# Meditation Is Big Business, but What Does the Science Say?

How much does the brain affect the body? Can meditation lessen chronic pain, anxiety, side effects from cancer treatment and more?

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In 2019, Debra Halsch was diagnosed with smoldering multiple myeloma, a rare blood and bone marrow disorder that can develop into a type of blood cancer. Her doctors recommended chemotherapy, she said, but she feared the taxing side effects the drugs might wreak on her body. Instead, the life coach from Piermont, New York tried meditation.

A friend had told Halsch, now 57, about Joe Dispenza, who holds week-long meditation retreats that regularly attract thousands of people and carry a $2,299 price tag. Halsch signed up for one in Cancun, Mexico and soon became a devotee. She now meditates for at least two hours a day and says her health has improved as a result.

Dispenza, a chiropractor who has written various self-help books, has said he believes the mind can heal the body. After all, he says he healed himself back in 1986, when a truck hit him while he was bicycling, breaking six vertebrae. Instead of surgery, Dispenza says he spent hours each day recreating his spine in his mind, visualizing it healthy and healed. After 11 weeks, the story goes, he was back on his feet.

Halsch said she believes she can do the same for her illness. “If our thoughts and emotions can make our bodies sick, they can make us well, too,” she said.

In an email to Undark, Rhadell Hovda, chief operating officer for Dispenza’s parent company, Encephalon, Inc., emphasized that Dispenza does not claim meditation can treat or cure cancer. However, he does “follow the evidence when it is presented,” and has encountered people at workshops and retreats “who claimed to have healed from many conditions.”

For more than two decades, various studies have suggested that meditation and mindfulness —

that is, being aware of the present moment — can help reduce and improve pain management, lending some credence to the notion that the brain can affect the body. Such results have helped the field grow into a multibillion-dollar industry, populated by meditation apps, guided workshops, and upscale retreats.

Yet the field has also faced sharp criticism from psychologists and researchers who say the health benefits are overstated and some of the research methodologically flawed. Meanwhile, claims that alternative approaches, including meditation can, by themselves, cure serious illness have been called dangerous by medical experts, who fear a true believer might forego a life-saving treatment. As researchers investigate meditation's effect on nearly everything from chronic pain to ADHD to brain function post-stroke to emotional regulation, the practice continues to be popular among converts and curious alike. And while no scientific findings suggest that meditation can go so far as to cure cancer, some researchers are interested in precisely how the brain affects the body's immune system.

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In fact, data collection for one of the largest research projects on the subject is being funded by none other than Dispenza, who is collaborating with scientists at the University of California San Diego and providing them with access to study attendees of his retreats. A study recently published by the group described an association between meditation and enhanced resiliency against Covid-19.

Overall, there are still a lot of unknowns about how meditation can affect disease processes, wrote Emily Lindsay, a researcher who specializes in the biological effects of mindfulness meditation at the University of Pittsburgh, in an email to Undark. "We know it impacts stress and sometimes stress biology, and we know that it can impact certain disease processes, but there's still a black box in between."

Whether Dispenza's collaboration with mainstream scientists will shed light into that black box is an open question, and many scientists are skeptical.

Over the last 20 years, meditation in the U.S. has gone from fringe hobby to mainstream. Between 2012 and 2017, according to the National Institutes of Health, the percentage of adults in the country who tried some form of the practice tripled, so that just over 14 percent of all Americans had meditated at least once in the last year. The American Heart Association has stated it may help reduce cardiovascular risk — while noting that further study is needed — and an article written by Mayo Clinic staff endorsed it as a "simple, fast way to reduce stress."

With more use has come more study. In the last three decades, the NIH has funded more than 1,700 studies on meditation, at a cost of $570 million. And that number has swelled over time: In 2002, the agency devoted $5 million to study the practice. Last year, it earmarked $45 million.

While there are many different forms of meditation, most studies have looked at a type called mindfulness meditation, which has its roots in Buddhist practice and aims to achieve a state of calm by focusing on the present moment, accepting whatever thoughts and feelings arise without judgment — though definitions and approaches vary between studies.

