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How the Increased UV Radiation Level in Thailand Causes Physical Health Problems

The increase of UV radiation in Thailand can cause physical health problems such as skin cancer and cataract. The purpose of this research report was to explain how UV radiation increased in Thailand causes physical health problems. The importance of this research report is to provide awareness on how UV radiation causes physical health problems. The pieces of information found in this research were based on seven sources. First, the article, "Biophysical and Physiological Effects of Solar Radiation on Human Skin" discussed the effects of UV radiation to people. Second, Charlotte Young in his article explained about the UV exposure that effects on human skin. Third, the article entitled "UV or not UV That is the question for your sunglasses?" revealed that how the sun rays damage our eyes. Fourth, the paper report entitled "UV radiation damage and bacterial DNA repair system" pointed out that UV radiation can also cause the mutation of cellular DNA. Next, the article entitled "UV - Index for the Public" identified the definition of UV radiation and level of UV index. Furthermore, the Conversation news reported that solar radiation affects directly to the human body. Lastly, the weather forecast website of UK reported about the increased of UV index in Thailand.

Definition and Levels of UV Radiation

Ultraviolet (UV) radiation is part of an electromagnetic spectrum that lies between x-ray and visible light. The wavelength of UV radiation is shorter than visible light that make it become invisible to human eyes. UV radiation is considered as solar radiation. Solar radiation is consist of UV radiation, visible light and infrared (IR) radiation. UV radiation is often measured in nanometers and it is divided into three ranges: UV-A, UV-B and UV-C. UV-A is the longest rays among these three rays that reach to earth's surface. It has a range of 315 to 400 nm. UV-A is the most abundant rays in UV radiation. UV radiation composed of 95 percent of UV-A. UV-B and UV-C have the range of 280 to 315 nm and 100 to 280 nm respectively. Meanwhile, UV-B is part of UV radiation with only five percent because UV-C does not reach to the earth's surface (Vanicek, et.al., 2016). UV-B also accounts for harming human skin such as skin cancer and sunburn. There are various factors that can contribute to increase of levels of UV radiation reaches to Earth's surface for examples, altitude, atmospheric zone, solar elevation and ground reflection.

UV Index

On the authority of U.S. Environmental Protection Agency, World Health Organization (WHO) has officially launched the UV Index scale. It ranges from 1 to 11+. The lower number of the scale means the lower danger from the UV exposure. The moderate level is 3 to 5 but still need to be careful of surfaces that can reflect the UV rays back to us. From the scale, over level six will start to get higher risk from sunburn. For level of 11+, unprotected skin and eyes can even burn in couple minutes. Over level 11+ will be extremely high of UV rays and can be very harmful to our health.

UV Radiation in Thailand

As claimed by weatheronline.co.uk, the UV index in Thailand always hits at the level of 9 or 10 and it usually stays stable at this level. Even though, at this level, it is very harmful to people skin and eyes but it still better than the extreme level. Nevertheless, weatheronline.co.uk in April 2016 reported that the UV index in Thailand has increased slightly from level 9 to 12 which is extreme level. This level of UV index still continues constantly until present. Even so, it is a slightly change but the effect of the UV radiation has a dramatically different in this level. Exposure to UV radiation in Thailand for a while in the UV index of 12 can affect our skin and eyes directly.

