SPECIAL TIME EDITION

Alternative Medicine

THE NEW MAINSTREAM

Natural Healing • Achieving Balance • Food Cures

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THE NEW MAINSTREAM

Contents

Parts of this edition appeared previously in TIME and on Time.com.

NEW ROADS TO WELLNESS

Ancient healing traditions pose a challenge, and offer a complement, to modern biomedicine. And vice versa. That's a good thing

BY DAVID BJERKLIE

THE HISTORY OF MEDICINE HAS NO BEGINNING. HUMANS HAVE DEVISED healing traditions ever since we became, well, human. But whether the traditions are Indian, Chinese, African, North or South American, or Greco-Roman, they all share, in the words of Claire M. Cassidy, an executive editor at the *Journal of Alternative and Complementary Medicine*, "the goals of alleviating the suffering of the sick, promoting health and protecting the wider society from illness." Each of these traditional healing systems, explains Cassidy, offers answers to fundamental questions about the body, life, death and the role of the healer. This is as true for healing traditions that are practiced only locally, among a single rain-forest tribe, as it is for traditions that have spread across continents.

All of this also applies, of course, to the healing tradition that most of us refer to as "modern" medicine, the health-care system that delivers organ transplants, billion-dollar cancer drugs and imaging technologies that track the subtle flow of blood in the brain. This is a system, notes Cassidy, "that can barely function in the absence of electricity, computers,

laboratories and perfect sanitation." It's no wonder that the word "modern" seems so self-evident and justified. Medical history, too, is written by the victors.

At the same time, we are increasingly aware of modern medicine's discontents. The nearly crushing cost of modern health care is just the most visible problem. Too much of a good thing, it turns out, can sometimes be a bad thing. "It has been estimated that one third of all medical interventions are unnecessary," says Marc Micozzi, author and editor of the textbook *Fundamentals of Complementary, Alternative and Integrative Medicine*, now in its sixth edition. Throw in medical mistakes, including fatal ones, adds Micozzi, along with the spread of drug-resistant infections, and we have hospitals that are too often health hazards in their own right. And if that isn't enough, there is also the steady creep of alienation stoked by industrial-scale medicine.

It is no wonder, then, that these discontents continue to fuel the boom in what is most commonly referred to as alternative medicine. That name, which people both inside and outside the field still struggle with, can trigger alarm by suggesting that proponents of such therapies believe they should be an "alternative" to, or suggest the exclusion of, conventional biomedicine. In practice, these therapies are nearly always used to complement conventional treatment. They are additions, not substitutes. The goal, for most practitioners as well as users, is to reach the point at which a broader range of approaches can be integrated into our health-care system.

THE HISTORY OF THESE CONCERNS IS REFLECTED in the very name of the initiative founded in 1992 by the National Institutes of Health (NIH) amid considerable controversy. First established as the Office of Alternative Medicine, the program was relaunched in 1999 as the National Center for Complementary and Alternative Medicine (NCCAM) and renamed again, in 2014, as the National Center for Complementary and Integrative Health (NCCIH). Name changes alone cannot smooth all waters, however, and there are still plenty of arguments over the validity and value of many alternative therapies.

And yet there are indeed signs of integration. Boundaries between what is considered alternative and what is mainstream are blurring, at least in some areas. Yoga, massage and meditation, even acupuncture, are becoming as accepted in many settings as physical therapy and advice on diet and exercise. There is also a renewed appreciation for less-medicalized approaches that have never been saddled with the designation "alternative" in the first place. The use of behavioral therapies continues to expand, for example, and the reach of social support groups has never been more extensive, whether their focus is cancer, grief or addiction. Even the simple, commonsense suggestions to make friends and enjoy nature are now being given the stamp of research approval as paths to improved health and well-being.

All of which is affirmation that even—and perhaps especially—in an era in which we are constantly being primed for the next revolution in genetics or drug development, the need for healing on multiple fronts is apparent. The lesson we should embrace, says Micozzi, is that "when it comes to medical intervention, we should start with the least expensive, least invasive approach. Instead, we too often do the opposite." Take back pain, for instance, says Micozzi. People turn to alternatives only after surgical and drug treatments have been exhausted. Alternative treatments have too often been the approach of last resort, born of desperation, when patients feel they have no other recourse.

The evidence is steadily mounting that this is changing. Increased acceptance fuels increased demand, and the other way around too. Major hospitals across the country have established "integrative care centers" that offer a range of complementary therapies for a growing number of diagnoses. Yes, complementary care is no doubt, at least in part, a marketing strategy, but even that fact attests to the rising acceptance of and demand for such treatments. True integration may still be an ambitious goal, but not so unrealistic as once thought.

THE POTENTIAL OF ALTERNATIVE TREATMENTS has been given striking new visibility by the opioid crisis, an example of conventional biomedicine dramatically failing its patients. In September 2019, a symposium on the NIH campus in Bethesda, Md., celebrated the 20th birthday of the NCCIH. The keynote address, by Lorimer Moseley of the University of South Australia, and much of the ensuing discussion were focused on the need for alternative approaches to pain management. Pain conditions are among the most disabling of all health problems, affecting an estimated 50 million Americans. And while our medicine cabinets are awash with effective pain medications, they come with serious risks. In

2017, opioid overdoses claimed 47,000 lives.

The symposium also addressed conditions that often accompany chronic pain, including anxiety, depression, sleep disorders and fatigue, as well as conditions that give rise to pain, such as cancer and trauma. Other research explored the use of probiotics for kidney stones, the discovery of new antimicrobial compounds in plant extracts and the potential of hot yoga to treat symptoms of depression.

In kicking off the 2019 symposium, NIH director Francis Collins acknowledged that when NCCAM was launched, there wasn't universal support for the unconventional initiative. But the reasons it has persisted have proven to be sound, said Collins, who lauded the program for its "exciting and important set of research opportunities." Research dollars being spent in integrative medicine, said Collins, "are not a cost, but an investment in human health."

Nearly 25 years ago, C. Everett Koop, former surgeon general to President Reagan, wrote that it was important to take a close look at alternative approaches, "not to offer these treatment modalities blindly but to expose them to the scientific method." Koop, who elevated the surgeon general's office to national importance, observed that "physicians have to depend on facts—on empirical data—when they determine treatment strategy for a particular patient." And if we don't have enough facts? "We can conduct the necessary studies and assemble the data that doctors and health-policy makers need, a type of biomedical research that would be a prudent long-term investment."

In the quarter-century since Koop's urging, research and data have come pouring in—helping to suggest the benefits, and drawbacks, of alternative treatments. "What is needed for proper interpretation and understanding is not *less science* but *more sciences* in the study of complementary and alternative medicine," says Micozzi. "Science must account for all of what is observed, not just the convenient part of it." That doesn't mean that trying to explain how traditional healing works will be simple, though. Micozzi likens it to the Hindu parable of the blind men and the elephant, with each healing tradition struggling with its narrow understanding of the whole.

Whatever new view emerges, however, Micozzi believes it will reveal a richer understanding of self-healing. "The body heals itself. This might seem to be an obvious statement," says Micozzi, but "this concept of self-healing is central and profound among CAM systems." Self-healing is the basis of all healing, says Micozzi. "Instead of wondering why the body's cells are sick, alternative systems ask why the body is not replacing its sick cells with healthy cells."

Because there are no sure things when it comes to betting on the future of medicine, building a portfolio is likely the most prudent approach. By putting resources into a wide range of strategies, long term as well as short and medium term, the payoff promises to be a more complete understanding of human health. Seeing the entire elephant in the room may be a feasible goal after all. ◻

The New Mainstream

The boundaries between alternative therapies and conventional medicine are blurring. Treatments once found only at the margins of health care are now being embraced in major hospitals.

Healing the Whole Cancer Patient

Comprehensive treatment programs now aim to not just save lives but also ease stress, relieve pain and promote a sense of well-being among patients

BY ALICE PARK AND AMANDA MACMILLAN

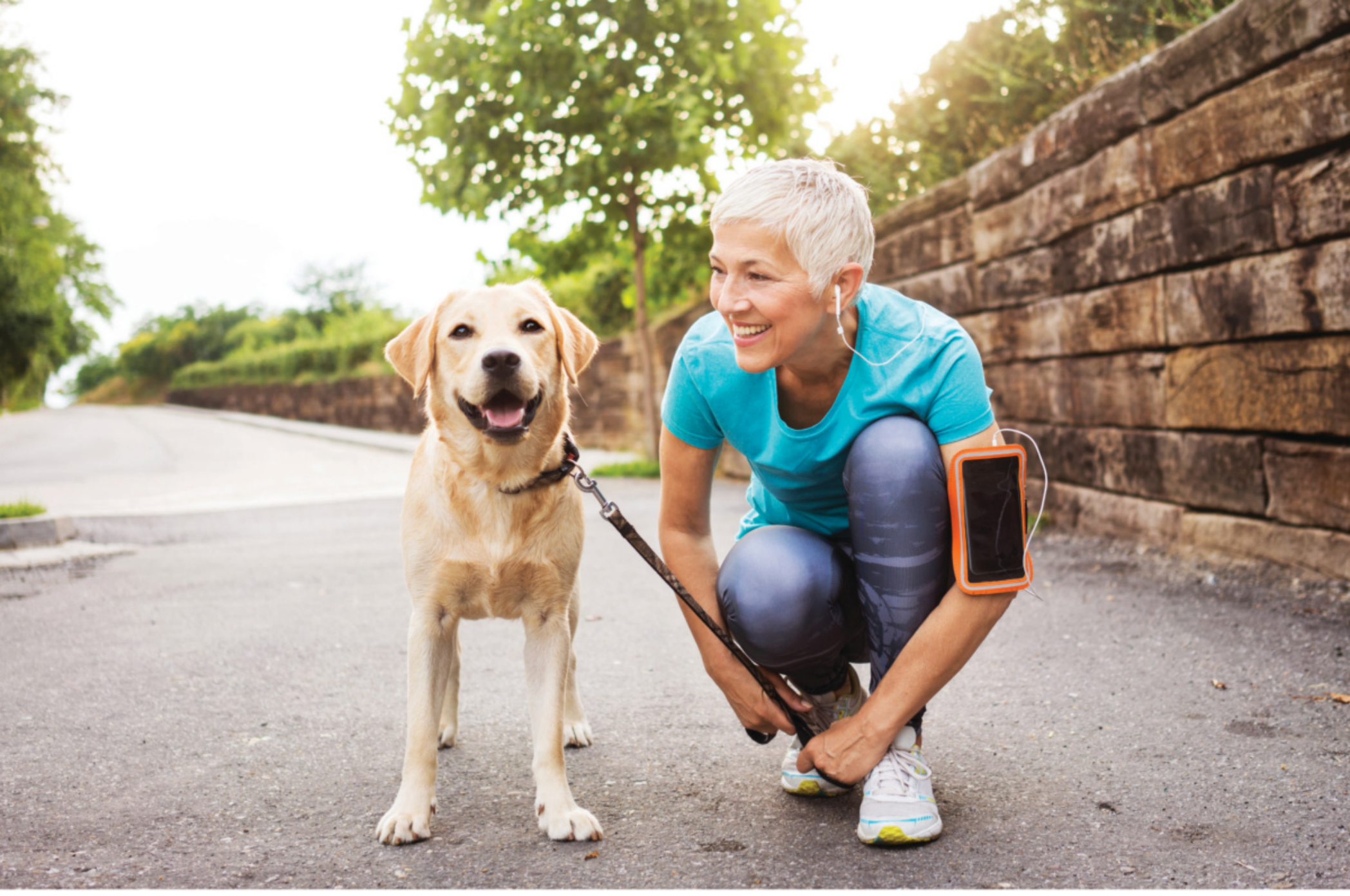
TUNNEL VISION CAN SET IN WITH A NEW CANCER diagnosis. Everyone—the doctor, the patient, the patient's loved ones—focuses almost exclusively on treatment: the chemotherapy, surgery and radiation that aim to keep a patient alive for as long as possible. But now some forward-thinking doctors are realizing that a single-minded focus on treatment puts cancer, and not the person with it, at the core of the patient's care. In an effort to change that, some hospitals across the country are launching innovative programs that aim not just to keep patients alive but also to keep them well.

"Medicine alone is not enough," says Anne Coscarelli, founding director of the Simms/Mann University of California, Los Angeles, Center for Integrative Oncology, one of several cancer centers to adopt a comprehensive view of patient care. "For every physical effect of a cancer treatment, there is an equal psychological effect."

Obvious as that seems, most cancer centers do not incorporate psychological care or social support into their patients' treatment plans. That's beginning to change, in part thanks to mounting research suggesting that a healthy mental state can play a part not only in quality-of-life improvements but also in a person's prognosis. This emerging field, called psychosocial oncology, is about everything but the actual medical interventions.

Research shows that the mental toll of a new illness can drain a person's physical resources and that social support can help patients cope with painful treatment regimens and improve recovery. A growing number of studies also show that social support, mindfulness meditation and exercise, among other holistic strategies, can reduce the depression that so often accompanies cancer while also improving people's ability to complete their treatment plans without interruption.

That includes getting a good night's sleep. Insomnia is a common concern for people who have cancer as well as cancer survivors, according to Jun Mao, chief of the integrative-medicine service at Memo-



Clinicians are paying more attention to the subtler parts of the cancer experience.

rial Sloan Kettering (MSK) in New York. "Up to 60% of cancer survivors have some form of insomnia, but it is often underdiagnosed and undertreated." A study led by MSK researchers showed that acupuncture and cognitive behavioral therapy were effective treatments to reduce insomnia.

Psychological distress, pain and fatigue are also very common in cancer patients, explains Mao, and should be more fully addressed in integrative care. The encouraging news is that there's "a continually emerging body of literature that suggests many of the therapeutics we use, such as massage, acupuncture, meditation and yoga, have beneficial effects."