"Scientists continue to make significant breakthrough discoveries on how meditation works, and whom it can benefit," wrote J. David Creswell, a psychology professor at Carnegie Mellon University, in an email to Undark. "Our research shows that much of the health benefits can be attributed to meditation helping us become better stress managers."

Much of the mindfulness research over the last two decades has focused on mental health and well-being, and studies suggest the practice can help with both. A seminal review assessing the impact of mindfulness meditation was published back in 2014: Researchers at Johns Hopkins University analyzed 47 randomized clinical trials involving more than 3,500 participants and found that there was moderate evidence meditation improved symptoms of anxiety, depression, and pain. Another meta-analysis, also from 2014, found that mindfulness-based interventions can reduce symptom severity in patients experiencing a depressive episode, while a 2015 review found that a meditative practice can help healthy individuals feel less stressed in their day-to-day lives.

Researchers have posited that meditation may help with stress and anxiety by increasing resiliency to challenging emotions through practicing awareness, acceptance, and non-judgment. "When you sort of open and broaden your awareness to everything that's occurring, everything that you're noticing, it sort of levels out the experience a bit and allows you to be less attached to that stress," Lindsay said.

But not every study on meditation finds significant results. Lydia Brown is a clinical psychologist

and researcher at the University of Melbourne, who, herself, is a meditator. She said she's found the practice to be personally transformative, but when she analyzed results from 19 randomized controlled trials on how mindfulness improved heart rate variability — a physiological variable that's indicative of how the body recovers from stress — she found that the evidence was mixed. Even so, if someone looked up meditation and heart rate variability, she said, they would see articles declaring that meditation can improve it. This can be problematic, Brown added, "because you might not be following the best evidence to improve your physical health or improve your mental health."

"I would have loved this research to come up with a positive result," she said, but as a researcher, she had to follow the data.

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Conflicting results isn't a new problem in meditation research. The 2014 meta-analysis, for example, actually had somewhat disappointing results for those who expected significant effects, said Elena Salmoirago-Blotcher, an associate professor of medicine, psychiatry, and epidemiology at Brown University School of Medicine. While the review, which was notable for being published in a highly reputable medical journal, found moderate improvements in anxiety, depression, and pain, there was little evidence for its effects on stress and mental health-related quality of life.

Other researchers have called attention to poor research methods in the field. In a 2017 paper, 15 psychologists and cognitive scientists urged readers to "mind the hype" surrounding meditation research, noting that many studies lacked an active control group to make a valid comparison, and were inconsistent in how they defined "mindfulness."

Another issue in the field, Salmoirago-Blotcher said, is something called researcher allegiance bias: When study authors develop the intervention themselves, their personal investment may skew the outcomes of their study.

Meanwhile, studies that recruit people who are already practiced meditators — such as the ones taking place at Dispenza's workshops — could have skewed results. "People that meditate tend to have healthier behaviors, tend to smoke less, they tend to exercise more, they're usually more educated and also higher socioeconomic status," Salmoirago-Blotcher said. "So there is a lot of

what we call confounding there."

The self-regulation gained from mindfulness may lead to better life choices, like eating better or choosing to exercise, but do people who meditate have fewer heart attacks? No one has studied that yet, Salmoirago-Blotcher said, adding that even the American Heart Association has been cautious in how it describes the benefits of meditation, writing in a 2017 statement: "Overall, studies of meditation suggest a possible benefit on cardiovascular risk, although the overall quality and, in some cases, quantity of study data are modest."

What seems clear, Salmoirago-Blotcher said, is that meditation seems to have some positive effects on depression and anxiety. Whether and how such benefits might manifest physiologically, however, remains murkier. In cancer patients, for example, meditation can help with distress, quality of life, and sleep. But Salmoirago-Blotcher says she's seen nothing to suggest it affects cancer cells. "I don't think there's anything absolutely proven yet," she said.

