

Investigating

Communicating

Knowledge and understanding

UV Light and Human Health

Learning outcomes in focus

Students should be able to:

NS6 conduct research relevant to a scientific issue, evaluate different sources of information including secondary data, understanding that a source may lack detail or show bias

NS7 organise and communicate their research and investigative findings in a variety of ways fit for purpose and audience, using relevant scientific terminology and representations

ES8 examine some of the current hazards and benefits of space exploration and discuss the future role and implications of space exploration in society

BW6 evaluate how human health is affected by: inherited factors and environmental factors including nutrition; lifestyle choices; examine the role of micro-organisms in human health

Learning intentions

We are learning to:

- conduct independent research
- communicate science to an audience
- evaluate sources
- keep a research log
- identify health implications of exposure to UV light
- identify health implications of exposure to UV light
- identify materials, the use of which, have a negative impact on the ozone layer

Teaching and learning context

This task was undertaken by two mixed-ability classes of First Year students. Prior to the task, students had been conducting an experimental investigation to determine the best design for an astronaut's visor with the proviso that it should afford good visibility and highest protection from UV light. For this they used UV colour changing beads, coloured cellophane gels and UV torches. They had compared the response of the beads to torch light and daylight on overcast and bright days. Following the interest generated by this work students were encouraged to investigate through research. It is common practice for these students to engage with the learning outcomes in the specification.

Task

Students were given four questions and asked to research one or more and to present their findings in a report for the school magazine. The actual task given to the students is included in Appendix 1.

Success Criteria

I can:

SC1: search for and find relevant information about the topic

SC2: arrange and report my findings in my own words in an appropriate format

SC3: use data in an informed manner to argue my position

SC4: evaluate my sources

SC5: organise and acknowledge my sources by keeping a log of my references and referring to these in my report

UV Light and Human Health

You have seen that UV light changes the colour of special beads and that some of these only changed colour when they were taken outside; where the UV light is more intense. In your experiments you discovered the best combination of coloured gels to make a visor for an astronaut. You know that astronauts need extra protection because they travel outside of the Earth's protective atmosphere.

But...

- What are the effects on our health if we get too much or too little UV light?
- How does the atmosphere protect us and have we done anything to reduce this protection?
- Would UV exposure be a concern in the same way as on Earth if we colonised other planets or moons?
- What, if any, lifestyle choices related to UV exposure might affect human health?

You must choose one, or more, of the questions above and research the topic using your Ipad, or other sources. It is important that you keep a written log of all the sources you use. You must consider how reliable the information you find might be and whether important details could have been missed out to help make a point; this is called bias and sometimes occurs in newspaper articles and adverts for example. When you have collected information from a number of different sources you must present your findings as a science report for a school magazine. This must be in your own words. Do not cut and paste other people's work and try to pass it off as your own. The report, excluding the reference list and research notes, must be between 650 and 800 words long. It will be marked against the following success criteria.

Success Criteria

I can:

SC1: search for and find relevant information about the topic

SC2: arrange and report my findings in my own words in an appropriate format

SC3: use data in an informed manner to argue my position

SC4: evaluate my sources

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Introduction

In this article I will explain the effects on us humans of too much/little UV exposure. In the first, I will say what UV rays are. In section 2, I will say ^{section} how UV rays are related to vitamin D and what vitamin D is. In the third section, I will show some of the effects of too much UV Exposure. In section 4 ~~me~~ I will present some effects of too little UV exposure. For section 5, I will give some information on how much UV light we need and how to protect ourselves from UVB rays. In the last section I will ask myself if I can trust my sources, ~~relate~~ this article to everyday life and give my opinion on the matter.

SC2:

The report is very well arranged and clearly written in the student's own words.

What are Ultra Violet (UV) rays?

UV rays are rays that come from the sun that are invisible to humans. Some animals can see them but we can't. These rays come from the sun and can give various health benefits and deficits.

