

An update to the recommended core content for sun safety messages for public education in Canada: A consensus report

Loraine D. Marrett, PhD,^{1,2} Maria B.H. Chu, MA, MSt,¹ John Atkinson, MSW,³ Robert Nuttall, PhD,⁴ Gillian Bromfield, MSc,⁵ Larry Hershfield, MA,^{2,6} Cheryl F. Rosen, MD, FRCPC,^{7,8} for Representatives in the National Consensus Process on the Recommended Core Content for Sun Safety Messages in Canada

ABSTRACT

Reducing ultraviolet radiation exposure decreases the risk of skin cancer and eye damage. Between 1996 and 2006, Canadians increased their time in the sun without improving protection. National consensus on sun protection information for the public was last achieved in 1994. Public messages have since been modified inconsistently. The Ontario Sun Safety Working Group initiated a review of messages and engaged a scientific panel to draft message content. Working Group members then delivered a national consensus process, engaging a National Steering Committee, a health communications expert and representatives from 28 organizations through a workshop with pre- and post-workshop surveys. The result of the consensus process is the updated Recommended Core Content for Sun Safety Messages in Canada. Four groups of statements comprise the new content: Key Facts, Primary Recommended Protective Action Statements, Additional Recommended Protective Action Statements, and Tips for Implementing the Primary Protective Actions. Organizations are encouraged to adopt, at minimum, the Primary Recommended Protective Action Statements as the basis for public messaging. The recommended core content establishes a common understanding of what is needed for effective sun protection. The underlying expectation is that, as a key next step, content will be tailored for different subpopulations and health promotion campaigns.

KEY WORDS: Ultraviolet rays/adverse effects; skin neoplasms/prevention and control; eye diseases/prevention and control; consensus; health education; Canada

La traduction du résumé se trouve à la fin de l'article.

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Exposure to the sun and other sources of ultraviolet radiation (UVR) without sufficient protection is a well-established cause of skin cancer.¹ UVR is also known to cause harm to the eyes.² National surveys found that in 2006, Canadians spent more time in the sun without improving their sun protection behaviours than in 1996.³ If current trends continue, there is expected to be a 72% increase in the number of new melanoma cases diagnosed in Canada during the five-year period of 2028–2032, compared to 2003–2007.⁴

Stakeholder consensus on sun safety information for public education across Canada was undertaken to increase message consistency. National consensus was last achieved in 1994⁵ and messages have been updated inconsistently since then. Research suggests that adoption of cancer prevention behaviours among individuals decreases when they are presented with ambiguous information.⁶ The result of the consensus process is a core set of recommended content describing protective measures for individuals based on the latest scientific information and balanced by considerations such as physical activity recommendations and the requirements of outdoor work.

The updated content is not expected to improve protection among individuals on its own. The content fulfills a standard step in planning for health communications campaigns by establishing agreement on what should be communicated. Organizations are expected to determine how this information should be communicated, and then tailor the wording of the content, the

order in which the content appears and the amount of detail provided according to the needs of different audiences. Developing

Author Affiliations

1. Cancer Care Ontario, Toronto, ON
2. Dalla Lana School of Public Health, University of Toronto, Toronto, ON
3. Canadian Cancer Society, Ontario Division, Toronto, ON
4. Canadian Cancer Society, National Office, Toronto, ON
5. Cancer Care Ontario, Toronto, ON, formerly with Canadian Cancer Society, National Office, Toronto, ON
6. Larry Hershfield & Associates, Ltd., Toronto, ON
7. Division of Dermatology, Toronto Western Hospital, University Health Network Hospitals, and Mount Sinai Hospital, Toronto, ON
8. Department of Medicine, University of Toronto, Toronto, ON

Correspondence: Maria Chu, Cancer Care Ontario, 505 University Avenue, 14th Floor, Toronto, ON M5G 1X3, Tel: 416-971-9800, E-mail: maria.chu@cancercare.on.ca

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tailored messages should be based on focus testing among target audiences and identifying communications strategies that research suggests can achieve behaviour change. In addition, some audiences may require information beyond the recommended core content. Integrating further evidence-based information for reducing UVR exposure as needed is encouraged. Similarly, reducing UVR exposure among the public will also require structural changes, such as policies to increase shade. Consensus on personal protection recommendations could support policy development.

The Ontario Sun Safety Working Group (OSSWG) initiated the current work in consultation with a scientific panel (see Supplementary Appendix, in the ARTICLE TOOLS section on the journal site) comprised of nine scientists, in the fields of UVR physics, optometry, dermatology, epidemiology, architectural science with a focus on shade, and endocrinology with a focus on vitamin D; and one health promotion specialist. The panel summarized their knowledge of the best available evidence in their fields. Major evidence reviews were identified where applicable, such as the International Agency for Research on Cancer's review establishing UVR as a cause of skin cancer.¹ Evidence in the field of UVR is otherwise primarily found in studies describing the UVR-protective properties of shade, clothing, eyewear and sunscreen, measured in controlled conditions, and through the measurements of UVR in Canada throughout the day and year and under different conditions, such as cloud, by Environment Canada. Further detail on the evidence is noted in Appendix A. Based on their summary, the panel also drafted a set of content, which served as a starting point for broader discussions, including a review by external experts (see Acknowledgements section) and focus testing among public health stakeholders in Ontario.

