

# Cancer Association of South Africa (CANSA)



## Fact Sheet on the Use of Sunbeds

### Introduction

A sunbed, also known as a tanning bed or sun tanning bed, is a device that emits ultraviolet radiation (typically 95% UVA and 5% UVB, +/-3%) to produce a cosmetic tan. Regular tanning beds use several fluorescent lamps that have phosphor blends designed to emit UV in a spectrum that is somewhat similar to the sun. Smaller, home tanning beds usually have 12 to 28 x 100 watt lamps while systems found in tanning salons (solariums) can consist of 24 to 60 lamps, each of 100 to 200 watts.



[Picture Credit: Sunbed]

There are also "high pressure" tanning beds that generate primarily UVA rays with some UVB rays by using highly specialised quartz lamps, reflector systems and filters. These are much more expensive, thus less commonly used. A tanning booth is similar to a tanning bed, but the person stands while tanning and the typical power output of a tanning booth is higher.

Because of the adverse effects on human health of overexposure to UV radiation, including skin cancer, cataracts, and premature skin aging, the World Health Organization (WHO) does not recommend the use of UV tanning devices for cosmetic reasons. Most tanning beds emit mainly UVA rays - which increase the risk of malignant melanoma, the deadliest form of skin cancer. Misusing a sunbed by not wearing special goggles may also lead to a condition known as arc eye (snow blindness) as well as cataracts. Occasional acute injuries occur where users carelessly fall asleep whilst having an artificial tan.

**Reickrath, J., Lindqvist, P.G., Pilz, S., März, W., Grant, W.B., Holick, M.F. & De Gruhl, F.R. 2020.**

**Background:** Intensive scientific debate is ongoing about whether moderate solarium use increases melanoma risk. The authors of some recent publications demand the debate be closed and propose "actions against solarium use for skin cancer prevention" because new studies have convincingly demonstrated causality. This minireview aims to investigate whether those demands are sufficiently supported by present scientific knowledge and comply with the principles of evidence-based medicine.

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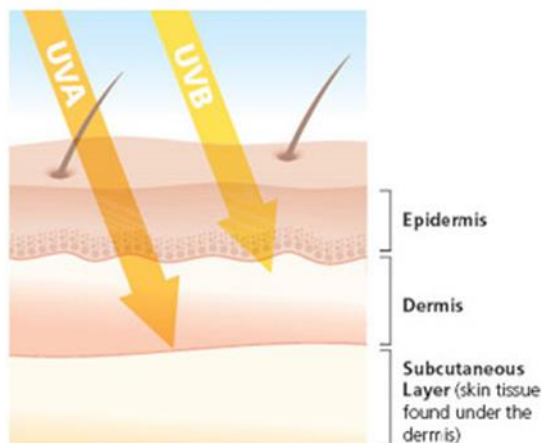
**Materials and methods:** We performed a systematic literature search (through June 2019; PubMed, ISI Web of Science) to identify publications investigating how solarium use affects melanoma risk.

**Results:** We found no studies that demonstrate a causal relationship between moderate solarium use and melanoma risk. Results of cohort and case-control studies published to date, including recent investigations, do not prove causality, and randomized controlled trials providing unequivocal proof are still lacking. Moreover, the overall quality of observational studies is low as a result of severe limitations (including unobserved or unrecorded confounding), possibly leading to bias. We also disagree with recent claims that Hill's criteria for the epidemiological evidence of a causal relationship between a potential causal factor and an observed effect are fulfilled in regard to the conclusion that moderate solarium use per se would increase melanoma risk. Conclusion: Current scientific knowledge does not demonstrate a causal relationship between moderate solarium use and melanoma risk. Therefore, the debate is not closed.

### UV Radiation and Tanning Beds

Sunlight contains two types of ultraviolet (UV) light: UVA and UVB. UVA rays consist of longer wavelengths that penetrate deep into the dermal layer of the skin. Limited exposure to UVA rays causes skin to tan, however, most experts agree that overexposure to UVA can lead to other long-term skin damage. The wavelengths of UVB rays are much shorter, affecting the outermost layers of skin. UVB rays are known as the "burning rays" and are considered more dangerous. Tanning beds and sun lamps generally emit 93% to 99% UVA radiation increasing the benefits of a tan – this, however, is three times the UVA radiation given off by the sun.

