

Lost your smell to Covid-19?

Here's how to retrain your brain

Millions of people infected with SARS-CoV-2 lose their sense of smell for months at a time. Hoping to speed up recovery, many are resorting to 'smell training.'

One bite into a warm grilled cheese sandwich and Chris Rogers knew something was wrong. He had tested positive for Covid-19 in March 2021 and, two days later, was unable to smell the comforting aroma of melted butter and cheese, or taste the toasted bread. "It was like eating a piece of cardboard," he says.

Many others who've had similar experiences regained their sense of smell and taste within days to a few weeks of the symptoms kicking in. But three months went by and Rogers' situation barely improved. "You have no idea until you've gone weeks upon weeks trying to eat things that you can't taste or smell," says the 50-year-old, who lives in Santa Rosa, California. "It's a very frustrating experience."

Tired of waiting for his olfactory system to recover naturally, Rogers sought out smell training therapy recommended to him by his ear, nose, and throat doctor. Twice a day for 10 weeks, Rogers sniffed four kinds of essential oils—rose, lemon, eucalyptus, and clove—to potentially activate or strengthen the survival of newly formed odor-detecting cells or speed up their production and rebuild the connection between his nose and brain. It's akin to physiotherapy, but for the nose, and has been used in the past decade to help restore the sense of smell lost to other viral infections like the common cold or influenza, brain injuries, and aging.

Therapy

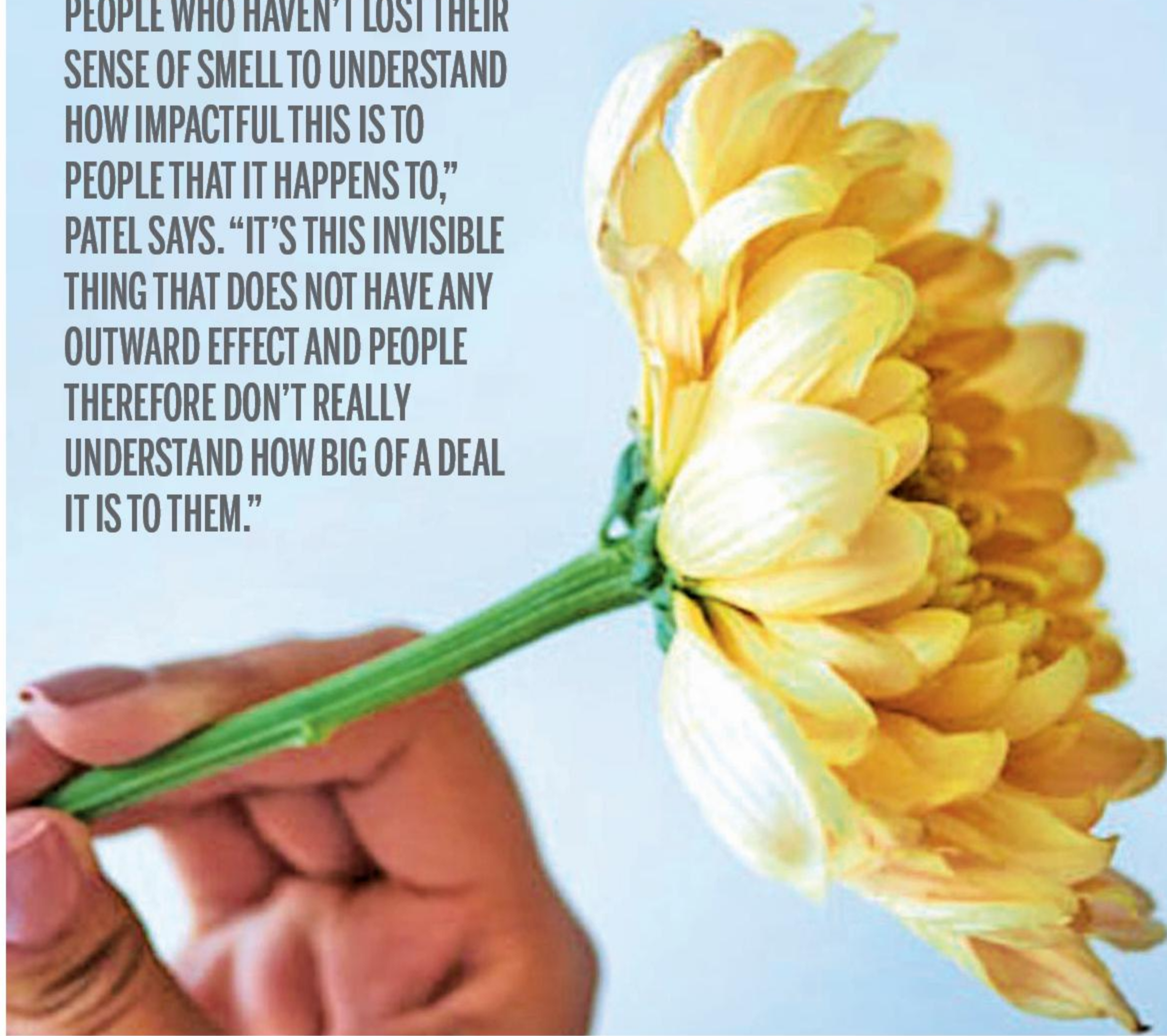
While scientists have recorded improvements in some individuals' ability to smell, typically after three to six months of such training, it's been difficult to show how much of that improvement comes from the therapy itself versus natural recovery occurring over time, says Eric Holbrook, a rhinologist studying and treating patients with smell disorders at Massachusetts Eye and Ear Hospital. Still, he continues to recommend the therapy to many patients, including those who've lost their sense of smell due to Covid-19, because he says such scent sniffing could enhance or speed up the healing process.

