

Physics case study – do sunbeds cause skin cancer essay sample



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As the pressure on young people to become perfectly preened and tanned steadily increases, more and more turn to sunbeds as a way to find that perfect summer glow. However, the darker side to the story, the soaring numbers of skin cancer, are they paying for their vanity, or is it pure coincidence.

The title I have chosen to study is " Do Sunbeds Cause Cancer?". Why? - Because in my opinion it is a currently pressing issue, so many young people today are turning to sunbeds, and with the sunbeds themselves becoming stronger and stronger, are we killing ourselves?

I'm looking for evidence to help me come to a personal conclusion. This will include articles either supporting sunbeds as a cause for skin cancer, with evidence from studies showing some undeniable correlation. Alternatively, I am also looking for evidence suggesting other causes, providing an alternative conclusion.

I hope by the end of this case study, I will have a better understanding of the effects of UVA/B radiation on the skin, and that I will be able to make a decision, as to what I think.

The Structure of the Skin

Many people actually know little about their skin, and as a result greatly undermine its importance. It is in fact the largest organ of the human body, making up on average around 16% of our body weight. It has a range of functions which are vital for our survival.

The skin is structured in layers with many different components integrated in these layers to help it fulfil the many tasks required of it constantly. The skin is required as a barrier between the outside world and our internal controlled environment, it is physically tough to protect us from various “ nasties”, such as harmful chemicals or bacteria and viruses, it is protective towards deeper tissues against bangs and bumps, and when exposed to sunlight it produces an essential nutrient, vitamin D. It also serves as an important input of information to the brain, through the millions of nerves within the skin.

There are two main layers of the skin, which are above the third subcutaneous layer, basically the layer of fat which varies in thickness depending on a persons body weight.

Epidermis

The epidermis is the top layer, the layer we see when we look at our skin, it contains many different layers of cells within it, as is demonstrated by the diagram below.

[1] The diagram can be found on the website, however, all labels were added by me.

The basal cell layer, is the deepest of all the layers in the epidermis, it is here that cells continually divide, supported by blood vessels in the dermis, producing millions of new skin cells every day.

As the new cells are made, they push older cells out of the basal layer and into the spinous layer. They start to become irregular in shape, flatter, as

they lose their contact with the blood supply, also they start to build up the protein, keratin.

By the time a cell reaches the stratum corneum it is flat in shape, and dead, they contain the highest levels of keratin. The cells are arranged overlapping, creating a strong weatherproof surface.

Dermis

The dermis is the layer underneath the epidermis, which is a lot thicker, and also has a lot of different functions. This is where you find the blood vessels and nerves as well as the hair roots and sweat glands.

The blood vessels contribute to homeostasis, maintaining a constant internal environment, as well as providing nutrients and removing waste. The nerves send information about our surroundings to the brain.

As you can see, the skin is an incredibly complicated organ, containing many structures, and many different functions.

The Electromagnetic Spectrum

The electromagnetic spectrum, describes the entire range of electromagnetic radiation, from the very low energy of radio waves to the very high energy of gamma rays. Generally speaking, the low energy radiations are safer to humans than high energy radiation, because with more energy they can do more damage.

Electromagnetic radiation travels as waves which are a combination of electrical and magnetic fields, unlike sound waves they require no medium to travel, so they can travel through space which is a vacuum.

Sunlight is a collection of radiations which travels from the sun to earth, the radiations include visible light which allows us to see the world around us, as well as Infra-Red, and Ultraviolet light, which is responsible for tanning.

Ultra Violet Light.

Ultraviolet radiation, is a higher energy radiation than visible light, it gets its name, because it is stronger than violet visible light, which is the colour with the highest energy. It is produced naturally by the sun, and is around us all the time, summer, spring, autumn and winter. It is also the type of radiation used in tanning beds by millions of people every year trying to achieve that glowing tanned appearance.

Ultraviolet light whether produced by the sun or by a tanning bed consists of two main components: UVA and UVB. The UVA ray is the longer of the two, whilst UVB rays are shorter with more intensity.

How the Skin Tans

Ultra violet rays, essentially cause tanning by affecting melanin the pigment in our skin. Everybody's skin contains melanin, that's what gives our skin it's colour, it is produced by cells called melanocytes, which send the pink pigment up through the epidermis, where it is absorbed by other skin cells.

The amount of melanocytes in our bodies is constant, everybody has around

5 million, however, genes dictate how much melanin your melanocytes produce.

The two different types of ultraviolet light cause tanning in different ways. UVA causes a tan by oxidising the melanin. After being exposed to the waves, it undergoes a chemical reaction, changing its colour from pink to brownish, this is what makes our skin appear darker, since as the melanin looks darker, so do the cells containing it. The UVA rays penetrate the skin deeper than UVB rays, all the way down to the subcutaneous fat layer.

On the other hand, UVB rays affect the melanocytes, they cause the melanocytes to produce more melanin, which is then darkened by the accompanying UVA rays. The UVB rays, do not usually go any deeper into the skin than the dermis.

There are an awful lot more UVA rays than UVB rays which reach the earth in sunlight, and this is echoed in tanning beds, where the percentages vary but usually it is around 95% UVA and 5% UVB.