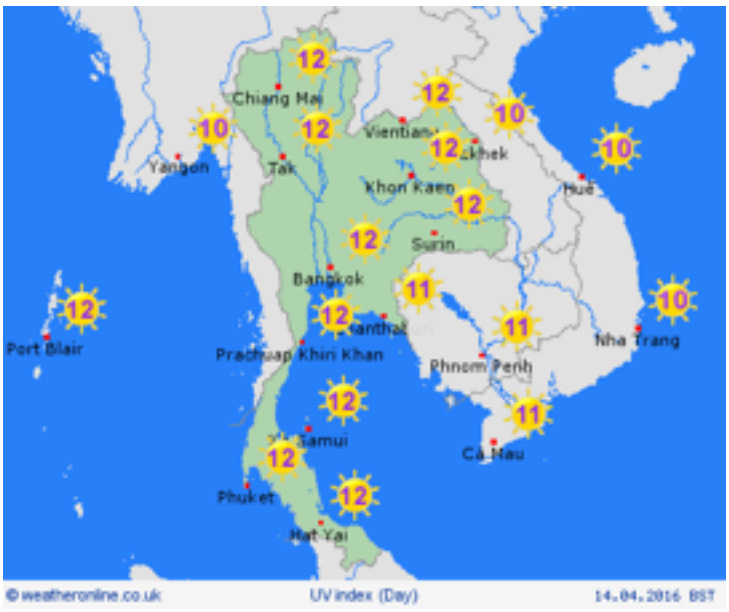

Figure 1- UV index in Thailand during April 2016.

Figure 2 - UV index in Thailand during Friday 27 May 2016.

UV Radiation Causes Skin Cancer

There are two major types of skin cancer: Melanoma and Nonmelanoma skin cancer. Nonmelanoma skin cancer can be classified into two types: basal cell carcinoma and squamous-cell carcinoma. Our skin triggers vitamin D from the UV radiation but in a small amount of UV radiation is essential for the body, it gives strength to the bone and muscle in the body. Since, every time when the skin is exposed to the sunlight, all of the UV radiation will be absorbed into the first layer of the skin. This implies that the more UV radiation, the more it will be absorbed into skin layer. Then, DNA will absorb UV radiation mainly into nucleotides. This causes the DNA to mutate or damage easily into other structure called *thymine dimer* (Zion, et.al., 2016). However, our bodies have developed the repair system that can detect and eliminate damaged DNA. Then, our bodies will substitute it by unimpaired DNA (Slevin, 2014). Another way that our bodies react to this situation is to increase the amount of melanocyte or pigment cell. Melanocyte produces melanin that gives out our skin color. The more melanocyte means the increased level of skin color.

Unfortunately, this is the last step that our bodies response to the damage site and it is quite frequently that these DNA repair system does not work properly and fail finally. This is when the bodies start the initial process of skin cancer.

UV Radiation Causes Cataract

Exposure to the UV radiation in long-term can influence to cataract, snow blindness, Age-Related Macular Degeneration (AMD), other eyes disorders and conditions. As the UV radiation transmits through the eye, the cornea and conjunctiva filtered the UV radiation out especially UV-B. However, other UV radiation will continue transmitted to the eyes and mainly filtered at the lens (Wichai, 2013). This can be point out that, exposure to high UV radiation will affect our eyes directly because the UV-A will be transmitted into our eye lens directly. As specified by National Eye Institute (NEI), the cells in the eye lens are composed of tiny organelles and especially water and proteins. This composition makes the lens transparent, capable to transmit the light and send to the retina of the eyes. Forming the cataract, UV-A penetrates deeply into the lens, proteins inside lens cells of the eye start to show the sign of oxidative damage. It is a stage, named oxidation stress, that our bodies have too much free radical but not enough antioxidant. Thus, too much free radical cause DNA, protein and other molecule to damage or mutate. This is called oxidation damage. After oxidation damage occurs in the len cells, protein will start to be clouded and finally clumped together which scattered the light instead of forwarded.

Conclusion

The purpose of this research report was to explain how UV radiation increase in Thailand causes physical health problems. This research report concluded that the increase of UV radiation in Thailand can cause physical health problem directly to human when exposure to sunlight in long-term. There are many physical health effects caused by UV radiation in Thailand but this research report has illustrated two physical health effects which are skin cancer and cataract. UV radiation penetrated into the first layer of the skin which causes the DNA to mutate into the shape called thymine dimer. To react with this situation, our human bodies will complete the DNA repair system. Nevertheless, this system might be ineffective which causes the beginning of the skin cancer. UV radiation also absorbed chiefly into the eye lens which also causes the protein and other molecules to damage. The protein will be stucked together and forming cataract later. This research report recommends additional studies on how sunblock protects skin from UV radiation.

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