



BE SUNSMART: A GUIDE FOR SCHOOLS



**The Cancer Association of South Africa (CANSA)
26 Concorde Road West
Bedfordview
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**Toll-free No 0800 22 66 22
www.cansa.org.za**

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SUN PROTECTION

A GUIDE FOR SCHOOLS

1. Introduction
2. The sun: friend and enemy
3. The ozone layer
4. The structure of the skin
5. Types of skin cancer
6. Factors which affect how we burn
7. A healthy tan? No!
8. Sunscreens
9. Cover up
10. The effect of the sun on the eyes and kidneys
11. UV protection and sport
12. How to examine your skin
13. First aid
14. For parents
15. A 'Sun Protection Program' for schools
16. Sun Protection Lesson Plans: Grade 1- 3
17. Sun Protection Lesson Plans: Grade 4 - 5
18. Sun Protection Lesson Plans: Grade 6 - 7

1. THE PURPOSE OF THIS GUIDE FOR SCHOOLS

The purpose of this guide, prepared by the Cancer Association of South Africa (CANSA), is to provide primary school teachers with accurate knowledge and information to empower them so that they will in a position to:

- inform learners of Grade 1 to Grade 7 about the dangers of excessive exposure to the sun;
- provide learners with information about UVA, UVB and UVC rays that are present in sunlight and what their effects are on human skin;
- give their learners an overview of ozone, the ozone layer and its importance;
- provide learners with basic information about the different types of skin cancer that can be caused by excessive exposure to the sun;
- Increase pupils' awareness of skin cancer risks and the means of protection;
- Change learners' attitudes about skin care;
- Allow learners to explore aspects of their personal lives which encourage responsible decision-making about skin care;
- teach learners about the importance of protecting themselves against the dangerous radiation present in sunlight through dressing adequately and making use of the correct type of sunscreens;
- inform learners of the important contribution made by the Cancer Association of South Africa (CANSA) in the prevention of cancer; and
- provide teachers with lesson plans to assist them in the teaching of the children in their care

2. INTRODUCTION

Many years ago ladies were expected to be "pale and interesting". They were clothed in long-sleeved dresses, gloves and broad-brimmed hats, and daintily clutched parasols to preserve their "peaches and cream" complexions. Men, for decorum, covered their bodies with long trousers, jackets and hats with brims. Only farm labourers and other outdoor workers were brown from the sun.

Then came the era of wider travel, and in Europe and North America a suntan became associated with exotic holidays in the sun. A tan, therefore, meant prosperity and was desirable. With increased leisure, outdoor pursuits also became popular, both for recreation and for health. And so a tan became equated with health too. Health, prosperity, and relaxation: what more could one wish to have! A tan, as an outward suggestion of these attributes, became very fashionable. The advertising



industry was quick to realise the appeal of scantily clad, bronzed bodies. And so the myth of a "healthy tan" was reinforced.

As with many pleasures, it was only over time that the hazards of the habit of sun exposure became apparent. At first, the warnings were those of a lone voice crying in the wilderness, but as figures for sun-induced skin cancers in light skinned people living in Australia and North America became available, these countries embarked on extensive public awareness campaigns about the dangers of sun exposure.



In view of all these factors and the certain dangers of both acute and prolonged over-exposure to the sun, it has become very important that South Africans are made aware of the hazards of excessive exposure to the sun.

Basal cell carcinoma

(pictured on the left) and **squamous** comprise a quarter of all male, and a

fifth of all female cancers, in South Africa. These cancers are an important public health problem all over the world and South Africa is no exception.



Risk factors include:

- a fair skin
- albinism
- presence of moles
- freckles
- family history of skin cancer
- natural light coloured hair
- blue, green or hazel eyes
- a tendency to burn rather than suntan
- history of severe sunburn under the age of 20
- outdoor work: farming, ranching, road construction, etc
- excessive exposure to the sun.

Children should be encouraged, from an early age, to protect themselves from the sun. In South Africa, the application of sunscreen should be as much a part of health routine as cleaning one's teeth. Fresh air and outdoor pursuits are psychologically and physically beneficial, but in order to enjoy them with safety, regular sun protection right from babyhood is essential.

2.1 The Sun: A Friend and an Enemy



The sun is the earth's major source of energy. It makes it possible for us to live on this planet by providing the heat and energy required for the growth of plants, animals and humans. In humans sunlight is essential for the formation of Vitamin D which has an important function in bone health and development, immune function, and blood formation.

The sun beams its energy to the earth in rays of heat, namely visible infrared light and invisible ultraviolet (UV) light. The sun's energy is greatest when it travels through fewer atmospheres. It is more intense closer to the equator, on mountain tops, in the summer, and during the middle of the day (from about 10:00 to 15:00).

Infrared and visible light can penetrate the skin. The energy of infrared rays is familiar to all of us in the pleasant warmth that the sun creates on our skin. Too much

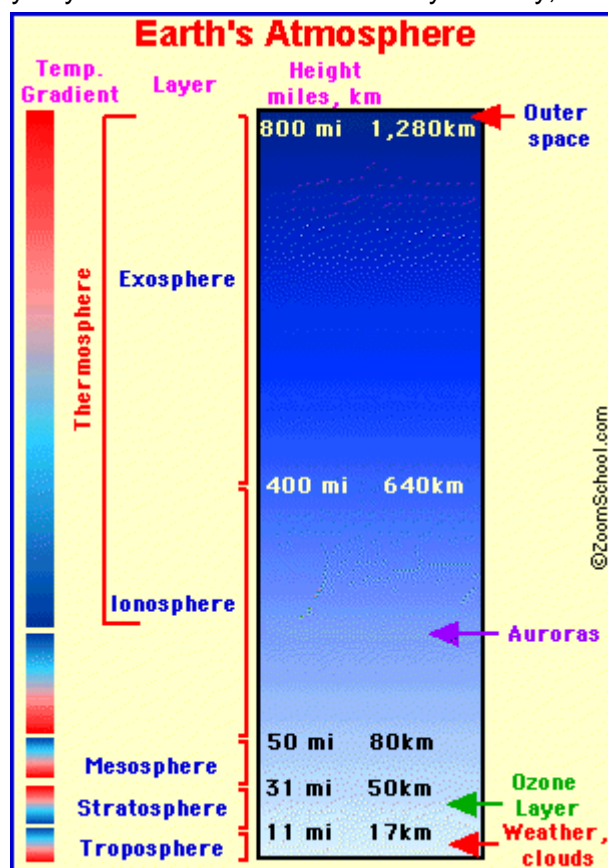
infrared energy makes us uncomfortably hot, causing us to protect ourselves by finding cool, shaded places. Just as infrared rays enter the skin, so do visible light and ultraviolet light rays. In fact, visible light rays can penetrate right through the skin.

Invisible ultraviolet light also penetrates into the skin. Two types of ultraviolet light, called UVA and UVB, reach the earth's surface. Rays that are shorter than UVB are screened out by the earth's atmosphere and never reach earth. Protective keratin on the skin surface reflects about 10% of ultraviolet light rays before they can enter the skin. UVA and UVB rays bounce off the keratin in much the same way as a mirror reflects light. Some of the rays that get past the first defense lines of keratin are blocked, scattered or captured by melanin packages as the second defense line of the body. About half of the UVA that enters the skin penetrates deeply into the dermis, but 80% or more of the UVB rays are trapped in the epidermal cells.

2.2 How Much UV Radiation Reaches Me?

The depletion of the ozone layer has resulted in the atmosphere losing its filter function and more solar ultraviolet (UV) radiation reaches the surface of the earth. This results in us getting more UV radiation, and sunburn faster, when the sun's rays are stronger. The amount of UV radiation that reaches the surface of the earth depends on:

- **The time of day** – UV radiation is greatest at midday (when the sun is highest in the sky), and less in the early morning or late afternoon.
- **The season** - UV radiation is greatest in the summer, less in spring, and least in the winter.
- **Cloud cover** - A thick, heavy layer of cloud blocks UV rays. Puffy, fair-weather clouds or layers of thin, light cloud let most of the UV rays through. The darker the clouds, the less the UV radiation that gets through. Be careful under thin clouds - the sun's rays don't feel as hot, but they still can burn.
- **The type of surface you are on** - You can get much more UV radiation on snow, since the white surface reflects the sun's rays back onto your skin, just like a mirror. Other bright surfaces like dry sand and concrete can also reflect almost 85% of the sun's rays.
- **Altitude** – Ultraviolet radiation increases by 8% with every 1 000 metres of altitude. With increased altitude the air becomes



thinner and less UV radiation is filtered out. You, therefore, get more UV radiation on a mountain than at lower elevations, as the air is clearer and thinner.

- **Environment** - UV radiation is strongest at the equator, and gets weaker as you go towards the earth's poles. The poles receive the least amount of UV radiation. UV radiation is reflected in variation on different surfaces: dry beach sand is about 15% and snow as much as 80%. This is referred to as indirect UV radiation.
- **How long you're out in the sun** - The longer you are out in the sun, the more UV radiation you receive.
- **What you're wearing** - Summer clothes often expose more skin to UV radiation.

2.3 UVC Rays

It is important to remember that:

- no natural UVC rays reach the earth.
- artificial UVC rays can be produced by arc-welders and by sterilising lamps.
- UVC radiation is extremely damaging to the skin and rapidly produces a cherry-red burn.
- people using arc-welders should always wear protective clothing and special goggles.
- Everyday sunscreens do NOT protect against UVC radiation.

2.4 UVB Rays

- most skin damage is caused by UVB rays
- UVB rays cause pigment cells (melanocytes) to multiply so a "tan" results. It also causes thickening, drying and leathery of the skin
- UVB radiation is the main cause of skin cancer
- Maximum protection sunscreens allow no more than 1% of UVB radiation to reach the skin

2.5 UVA Rays

- UVA radiation causes the pigment in existing melanocytes to darken so a light, temporary "tan" results.
- About 50% of UVA rays pass through the epidermis and reaches into the connective tissue of the dermis - mainly causing premature ageing.