The consensus process

In 2014–2015, OSSWG members with Cancer Care Ontario, the Canadian Cancer Society and the Canadian Dermatology Association convened an interdisciplinary national steering committee (see Supplementary Appendix) including scientists and health promotion specialists, and initiated a national consensus process. The objective of the consensus process was to balance the need to reduce UVR exposure as much as possible with the recognition that eliminating all UVR exposure is not practical.

As a first step in the process, the National Steering Committee took the information gathered and revised the wording of the scientific panel's set of content by integrating feedback from the external reviewers and the focus testing process with a view to increasing usability for public education. Revisions were for the purposes of increasing clarity, conciseness and – to support the feasibility of the project – limiting the focus of the content to protective actions for individuals among the general population. Interpretation of the science was not revised; revisions focused on the level of detail to include, with consideration given to the strength of the evidence supporting further detail. Accuracy was maintained through the advice of the scientists on the committee. Information that was not relevant to individual protection, such as developing shade policies, was not considered part of the project's scope. The committee also agreed that addressing the protective requirements of vulnerable populations, such as those with very fair skin and infants, would require further expert review of the

evidence. This approach to revisions with scientific oversight was maintained throughout the consensus process.

Following the revisions, the steering committee then:

- engaged a health communications expert;
- identified stakeholders;
- established a framework and criteria for achieving consensus;
- conducted an in-person workshop on March 12, 2015; and
- conducted pre- and post-workshop surveys with stakeholders regarding message content.

A total of 28 organizations (Table 1) across Canada with a role in promoting sun safety participated in the consensus process. Participants included: national dermatology, eye health, public health, family medicine and pediatric organizations; Environment Canada; the Public Health Agency of Canada; provincial cancer agencies and Canadian Cancer Society national and provincial divisions.

Most disagreements identified in the pre-workshop survey related to the details included in four topics: time in the sun, sunscreen, vitamin D and eye protection. At the in-person workshop, scientific experts presented on these four topics. After each presentation, attendees discussed content for that topic in small-group and plenary sessions. Final wording was agreed in plenary sessions. Attendees indicated residual disagreements through a voting process. In the follow-up survey to confirm the wording from the workshop, there was a high degree of acceptance and support. Only three statements in the content set were indicated as not accepted, and no more than two consensus participants indicated this position for any one statement. The

Table 1. Participant organizations in the 2014–2015 National Consensus Process on Content for Sun Safety Messages in Canada

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- Alberta Health Services
 - British Columbia Cancer Agency
 - British Columbia Cancer Research Centre
 - Canadian Association of Optometrists
 - Canadian Cancer Society, British Columbia
 - Canadian Cancer Society, National Office
 - Canadian Cancer Society, Ontario Division
 - Canadian Cancer Society, Quebec
 - Canadian Cancer Society, Saskatchewan
 - Canadian Dermatology Association
 - Canadian Ophthalmological Society
 - Canadian Paediatric Society
 - Canadian Partnership Against Cancer
 - Canadian Public Health Association
 - Cancer Care Nova Scotia
 - Cancer Care Ontario
 - CancerCare Manitoba
 - CNIB [Canadian National Institute for the Blind]
 - College of Family Physicians of Canada
 - Environment Canada
 - New Brunswick Department of Health, Office of the Chief Medical Officer of Health
 - Newfoundland and Labrador Department of Health and Community Services, Healthy Living Division
 - Ontario Sun Safety Working Group
 - Public Health Agency of Canada
 - Saskatchewan Cancer Agency with Sun Smart Saskatchewan
 - SunSafe Nova Scotia
 - Toronto Cancer Prevention Coalition
 - University of Waterloo, School of Optometry and Vision Science
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National Steering Committee reviewed the comments describing the reason for disagreements and changes were integrated into the final set of content with confirmation from the consensus participants.

As a final step, the steering committee elected to undertake further review of the primary statement on eye protection through one additional survey among consensus participants. The survey was not able to identify a resolution on details describing when to wear eye protection. This was primarily due to imprecision in the science and difficulty in making practical recommendations. As a result, the steering committee moved these details to secondary levels of content, which were not the primary focus for achieving consensus.

The Recommended Core Content for Sun Safety Messages in Canada

The result of the consensus process is the new Recommended Core Content for Sun Safety Messages in Canada (Table 2), which comprises four groups of statements:

1. *Key Facts:* These statements highlight the potential harms of UVR. Additional facts may be added to public communications, but the key facts are core statements for describing why skin and eye protection are needed.
2. *Primary Recommended Protective Action Statements:* These statements provide information on the specific actions that individuals should take to reduce harmful UVR exposure.

