
UV rays damage skin hours after exposure to sun

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Not quite. Researchers have discovered that sunlight continues to damage DNA in the skin hours after you've gone inside – something that can lead to cancer. The lingering effect could be combated by applying an "evening-after" sunscreen, they suggest.

Melanoma, the deadliest form of skin cancer, has long been linked to exposure to ultraviolet wavelengths of sunlight. These UV rays cause kinks in the DNA of cells called cyclobutane pyrimidine dimers. These CPDs form in the DNA of cells, ultimately causing mutations that can lead to cancer. This damage was thought to happen immediately when the UV light strikes the DNA in the skin cells.

But now a team led by [Douglas Brash](#), a biophysicist at Yale University, have evidence that the effects are less direct – and longer lasting. They noticed that mouse skin cells continue to produce CPDs up to three hours after irradiation with UV light - but only in cells that contain melanin, the pigment responsible for skin colour and for giving us a tan. Because melanin absorbs UV light the thinking was that the pigment protected us from some of the damaging effects of sunlight. "The melanin, which is supposed to be protecting us, is also doing something harmful," says Brash. "That shouldn't happen."

Dark damage

When Brash's team looked more closely, they found that UV light activates two enzymes that combine to chemically excite an electron in the melanin pigment. The energy of this electron then gets transferred to the DNA in the cell, causing the production of CPDs. Once "turned on" by sunlight, the enzymes remain active for several hours, continuing to produce these "dark CPDs".

The same process also occurs in human melanocytes, the skin cells that produce melanin, Brash found.

This means that existing measurements of DNA damage from sunlight – which record only the immediate effect – probably underestimate the true damage, says Brash. However, there could be ways to block the delayed effects with antioxidants that absorb the excited electrons before they can damage DNA. Sure enough, when Brash's team added the antioxidant ethyl sorbate to irradiated skin cells, they found that it prevented the dark CPDs from forming. Sunbathers may eventually be able to apply an "evening-after" sunscreen containing a similar antioxidant to reduce DNA damage, Brash suggests.

[David Fisher](#), a melanoma specialist at Massachusetts General Hospital in Boston, calls this an intriguing idea. "Understanding the enemy is the first step to neutralising it," he says.

The research has a further implication, Fisher adds. Sunscreens protect mostly against high energy UVB light, but even the lower energy UVA light, which is used in tanning beds, caused the delayed effects, Brash found. "This further underlines the importance of UV protection," says Fisher.