2.6 Some More Important Facts

Important facts to remember about UV radiation:

- UV radiation is not felt as heat on the skin, so even on a cool and cloudy day, the radiation may be just as high, and just as damaging, as on a clear, sunny day.
- 80-85% of UV radiation passes through clouds.
- calculations suggest that locations in the southern hemisphere receive approximately 15% more UV radiation than locations at a similar latitude north of the equator. This is caused by differences in ozone between the northern

and southern hemispheres. However, measurements show much larger differences, with biologically damaging UV radiation being 50 - 80% more in the southern hemisphere than at comparable northern latitudes in Europe.

- UV rays can cause cataracts and damage to the retina of the eye.
- protection from UV rays is important all year round, not just during the summer or at the beach.

2.7 How Do I Protect Myself From UV Radiation?

It is impossible to completely avoid sunlight and it would be unwise to reduce your level of activity because you don't want to be outdoors. But there are precautions that you can take to limit the amount of UV radiation you are exposed to. The most important fact about sun protection is to minimize the amount of time spent in the intense sun. It is, therefore, important not to be in the sun between 10:00 and 15:00.

Some people think about sun protection only when they spend a full day at the beach or at the pool. But sun exposure adds up day after day, and exposure occurs whenever you are in the sun. For example, when you are gardening, fishing, hiking, riding a bike, going to the zoo or going to and from your car, you are being exposed.

The Cancer Association of South Africa (CANSA) provides recommendations for ensuring safe sun exposure. The following are steps that provide a practical approach to protecting yourself from the effects of the sun.

- Limit direct sun exposure during midday
- Cover up against sun exposure. Wear UV protective clothing and loose fitting, thickly wove materials
- Wear a hat with a wide brim that covers the face, neck and ear
- Use a sunscreen with an SPF of 20 (twenty) or higher
- Wear sunglasses that block UV rays
- Consider the type of activity you are involved in
- Avoid sunlamps and tanning booths
- Check your skin regularly
- Check for the UV index sometimes provided on the weather report on TV.

2.8 Radiation Attacking our Children

By the time a child reaches adolescence, nine out of every ten of them will have UV-related skin damage. Strong scientific evidence indicates that UV exposure during childhood and adolescence is a risk factor for developing skin cancer in later life.

Childhood is a critical period during which UV radiation can do the most damage. Often the signs don't appear until later in life and then it may be anything from pigmentation through to skin cancer and from cataracts through to a suppressed immune system. You may even develop **malignant melanoma** (pictured on the right) and this may occur sooner rather than later.



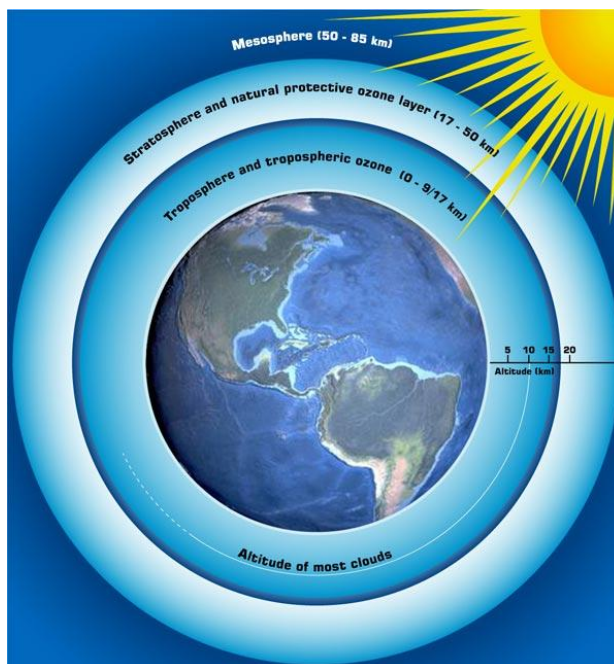
It only takes a few minutes for a child's skin to burn and that damage is permanent and cumulative. If you think of exposure to UV radiation beginning as an empty glass - even a drop at a time - the glass will eventually fill up. If it overflows, then you've got a problem.

It has been found that adequate protection (appropriate clothing and the use of sunscreens) during childhood can reduce the risks of developing problems later in life by up to 78%. Protection will filter UV rays and help limit the total exposure. It's like making sure the glass never fills up.

3. THE OZONE LAYER

Over the past 60 years, damage to the planet's ozone layer has increased the amount of harmful radiation that reaches our skin. Scientists estimate that the ozone layer has been depleted by 3-5%, letting in up to 12% more UV radiation. Australia, South Africa and Zimbabwe share the highest skin cancer rates in the world, because of the amount of time people spend in the sun, and because of the hole in the ozone layer that lies over the southernmost countries.

Ozone serves as a filter to screen out and reduce the UV light that reaches the earth's surface and its people.



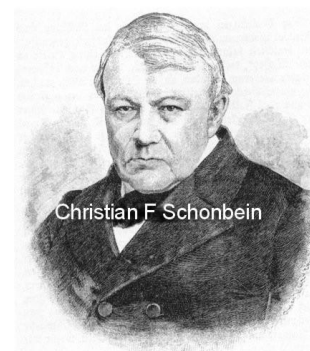
3.1 The Sun is Getting Hotter

The sun itself is no hotter today than it was thousands of years ago. But what has been happening in recent times is that the "sun umbrella" which shielded our planet earth, has gradually become more and more damaged. In fact, like an old umbrella, it's even been getting some holes in it. The sun umbrella is the ozone layer that shields and protects life on earth. And as it has become more and more depleted, so increasing amounts of dangerous ultraviolet (UV) radiation have been able to penetrate through to the earth - and to us! So, in a sense, it's perfectly true to say that - for us - the sun is indeed getting "hotter".

3.2 What is the Ozone Layer?

Ozone is a bluish gas related to oxygen, and known by the chemical symbol O_3 . It surrounds the earth in the upper atmosphere region, with the highest concentration between about 23 and 30 kilometers above the earth's surface.

Ozone or trioxygen (O_3) is a simple triatomic molecule, consisting of three oxygen atoms. It is much less stable than the diatomic oxygen (O_2). Ground-level ozone is an air pollutant with harmful effects on the respiratory systems of animals. Ozone was named after the Greek verb ozein, "to smell", from the peculiar odour in lightning storms. The formula for ozone was not determined until 1865 by **Jacques-Louis Soret**, and confirmed by **Christian Friedrich Schönbein** in 1867.





The photochemical mechanisms that give rise to the ozone layer were discovered by the British physicist **Sidney Chapman** in 1930 (pictured on the left). Ozone in the Earth's stratosphere is created by ultraviolet light striking oxygen molecules containing two oxygen atoms (O_2), splitting them into individual oxygen atoms (atomic oxygen); the atomic oxygen then combines with unbroken O_2 to create ozone, O_3 .

The ozone molecule is unstable (although, in the stratosphere, long-lived) and when ultraviolet light hits ozone, it splits into a molecule of O_2 and an atom of atomic oxygen, a continuing process called the ozone-oxygen cycle, thus creating an ozone layer in the stratosphere.

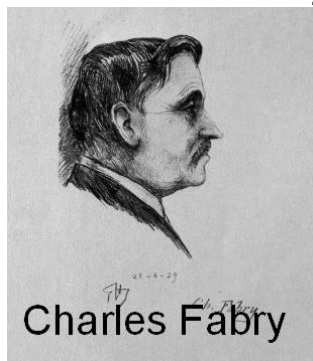
The major importance of ozone to us is that it shields the earth from between 95-99% of the sun's ultraviolet rays, rays that are known to be a leading cause of skin cancer. So the ozone layer, invisible as it is, is a major factor in making life on earth possible. Without this built-in sun umbrella we would be in the most terrible danger.

Even though the ozone layer is in total about 40 kilometers thick at the high altitudes where it occurs, it's a very fragile shield indeed. At its highest concentration within the centre of the ozone layer, its density is only about one molecule of ozone to a hundred thousand molecules of air. So, in non-technical language, you could say it's very "spread out".

If you compressed the whole 40 kilometer-thick layer of ozone under sea-level pressure, it would form a layer a few millimeters thick, or about the height of the capital letters on this page! Not much of a protection - and yet one on which our very lives depend.

3.3 What is Happening to Our Ozone?

Ozone itself was discovered in 1840 by a German chemist **Christian Friedrich Schönbein** (1799-1868), but it wasn't until very recent times, in 1913, when French chemists **Charles Fabry** and **Henri Buisson**



(pictured on the right) discovered the ozone layer.

The importance of the protective ozone layer began to be more fully understood and appreciated.



In 1974, American researchers established that man-made chemicals known as chloro-fluoro-carbons - CFC's for short - were damaging the ozone layer. These are still sometimes used in refrigerants, cleaning fluids and as propellants in aerosol spray cans, among other things.

After CFC's are released, they slowly rise into the atmosphere. When they reach the upper atmosphere, they are broken down by ultraviolet light from the sun, releasing chlorine that attacks the ozone layer. Each chlorine molecule, scientists say, is capable of destroying 10 000 molecules of ozone.

It doesn't take much imagination to see the potential danger of such a situation. By the 1980's it had become a worldwide global crisis. Teams of scientist have been discovering more and more depletion of our ozone layer. In the past ten years there has been a global drop in the ozone layer of at least 4%.

ANY CHANGE IN SKIN COLOUR AFTER TIME OUTDOORS - WHETHER SUNTAN OR SUNBURN - MEANS DAMAGE FROM THE SUN'S UV RAYS. AND JUST A FEW SERIOUS SUNBURNS CAN INCREASE YOUR RISK OF SKIN CANCER.