Integrative medical centers are also including patient resources on natural products. Such A-to-Z compendiums are far from blanket endorsements, however; in many cases, they are intended to offer patients information on which therapies have little or no evidence of efficacy, or even evidence that they are harmful. "Newly diagnosed cancer patients are undergoing much distress and anxiety," writes MSK's Gary Deng in an article in *Current Oncology*. "The public is exposed to an overwhelming amount of information and misinformation on CAM," notes Deng, who is the medical director of integrative-medicine service, and it is vital that they "feel that they are not missing out on any options." Deng adds that MSK's online resource About Herbs, which is also available as a smartphone app, routinely receives more page views than MSK's home pages, "underlining the tremendous demand for this kind of information from the general public."

Such encyclopedic resources are also aimed at facilitating conversations between doctors and patients. About a third of cancer patients use alternative medicine, according to 2019 study published in *JAMA Oncology*. Out of more than 3,000 cancer patients who responded to questions about cancer and complementary therapy use through the 2012 National Health Interview Survey, just over 1,000 reported using one or more of these therapies during the prior year. Patients turn to alternative medicine for many reasons, including, according to the study, "persistent symptoms, psychological distress or to gain a sense of control over their care." And some alternative therapies are indeed widely recommended

by oncologists. Mind-body interventions like yoga, tai chi, meditation and mindfulness, which were each used by about 7% of patients, can keep people fit and energetic as they undergo treatment, reduce the side effects of traditional therapies, lessen stress and improve mental health. Cancer patients who were more likely to use complementary therapies, noted the study, were young, white and female.

But the problem, according to the study, was that about a third of these patients did not tell their doctors that they were using alternative therapies. Why not? In many cases, explained the survey respondents, either their doctors did not ask or they did not think their doctors needed to know. That's a potentially risky oversight. Some herbal supplements may interact in unforeseen ways with conventional treatments such as chemotherapy and radiation. High levels of antioxidants can interfere with radiation, for example, and herbal supplements can become dangerous when mixed with certain prescription drugs. This is the reason, according to the study's lead author, Nina Sanford, of the University of Texas Southwestern Medical Center, that it is paramount for cancer patients to discuss such use of supplements with their doctors.

The benefits of communication can also extend to side effects that are well known and seemingly unavoidable. Every year, for instance, tens of thousands of breast-cancer patients are prescribed

Holistic approaches can often reduce the depression associated with cancer.

Insomnia, psychological distress, pain and fatigue are common complications for cancer patients. The encouraging news is that a range of alternative therapies can help.

aromatase inhibitors—medications recommended for up to 10 years to protect against a recurrence of the disease. But these drugs can produce side effects, including severe joint pain, which cause many women to stop taking them. Patients may now have another option they can discuss with doctors. Research presented at the 2017 San Antonio Breast Cancer Symposium suggests that acupuncture may reduce drug-related joint pain for such women and may provide a way for them to continue taking these potentially lifesaving medications.

"Aromatase inhibitors are one of the most common and most effective medications in breast cancer, and they're used for both prevention and for early-stage treatment," says lead author Dawn Hershman, professor of medicine and epidemiology at Columbia University and vice chair of the research network that conducted the study. "But we know that they don't work if people don't take them, and we know the most common reason people don't take them is because they develop side effects."

The cancer-fighting medicines are commonly prescribed to postmenopausal women with hormone-sensitive breast cancers, sometimes for up to 10 years. (About 80% of all breast cancers are hormone-sensitive, also known as estrogen receptor–positive.) But about half of the women who take aromatase inhibitors report joint pain and stiffness that affect the knees, hips, hands and wrists. The pain can be so severe that it makes it difficult for women to walk, sit, climb stairs, type or drive a vehicle. Researchers even have a name for the condition: aromatase inhibitor–associated musculoskeletal syndrome, or AIMSS.

The study authors wanted to determine acu-

puncture's potential as a non-pharmaceutical option for treating for the painful syndrome. "People don't want to take a medication that causes its own side effects to treat the side effects of another medication," says Hershman. "And in this country right now, we want to do everything we can to avoid prescribing opioids, especially on a long-term basis."

Hershman and her colleagues enrolled 226 patients with early-stage breast cancer from 11 treatment centers across the country. The women who received acupuncture experienced at least a 50% reduction in pain after six weeks, and when the researchers followed up 12 weeks after the acupuncture treatments had stopped, the pain relief remained significant. Hershman believes the findings should give patients and doctors alike confidence that acupuncture may provide some benefit to women experiencing joint pain due to aromatase inhibitors.

Although breast cancer may be leading the way in the use of complementary medicine therapies, the larger goal for many practitioners is to broaden the use of such treatments to wherever they are determined to be appropriate. And toward this end, researchers as well as clinicians are increasingly paying attention to the subtler parts of the cancer experience, including how the disease can affect body image–something that is a major source of anxiety for many patients but often gets overlooked.

It is exactly this kind of thinking that encouraged the National Academy of Medicine, more than a decade ago, to advocate a more comprehensive cancer-treatment plan–one that includes stress-management strategies as well as emotional and financial support. "What doctors need to remember," says Kathryn Ruddy, a specialist in cancer survivorship at the Mayo Clinic, "is that for the rest of their lives, these people may be dealing with the effects of our treatments. It's our responsibility to support them the best way that we can."

Doing that at scale will require a major shift that is still underway. For now, many of the largest and most comprehensive integrative-care programs exist thanks to philanthropic gifts. Leaders in the psychosocial-oncology field hope that such programs will one day be a line item on hospitals' budgets in cities of all sizes across the country. "We are in a revolution where we are becoming more wellness-focused," says Carolyn Katzin, an integrative-oncology specialist at UCLA. "But we are not there yet. We're still in the middle of the shift." ◻

After Surgery: *Supporting the Recovery Process*

Hospitals are offering treatments that help relieve the physical, mental and emotional suffering that often accompanies major surgery

By Jeffrey Kluger

An operating room is a monument to the idea of not messing around. When you deliver yourself into the hands of semi-strangers and give them license—indeed, pay them money—to knock you out, open you up and manipulate your very innards, you want to know there is hard, tested science on your side.

That's one reason complementary and alternative medicine (CAM) has had such a rough time gaining purchase in most pre- and post-surgical wards. Even as more than 40% of Americans report receiving some kind of CAM treatment in any given year, the surgical arena has long been off limits. The problem is, surgery isn't just about repairing or removing sick tissue—it's about fear, pain, depression and stress, not to mention the deep existential terror that comes from walking into a hospital and knowing there's a risk that you may not walk out again. That's not the kind of thing that can be diagnosed with a CT scan or be repaired by microrobotic surgery. But it is exactly the kind of thing that can have a significant impact on healing.

And yet a wealth of research shows that what doctors call "psychosocial factors" and everyone else calls "feeling lousy and depressed" can have a powerful effect on how quickly surgical patients recover and how successful their surgery turns out to be. Studies like these have pushed leading medical institutions to look for new ways to aid recovery. More than a decade ago, the Mayo Clinic made one of the first big pushes into incorporating CAM into its pre- and post-op wards, targeting cardiac patients specifically. Few procedures are as grueling as heart surgery. For all the advances made in minimally invasive cardiac care, there's just no other means to perform a bypass, for example, than by cutting the sternum, splitting the chest and subjecting the patient to hours of deep anesthesia while the heart is manipulated by hand, scalpel and suture.

All that awfulness makes feeling better—not to mention actually getting better—difficult. Mayo researchers thus decided to determine whether a bit of massage might help the healing process along. After recruiting a group of pre-op patients, the researchers assigned half to receive standard post-surgical care, including pain medications, plus two 20-minute sessions of massage on the second and fifth days after surgery. The other half received the same care, except that they spent those 20 minutes quietly relaxing with no massage.

Before and after the sessions, the patients evaluated their level of pain, anxiety and tension on a scale from 1 to 10. All the subjects in the Mayo study started out in more or less the same range in all three categories. But after just 20 minutes of hands-on attention, anxiety, pain and tension levels for the massage group plunged relative to the control group. Mayo researchers discovered similar results for audio therapy—simply listening to music or recorded nature sounds to reduce post-surgical pain and anxiety. Both represent further means to achieve the goal of reducing pain in order to hasten recovery.

Agonizing as pain can be, many patients coming out of surgery suffer even more from nausea. It's a common side effect of general anesthesia that can be exacerbated by drugs or even the stress of being hospitalized. In a study in which acupuncture was administered shortly before surgery, Mayo researchers found that patients who received acupuncture reported feeling nauseous significantly less frequently than patients who did not receive acupuncture, and their suffering was significantly less acute when they did feel ill.

Similar benefits have been seen from other, equally nonmainstream treatments. Aromatherapy—with spearmint, peppermint, ginger or lavender oils—has been shown to ease post-op nausea. Reiki, a Japanese technique of energy healing, has reduced stress and sped recovery. Patients in the Mayo network are also offered meditation, yoga, tai chi and even animal therapy, in which companion dogs visit patients before and after surgery.

That number is likely to grow—and not just at Mayo. The uniquely violative, uniquely mortal nature of surgery makes it a feared and serious enterprise. But such gravity can open minds and clarify thinking too. Wisdom dictates not accepting just any old nostrum. Wisdom also dictates embracing ideas you might not ordinarily consider. When your health, welfare and life are on the line, you're not likely to be picky about where legitimate help comes from. Relief and recovery are what count—and, more and more, CAM is delivering both.

The Mystery of Acupuncture

Why it works is a matter of debate, but research shows that the ancient technique is effective for treating everything from menopause to backaches

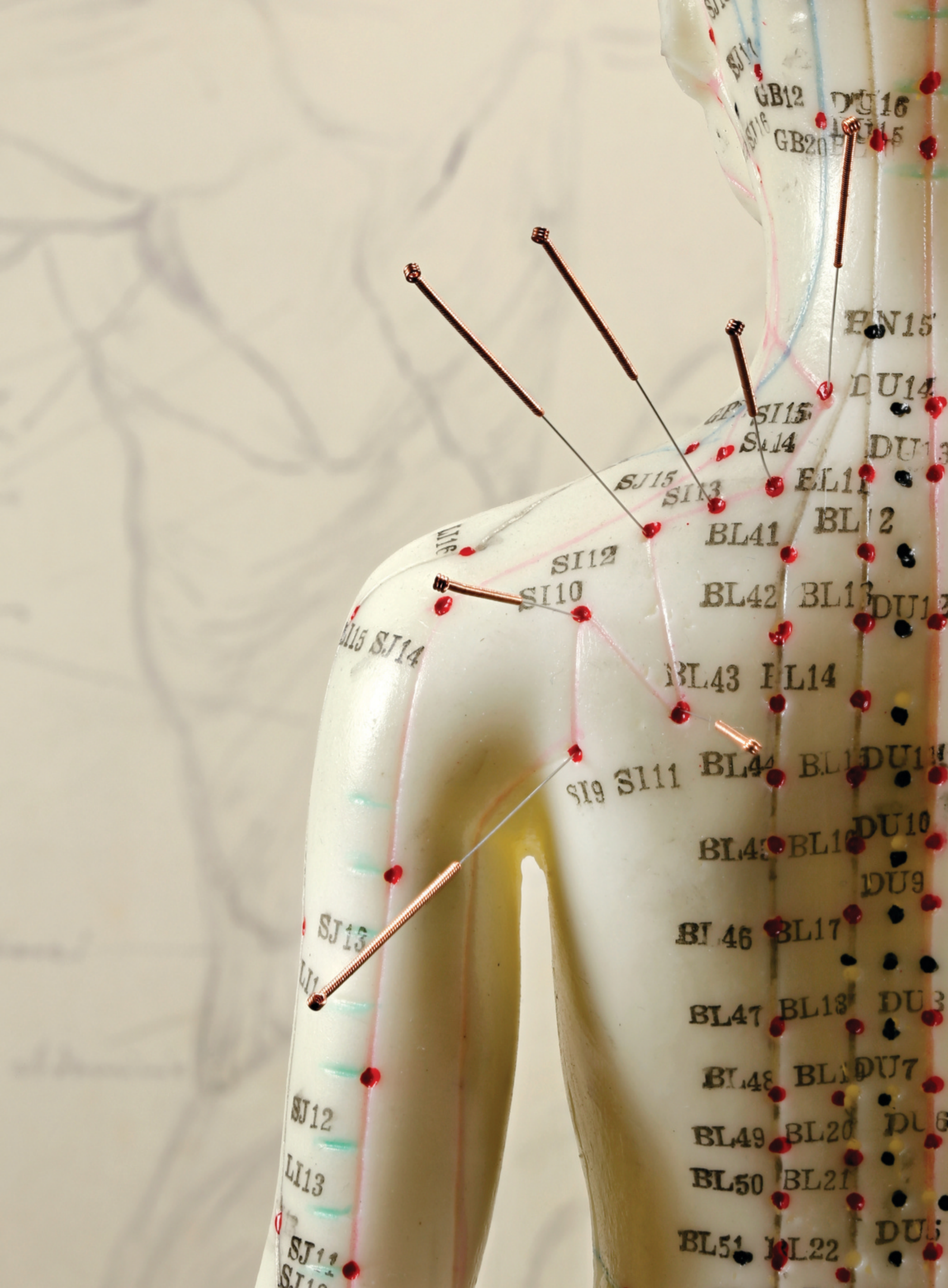
BY JEFFREY KLUGER

THE HISTORY OF MEDICINE IS THE HISTORY OF preposterous ideas that turned out to be right. Illness couldn't be caused by invisible creatures that invade the body. Then Antonie van Leeuwenhoek invented the microscope, and we discovered bacteria. Deliberately infecting people with an extremely mild case of a disease shouldn't be the best way to protect them from catching a serious case of it. Then Edward Jenner hit upon smallpox immunization, and the era of the vaccine was born.