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While no studies have found that meditation can cure an illness such as cancer — and some researchers, including Salmoirago-Blotcher, emphatically underline this lack of evidence — an increasing amount of research has focused on mindfulness's effect on the central nervous and immune systems.

One 2016 study, for example found that mindfulness practices may be associated with changes in immune system activity, as meditators showed improvements in stress-related markers like inflammation and immune cell aging. And a 2019 study found mindfulness may have led to a reduction in the production of pro-inflammatory molecules and been associated with a quicker restoration of immune function in women undergoing breast cancer treatments.

There is some logic, researchers suggest, underlying the idea that a regular meditation practice might help boost the immune system. Because mindfulness seems to help with how the body manages stress, and because stress can affect immunity, the theory goes that meditation could help boost the body's defenses.

"If you look across the big studies of immune system function in general, the meta-analyses do suggest that meditation is beneficial to the function of the immune system," said Melissa Rosenkranz, a psychiatry professor at the University of Wisconsin School of Medicine and Public Health. "And that almost certainly has something to do with its effects on distress."

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If the body’s stress responses are activated on occasion, that’s okay, said Liudmila Gamaiunova, a postdoctoral researcher at the Institute for Social Sciences of Religions at the University of Lausanne in Switzerland. “But if it happens often, or if we get to this chronic state, of course then it has an effect on the immune system.”

Chronic stress has been linked to conditions such as heart disease and diabetes (the science on any connection to cancer is much less clear), but exactly how those illnesses manifest via stress is far from settled. One theory is that when the body has an acute stress response, the hormones norepinephrine, epinephrine, and corticosterone make sure immune cells are appropriately distributed throughout the body.

They also regulate inflammation, and while that can be useful at times, chronic inflammation has been associated with some diseases, including rheumatoid arthritis and Alzheimer’s. That state of chronic inflammation can keep the immune system from operating efficiently, said David Victorson, a professor of medical social sciences at Northwestern University’s Feinberg School of Medicine. He likened the immune system to a hard drive on a computer and inflammation to having a lot of tabs open on the desktop at once. With all of those programs running in the background, the hard drive cannot operate efficiently, he said. “When the volume is turned down on those other areas, it just frees up more space for the immune system to function properly, like it needs to.”

Some studies from the last decade have suggested that meditation can help regulate certain bodily mechanisms that influence inflammation. And meditation seems to do that, Rosenkranz said, by changing the lens through which you experience the world and your reaction to the events in it.

“A state of psychological distress communicates something to your immune system that your immune system responds to,” she said. “When you change the way that you are filtering the

environment, and what that means to you, as an entity, it really has a profound effect on your body."

Reducing stress also can reduce the secretion of cortisol, a hormone that suppresses inflammation, regulates blood pressure, and regulates the immune system. But chronic elevations of it can lead to the immune system becoming resistant to it, compromising the immune response, research shows.

"These stress physiological systems didn't evolve to be chronically activated. They evolved to respond to punctuated stressors and then turn off," said Robin Nusslock, a psychology professor and director of the Affective & Clinical Neuroscience Lab at Northwestern University. But now, "we have the capacity to activate the same stress physiology of a zebra running away from a tiger by thinking about our 401K."

"The best target for meditation's effect on the immune system would involve attenuating inflammation," said Nusslock. "And inflammation is the common soil which fertilizes many mental and physical health problems."

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Wherever one comes down on Dispenza — and views among experts are mixed — some researchers see his meditation retreats as an opportunity for study. After all, they can attract up to 2,500 people each — a fertile ground for finding volunteers who can participate in intensive studies.

Scientists at the University of California, San Diego are currently conducting about a dozen studies investigating how meditation affects the body, both physiologically and mentally.

In academic medicine, it can sometimes take five years to recruit 150 people for a study, said Hemal Patel, a professor of anesthesiology at UCSD and one of the two principal collaborators on the studies. Those challenges aren't an issue when Dispenza has a retreat, he said. "We would write up a study, we would solicit participants, we would get 800, 900 people volunteering to be involved in the study," Patel said.