Even more alarming has been the discovery of massive "holes" in the ozone layer. One such hole in the ozone layer over the South Pole region is some 40-50% less dense or "thinner", allowing a huge increase in penetration by dangerous ultraviolet rays.

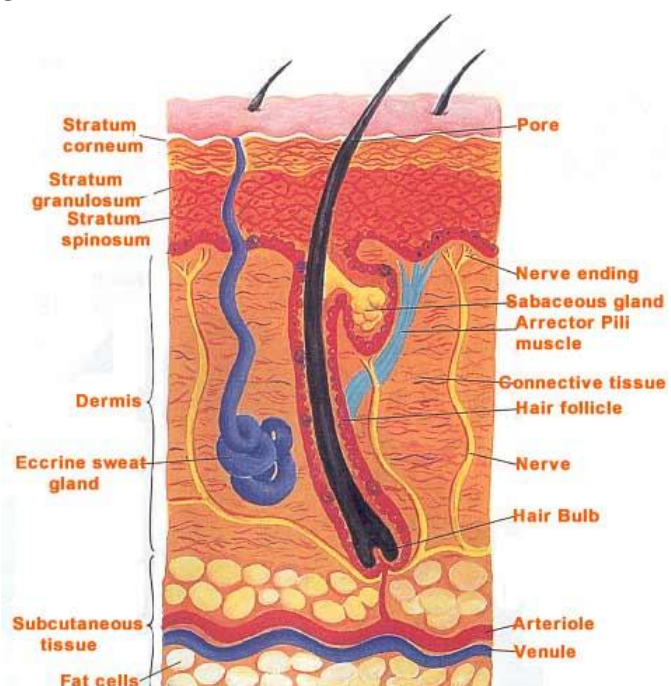
South African scientists say they have discovered a disturbing relationship between the hole in the ozone layer over the Antarctic and ozone measurements above South Africa. Each summer, they now believe, ozone-rich air in countries adjacent to the Antarctic spreads to fill the ozone hole, reducing the protection in countries such as South Africa.

So, while depletion of the ozone layer is a worldwide problem, for us in South Africa, it's an even more serious situation still.

4. THE STRUCTURE OF THE SKIN

The skin is the body's largest protective organ. It makes up approximately 16% of a person's weight. The average adult skin surface is 1,8m² and weighs about 11kg. It is composed of two layers - the inner layer called the dermis and the outer layer called the epidermis.

Functions of the skin – The skin has nerve endings that send impulses to the central nervous system, called the 5th sense. It regulates the body's temperature, and protects us against mechanical impact and chemical substances such as solar radiation and bacteria. The skin consists of different layers:



Epidermis – is on the surface or top layer of the skin and is made up of **keratinocytes** and **melanocytes**. **Keratinocytes** are stacked on top of each other

and reproduce from the bottom up. They constantly renew and are shed as dead cells. **Melanocytes** produce a dark pigment called melanin which provides the colour of the skin and protects us from UV radiation. The epidermis also contains **dendritic (Langerhans)** cells that are involved in the body's immune response. Basal cells are found at the bottom of the epidermis from which basal cell carcinoma develops.

Dermis – is the next layer that contains **blood vessels, sebaceous glands, nerve endings, hair follicles** and the **Meissner's corpuscles** that are touch receptors.

Subcutaneous layer – consists of connective tissue and fat that acts as a protective cushion, insulating the body against heat and cold.

4.1 Skin Types

There are various dermatological definitions of skin types, e.g. the Robert's Skin Classification of **Dr Wendy Roberts**, a renowned skin cancer dermatologist from the United States of America, who started an outreach programme "Play Safe in the Sun", and the Fitzpatrick Scale of **Dr Thomas Fitzpatrick**, which determines the tolerance of the skin to UV radiation.

Below is a depiction of the Fitzpatrick Skin Classification Scale:

Skin Type:	Skin Colour:	Skin Characteristics:
I	White; very fair; red or blond hair; blue eyes; freckles	Always burns, never tans
II	White; fair; red or blond hair; blue, hazel or green eyes	Usually burns, tans with difficulty
III	Cream white; fair with any eye or hair colour; very common	Sometimes mild burn, gradually tans
IV	Brown; typical Mediterranean caucasian skin	Rarely burns, tans with ease
V	Dark brown; mid-eastern skin types	Very rarely burns, tans very easily
VI	Black	Never burns, tans very easily

Abnormalities are common in cells that make up the skin. These can show up as lumps such as cysts or discolouration on the surface, for example birthmarks. The majority of these are not cancerous and will not become cancerous.

4.2 Skin Changes Caused by Ultraviolet (UV) Light

Suntan - Suntan is the result of a complex series of chemical and physical processes in the skin caused by UVA and UVB rays. UVB activates the production of vitamin D by acting on a chemical present in the epidermis. UVB also activates melanin-producing cells in the epidermis causing the chemical reactions that result in the production of melanin, the suntan pigment. UVB also causes the melanin-producing cells to share the pigment with neighbouring keratin-producing cells in an attempt to protect them from sun damage. The increase in pigment provides the brown colour

that we call a tan, and the increase in the number of keratinocytes makes the horny layer of the skin thicker - this gives the skin a leather-like appearance. A true "tan" begins to appear 2-3 days after exposure and reaches a peak 2-3 weeks later.

A suntan is not a sign of good health - It is a defense mechanism of the skin but still permits UV rays to cause ageing and other changes to the skin.

Sunburn - sunburn occurs when the body receives an overdose of radiation. The UVB light in the sun's rays burns the skin cells and breaks them down, which allows increased blood into the area, and increased fluid into the cells, which causes redness, swelling, pain and, in the severe cases, blistering. The cells begin to repair within 72 hours of exposure. The repaired skin, then, has a thicker upper layer than previously.

Ageing - The common harmful effects of UVA rays are invisible and add up over the years. UVA radiation damages the dermis, causing wrinkles and the loss of elasticity, making the skin look "old". These changes start to appear in the early 20's in the unprotected skin of fair-skinned people.

Leucoplakia - This is a slightly raised pale white blotch that may occur on the outer half of the lip, also called solar keratosis. Leucoplakia, not due to sunlight, occurs on other mucous surfaces. This is pre-cancerous and could turn into squamous cell carcinoma if not treated.

Solar Keratosis - This appears as a small irregular whitish-yellow or brown scaly thickening of skin, found on the neck, ears, hands and outer half of the lower lip. This is not skin cancer but a warning that the skin is prone to cancer.

Skin Cancers - Are most commonly caused by repeated exposure to high levels of ultraviolet light. It is not necessary to get sunburnt to develop skin cancer. Repeated cases of sunburn, however, do not improve the situation.

5. TYPES OF SKIN CANCER

Skin cancer is the most common form of cancer in South Africa. The three major types of skin cancer are:

- **basal cell carcinoma** which is highly curable;
- **squamous cell carcinoma**; and
- **malignant melanoma** which is far more serious.

Basal, and squamous cell, carcinomas comprise a quarter of all cancers in males, and a fifth of all cancers in females in South Africa and are, therefore, an important public health problem. Risk factors include fair skin, albinism and sun exposure.

Exposure to sunlight and a fair skin are the two major risk factors for malignant melanoma. Rates for malignant melanoma for South African, Australian and Zimbabwean whites are among the highest in the world.

Basal Cell Carcinoma (or rodent ulcer) is the most common kind of skin cancer. Slow growing, it usually begins with a small shiny pearly bump or nodule on the head, neck or hand or other exposed parts of the body. If left untreated, it can bleed and crust over only to open again. This cancer usually does not become life threatening, but it can continue to grow, reaching underlying tissues and destroying them.



Squamous Cell Carcinoma may start as red patches with well-defined outlines, typically on the lips, face and tips on the ears or areas exposed to sunlight. Unlike basal cell carcinoma, this skin cancer can spread to other parts of the body and can become quite large if left untreated.



Although death rates from basal cell and squamous cell carcinomas are low, these cancers can cause considerable damage and disfigurement if they are left untreated. However, when detected and treated early, these carcinomas have a cure rate of more than 95%.

Malignant Melanoma is the least common but the most serious of the major skin cancers (pictured on the right). It may originate in or near a mole and can appear anywhere in the body. Melanomas continue to grow larger and have irregular borders. If discovered early enough, melanoma is completely curable. If not treated promptly, it can spread throughout the body and can be fatal. Melanomas can develop in all age groups, including teenagers, young adults and older people.



5.2 Warning Signs of Malignant Melanoma

The warning signs of malignant melanoma are:

- **In size** (especially sudden or continuous enlargement)
- **In colour** (multiple shades of brown, black, mixing red, white and blue)
- **In shape** (especially an irregular border)

- **In elevation** (especially the raising of a part of a pigmented area that used to be flat)
- **In surrounding skin** (especially redness, swelling or developing coloured blemishes next to the pigmented area)
- **In sensation** (especially itchiness, tenderness or pain)
- **In consistency** (especially softening or hardening).

5.3 Who is at Risk of Skin Cancer?

Individuals with the following characteristics are most at risk of skin cancer:

- fair skin, light hair, light eye colour and the tendency to sunburn easily and “tan” with difficulty;
- large brown moles at birth;
- unusual moles (larger than 0.76 cm, irregular in shape and multi-coloured);
- a record of blistering sunburns, especially when young;
- indoor occupations and outdoor recreational habits;
- a family history of malignant melanoma; and
- a personal history of malignant melanoma.

5.4 How is Skin Cancer Treated?

After diagnosing the sample tissue by microscopic examination (a biopsy) physicians can choose several different methods to treat skin cancer, depending on the size and site of the cancer and the risks to the patient. Normally surgery, electrical current, radiation therapy and cryosurgery (freezing) or a combination of these forms of treatment are used. Chemotherapy and immunotherapy is also sometimes employed. Some plastic surgery may be performed afterwards to improve appearance.

JUST A FEW SERIOUS SUNBURNS CAN INCREASE YOUR RISK OF GETTING SKIN CANCER. PROTECTING YOUR SKIN CAN REDUCE YOUR RISK OF UV RADIATION DAMAGE.

