

# Sunscreen ingredient may pose skin cancer risk, researchers find

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(Phys.org) -- As vacationers prepare to spend time outdoors this summer, many of them will pack plenty of sunscreen in hopes it will protect their bodies from overexposure, and possibly from skin cancer. But researchers at Missouri University of Science and Technology are discovering that sunscreen may not be so safe after all.

Cell toxicity studies by Dr. Yinfa Ma, Curators' Teaching Professor of chemistry at Missouri S&T, and his graduate student Qingbo Yang, suggest that when exposed to sunlight, zinc oxide, a common ingredient in sunscreens, undergoes a chemical reaction that may release unstable molecules known as free radicals. Free radicals seek to bond with other molecules, but in the process, they can damage cells or the DNA contained within those cells. This in turn could increase the risk of [skin cancer](#).

Ma also found that the longer zinc oxide is exposed to sunlight, the greater the potential damage to human cells.

"Zinc oxide may generate free radicals when exposed to UV (ultraviolet) sunlight," Ma says, "and those free radicals can kill cells."

Ma studied how human lung cells immersed in a solution containing nano-particles of zinc oxide react when exposed to different types of light over numerous time frames. Using a control group of cells that were not immersed in the zinc oxide solution, Ma compared the results of light exposure on the various groups of cells. He found that zinc oxide-

exposed cells deteriorated more rapidly than those not immersed in the chemical compound.

Even when exposed to visible light only, the lung cells suspended in zinc oxide deteriorated. But for cells exposed to ultraviolet rays, Ma found that "cell viability decreases dramatically."

When exposed to ultraviolet long-wave light (ultraviolet A or UVA) for 3 hours, half of the lung cells in the zinc oxide solution died. After 12 hours, 90 percent of the cells in that solution died, Ma found.

Why does zinc oxide, an ingredient used in [sunscreen](#) to help block harmful UV rays, cause cells to deteriorate when exposed to sunlight? According to Ma, when the zinc oxide nano-particles in the solution absorb the UV rays, the reaction releases electrons, which in turn may produce unstable free radical molecules in the zinc oxide solution. Those free radical molecules then bond with other molecules and act as parasites, damaging the other molecules in the process.

Ma and his colleagues at Missouri S&T published their initial research results in the January 2009 edition of the [Journal of Nanoparticle Research](#). The paper, titled "[Toxicity of nano- and micro-sized ZnO particles in human lung epithelial cells](#)," was the first comprehensive study ever published on this subject. Lead author Weisheng Lin was Ma's Ph.D. student at the time. Other authors of the paper were Chuan-Chin Huang, a graduate student in biological sciences at the time, and two members of S&T's biological sciences faculty, Dr. Katie Shannon (assistant professor) and Dr. Yue-Wern Huang (associate professor).

Now, Ma is preparing to publish his latest research results in the journal [Toxicology and Applied Pharmacology](#). A publication date has not been determined.

Ma's research on zinc oxide's effect on [cells](#) is still in the early stages, so he cautions people from drawing conclusions about the safety or dangers of sunscreen based on this preliminary research.

"More extensive study is still needed," May says. "This is just the first step."

For instance, Ma plans to conduct electron spin resonance tests to see whether zinc oxide truly does generate [free radicals](#), as he suspects. In addition, clinical trials will be needed before any conclusive evidence may be drawn from his studies.

In the meantime, Ma advises sunbathers to use sunscreen and to limit their exposure to the sun.

"I still would advise people to wear sunscreen," he says. "Sunscreen is better than no protection at all."

Besides sunscreen, [zinc oxide](#) is used in many commercial products, including plastics, paints, ointments and sealants.

Provided by Missouri University of Science and Technology

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