And you shouldn't be able to treat all manner of afflictions, from headaches to backaches to depression to addiction, by letting someone stick needles into any number of 360 specific spots on your skin. Especially if the best explanation anyone can give you for why the treatment works is that it frees up the life force, or "qi," that flows through the human body along 14 different lines, or "meridians."

Yet the lure (some would say lore) of the ancient Chinese art of acupuncture is irresistible all the same, and not only in the Far East. The World Health Organization has declared acupuncture a useful adjunct for more than 50 medical conditions, including emotional woes like chronic stress. In the U.S., the National Institutes of Health agrees, endorsing acupuncture as a potentially useful treatment for addiction, migraines, menstrual cramps, abdominal pain, tennis elbow, nausea resulting from chemotherapy and more. NIH statistics from 2012 showed that 3.5 million American adults and 80,000 children had undergone acupuncture in the previous year. From 2002 to 2012, the number of adult users alone jumped by more than 1.5 million.

In 2009, the U.S. Air Force became a believer too, implementing battlefield acupuncture—a treatment that can include the implantation of semipermanent needles in key acupoints to block or disrupt pain signals—in Iraq and Afghanistan. Acupuncture is increasingly used by the military to deal with post-traumatic stress disorder as well. Now NATO forces are considering following the Americans' lead. The Chinese military uses it routinely.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Civilian practitioners have embraced acupuncture in an even bigger way. Leading American hospitals like the Mayo Clinic and the Cleveland Clinic offer it as part of their alternative-care packages. And numerous groups, including the American Medical Association, have succeeded in getting a few states, including California, to designate acupuncture an "essential health benefit" under the Affordable Care Act. The move requires health insurers to include it on their list of covered services.

But just because a treatment is popular—even one that has been around for millennia—that doesn't guarantee that it is effective. If it were, we'd long since have cleansed, Rolfed and low-carbed our way to immortality. More and more, though, acupuncture is getting the close empirical scrutiny that modern drugs and medical procedures are routinely subjected to. And the results are, well, mixed.

A growing body of experimental evidence shows that acupuncture does indeed work, in some cases extraordinarily well. Another body suggests that it may very well work, but not for the reasons believers think. And yet a third body of "beats me" findings is sufficient to keep partisans on both sides arguing. In any case, something is clearly going on—and that something may, at least in some cases, be a cure for what ails you.

As the applications for acupuncture expand, the numbers of patients who are trying it increases.

Crunching the numbers

AFTER COLDS AND FLU, PAIN IS THE MOST COMmon cause of visits to physicians—with lower-back pain clocking in at No. 1 on that very long list. Four out of five of us will eventually suffer from back pain of some kind. Untreated—or inadequately treated—it's the most common reason for disability claims and employee absenteeism.

Acupuncture is often recommended as one way to treat the problem. In 2007, investigators at the University of Regensburg in Germany gathered a group of 1,162 patients with long histories of lower-back pain to determine whether it could actually make a difference.

Patients were given two half-hour treatment sessions per week for five weeks. About a third of the group underwent traditional, lower-back acupuncture, with needles inserted at the prescribed points. Another third got sham acupuncture, which involved real needles being inserted at random spots on the lower back. The remaining third received conventional treatment, consisting of physical therapy and exercise, along with the drugs they were taking.

At the end of the five weeks, the subjects were examined to determine how much pain relief they'd gotten and to what extent their physical functioning had improved. The results: 47.6% of the real-acupuncture group experienced significant relief in both categories; in the sham-acupuncture group, 44.2% did. For the rest, it was just 27.4%. The researchers sunnily concluded that "acupuncture gives physicians a promising and effective treatment option for lower-back pain, with few adverse effects or contra-indications."

But does it? There is no denying that both groups that received some kind of acupuncture did better than the one that didn't. But there's also no denying that the results of the sham procedure make the idea

An illustration from a medical guide explaining the ancient Chinese tradition of acupuncture

of 360 carefully mapped entry points on the body look a little silly. The problem is, results like that aren't at all uncommon in acupuncture research—and that's not the best news for a treatment trying to prove its worth.

In 2011, for example, a study at the Karolinska Institute in Sweden separated patients suffering from chemotherapy-related pain and nausea into the same three experimental groups: real acupuncture, sham acupuncture and conventional therapy. This time the sham acupuncture involved blunt needles that didn't even break the skin. Again, both the fake and real groups showed improvement—more than the Western-medicine group. In yet another study, this one looking at the effects of acupuncture on women trying to get pregnant through in vitro fertilization, sham acupuncture actually produced better results—a higher pregnancy rate—than the real thing.

"When a treatment is truly effective, studies tend to produce more convincing results as time passes and the weight of evidence accumulates," wrote Harriet Hall, a former Air Force flight surgeon and an alternative-medicine skeptic, in a 2011 issue of the *Journal of Pain*. "Taken as a whole, the published (and scientifically rigorous) evidence leads to the conclusion that acupuncture is no more effective than a placebo."

Critics also point out that despite the common wisdom that even if acupuncture doesn't help, it can't hurt, there are, in fact, risks involved. Pregnant women, people with a bleeding disorder and people with a pacemaker (because of possible interference from the mild electricity that is sometimes applied to the needles) should be especially cautious. Even healthy people can suffer organ injury, infection or soreness if the procedure isn't performed well.

Yet for every study that yields murky or even negative results, plenty of others present a clear win for the pro-acupuncture camp. Women going through menopause received significant relief for their hot flashes and mood swings with acupuncture, and those who got real acupuncture showed far more improvement than those who got the sham version. What's more, blood tests bolstered the results, showing that the level of estrogen rose while luteinizing hormone fell significantly after real acupuncture—the opposite of the direction those hormones usually move during menopause.

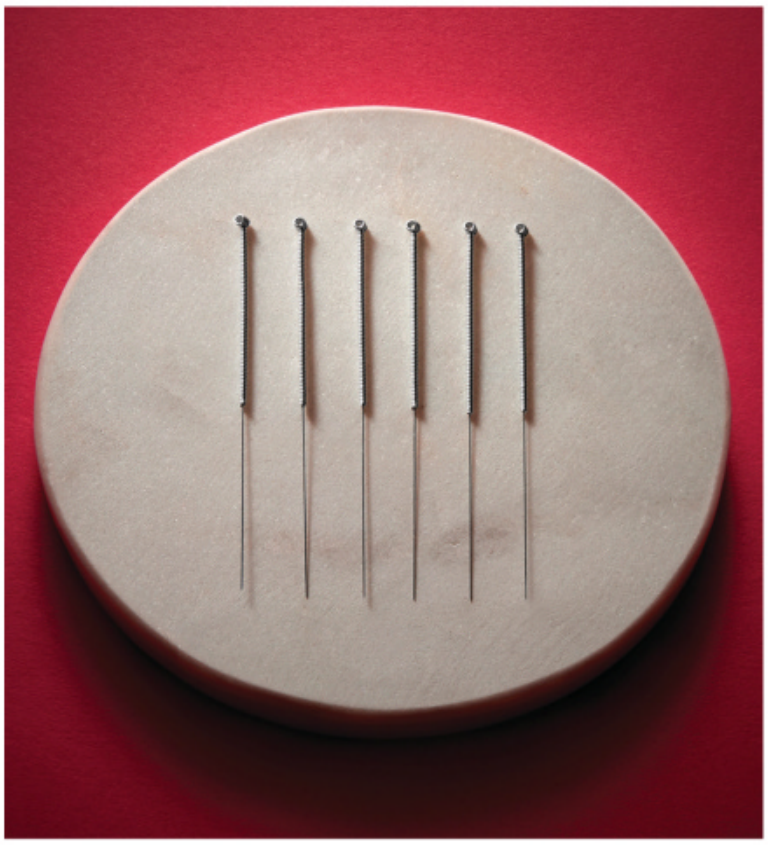
Similarly, the National Institute on Drug Abuse found that real acupuncture—with needles inserted in spots in the ear said to modulate cravings—is overwhelmingly more effective than the fake kind or none at all in treating cocaine addiction. In patients who underwent the proper needle sticks, 53.8% had clean drug screens at the end of the study, compared with 23.5% of subjects who got the sham routine and 9.1% of those who received no acupuncture at all.

Whatever the exact numbers, some relief is obviously better than none, even if it's sometimes conferred by what seems to be the power of the placebo. Besides, it's an enduring truth of the placebo effect that in order for a patient to experience relief, something has to have changed in the body.

So when it comes to acupuncture—real or fake—what is that something?

How it works

FUNCTIONAL MAGNETIC RESONANCE IMAGING (fMRI) has revealed that when volunteers are subjected to mild electrical shock while undergoing acupuncture, there is much less activity in four different pain-processing regions of the brain than usual. Although the pain stimulus continues, the brain notices it less. A fifth region—the anterior insula, which governs the expectation of pain—quiets down too. Often, the less pain you expect to feel, the less you do feel, a tail-wagging-the-dog phenomenon that is key to the placebo effect. If sham acupuncture produces only partial results, it may be because it affects only the insula rather than all the areas that deal with pain sensation. In any case, however, it is clear that something happens. "Acupuncture is supposed to act through at least two mechanisms: nonspecific expectancy-based effects and specific modulation of the incoming pain signal," says Nina Theysohn of University Hospital in Essen, Germany, who conducted the fMRI study.



Studies suggest that pain receptors in the brain are activated by acupuncture needles.

Tackling the Opioid Crisis

Why alternative treatments may offer safer solutions

By David Bjerklie

Epidemics both instill fear and demand action. The epidemic of opioid-overdose deaths in the U.S. is a case in point: the country saw a sixfold increase in such deaths from 1999 to 2017. The crisis has driven dire headlines and resolute legislative measures, as well as a deluge of legal and financial action against Purdue Pharma, the maker of OxyContin.

What has often been lost in the headlines is the fact that underlying the opioid crisis is an even larger medical crisis. More than 50 million Americans suffer from chronic pain, and far too many of them lack safe and effective options for managing it. In the urgency to address the opioid crisis, the Centers for Disease Control and Prevention issued guidelines for physicians to help patients taper opioid use to lower dosages or fully discontinue them.

This, in turn, fueled efforts by states to legislate prescription limits, by insurance carriers and pharmacies to cap the strength of prescriptions and by law enforcement to crack down on pill mills. Chronic-pain patients were seen as legally risky, and prescribers grew nervous about treating them.

Some pain experts pushed back, worried that patients would be abandoned. The CDC clarified its position, and finally the Department of Health and Human Services issued guidelines on the guidelines, attempting "to strike a balance between reducing the amount of opioids prescribed and ensuring patients aren't left behind."

In addition to debate over the guidelines, there thankfully are renewed efforts to expand approaches to pain management. In September 2019, the National Institutes of Health announced the HEAL Initiative (Helping to End Addiction Long-term), which will take an "all hands on deck" approach to the opioid crisis, tapping resources from across the NIH "to accelerate research and address the public health emergency from all angles." It's a billion-dollar program with the goal of finding safe and effective options for pain management.

"Our country, sadly, is in the

Naturally occurring brain opiates appear to be activated by acupuncture as well: imaging studies show that mu-opioid receptors—the molecular attachment sites that help nerve cells process the pain-relieving chemicals—have improved binding ability after treatment. Brain scans have also helped to validate an important part of the acupuncturist's healing technique: the rotation of the needles that leads to something known as "de qi," in which the body's tissue seems to grab hold of the metal. There's nothing mysterious about this; tissue fibers actually wind around the needle, making it significantly more difficult to remove. Patients may report a tingle or electric sensation when de qi occurs, and this too travels to the brain, quieting pain centers. The trade-off is a big payoff of analgesic effect for a little pinprick.

Ultimately, it's this minimally invasive quality that makes acupuncture so appealing. Yes, a natural skittishness accompanies being punctured by needles, even exceedingly fine ones. And yes, those punctures can hurt a bit, depending on where the needles are inserted and how deftly. But once they're in place, treatment requires nothing more than that you lie still and relax.

Maybe acupuncture produces enduring results and maybe it doesn't. It is certainly the case that it appears more effective in relieving pain, stress and anxiety than it does with gastrointestinal or respiratory disorders. But as with any complementary treatment, it's meant to be taken as part of a buffet of choices. And when you are suffering from something as frustrating as chronic pain, why wouldn't you try whatever might help?

"It's the effects of the treatment that are important to the patient, even if those effects are caused by unspecific factors," says Linköping University's Anna Enblom, who conducted one of the sham-acupuncture studies. Sure, we need to figure out what those factors are, but that's a job for doctors and other scientists. The patient's only job is to reap the rewards. ◻

midst of a pain crisis, as well as an opioid crisis," says Helene Langevin, director of the National Center for Complementary and Integrative Health, who adds that non-drug approaches for chronic pain are a major research focus for the center. Studies have shown, says Langevin, that "approaches such as spinal manipulation, acupuncture and yoga can help people manage their chronic-pain symptoms." Moreover, in many instances, these treatments can be first-line options. Another promising area of emerging research, adds Langevin, is "natural products, including cannabinoids and animal venoms."

The NCCIH is aiming to develop both "new tools and new thinking," says Langevin. And to remind us, above all, that pain demands a "whole person" approach. By deepening our understanding of the interactions between the brain and the body, she says, "NCCIH can establish the cross-disciplinary and integrative thinking needed to address pain in more comprehensive ways." And that will save lives.