6. FACTORS WHICH AFFECT HOW WE BURN

6.1 Skin Type

Not everyone responds alike to the "burning" effect of ultraviolet light. This difference in response is quantitative, not qualitative, i.e. it depends on how much of the radiation gets into the skin - once there, all skin types behave alike. The main natural protective factors are the degree of pigmentation, and the thickness of the outer, horny layer of the skin. Thus, very dark-skinned individuals sunburn rarely and develop few "ageing" changes or cancers, while the freckled redhead person with milky skin gets into trouble early. People who, on a genetic basis, cannot “tan” evenly or deeply have easily damaged skin since the pigment is our natural sunscreen.

Although dark-skinned people are generally less likely to get skin cancer, they are just as susceptible to cataracts or immune suppression. Please refer to 4.1 (page 11) above.

6.2 Environmental Factors

What you wear obviously affects how much of your skin is exposed to the sun. UV light can penetrate fabric. Denim provides good protection; cotton fabric allows approximately 15% of UV rays to penetrate, while wet cotton is more permeable

(30% penetration), so swimming in a T-shirt provides poor protection. A nylon stocking allows about 75% of UV light through.



Hats are an important method of protection against exposure to the sun. It is regrettable that hats no longer form part of South African school uniforms. In Australia the use of brimmed hats is encouraged by skin cancer prevention campaigns. In most Australian schools the rule is "no hat, no play".

Where you are in relation to the sun is the next most important factor that determines how quickly you will sunburn. The closer the sun's angle to 90 degrees to the earth, the shorter the path of the rays through the atmosphere, therefore, the less UV radiation is filtered out. This means that latitude, season, altitude and time of day, all affect the final amount of UV rays that reaches the earth's surface at any given time.

South Africans live close to, or within the tropics, in a climate which has long hours of sunlight. The hours around midday are obviously the hottest when the sun is the strongest. **So it is best to avoid sun exposure between 10:00 and 15:00.**

Altitude - for every 300 meter rise in altitude, there is a 4% increase in direct UV radiation. Hence the highveld has 20% more direct radiation than a coastal city like Durban. The perceived greater "effect" of sunlight at the coast is due to more prolonged exposure.

Cloud cover provides a little extra filtration of UV light, but sun protection is still necessary even on cloudy days.

Very little UVB penetrates window glass, but a large portion of UVA radiation penetrates all but the specially treated reflective type of glass. How much UV light penetrates sunglasses depends on the composition of the lens. Most sunglasses do allow UV radiation to penetrate.

Water provides little protection against UV radiation. At a depth of 1 meter UV radiation is still 50% of that at the surface. Contrary to popular belief, water reflects only 5% of UV light. Sand reflects 17% of UV radiation, grass 25% and snow a hefty 85%. As cotton fabric is penetrated by UV light, it is still possible to burn whilst sitting under a sun umbrella.

7. A HEALTHY TAN? NO!

A suntan originally carried with it powerful associations of 'a good time' and 'a good holiday'. It was seen to symbolise an opulent lifestyle of wealth, leisure and travel, of the kind favoured by perennially suntanned film stars. The positive associations of having a suntan were also reinforced by the feeling that being tanned was a by-product of being out-of-doors pursuing healthy and characteristically South African activities and pastimes. The unquestionable desirability of looking tanned and, therefore, fit and healthy, received copious reinforcement, not just from well-publicised film stars, or the wealthy and well travelled, but also from immediate friends and family.

When you are exposed to the sun, the UVA rays activate the body's natural sunscreen process. This involves a variety of special cells in the lower layers of the

skin. These cells produce **melanin** (brown pigment); they repair the skin and protect the skin from harmful effects of the sun. As these skin cells divide and move to the surface of the skin to protect it, the **melanin** pigment is also carried to the surface. Because the **melanin** is a dark pigment, the colour of the skin darkens too.

7.1 Isn't Sun Necessary for Health?

Yes, the sun is necessary for health, but only a little bit. It is true that dark-skinned individuals, living in northern Europe, can have vitamin D deficiency due to the sun's intensity being too low to stimulate sufficient natural vitamin D production through their darkly pigmented skin.

The amount of sun which the average white South African needs to maintain his/her vitamin D levels is, however, as little as a few minutes a day. You do not need a "tan" to be healthy. We are so conditioned by fashion and the media that we tend to associate "pale" with "sickly".

7.2 Artificial Tanning Lotions and Creams

There will always be some individuals who are determined to have a "tan", even though they are aware of the danger. The most sensible answer for these people is to use a self-tanning or bronzing preparation. The majority of these products contain **di-hydroxyacetone** (DHA) which is colourless when applied to the skin, but darkens within 3-4 hours. For maximum effect, the self-tanning preparation should be applied every 3 to 4 days, but care must be taken to apply it evenly, or unsightly streaking may result. Before applying the self-tanning preparation, it is a good idea to apply a light moisturiser to the skin. Then apply the self-tanning preparation sparingly, rubbing it in well and avoiding areas such as the knees, elbows and eyebrows where the self-tanning preparation may collect causing very dark areas to develop.

After putting on a self-tanning preparation, scrub your hands thoroughly with soap and water to avoid the palms of your hands to turn brown. 'Little and often' is a good motto for self-tanning product use. A "tan" obtained with these products does not provide protection against sun exposure.

7.3 Sun Lamps and Salons

The old fashioned sun lamps are very dangerous, as they produce intense UVB radiation and have been found to be carcinogenic (cancer causing) to humans. The same damage results but in less time than with a "tan" obtained from the sun. Tanning salons or solariums rely mainly on UVA radiation, with small amounts of UVB radiation. The radiation will stimulate pigmentation without the normal burning. It has been shown, however, that UVA radiation, combined with even the small amounts of UVB radiation, can be carcinogenic, i.e. causes cancer. Therefore, the use of artificial light to induce a tan should be discouraged, as it can be dangerous.



7.4 Ultraviolet Light is Used in Medicine: Is this Safe?

UV light is used in the treatment of certain skin disorders such as *psoriasis* and *acne*, and for *jaundice* in newborn babies. Medical specialists use this UV radiation under strict and controlled conditions. Under these circumstances, the benefits from the use of UV light far outweigh the risk of possible skin damage.

8. SUNSCREENS

Sunscreens are at present graded with a *sun protection factor (SPF)*, a laboratory measure that assesses its ability to filter out harmful rays. The sun protection number (SPF) suggests how long it will take a protected sunbather's skin to burn compared with someone out in the sun without a sunscreen. The higher the SPF number, the more protection you should get. For example, SPF20 means you can spend 20 times as long in the sun than if you were unprotected before getting burned.

Many sunbathers suffer sunburn even when they use high sun protection products. Many more use less protective sunscreen than they should. The manufacturers of sunscreen have an internationally agreed application thickness of 2mg per square centimeter of skin surface. This is about one-third of a bottle of sunscreen for the body of an average adult in a swimming costume.

In practice, people usually apply less than half the amount they need or miss out on covering some part of the body, or both. When this is combined with overexposure to the sun, in the belief that they are protected, they end up getting burned.

People often want to sue the manufacturers of sunscreen products because they had suffered sunburn despite using a high SPF cream or lotion. Yet, there is nothing wrong with the product, it is the way they are using it.

Make sure you buy a sunscreen which offers broad-spectrum protection to ward off both UVA and UVB rays. Dermatologists recommend at least SPF20 products. Don't be fooled by SPF30. It does not double the protection of SPF20; it gives you only 3% more protection.

Look out for products that carry the Cancer Association of South Africa Seal of Approval.

People should not depend totally on sunscreens. While sunscreens protect against sunburn, they don't necessarily prevent the occurrence of skin cancer. If you use sunscreens to spend more time in the sun, your skin could collect about the same total exposure of damaging radiation. Therefore, it is still a good idea to stay out of the sun at midday, and to protect yourself with a wide-brim hat and adequate clothing.

A sunscreen can be bought as a cream, lotion or gel. All of them work equally well, but a preference for one or the other may depend on things like stickiness or skin type.

8.1 Wearing Sunscreens Under Your Make-up

Some moisturisers contain sunscreen, but they usually offer only low protection. It is better to choose a sunscreen with an appropriate protection factor for your requirements. It should not be difficult to select a sunscreen whose base goes well under make-up. Avoid greasy formulations as these may cause the make-up to "slip"

i.e. streak when applied over the sunscreen. There is a wide range of sunscreens available and some do well as under make-up moisturisers.

8.2 Dark Skins and the Sun

All, but the very darkest of dark skin, will darken due to chronic sun exposure. The regular use of a high protection sunscreen will help keep the complexion as light as possible.

Many of the cosmetic manufacturers who aim their products at Black Africans now incorporate sunscreen into their moisturisers. The use of sunscreen on dark skins has the added advantage of protection against premature skin ageing. While the use of sunscreens is beneficial, skin lighteners must be avoided.

8.3 Some More Important Facts

- Get rid of last year's sunscreen dregs as the properties of the sunscreen can change with time, especially in extreme heat
- Use a sunscreen during high-altitude activities such as mountain climbing and skiing. At high altitudes, where there is less atmosphere to absorb the sun's rays, your risk of burning is greater. The sun is also stronger near the equator where the sun's rays strike the earth most directly
- Shirt material has a SPF of only 3 to 6. It is better to be naked at the beach and have fully apply a SPF20 or higher sunscreen than to be fully clothed in T-shirt material with no sunscreen
- Apply sunscreens 20 minutes before going outside and reapply after swimming or if you perspire
- Mixing sunscreens is usually not a problem, nor is using one sunscreen on one part of the body and another brand on another part of the body
- Sunscreens are composed of many different ingredients, including dozens of perfume chemicals. Some individuals may be, or may become, allergic to one or more of these ingredients. Patch testing is usually unnecessary and an unproductive waste of money. Most individuals can solve the problem by switching to another brand of sunscreen without needless testing
- Sunscreens do not work well inside the bottle! Find a sunscreen you do like and USE IT. Companies are constantly changing and upgrading their products, so look for what's new in sunscreens
- Keep in mind that you can't add SPF numbers. If an SPF 4 product gives you an hour in the sun, reapplying won't give you another hour. Your time's up. If you want longer exposure, next time use a higher SPF sunscreen before going out into the sun
- With sunscreens, we believe that most individuals use only a minute fraction of what is supposed to be used. People just simply don't understand how much sunscreen it takes to get protection. To completely cover the average adult body, about 30g of sunscreen is necessary
- Most people apply sunscreens to their faces because that is the area they are most concerned about keeping youthful
- Always apply sunscreen on dry skin.

