

## Osteoporosis drug may treat breast and liver cancers

By Tiffany Woods

A drug used to prevent and treat osteoporosis in postmenopausal women may also be an effective treatment for some breast and liver cancers, according to a [study](http://www.ncbi.nlm.nih.gov/pubmed/24481452) (<http://www.ncbi.nlm.nih.gov/pubmed/24481452>) from Oregon State University (OSU), funded in part by NIEHS, and published Jan. 30 in the journal *Cell Death and Disease*.

Although clinical trials on patients are still needed, researchers found that the drug raloxifene killed human triple-negative breast cancer cells, as well as liver cancer cells. The cells are named triple-negative because they lack receptors for estrogen, progesterone, and a protein known as human epidermal growth factor receptor 2.

### Targeting treatment-resistant breast cancers

Triple-negative breast cancers represent about 15-20 percent of all breast cancers in the U.S., and are more common in younger and African-American women, and women who have BRCA1 mutations, according to a [factsheet](http://www5.komen.org/uploadedFiles/Content_Binaries/KOMEED079100.pdf) ([http://www5.komen.org/uploadedFiles/Content\\_Binaries/KOMEED079100.pdf](http://www5.komen.org/uploadedFiles/Content_Binaries/KOMEED079100.pdf)) from the Susan G. Komen organization. Chemotherapy, radiation, and surgery are the preferred treatments, because triple-negative breast cancers don't respond to typical medications, such as tamoxifen or trastuzumab.

Receptors, which are proteins in or on cells, are like a lock. Hormones act like keys in these receptors to unlock different cellular functions. For example, the hormone estrogen causes uncontrolled proliferation of breast cancer cells by binding to a receptor. Raloxifene blocks estrogen from binding to its receptor and thus keeps breast cancer cells from multiplying.

OSU researchers discovered that raloxifene also binds with a protein called the aryl hydrocarbon receptor (AhR) and kills cancer cells that do not have receptors for estrogen, said Ed O'Donnell, Ph.D., a postdoctoral scholar at OSU who conducted the research.

O'Donnell also analyzed survival data on women who had breast cancers that didn't require hormones to fuel the proliferation of the tumor cells. He found an increased survival rate in the women whose breast cancers had higher levels of the AhR protein.

### Repurposing a drug with a nearly 20-year track record

"Our findings are exciting for two reasons," said OSU cancer researcher [Siva Kolluri, Ph.D.](http://emt.oregonstate.edu/sivakumarkolluri), (<http://emt.oregonstate.edu/sivakumarkolluri>)

who led the research team. "No. 1, our research revealed that we can target a specific protein, the AhR, to potentially develop new drugs for liver cancer and a subset of stubborn breast cancers. That's a major goal of our lab. No. 2, we discovered that raloxifene, a known drug, could potentially be repurposed to treat two distinct types of cancers."

The U.S. Food and Drug Administration approved raloxifene for use in bone loss prevention in postmenopausal women in 1997. In 1999, it was approved for treating postmenopausal women with osteoporosis. In 2007, the agency approved the use of raloxifene for reducing the risk of invasive breast cancer in postmenopausal women with osteoporosis, and in postmenopausal women at high risk for invasive breast cancer, which spreads outside the lobules, or milk ducts, into surrounding breast tissue.

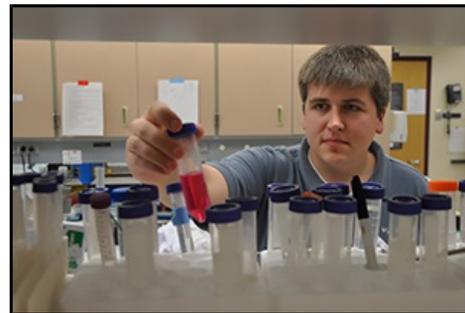
*Citation:* O'Donnell EF, Koch DC, Bisson WH, Jang HS, Kolluri SK. (<http://www.ncbi.nlm.nih.gov/pubmed/24481452>)

2014. The aryl hydrocarbon receptor mediates raloxifene-induced apoptosis in estrogen receptor-negative hepatoma and breast cancer cells. *Cell Death Dis.* 5:e1038.

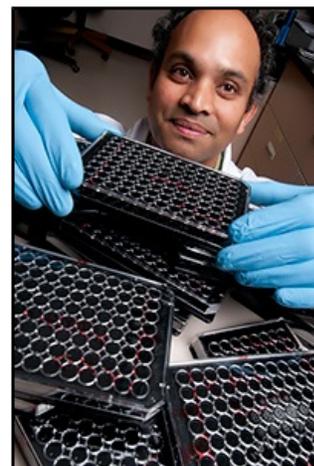
(This story was adapted from an [article](http://extension.oregonstate.edu/news/release/2014/02/osu-study-osteoporosis-drug-may-treat-breast-and-liver-cancers?utm_source=vocus&utm_medium=news&utm_content=news&utm_campaign=news_release))

([http://extension.oregonstate.edu/news/release/2014/02/osu-study-osteoporosis-drug-may-treat-breast-and-liver-cancers?utm\\_source=vocus&utm\\_medium=news&utm\\_content=news&utm\\_campaign=news\\_release](http://extension.oregonstate.edu/news/release/2014/02/osu-study-osteoporosis-drug-may-treat-breast-and-liver-cancers?utm_source=vocus&utm_medium=news&utm_content=news&utm_campaign=news_release))

by Tiffany Woods, news leader for the OSU Extension and Experiment Station Communications department.)



O'Donnell, a postdoctoral scholar at OSU, conducted research that led to the discovery that raloxifene may be an effective treatment for some breast and liver cancers. (Photo courtesy of Tiffany Woods)



Kolluri is an associate professor of cancer research at OSU. (Photo courtesy of Lynn Ketchum)

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