Table 2. Recommended Core Content for Sun Safety Messages in Canada

1. Key Facts

- Sources of ultraviolet radiation (UVR) are the sun and UVR-emitting devices, e.g., tanning beds. UVR causes skin cancer and other forms of skin damage (e.g., wrinkling and photoaging of the skin) and causes harm to the eyes.^{1,2}
- Skin cancer is the most common cancer in Canada, and incidence rates for melanoma, the most fatal form of the disease, continue to increase.⁴ Skin cancer is also one of the most preventable cancers.⁷
- While UVR that is harmful to the skin is primarily present in the sun's rays from 11 a.m. to 3 p.m. between April and September in Canada,^{8,9} UVR that is harmful to the eyes is present in the sun's rays all year round and throughout the day.¹⁰ In both cases, UVR can be harmful, even when it's cloudy.⁸⁻¹⁰

2. Primary Recommended Protective Action Statements

Enjoy the sun safely: Protect your skin, protect your eyes.

Protect your skin

- When the UV Index is 3 or higher, protect your skin as much as possible. In general, the UV Index in Canada can be 3 or higher from 11 a.m. to 3 p.m. between April and September, even when it's cloudy.
 - Seek shade or bring your own (e.g., an umbrella).
 - Wear clothing and a wide-brimmed hat that cover as much skin as possible, as appropriate to the activity and weather.
 - Use sunscreen labelled "broad spectrum" and "water-resistant" with a sun protection factor (SPF) of at least 30, on skin not covered by clothing. Apply sunscreen generously and reapply when required.
- Don't use UV tanning equipment or deliberately try to get a suntan, and avoid getting a sunburn.

Protect your eyes

- Wear sunglasses or prescription eyeglasses with UV-protective lenses.
- Wear a wide-brimmed hat for added eye protection.

3. Additional Recommended Protective Action Statements

- Check the daily forecast for the UV Index and protect your skin accordingly.
- Between April and September, whenever possible, plan outdoor activities for before 11 a.m. or after 3 p.m.
- Use sources of vitamin D that are safer than UVR exposure, e.g., dietary sources, including fortified foods, and vitamin D supplements. Intentional UVR exposure to meet vitamin D requirements is not recommended.

4. Tips for Implementing the Primary Protective Actions

Shade

- Good-quality shade includes dense vegetation and covered structures that offer shade from the side, and not just overhead, to protect against scattered UVR.¹¹
- As a general guide, wider and denser sources of shade provide increased SPF.¹¹
- Cloth sources of shade, such as canopies and umbrellas, should have tightly woven fabric.
- Additional personal protection (clothes, sunglasses and sunscreen) is recommended even when in the shade to protect against scattered UVR, especially on high UV Index days.

Clothing

- Hats should shade the head, face, ears and back of the neck with a wide brim.
- In general, clothing provides better protection than sunscreen.^{12,13}
- Tightly woven or UV-protective labelled clothing is recommended.^{13,14}

Sunscreen

- Sunscreen should be used on exposed skin not covered by protective clothing. Consider using sunscreen for the lips (e.g., sunscreen lip balm) as well.
- Use a generous amount of sunscreen (e.g., the average adult requires approximately two to three tablespoons of lotion-formulated sunscreen to cover the whole body, and a teaspoon to cover the face and neck).
- Reapply after swimming, strenuous exercise, or towelling off.
- Use sunscreen that says on the label:
 - "Broad spectrum"
 - "SPF 30" or higher
 - "Water resistant"
- Sunscreen comes in a variety of formulations. Find one that suits you best and apply it properly with thorough coverage. Sunscreen formulations that you find easier to apply thoroughly will be more effective.

Eye protection

- Because UVR that is harmful to the eyes is present in the sun's rays all year round and throughout the day, eye protection may be required even when skin protection is not.
- Eye protection is required around highly reflective environments, such as snow, sand and water.
- The best UV protection for eyes is offered by close-fitting wraparound sunglasses.
- Look for sunglasses or prescription lenses with full UVA and UVB protection. Examples of appropriate labels are "UV400" or "100% UV protection."
- Contact lenses, even those with UV protection, do not provide full coverage for the eye and the skin around the eye.

Table 3. Comparison of 1994 and 2014–2015 protective action statements

1994 strategies to reduce ultraviolet radiation (UVR) exposure and related health risks

- It is possible to enjoy healthy outdoor activity while reducing exposure to UVR.
- Minimize sun exposure
- Plan your outdoor activity to take place before 11:00 a.m. or after 4:00 p.m., when sun rays are the weakest. Consult the UV index for daily forecasts of UVR intensity.
 - Practice sun protection behaviours when you are outdoors between April through September, between 11:00 a.m. and 4:00 p.m. every day.
 - In winter, practice sun protection behaviours during periods of extended exposure, and/or when you are near fresh/bright snow.
 - When visiting warmer climates, remember that UVR is more intense there and sun protection is especially important.
 - There is no such thing as a “healthy” tan. Tanning parlours and sunlamps are not a safe way to tan.
- Seek shade
- Seek shade, especially from 11:00 a.m. to 4:00 p.m.
 - Work towards creating shade in the form of shelters, canopies and trees.
- Cover up
- Wear clothing to cover your arms and legs.
 - Wear a hat with a wide brim to shade your face and neck.
 - Wear sunglasses that absorb UVR.
- Use sunscreen
- Sunscreens should be used in conjunction with shade, clothing, hats and sunglasses, not instead of them.
 - Sunscreens are not intended to lengthen the time spent in the sun, but to reduce exposure and provide some protection from sunburn when people need to be in the sun.
 - Use a sunscreen with SPF #15 or higher that has both UVA and UVB protection.