It Hurts So Good

Chiropractic and massage therapies are finding their way into the mainstream—for good reason

BY BRYAN WALSH

I'M LYING ON MY STOMACH, HEAD WEDGED INTO a cushioned face rest that leaves just enough space for me to breathe. The position itself should be sufficient to generate no small amount of apprehension, but there's also this: I'm naked, save for the sheet draped over my posterior. Yet I'm as relaxed as I've ever been, the tension in my body—and especially that knot I've felt in my right side for years—dissolving in waves. I can even forgive the chanting that's playing quietly in the background. All thanks to the massage therapist standing over me, her fingers kneading the small of my back, arranging and rearranging my muscles until I feel as soft and pliable as Silly Putty. At the moment, I don't particularly care about the medical benefits of massage. All I need to know is that it feels good.

I have joined the blissful state shared by a growing number of patients taking advantage of what has come to be known as "manipulative medicine." According to the National Institutes of Health, an estimated 18 million adults in the U.S. receive massage therapy each year. Chiropractors treat more than 30 million of us annually. Those are robust numbers for a pair of alternative practices that were once barely considered legitimate by the medical establishment. Decades ago the American Medical Association branded chiropractic an "unscientific cult," and massage therapy still has to contend with a slightly seamy backroom reputation. But these days, manipulative medicine is pretty much mainstream. According to a 2011 survey by Health Forum and Samueli Institute, more than 42% of responding hospitals indicated that they offer one or more complementary and alternative-medicine therapies, up from 37% in 2007. Massage therapy was one of the top two services provided.

But even patients who swear by their massage therapist or chiropractor do so less because they

know exactly why their visits make them feel better than because they simply do. They're in good company. The fact is, doctors have only recently begun to understand the physiology of manipulative medicine.

For starters, studies have shown that massage therapy, which takes many forms but almost always involves rubbing, pressing or otherwise manipulating the soft tissues of the body, can increase the body's output of endorphins and serotonin, chemicals that act as natural painkillers and mood regulators. At the same time, massage also reduces levels of cortisol, a stress hormone. Research published in the *Journal of Alternative and Complementary Medicine* suggests one explanation for this effect: scientists at Cedars-Sinai Hospital in Los Angeles found that a single deep-tissue Swedish massage led to a more significant decrease in arginine vasopressin (AVP) hormone than a control treatment of light-touch therapy. AVP constricts blood vessels and increases blood pressure, both of which are markers of stress.

Another study showed that massage turns off genes associated with inflammation and the pain that results from it. That, in turn, helps relieve the muscle soreness that follows physical activity or injury. Stack this anti-pain effect on top of the anti-anxiety benefits, and you can see why many hospitals have begun to incorporate massage therapy into postsurgical treatment.

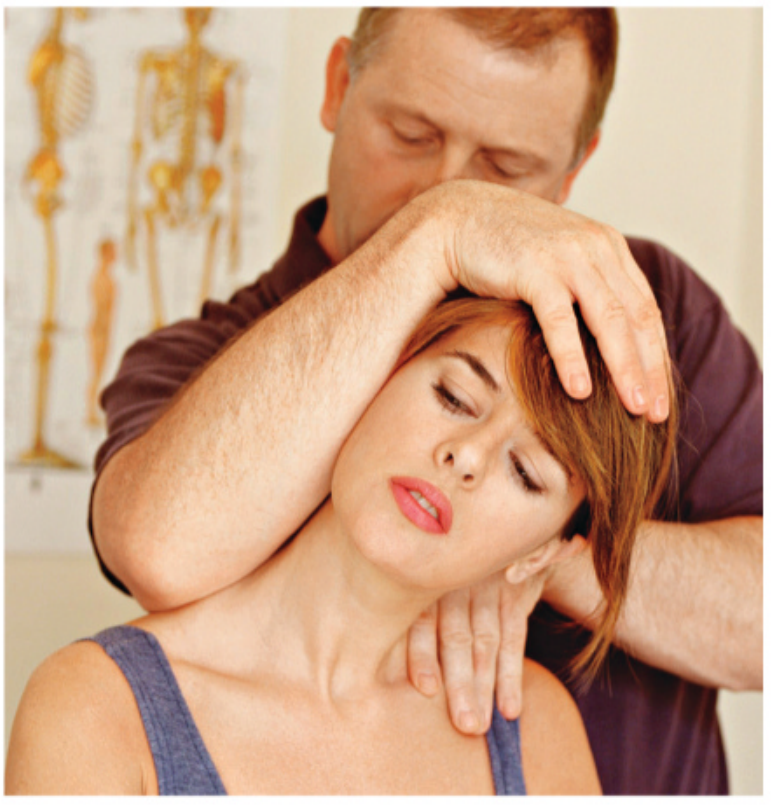
The benefits of massage, however, really do go beyond the most obvious ones. Research by Tiffany Field, director of the Touch Research Institute at the University of Miami School of Medicine, showed that moderate- to deep-pressure massage can activate the vagus nerve, which helps regulate heartbeat. Field also found that massage can help with everything from depression relief to weight gain in

premature infants, and she suspects that an energized vagus nerve may explain why.

Massage offers the kind of benefits that cancer patients can appreciate as well. A study published in the *Journal of Integrative Oncology* found that after learning massage techniques in short workshops, partners of cancer patients were able to give treatments that reduced anxiety, pain, nausea and other side effects of cancer by up to 44%. As is often the case with complementary treatments, the researchers hypothesized that it wasn't so much the therapy itself as the intimacy of the contact that conferred the positive result. On the other hand, the Cedars-Sinai AVP study found that massage seemed to raise the production of the cancer-fighting white blood cells known as lymphocytes, and that is much less likely to be a result of such a placebo effect.

Neither cancer nor post-op healing is the primary battleground of massage. The condition that drives more patients to massage therapists and chiropractors than any other is much more mundane: back pain. According to the American Chiropractic Association, more than 30 million Americans suffer from back pain at any given time, and if you're not among them at the moment, chances are you will be eventually. An estimated 80% of us will fall prey sooner or later.

And when you're hurting, fast relief is all that's on your mind. Research indicates that spinal manipulation—a chiropractor's application of force at specific joints of the spine—is a good place to start. A study published in the *Annals of Internal Medicine* showed that chiropractic treatment of neck pain provided more relief than over-the-counter drugs like aspirin and ibuprofen. Specifically, after 12 weeks of treatment, more than half of chiropractic subjects reported at least a 75% reduction in pain, compared with one third of those in the drug group.



Chiropractic treatment of neck pain may offer more relief than over-the-counter pain pills.

The improvement seemed to last—a year later, more than 50% of the chiropractic group still reported a significant decrease in pain. Meanwhile, those patients taking painkillers tended to have upped their dosage by the time of the follow-up, and that meant an added bonus for the members of the chiropractic group: they didn't have to worry about the side effects the drug group was contending with.

Which isn't to imply that chiropractic treatment is without controversy. Years ago neurologists noticed a pattern of people suffering strokes following chiropractic adjustment for neck pain. Many implicated the sudden neck-twisting that is central to the treatment, hypothesizing that it injured the arteries leading to the brain, thus triggering strokes. But more recent research is causing doctors to rethink that assumption. One study found that younger stroke patients were more likely to have complained about head and neck pain—symptoms that often precede a stroke—before their visit to the chiropractor, and that could mean they were already suffering the effects of damaged arteries before they underwent any manipulations.

If that's the case, the only significant risk of manipulative medicine may be to your wallet. According to a 2010 survey by the American Massage Therapy Association, just 3% or so of Americans who got a massage over the previous five years were covered by health insurance for the treatment. Massage therapists aren't considered licensed medical practitioners, which means their work isn't recognized by most insurers. On the other hand, almost 90% of insured Americans are covered for chiropractic treatment, because licensed chiropractors, like physicians, have undergone four years of schooling.

For now, there is still no national standard for massage therapists, making it that much more important to scout out a therapist you can trust. Then again, anyone who is prepared to lie facedown and naked on an odd table in a room with a stranger has probably done that due diligence already. ◻

Kneads Test

Move beyond the popular and straightforward kneadings of Swedish or shiatsu massage, and most versions of hands-on therapy continue to fall more under the heading of "if it feels good, do it" than "because it does good, do it." Here are some approaches that it won't hurt to try, even if in most cases there is limited evidence that they offer measurable relief.

Reflexology seeks to make connections from the feet up.

Alexander technique

Named for the Australian-English actor F.M. Alexander, who developed it, this method focuses on the link between the body's posture and movements and its physical problems. Stand or move differently, the thinking goes, and you can relieve or prevent injury. Though little research has been conducted on the Alexander technique, many doctors believe it is worth a try for anyone looking to relieve chronic pain.

Feldenkrais method

Think yoga, minus the obsession with specific positioning. This technique aims for dexterous and painless body movement with the goal of building better body awareness. That makes it similar to the Alexander technique. Another thing in common? Limited research on its effectiveness.

Rolfing

This deep-tissue massage was developed by the biochemist Ida Rolf, who discovered that the connective tissue surrounding muscles thickens and stiffens with age. Rolfing practitioners use fingers, knuckles and even knees to knead that tissue in an effort to loosen it up, improving posture and realigning the body. Some people find Rolfing helpful, but be warned: it can be painful, and certain conditions—advanced osteoporosis, for example—can be made worse by the therapy.

Reflexology

Popular throughout Asia, reflexology (which traces its roots to ancient China as well as ancient Egypt) works from the assumption that specific spots on the soles of the feet correspond to various other parts of the body. Massage the foot in a certain place, and relieve pressure or tension in the neck or even the liver. Although there is scant scientific evidence of its effectiveness, reflexology can't harm you, and many people find it relaxing. After all, who isn't up for a nice foot massage now and then?

Spinal manipulation

Lots of studies have shown that spinal manipulation can treat mild to moderate back pain—and certain other conditions such as headache as well. Some chiropractors believe that they can heal many other conditions and diseases by properly aligning the skeleton, but there isn't much research to back up those claims. There are some risks, especially for those who suffer from osteoporosis or nerve damage. Those cracking sounds you may notice, however, are most likely all bark and no bite.

Many restorative traditions being used today have ancient roots. The practice of yoga may be 5,000 years old, and the use of botanical remedies reaches back to the dawn of humankind.

Natural Healing

Bend and Be Well

Modern medicine is embracing the ancient Indian discipline of yoga, which can help ease ailments ranging from back pain to heart disease

BY LESLEY ALDERMAN

HARD TO BELIEVE NOW, BUT YOGA WAS ONCE CONsidered heretical, even dangerous. As recently as a century ago, yogis in America were viewed with suspicion; some were actually thrown in jail. Today, though, most gyms offer it, many public schools teach it, and a growing number of doctors prescribe it. Yoga studios are as ubiquitous as Starbucks. It may have taken 5,000 years, but yoga has arrived.

Although yoga means "union" in Sanskrit, there are widely diverse ways to practice it. There's gentle yoga and power yoga. Iyengar and Ashtanga. Short classes and long. But almost all offerings share core elements: challenging postures (asanas), focused breathing, self-acceptance. And no multitasking allowed. The poses challenge muscles, while yoga's meditative character calms the mind. Altogether, yoga activates healthy processes (such as the rest-and-digest response) and deactivates less healthy ones (stress), bringing the body into better balance. Turns out this ancient Indian practice is a one-stop antidote to our modern, caffeinated culture. "Yoga is a systematic way to improve the function of everything in the body a little bit," says Timothy McCall, author of *Yoga as Medicine*. "Keep up the practice, and those improvements tend to deepen over time."

Some of those improvements, a growing body of research suggests, affect an array of particularly hard-to-treat medical problems, including depression, multiple sclerosis and osteoporosis. And that message is finally getting through. "M.D.s are increasingly comfortable recommending yoga for conditions ranging from lower-back pain to stress," says Baxter Bell, a physician and therapeutic yoga instructor in Oakland, Calif.

As we all know, chronic stress is no joke. Over time it can exacerbate or increase the risk of serious conditions including obesity, heart disease, diabetes, depression and gastrointestinal problems. "Unfortunately, stress is one condition our culture hasn't found a good way to treat," says Brent Bauer, director of the Mayo Clinic Integrative Medicine Program.

Just 10 minutes of yoga a day helps build bone mineral density in middle-aged subjects.

Luckily for our culture, another one has. Researchers at Ohio State University College of Medicine compared 25 novice yogis with 25 expert yogis (those who had been practicing at least twice a week for a year or more). The expert yogis had lower blood levels of interleukin-6, a marker of inflammation that often results from stress, which in turn contributes to heart disease and diabetes. In addition, IL-6 levels in the expert yogis increased less after they were subjected to stressors.

Mood disorders also seem to respond positively to yoga. While any number of medicines can boost mood and lower anxiety, too often it is difficult to come up with the right cocktail of drugs for particular patients. And the side effects can be deterring. Yoga, though, has been shown to have a Prozac-like effect on the brain. Researchers at Boston University School of Medicine, for example, monitored two groups of individuals for 12 weeks: one group walked for 60 minutes three times a week; the other spent the same amount of time doing yoga. The yoga group reported lower levels of anxiety and a greater improvement in mood. As mood rose, so did levels of GABA (gamma-amniobutyric acid), a neurotransmitter that helps promote a state of calm. (Low GABA levels, in contrast, are associated with depression and anxiety.) "Yoga may work in part by correcting imbalances in the autonomic nervous system caused by stress," says one of the study's authors, Chris Streeter, a Boston University School of Medicine psychiatrist.

A number of small studies have shown that yoga can reduce physical pain too, particularly back pain. One study compared three treatment options over a 12-week period: a weekly yoga class, a weekly stretching class and reading self-help books on back care. The yoga and stretching groups both improved significantly during and after the trial; these participants had less pain and were able to move more easily than the readers. The study's authors concluded that because the two exercise groups had similar effects, yoga's contribution to alleviating back pain was "largely attributable to the physical benefits of stretching and strengthening the muscles."