UV is made up of three types of rays: ultraviolet A, ultraviolet B and ultraviolet C. Otherwise known as: UVA, UVB and UVC. UV C can't pass through our atmosphere, but if it could ~~was~~ it wouldn't be good as it's the most dangerous type. UVA gets furthest into our skin but is the least dangerous and UVB doesn't get as far into our skin but is more dangerous.

There are also some torches/lamps that use UV light like tanning beds and invisible ink revealers.

160 From www.medicinenet.com/script/main/art.asp?articleKey=34066

How are UV rays related to vitamin D?

Vitamin D is something we need for strong bones and protection against some cancers. Since there aren't many foods with a good amount of vitamin D, we need and get it from somewhere else. We get it from the sun. (more specifically UVB rays). Vitamin D is made when UVB rays react with a compound (7-dehydrocholesterol) in our skin.

70 From sciencelearn.org.nz/Contexts/You-me-and-UV/Science-Ideas-and-Concepts/Vitamin-D-and-UV

What are the effects of too much UV exposure?

The effects of too much UV exposure are: **skin cancers** (UV rays cause over 90% of skin cancers), **Sunburn** - UV rays burn the skin. Extra blood flows to the damaged skin in an attempt to repair it, that's why it turns red., **Immune System Suppression** - scientists have proved that ~~after~~ for up to 24 hours after sun exposure, your immune system is less effective., **Eye damage** - UV rays can damage your eyes and give you conditions such as cataracts (which can lead to blindness)., **Ages skin** - UV rays quicken aging and increase the amount of brown spots on your skin.

130 From sciencelearn.org.nz/Contexts/You-me-and-UV/Science-Ideas-and-Concepts/Positive-and-negative-effects-of-UV

SC1:
Clear evidence that the student has searched for and selected highly relevant information.

SC5:
References are consistently included with each section and used to support the argument.

The Effects of too little UV exposure

The effects of too little UV exposure are:

- Lack of vitamin D, we get vitamin D from the sun and there aren't many other sources.
- Pale skin

uv.biospherical.com/student/page4.html

How much UV exposure do I need?

Well, there is no exact amount that I can say but if you have dark skin or very dark skin you need about 1hr 30 mins to 2hrs of sunlight a day to produce enough vitamin D. If you have pale skin, then you only need about 15-20 mins however a good rule is to get half the exposure it takes for your skin to turn pink to get the right amount.

<https://www.vitaminDcouncil.org/about-vitamin-d/how-do-i-get-the-vitamin-d-my-body-needs/>

What can we do to protect ourselves from UVB rays?

For protection you should always:

- Wear sunglasses
- Use sun cream higher than SPF 15 (blockout 93% of UVB rays)
- Be careful

The figures for recommended sunshine above is to your bare skin. If you don't want to get burnt or tanned you should always be careful about which sun cream you can use and research into it before you buy it.

<http://www.webmd.com/beauty/features/whats-best-sunscreen#1>

Can I trust my sources?

I used a variety of sources, some were bias, some were fair. The ones in the project seemed to not be biased as they gave me lots of information that was fair from both sides of the argument.

I tried my best to make sure they were fair and weren't pushing opinions on me. Each URL address is underneath each paragraph.

How does this relate to everyday life?

These studies relate to everyday life because:

1. We can't avoid the sun, so we should know much of it to take in
2. How dangerous/helpful UV rays are.
3. What can we do to protect ourselves.

My Opinion

Out of all the information I have collected from my research I think that UV rays aren't the devils like some people point them out to be as ~~if~~ without them we would not be in a good place. ~~on~~ Even companies are boosting our economy in the summer because of the amount of people out in the sun needing sunscreen. As long as we are careful and don't go out trying to get a tan then these UV rays are actually helpful. I hope this information was useful. If you stick to the figures in section 5 then UV light can be safe and fun.

SC4:
Consideration is given to the reliability of sources but there is a lack of justification for the bias..

SC3:
An opinion is expressed and reference is made to the data in section 5.

Overall judgement:  Expectational