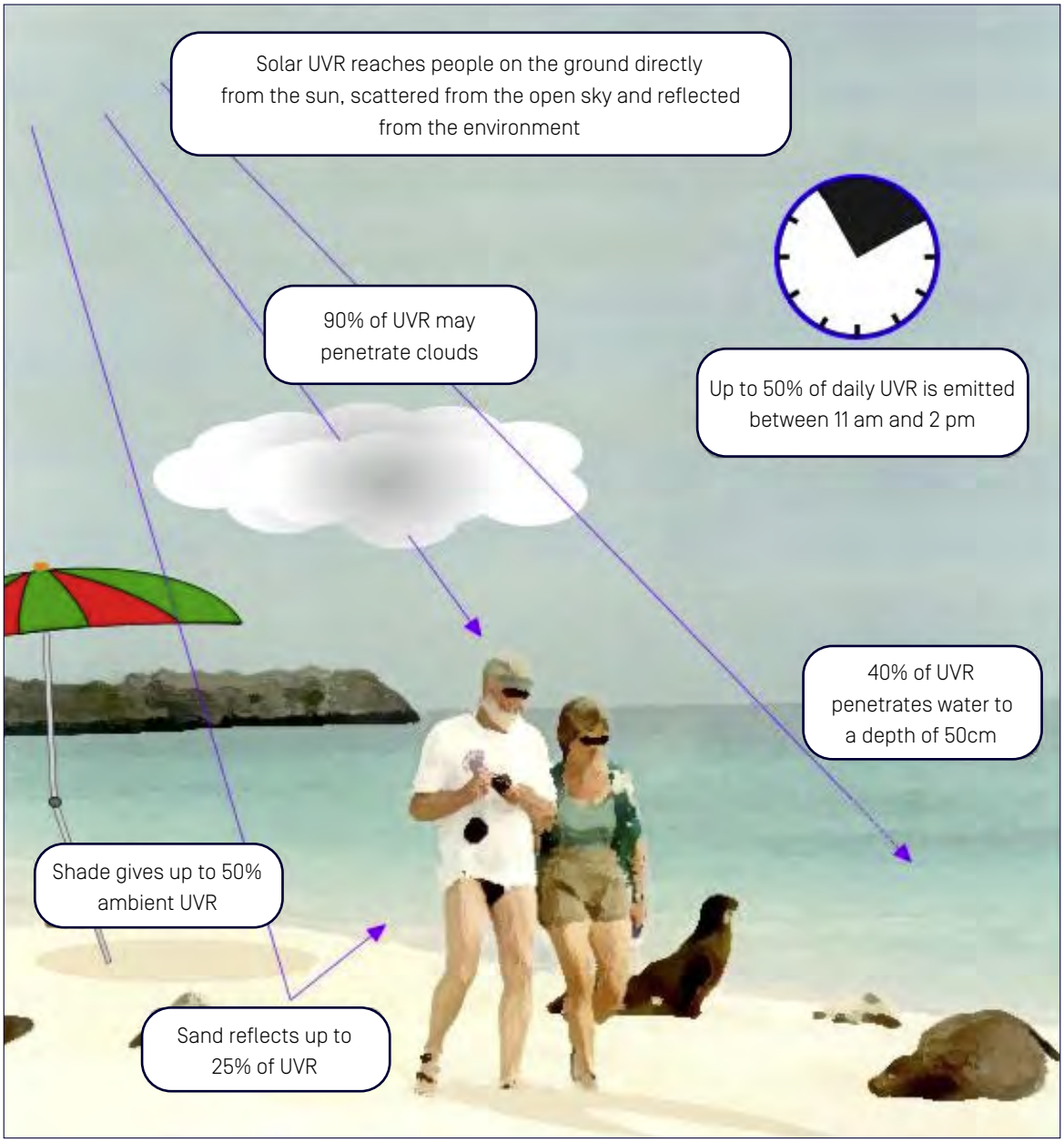

Figure 6: Illustration of how people are exposed to solar UV radiation.[90, 99]

The time of year affects UV radiation intensity. The estimated clear-sky average solar UV Index at noon across Australia in winter and summer clearly illustrate the changes to UV radiation intensity during two seasons (Figure 6).