2014–2015 Recommended Core Content for Sun Safety Messages in Canada – primary recommended protective action statements

- Enjoy the sun safely: Protect your skin, protect your eyes.
- Protect your skin
- When the UV Index is 3 or higher, protect your skin as much as possible. In general, the UV Index in Canada can be 3 or higher from 11 a.m. to 3 p.m. between April and September, even when it’s cloudy.
 - [statement on tanning moved down]
 - Seek shade or bring your own (e.g., an umbrella).
 - Wear clothing and a wide-brimmed hat that cover as much skin as possible, as appropriate to the activity and weather.
 - [eye protection given separate section]
 - Use sunscreen labelled “broad spectrum” and “water-resistant” with a sun protection factor (SPF) of at least 30, on skin not covered by clothing. Apply sunscreen generously and reapply when required.
 - Don’t use UV tanning equipment or deliberately try to get a suntan, and avoid getting a sunburn.
- Protect your eyes
- Wear sunglasses or prescription eyeglasses with UV-protective lenses.
 - Wear a wide-brimmed hat for added eye protection.

They make recommendations for situations where protection is required.

3. *Additional Recommended Protective Action Statements:* These statements provide additional actions for individuals to consider when planning daily activities, prior to UVR exposure. They would be most relevant to an audience receptive to recommendations for advanced planning.
4. *Tips for Implementing the Primary Protective Actions:* These statements provide further details on how to implement personal protective actions, as outlined in the primary protective action statements. The tips are a secondary level of information to include in materials where space permits.

Organizations are encouraged to adopt, at minimum, the Primary Recommended Protective Action Statements (group 2) where practical. By doing so, sun safety information will be communicated more consistently, thereby improving knowledge and reducing inaction that may result from message ambiguity.⁶

Table 3 compares the 1994 Strategies to Reduce Ultraviolet Radiation (UVR) Exposure and Related Health Risks, which served as the action statements for the public, to the new action statements. In addition to a shortened list, which focuses on the immediate protective actions that are recommended with UVR exposure, there are several detailed changes in the new set, and greater prominence is given to eye protection.

IMPLICATIONS AND NEXT STEPS FOR PUBLIC EDUCATION

The consensus process was well received and a high degree of agreement on the resulting content was achieved. The process benefitted from interdisciplinary discussions and a phased approach to developing the content.

A longer report, to be posted on the OSSWG website, will provide a summary of the evidence, describe the consensus process in detail and additional considerations for UVR protection.

The recommended core content helps organizations with a role in promoting sun safety in Canada to form a common understanding of what is needed for effective sun protection. A key next step is adapting the agreed-upon content to tailor messages for target audiences, including priority subpopulations, and community-wide campaigns. Most workshop attendees expressed interest in continuing to be involved in the development of public education messages.

APPENDIX A. EVIDENCE AND RATIONALE SUPPORTING THE STATEMENTS ACCEPTED THROUGH THE CONSENSUS PROCESS AND INCLUDED IN THE FINAL SET OF CONTENT

Where applicable, major reviews were identified and included to develop the Recommended Core Content for Sun Safety Messages in Canada and are noted below. Research in the area of the

properties of ultraviolet radiation (UVR) and protective measures is not extensive and therefore limited to individual studies. The scientific panel evaluated these studies and relevant review articles to come to an agreement regarding what is reasonable to recommend in the context of the level of evidence available. The underlying premise of the recommended core content is that whatever individuals can realistically do to reduce UVR exposure

will be to their benefit. This is based on the research that UVR is a cause of skin cancer and eye damage. The more limited evidence in other areas, such as how some protective measures have been observed to be more reliable than others (e.g., shade and clothing are more reliable than sunscreen), was evaluated as to whether they are nonetheless reasonable to integrate into the recommended core content.

1. Key Facts

High-level information statements based on an International Agency for Research on Cancer (IARC) review linking UVR to skin cancer, and measurement studies observing UVR effects on the eye and UVR strength throughout the day and year and under cloudy conditions as cited in Table 2. Recommended Core Content for Sun Safety Messages in Canada.

2. Primary Recommended Protective Action Statements

Enjoy the sun safely.

This statement is based on feedback from the health promotion field and recommendations from the National Institute for Health and Care Excellence (NICE) UK¹⁵ and the International Commission on Non-Ionizing Radiation Protection (ICNIRP) UVI Working Group¹⁶ to acknowledge the sense of well-being individuals experience when outdoors and to ensure that sun protection messages do not conflict with physical activity messages. Evidence also suggests that increased outdoor time, among children and youth in particular, is associated with increased physical activity.^{17,18}

Protect your skin.

