Harm reduction cigarettes can be more harmful than conventional brands, researchers report

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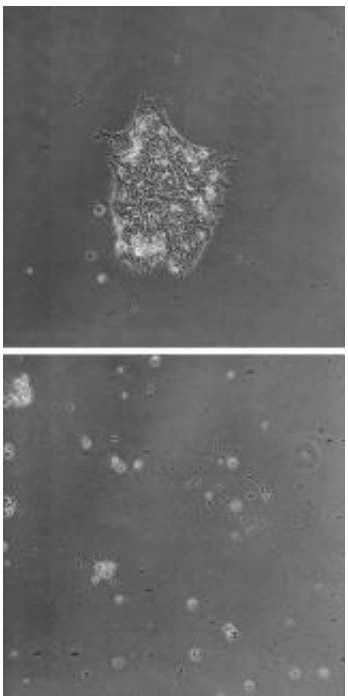

The top image shows a control colony of human embryonic stem cells at 48 hours. The bottom image shows, also at 48 hours, a colony of human embryonic stem cells treated to sidestream smoke from a harm reduction brand (the colony has been killed by the smoke treatment). Credit: Talbot lab, UC Riverside.

To reduce the toxicity of cigarette smoke, tobacco companies have introduced "harm reduction cigarettes," often marketed as safer than conventional brands.

But stem cell scientists at the University of California, Riverside have found that even sidestream smoke (which burns off the tip of a cigarette) from harm reduction cigarettes impairs growth of human embryonic stem cells more than sidestream smoke from a conventional brand.

"Harm reduction products are not necessarily safer than their conventional counterparts," said Prue Talbot, the director of UC Riverside's Stem Cell Center and the research team leader. "Our analyses show there is significant toxicity in harm reduction products, and our data show that reduction of carcinogens in harm reduction mainstream smoke does not necessarily reduce the toxicity of unfiltered sidestream smoke."

Because it is not possible to directly determine chemical toxicity on actual human embryos, the researchers developed tests with human embryonic stem cells, which model young embryos, to measure and compare the toxicity of mainstream (smoke actively inhaled by smokers) and sidestream smoke from both conventional and harm reduction cigarette brands.

"Embryonic stem cells provide the best model currently available for evaluating the effects of environmental toxicants on prenatal stages of development, which are usually the most sensitive to chemical stress," said Talbot, a professor of cell biology and neuroscience.

Her group also found that sidestream smoke was consistently more potent to the embryonic stem cells than mainstream smoke, regardless of whether the cigarette brand was harm reduction or conventional.

"This information should be valuable to potential users of harm reduction cigarettes and should be taken into account when establishing policies regarding the sale, advertising, and use of harm reduction products," Talbot said.

Study results appear in the November issue of *Toxicological Sciences*.

For the analyses, the researchers used a rapid human embryonic stem cell-based test that provides data on dynamic cellular processes by combining time-lapse video data with video bioinformatics tools.

Talbot's research team examined the following harm-reduction cigarette brands: Marlboro Lights, Advance Premium Lights, and Quest. The team used Marlboro Red cigarettes to represent conventional brands.

Tobacco smoke is comprised of both mainstream smoke and sidestream smoke. The latter is the major component of secondhand smoke, also called environmental tobacco smoke, and is inhaled by passive smokers.

Harm reduction cigarettes are made using complex filters or by genetically altering tobacco plants to reduce nicotine concentration.

Provided by University of California -- Riverside