9. COVER UP

9.1 Clothing

Clothing covers your skin and protects against the sun's UV rays. A long-sleeved shirt and long pants with a thick weave provide the best protection. If wearing all that clothing isn't practical, at least try to wear a T-shirt or a beach cover-up. Keep in mind, however, that a typical T-shirt actually has an SPF rating substantially lower than the recommended SPF20, so double-up on protection by using sunscreen with at least SPF20 and stay in the shade when you can.

Questions and Answers

Q: What kinds of clothing are the best to protect my skin from UV rays?

A: Loose-fitting clothing made from tightly woven fabric offers the best protection. Moreover, you should try to keep dry; a wet T-shirt offers you much less protection than does a dry one.

Q: Does protective clothing have to be a certain colour?

A: Wearing clothing made of tightly-woven fabric is always a good idea, regardless of the colour. Darker colours, though, may offer more protection than lighter colours.

Q: It gets so hot here in South Africa during the summer, there's no way I could be comfortable in long pants and a long-sleeved shirt. So, what else can I do to protect my skin?

A: Protecting yourself from the sun's UV rays doesn't have to be a major chore; it's just a matter of knowing your options and using them. Wearing at least a T-shirt is a good start, but it is not enough if you are going to be out in the sun for more than a few minutes. If you can't wear long pants and a long-sleeved shirt, you can boost your protection by seeking shade whenever possible and by always wearing sunscreen with at least SPF20.

9.2 Seek the Shade

It is important to always try to stay in the shade as much as possible to protect your skin from unnecessary exposure to the harmful rays of the sun.

Questions and Answers

Q: I work outdoors all summer and don't stay in the shade. What can I do to protect my skin?

A: If you can't avoid the sun, you can protect your skin by wearing a wide-brimmed hat, long-sleeved shirt and long pants. You can also wear a sunscreen with at least SPF20 which protects against both UVA and UVB rays. When you can, take your breaks and your lunch in the shade.

Q: If I stay in the shade, should I still use sunscreen and wear a hat?

A: UV rays can reflect off virtually any surface, including sand, snow and concrete, and reach you in the shade. Your best bet to protect your skin is to use sunscreen or wear protective clothing when you're outside - even when you are hanging out in the shade.

9.3 Get a Hat



Hats can help shield your skin from the UV rays. For the best protection, look for a hat with a broad brim, all the way round, that shades your face, ears, and the back of your neck. If you choose to wear a baseball cap, you also should protect your ears and the back of your neck by wearing other clothing, using sunscreen with at least SPF 20, or - when possible - by staying in the shade.

Questions and Answers

Q: For the best protection, what material should I look for in a hat?

A: A tightly woven fabric, such as canvas, works best to protect your skin from UV rays. When possible, avoid straw hats with holes that let sunlight through.

Q: Do I need to worry about the colour of my hat?

A: The amount of shade offered by a particular hat appears to be its most important prevention characteristic. If a darker hat is an option, though, it may offer even more UV protection.

Q: Are there recommended styles of hats for the best protection?

A: The best way to choose a hat is to look for one that provides shade for all of your head and neck. All head sizes are not created equal. As a result, each person should choose a hat style that offers him or her maximum coverage.

9.4 Apply a Sunscreen

Besides protecting yourself from overexposure to sunlight, application of sunscreens help to prevent other problems related to sun exposure, such as ageing skin and pre-cancerous growths. Sunscreens currently come in a variety of forms (such as ointments, creams, gels, lotions and sprays), so there are plenty of different options. There are also sunscreens made specifically for the face that limit acne breakouts. Regardless of the type of sunscreen you choose, however, be sure that it blocks both UVA and UVB rays and that it has at least SPF20 or higher.

Questions and Answers

Q: What does a sunscreen's "SPF" rating mean?

A: Sunscreens are rated according to their effectiveness in offering protection from UV rays and are then assigned a **Sun Protection Factor** (SPF) number. Higher numbers indicate more protection. As a rule of thumb, you always should use a sunscreen with at least SPF20 or higher.

Q: Do sunscreens need to be reapplied during the course of the day?

A: You always should follow the manufacturer's directions regarding re-application, or else you will not get the same protection from UV rays that you might think you are getting. Even though recently developed sunscreens are more resistant to loss through perspiration and removal by water, they should still be reapplied frequently, especially during peak sun hours or after swimming or exercising.

Q: How do sunscreens work?

A: Most sun protection products work by absorbing, reflecting or scattering the sun's rays. Such products actually contain chemicals that interact with the skin to protect it from UV rays.

Q: Some cosmetic products now claim to protect you from UV rays. Can they?

A: Cosmetics and lip protectors containing some of the same protective chemicals used by sunscreens are now on the market. Not all of these products, however, meet the standard of having at least SPF20, and, as a result, do not offer sufficient protection by themselves.

9.5 Wear Sunglasses

Sunglasses with proper lenses will protect your eyes from UV rays and reduce the risks of cataracts. They also protect the tender skin around your eyes from sun exposure. As a result, a pair of sunglasses can be an important part of your overall sun protection plan. For maximum protection, look for glasses that blocks both UVA and UVB rays.



Questions and Answers

Q: What's the best kind of sunglasses to protect my eyes from UV rays?

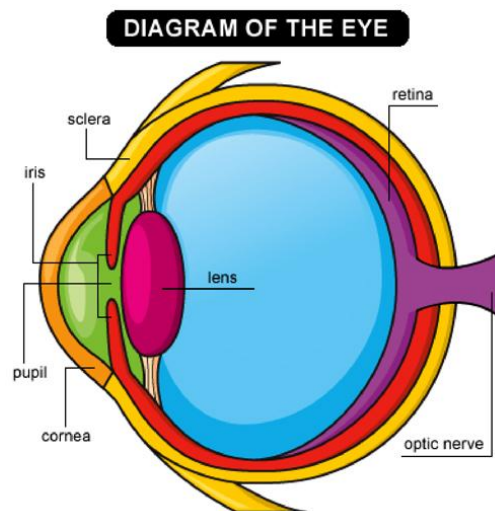
A: Sunglasses that block both UVA and UVB offer the best protection. Wrap-around lenses work best because they will block UV rays from sneaking in from the side or from behind.

10. THE EFFECT OF THE SUN ON THE EYES AND KIDNEYS

10.1 The Effect of the Sun on the Eyes

The eyes are exposed to all types of weather and ultraviolet light does have an effect on the eye. Cataracts are the leading cause of blindness in the world. Sun exposure, particularly exposure to UVB radiation appears to be the major risk factor for cataract development.

Just as the skin can get sunburned by over-exposure to UV, so can the eyes. The most delicate areas are the **cornea** and the **retina** - the sensitive seeing part of the eye. The symptom of early damage to the eyes (in this instance) is red, swollen and sore eyes. This irritation can also cause a swelling of the conjunctiva. Sunburn of the eyes can lead to *conjunctivitis* or lesions of the retina, resulting sometimes in temporary or permanent deterioration of vision. Generally sore eyes improve in 48 hours as the burnt surface of the eye can be avoided by wearing good quality sunglasses that filter out 100% of UV rays. Good sunglasses have



information about the filtering effect available so that one can make an informed choice when purchasing.

You should NEVER look directly into the sun. This can result in burning of the retina of the eye which can lead to blindness.

Some chronic eye problems result from ultraviolet exposure over many years. The main conditions that result from UV radiation exposure include:



Pterygium (fleshy membrane that grows on the clear covering over the white of the eye that can interfere with vision – pictured on the left).

Ectropion (shortening in the skin of the cheeks and eyelids which can prevent the eyelids from closing properly – pictured below on the left).

Cancer of the eyelids (pictured on the right).



10.2 The Effect of the Sun on the Kidneys

The effect of a hot environment on the body causes a loss of water from the body and this, in turn, has an effect on the kidneys.

In hot weather the human body cools itself by perspiring. This may result in the loss of many litres of water from the body. Unless adequate replacement fluid is taken, the kidneys may suffer because there is insufficient fluid to wash through toxic substances that have to be excreted from the body.

Children who weigh much less than adults, dehydrate quicker. Therefore, children should never be left in cars or hot places for long periods of time. They should get into the habit of drinking water often, particularly in hot weather.

Kidney disease often stems from drinking too little water over a long period of time. Dehydration often also causes a headache.

Activities in strong sunshine such as running, or playing sport, can cause the body's temperature to rise quickly – the body then sweats in order to lower the body's temperature. It is necessary, under such conditions, to drink lots of water. Death from overheating is a serious risk. All fluids are good to drink, but water is the best.

11. UV PROTECTION AND SPORT

The intensity of the UV radiation from the sun is one of the significant health problems confronting children at school while participation in sport. The same applies to individuals who actively participate in the activities of sporting organisations.

Many schools and clubs are already introducing policies to reduce exposure to UV radiation by increasing the provision of shade and encouraging learners or players to take necessary preventative steps themselves.

11.1 Shirts

Many organisers of sporting events encourage the wearing of shirts with collars and slightly longer and looser sleeves which offer more shade to the skin. The looser design of clothing allows better ventilation and this helps to reduce heat exhaustion. Generally, the closer the weave of the fabric, the fewer holes there are for the penetration of UV radiation.