Skin protection is needed to reduce ultraviolet radiation (UVR) exposure from the sun and UVR-emitting tanning devices because UVR exposure has been classified as carcinogenic to humans by the IARC:

- Solar UVR causes melanoma, and basal and squamous cell carcinoma.¹⁹
- UVR-emitting tanning devices cause melanoma.¹⁹

Protect your eyes.

There is sufficient evidence that UVR-emitting tanning devices are a cause of some forms of ocular melanoma, although the evidence is limited for solar UVR.¹⁹

Some evidence suggests chronic exposure to UVR, in general, is a risk factor for several other eye-related disorders, including cortical cataracts and pterygium.^{20,21} Acute exposure to UVR can also cause photokeratitis, photoconjunctivitis, and retinal burns (e.g., from looking directly at the sun).²² Age-related macular degeneration is likely related to exposure to the visible light portion of sunlight, specifically the blue light range.²

When the UV Index is 3 or higher, protect your skin as much as possible.

The UV Index is based on the erythemal (sunburn) action spectrum and primarily includes the UVB spectrum and a portion of the UVA spectrum. The minimal erythema dose (MED) is the measure of the minimum dose of UVR to produce a just-noticeable erythema on previously unexposed skin. The MED varies by skin type, sensitivity to UVR and time. When the UV Index is 3, the first sign of erythema, or 1 MED, occurs after 44.4 minutes for skin type I, the most sensitive skin type (e.g., fair skin and burns easily) and about 56 minutes of exposure for skin type II.^{9,23} A UV Index of 3 is used as a threshold for increased risk of skin damage during common outdoor activities for the broadest segment of the population. The ICNIRP UVI Working Group has recommended using a single sun protection message to coincide with times when the UV Index is 3 and above, and to indicate times of day when sun protection is recommended.¹⁶

In general, the UV Index in Canada can be 3 or higher from 11 a.m. to 3 p.m. between April and September, even when it's cloudy.

The strength of the rays of the sun that cause sunburn, which is what the UV Index measures, is greatest around solar noon on a clear day in the summer. The UV Index can remain strong at 3 or higher, from about 10 a.m. to 2 p.m. local solar time (approximately 11 a.m. to 3 p.m. during daylight savings time) from April to September in Canada. While the UV Index declines with increasing latitude, the differences between Toronto (44° N) and Edmonton (54° N) are not very large.⁸

Previously, 11 a.m. to 4 p.m. was established to account for variations in solar noon time across the country. Based on the more recent studies cited from Environment Canada scientists, this variation was determined to not be substantial and consensus participants agreed that a narrower time frame would likely increase its acceptability with the public.

The statement on cloudy conditions is included because partly cloudy skies will either magnify or mitigate UVR, depending on the pattern of cloud cover and the sun's relative position,²⁴ while uniform cloud cover reduces UVR in relation to its thickness.²⁵

Seek shade or bring your own (e.g., an umbrella). Wear clothing and a wide-brimmed hat that cover as much skin as possible, as appropriate to the activity and weather.

Evidence suggests reported use of shade and protective clothing is more strongly related to reduced risk of sunburn than sunscreen use.²⁶⁻²⁸ Research has measured substantially higher levels of protection with clothing compared to sunscreen.^{12,13} Shade and clothing can provide broader and more visible coverage than sunscreen and therefore appear before the statement on sunscreen.

Use sunscreen labelled "broad spectrum" and "water-resistant" with a sun protection factor (SPF) of at least 30 on skin not covered by clothing. Apply sunscreen generously and reapply when required.

The effectiveness of sunscreens labelled "broad spectrum" (filtering UVA and UVB) is determined by laboratory tests.²⁹ Water-resistant sunscreen is recommended to reduce the amount removed through perspiration and swimming. Sunscreens labelled "water resistant" in Canada must continue to provide protection for at least 40 minutes in water.²⁹

SPF 15 is the minimum accepted protection level for sunscreens in Canada, based on Health Canada regulations. Laboratory tests also show that sunscreen with an SPF of 15 filters 93.33% of UVB, while an SPF of 30 filters 96.67%.³⁰ SPF testing to determine the labelled value is based on an application of 2 mg/cm². However, tests of volunteers reporting sunscreen use in community settings show that application densities typically range from 0.5 mg/cm² to 1.3 mg/cm² – substantially less than the recommended amount. A minimum SPF of 30 is therefore recommended for use by the public to offset the typically lower volume of application.³¹

(Continued)