#### UV Radiation and the Skin



Exposure to solar radiation is predominantly responsible for the high incidence rate of skin cancer, but there are also indications that sunbeds are involved. The UV emission spectra of sunbeds have special characteristics and are different from the sun spectrum, which can be seen in high-resolution spectral measurements. Sunbed emission spectra are similar to the sun spectrum in the UVB (around 280-320 nm) range but reach values 10 to 15 times higher in the UVA (320-400 nm) range. An average erythema-effective irradiance of 0.33 W/m<sup>2</sup> was determined for sunbeds. This corresponds to a UV index of 13, which is significantly higher than the

UV index of 8.5 of the high summer sun at noon at intermediate latitudes (Gerber, *et al.* 2002).

**Rodriguez-Acevedo, A.J., Green, A.C., Sinclair, C., van Deventer, E. & Gordon, L.G. 2020.**

**Background:** Exposure to artificial tanning devices is carcinogenic to humans, and government regulations to restrict or ban indoor tanning appear to be increasing.

**Objectives:** We evaluated changes in the international prevalence of indoor tanning among adolescents and adults after artificial tanning devices were classified as carcinogenic by the International Agency for Research on Cancer (IARC) in 2009.

**Methods:** Systematic searches in PubMed and Web of Science databases were undertaken. Overall, 43 studies reporting 'ever' or 'past-year' indoor tanning exposure after 2009 were identified. We used metaregression analysis to evaluate the prevalence of indoor tanning over time. Random

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effects meta-analysis was used to summarize the prevalence of indoor tanning in adolescents and adults according to sex, region and presence of age prohibitions.

**Results:** Global prevalence of indoor tanning in adolescents for 2013-2018 was 6.5% [95% confidence interval (CI) 3.3-10.6], 70% lower than the 22.0% (95% CI 17.2-26.8) prevalence for 2007-2012. Among adults, the prevalence was 10.4% (95% CI 5.7-16.3) for 2013-2018, a decrease of 35% from 18.2% for 2007-2012. Since 2009, the overall past-year prevalence among adolescents was 6.7% (95% CI 4.4-9.6) and 12.5% (95% CI 9.5-15.6) among adults. The prevalence of tanning indoors in the past year was similar in North America (adults, 12.5%; adolescents, 7.6%) and Europe (adults, 11.1%; adolescents, 5.1%). In 2009, three countries had regulations restricting indoor tanning, compared with 26 countries today.

**Conclusions:** Prevalence of indoor tanning has declined substantially and significantly in adolescents and adults since the 2009 IARC statement, reflecting the rise in regulations that limit this source of unnecessary exposure to carcinogenic ultraviolet radiation. What is already known about this topic? Indoor tanning is associated with an increased risk of melanoma. A meta-analysis of worldwide indoor tanning prevalence for 1986-2012 found a past-year prevalence of 18% in adolescents and 14% in adults, with higher prevalences during the period 2007-2012. Policies to regulate indoor tanning began to be implemented across the globe in 2009. Only one study carried out in the U.S.A. has evaluated the efficacy of such policies in reducing indoor tanning prevalence. What does this study add? For the period 2013-2018, we found indoor tanning prevalences of 6.7% in adolescents and 11.9% in adults. This implies a reduction in indoor tanning use of 70% in adolescents and 35% in adults during the last 10 years. Our study encourages policy makers to strengthen indoor tanning regulations that reduce sunbed use among the general population in order to produce maximum public health benefit.

**Køster, B., Meyer, M.K.H., Søgaard, J. & Dalum, P.** 2019.

**Background:** Ninety percent of skin cancers are avoidable. In Denmark, 16,500 cases of melanoma and keratinocyte cancers were registered in 2015. The Danish Sun Safety Campaign has campaigned since 2007, targeting overexposure to ultraviolet radiation. During 2007-2015, the key indicators of skin cancer, i.e. sunbed use and sunburn, showed annual reductions of 6% and 1%, respectively.

**Objectives:** We aimed to examine the financial savings to society as a result of the campaign reductions in skin cancer cases (2007-2040), and to examine the campaign's cost-benefit and return on investment (ROI).

**Methods:** The analysis is based on existing data: (1) annual population-based surveys regarding the Danish population's behavior in the sun; (2) skin cancer projections; (3) relative risks of skin cancers from sunburn and sunbed use and (4) historical cancer incidences, combined with new data; (5) benefits from the avoided costs of skin cancer reductions; and (6) the costs of the Danish Sun Safety Campaign.