Yet the findings, which were published in *Archives of Internal Medicine*, may not tell the whole story. "All the yoga subjects did the exact same moves," notes Loren Fishman, the medical director

of Manhattan Physical Medicine and Rehabilitation in New York. "In real life, patients with back pain would be given a series of poses tailored to their diagnosis. Someone with a herniated disc would be treated very differently from someone with spinal stenosis. So the results could be even better."

Fishman brings up an interesting point. The many different versions of yoga provide an opportunity to customize therapy. So to optimize yoga's benefits, patients should first consult a doctor to help pinpoint a class or style for their specific ailment. Although a general yoga class may help with problems like stress and depression, particular problems like arthritis may well require a more specialized class or customized routine.

In any case, most yoga will help keep the heart healthy by reducing stress levels and blood pressure. A study conducted at the University of Pennsylvania found that after completing a three-month yoga course, participants with hypertension had significantly lower blood pressure. And a review of 70 studies by the Center for the Study of Complementary and Alternative Therapies at the University of Virginia found that yoga may be instrumental in improving glucose tolerance and insulin sensitivity, cholesterol and triglyceride profiles, and blood pressure, all factors that contribute to cardiovascular problems. What's more, yoga encourages heart-rate variability, which, perhaps counterintuitively, reduces heart-disease risk.

And while you are building heart health, you may be building bone strength as well. A 2009 study by Fishman found that just 10 minutes of yoga a day helped build bone mineral density in middle-aged subjects. How does yoga build bone? Bending and twisting stimulate osteocytes, the cells that make bone. Because yoga isn't a traditional weight-bearing workout, however, it shouldn't damage cartilage or lead to osteoarthritis, both common consequences of strength training.

Speaking of joint pain, rheumatoid arthritis is an autoimmune disease that causes painful inflammation of joints and surrounding tissues. Conventional treatments, including steroids, can have serious and unpleasant side effects such as heart problems and weight gain. Once again, preliminary research shows that yoga may be an appropriate alternative. An Indian study found that participants in a one-week yoga camp who practiced breathing exercises and yoga poses twice a day lowered their stress and anxiety levels and were able to perform basic tasks, including dressing and eating, more easily. What's more, the subjects' rheumatoid-factor levels, the most relevant marker of the disease, dropped. It was not clear why yoga helped reduce those levels, but the study's lead author, Shirley Telles, head of the Indian Council of Medical Research Center for Advanced Research in Yoga and Neurophysiology, in Bangalore, theorizes that the carefully designed yoga program helped "correct the imbalance in the immune system."

Yoga may provide benefits for an array of hard-to-treat medical problems, including depression, multiple sclerosis, osteoporosis and even rheumatoid arthritis.

And a Mayo study found significant positive effects on its own employees after just six weeks of a yoga-based wellness program that included nutritional counseling and meditation. In particular, the participants displayed reductions in blood pressure and stress along with an increase in flexibility. What was especially encouraging to the researchers was that the participants attended class six days a week at 5:10 a.m. in the dead of winter, yet, according to Mayo's Bauer, "we had to turn people away in droves." That, more than anything else, he says, speaks to the interest that yoga is generating as people get increasingly concerned about contributing to their own wellness.

They're making a good call. Yoga's reach extends to most corners of the body, from the nervous system to the circulatory system to the immune system. But in the end, most of yoga's advantages are a result of its overall calming influence. "Yoga is about learning to be where you are in this moment and not trying to be somewhere else or in some other body," says Barbara Verrochi, a co-director of the Shala Yoga House, a New York studio. After a few months of yoga, there may be no other body you'd rather be in. ☐

The Healing Power of Cannabis

Recent research shows that pot has promise in treating many ailments, including seizures, PTSD, nausea and especially pain

BY ALEXANDRA SIFFERLIN

WHEN DR. ORRIN DEVINSKY DECIDED HE WANTED to study whether cannabidiol—a compound from cannabis also known as CBD—could help people who suffer severe seizures, he didn't realize just how difficult a feat it would be. Coming up with how the study would be conducted was the easiest part. Ultimately, the researchers would study whether taking CBD over a 14-week period could reduce seizure frequency in children and adolescents with Dravet syndrome—a rare and severe form of epilepsy.

After Devinsky, the director of the Comprehensive Epilepsy Center at NYU Langone Health, and his colleagues got approval for the research from NYU and the U.S. Food and Drug Administration, the team applied for approval from the U.S. Drug Enforcement Administration (DEA). "The DEA sent men with guns to my office to inspect," recalls Devinsky. Whatever room the CBD was to be kept in needed to have a secure lock. Not only that, but the hospital itself had to have a special alarm system. The researchers had to keep the cannabis in a specific kind of safe that was so large that the university had to bring in engineers to ensure its weight wouldn't cause it to cave into the floor. The DEA then returned to inspect the safe and the building's security system one more time.

It may seem excessive, but all the regulatory hurdles that Devinsky and his team had to clear are standard when it comes to studying marijuana, which the federal government still considers an addictive and easy-to-abuse substance. "It's a big deal every time the drug gets sent in," says Devinsky.

So far, the results of Devinsky's studies indicate that CBD is in fact an effective treatment. In a 2017 study published in the *New England Journal of Medicine*, the team reported that CBD reduced by 39% the number of seizures experienced by patients with Dravet syndrome. CBD, which does not contain the psychoactive attributes that induce a high, has been shown in studies to act as an anticonvulsant. "I think we've established that the drug works," says Devinsky. "For some people the effects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are superb, and some are mild to moderate." Yet despite these results, the drug remains incredibly difficult to study. That's because marijuana is still classified as a Schedule I drug in the United States.

Many researchers who study cannabis, including Devinsky, argue that the label does not match the science. Many of the compounds used in studies for therapeutic purposes do not contain THC, the compound in marijuana that gives people a high and that authorities may find objectionable. Part of what may make cannabis compounds effective medicine are the more than 60 cannabinoids they contain that interact with the body's central nervous system and provide relief from a variety of conditions. "I think the Schedule I classification is insane and nonscientific," says Devinsky. "We have so much data showing that CBD is not an addictive drug. It's certainly safer than so many drugs that are not scheduled at all." Such as alcohol, he points out.

In the U.S., 33 states and the District of Columbia have legalized marijuana for medical use, and patients are using cannabis-based products for a wide range of ailments, from seizures to PTSD to chronic pain. The growth of the medical-marijuana market and its legalization suggest a changing tide of social acceptance. "I think cannabis has gone from a plant that can produce compounds for spasms to a promise being realized," says Devinsky.

While he was co-owner of the Northwest Patient Resource Center medical-marijuana dispensary, Jake Dimmock worked with flowering plants in a grow room in Seattle.

Marijuana is still classified as a Schedule I drug in the United States. But some researchers who study the complex chemistry of cannabis argue that the label does not match the science.

But this transformation has not been seamless. Not all scientists can afford to do this research, which in addition to applying for approval requires special security systems, safes and other expensive protocols. Devinsky says his team still wants to know if CBD is helpful for other people with epilepsy and whether the types of compounds and oils that people are buying from state dispensaries are safe and effective. Unfortunately, that type of research is impossible under the current system.

In the meantime, research is continuing to show that medical cannabis has value. In January 2017, the National Academies of Sciences, Engineering and Medicine released a committee review of all research on the health impacts of cannabis since 1999. Its finding? Marijuana can bring about therapeutic effects for a number of ailments, especially pain.

And the drug looks promising for more than just pain. For adults with multiple-sclerosis-related muscle spasms, the researchers noted, there was substantial evidence that short-term use of man-made cannabinoid-based medications lessened symptoms. And for people with cancer, certain oral cannabinoids were effective at preventing chemotherapy-induced vomiting and nausea.

"No one has died from an overdose of cannabis," says Donald Abrams, a professor of clinical medicine at the University of California, San Francisco, who has studied the health effects of marijuana and was on the committee that conducted the review. "There's abundant evidence that it is a useful intervention for chronic pain, and we may see it's useful in harm reduction."

Cannabis's potential in reducing pain has led some experts to recommend it as an alternative to addictive painkillers, such as opioids. Since 1999, overdose deaths in the U.S. involving opioids (prescription painkillers and heroin) have increased sixfold. A 2015 analysis published in the *Journal of the American Medical Association* reported a 30% or more reduction in pain from cannabinoids, compared with a placebo. Studies suggest that cannabinoids interact with receptors in pain centers in the brain and spinal cord and may have anti-inflammatory effects. States that have legalized medical marijuana have seen drops in opioid-related deaths.

What's interesting is the effect that legal medical marijuana has on doctors' prescriptions. In a

In states where medical marijuana is legal, doctors write fewer prescriptions for opioid pain medications.

2016 report in the journal *Health Affairs*, W. David Bradford, the Busbee Chair in Public Policy in the Department of Public Administration and Policy at the University of Georgia, and his co-researcher and daughter Ashley C. Bradford looked at data on prescriptions filled by Medicare enrollees from 2010 to 2013 and found that older people who qualified for Medicare were, where appropriate, making use of medical pot. Not only that, they also found that when states legalized medical marijuana, prescriptions dropped significantly for painkillers and other drugs for which pot may be an alternative.

There's evidence suggesting that elderly people may benefit from the drug. A 2018 study by Israeli researchers published in the *European Journal of Internal Medicine* found that using cannabis not only is safe for people over 65 but also may help symptoms of a variety of conditions. The study authors followed 2,736 people ages 65 and older who were using the drug to treat health problems (most were taking it for pain and cancer). The men and women filled out questionnaires about their experience six months after starting treatment: nearly 94% said their condition had improved, and the level of pain had decreased for most from around an 8 out of 10 to a 4. At six months, about 18% of the people in the study either had stopped taking painkillers or had reduced their dose.

The researchers write that "the therapeutic use of cannabis is safe and efficacious in the elderly population." There were only a small number of reported side effects, and all were minor, including dizziness and dry mouth. "What we hope people take away from this is that when marijuana becomes available as a clinical option, physicians and patients together are reacting as if marijuana is medicine," says Bradford.

As for Devinsky, he plans to continue his research. He argues that, as with any other drug, scientists need to fully understand marijuana's efficacy and safety. "We are getting to the bottom of it," he says. "But we are not there yet." ◻

Excerpted from TIME's Marijuana: The Medical Movement. *Available at retailers and on amazon.com.*

The Facts About Weed

Rx History

1500 B.C. Earliest written reference to marijuana in Chinese pharmacopeia. The plant's medicinal uses were also extolled in records from ancient India, Egypt, Persia, Greece and Rome.

1842 Irish physician William O'Shaughnessy's clinical studies of cannabis find it to be an effective muscle relaxant and anticonvulsive.

1860 First U.S. government survey of the cannabis medical literature reports that the plant is helpful for pain, bronchitis, venereal disease and postpartum depression.

1915 Canadian physician Sir William Osler, often referred to as the "Father of Modern Medicine," calls cannabis "the most satisfactory remedy" for migraines.

1996 California becomes the first state to legalize cannabis for medical purposes.

By the Numbers

94% of Americans favor legalization of medical marijuana.

23 conditions qualify for a medical- marijuana card in Pennsylvania.

92% of pediatric oncology providers surveyed in Illinois, Massachusetts and Washington said they would help children with cancer get medical marijuana.

$165 million was saved in Medicare prescriptions in 2013 by states that had legalized medical marijuana.

44% of patients with a severe type of epilepsy were helped by a marijuana-based drug called Epidiolex; the drug won FDA approval in 2018.

Under Study

Studies suggest that a compound in marijuana might slow the progression of Alzheimer's. Other research is looking into whether marijuana might mitigate brain damage from stroke or concussions.

Marijuana is often used to treat PTSD, but not all experts feel that there is sufficient evidence to support its use for this condition. Further research is attempting to determine whether it works and, if so, how.

Studies in Israel show promising results in using cannabidiol to treat children with autism. Preliminary evidence suggests that it may help improve social interactions and reduce repetitive behaviors.

Plants with Benefits

Plants were the original medicines. Long before FDA-approved pharmaceuticals and synthetic vitamins, people relied on leaves, seeds and flowers as the best lines of defense against illness. Every culture had its favorites, and we can learn something from each. However, many have yet to be subjected to rigorous study, so we still don't know how safe and effective they are, both in general and for each individual with his or her particular needs. Ancient claims are not the same as scientific proof. Before adding any herbal product to your routine, do your research about possible side effects and interactions it might have with prescription drugs. And consult your caregivers before taking the plunge.

Ayurvedic

Ayurveda, "the study of life," is a Hindu system that dates to 300 B.C. Taking into account personality, pulse and habits, it is the original holistic approach. In India, Ayurveda is still practiced by 80% of the population, but its complexity and controversy (some of its herbs contain toxins) keep it outside the Western mainstream.

Ashwagandha
"That which has the smell of a horse" is said to offer the vitality and sexual energy of a stallion.

Gotu kola
This is used to revitalize nerves and brain cells—and thus supposedly to increase intelligence, memory and longevity.

Shatavari
Also known as asparagus root (no relation to the vegetable), it is used to treat fertility and menopause problems.

Amla
One of these walnut-size fruits has the vitamin C of 10 oranges.

Chinese

Another ancient holistic system that continues to evolve, Chinese medicine counts herbal remedies and acupuncture as primary elements. The herbs—more accurately "medicinals," as they often include minerals and animal parts—are almost always used in combination.

Ginseng
One of the most popular of all herbs, it is said to boost energy, ward off mental decline and aid digestion.

Bupleurum
This herb is used for a variety of liver diseases, including cirrhosis and hepatitis.

Fo Ti
A restorative, this tonic herb is said to strengthen the lower back, darken gray hair, and nourish semen and blood.

Astragalus
Also known as yellow vetch, it purportedly bolsters the immune system. There are claims that it helps digestion and the lungs.

Native American

To the early indigenous populations of North and South America, plants, stones and animals provided as much healing information as any of today's medical tomes. Their herbal remedies tended to be antimicrobial.

