

## TEA TREE OIL AND ENDOCRINE DISRUPTORS

Bloch and researchers at the National of Environmental Health Sciences published the findings of their [2007 study](#) in the New England Journal of Medicine. The National Institutes of Health then published an [alert](#) that lavender and tea tree oils may cause breast growth in boys.

Since then, the fragrance and aromatherapy industries have hit back, with a 2013 [blog post](#) and a [2013 study](#) finding that lavender oil is not an endocrine disruptor as alleged. That year, three other industry-linked scientists published a [letter to the editor](#) in the journal Reproductive Toxicology refuting 2007 finding that essential oils "affect puberty."

If you use essential oils, especially the two common ones named in the controversy, you might wonder if it is safe to use lavender and tea tree essential oils. To reach a conclusion, one must examine the evidence presented in 2007. Three boys, ages 4, 7 and 10, came to Bloch with breast growth. The younger two were prepubescent, but the oldest of the three was in the earliest stage of puberty and his growing breasts were as large as those of a girl entering puberty.

All three children used lavender products regularly: a "healing balm" for the 4-year-old, lavender and tea tree [shampoo](#) and styling gel for the 10-year-old and lavender lotion and soap for the 7-year-old. The 7-year-old's fraternal twin brother also used the lavender lotion, but not the soap.

The physician recommended the boys stop using the products, and the breast growth resolved in a matter of months. Bloch worked with a research team to test the common ingredient in the suspected products: lavender essential oil. They also tested tea tree oil.

To perform the test, they exposed cells responsive to estrogen to each of the essential oils diluted in a solvent, as well as the solvent alone and estrogen itself. They compared the cells' response to the essential oils to their response to estrogen (as a positive control) and the solvent alone (as a negative control). They performed the test at different concentrations, ranging from 0.005 percent to 0.025 percent by volume for each essential oil. Above these concentrations, the essential oils were toxic to the cells.

The essential oils had a statistically significant effect on the cells, although not as great an effect as estrogen itself. Their study confirms that "lavender oil and tea tree oil possess weak estrogenic and anti-androgenic activities that may contribute to an imbalance in estrogen and androgen pathway signaling."

Additionally, the scientists referred to previous studies finding estrogenic activity in essential oils, such as a [2002 study](#) that found estrogenic activity in some common essential oil constituents (chemicals frequently found in essential oils).

It took six years, but those who make their living from essential oils hit back. In a [post](#) on the National Association for Holistic Aromatherapy website, Robert Tisserand, a shareholder of First Natural Brands, provided a rebuttal. His claims in part rest on low levels of exposure the boys in the initial study must have had. He notes that products like soap and shampoo are washed off before the essential oils could have been absorbed through the skin and questions how much essential oils were in the products or if they were in them at all. Yet this does not explain the estrogenic activity of the essential oils when they were tested in the lab.

The study published that year by the Research Institute for Fragrance Materials tested the essential oils themselves. Researchers exposed baby female rats to lavender essential oils at high doses—6,000 and 30,000 times the estimated maximum levels a human would be exposed to through bath and beauty products. As positive and negative controls, researchers used estrogen and corn oil.

At the end of the study, the researchers found that the group of rats given estrogen gained more weight than the control group and those given lavender essential oil. When given the lavender essential oil, in fact, weight gain decreased in the rats. Additionally, they measured the weight of the rats' uteruses and found that those given estrogen were heavier than the others.

The study concludes that lavender essential oil at these high doses has no estrogenic activity. However, they add that the decrease in weight gain when the rat pups were given the essential oil is likely indicates "systemic toxicity."

Recall that in the 2007 study, high concentrations of lavender essential oil were toxic to the cells tested. What would a study find if it used lower doses of lavender essential oils—doses more similar to what a human using lavender bath products is actually exposed to?

Furthermore, the two studies used lavender essential oils from different manufacturers. This leads to the next avenue of doubt in the validity of the finding that lavender and tea tree essential oils are endocrine disruptors. Were the essential oils contaminated in any way?

Studies of other essential oils have found contamination with [pesticides](#) and endocrine-disrupting [phthalates](#). [Phthalates](#) are a group of chemicals used to make plastics pliable and they can have some estrogenic activity.

A [study](#) of essential oils from a wildcrafted plant in Iran mentions phthalate contamination in the plants themselves due to pollution in the water and soil. However, another [study](#) of citrus essential oils from Italy found that the phthalate contamination came from plastic used in processing.

Tisserand, along with an Australian researcher and the CEO of the Australian Tea Tree Industry Association, brought up the possibility of contamination in their co-authored 2013 [letter to the editor](#). They criticize the initial 2007 study for using non-organic essential oils, which may have been contaminated and for not analyzing their chemical compositions. They also point out that studies of estrogenic activity of essential oils could find false positive results because they use plastic containers in the lab. The plastic containers could leach estrogenic nonylphenols and phthalates into the essential oils.

In sum, there is no definitive answer as to whether or not lavender and tea tree oils are endocrine disruptors. Given that the initial study was published nine years ago, it appears researchers are in no hurry to find definitive answers and the only rebuttals that have come forward are from those with a clear and obvious conflict of interest.

Wading into the scientific literature on essential oils leaves one with two clear takeaways. First, given the potential for contamination, buying organic essential oils is never a bad idea. Second, there are far more studies showing the beneficial health effects of essential oils than the potential negative ones.