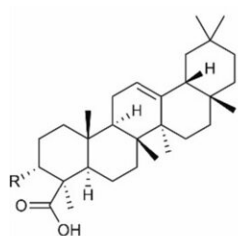
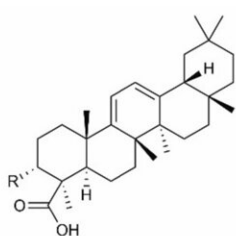


Researchers find Boswellia, an extract of frankincense, shows anti-cancer activity in small trial

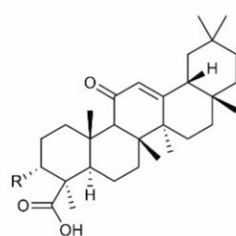
January 11 2024, by Leslie Cantu



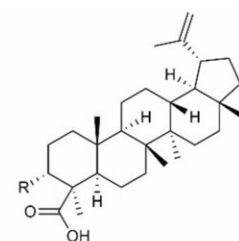
α -Boswellic acid



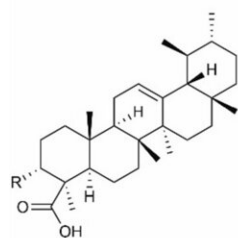
9,11-dehydro- α -Boswellic acid



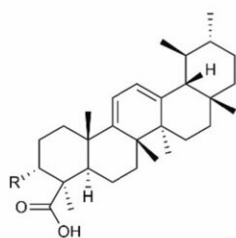
11-keto- α -Boswellic acid



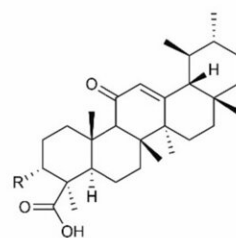
Lupeolic acid



β -Boswellic acid



9,11-dehydro- β -Boswellic acid



11-keto- β -Boswellic acid

R=OH
R=CH₃COO

Major types of boswellic acids in *B. serrate*. Credit: *Breast Cancer Research and Treatment* (2024). DOI: 10.1007/s10549-023-07215-4

Extracts of a plant used in traditional medicine for centuries have shown anti-proliferative effects against breast cancer in a small early-stage clinical trial.

Researchers at MUSC Hollings Cancer Center provided [breast cancer](#)

[patients](#) with an extract of the Boswellia tree—probably best known as the source of frankincense—and instructed them to take it each day until surgery. The researchers then compared the activity of cancer cells in each woman's tumor removed during surgery with the activity in the piece of her tumor that was removed during the biopsy.

"We looked at differences in the growth rate of the tumors before and after treatment, and we found that the tumors after treatment had a lower growth rate compared to before treatment," said Nancy Klauber-DeMore, M.D., a surgical oncologist and co-leader of Developmental Cancer Therapeutics at Hollings Cancer Center.

The team also looked at biopsy and tumor samples of women who didn't take the Boswellia extract.

"We saw a statistically significant reduction in tumor proliferation compared to the non-treated group, so the implications are that Boswellia, this extract of frankincense, does have anti-cancer activity in humans," Klauber-DeMore said.

The results of the study are published this month in [*Breast Cancer Research and Treatment*](#).

Klauber-DeMore emphasized that this was a preliminary study only to see whether there was an effect. Although the results are promising, there is much work to be done before Boswellia might be considered part of a treatment regimen.

"This study was not designed to look at survival or recurrence—it was designed to see if this supplement has anti-cancer activity in humans. Since this was a positive trial, larger studies to look at endpoints of survival and recurrence are warranted," she explained. "This does not imply that patients should take Boswellia in place of standard breast

cancer treatment."

Despite their professional caution, the results are exciting for the researchers, especially first author Ingrid Bonilla Valente, M.D.

Now a pediatrics resident at Baylor College of Medicine, Bonilla Valente was in her last semester as an undergraduate at Charleston Southern University (CSU) when she and Klauber-DeMore met. Bonilla Valente had already started researching the effects of Boswellia on breast cancer with a professor at CSU and was eager to continue her work after graduation.