Goldenseal
Used as an antibiotic and to clear the GI tract of harmful yeast and bacteria, it may have anti-mucus properties as well. It's not safe for children or pregnant or lactating women.

Saw palmetto
This small palm has a reputation for treating prostate problems, but studies yield conflicting results. It is also used for impotence and upper-respiratory problems.

Echinacea
An antibiotic, echinacea is said to activate white blood cells. It's a popular treatment for the common cold, though studies have generally failed to confirm its effectiveness.

Chaparral
Claimed to offer antiviral, antifungal and antibacterial protections on top of an anti-inflammatory action, it can be dangerous, causing serious liver damage if not prepared properly.

European

Old World herbs have often served as a bridge between older, Eastern holistic traditions and the symptom-based approach of modern medicine. They are prescribed primarily as antidotes for the excesses of modern living.

St. John's wort
It has been shown to treat mild depression, but this herb also interferes with some prescription drugs.

Celandine
This herb is used as an all-purpose liver remedy as well as a treatment for gout and insomnia.

Chamomile
Used to calm the nervous system and digestive tract, this well-known plant is popular as a tea.

Fennel
This aromatic is said to relieve intestinal bloating and gas, including in babies being breastfed.

Common Ground

Several broad-based herbs span most traditions, though they often have different names in different cultures.

Comfrey
Also called knitbone because of its reputation for healing fractures, it is for topical use only and can be toxic if taken internally.

Ginger
A digestive that dissolves mucus, this popular herb is used to treat nausea, vomiting and motion sickness.

Barberry
Said to dissolve kidney stones and relieve gout, the plant is considered a digestive by the Chinese.

Angelica
The Chinese variety (dong gui) is considered a first-line treatment for problems related to menstruation and pregnancy.

Nothing to Sneeze About

It's true: global warming is making seasonal allergies worse than ever. Turns out some of the best weapons against this itchy future may be ancient ones

BY BRYAN WALSH

THE SPRING OF 2019 (LIKE MANY SPRINGS IN THE past 25 years) was a great one for fans of preternaturally warm weather and prematurely budding flowers. It was significantly less so for any of the roughly 40% of Americans who suffer from seasonal allergies. According to a report from the Environmental Protection Agency, warmer temperatures between 1995 and 2015 have lengthened the allergy season by up to three weeks by pushing oak and elm trees—two of the most notorious offenders for spring allergies—to sprout earlier in the year. And that meant millions of Americans found themselves sneezing and sniffling, blowing their noses and dabbing at watery eyes well ahead of schedule. As Alvin Sanico of Johns Hopkins Hospital says, "People were caught by surprise."

Nature's global-warming-induced practical joke is just the latest reminder of how tough allergies can be to control. The annual costs of asthma and allergic rhinitis in the U.S. are already estimated at $60 billion. On the day the antihistamine Allegra became available over the counter in 2012, manufacturers shipped more than 8 million pills. And now we can't even predict when hay fever and its vexing relatives will come knocking? Something that is so common, so annoying and so unpredictable is bound to have desperate victims seeking relief wherever they believe they can find it. In fact, allergy sufferers have been quick to turn to alternative-medicine options in significant numbers—upwards of 1 in 4 of them, according to a 2011 study. But the question, as always, is: Are any of those treatments more than uncertain (as well as unregulated) hope in a bottle?

The short answer is yes, particularly if that answer includes "butterbur." Butterbur is an herb whose roots were made into a remedy for headaches and inflammation by Native Americans. Today you can buy tablets of it over the counter. In a 2002 study published in the *British Medical Journal*, Swiss researchers showed that one tablet taken four times daily can be as effective as

BUTTERBUR AND STINGING-NETTLE TEA: *Butterbur works by inhibiting inflammatory compounds; stinging nettle, which is rich in vitamins and minerals, can be made into tea or eaten as a vegetable.*

MELONS AND RAGWEED: *Oral allergy syndrome can cause people with pollen allergies, such as those to ragweed, to also experience symptoms when eating certain raw fruits or vegetables, including melons.*

the popular antihistamine cetirizine (brand name Zyrtec) in controlling symptoms of hay fever, and without the drowsiness that's often associated with this kind of allergy medicine. Another study found that butterbur worked as well as the antihistamine fexofenadine (Allegra) at relieving sneezing, congestion and itchy eyes.

Like conventional antihistamines, butterbur seems to block the effects of histamine and leukotrienes, those inflammatory chemicals that are activated by allergens and trigger the runny noses and watery eyes that every hay-fever sufferer dreads. Another substance, a natural antioxidant called quercetin, works in a similar way. Quercetin appears in some foods, like red apples, but it is also available in supplement form (a typical dose is 200 to 400 milligrams three times a day).

Other natural remedies that have been found to offer some relief include stinging nettle, which you can eat like spinach or consume in capsules or tea, and goldenseal, an herb with quite a memorable nickname: "king of the mucous membranes." "King" may be a bit strong, but goldenseal does reduce inflammation and mucus production in the eyes, sinuses, nose and throat. Avoid it, though, if you have cardiovascular problems—berberine, one of the herb's active ingredients, can disrupt heart rhythms. Pregnant or breastfeeding women also need to stay away from it, and infants given goldenseal have developed a rare but serious neurological condition known as kernicterus.

Girding against the seasonal onslaught of allergens isn't just a matter of what you ingest. Hay-fever victims and other weed-pollen sufferers can benefit from what they don't put into their bodies. Melons, cucumbers, bananas, chamomile and supplements that contain echinacea—a popular herbal treatment for colds and other respiratory infections—can often trigger the same allergic reactions that ragweed pollen does. In fact, echinacea is a member of the same botanical family as ragweed. What's more, it is not even certain that echinacea does what it is supposed to do—prevent or alleviate colds.

It is a case study in the difficulty of establishing effectiveness in herbal remedies. Studies in 2005 and 2006 found no evidence that echinacea could prevent colds, but the latter study did turn up findings (albeit inconsistent ones) that echinacea might lessen a cold's length and symptoms. A 2010 study that compared echinacea to a placebo and to no treatment at all found evidence that echinacea outperformed both when it came to reducing the duration of the common cold—but these benefits were too small to be considered statistically significant. In a 2014 review, however, researchers credited echinacea with "small preventative effects," and a 2015 review gave echinacea a full-throated endorsement, concluding that it could reduce a person's risk for colds by 35%. Whew!

Natural remedies may offer some relief from seasonal allergies. But such allergies, like the common cold, can only be managed; they are never really defeated.

Herbal medicines and dietary restrictions fall woefully short when your head is a cement block of congestion, though. Many clogged sufferers are inclined to head straight for a decongestant nasal spray or pill, but those can come with side effects like drowsiness, and they can even worsen symptoms if they're used more than three days in a row. An old-time alternative, the neti pot, may be a better solution. Resembling a small plastic teapot and usually selling for around $10, the neti pot makes it easy to snort warm saline water, which irrigates the sinus cavities and shrinks the sinus walls, thus relieving congestion. Rinsing nasal passages with a saline-water solution can also flush out the tiny particles that trigger allergies, says Stephen Tilles, past president of the American College of Allergy, Asthma and Immunology. "This is dramatically effective for a lot of patients, and it's a very reasonable, safe and well-tolerated option," he says.

In fact, a study at the University of Michigan found that adults with chronic nasal and sinus problems who were treated with irrigation had better results over a two-month period than those on a conventional spray. It has reduced the need for steroid sprays in kids with allergies too. The FDA recommends always using distilled, sterilized or boiled water in neti pots, as tap water can contain micro-

organisms that are safe to swallow but can be dangerous in the nasal passages.

Common sense says the best allergy treatment, alternative or otherwise, would be to avoid whatever irritant causes the problem. Few doctors would counsel a hay-fever sufferer to take a stroll through a cloud of pollen. But you may have heard of an alternative treatment known as homeopathy, which is actually built on the theory that "like cures like"—that is, consuming a bit of a substance that causes disease in healthy people can cure that disease in the sick. Conventional practitioners regard homeopathy with a skeptical eye, and you can't blame them. With the active ingredients in these remedies diluted to 1% or far less, it does seem a stretch to think they could have much of a medical effect. And few if any placebo-controlled studies have proved otherwise.

A more reasonable alternative is acupuncture. The ancient Chinese medical art is better known as a treatment for pain, as the piercing needles signal the brain to release morphine-like neurotransmitters known as endorphins. But endorphins may also help people with asthma or hay fever breathe easier. In a 2004 study published in the journal *Pediatrics*, school-age allergy sufferers who underwent a regular course of acupuncture had better symptom scores and more symptom-free days, both during treatment and afterward, than those given a placebo acupuncture therapy. (The placebo treatment involved the insertion of needles to much shallower depths than with actual acupuncture.) It's notable that the kids in the study said they preferred oral medications to acupuncture—probably because not everyone is eager to be poked with needles. Also, aside from this one, studies that show a significant benefit against allergies from acupuncture are rare.

As people with allergies know all too well, a "significant benefit" is often too much to ask for. Like the common cold, seasonal allergies can only be managed; they are never really defeated. That was demoralizing enough before recent climatic realities ramped things up. Early springs surprise us now, but they're likely to be routine before long, so seasonal allergies are almost certainly going to worsen. And premature discomfort is just the half of it: a study in the *Proceedings of the National Academy of Sciences* showed a strong link between increasing temperatures and a longer ragweed-pollen season.

But then, all the wet, red eyes staring at this page seem to say that this isn't exactly news. ◻

Allergist's Restaurant: *A Dining Guide*

Diet can make a difference for nearly everything that ails us, so why not allergies? Here are five healthy foods that have been shown to minimize the agony of seasonal sufferers

By Bryan Walsh

Nuts

A 2007 study found that children from the island of Crete who ate a Mediterranean diet—fresh fruits and vegetables, fish, olive oil, nuts—were less likely to develop allergy and asthma symptoms. Explaining the first four items is easy: studies show that a diet high in antioxidants (fruits, veggies, olive oil) and omega-3 fatty acids (fish) can ease seasonal allergy suffering. But what do nuts have to do with it? Well, they are rich in magnesium, which helps protect against the wheezing that accompanies asthma, and vitamin E, which boosts immunity and protects against free radicals, those floating molecules that cause inflammation. The study offers support for the idea that the protective effects of the foods we eat may be especially apparent in children because their growing airways may be vulnerable to stress. Food for thought: 80% of the kids ate fresh fruit and 70% ate fresh vegetables at least twice a day.

Fish

Omega-3 fatty acids in seafood have natural anti-inflammatory effects that boost the immune system—which is helpful, given that allergies occur when your immune system is out of whack. In a study of expectant moms, researchers found that those who ate fish during pregnancy reduced the risk that their children would develop asthma or allergic diseases. The kids whose moms ate fish once a week or more were less likely to have eczema than children of mothers who never ate fish. Not a fan of fish? Try omega-3 and algae supplements or fish oil to boost your defenses.

Apples

In the Crete diet study on nuts, researchers also found that people whose diets included apples as a staple had greater protection against both allergies and asthma. Apples are rich in quercetin, a flavonoid with anti-inflammatory properties. But don't peel them—much of the benefit comes from the skin, which is also packed with antioxidants called polyphenols that help prevent cell damage. Another study found that pregnant women who ate apples reduced their children's risk of developing asthma. Kids whose moms ate the most apples during pregnancy were the least likely to report wheezing or to have asthma.

Grapes

The skin of red grapes is high in antioxidants and resveratrol, another anti-inflammatory compound. Reducing inflammation throughout the body can go a long way toward lowering the impact of allergies. It also helps reduce the risk of heart disease and other cardiovascular problems, which have been connected to inflammation. Stick with red grapes, though. Green, purple, white, blush . . . no other color is as rich in either antioxidants or resveratrol.

Tomatoes

Whether you eat them fresh or in sauce or paste, tomatoes are high in vitamin C, and studies say that can help build tolerance against asthma and respiratory problems. Vitamin C is an immune-system booster and a natural antihistamine, but it also suppresses swelling. Plus, tomatoes contain lycopene, another antioxidant compound. A study from the University of Tel Aviv found that men who added 30 milligrams of lycopene to their daily diet improved their ability to fight off asthma attacks by 45%. In another study, Spanish children who consumed more than 40 grams of fruity veggies a day—including eggplant, cucumber and zucchini—were much less likely to suffer from childhood asthma than those who ate less.

