

New sunscreen ingredient to heal sunburn and help prevent skin cancer

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People who suffer from sunburn could soon benefit from a new sunscreen ingredient that actively repairs sunburnt skin and helps prevent the onset of skin cancer, according to research published in the Journal of Investigative Dermatology.

Unlike conventional sunscreen lotions which merely act as a filter for UVA and UVB sunlight, the new ingredient releases an active ingredient which mops up free iron that is released when the skin burns.

This reduces the inflammation and pain that goes with sunburn – which is exacerbated by the iron - and also prevents the build up of harmful sunlight-generated free radicals, which can lead to the development of skin cancers.

The new ingredient is light-responsive and only becomes active when it is exposed to UV radiation in sunlight, avoiding any side-effects that might result from long-term exposure to the active form of the drug.

The researchers are currently testing prototypes of the ingredient in the laboratory using three dimensional human skin cultures, but expect to be trialling the ingredient with volunteers in the next two to three years.

"When skin is exposed to high doses of sunlight, such as when you are sunbathing, a massive amount of free iron is released in skin cells," said Dr Charareh Pourzand from the University of Bath who is working in collaboration with Dr James Dowden (presently at Nottingham

University).

"This free iron can act as catalysts for the generation of more harmful free radicals that cause severe cell damage.

"Many forms of cancer are thought to be the result of reactions between free radicals and DNA, causing mutations that can disrupt the cell cycle and potentially lead to cancer.

"We wanted to find a way of mopping up sunlight-generated free iron that produce harmful radicals during exposure to bright sunlight in order to prevent the unwanted side reactions that can lead to skin damage and ultimately cancer.

"The best way to do this is using chelators, drugs that bind and export iron from the body.

"However, long term use of chelators can be toxic for cells as it starves them of the iron necessary for normal biological processes, for example the red blood cells that transport oxygen around the body need iron to work."

Additional hurdles in the research were that many chelators are ineffective protectors of cells, and many of them are patented and so cannot be used freely by all researchers.

The researchers had to find chelators which were strong enough to export the excess iron out of cells, but that would not have an adverse effect on other essential cellular processes.

After three years of research, the team has designed two commercially attractive prototypes which are currently in laboratory trials.

The prototypes contain 'caged' iron binding sites which release the chelators only in response to high doses of UV light, thus avoiding toxicity to cells.

The new sunscreens containing these components will not only contribute to preventing and repairing skin damage caused by UV light, but will also be more effective and will last longer (up to three hours) after application on the skin than conventional sunscreen lotions.

Skin cancer is one of the most common cancers in the UK and the number of people who get it is increasing. There are over 70,000 new cases of skin cancer diagnosed each year in the UK and many cases are not reported so the real number of cases is probably much higher.

Over 2,000 people die from skin cancer each year in the UK.

Cancer Research UK has recently launched the SunSmart - the UK's national skin cancer prevention campaign. It is advising people to follow the smart advice:

- Spend time in the shade between 11am and 3pm
- Make sure you never burn
- Aim to cover up with a t-shirt, hat and sunglasses
- Remember to take extra care with children
- Then use factor 15+ sunscreen

"UVB sunlight is associated with the hottest part of the day, between 10am and 3pm, when the sunlight is brightest," said Dr Pourzand who works in the University of Bath's Department of Pharmacy & Pharmacology.

"UVB affects the outer layer of the skin and is the primary agent responsible for skin blistering and peeling after sunburn.

"UVA sunlight is typically associated with the cooler parts of hot summer days, before 10am and after 3pm.

"UVA was once thought to have a minor effect on skin damage, but now it is considered to be a major contributor as it penetrates deeper into the skin than UVB.

"It is overexposure to UVA that causes the redness and inflammation, or erythema, associated with sunburn.

"The UVA component of sunlight is dangerous as it acts as an oxidising agent that forms free radicals which trigger chain reactions that potentially lead to DNA damage that can convert healthy skin cells into cancerous ones."

Source: University of Bath

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