

Sleep hormone melatonin helps breast cancer drug kill more cancer cells

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Tiny bubbles filled with the sleep hormone melatonin can make breast cancer treatment more effective, which means people need a lower dose, giving them less severe side effects. In a new study published in *Colloids and Surfaces B: Biointerfaces*, researchers show that the bubbles, called nanostructured lipid carriers (NLCs), made tamoxifen stronger and help it kill cancer cells.

The authors of the study, from Tabriz University of Medical Sciences in Iran, say using NLCs packed with [melatonin](#) could also help avoid the [cancer cells](#) growing resistant to the treatment, so it will remain effective.

According to the Centers for Disease Control and Prevention (CDC), [breast cancer](#) is the most common cancer in women; more than 224,000 people were diagnosed with breast cancer in 2012 in the US alone. The leading medication used to treat breast cancer is a drug called tamoxifen, which stops [breast cells](#) from growing.

Despite its popularity, tamoxifen has some serious side effects. It can increase the risk of uterine cancer, stroke, pulmonary embolism and can cause vision problems. More common side effects include irregular menstruation, hot flushes and weight loss.

There is also the developing problem of chemoresistance: cancer cells can get used to a treatment like tamoxifen and become resistant to it, which means it will become less effective and ultimately stop working

altogether.

Researchers have been working on ways to address these two problems: side effects and chemoresistance. Previous research has shown that the sleep hormone melatonin can help cancer cells die, so the researchers behind the new study wanted to see if they could use it to help tamoxifen kill cells more effectively.

"We tried to solve both issues by putting melatonin into nanostructures so they can help the chemotherapeutic agent kill more cells," said corresponding author Dr. Nasser Samadi, from Tabriz University of Medical Sciences. "By doing this, you can decrease the dose of tamoxifen needed, reducing the severity of the [side effects](#)."

Melatonin is a naturally occurring hormone produced in the body. We need it for many things, like sleep and the growth and development of different tissues. It also helps cancer cells die, but because melatonin is not very stable, it breaks down quickly in the body so it needs to be re-injected or taken again every few hours.

Dr. Samadi and the team tested the effectiveness of melatonin as an adjuvant to [tamoxifen](#). To overcome its short survival time, they developed [tiny bubbles](#) called nanostructured lipid carriers (NLCs) that can release melatonin slowly over a period of time. Essentially, this means the treatment can kill the cancer cells continuously, without needing to take new doses of melatonin.

Testing the structures on cells in the lab, the researchers found that melatonin-loaded NLCs inhibited the growth of [breast cancer cells](#) more effectively than melatonin alone. They also tested the empty NLCs and found that they did not kill the breast cancer cells without the melatonin, but they were not toxic to surrounding tissue - a promising finding, said Dr. Samadi:

"Lots of nanostructures these days are toxic to the body or to other cells, but we found no significant toxicity in the empty NLCs. The characteristics are very suitable for applying to these kinds of treatments.

This research is still at an early stage; the team plans to test their NLCs on other cancer cells and treatments before moving to animal models and, eventually, clinical trials.

More information: Mehdi Sabzichi et al. Sustained release of melatonin: A novel approach in elevating efficacy of tamoxifen in breast cancer treatment, *Colloids and Surfaces B: Biointerfaces* (2016). [DOI: 10.1016/j.colsurfb.2016.04.042](https://doi.org/10.1016/j.colsurfb.2016.04.042)

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