

Sun-induced skin cancer: New discovery permits doctors to assess genetic risk

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As people head to the beach this summer, very few if any, really know how likely they are to develop skin cancer from their outdoor fun. That's about to change, thanks to a new discovery by an international team of scientists that makes it possible for doctors to assess people's personal risk for skin cancer.

In a new research report appearing online in *The FASEB Journal*, these researchers describe for the first time the chain of molecular events that increase one's risk of [skin cancer](#). This discovery may lead to new tests that assess personal skin cancer risk as well as a new generation of sunscreens that increase the skin's ability to protect itself from the sun's damaging rays.

"Our study heralds the onset of personalized medicine for individuals who carry a change in the MC1R gene," said Zalfa A. Abdel-Malek, Ph.D., a researcher involved in the work from the Department of Dermatology at the University of Cincinnati. "The data we have obtained allows us to better predict which individuals will be at risk for skin cancer, as well as potentially why and to what degree. In the future, genetic testing for MC1R gene changes may be clinically available so that individuals can be made aware of the molecular basis of their risk prior to development of cancer."

Abdel-Malek and colleagues found that when a pigmentation gene called the "melanocortin 1 receptor" or MC1R does not function properly, skin cells do not respond to a hormone, called α -MSH, which causes cells to

produce dark pigmentation to protect themselves from ultraviolet rays. To make this discovery, the researchers studied 21 human skin cell cultures that express the MC1R gene in different ways. Each culture was studied for expression of genetic changes of MC1R, pigment levels and the ability to respond to α -MSH. The researchers also exposed the cell cultures to ultraviolet rays and measured the amount of DNA damage and the rate of its repair, as well as the percent of surviving melanocytes. Then the scientists inserted a normal version of the MC1R gene into the [skin cells](#) and found that they responded properly to ultraviolet light by producing the pigment necessary to protect themselves. These results give researchers testable strategies to reduce or prevent skin cancer. The results also suggest that it may be possible to develop drugs or a new generation of sunscreens that restore the lost function of MC1R.

"This research permits us know our own, personal risk for skin cancer." said Gerald Weissmann, M.D., Editor-in-Chief of *The [FASEB Journal](#)*. "We've known for a long time that smearing on sunscreen is the best way to avoid skin cancer, but never how much or what kind. This study points the way to new kinds of [sunscreens](#) that restore their skin's ability to protect itself from DNA damage."

More information: Ana Luisa Kadekaro, Sancy Leachman, Renny J. Kavanagh, Viki Swope, Pamela Cassidy, Dorothy Supp, Maureen Sartor, Sandy Schwemberger, George Babcock, Kazumasa Wakamatsu, Shosuke Ito, Amy Koshoffer, Raymond E. Boissy, Prashiela Manga, Richard A. Sturm, and Zalfa A. Abdel-Malek. Melanocortin 1 receptor genotype: an important determinant of the damage response of melanocytes to ultraviolet radiation. *FASEB J.*
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