<p>Don't use UV tanning equipment or deliberately try to get a suntan, and avoid getting a sunburn.</p>	<p>Reapplication after two hours is not included as a recommendation because research has measured only a 25% reduction in SPF after a day without physical activity or UVR exposure,³² and even after eight hours on a day with physical activity and bathing, 43% of the initial protective effect of sunscreen was still present.³³</p> <p>Nonetheless, evidence for improved outcomes with sunscreen use is not as strong as for shade, as described above, which may be in part due to the typically inadequate sunscreen application patterns among the public. Therefore, shade and clothing appear before sunscreen in the action statements because they are considered better UVR-protection options.</p>
<p>Wear sunglasses or prescription eyeglasses with UV-protective lenses.</p>	<p>UVR from the sun and UVR-emitting tanning devices has been classified by IARC as carcinogenic to humans. UVR-emitting tanning devices cause melanoma.¹⁹</p> <p>Reported history of sunburns and tan-seeking behaviour may be associated with an increased risk of melanoma.^{34,35}</p> <p>The UV Index is a measure of the shorter wavelengths of the UVR spectrum that cause sunburns, primarily within the UVB spectrum. Since the longer wavelengths of UVR, primarily within the UVA spectrum, are more directly associated with eye health and can be strong throughout the day, eye protection recommendations apply on days even when the UV Index is low, and are therefore separate from the skin protection recommendations and do not include specific times for when eye protection is needed. The cornea fully absorbs UVB, but UVA penetrates surface layers and reaches the lens of the eye.³⁶</p> <p>Modern sunglass and eyeglass lens materials that are commonly available, including polyurethanes (mid- to high-index plastics), polycarbonate and CR39 with UV blocking dye (UV400), provide UVR protection.³⁷</p>
<p>Wear a wide-brimmed hat for added eye protection.</p>	<p>Wide-brimmed hats provide additional eye protection when worn in conjunction with eyewear, especially when eyewear does not cover the peripheral areas of the eyes.</p>

3. Additional Recommended Protective Action Statements

<p>Check the daily forecast for the UV Index and protect your skin accordingly.</p>	<p>The UV Index provides more detailed guidance on the level of protection required on a given day. The UV Index can reach up to 10 in Canada and higher in other parts of the world. The higher the UV Index value, the more protection is needed.</p> <p>However, information on the UV Index is not always accessible throughout the day and real-time values may differ from forecasted values. Therefore, this recommendation is listed as an additional recommended protective action statement, rather than as a primary action statement.</p>
<p>Between April and September, whenever possible, plan outdoor activities for before 11 a.m. or after 3 p.m.</p>	<p>An additional measure to reduce UVR exposure is to limit time outdoors. At all stages of the consensus process, consensus participants were in agreement that prioritizing this statement would result in losing the attention of most audiences. Therefore, this statement appears as an additional recommended protective action statement and for when planning outdoor activities would be feasible.</p>
<p>Use sources of vitamin D that are safer than UVR exposure, e.g., dietary sources, including fortified foods, and vitamin D supplements. Intentional UVR exposure to meet vitamin D requirements is not recommended.</p>	<p>Although UVB exposure can increase vitamin D levels, the science has not established a safe level of exposure in terms of health risk. This recommendation to not use UVR exposure for obtaining vitamin D is consistent with Health Canada's recommendation, which is based on an extensive review by the Institute of Medicine.³⁸</p>

4. Tips for Implementing the Primary Protective Actions

These tips are based on expert knowledge on the evidence for the UVR-protective properties of shade, clothing, sunscreen and the field of eye health and eye protection. Citations where applicable are included in the main table.