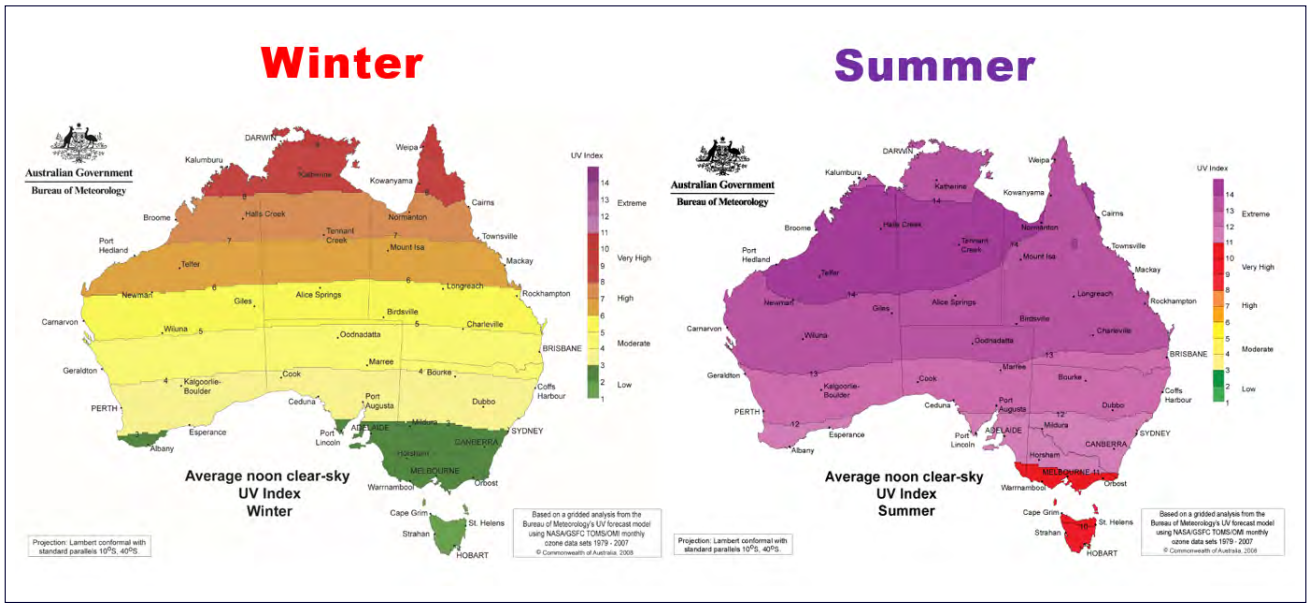

Figure 7: Average noon clear-sky UV Index for winter and summer in Australia

To prevent skin cancer and other UV radiation-related diseases, the World Health Organization (WHO) recommends people protect their skin from the sun when UV radiation levels reach 3 or above.[109] For most of Australia, this means sun protection is required year-round. Even during winter, all regions except the very southern regions regularly exceed a UV radiation level of 3. Once the UV Index reaches 3 or above, the amount of UV radiation reaching the Earth's surface is high enough to damage unprotected skin, which can lead to skin cancer. However, because UV damage accumulates over time, it is recommended that outdoor workers - and/or those that are often outside, outside for extended periods (more than an hour or two), and/or near highly reflective surfaces – use sun protection measures year-round, even when the UV Index is below 3, due to high cumulative UV radiation exposure.[59] The amount of time athletes, coaches, officials, volunteers and others involved in sport spend outdoors is similar to an outdoor worker, and as such this position statement is in alignment with the advice provided to protect outdoor workers from solar UV radiation.

The degree of skin damage is determined by solar UV radiation intensity and duration of exposure. Therefore, the UV radiation intensity and duration, measured by UV radiation 'dose' and reported in units of Standard Erythema Dose (SED).[99] One SED per day is considered safe for most people.[110] For example, a short exposure period in high levels of UV radiation may have a similar total dose to a longer period in lower UV radiation. Both high intensity and low intensity UV radiation exposure has been linked to an increased risk of skin cancer.[51, 111] Further, both cumulative and intense intermittent UV radiation exposure can be harmful.

Figure 7 illustrates the number of SEDs - hourly and the total - that can be accumulated on a winter's day and a summer's day in Melbourne.[59] The red line showing maximum daily recommended SEDs, the amount of hourly and total exposure in both winter (total of 9 SEDs on this day) and summer (total of 65 SEDs on this day), are enough to damage unprotected skin and eyes. The dose of UV radiation during summer in Melbourne is 32 times the dose of 2 SEDs where damage can occur.

