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Melatonin shows potential to slow tumor growth in certain breast cancers

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An early stage study shows melatonin – a hormone that regulates the body's sleep and awake cycles – may have the potential to help slow the growth of certain breast cancer tumors, according to researchers from Henry Ford Hospital in Detroit and Foundation for Research Support of the State of São Paulo.

The study, published online in the journal *PLoS One*, finds that melatonin may inhibit tumor growth and cell production, as well as block the formation of new blood vessels in ER-negative breast cancer models.

"These early stage research results with the melatonin drug in a triple-negative breast cancer animal models achieved in our lab has not been seen anywhere else," says study co-author Adarsh Shankar, a research assistant in the Department of Radiology at Henry Ford Hospital.

"The key finding of the study is that we now know that we can trace this drug and its effect on tumor growth, which opens the door for more research on this topic."

Melatonin is a hormone naturally produced by the brain's pineal gland in response to darkness, and it is also available as a man-made supplement.

Because of melatonin's suspected antioxidant properties, some believe it may suppress the growth of some types of cancer cells, especially when combined with certain anti-cancer drugs, according to the American Cancer Society.

A promising tactic in limiting cancer progression is controlling angiogenesis, the formation of new blood vessels. Once a tumor exceeds a few millimeters in diameter, hypoxia (lack of oxygen) triggers a cascade of events to allow angiogenesis and tumor progression.

To determine the therapeutic effectiveness of melatonin on tumor growth, the Henry Ford Hospital and Foundation for Research Support of the State of São Paulo researchers evaluated the action of melatonin on angiogenesis in ER-negative breast cancer in vitro and in vivo using cell and mouse models respectively.

The mice were randomly assigned to either the melatonin or control groups. The melatonin group received treatment each night for 21 days; melatonin was administered at pharmacologic concentration one hour before room lighting was switched off. Melatonin administered prior to the nocturnal is believed to be more effective because tissues are most sensitive to the hormone at this time.

At the end of the 21-day treatment, researchers used single photon emission computed tomography (SPECT) to determine whether melatonin therapy effectively decreased the size of implanted human triple negative breast cancer in the mouse models and if there was be any changes in the formation of new blood vessels.

Additionally, tumor volume was measured each week and tumor tissue was analyzed at the end of treatment.

The study found that none of the treated mice showed any loss of weight and lethargy during the 21-day treatment; instead, most showed excessive movement but no irritability or aggressive behavior.

Those treated showed significantly smaller tumors after 21 days while the mean tumor volume increased significantly in the control group.

And, there was less vascular growth in the tumors of the treated group.

Results were also replicated in cell models.

The study showed that melatonin administered at pharmacologic concentration was able to reduce ER-negative breast cancer cell viability in vitro.

These results suggest that melatonin has the potential as a therapeutic agent for breast cancer.

The study's authors caution, however, that this research is still in its very early stages and results are not yet ready to be translated for patient use.

More basic research is needed on this topic – particularly on how melatonin acts on angiogenesis in various cancers – before clinical trials with humans can be planned.

Provided by Henry Ford Health System