11.2 Hats

Sports hats must allow clear vision, be comfortable and not fall off in the wind or when running. Not all hats have a brim that shades the whole face, ears and neck. Extra care should be taken to protect the nose, lips, cheeks, ears, neck and chin with proper sunscreen. The legionnaire's cap is proving to be a popular choice because it has the advantage of protecting the ears and neck, which are common sites for the development of skin cancers – see picture on the left. It is important that the flap covers the ears fully, and is of a heavy enough material to stay down around the neck. The person's cheeks, however, may still be exposed.



The Greg Chappell-style hat has developed into a classical for cricketers because of its firm fit and all-round brim. Many veteran cricketers are realising the mistakes of their youth when they spend countless hours on the cricket field without a hat for protection. A picture of Greg Chappell wearing a “Greg Chappell” hat appears on the right.



11.3 Sunscreens

A broad-spectrum, waterproof sunscreen with a sun protection factor (SPF) of 20 or higher should be applied to clean, dry skin at least 15 minutes before exposure to give maximum protection. SPF20 or higher sunscreen will protect the skin for a couple of hours (as long as it is not washed off), but after that time the skin has received enough radiation to begin burning, and ideally further exposure should be avoided.

In practice, sport competitions continue for longer than two hours, in which case it is important to keep up the thickness of the sunscreen layer by reapplying it. Even so, some UV radiation will still penetrate the skin and may cause sunburn.

For sport, water-resistant sunscreens will be less easily washed off by perspiration.

Broad-spectrum products which absorb both UVA and UVB radiation are recommended. Zinc cream can provide additional cover as a total block out, but can only be comfortably used on small areas such as the nose and lips.

For sporting teams or physical education classes, an ideal solution to the need for protection from UV radiation is to make available large pump packs of sunscreen. A picture of a typical pump pack appears to the right. A sunscreen pump pack is ideal because:

- It becomes part of the team or class equipment;
- It makes the application of sunscreen easy; and
- It becomes a habit, under the coach's or teacher's supervision.

11.4 Eye Protection

Eye protection from the sun is another important aspect that must be considered. Skin cancers commonly occur around the eyes, and the eyes themselves may be more likely to develop cataracts with increased UV radiation exposure. Scheduling sports away from the middle of the day would be very helpful in reducing exposure to ultraviolet radiation.

A wide-brimmed hat halves the radiation that reaches the eyes, so eye protection is an additional benefit from wearing a hat.

Sunglasses can also help - the South African National Cricket Team, the Proteas, has clearly demonstrated the usefulness of sunglasses in recent summers.

11.5 The Value of Shade



Shade relief is extremely important, but there are obvious problems in providing it. Mature trees are not always where they may be needed but suitable shade can be arranged. Spectators or players who are waiting to compete can be given shade by awnings, marquees or umbrellas. This type of protection can be very effective for sports such as cricket, swimming and athletics.



Excellent temporary shade can be provided quickly and simply by using **umbrellas**. Half a dozen umbrellas, close to one another, provide a surprising amount of shade. Umbrella manufacturers are listed in the 'Yellow Pages'. Industrial type umbrellas should be used which are made of canvas material.

If there are no trees adjacent to sport grounds, it may be possible to convince the school governing body or local government authorities that a tree planting program, in the form of an arbor day, could be considered.

11.6 Scheduling of Sporting Events

Unfortunately, there are often difficulties in rescheduling sporting events to other times of the day. Junior sport often has to use the grounds when the senior players do not need them. Schools cannot totally avoid the hours of the day when the UV radiation is at its maximum. However, it is much safer for young people who take part in sport, if these activities are scheduled as far as possible outside the danger times.

The main **danger period** is the five hours around noon: **10:00 to 15:00**. Sixty percent of the day's UV rays are received during this period, and if it can be avoided there is an obvious advantage.

11.7 Some Valuable Tips

Be a role model yourself by:

- Slipping on a shirt with collar and sleeves.
- Applying a broad-spectrum SPF20 or higher sunscreen.
- Wearing a comfortable shade hat.
- Wearing proper sunglasses.

Talk to others about ways of reducing UV radiation exposure:

- ✓ Provide shade for spectators and players.
- ✓ Make the wearing of a suitable hat part of your team or school uniform, just like the team's socks, shorts or jumpers.
- ✓ Buy a sunscreen pump pack and place it in the shade near the drinking water.
- ✓ Schedule sports earlier in the day or later in the afternoon away from the solar noon whenever possible.
- ✓ Be sun smart even on a cloudy day: UV radiation may still be high even though the temperature is lower.

UV RAYS FROM THE SUN CAN HURT YOUR SKIN. THEY CAN CAUSE WRINKLES OR EVEN LEAD TO SKIN CANCER. SO, BEFORE THE GAME STARTS, REMEMBER TO APPLY SUNSCREEN WITH SPF20 OR HIGHER WHICH PROVIDES BOTH UVA AND UVB PROTECTION. ON THE SIDELINES, SEEK SOME SHADE, COVER UP WITH EXTRA CLOTHING, AND GRAB A HAT AND SUNGLASSES.

12. HOW TO EXAMINE YOUR SKIN

How to do a Mole Patrol

Do a mole patrol every three months. Remember, you are looking for moles and freckles that are unusual in one way or another.

- Strip off and have a mirror handy.
- Check your chest, your abdomen and the front of your arms and legs.
- Now check the back of your arms and legs.

- Twist to see your sides.
- With a mirror, carefully check your face, your ears and your back.
- Have a relative or friend check your back. If this is not possible, you can examine your back yourself with a hand mirror, while standing in front of a wall mirror.

If you find anything suspicious, show it to your doctor as soon as possible.

Remember - not one of the many thousands of people currently suffering from malignant melanoma ever thought it would happen to them.

13. FIRST AID

13.1 Sunburn

Prolonged exposure to the sun's UV rays produces red, tender, swollen skin that may develop water blisters. Severe cases of sunburn and heat exposure can result in more serious consequences requiring emergency care.

A cold shower or application of cool, damp towels to the skin gives the quickest relief from the pain and heat of sunburn. Mild cases of sunburn with no blistering can be relieved by the use of some commercial preparations. Severe cases with blistering may require medical care. Fever, nausea, headache and even delirium may occur in extreme cases.

Treatment

- Cool damp towels may provide some relief.
- Encourage the person to drink fluids, especially water.
- Aspirin may help to reduce pain and fever.
- Do not attempt to break the blisters - infection can set in easily.

13.2 Heat Exhaustion

Heat exhaustion results from high environmental temperatures. Outdoor excursions in summer can be a cause of heat exhaustion. The blood circulation collapses and there is often a depletion of the body's store of salt. Symptoms include: cold, clammy skin; rapid, shallow breathing; and loss of consciousness.

Treatment

- Regardless of the heat of the day keep the patient warm. Give comfort and reassurance and call a doctor.

13.3 Sunstroke

This is uncommon, but should it occur, must be taken very seriously. Lower the body temperature and get a doctor. Sunstroke is caused by a breakdown of the body's cooling mechanism and the temperature then rises excessively. It occurs more often in males than females and is more common in young children and the elderly. Symptoms include: body temperature over 40.5°C, red, hot, dry skin; and loss of consciousness. A serious complication includes circulatory collapse.

Treatment

- First aid must begin immediately.

- Lower the body temperature by any of the following; a cold bath; cold water hosing; wrapping the person in wet, cold sheets; and expose the person to a breeze.
- Keep a check on the person's temperature.
- Call a doctor.

Factors which contribute to sunstroke are high environmental temperatures and high humidity, physical exertion, exercise, over-eating, intake of alcohol, bareheaded in direct sunlight. High fever can cause damage to the brain, kidneys or liver. Sunstroke is dangerous.

14. SPECIAL INFORMATION FOR PARENTS

14.1 Protect Your Child's Skin from the Sun

By making sure your children eat right and get enough sleep takes care of their 'inside'. But their 'outside' needs special care too. It's important to protect their skin from the damaging effects of the sun. No matter what time of year it is, if they are outside, they need to be protected. As a parent, it's up to you to set a good example. Your attitude and behaviour toward sun protection is very important.

Unprotected sun exposure and skin cancer is a serious threat to children. What may start off as painful, blistering sunburn, may, later in life, turn out to become skin cancer.

Did you know that people may receive up to 80% of their life's total exposure to UV light by the age of 18? As a parent, there's so much you can do to safeguard your children from skin cancer.

Start early in promoting a healthy attitude about sun protection in your kids by adopting a family sun safety program right away. The sooner children learn about UV protection and why it's important to cover up, the better. It can be an important step in starting lifelong sun protection behaviour. Your attitude, and example, are very important.

Here are some everyday actions you can take now to safeguard the children in your care against the dangers of the sun.

- Remember, sun exposure occurs day after day, so think about protection from UV radiation every day, even when it's hazy or cloudy.
- Take care when planning your children's outdoor activities. The best way to avoid UV exposure is to limit the time of exposure to the sun, especially between the hours of 10:00 to 15:00, when the sun's rays are strongest. Teach children the shadow rule.

14.2 Encourage Kids to Play in the Shade

Whenever possible, plan their outdoor activities so that they are not in the sun during the middle of the day. When your kids are outdoors, be sure their skin is protected. UV rays reflect off water, sand, snow and any light-coloured surface, like concrete. UV rays can also reach below the water's surface.

14.3 Cover Up with Hats and Shirts

Encourage your kids to wear clothing that protects as much skin as possible from the sun. Make it fun to wear hats that completely shade their faces, necks and ears. To protect arms, legs, and the body, choose comfortable clothing made of tightly woven fabrics through which you can't see any light. Dark colours provide more protection than light colours.