Study volunteers have donned skull caps to track electrical activity in their brain, worn devices to track their sleep data and heart rates, donated cheek cells to check DNA, and submitted stool samples to see changes in their microbiome. The idea is to see what, if anything, happens to their bodies after seven days of meditative practice. In an email to Undark, Patel noted that the meditation carried out at Dispenza's retreats is not considered mindfulness and incorporates

elements from different types of practices. “The goal of our research is to define exactly what this new type of [meditation] retreat is.”

Dispenza’s sample sets are unique in that recruits stay in the same environment, controlling for some of the variables that can confound results. However, there are still limitations to this type of study, including self-selection bias. The population of Dispenza acolytes may well be primed to believe meditation works, so a placebo effect may come into play, said David Vago, a meditation researcher and professor at the University of Virginia who is not involved in the UCSD research.

“Self-selection bias is certainly a problem,” Vago wrote in an email. “One advantage of the study is the built-in controls they had with participants who were in the same setting but did not get meditation training.” One of the UCSD studies, for example, hopes to examine the emotional states of twins, when one is meditating and the other is not.

The first research published looked at whether the type of meditation practiced at Dispenza’s retreats could be used to improve resiliency to the Covid-19 virus. In that paper, which was published in the journal Brain, Behavior, & Immunity - Health, researchers surveyed nearly 3,000 people who had attended a retreat organized by Dispenza. They asked how many had received a Covid-19 diagnosis and how quickly their symptoms resolved. The UCSD researchers found that the longer people had been maintaining a regular meditation practice, the less likely they were to report testing positive for the virus. And among those that did get infected, they reported having fewer symptoms and recovering much faster than those that had less or no meditative practice.

Studies that depend on self-reporting are viewed as less reliable, but the study by the UCSD researchers also utilized other more objective measures to test whether meditation might improve health outcomes.

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The group’s original hypothesis was that meditation could increase health resiliency because of the release of biological factors, like proteins or metabolites, into the bloodstream during meditation. They’d collected blood samples from retreat participants before the pandemic began,

and then decided to pivot their focus specifically to SARS-CoV-2. To identify what those factors might be, the UCSD scientists created a pseudovirus to represent SARS-CoV-2, bearing the characteristic spike protein so it could enter a cell using the same mechanism as the real virus. While the pseudovirus did not contain any SARS-CoV-2 genetic material, it did include what's called a "reporting protein" gene, which expresses a fluorescent red color. That way, researchers could see if and when the virus entered a cell.

The researchers then took blood from about 100 people at a Joe Dispenza meditation retreat — some who were experienced meditators, some who were new meditators, and some who did not meditate at all — then added plasma distilled from those blood samples into cultures of human lung cells. When they then exposed those cells to the pseudovirus they'd created and let them incubate for 24 hours, they found there were almost no viral particles inside the lung cells inoculated with the plasma of experienced meditators. There was some evidence of infection in the lung cells treated with novice meditator plasma, and in lung cells treated with non-meditator plasma, the virus appeared to have infected the cells unfettered.

"We showed that the blood of a meditator after the week-long event was able to keep the fake virus from entering the lung cells," Patel said. The question then, was, how?

After further testing the participants' plasma, the UCSD team found that the blood of meditators had elevated levels of a particular protein called SERPINA5, which inhibits a type of enzyme that the virus utilizes to infect a cell. In other words, that protein — which appeared to be increased in the bloodstream of experienced meditators during this type of meditative practice — seemed to give people an extra dose of protection against being infected.

"What I think is happening is that when you go into this elevated, emotional mental state during meditation, you're releasing things from your neurons in your brain. And then ultimately, those neurons, whatever is being released, has to filter through and eventually ends up in the blood," Patel said.

Amesh Adalja, an infectious disease physician and a senior scholar at Johns Hopkins Center for Health Security said he doesn't believe the study answered that question.