Her interest was personal.

"At the time, my mom was battling breast cancer," she explained. Bonilla Valente began turning over every possible stone, looking for options for her mother. "There was a big popular use in the community of essential oils for different things medically, but they lacked a lot of medical or scientific data. So that's where it all started."

Hollings researcher Mark Hamann, Ph.D., who later joined the research team, said there are many anti-cancer and other drugs that started off as traditional medicines from plants.

He pointed to Taxol, a chemotherapy drug developed from the Pacific yew tree, and vinblastine and vincristine, chemotherapy drugs developed from the Madagascar periwinkle. He's spent his career discovering [natural products](#) from plants and marine invertebrates and their associated microbiomes that can combat disease and then synthesize them.

Boswellia has also been used in [traditional medicine](#) for thousands, if not tens of thousands, of years, he said. Several thousand years ago, it was as

valuable as gold and was used to treat cancer as well as other diseases, he noted.

Developing a clinical trial

With Bonilla Valente's college graduation then-nearing, a mutual acquaintance connected her to Klauber-DeMore. Klauber-DeMore wasn't looking to hire any new staff in her lab at Hollings, but after meeting with Bonilla Valente and seeing her passion for trying to develop new drugs for breast cancer, she decided to add her to the team.

"With that came opportunities for me to do a lot of other projects in research—breast cancer, osteosarcoma—and to bring my research from college over to her lab," Bonilla Valente said.

The Boswellia extract was supplied from an Indian company, focusing on *Boswellia serrata*, one of a handful of *Boswellia* species that produce frankincense resin.

The study was a "window of opportunity" trial, meaning that the researchers took advantage of the open days before each patient's surgery was scheduled, during which the patients took the supplements. Because the primary treatment for the 20 patients in the study was surgery, they would not otherwise have been receiving any type of treatment during that time.

"Window of opportunity trials are done with drugs to see if they have any anti-tumor activity in humans," Klauber-DeMore explained. "It can speed up the drug development process because late-stage clinical trials can cost millions of dollars, so it is important to know that something has activity in humans before conducting larger clinical trials."

The patients in the trial had minimal side effects from the *Boswellia*, she

said.

"This is part of the drug development process, and this shows us that there's activity, which means that we need to do future studies to see if *Boswellia* prolongs survival," Klauber-DeMore said.

As the team was preparing for and conducting the trial, Bonilla Valente started—and finished—medical school at the MUSC College of Medicine. Along the way, she realized that her calling was in pediatrics, not oncology.

She also lost her mother to [breast cancer](#).

Although this research cannot help her mother, it could help future patients.

Hamann said they're already working on further developing this research, and the next step is to purify some molecules that they've isolated in the *Boswellia* and reformulate them into a standardized oral medication for testing. This step of the process has proved more challenging than usual, he said.

"What's strange about *Boswellia* is that it's probably been used in medicine longer than any other plant-based product, but we still don't have any purified active drug products from the plant," he said. "It is disappointing—but based on the difficulty we had in identifying the active pharmaceutical ingredient, perhaps not surprising."

Using a standard approach, Hamann and the team added some of the *Boswellia* extracts to a sample of cancer cells to see whether the *Boswellia* showed anti-cancer activity directly on the cancer cells.

When that approach failed to reveal the [active pharmaceutical ingredient](#)

, Hamann's lab used an informatics approach to compare all known molecules of *Boswellia* against all known breast [cancer](#) targets, including those involving the host immune system. They now have two molecules of interest for future studies in animals and humans.

Bonilla Valente and Klauber-DeMore are curious to see where the research goes.

"It's been quite a journey. You know, this has been years—this started in 2016," Bonilla Valente said.

"It's very exciting to pursue as a potential drug," Klauber-DeMore added.

More information: Ingrid V. Bonilla Valente et al, The anti-proliferative effects of a frankincense extract in a window of opportunity phase ia clinical trial for patients with breast cancer, *Breast Cancer Research and Treatment* (2024). [DOI: 10.1007/s10549-023-07215-4](#)

Provided by Medical University of South Carolina

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