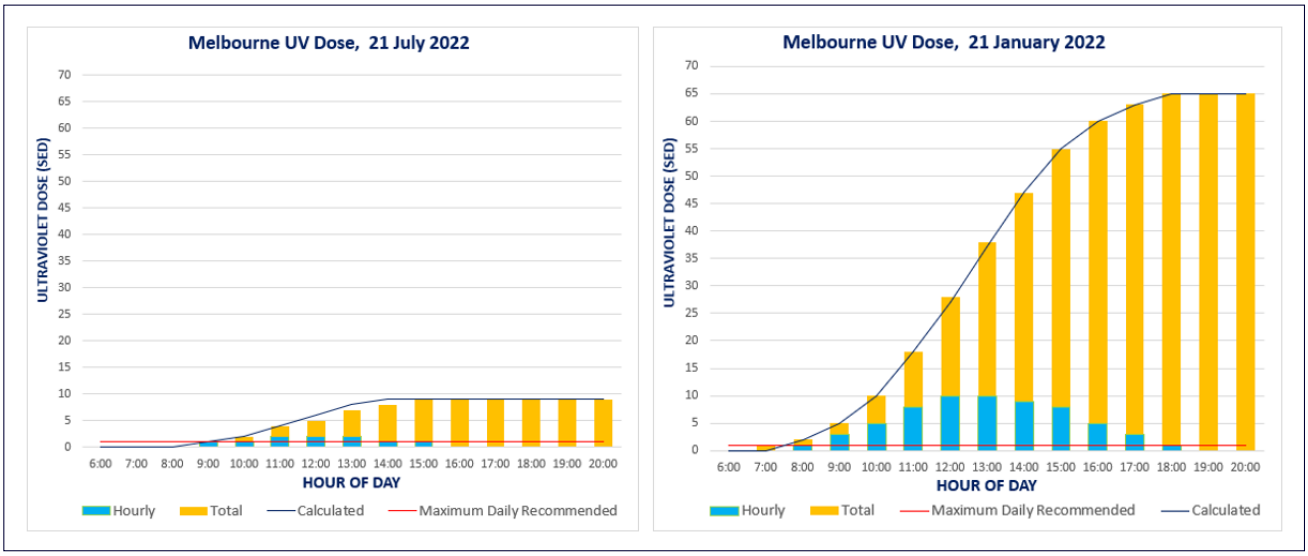

Figure 8: Hourly accumulation of SEDs in Melbourne on a winter and summer day[112]

Children's skin is more sensitive to UV radiation. Their thinner skin with high density of short and fine vellus hair follicles increase the percutaneous UV radiation absorption.[15, 16] Children spend an average of 1.5 to 5.1 hrs per day in outdoors during their childhood.[16] Therefore, 50% of the total lifetime UV radiation exposure is estimated to occur before an individual is 18 years old.[16, 17] Therefore, while sun protection is important regardless of age, childhood and adolescence are the most critical periods for cancer-causing skin damage from solar UV radiation.[5, 16, 107, 113, 114]

APPENDIX 3

Skin cancer: Australia's national cancer

Australia has the highest rates of skin cancer, including melanoma, in the world[5, 115] with at least two in three people being diagnosed with some form of skin cancer before the age of 70.[27] Melanoma of the skin is the third most commonly diagnosed cancer in Australia (excluding KC).[116] Between 1982 and 2018, the incidence rates of melanoma more than doubled, with more men being diagnosed with melanoma (58%) than women (42%).[116] While the incidence of melanoma has started to decline in young Australians aged up to 29 years,[117, 118] melanoma was the second most commonly diagnosed cancer amongst adolescents and young adults in 2017.[119] While melanoma is much less common than other types of skin cancer, it is more dangerous because it's much more likely to mutate and spread to other parts of the body if it is not found and treated early. Skin cancer presents the highest cost burden to the health system of any cancer type: $1.72 billion in 2019-20, with costs escalating due to our ageing population, new technologies and increased costs for managing late-stage melanomas.[31, 120] Further, approximately 2,000 annual deaths are attributed to all skin cancer types, nearly double the number of the annual road toll.[121] Twice as many men as women are estimated to have died from melanoma in 2022 (67% vs 33%)[122]

Compared to the general Australian population, pre-skin cancer (actinic keratosis), KC and melanoma rates were higher in surfers and swimmers from Southeast Queensland and Northern New South Wales compared to the general Australian population. Further, media reports of high profile athletes (e.g. Bernadette Wallace OLY,[65] Cate Campbell OLY,[64] Sam Short[63]) and coaches (e.g. Jackie Byrnes[62]) being diagnosed with skin cancer are not uncommon.