REFERENCES

1. IARC Working Group on Risk of Skin Cancer and Exposure to Artificial Ultraviolet Light, International Agency for Research on Cancer (Eds.). *Exposure to Artificial UV Radiation and Skin Cancer*. Lyon, France: World Health Organization, International Agency for Research on Cancer, 2006.
2. Yam JCS, Kwok AKH. Ultraviolet light and ocular diseases. *Int Ophthalmol* 2014;34(2):383–400. PMID: 23722672. doi: 10.1007/s10792-013-9791-x.
3. National Skin Cancer Prevention Committee. *Exposure to and Protection from the Sun in Canada: A Report Based on the 2006 Second National Sun Survey*. Toronto, ON: Canadian Partnership Against Cancer, 2010.
4. Canadian Cancer Society's Advisory Committee on Cancer Statistics. *Canadian Cancer Statistics 2015. Special Topic: Predictions of the Future Burden of Cancer in Canada*. Toronto, ON: Canadian Cancer Society, 2015.
5. Mills CJ, Jackson S. Workshop report: Public education messages for reducing health risks from ultraviolet radiation. *Chronic Dis Can* 1995; 16(1):33–36. Available at: http://www.collectionscanada.gc.ca/webarchives/20071223122331/http://www.phac-aspc.gc.ca/publicat/cdic-mcc/16-1/d_e.html (Accessed June 1, 2015).
6. Han PKJ, Moser RP, Klein WMP. Perceived ambiguity about cancer prevention recommendations: Associations with cancer-related perceptions and behaviours in a US population survey. *Health Expect* 2007;10(4):321–36. PMID: 17986069. doi: 10.1111/j.1369-7625.2007.00456.x.
7. Armstrong BK, Kricker A. The epidemiology of UV induced skin cancer. *J Photochem Photobiol B* 2001;63(1–3):8–18. PMID: 11684447. doi: 10.1016/S1011-1344(01)00198-1.
8. Fioletov VE, Kerr JB, McArthur LJB, Wardle DI, Mathews TW. Estimating UV Index climatology over Canada. *J Appl Meteorol* 2003;42(3):417–33. doi: 10.1175/1520-0450(2003)042<0417:EUICOC>2.0.CO;2.
9. Fioletov V, Kerr JB, Fergusson A. The UV Index: Definition, distribution and factors affecting it. *Can J Public Health* 2010;101(4):15–19. PMID: 21033538.
10. Sasaki H, Sakamoto Y, Schnider C, Fujita N, Hatsusaka N, Sliney DH, et al. UV-B exposure to the eye depending on solar altitude. *Eye Contact Lens* 2011; 37(4):191–95. PMID: 21670696. doi: 10.1097/ICL.0b013e31821fbf29.
11. Kapelos G, Patterson M. Health, planning, design and shade: A critical review. *J Archit Plan Res* 2014;31(2):91–111.
12. Aguilera J, de Gálvez MV, Sánchez-Roldán C, Herrera-Ceballos E. New advances in protection against solar ultraviolet radiation in textiles for summer clothing. *Photochem Photobiol* 2014;90(5):1199–206. PMID: 24861801. doi: 10.1111/php.12292.
13. Ghazi S, Couteau C, Coiffard LJM. What level of protection can be obtained using sun protective clothing? Determining effectiveness using an in vitro method. *Int J Pharm* 2010;397(1–2):144–46. PMID: 20600730. doi: 10.1016/j.ijpharm.2010.06.022.
14. Lautenschlager S, Wulf HC, Pittelkow MR. Photoprotection. *Lancet* 2007; 370(9586):528–37. PMID: 17693182. doi: 10.1016/S0140-6736(07)60638-2.
15. National Institute for Health and Care Excellence (NICE). *Skin Cancer Prevention: Information, Resources and Environmental Changes*. NICE Public Health Guidance 32, 2011. Available at: <https://www.nice.org.uk/guidance/ph32/chapter/1-Recommendations#recommendation-3-information-provision-message-content> (Accessed June 1, 2015).