"This study doesn't give you enough information to say it's anything more than a hypothesis that needs testing in a more rigorous manner," Adalja said. While noting the study's limitations, he added, "there's biological plausibility in the sense that meditation decreases stress, and we know that stress responses do influence susceptibility to infectious diseases."

Among other things, Adalja added, the UCSD team did not control for confounding variables that

could have affected their results in the blood plasma study, like age or lifestyle habits, or whether a study participant had an immunocompromising health condition. By not taking into account each participant's individual health status, Adalja said, the UCSD researchers cannot claim that the result they obtained was caused by meditation, because it may have been influenced by some other variable.

In theory, Adalja pointed out, it could be that people who meditate may also sleep eight hours a night, for example, and so perhaps they're benefitting from the sleep and not the meditation. "Meditation could just be a marker for some other healthy behavior, or some other biological phenomenon that goes with it."

Patel refuted Adalja's critiques, saying his study only tested blood from individuals with no self-reported chronic or terminal disease so that there would be no confounding conditions to influence outcomes. He also noted that the survey portion of the study did control for confounding variables, and that a multivariate analysis was performed to address specific confounders in that data. "Our studies on the biological assays controlled for all of the issues that Amesh says we did not control for," he said. "We were very careful to do this."

Patel also argued that his team's results pinpointed something specific about meditation. The group that did not meditate, he said, spent their days at the same resort as the meditators, during the same events, but instead of meditating, enjoyed a relaxing time away from work at the resort, in an environment that would be expected to also reduce stress. But the protective effect was only observed in the individuals who meditated, suggesting to Patel that it was the meditation — and not mere stress reduction — that mattered.

Disagreements over methodologies and results aside, the involvement of Dispenza, who was named as a co-author on the recently published study — and may be listed as one on future publications — has also raised eyebrows among some researchers.

"I've always been concerned about pseudoscience around meditation, and Joe Dispenza certainly created some red flags for me, personally," said Vago, who is one of the co-authors of the 2018 "Mind the Hype" study. Vago cites Dispenza's language in his workshops and videos, which he says can be exaggerated, with little to no science behind certain claims.

The podcast Conspirituality relates an instance where, at one retreat, Dispenza had a woman come up on stage who was having trouble getting pregnant because she feared she had waited too long and now felt guilty. Dispenza told her the guilt is stored in that same center of her uterus and that she could fix her infertility with her thoughts.

“He’s charismatic and talks about healing people from chronic health conditions and rare genetic disorders in one session of meditation,” said Vago. “Those words are enough for me to be skeptical of anything else that he claims.”

Dispenza has been a popular figure in the yoga, meditation, and self-transformation community ever since appearing in the 2004 documentary, “What the Bleep Do We Know,” which focuses on the connection between quantum physics and consciousness. Today, he boasts 2.8 million followers on Instagram, where he posts inspirational quotations and promotes his teachings.

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But critics take issue with the way Dispenza infuses scientific concepts into his lectures and books to make it sound like there is scientific evidence behind his theories.

“I think it’s science that demystifies the mystical,” Dispenza told podcaster Aubrey Marcus in December of 2020. “And if you can combine a little quantum physics with a little neuroscience with neuroendocrinology with psycho neuroimmunology, the mind-body connection, epigenetics, all of those sciences point the finger at possibility.”

Julian Walker, an author and co-host of Conspirituality, doesn’t buy it. “This is the thing about New Age pseudoscience,” he said. “The claims are so big and so bold that if any one of them were true, even in the smallest way, it would be such a massive change in terms of how we understand life itself.”

For his part, Patel says he and his co-lead author designed all of the UCSD studies, and that they have full autonomy on how they are done and implemented. “This is something I was very adamant about to make sure we are doing critical and unbiased science,” Patel said. In the Covid-19 paper’s author contributions, however, Dispenza is credited with helping conceive and design the study.