APPENDIX 4

Additional resources

Sport Organisation Guidance Information

- Cancer Council sun protection policy advice for sporting organisations **Sun protection policies for sports groups - SunSmart** and policy template **https://www.cancercouncil.com.au/wp-content/uploads/2020/12/Sporting-groups-sun-protection-policy_CAN10502.pdf**
- A 10-step sun protection checklist for sporting organisations **https://www.cancercouncil.com.au/wp-content/uploads/2020/12/10-Step-checklist-CAN10501.pdf**
- The SunSmart website provides tips to assist sporting clubs in improving their sun protection strategies, with information tips to help frame sun protection messaging to suit 12 sports **https://www.sunsmart.com.au/advice-for/sports-groups/top-sunsmart-tips-for-your-sport**
- A sample of sun protection newsletter content for sporting organisations to use **https://www.cancercouncil.com.au/wp-content/uploads/2020/12/Sporting-Groups-Sample-Newsletter-Content.pdf**
- The Office of Sport in NSW provides 8 steps for sporting club committee members to help them improve their sun protection practices **https://www.sport.nsw.gov.au/running-your-club/safe-and-fair-clubs/8-steps-for-club-committees**
- A Sun Safety Champions Implementation Guide to support organisations in how they protect their for outdoor workers **https://www.cancercouncil.com.au/wp-content/uploads/2022/04/CCNSW_Champion_Implementation_Guide.pdf**

General Work Health and Safety Information

- The SafeWork Australia Guide to exposure to Solar Ultraviolet Radiation **https://www.safeworkaustralia.gov.au/system/files/documents/1702/guide-exposure-solar-ultraviolet-radiation.pdf**
- ARPANSA Radiation Protection Standard for Occupational Exposure to Ultraviolet Radiation **https://www.arpansa.gov.au/sites/default/files/legacy/pubs/rps/rps12.pdf**
- ARPANSA also developed a sun protection management plan for organisations, to support the Radiation Protection Standard outlined above **https://www.arpansa.gov.au/sites/default/files/legacy/pubs/rps/rps12_Supplementary_Information_Sun_Protection.pdf**
- The Cancer Council Skin Cancer and Outdoor Work – a Work Health and Safety guide **https://www.cancercouncil.com.au/wp-content/uploads/2018/12/Skin-cancer-and-outdoor-work-booklet-Oct2018-v2.pdf**
- SafeWork NSW has developed UV radiation safety guidance in the context of other seasonal risks – heat management and air quality safety – to acknowledge the increased frequency and duration of heat events and the challenges presented of living and working near bush fire smoke. This information is packaged in their seasonal safety guidance, **https://www.safework.nsw.gov.au/safety-starts-here/seasonal-safe**
- A Cancer Council sun safety policy template for workplaces **https://www.cancercouncil.com.au/wp-content/uploads/2022/04/Sun-safety-policy-template.pdf**
- A detailed Sun Safety risk assessment template for outdoor workers has been developed to support the risk assessment process. It can be used by workplace champions to assess their UV radiation risk, current sun safety practices and identify priority areas for improvement **https://www.cancercouncil.com.au/wp-content/uploads/2022/02/CCNSW-UV-Risk-Assessment.pdf**

- This Action Plan template is designed to be used after completing the UV Risk Assessment, to help identify the priority actions to protect outdoor workers **https://www.cancercouncil.com.au/wp-content/uploads/2022/03/CCNSW-Outdoor-Worker-Action-Plan.pdf**
- The Cancer Council Occupational Cancer Risk Series: Solar Ultraviolet Radiation **https://www.cancer.org.au/assets/pdf/occupational-cancer-risk-series-solar-ultraviolet-radiation**

Melanoma Risk Tools for Individuals to Determine Their Own Risk Profile

- The Melanoma Institute of Australia has developed risk prediction tools for estimating risk of developing a first or subsequent melanoma. See **www.melanomarisk.org.au**
- The QIMR Berghofer Medical Research Institute has developed a melanoma risk prediction tool that predicts the probability of developing a melanoma in the next 3-5 years. See **https://publications.qimrberghofer.edu.au/Custom/QSkinMelanomaRisk**
- Alfred Health has developed a melanoma risk calculator. See **https://www.alfredhealth.org.au/melanoma-risk-calculator/health-professionals**

ARPANSA Guidance on UV Radiation Protection Standards across the 5 forms of sun protection

- Slip on protective clothing **https://www.arpansa.gov.au/our-services/testing-and-calibration/ultraviolet-services/labelling-sun-protective-clothing/au-standard**
- Slop on sunscreen **https://www.arpansa.gov.au/understanding-radiation/radiation-sources/more-radiation-sources/sun-protection-sunscreen.**
- Slap on a hat **https://www.arpansa.gov.au/understanding-radiation/radiation-sources/more-radiation-sources/sun-protection-hats**
- Seek out shade **https://www.arpansa.gov.au/understanding-radiation/radiation-sources/more-radiation-sources/sun-protection-shade**
- Slide on sunglasses – a standard for Australia **https://www.arpansa.gov.au/understanding-radiation/radiation-sources/more-radiation-sources/sun-protection-sunglasses**

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