

Some sunscreen ingredients may disrupt sperm cell function

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Many ultraviolet (UV)-filtering chemicals commonly used in sunscreens interfere with the function of human sperm cells, and some mimic the effect of the female hormone progesterone, a new study finds. Results of the Danish study will be presented Friday at the Endocrine Society's 98th annual meeting in Boston.

"These results are of concern and might explain in part why unexplained infertility is so prevalent," said the study's senior investigator, Niels Skakkebaek, MD, DMSc, a professor at the University of Copenhagen and a researcher at the Copenhagen University Hospital, Rigshospitalet.

Although the purpose of the chemical UV filters is to reduce the amount of the sun's UV rays getting through the skin by absorbing UV, some UV filters are rapidly absorbed through the skin, Skakkebaek said. UV filter chemicals reportedly have been found in human blood samples and in 95 percent of urine samples in the U.S., Denmark and other countries.

Skakkebaek and his colleagues tested 29 of the 31 UV filters allowed in sunscreens in the U.S. or the European Union (EU) on live, healthy human sperm cells, from fresh semen samples obtained from several healthy donors. The sperm cells underwent testing in a buffer solution that resembled the conditions in female fallopian tubes.

Specifically, the investigators evaluated calcium signaling, which is signaling inside the cell brought on by changes in the concentration of [calcium ions](#). Movement of calcium ions within sperm cells, through

calcium ion channels, plays a major role on sperm cell function, according to Skakkebaek. CatSper is a sperm-specific [calcium ion channel](#) that he said is essential for male fertility. This channel is the main sperm receptor for progesterone, a potent hormone attractant for human sperm cells. Binding of progesterone to CatSper causes a temporary influx, or surge, of calcium ions into the sperm cell, controlling several sperm functions necessary for fertilization.

The researchers found that 13, or 45 percent, of the 29 UV filters tested induced calcium ion influxes in the [sperm cells](#), thus interfering with normal sperm cell function. "This effect began at very low doses of the chemicals, below the levels of some UV filters found in people after whole-body application of sunscreens," Skakkebaek said.

Furthermore, nine of the 13 UV filters seem to induce this calcium ion influx by directly activating the CatSper channel, thereby mimicking the effect of progesterone. This finding suggests that these UV filters are endocrine disruptors, Skakkebaek said. In addition, several of the UV filters affected important sperm functions normally controlled via CatSper, such as sperm motility.

Skakkebaek called for clinical studies to investigate whether chemical UV filters affect human fertility. He added, "Our study suggests that regulatory agencies should have a closer look at the effects of UV filters on fertility before approval."

Eight of the 13 UV filters that disrupted sperm [cell function](#) are approved for use in the U.S. They are avobenzene, homosalate, meradimate, octisalate (also known as octyl salicylate), octinoxate (or octyl methoxycinnamate), octocrylene, oxybenzone (also called benzophenone-3 or BP-3) and padimate O. These chemicals are common active ingredients in sunscreens as well as sunscreen-containing personal care products, such as makeup, moisturizers and lip balms.

PhD student and coauthor Anders Rehfeld, MD, will present the study findings.

Provided by The Endocrine Society

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