Dispenza has been involved in monthly meetings with the scientists, where he does, according to Hovda, “make suggestions to enhance the research.” In her email to Undark, Hovda also said that

Dispenza had not made direct monetary contributions to the studies, but has supported the research through in-kind donations. That includes paying independent contractors to collect the data on his behalf, a process that involves the use of 18 EEG machines purchased at a cost of $20,000 each.

Despite some of the pause some meditation researchers may take when hearing Dispenza is involved, Vago said he respects Patel's previous work, and found their latest results fascinating. "I wasn't even familiar with that particular data, that the fake virus that they created and how they found that the blood of meditators, after a week-long event, was able to keep the virus that they created from entering the lung cells. That's very impressive," he said.

He noted that it is convincing to see that the research subjects' meditation experience correlated with the findings, rather than something more objective.

"I guess my biggest problem is really with how Joe sells himself on the internet, because that comes across as pseudoscience, and some of the claims that he makes come across that way. But the research Patel is doing "all sounds pretty legitimate," Vago said.

And it adds to a growing body of research showing meditation's impact on immunity, from its effect on inflammatory markers like cytokines to its effect on parts of DNA, like telomeres on chromosomes. In fact, Vago is currently involved in a study at Vanderbilt University, where he was the former research director of the Osher Center for Integrative Medicine, where they are looking at the effects of meditation and breath work on the glymphatic system, which eliminates waste from the central nervous system.

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As researchers continue to investigate the mind's impact on the body through meditation, the business shows no sign of slowing down. A 2022 market analysis report by Data Bridge Market Research predicts the global meditation market will grow from $5.3 billion in 2022 to an estimated $20.5 billion by 2029.

While Salmoirago-Blotcher has found personal value in meditation, she cautions against expensive retreats that target people facing personal crises. "These people craft these wonderful programs where desperate people go — because they have nowhere else to go, right?" she said. Retreats that can cost thousands of dollars, Salmoirago-Blotcher said, run "really contrary to the spirit of how these practices were generated, which is the practice of generosity."

Walker, of the Conspirituality podcast, is even more blunt, calling those who peddle mindfulness as a panacea nothing more than modern-day faith healers. “To me, it’s no different than the faith healer who comes through town, sets up the big tent, tells people to bring their sick and disabled family members and that through the Holy Spirit, they’re going to be cured,” he said.

Like Salmoirago-Blotcher, Walker is himself a long-time meditator, but he said the practice is powerful because of its more subtle, everyday effects, including helping people manage stress better, become more aware of their bodies, and connect with emotions — not because it brings about miracles.

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Such promises can be dangerous: Conspirituality recently featured an interview with a woman whose husband was undergoing chemotherapy to treat pancreatic cancer when he started attending Joe Dispenza retreats and almost decided to stop his treatments. Although he continued with the chemotherapy — and died from his illness at the age of 45 — his wife was scared, the podcast said, by how pseudoscientific beliefs might affect his health outcomes.

In her email to Undark, Hovda stated that Dispenza does not recommend individuals dealing with an illness stop their current treatment plan. “There are many choices that people have during a treatment and cure for their disease,” she wrote, “and these evolve with time as well as how the disease is progressing. Meditation and self-regulation are paths that need further exploration, and it is one modality we are researching that should be considered in conjunction with traditional approaches to further assist one’s body in returning back to homeostatis.”

Whether results from the other ongoing UCSD studies will show significant effects remains to be seen. And while research has found meditation can improve some health outcomes — such as decreasing blood pressure and biomarkers of stress — its effect on the biological mechanisms underlying human health is less clear. It’s known to do some good in some situations, but it’s still

unclear which situations and how.

As for Halsch, she attributes her improved health, in part, to her meditative practice. “I believe with my whole heart and soul it’s because I’m back on track meditating every day,” she said, “receiving healings, participating in healings — and eating plant-based.”

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Caren Chesler is a journalist on the Jersey Shore whose work has appeared in The New York Times, The Washington Post, Smithsonian, and Wired.

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