**Results:** The results were based on a reduction of 9000 skin cancer cases, saving €29 million of which €13 million were derived from sunburn reductions and €16 million from reductions in sunbed use. The ROI was €2.18.

**Conclusion:** Skin cancer prevention in Denmark is cost effective. Every Euro spent by the Danish Sun Safety Campaign saved the Danish health budget €2.18 in health expenses.

## Ultraviolet Radiation

UVA, which penetrates the skin more deeply than UVB, has long been known to play a major part in skin aging and wrinkling (photoaging), but until recently scientists believed it did not cause

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significant damage in areas of the epidermis (outermost skin layer) where most skin cancers occur. Studies over the past two decades, however, showed that UVA damages skin cells called keratinocytes in the basal layer of the epidermis, where most skin cancers occur. (Basal and squamous cells are types of keratinocytes.) UVA contributes to, and may even initiate, the development of skin cancers.

UVA is the dominant tanning ray, and we now know that tanning, whether outdoors or in a salon, causes cumulative damage over time. A tan results in injury to the skin's DNA; the skin darkens in an imperfect attempt to prevent further DNA damage. These imperfections, or mutations, can lead to skin cancer.

Tanning booths primarily emit UVA. The high-pressure sunlamps used in tanning salons emit doses of UVA as much as 12 times that of the sun. People who use tanning salons are 2.5 times more likely to develop squamous cell carcinoma, and 1.5 times more likely to develop basal cell carcinoma. According to recent research, first exposure to tanning beds in youth increases malignant melanoma risk by 75 percent.

UVB, the chief cause of skin reddening and sunburn, tends to damage the skin's more superficial epidermal layers. It plays a key role in the development of skin cancer and has a contributory role in tanning and photoaging. Its intensity varies by season, location, and time of day. The most significant amount of UVB hits South Africa between 10:00 and 15:00. However, UVB rays can burn and damage one's skin year-round, especially at high altitudes and on reflective surfaces such as snow, ice, cement, etc which bounce back up to 80 percent of the rays so that they hit the skin twice. UVB rays do not significantly penetrate glass.

### **Indoor Tanning is not a Safe Way to get Vitamin D**

Although it is important to get sufficient amounts of Vitamin D, the safest way to do so is through what one eats. Tanning harms one's skin, and the amount of UV exposure one needs to get enough Vitamin D is hard to measure because it is different for every person and also varies with the weather, latitude, altitude, and more.

### **IARC Classification of Sunbeds**

A Working Groups of the International Agency for Research on Cancer (IARC) has classified UV-emitting tanning devices as "carcinogenic to humans" (Group 1). A classification of Group 1 means that there is sufficient evidence of carcinogenesis (ability to cause cancer) in humans. The Working Group was convened by the IARC Monographs Programme and the conclusions were reported in an article and press release issued by *The Lancet Oncology* .

### **How Sunbeds Cause Skin Cancer**

Like the sun, sunbeds give off both UVA and UVB radiation that can damage the DNA in one's skin. If sufficient DNA damage builds up over time, it can cause cells to start growing out of control, which can lead to skin cancer.

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The International Agency for Research on Cancer (IARC) agrees that sunbeds are an established cause of melanoma. It must be remembered that one cannot always immediately notice the skin damage caused by ultraviolet radiation, as it builds up over time.

Every time a person uses a sunbed, some additional DNA damage is caused, increasing one's risk of melanoma and non-melanoma skin cancer, and making matters worse in the long run.

### **Position of CANSA on the Use of Sunbeds**

The Position of the Cancer Association of South Africa (CANSA):

CANSA supports the view of the International Agency for Research on Cancer (IARC) that it is an established fact that sunbeds cause melanoma.

CANSA further supports conclusive research that points to the use of sunbeds as a cause of non-melanoma skin cancer.

CANSA believes that, at present, it is not possible to give a safe limit for either short- or long-term effects of sunbed usage because there is no known threshold dose of ultraviolet radiation below which it can be safely be stated that melanoma or non-melanoma skin cancer will not occur.

### **Non-Cancer Risks of Tanning**

In addition to the serious risk of skin cancer, tanning can cause:

Premature aging - tanning causes the skin to lose elasticity and wrinkle prematurely. This leathery look may not show up until many years after you've had a tan or sunburn.

Immune suppression - UV-B radiation may suppress proper functioning of the body's immune system and the skin's natural defenses, leaving you more vulnerable to diseases, including skin cancer.