14.4 Use Sunscreen Every Day

Use a sunscreen every day on skin that is not protected by clothing or a hat. Choose a sunscreen with a Sun Protection Factor (SPF) of 20 or higher. For almost total protection, use zinc oxide to protect sensitive areas like the nose, lips, ears, cheeks and shoulders.

Sunscreen is not recommended for children less than six months old. Keep infants in the shade and covered up with comfortable clothing.

14.5 Avoid Tanning Booths

No matter how much your teenager may beg, a sunlamp or tanning booth is not a good idea. They are as harmful to the skin as the sun. It's a common misconception that a tan from one of these artificial methods can protect a person in the sun when they go on a vacation. Sunlamps damage the skin and don't help, or protect.

15. A SUN PROTECTION PROGRAMME FOR SCHOOLS

15.1 Introduction

Summer in South Africa is a time of holidays, picnics, swimming - and sunburn. South Africans have tended to accept sunburn as a passing nuisance, something red and sore for a while but gone in a while.

In fact, the effects of sunburn can be very long lasting. Research is increasingly suggesting that sunburn and sunlight exposure in childhood are important factors in the development of skin cancer in adult life.

Skin cancer is very common in white populations worldwide. The major cause, overexposure to the sun's ultraviolet radiation during childhood and adolescence, is well known and easily avoidable. Black or brown skinned people have a negligible incidence of skin cancer because of the melanin pigment in their skin, but they are still prone to other sun-related damage.

Because the sun causes most skin cancers, it has been estimated at least 75% of skin cancers could be prevented by adequate skin protection during childhood alone. Furthermore, skin cancers are visible cancers and so can be detected early and treated before they pose a threat to life.

15.2 What Schools Could Do

Schools have the potential to have a major impact on the level of sun exposure that pupils may be exposed to for the following reasons:

- Children are at school throughout the high-risk period each day for five days a week.

- The crucial period for sustaining damaging levels of sun exposure occurs during the school years.
- Schools can play a significant role in changing behaviours through education.
- Buy a sunscreen pump pack and place it in the shade near drinking water.

15.3 Skin Cancer Prevention Education

Skin cancer prevention education is particularly important for school pupils because a considerable amount of sun exposure is experienced by youth because of school activities and timetabling. Fortunately skin cancer is highly preventable, especially through education.

The purpose of this **SUN PROTECTION** programme is to provide teachers with a range of activities to:

- Increase pupils' awareness of skin cancer risks and the means of protection.
- Change learners' attitudes about skin care.
- Allow learners to explore aspects of their personal lives which encourage responsible decision-making about skin care.

It also seeks to involve learners, parents, teachers and the general school environment in the reduction of risk of skin cancer. Skin education fits into most subjects areas, so each teacher will find something relevant and of interest to fit into one or more of the learning areas they teach. The lesson package is designed to be a user-friendly starting point for teachers to adopt, or adapt as required.

15.4 Adopt a Sun Protection Policy

A school policy encourages schools to minimise the danger of excessive UV radiation exposure for both staff and learners to ensure a healthier environment with long-term health benefits.

Ultra-Violet (UV) radiation is part of the sun's light that burns and damages the skin. Most children and adults can be sunburned after only 10 minutes exposure to the sun, particularly at times when the UV radiation levels are at their highest. That is between 10:00 and 15:00. UV radiation increases sharply from October, reaches its peak in January, and decreases during March.

15.5 Criteria for School Policy Development

Each school should implement a sun protection strategy in consultation with the school community which:

- ✓ Provides effective educational programmes on 'sun sense' and preventive measures.
- ✓ Maximises the use of available shade for outdoor activities.
- ✓ Provides flexible planning of activities to reduce, as far as practicable, time spent by pupils in the sun between 10:00 and 15:00.
- ✓ Includes shade tree planting and caring programmes.
- ✓ Considers sun protection when determining or reviewing school uniform designs.
- ✓ Requires the wearing of protective clothing, including appropriate hats, when in the sun during the school day.

- ✓ Encourages the use of SPF20 or higher, broad spectrum, sunscreen on uncovered areas of the skin, such as the face and the back of the hands.
- ✓ Promotes the importance of parents, teachers and voluntary helpers as role models for learners in relation to sun protection strategies.
- ✓ Informs parents during learner enrolment of the school's sun protection policy.

15.6 Guideline on Protection

Because school hours predominantly fall during the high-risk period of the day, we believe it is important to encourage learners to wear hats and protective clothing while outdoors, particularly during breaks, when they are doing physical education, or participating in sporting activities.

Guidelines should include:

- ✓ Recommend broad brimmed hats that provide protection for the face, neck and ears.
- ✓ Consider a hat as part of the school uniform.
- ✓ Encourage wearing a hat during breaks, lunchtime and during sporting and other high-risk activities.
- ✓ Recommend clothing made of a close-weave material with long sleeves and collars.
- ✓ Promote the use of broad-spectrum SPF20 or higher sunscreens.
- ✓ Educate learners on the correct application of sunscreens.
- ✓ Buy a sunscreen pump pack and place it in the shade near drinking water.

15.7 Guidelines on School Organisation

- ✓ Outdoor assemblies to be held under shade during Terms 1 and 4 where possible.
- ✓ All learners to be sun protect during outdoor physical education and sport classes.
- ✓ Maximise the use of indoor and shaded facilities and plan for lessons outside of the high-risk UV times.
- ✓ Apply the sun protection policy to the swimming programme.
- ✓ Learners who are not actively competing should be encouraged to wear an appropriate top in the water where requested by parents.
- ✓ Suitable hats, clothing and the use of SPF20 or higher sunscreens should be required for all camps and excursions.
- ✓ These items should be listed on the parent "permission" form.
- ✓ Teachers and parents to reinforce the policy should model appropriate behaviour.
- ✓ Learners should be required to participate in activities out of sun if they are not appropriately protected.

15.8 Guidelines for the School Environment

We would also encourage school communities to investigate shade provision (by shelters or planting trees) within the school grounds.

- ✓ Assess the use of school grounds in relation to the availability and use of shade.

- ✓ Facilitate grounds committee to develop long-term shade strategies for the school grounds.

Consider the following:

Where are the favourite places to spend time during breaks and after school?

Why are these places popular?

Which areas of the school-grounds don't have much shade?

What should we do to provide more shade in the school?

Could a shady shelter be built or more trees planted? Where would be the best place?

- Shade-play equipment.
- Plant shade trees.
- Consider temporary shade structures as a short-term measure.
- Plan shade for high-risk areas such as canteens and assembly points.

16. SUN PROTECTION LESSON PLANS: GRADES 1- 3

16.1 Learning Objectives

At the conclusion of the lesson on sun protection, pupils should be able to:

- Discuss how sunshine helps and harms people;
- Discuss the times when the sun is most intense;
- Describe ways to protect the skin from the sun; and
- Take CARE of themselves and protect themselves while in the sun.

16.2 Outline

- Teacher uses suggested lesson plan and other activities.
- Teacher collects pictures of swimsuits, umbrellas, hats, sunglasses, T-shirts, picnic baskets, sunscreens, etcetera from magazines or other sources.

16.3 Lesson Plan

1. Let's play "What if".

"What if school is dismissed today at noon? We are all going to Bloubergstrand / Strand / Gordon's Bay / local Zoo..... You have three hours to get ready. What will you take?"

Show examples of: bathing suit, snorkel equipment, shirt, picnic basket, etcetera to the learners.

"What have we forgotten?" Stick pictures of **Sunscreens** on the board or walls.

2. "We are going to discuss **Sun Protection** today. So, who needs it? Why? When?"

3. Ask who has been sunburned. Count the number who has had sunburn. Ask learners to describe their sunburn, where they were when it happened, etcetera.

4. Draw the face of a clock on the board. Discuss the hours of greatest intensity of the sun - call the hours from 10:00 to 15:00 "Protect Time".
5. Discuss ways to put a block between you and the sun (clothing, umbrellas, and sunscreens). Pass out pictures from magazines of people engaged in an outdoor activity and have pupils recommend sun protection for them, including sunscreens, hats and T-shirts. Draw self-portraits and colour the areas of skin where sunscreens should be applied.
6. Checking for understanding: "What did we learn?" Ask the pupils to list items that provide protection against the sun. Arrange protection list into Take CARE in the sun:

C=Cover up

A=Avoid the sun between 10:00 and 15:00

R=Rub on sunscreen

E=Examine your skin regularly

16.4 Extended Activities

Activity 1

- Each child receives 3 pictures of a clock on a paper.
- Colour the part of the clock green when they can play without sun protection in the morning.
- Colour the part of the clock red when they should play with sun protection in the middle of the day.
- Colour the part of the clock green when they can play without protection in the afternoon.

Activity 2

Take pupils for a walk around the school and find all the shady spots. Draw a map of the school grounds and show where the shade is during break and at lunchtime.

Activity 3

Hold a hat competition. Have a discussion to point out which hats are the most effective to protect against UV radiation and give reasons why.

Activity 4

Try to plan a "refresher" project each week from now until summer vacation begins. Suggested projects; colour and decorate T-shirts, hats and umbrellas.

Activity 5

Provide a variety of hats, clothing, sunglasses, etcetera for the children to wear in the class and demonstrate how to play safely in the sun.

16.5 Evaluation

As a follow-up evaluation activity, develop a checklist for all the members of the class that would show who has started to play indoors and outdoors at the appropriate times; who is wearing sunglasses, hats and other apparel in the sun; who has told their friends and parents about the TAKE CARE in the sun. This would best take place at the end of the school year before leaving for summer vacation.

17. SUN PROTECTION LESSON PLANS: GRADES 4 - 5

17.1 Learning Objectives

At the conclusion of the lesson on sun protection, learners should be able to:

- Tell the positive effects and negative effects of sunshine on the skin.
- Express that summer is the season with the strongest sun and understand which times of day require sun protection activities.
- Differentiate among persons with skin types 1, 2 and 3 regarding their sun sensitivity.
- Relate how to adequately protect the skin by blocking the sun.
- Take **CARE** in the sun.

