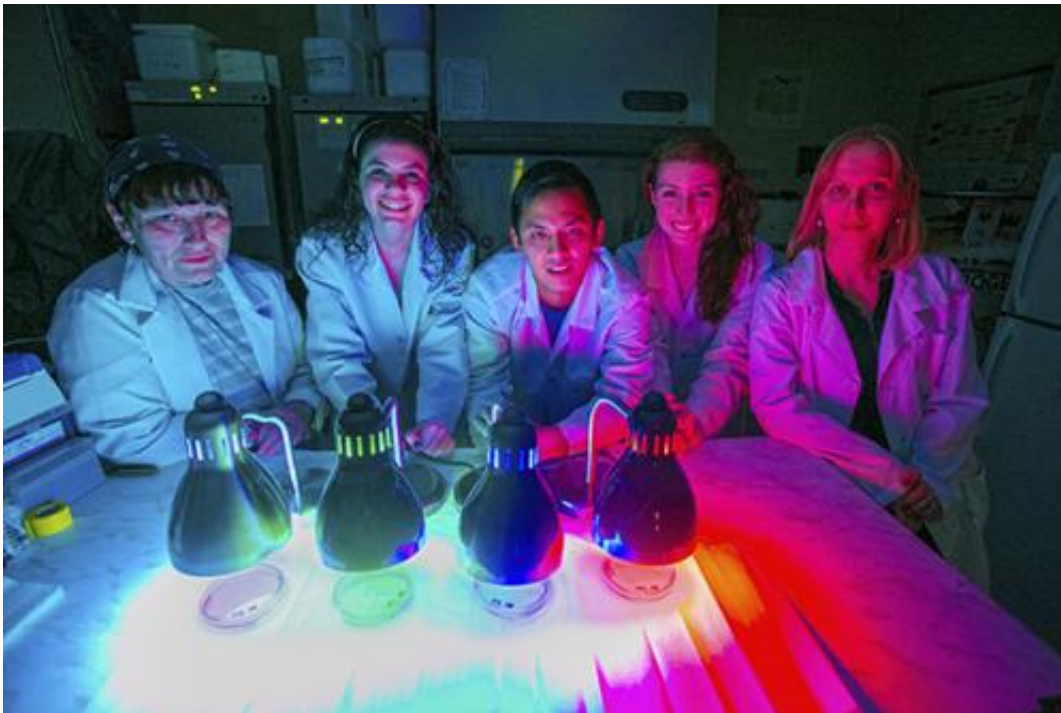


# LED exposure is not harmful to human dermal fibroblasts

April 23 2014

---



Distinguished Professor of Materials Science & Engineering in the College of Engineering and Applied Sciences Miriam Rafailovich (left), Visiting Assistant Professor Tatsiana Mironava, PhD (right) and undergraduate chemical engineering students Emily Leonard, Jason Caballes, and Stephanie Falco performed tests on the effects of LED lights on skin cells.

There was a time when no one thought about light bulbs—one blew, you screwed another one in. Nowadays, it's more complicated, as energy efficiency concerns have given rise to a slew of options, including

incandescent, compact fluorescent lights, and light emitting diodes.

LEDs are the most expensive option, but they are also the most energy efficient, are getting more cost-efficient, and they are growing in popularity. With this increasing acceptance, concerns have arisen about long- or short-term direct skin [exposure](#)—especially since a 2012 SBU study found that contact fluorescent light (CFL) bulbs can harm skin cells due to UV-light emittance (Study Reveals Harmful Effects of CFL Bulbs to Skin).

A senior thesis by Stony Brook University Chemical Engineering undergraduates has alleviated the concern. The findings, *The Effects of Color LED exposure on Human Dermal Fibroblast Proliferation, Mitochondrial Activity and Cell Morphology*, were presented as a poster on March 29 at the American Institute of Chemical Engineers (AIChE) conference.

"LEDs have the potential to be used for both indoor lighting applications and in wound healing therapy, taking the place of lasers," says Tatsiana Mironava, PhD, a Visiting Assistant Professor in the SBU Material Sciences and Engineering Department, and one of the students' mentors. "We wanted to assess the effects of color changing light emitting diode bulb exposure on human dermal fibroblast cells."

The team worked in the lab of Miriam Rafailovich, Distinguished Professor of Materials Science & Engineering in the College of Engineering and Applied Sciences. Dr. Rafailovich, who also directs the Garcia Materials Research Science and Engineering Center at Stony Brook University, was Principal Investigator on the project, and is one of SBU's most experienced mentors. The students were Jason Caballes, Stephanie Falco, and Emily Leonard.

"The team exposed fibroblast cultures to four LED wavelengths—red,

green, blue, and white—for intensity-normalized time periods, so all samples were being exposed to the same power within one test," Rafailovich says. "The cells were counted using a hemocytometer; the mitochondrial activity was determined through MTS Assay analysis; and cell morphology was analyzed through confocal microscopy images. The cultures were exposed to two different conditions: longer exposure trials with Dulbecco's Modified Eagle Medium [DMEM], with no phenol red on the samples, and trials without any media, a maximum exposure of 3 minutes."

The short exposure samples without media displayed a trend of a higher cell proliferation than both controls (one sample stayed in the incubator; one sample was only exposed to ambient light). The long exposure samples that had 1 mL of DMEM media (maximum exposure time of 15 minutes) displayed no trend in growth for the LED exposed cells over the control samples.

"At this point, we have seen the consistent trend that LED exposure is not harmful to human dermal fibroblasts," Leonard reports. That helps clarify the scientific thinking on the subject, according to Falco. "When we first started preliminary research for our paper, we ran into several conflicting opinions of whether or not LED lights were harmful," she says. "Some people claimed that they did damage to skin cells, while others were using them to heal wounds, so it was gratifying to see for ourselves that cells were proliferating under the LEDs."

Dr. Mironava confirms the students' conclusions. "LEDs definitely don't hurt dermal fibroblasts cells, and pose no risk at all," she says. "In fact, in some cases we observed an increase in mitochondrial activity and cell proliferation, which indicates that exposure to LED light may be beneficial for the cells."

The students are now investigating the influence of LED light exposure

on factors affecting wound healing. They are thrilled to participate in research as undergraduates. "I feel very fortunate to have the opportunity to experience the process of conducting research from the formulation of the thesis, as opposed to jumping onto a preexisting project," says Leonard. Adds Caballes, "It's exciting to be working on developing a thesis and conducting an experiment as an undergraduate student. I have had very little exposure to cell biology laboratories before this research, and being able to expand my horizons through this study has been very fulfilling."

Mentoring is equally gratifying. "I enjoy not only the science, but watching the students gain confidence," Dr. Mironava says. "It is extremely important for students to have an experience of working in real lab, and I am sure it will help them to find a job in the future."

The students, in turn, appreciated their mentors' commitment. Falco speaks for all three: "Dr. Mironava sacrificed so much of her time to educate us on how to create a good experiment, and spent many days in lab with us showing us the ropes. She was understanding that we were beginners at this, yet stern enough to make sure that we always tried to improve everyday, to ensure that we ended up with a great result to be proud of. Dr. Rafailovich has been fantastic, allowing us the use of lab space, and offering her expertise whenever it was needed."

Provided by Stony Brook University

Citation: LED exposure is not harmful to human dermal fibroblasts (2014, April 23) retrieved 4 July 2024 from <https://medicalxpress.com/news/2014-04-exposure-human-dermal-fibroblasts.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.