16. Allinson S, Asmuss M, Baldermann C, Bentzen J, Buller D, Gerber N, et al. Validity and use of the UV index: Report from the UVI working group, Schloss Hohenkammer, Germany, 5–7 December 2011. *Health Phys* 2012;103(3):301–6. PMID: 22850235. doi: 10.1097/HP0b013e31825b581e.
17. Schaefer L, Plotnikoff RC, Majumdar SR, Mollard R, Woo M, Sadman R, et al. Outdoor time is associated with physical activity, sedentary time, and cardiorespiratory fitness in youth. *J Pediatr* 2014;165(3):516–21. PMID: 25043155. doi: 10.1016/j.jpeds.2014.05.029.
18. Pearce M, Page AS, Griffin TP, Cooper AR. Who children spend time with after school: Associations with objectively recorded indoor and outdoor physical activity. *Int J Behav Nutr Phys Act* 2014;11(1):45. PMID: 24679149. doi: 10.1186/1479-5868-11-45.
19. International Agency for Research on Cancer. *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans*. Volume 100D. A Review of Human Carcinogens. Part D: Radiation. Lyon, France: IARC Press, 2012.
20. Sliney DH. Photoprotection of the eye – UV radiation and sunglasses. *J Photochem Photobiol B* 2001;64(2–3):166–75. PMID: 11744403. doi: 10.1016/S1011-1344(01)00229-9.
21. Lucas RM. An epidemiological perspective of ultraviolet exposure – Public health concerns. *Eye Contact Lens* 2011;37(4):168–75. PMID: 21670693. doi: 10.1097/ICL.0b013e31821cb0cf.
22. Cullen AP. Ozone depletion and solar ultraviolet radiation: Ocular effects, a United Nations Environment Programme perspective. *Eye Contact Lens* 2011;37(4):185–90. PMID: 21670695. doi: 10.1097/ICL.0b013e318223392e.
23. Fioletov VE, McArthur LJB, Mathews TW, Marrett L. On the relationship between erythema and vitamin D action spectrum weighted ultraviolet radiation. *J Photochem Photobiol B* 2009;95(1):9–16. PMID: 19150601. doi: 10.1016/j.jphotobiol.2008.11.014.
24. Bodeker GE, McKenzie RL. An algorithm for inferring surface UV irradiance including cloud effects. *J Appl Meteorol* 1996;35(10):1860–77. doi: 10.1175/1520-0450(1996)035<1860:AAFISU>2.0.CO;2.
25. Tarasick DW, Fioletov VE, Wardle DI, Kerr JB, McArthur LJB, McLinden CA. Climatology and trends of surface UV radiation: Survey article. *Atmos-Ocean* 2003;41(2):121–38. doi: 10.3137/ao.410202.
26. Linos E, Keiser E, Fu T, Colditz G, Chen S, Tang JY. Hat, shade, long sleeves, or sunscreen? Rethinking US sun protection messages based on their relative effectiveness. *Cancer Causes Control* 2011;22(7):1067–71. PMID: 21637987. doi: 10.1007/s10552-011-9780-1.
27. Køster B, Thorgaard C, Philip A, Clemmensen IH. Prevalence of sunburn and sun-related behaviour in the Danish population: A cross-sectional study. *Scand J Public Health* 2010;38(5):548–52. PMID: 20484310. doi: 10.1177/1403494810371250.
28. Bränström R, Kasparian NA, Chang Y, Affleck P, Tibben A, Aspinwall LG, et al. Predictors of sun protection behaviors and severe sunburn in an international online study. *Cancer Epidemiol Biomarkers Prev* 2010;19(9):2199–210. PMID: 20643826. doi: 10.1158/1055-9965.EPI-10-0196.
29. Health Canada. *Sunscreen Monograph – Version 2.0*, 2013. Available at: <http://webprod.hc-sc.gc.ca/nhp/bdpsn/atReq.do?atid=sunscreen-ecransolaire&lang=eng> (Accessed May 29, 2015).
30. Moloney EJ, Collins S, Murphy GM. Sunscreens: Safety, efficacy and appropriate use. *Am J Clin Dermatol* 2002;3(3):185–91. PMID: 11978139. doi: 10.2165/00128071-200203030-00005.
31. Diffey B. Sunscreens: Expectation and realization. *Photodermatol Photoimmunol Photomed* 2009;25(5):233–36. PMID: 19747240. doi: 10.1111/j.1600-0781.2009.00459.x.
32. Beyer DM, Faurschou A, Philipsen PA, Haedersdal M, Wulf HC. Sun protection factor persistence on human skin during a day without physical activity or ultraviolet exposure. *Photodermatol Photoimmunol Photomed* 2010;26(1):22–27. PMID: 20070835. doi: 10.1111/j.1600-0781.2009.00479.x.
33. Bodekaer M, Faurschou A, Philipsen PA, Wulf HC. Sun protection factor persistence during a day with physical activity and bathing. *Photodermatol Photoimmunol Photomed* 2008;24(6):296–300. PMID: 19000186. doi: 10.1111/j.1600-0781.2008.00379.x.
34. Usher-Smith JA, Emery J, Kassianos AP, Walter FM. Risk prediction models for melanoma: A systematic review. *Cancer Epidemiol Biomarkers Prev* 2014;23(8):1450–63. PMID: 24895414. doi: 10.1158/1055-9965.EPI-14-0295.
35. Gandini S, Autier P, Boniol M. Reviews on sun exposure and artificial light and melanoma. *Prog Biophys Mol Biol* 2011;107(3):362–66. PMID: 21958910. doi: 10.1016/j.pbiomolbio.2011.09.011.
36. World Health Organization. *The Known Health Effects of UV*. Available at: <http://www.who.int/uv/faq/uvhealthfac/en/> (Accessed May 29, 2015).
37. Fannin TE, Grosvenor T. *Clinical Optics*. Boston, MA: Butterworths, 1987.
38. Health Canada. *Vitamin D and Calcium: Updated Dietary Reference Intakes*, 2013. Available at: <http://www.hc-sc.gc.ca/fn-an/nutrition/vitamin/vita-d-eng.php> (Accessed July 23, 2014).

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RÉSUMÉ

La réduction de l'exposition aux rayons ultraviolets diminue le risque de cancer de la peau et de lésions oculaires. Entre 1996 et 2006, les Canadiens ont accru le temps qu'ils passent au soleil sans améliorer leur protection. Le dernier consensus national concernant l'information sur la protection solaire à transmettre au public date de 1994. Depuis, les messages d'intérêt public sont modifiés de façon contradictoire. L'OSSWG (Ontario Sun Safety Working Group), un organisme ontarien, a amorcé un examen de ces messages et confié à un comité scientifique le mandat d'élaborer leur contenu. Les membres de l'OSSWG ont ensuite proposé un processus de consensus national et coopéré avec un comité directeur national, une spécialiste en communication de messages sur la santé et des représentants de 28 organismes dans le cadre d'un atelier et de sondages avant et après l'atelier. Le processus de consensus a mené à la révision du contenu de base recommandé pour les messages de sécurité au soleil au Canada. Le nouveau contenu comprend quatre groupes d'énoncés : des « faits clés », des « énoncés des mesures de protection primaires recommandées », des « énoncés des mesures de protection supplémentaires recommandées » et des « conseils pour appliquer les mesures de protection primaires ». On encourage les organismes à adopter, au minimum, les « énoncés des mesures de protection primaires recommandées » à la base de leurs messages d'intérêt public. Le contenu de base recommandé établit une compréhension commune de ce qui est nécessaire à une protection solaire efficace. L'attente sous-jacente est qu'à la prochaine étape clé, on adaptera ce contenu à différentes sous-populations et à des campagnes de promotion de la santé.

MOTS CLÉS : rayons ultraviolets/effets des rayonnements; tumeurs de la peau/prévention et contrôle; maladies de l'œil/prévention et contrôle; consensus; éducation sanitaire; Canada