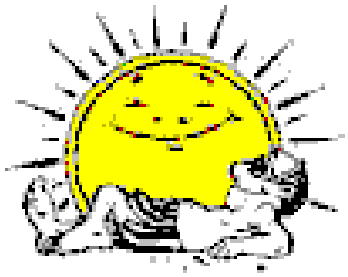
11. Health Effects Of Ozone Depletion: Skin Cancer

Introduction



Ozone's unique physical properties allow the ozone layer to act as our planet's sunscreen, providing an invisible filter to help protect all life forms from the Sun's damaging ultraviolet (UV) rays. Most incoming UV radiation is absorbed by ozone and prevented from reaching the Earth's surface. Without the protective effect of ozone, life on Earth would not have evolved the way it has. The ozone layer protects us from the harmful effects of certain wavelengths of ultraviolet (UV) light from the Sun. The danger to human skin from ultraviolet radiation comes mainly from the UV-B range of the spectrum, although UV-A poses some risk if exposure is long enough. Any significant decrease of ozone in the stratosphere would result in an increase of UV-B radiation reaching the Earth's surface, and of skin cancers.

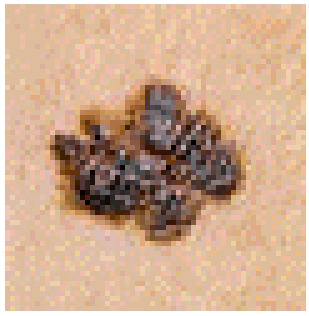
UV-B and Skin Cancer

The most well-known effect of UV radiation is the slight reddening or burning of the skin in sunshine. This change of colour is caused by an expansion of the skin's blood vessels. For most people burning is followed by tanning within a couple of days. A permanent tan will occur when the UV radiation causes a pigment called melanin to form in the pigment cells of the skin. Over a period of years, exposure to radiation originating from the Sun causes damages in the skin's connective tissues, so-called photo-ageing. This shows itself as a thickening of the skin, as wrinkles and decreasing

elasticity. Elastine and collagen fibres determining the firmness and elasticity of the skin are damaged. UV radiation increases the risk of getting skin cancer.

Research has shown that even small amounts of UV-B radiation can cause considerable harm. UV-B damages the genetic material of DNA and is related to some types of skin cancer. It is important to note, however, that UV-B radiation has always had this effect on humans. In recent years non-melanoma skin cancer has become more prevalent in many parts of the world because people are spending more time in the Sun and are exposing more of their skin in the process.

The relationship between the occurrence of milder non-melanoma skin cancers and time spent in the Sun is well documented. Such cancers generally occur in people in their 70s and 80s on areas of the skin usually exposed to sunlight (such as the face or hands). Malignant melanoma, however, usually occurs in younger people and in skin areas not necessarily exposed to sunlight. It tends to occur most commonly among groups of people less likely to have spent significant amounts of time outdoors.



The risk of developing malignant melanoma is directly related to the sensitivity of an individual's skin to the Sun (i.e., fair-skinned are more susceptible than darker skinned individuals). The victims are almost exclusively Caucasians, particularly fair-skinned Caucasians. The incidence of malignant melanoma has been increasing among light-skinned populations around the world for decades.

Ozone Depletion and Skin Cancer

Ozone in the stratosphere protects Earth from damaging amounts of ultraviolet (UV) radiation. A depleted ozone layer would allow more of the Sun's rays to reach Earth's surface. An increase in the levels of UV-B reaching the Earth as a result of ozone depletion may compound the effects of spending more time in the Sun. According to some estimates a sustained 10% global loss of ozone may lead to a 26% increase in the incidence of skin cancers among fair skinned people. The US Environmental Protection Agency estimates that a 2% increase in UV-B radiation would result in a 2 to 6% increase in non-melanoma skin cancer. Increases in UV radiation relative to levels in the 1970s are estimated to be as much as 7% at Northern Hemisphere mid-latitudes during the winter and spring, 4% at Northern Hemisphere mid-latidudes in summer and autumn, and 6% at Southern Hemisphere mid-latidudes on a year-round basis.

Australia, with high sunshine levels, has very high skin cancer rates. An estimated 2 out of every 3 people in most parts of the country will develop some form of skin cancer. In Queensland, where UV-B radiation is the highest, the probability jumps to 3 in every 4. In America, in 1935, the chances of developing the more serious malignant melanoma was 1 in 1500. In 1991 it had soared to 1 in 150, and it is predicted that by the beginning of the new millennium it will be 1 in 75.