Also, it's one of very few and often the only therapeutic options that's available to millions of people who haven't been able to regain their sense of smell for months after a Covid-19 infection.

Although the benefits of smell training can vary considerably among patients, depending on their starting point, "it is generally not considered harmful," says Bradley Goldstein, an ear, nose, and throat specialist studying smell disorders at Duke University. "We've recommended it with somewhat tempered expectations, but we still need to find specific, more effective drug therapies. It's really an unmet need."

Nearly two decades ago, scientists started documenting the prevalence of smell impairment among large populations. Scouring the scientific literature, Thomas Hummel, an ear, nose, and throat expert at the University

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of Dresden Medical School's Smell & Taste Clinic in Germany, realised that such smell loss—either temporary or permanent—was more common than previously assumed, affecting nearly five percent of the general population. Among patients visiting his own clinic, he had seen firsthand the toll it took on their emotional wellbeing and quality of life. Some showed signs of depression; others lost weight due to loss of appetite and subsequent malnutrition.

Hummel was determined to help his patients regain their sense of smell. He knew that the olfactory system has a unique ability to continuously regenerate throughout the human lifetime in response to an injury, like head trauma, or after experiencing smell loss following an upper respiratory viral infection. And experiments had shown that people who weren't able to smell certain odors could learn to perceive them after repeated exposures to that scent. He thought using such an approach may assist his patients.

To test his hypothesis, Hummel recruited 40 such patients who were each asked to inhale four odours—rose, lemon, eucalyptus and clove—from labeled glass jars for 10 seconds twice a day, for 12 weeks. Hummel chose those scents because they represented four out of six primary odor groups—floral, fruity, foul, spicy, smoky, and resinous—identified by German psychologist Hans Henning in 1916.

To assess whether this smell therapy was effective, Hummel and his colleagues asked the study participants to identify and discriminate between an array of additional odours before and after the smell training. They found that approximately 30 percent of the

participants reported some improvement at the end of the study compared to six percent who received no smell training.

Since then, multiple studies have explored the therapeutic benefits of this technique, often observing improvements that, on average, are small. In some cases the improvement can be 25 percent and in others it's more like 70 percent, Hummel says. It often depends on age as well as how long people incurred smell loss or the extent of it before they sought smell training.

Smell loss

"So people, let's say with post-infection smell loss for a short period of time will have a higher likelihood of recovery than those who had smell loss for the same reason but didn't smell anything for two years and then came to our clinic," he says.