18+

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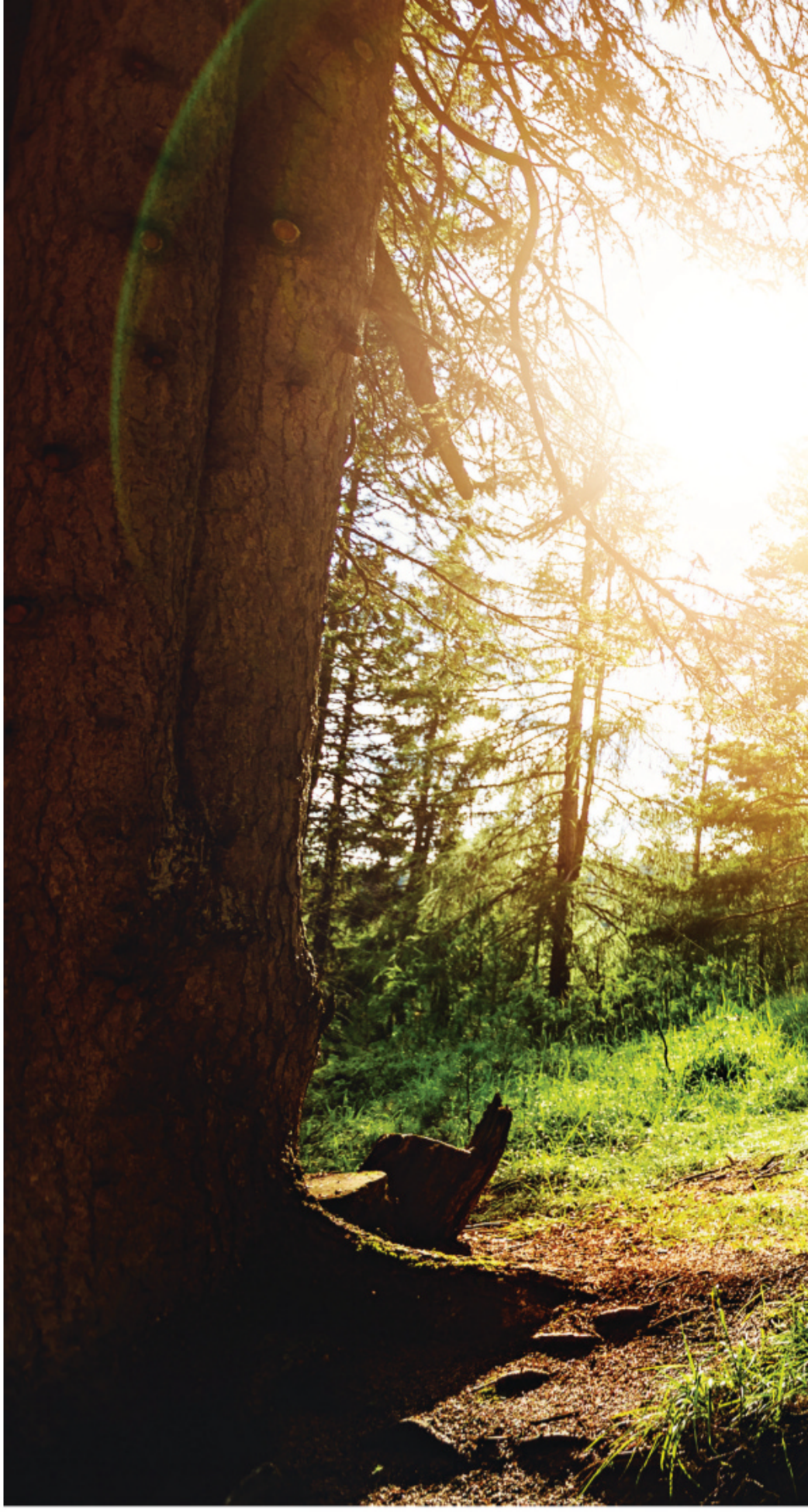
Let Nature Heal

A walk in the park will boost your health. It can make you happier too

BY JAMIE DUCHARME



SPENDING TIME OUTDOORS, ESPECIALLY IN GREEN spaces, is an effective way to improve your health and happiness. It's been shown to lower stress, blood pressure and heart rate while encouraging physical activity and buoying mood and mental health. Some research even suggests that green space is associated with a lower risk of developing psychiatric disorders.

A recent study published in the *International Journal of Environmental Health Research* adds to the evidence and shows how little time it takes to get the benefits of being outside. Spending just 30 minutes in a park—even if you don't exercise while you're there—is enough to improve well-being, according to the research.

For the study, researchers surveyed 94 adults who visited one of three urban parks near Birmingham, Ala., over the summer and fall. They were given fitness trackers to measure physical activity but were not told what to do in the park or how long to stay. Each person also answered questions about their life satisfaction and mood—which were used to calculate a score of subjective well-being before and after their park visit.

The average park visit lasted 32 minutes, and even though just 30% of people engaged in physical activity while there, well-being scores rose during the park visit in 60% of people. For a substantial number of people in the study, simply being in green space seemed to be enough to spark a change, says study co-author Hon Yuen, director of research in the occupational-therapy department at the University of Alabama at Birmingham.

"Some people may go to the park and just enjoy

nature. It's not that they have to be rigorous in terms of exercise," Yuen says. "You relax and reduce stress, and then you feel more happy." And that's certainly not to diminish the value of more strenuous exercise. Health professionals are unanimous in advocating for physical activity that gets your heart pumping faster. There is also plenty of research that comes to the conclusion that while exercising is good for mental health, exercising outside is even better.

It is for all of these reasons that the medical community is increasingly viewing green space as a great place where their patients can reap physical and mental health benefits. Some physicians, like Robert Zarr, a pediatrician in Washington, D.C., are even writing prescriptions for it. These "nature prescriptions"—therapies that are redeemable only outdoors, in the fresh air of a local park—advise patients to spend an hour each week playing tennis, for instance, or exploring all the soccer fields near their home. The scrips are recorded in his patients' electronic health records."There's a paradigm shift in the way we think about parks: not just as a place for recreation, but literally as a prescription, a place to improve your health," says Zarr, who writes up to 10 park prescriptions per day. In 2017 he founded

Doctors are writing their patients "nature prescriptions" to promote outdoor activities.

Park Rx America to make it easier for health professionals to write park prescriptions for people of all ages, particularly those with obesity, mental-health issues or chronic conditions like hypertension and Type 2 diabetes.

By writing nature prescriptions—alongside pharmaceutical prescriptions, when necessary—physicians are encouraging their patients to get outdoors and take advantage of what many view to be free medicine. The specificity that comes with framing these recommendations as prescriptions, Zarr says, motivates his patients to actually do them. "It's something to look forward to and to try to feel successful about," he says.

In 2018, NHS Shetland, a government-run hospital system in Scotland, began allowing doctors at 10 medical practices to write nature prescriptions that promote outdoor activities as a routine part of patient care. And in recent years, organizations with the goal of getting people outside for their health have proliferated in the U.S. The National Park Service's Healthy Parks Healthy People program promotes parks as a "powerful health prevention strategy" locally and nationally. Walk with a Doc, which sponsors free physician-led community walks, is now in 48 states (and 29 countries), and Park Rx, which has studied and tracked park-prescription programs since 2013, says these are now in at least 34 states and Washington, D.C. Even mental-health professionals are going green. A growing number of "ecotherapy" counselors conduct sessions outdoors to combine the benefits of therapy and nature.

Plus, these unusual prescriptions are the prettiest you'll ever fill—a fact that Betty Sun, program manager at the Institute at the Golden Gate, which runs Park Rx, says encourages people to actually do them. "With social media and Instagram, when you see your friends going out to beautiful places, you want to go too," Sun says. "It's about making a positive choice in your life rather than a punitive choice—like 'You're sick; take a pill.' It just seems so much more supportive." ◻

Will Any Green Space Do?

Quality matters. So do your goals

By Abigail Abrams

Taking the nature cure can sometimes feel like a tall order. Not everyone has the means to stroll on stunning beaches or hike to awe-inspiring views of mountain valleys. The good news is that neither is necessary. At least, not exactly. Studies suggest that nearly any green space can boost your well-being, as long as it meets certain criteria.

The quality of the green space seems to matters more than the quantity. In one recent study in the journal *BMC Public Health*, researchers found no significant link between the amount of green space in an individual's local area and their mental well-being. Merely having vegetation doesn't guarantee a positive experience, explains study author Victoria Houlden, at the University of Warwick in England.

Although Houlden's study used census units to measure how much green space people had access to, individuals don't stick to government-assigned districts in real life. They may frequent a park near their office or go out of their way to play sports in a neighboring town. "The relationship between green space and mental well-being is more complicated than an arbitrary sense of boundary," Houlden says.

In another recent study, a group of researchers in the Netherlands found that people who think of their local green spaces as more accessible and usable felt more satisfied with their neighborhood, regardless of the amount of green space they had. But they also reported better mental health and more emotional attachment to local greenery when they had higher-quality green spaces.

So what makes a green space high-quality—and therefore more healthful? Some research has linked health effects to specific types of green spaces—broadleaf woods, parks that feature water and areas with significant biodiversity, for example. Aesthetic factors can be important.

But that's not the last word. Andrew Lee, a public-health researcher at the University of Sheffield in England who has conducted large reviews of green-space research, says the functionality of parks is paramount for making people feel happy. "If it's a social space, where people meet together and chat and go on walks, that kind of social contact and interaction builds social networks," Lee says. "That's probably where the real impact is coming from that gives people a sense of well-being." On the other hand, if a green space is difficult to get to, has poor lighting or is not clean, it may be seen as unsafe or inaccessible and probably wouldn't boost a visitor's mood, explains Lee.

People may also experience the benefits of green spaces in unique ways, says Sarah Bell, a lecturer at the University of Exeter's European Centre for Environment and Human Health. "It doesn't necessarily come naturally to people," Bell says of nature appreciation. Sudden health changes, the end of a job or something that causes a high level of stress can make nature more important to people, she says.

The secret to using nature as a mood booster in these situations, Bell says, is to find activities in a green space that match your own individual preferences, personality and goals.

The social function of green spaces may matter more than size.

Kids on Alternative Medicine

Adults seek out alternative treatments for many reasons, including the health and well-being of their children, especially when there are few other options

BY KATHRYN SATTERFIELD

I GREW UP IN A FAMILY THAT EMBRACED CONVENtional medicine, getting vaccinations on time, attending all appointments on schedule and following doctors' orders closely. That began to change when my first son was born. On his third day of life, doctors at Yale New Haven Hospital saw physical anomalies that indicated he could have issues and ordered genetic testing. Six months later, they told us he had 150 or so extra genes on his 15th chromosome. They also noted that, upon reviewing the literature, they could find only a handful of similar cases. We were dealing with an unknown syndrome. The kindly but ill-prepared geneticist couldn't say what this meant for our son, only that he would be mildly to severely delayed. "What can we do?" I cried. "Go home and love your baby," he said.

Several months later, our pediatrician, who specialized in neonatal-perinatal medicine, patted my hand when I expressed concerns about my son's seemingly incurable congestion and resulting asthmatic episodes, and the subsequent prescriptions for steroids. "You have enough to worry about," he'd tell me. Conventional medicine wasn't giving me any answers. Thus began an ongoing journey to treat my son with alternative options. Throughout the years, I've tried craniosacral therapy. Hippotherapy. Swim therapy. Speech and occupational therapies, which he continues today. Nutritional supplements. Essential oils. I applied for a service dog, hoping she would keep him calmer. And yet I haven't turned my back on modern medicine. I vaccinate him on a modified schedule. He has an inhaler and nebulizer for the asthma. Both he and his younger brother have regular checkups, take antibiotics when they have an infection and get a flu shot every fall.

Though my son's primary diagnosis itself may be unique, incorporating alternative medicine into his care is not. A recent survey by the National Center for Complementary and Integrative Health (NCCIH) revealed that approximately 12% of children ages 4 to 17 had been given some form of com-

plementary health product or practice in the previous year. In children living with chronic illness, including asthma, ADHD and migraines, the number increased to more than 50%. Among the most common treatments were herbal medicines and probiotics, osteopathic or chiropractic manipulation, and yoga, tai chi or qigong.

Interest in the field of pediatric integrative medicine has increased as parents and physicians seek out options when treating children with chronic illness; there is the desire to reduce frequency and duration of pediatric prescription medication use, and there's a need for more effective approaches to preventive health in children. The NCCIH's mission, after all, applies to children as well as adults.

But what does this look like in practice? At St. Jude Children's Research Hospital in Memphis, Tenn., researchers are exploring the use of virtual reality as a "distraction technique" for children and teens suffering from the painful episodes of sickle cell disease. As part of an ongoing study, the hospital has partnered with the Methodist Comprehensive Sickle Cell Center to study the use of immersive virtual-reality sessions—exploring an ocean habitat while swimming alongside tropical fish, friendly seals and dolphins, for example—as a complement to the pain meds. While receiving IV medications, patients enter an interactive 360-degree underwater world where they can launch multicolored bubbles at passing marine life and other objects such as treasure chests. It is an opportunity, explains Doralina Anghelescu, director of the hospital's pain-management service, for St. Jude to "be on the front line and be a champion for this new concept of integrative medicine."

Treatments don't need to be high-tech to make a difference. At Nationwide Children's Hospital in Columbus, Ohio, the behavioral-health group has developed a complementary treatment for patients struggling with anxiety. For 90 minutes a week for six weeks, "skill building" sessions teach children sensory-based and mindfulness-based activities including mindful movement. Each session ends with a guided meditation. "I'm a licensed professional clinical counselor, but I'm also a yoga instructor, so I combined forces," says Gina McDowell, a behavioral-health clinical educator who developed the program. Most of the participants also met weekly with their assigned therapist or psychiatrist; some were on medication. "A lot of these kids had been discharged from a hospitalization. So we used it in conjunction with other treatment and found that combining all those things together has the best results," McDowell says.

The program draws not only from yoga but also from various techniques based on sensory check-ins. "It helps establish the mind-body connection and grounding," she says. "What we have found is that a lot of kids with anxiety or emotional dysregulation do very well with sensory activities. It helps calm everything down. It doesn't necessarily fix the problem, but it helps them regulate enough to a point that they can get through it." They are also given homework to consistently practice the techniques throughout the week, while they are calm and not in crisis. The goal is to make it their "new norm." As McDowell notes, "We have kids that have said, 'I was at school and was in a large crowd and started to panic, but I was able to use deep breathing or pull out a sensory item that was really helpful to me.' They've figured out beforehand what works, and then they can use it in the moment."

The program has produced measurable results. Kids reported a 24% reduction in anxiety, and parents reported a 29% reduction in their child's anxiety upon completion of the group sessions. "We've really found that mindfulness is so beneficial no matter what we're dealing with, no matter the diagnosis—even physical diagnoses," McDowell says.