Skin Cancer

Skin cancer, is as the name suggests a cancer of the skin. It is a tumour, or growth found in any of the different levels of the skin, this is created when the DNA of a skin cell becomes mutated, and then it multiplies in an uncontrolled way. The cancerous cells can then travel around the body through the blood stream or lymph system, to produce secondary tumours, in other parts of the body, this is called metastasis.

There are different types of skin cancer, denoted by the different cells which it forms in. Non melanoma, is the least serious type of cancer, which can be subcategorized into Basal cell carcinoma and Squamous cell carcinoma, according to Bupa “ Each year in the UK over 67, 500 people are diagnosed with NMSC (Non Melanoma Skin Cancer)”. Basal Cell Carcinoma is the most common form of skin cancer, it forms in the basal cells of the epidermis, and left untreated it will turn into an ulcer, but this is rare, and it is almost never fatal. Squamous Cell Carcinoma is the second most common form of skin cancer, it is formed in the top layer of the epidermis, and sometimes spreads to surrounding cells, but rarely around the body.

Melanoma is the most serious type of skin cancer; around 7000 people a year are diagnosed with it in the UK. It is created when our melanocytes begin to divide in an uncontrolled manner. It can prove fatal, but is treatable when found early enough.

Causes of Skin Cancer

The definite cause of skin cancer is as of yet unknown, but there has been a lot of speculation, that using sun beds could be a cause.

An article from the Times newspaper, (April 8 2008) focuses on a recent study by Cancer Research UK which has found a correlation with the increased use of sun-beds and a rise in the number of cases of skin cancer. In the past it definitely hasn't been the most common skin cancer, but as the article explains “ skin cancer, has overtaken cancers of the cervix and breast to become the most common cancer diagnosed in women under 30” it is thought, that this is because women under thirty are the most likely
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candidates to use sunbeds, and that the reason it is so much more prevalent in women, is because men do not often choose to use sunbeds. The article also throws around some worrying statistics, such as “ women who use sunbeds under the age of 35 could increase their risk of developing melanoma by as much as 75 per cent”. However, whilst a correlation can put forward compelling evidence is not a cause.

Nevertheless, this article is not alone. Another article, from Earth Times, a news website, with articles from all around the world, focuses on information uncovered by Dr Harry Moseley of Ninewalls Hospital and Medical School in Dundee, who conducted a study into the safety of sunbeds. It claims “ The risk of contracting skin cancer by use of sunbeds has trebled in 10 years” that is quite a scary prospect, but what scares me the most is the fact “ 83 per cent of the sunbeds had UV light outputs that exceeded recommendations laid down in the British and European standards” this means that despite the fact questions are being raised about the safety of suntan, manufacturers are creating stronger and stronger sunbeds. In my opinion, this is very irresponsible. What is even more irresponsible however is “ a 30 per cent increase in the number of unregulated, privately operated sunbeds” this means that uninformed members of the public are using the technology without considering the risks or their own safety.

I believe that both of these articles are reliable reasonably reliable, they were written by impartial organisations and supported by reputable studies. However, I am inclined to trust the article published in the Times more, as I know that the author of that article, has got science qualifications, and has been writing about science for his entire journalistic career, whereas I do not <https://assignbuster.com/physics-case-study-do-sunbeds-cause-skin-cancer-essay-sample/>

know much about the author of the internet article, so I am unsure as to whether or not he actually knows anything about science, so whether or not he is really qualified to discuss this.

On the other hand, I read article recently in the Daily Mail (13th July 2009) which claims the risk of getting skin cancer through UVA/B light is “ overstated”. The article claims that our genetic make-up is more of a risk for cancer, it focuses on a study published in the journal Nature Genetics. It states “ although tanning is a risk factor, the number of moles on a person’s skin is the most important indicator of whether they will go on to develop melanoma.” The author of the study Tim Spector, professor of genetic epidemiology at King’s College London, said “ we found two important genes that... give you an extra risk of melanoma” This would suggest, that developing skin cancer, is more a result of a genetic predisposition than using tanning beds. His argument is supported by Dr Veronique Bataille, a dermatologist with the NHS “ You often read that nearly all melanomas are caused by UVA/B radiation, which is not supported by the evidence.”

Another article, published in the New Scientist magazine on the 18th May 2008, focuses on two studies, which found similar links to genes. This time independent teams in Australia and Iceland have pinpointed the same gene as increasing the risk “ two mutations in the gene ASIP doubled the chances of developing melanoma, the deadliest form of skin cancer” I think think the fact that two independent studies came to the same conclusions tightens the evidence further. Geneticist Stuart MacGregor of Queensland Institute of Medical Research in Brisbane tells people to think carefully about identifying people at risk “ identifying people at risk of melanoma early on, based on <https://assignbuster.com/physics-case-study-do-sunbeds-cause-skin-cancer-essay-sample/>

their genes could save lives" I agree, that people should take into consideration this new gene link before condemning UVA/B rays as the ultimate cause.

Although both of these articles were written by impartial organisations, I consider the one published in the New Scientist to be more reliable. This is because the article published in the daily mail was not written by a scientist, or anyone with any real background in science, he is a journalist, trying to sell papers. On the other hand, the article published in the New Scientist was written by somebody who has a strong background in science, he knows what he is talking about and is therefore more qualified to discuss this topic.