Adding a few more odors to the scent sniffing routine can also enhance benefits. In a 2015 study, Hummel showed that continuing the smell training therapy for an additional 12 weeks and replacing the original four odors with combinations like menthol, thyme, tangerine, and jasmine or green tea, bergamot, rosemary, and gardenia was more effective than using the original set of odors throughout.

While scientists are still fine-tuning the ideal duration of smell training therapy and what scent concentrations are most effective, Patel points out that the way to quantify those benefits is still very rudimentary. Currently, to measure how well the therapy worked,

physicians calculate a score before and after the smell training by presenting patients with 40 odours via sniffing pens or scratch and sniff tests. Patient must then pick the correct odour from among four choices. "These are so subjective and it's not a true objective measure," says Zara Patel, a head and neck surgeon and smell-loss expert at Stanford University. Also, depending on where people grew up and their cultural background, not everyone may be familiar with each of the 40 scents, she says.

It remains unclear how this smell training brings about the improvements recorded in several studies. But scientists have hypotheses. Based on insights from rodent studies, Hummel, for instance, thinks that exposing people with a smell deficit to odors could speed up the regeneration of odor-detecting cells, which may help patients recover faster.

Goldstein, on the other hand, suggests that smell training could improve the survival and functioning of the new and naturally forming odor-detecting cells by stimulating a variety of them using the four scents, thus giving them a chance to connect to the brain and eventually restore smell loss.

As the pandemic unfolded, the demand for smell training therapy escalated, as potentially millions of those who had Covid-19 experienced smell impairment.

"Smell loss and smell distortion became much more widely talked about and known as a problem," Patel says. "It's one of the silver linings of the pandemic, honestly, because before then, most patients [and] most

physicians had never heard of it."

Unlike some other viruses that can cause smell loss by directly infecting cells involved in detecting odours, SARS-CoV-2, the virus that causes Covid-19, spares them. Instead, the coronavirus infects surrounding support cells, which have the ACE2 receptor that SARS-CoV-2 needs to infect human host cells. To defend the body against the virus, immune cells rush to this site of infection and generate antiviral proteins that, according to a 2022 Cell study, may decrease the activity of genes needed to build the odor-receptors on these smell-detecting neurons, which then leads to smell loss.

Smell training

Still, approximately 80 percent of Covid-19 patients who had lost their sense of smell regained it without any treatment within one to four weeks, and 95 percent recovered within six months. For many patients who experienced smell loss extending beyond a few months, hoping for a full recovery didn't feel like an option and they sought smell training.

They did this knowing the therapy took time to yield benefits and didn't work for everyone.

"It's really difficult for people who haven't lost their sense of smell to understand how impactful this is to people that it happens to," Patel says. "It's this invisible thing that does not have any outward effect and people therefore don't really understand how big of a deal it is to them."

Some studies are beginning to suggest that smell training may benefit Covid-19 patients who've had

smell loss for more than six weeks. Rogers, who did the therapy for 10 weeks, started noticing improvements at week six. "The taste and smells progressively began to get stronger," he says, "eventually it was getting to a point where I would taste a piece of pizza the entire time I was eating it."

Now, at least five months since the smell training ended, "I'm probably 75 percent of where I used to be," he says.

Rogers is also dealing with smell distortions where the pickled ginger accompanying sushi smells repugnant to him, coffee smells like pepper, and his favorite Russian River IPA tastes metallic.

Scientists have found that such "cross-connections" can be associated with recovery after smell loss and a study suggests that smell training can help overcome those.

Aside from this therapy, few treatment options are available for patients. Physicians like Patel have recommended steroid irrigation in addition to smell training. This involves rinsing the nose with an anti-inflammatory medication that reduces the swelling and improves the impact of the smell training therapy. She and other smell scientists are also looking into omega-3 supplements, vitamin A, and platelet-rich plasma as other options to help restore loss of smell from Covid-19.

For now, smell training, despite its no-guarantees, is still considered the best available, inexpensive, and generally safe option. "Basically, it puts patients in the driving seat," Hummel says. "That's why people use it a lot."

-National Geographic