17.2 Lesson Outline

- Teacher to review information in the package on Skin Cancer.
- Teacher uses suggested lesson plan and activities.

17.3 Lesson Plan

1. Let's play "What if".

"What if school is dismissed today at noon? We are all going to Bloubergstrand/Strand/Gordon's Bay/the local Zoo..... You have three hours to get ready. What will you take?"

Show examples of: bathing suit, snorkel equipment, shirts, picnic baskets, etcetera.

"What have we forgotten?" Write on board: **Sunscreen** (or circle if they mentioned it?)

2. "That's our objective today." Write on board **Sun Protection**. So, who needs it? Why? When?
3. Elicit good and bad effects of sun exposure and list them on the board - make sure that sunburn, wrinkles and skin cancer are included.
4. Conduct a sun sensitivity survey. Ask who has been sunburned? Use the hair colour, skin colour, presence of freckles, etcetera of sunburned learners to develop the characteristics of skin types 1, 2 and 3. Count the number of type 1, type 2 and type 3 learners in the class. Count the number who has had sunburn in each group. Have each pupil describe his/her own skin colour, hair colour, presence or absence of skin sensitivity and skin type.
5. Draw the face of a clock on the board. Discuss the hours of greatest intensity of the sun - call the hours from 10:00 – 15:00 "Protect Time". Have pupils suggest appropriate activities for "Protect Time" and other times of the day.
6. Discuss ways to put a block between you and the sun (clothing, umbrellas, and sunscreens). Pass out pictures from magazine of people engaged in an outdoor activity and have pupils recommend sun protection for them, including sunscreens, hats and T-shirts. Draw self portraits and colour the areas of skin where sunscreens should be used.

7. Checking for understanding: "What did we learn?" List the items on the board that were elicited from the learners. Arrange protection list in TAKE CARE in the sun

C=Cover up

A=Avoid sun between 10 and 3

R=Rub on sunscreen

E=Examine your skin regularly

17.4 Extended Activities

Activity 1

Ask the class to describe sunburns they have had. Chart their answers to the following questions: Where were they when they got burned (beach etc), the season, the time of day, how long they were in the sun, how long it took for the sunburn to appear, the parts of the body, how it looked, how it felt, and how long it lasted.

Activity 2

Demonstrate the energy of the sun:

Warming rays of sunlight: warm a container of water placed in direct sunlight.

Visible rays of sunlight: shine a flashlight through your hand in a darkened room.

Invisible rays of sunlight: cannot be seen or felt until they cause sunburn or long term changes such as wrinkles and skin cancers. These are the rays we need to block.

Activity 3

Design a poster about sun protection and ways to block the sun.

Activity 4

Ask learners what they would tell their mum/dad/uncle/friend to take with them or to wear when they are going: golfing, fishing, sailing, on a picnic, to the beach, gardening, walking the dog, and swimming in the pool. Make a list of items for each activity on the board. Brainstorm ideas. Discuss which of these provide the best protection from the sun.

Activity 5

Take learners for a walk around the school to find all the shady spot. Draw up a map of the school grounds and indicate where the shade is during break and at lunchtime.

Activity 6

Hold a hat competition. Have a discussion to point out which hats are the most effective to protect against UV radiation and give reasons why.



Activity 7

Try to plan a "refresher" project each week from now until summer vacation begins. Suggest projects: colour and decorate T-shirts, hats and umbrellas.

Activity 8

Invite a dermatologist/health promoter from your area to visit the class and discuss sun protection.

17.5 Evaluation

As a follow-up evaluation activity, develop a checklist for all the members of the class which would show who has started to play indoors and outdoors at the appropriate times; who is wearing sunglasses, hats and other apparel in the sun; who has told their friends and parents about the need to **TAKE CARE** in the sun? This would be best take place at the end of the school year before leaving for summer vacation.

18. SUN PROTECTION LESSON PLANS: GRADE 6 - 7

18.1 Learning Objectives

At the conclusion of the lesson **Sun Protection**, learners should be able to:

- Tell the positive effects and the negative effects of sunshine on the skin.
- Express that summer is the season with the strongest sun and understand which times of day require sun protection activities.
- Differentiate among persons with skin types 1, 2 and 3 regarding their sun sensitivity.
- Relate how to protect the skin by blocking the sun
- Take CARE in the sun.

18.2 Extended Activities

Activity 1

Sunburn - Ask the class to describe sunburns some of them may have had. Chart their answers to the following questions: Where were they when they got burned (beach etc), the season, the time of day, how long they were in the sun, how long it took for the sunburn to appear, the parts of the body, how it looked, how it felt, and how long it lasted.

Activity 2

Why we should look after our skin

- Show the structure of the skin - discuss the diagram.
- Discuss the function of the skin: protection, excretion, etcetera.
- What happens when we hurt ourselves (e.g. cut, sunburn)?
- Discuss different skin types and how they react to the sun.

Activity 3

Depletion of the ozone layer

- Discuss why the ozone layer is important.
- Discuss what damages the ozone layer.
- Ask what would happen to the living organisms if there was no ozone layer.

- Discuss what everybody can do to help to save the ozone layer.
- Discuss how the depletion of the ozone layer affects our skins.

Activity 4

Skin conditions caused by the sun

- Discuss the warning signs of skin cancer.
- How does skin cancer develop? Explain cell division and how UV radiation can change orderly division.

Activity 5

The “tanning” fashion

- Discuss what is a “tan”?
- Discuss fashion and tan through the ages.
- Discuss artificial means of tanning - lamps, ointments, tablets.

Activity 6

Sunscreens

- Explain what a sunscreen is - show examples or make up a poster using different brands of sunscreens. Encourage learners to make a similar poster.
- Discuss what sunscreens do and why they are important.
- Explain what SPF means
- Demonstrate how and when to use sunscreens correctly.
- Compare prices of sunscreens to the volume and price. Compare instructions for use on all the different products.
- Get learners to look at the cost of sunscreen products and make comparisons, e.g. are creams more expensive than lotions?
- Look at magazines, advertisements. Issues could include water resistance, SPF factor, tanning promises, skin types, and other messages conveyed in the magazine articles or advertisements.
- Design a label for a bottle of sunscreen.

Activity 7

The effect of the sun on the kidneys

- Discuss how people feel on a hot day - what do they wear in hot weather?
- Discuss what happens when people sweat. Children dehydrate faster than adults. Explain that kidneys get rid of waste products and they need fluid to do it properly.
- What are other signs of dehydration?
- Discuss various types of fluids one can drink to stop dehydration.

Activity 8

The effect of the sun on the eyes

- Show rough diagram of the eye,
- Show which parts of the eye can get burnt if not protected - explain what happens.
- Discuss the wearing of good quality sunglasses – what must one look out for when buying them - emphasise the importance of wearing a hat for the purpose of eye protection. Explain that you can't put sunscreen on the surface on the eye.

- Discuss long term effects of sun on the eyes, e.g. cataracts, cancer of the eyelids.

Activity 9

Too much sun – what to do in an emergency

- Explain that one needs to protect oneself from too much sun. However, if one does spend too much time in the sun, the following may happen: Sunburn, Heat exhaustion, and sunstroke.
- Explain the symptoms and treatment of each of the above conditions.

Activity 10

- Arrange an interview with your grandparents or other elderly friends.
- Ask them what they did and what they wore in summer when they were young.
- What warnings did they get about the sun and what information, if any, they have now that they didn't have then? Compare your knowledge with theirs.
- Ask them to describe the summer fashions of their parents. See if you can draw or copy the fashions in your family from old photographs.

Activity 11

- Draw up a list of outdoor activities including work, sport, and leisure. Include activities done by country and city people. Indicate whether these are high, medium or low risk activities. Which activities place people at risk? Which groups are most at risk? Why is this so? What can be done to reduce the risks of sunburn? Which types of jobs would have the most sunburn risk? Why?

Activity 12

- Design a range of high-fashion beachwear for males or females to use in the year 2025. (Assume that ultraviolet radiation effects will be stronger then.)
- Design a primary school lunchtime hat competition. Have a discussion to point out which hats are the most effective to protect against UV radiation and give reasons why.
- Plan a project which aims to get young children to wear hats at school during playtimes. How will you accomplish this change in behaviour?

Activity 13

Let's play "IF": The Minister of Health has just announced that it is now compulsory for outdoor workers in South Africa to stop work between 10:00 and 15:00 during summer, when sunlight radiation is strongest. If this happened, describe a day in the life of one of these people: yourself, your mother or father, your teacher, the person you most admire.

Activity 14

- Take a walk around and find all the shady spots on the school grounds.
- Draw a map of your school grounds and mark existing shade areas in blue. Areas such as verandas, doorways, trees and covered ways are all possible shade areas. Estimate, if you can, the percentage area of your school grounds which offer shade.

- Conduct a shade survey:
 - *Where are the favourite places to spend time during breaks, and after school?*
 - *Why are these places popular?*
 - *Which areas of the school grounds don't have shade?*
 - *What could we do to provide more shade in the school?*
 - *Could a shady shelter be built or more trees planted? Where would the best place be?*
 - *Mark in red on your map where shade is needed. Estimate the percentage of the school grounds that need shade.*
- Use your chart to plan a school tree planting event - shade areas for staff and learners. Make sure you allow for the movement of the sun. Mark in green where trees are needed.
- Display your plan and ask others for suggestions.
- Put your proposal to the school board.

Activity 15

Invite a dermatologist/health promoter from your area to visit the class and discuss sun protection.

18.3 Evaluation

As a follow-up evaluation activity, develop a checklist for all the members of the class that would show who has started to play indoors and outdoors at the appropriated times; who is wearing sunglasses, hats and other apparel in the sun; who has told their friends and parents about the need to **TAKE CARE** in the sun. This would best take place at the end of the school year before summer vacation.

