

## Podcast script: Botanical safety

[Intro music]

**Ashley Ahearn (Narrator):** You're listening to Environmental Health Chat – a show from the National Institute of Environmental Health Sciences that explores the connections between our health and our world.

I'm Ashley Ahearn.

We use plant-derived products for cooking, cleaning, and personal hygiene among other things – and there are more and more of these quote “natural” botanical products on the market than ever before. Essential oils are being marketed as a way to ease stress, boost mood, relieve pain, nausea, and insomnia – even repel insects.

One out of every five Americans – 18% of us – uses some kind of botanical supplement – think: echinacea or ginkgo biloba. The NIH estimates that there are roughly 27,000 such supplements on the market.

But what do we actually know about what's in those botanical, or plant-derived, products, or how safe they are for us?

**Cynthia Rider:** People just have this feeling that if it's natural, it's definitely safe.

**AA:** And that's not necessarily the case, says Cynthia Rider. She's a toxicologist at the National Toxicology Program at NIEHS who studies botanicals. They're everywhere...

**CR:** So botanical ingredients can go into dietary supplements, if you think about things like echinacea, or ginkgo biloba extract, or green tea extract, even. Or they can go into cosmetics, if they are intended for cosmetic use, or they can be in personal care products or consumer products. Or they can be drugs, so really, they can go into a whole lot of different things.

**AA:** But those botanical ingredients aren't regulated the same way as say, pharmaceuticals are, even though many people are turning to them for medicinal purposes.

**CR:** Something like a botanical ingredient used in a prescription medicine in the U.S. that has a lot of hurdles to get through in order to be approved for use. So there's a lot of safety information that goes along with that. But on the other hand, you have things like dietary ingredients, dietary supplements, that have much looser regulatory structures around them. So, they're typically assumed to be safe.

**AA:** Does that make you worried as someone who thinks about public health?

**CR:** Yes, it really does. It is a concern. The problem is, we've changed the way we use these things, like we've really concentrated them, or the use of a dietary supplement of very big daily dose differs a lot from the occasional food use.

**AA:** Essential oils are a great example of a concentrated botanical product. They're basically the distilled down, essence of a plant – like pine or lavender.

And in some cases, more of a good thing... isn't necessarily a good thing.

Some work at the NIEHS on lavender oil found that it can potentially disrupt the endocrine system and change sexual development. Researchers documented breast development in girls and boys as young as three years old.

**CR:** And they found several different patients who had been using lavender oil, either in products like soaps, or colognes, or sprays. One girl was sitting by her teacher's desk, and the teacher had a diffuser of lavender oil. And so she was breathing it in that way for a year before she presented with the premature development of breast tissue.

**AA:** The good news, Rider said, is that once the exposure was removed, the breast tissue went back to normal. For her, it raises the question though: With any supplements or personal products – how badly do I need this?

**CR:** And if there are signs of potential toxicity, and it's not something that's necessary for health, you know, smelling great is wonderful, but if you don't need to use a cologne every day, I would tend to err on the side of trying to limit my chemical exposure, especially for developing kids and in utero exposures or while you're pregnant.

**AA:** Rider's job is to try to sift through the uncertainty associated with many "natural" products and provide safety data that can be used to assess risk and protect consumers. She's a leader in botanical safety research at the NIEHS and a steering committee member of the Botanical Safety Consortium, a collaborative forum for botanical safety research.

The list of natural or plant-derived botanical supplements on the market is long and ever growing, but Rider and her team take a systematic approach to studying their potential health effects.

**CR:** The first thing we do before we even decide to study one of these natural products, is we look at the marketplace and see what's really popular, and what doesn't have a lot of safety data attached to it.

**AA:** Ginkgo biloba was all the rage a few years ago. People were buying it to enhance brain function and help with memory loss, dementia, and Alzheimer's disease. The National Toxicology Program decided to take a closer look.

**CR:** We always start with what are the knowledge gaps? What do we not know about it? And for ginkgo, we didn't know a lot. So we started from scratch.

**AA:** Rider and her team set up short term studies to establish dosages where they might see some effects in lab mice and rats. Then they expanded to longer term chronic toxicity studies where they studied the lab animals over the course of their lives – a two year exposure. Now, of course the dosages in the lab animals didn't exactly mirror the dosage levels in humans but...

**CR:** In the mice, we saw an increase in liver tumors with increasing dose of ginkgo and an increase in thyroid tumors with increasing dose of ginkgo in the rats. So we see signs of carcinogenicity after this two year testing period.

**AA:** They didn't study brain function in the lab animals, so we don't know if the rodents even reaped the supposed benefits of Ginkgo biloba. But, in clinical trials on humans who used ginkgo, the results were not impressive.

**CR:** They did not find any improvement in memory or functionality in that test. So I would say that ginkgo is one where, in the big studies, the really well conducted studies, we haven't seen clear signs of its efficacy. And because we see these signals of toxicity in the animal studies, when you do your cost-benefit about whether or not to take this product in particular, it might make sense to avoid it, because you don't have the efficacy.

**AA:** And they also found that with some natural supplements, whether they work or not, you might not even be getting the product you're paying for. Rider and her colleagues bought 20 different Ginkgo biloba products and looked at the chemistry to see what was actually in there.

**CR:** And what we saw was super interesting. A lot of them looked like ginkgo. And then some of the products – maybe a little less than half – looked nothing like ginkgo. They either had some adulteration, like another botanical was added in or they looked like maybe someone got some dirt off the floor and was passing it off as ginkgo. So, it was really interesting to see that there are some sketchy suppliers out there.

**AA:** So, where does that leave consumers?

In general, Rider says it's best to keep things simple. Avoid products, fragrances or supplements you don't need. But if you do choose to take botanical supplements look for a seal from the NSF or the U.S. Pharmacopoeia. That tells you that at the very least, that product has gone through some kind of testing to ensure that what's in the bottle is actually what it says on the label.

And, Rider says always tell your doctor about all the supplements you may be taking.

**[Exit music]**

I'm Ashley Ahearn. Thanks for listening to Environmental Health Chat.