

Total darkness at night is key to success of breast cancer therapy

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Exposure to light at night, which shuts off nighttime production of the hormone melatonin, renders breast cancer completely resistant to tamoxifen, a widely used breast cancer drug, says a new study by Tulane University School of Medicine cancer researchers. The study, "Circadian and Melatonin Disruption by Exposure to Light at Night Drives Intrinsic Resistance to Tamoxifen Therapy in Breast Cancer," published in the journal *Cancer Research*, is the first to show that melatonin is vital to the success of tamoxifen in treating breast cancer.

Principal investigators and co-leaders of Tulane's Circadian Cancer Biology Group, Steven Hill and David Blask, along with team members Robert Dauchy and Shulin Xiang, investigated the role of [melatonin](#) on the effectiveness of tamoxifen in combating human breast cancer cells implanted in rats.

"In the first phase of the study, we kept animals in a daily light/dark cycle of 12 hours of light followed by 12 hours of total darkness (melatonin is elevated during the dark phase) for several weeks," says Hill. "In the second study, we exposed them to the same daily light/dark cycle; however, during the 12 hour dark phase, animals were exposed to extremely dim light at night (melatonin levels are suppressed), roughly equivalent to faint light coming under a door."

Melatonin by itself delayed the formation of tumors and significantly slowed their growth but tamoxifen caused a dramatic regression of tumors in animals with either high nighttime levels of melatonin during

complete darkness or those receiving melatonin supplementation during dim light at night exposure.

These findings have potentially enormous implications for women being treated with tamoxifen and also regularly exposed to light at night due to sleep problems, working night shifts or exposed to light from computer and TV screens.

"High melatonin levels at night put breast cancer cells to 'sleep' by turning off key growth mechanisms. These cells are vulnerable to tamoxifen. But when the lights are on and melatonin is suppressed, [breast cancer cells](#) 'wake up' and ignore tamoxifen," Blask says.

The study could make light at night a new and serious risk factor for developing resistance to tamoxifen and other anticancer drugs and make the use of melatonin in combination with [tamoxifen](#), administered at the optimal time of day or night, standard treatment for [breast cancer](#) patients.

Provided by Tulane University

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