Eye damage - exposure to UV radiation can cause irreversible damage to the eyes.

Allergic reaction - some people who are especially sensitive to UV radiation may develop an itchy red rash and other adverse effects.

Advocates of tanning devices sometimes argue that using these devices is less dangerous than sun tanning because the intensity of UV radiation and the time spent tanning can be controlled. But there is no evidence to support these claims. In fact, sunlamps may be more dangerous than the sun because they can be used at the same high intensity every day of the year - unlike the sun whose intensity varies with the time of day, the season, and cloud cover.

### **Tanning in Children and Teens**

The US Food and Drug Administration (FDA) is particularly concerned about children and teens being exposed to UV rays. Intermittent exposures to intense UV radiation leading to sunburns, especially in childhood and teen years, increase the risk of melanoma, according to National Cancer Institute (NCI).

FDA believes that limiting sun exposure and using sunscreen or sunblock are particularly important for children since these measures can prevent sunburn at a young age.

NCI reports that women who use tanning beds more than once a month are 55 percent more likely to develop melanoma. Teenage girls and young women make up a growing number of tanning bed customers.

### **Individuals who should Never use a Sunbed**

The following individuals should never make use of a sunbed:

- under 18s
- people who have very fair skin
- people who burn easily
- people who tan poorly
- people with a lot of freckles
- people with a lot of moles
- people who have had skin cancer
- people who have a family history of skin cancer
- people using any medication that could make their skin more sensitive to UV
- people who already have extensive "sunlight" damage.

**Byrne, N. & Markha, T. 2020.**

**Background:** The incidence of malignant melanoma is increasing faster than any other cancer, and it is now the second most common cancer in young adults. Most skin cancer prevention campaigns are based on the hypothesis that improved skin cancer knowledge leads to a change in sun-related behaviour.

**Aim:** The aim of this study was to analyse the relationship of good skin cancer knowledge in a high knowledge group-medical students-with sun-related behaviours and tanning attitudes in Ireland.

**Methods:** A cross-sectional survey was conducted on university students studying medicine in a single institution.

**Results:** The final analyses included 312 complete questionnaires. Two hundred three (65.27%) were female, and 108 (34.73%) were male. The majority (65.06%) were aged 21-25 years. The mean skin cancer knowledge score was 89.77%. There was a positive attitude to tanning with 201 (64.63%) participants feeling more attractive with a suntan and 174 (55.94%) feeling better about themselves with a suntan. More than half of participants, 196 (54.17%), got a suntan last year, 171 (54.81%) participants sunbathed, 188 (60.26%) got sunburned and 30 (9.61%) reported using sunbeds previously. Those with a positive attitude to tanning were more likely to sunbath, suntan and get sunburned. High skin cancer knowledge scores were positively associated with high-risk sun behaviours (Spearman's rank correlation coefficient = 0.156, P = 0.006).



**Conclusion:** Urgent action is needed to promote skin cancer prevention. This study adds to the evidence that melanoma prevention strategies should preferentially target tanning attitudes rather than skin cancer knowledge.

### Medical Disclaimer

This Fact Sheet is intended to provide general information only and, as such, should not be considered as a substitute for advice, medically or otherwise, covering any specific situation. Users should seek appropriate advice before taking or refraining from taking any action in reliance on any information contained in this Fact Sheet. So far as permissible by law, the Cancer Association of South Africa (CANSA) does not accept any liability to any person (or his/her dependants/estate/heirs) relating to the use of any information contained in this Fact Sheet.

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#### Sunbed

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#### European Union Public Health

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#### Erratum in

[Correction to: Benefit-Cost Analysis of the Danish Sun Safety Campaign 2007-2015: Cost Savings from Sunburn and Sunbed Use Reduction and Derived Skin Cancer Reductions 2007-2040 in the Danish Population.](#)

Køster B, Meyer MKH, Sjøgaard J, Dalum P. *Pharmacoecoon Open*. 2019 Nov 5. doi: 10.1007/s41669-019-00187-6. Online ahead of print. PMID: 31691200

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**Skin Cancer Foundation**

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**US Food and Drug Administration**

<http://www.fda.gov/ForConsumers/ConsumerUpdates/ucm186687.htm>

**UV Radiation**

<http://www.skincancer.org/prevention/uva-and-uvb/understanding-uva-and-uvb>

**UV Radiation and the Skin**

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**Vanderbilt University**

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**Wikipedia**

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