In 2017, the American Academy of Pediatrics (AAP) updated its statement on complementary medicine. The organization noted that "consumer interest in and use of complementary therapies has outpaced training options in pediatric integrative medicine, leaving pediatricians with a desire for more training and familiarity with resources." For example, a 2012 survey of academic pediatric training programs revealed that only 16 of 143 programs reported having an integrative-medicine program. In response to this gap, conventional pediatric residency training is being expanded to include pediatric integrative medicine. One example is the Pediatric Integrative Medicine in Residency program through the University of Arizona. Other teaching initiatives are underway in medical schools affiliated with the Academic Consortium for Integrative Medicine and Health.

"It's important for conventionally trained doctors to have an understanding," says Joy Weydert, of the AAP's Section on Integrative Medicine. "Rather

Immersive virtual-reality and relaxation techniques are being used to help ease pain.

than say [to parents], 'That's stupid'—which some doctors do—they can say, 'Tell me more about your experience with that.' They can at least learn from their patients' experiences, which may be helpful to another family." Too often, says Weydert, there is too little exchange of information and families seek complementary treatments only as a "last-ditch effort" after they have exhausted all conventional approaches. "I saw this so frequently."

Though interest among physicians continues to grow, Weydert still sees resistance. After all, medicine is a scientific field that demands hard evidence from clinical trials. "Little by little as physicians we're starting to do the research to show the effectiveness" of natural remedies, she says.

Weydert would like to see conventional physicians working alongside their patients to come up with solutions to health problems when there seems to be none. This requires time—listening to their story, getting a diet history, asking what they've already tried—and an open mind. Is the child getting enough vitamins and minerals? How does the child's gut function?

Alternative medicine—especially when it is for kids—should be a collaboration. Parents know their children best, says Weydert, but "pediatricians may have knowledge about potential interactions between dietary supplements and the child's condition or medications. The pediatrician may also have access to clinical studies that support the safety and efficacy for these natural [treatments] so that they can be used with confidence."

By listening and asking questions and taking into account a wide range of factors, Weydert, while she was in clinical practice, was able to help families who had long been searching for help. When a dietary change or other action finally made a difference, explains Weydert, "they would ask, 'Why aren't there more physicians like you out there?' " For Weydert, the answer is clear, and so is the solution: "So what I'm trying to do is reach the doctors who can reach them." □

Minds Matter

It should be no surprise—and yet we still marvel—that the mind is so intimately connected to the body. Neuroscience confirms that our minds have the power to calm, strengthen and, quite literally, heal.

Training the Mind to Reduce Stress

Our hurried, harried lives can make us sick. By changing the way we think, we can take our brains in a different direction. And where the brain goes, the body tends to follow

BY ALICE PARK

WHAT'S THE FIRST THING YOU THINK ABOUT when you wake up each morning? Chances are, before you open your eyes you're already focused on the dozens of responsibilities that await you. Maybe your to-do list starts simply, with getting yourself ready for work or packing the kids off to school. But somewhere in those first split seconds you also begin to dread the commute or fret about whether the cable guy is actually going to show up this time. Then there's that nagging pain in your tooth that says you shouldn't put off a visit to the dentist any longer. And don't forget that you need to call your mother to see how Dad is doing after hip surgery. You're not even out of bed, and you're already mentally exhausted.

As the clutter of thoughts tumbles into consciousness, your physical plant gears up accordingly. Nerve circuits in your brain trip an alarm, letting the rest of your body know that harrying times are ahead. Hormones tip your heart to pump faster. The immune system slows its patrol for invading pathogens so that it can cede its share of the body's energy store to other precincts that need to be primed for the impending onslaught. Muscles pull in more oxygen, readying for action. Senses go on high alert.

Somebody might as well have scribbled "Stress was here" across your forehead. And this is on a relatively manageable day. Imagine the toll that stress can take over time. Unchecked, those metabolic changes can cause serious ailments, from high blood pressure to obesity to heart disease. Long-term stress also runs down cells, tissues and organs, making them degenerate before their time. Clearly, when it comes to your fitness, the brain is as important as diet and exercise, because where it goes, the body tends to follow. They say the mind can triumph over matter. Harness it well, and it can beat back sickness too.

As higher-order beings, we worry. We also plan and organize and ruminate: on average, at any given time we are balancing 150 uncompleted tasks and 15 unaccomplished goals. Hence the worrying.

Competition for our attention comes in three categories: threat, pleasure and novelty.

These days, new technologies allow us to peer behind the knitted brows and twitching eyes to see what that worrying actually looks like. In a 2001 study, researchers at Washington University in St. Louis used functional magnetic resonance imaging (fMRI), which captures real-time changes in oxygen flow in the brain during mental tasks, to map a baseline state of cranial activity. They found that the amount of oxygen expended during many routine chores—reading, for example—is actually comparable to the amount dispersed during eyes-closed rest. But the portrait the fMRI painted of a brain working to tie up a bunch of loose ends—a brain mired in stress—looked very different. A brain in the process of serially ticking off the upcoming day's to-do list activates a particular circuit of neurons that loops in the hypothalamus and the pituitary and adrenal glands and triggers the release of the hormones cortisol and adrenaline, both of which set the body on edge. Like a pebble dropped in a pond, this turned-on circuit then sends tension throughout the body, pushing a variety of metabolic systems off balance. It's why your heart races and your hands get damp, why a knot grows in your stomach and your chest tightens.

We all know too well how easy it is to turn this stress system on. Turning it off . . . well, that's something else entirely. Turns out toggling your brain between a pattern of agitation and one of calm isn't like flipping a switch at all. How could it be? What we're talking about, after all, is nothing less than manipulating molecular pathways that link the brain's infinitely complex network of 100 billion nerve cells with virtually every other tissue and organ in the body. There is no remote control for that.

There are, however, other ways to change your channel. As head of the Stress Management and Resiliency Training (SMART) program at the Mayo Clinic, Amit Sood gives participants concrete ways to accomplish just that. But before he puts his mind-body medicine into practice, he showers them with science. "If you want to learn about stress management and resilience, you need to know about the brain," Sood says. He begins by describing two different modes of the brain. One is activated when a person focuses on external events or tasks, like finishing a puzzle, appreciating a painting or getting lost in a song. The other is the product of inter-

nalized thoughts: planning, thinking and worrying. Those internalized thoughts are where trouble lies.

Everything that competes for our attention, he explains, falls into one of three categories: threat, pleasure or novelty. And unfortunately, we have evolved to prioritize threat. That's how early man protected himself from mortal dangers like predators, flood and fire. Today most of the threats we encounter are of our own making, such as anxiety about upcoming engagements, guilt over things we have done or said, and fears of the future. At first glance, those "threats" don't seem to pack the menace of a hungry sabertooth cat. But they engulf our attention like black holes all the same. And once we are sucked in, it's extremely difficult to free ourselves from the gravitational pull.

Making escape even more sticky is the fact that a stressful state often becomes the brain's default setting, one it slips into almost automatically. Blame human biology. The plasticity of the brain allows its frequently used nerves and networks to become well worn, like a rutted country road, and your thoughts end up stuck following routes that take them somewhere other than where you want them to go. Soon, obsessing over perceived threats is your norm; you go to bed with your head spinning with them and wake up still churning. "This is nobody's fault; it's ingrained in the way these networks are set up," Sood says.

Just as stress is often a learned pattern, so too, with practice, is being in the moment.

The stress response was always meant to be an emergency measure only, a quick and focused reaction to impending and immediate disaster. But modern-day threats—job security, your faltering 401(k), your daughter's new boyfriend—tend to linger. And neither our brains nor our bodies were designed to manage that kind of sustained strain. So they protest. And that rebellion takes the form of heart disease, hypertension, stroke and depression.

Fortunately—and here is the point of Sood's training—just as those well-worn negative neural pathways can be created, they can also be redirected. The key is learning to recognize what it feels like when you begin to slip into the default state. Only then can you work on breaking free of its grasp. Eventually what once took conscious effort to adjust becomes another ingrained circuit—and the new default. "It's more a life skill than anything else," says Sood. Rebuilding that mental infrastructure means being able to focus on the task or experience at hand, shutting yourself off from any other distracting thoughts. It's what meditation experts are advocating when they talk about "emptying the mind" or "being in the moment," and it's what they hope to accomplish when they ask clients to concentrate on their breathing. Of course, the more ingrained the stress pathway, the more difficult this seemingly uncomplicated task can be.

Sood says you just have to train your brain one thought at a time. Be more attentive to external rather than internal experiences. Start with those very first thoughts of the morning: Don't be ensnared by responsibilities; welcome the day instead by thinking about five individuals you love. Picturing their faces one at a time, remind yourself why you are grateful and happy to have them in your life. Then, throughout the day, find reasons to take 10-minute breaks to draw yourself away from your pressure-filled routines. When you're with friends or family members, treat them as if you are meeting after a long time apart; pay attention to what they say and how they are feeling. Sometimes a change of scenery helps, so take a walk. Make sure it's not a march to the finish, though, consumed all the while by the chaos in your head. The purpose of getting away is to get away.

Oh, and if on one of your strolls you happen to stop by a rosebush, you know what to do. ◻

The Magic of Placebo

Scientists have found a complex world in the lowly sugar pill that challenges what we know about psychology and physiology as well as how we practice medicine

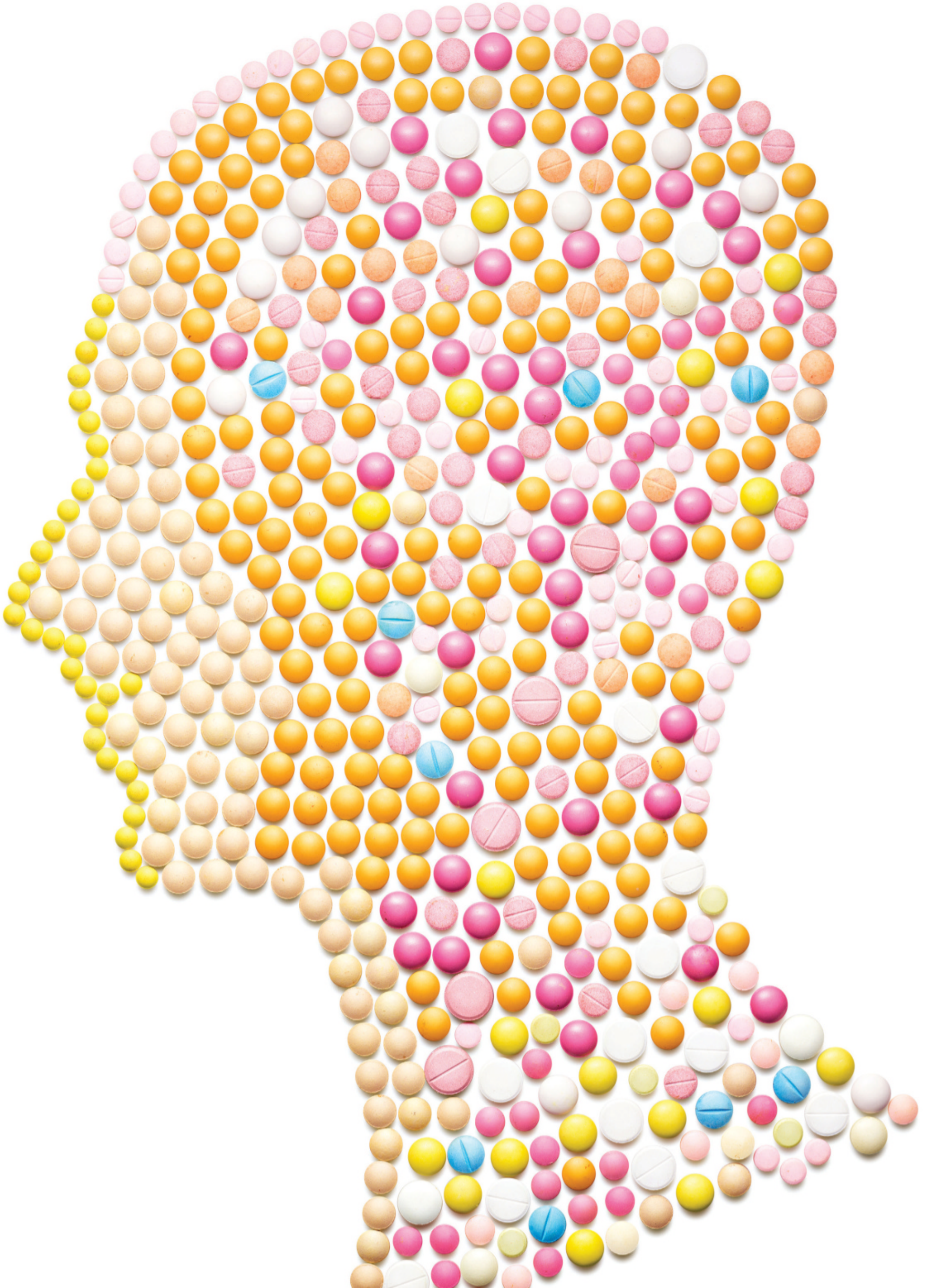
BY DAVID BJERKLIE

THE STUDIES HARDLY SEEM A SHINING EXAMPLE of medicine's healing grace. Patients suffering pain, depression and even Parkinson's disease are treated with sugar pills, saline injections or sham surgery. Irritable-bowel sufferers are given fake acupuncture. Women with polycystic ovarian syndrome, a common cause of infertility, are prescribed bogus remedies. But these "treatments" aren't the latest outrages of medical malfeasance. In fact, the subjects felt better, coped better, moved better, experienced fewer symptoms, even conceived better. What in the name of Hippocrates is going on here?

You have just entered the fun-house world of placebos. The supervised deceptions listed above are actually scrupulously conducted research trials designed to investigate the healing power of the mind. Traditionally, the accepted role of placebos is to serve as inactive controls in randomized clinical studies, the baseline yardstick by which scientific objectivity is sought and results are measured. But increasingly, placebos are also the rising stars of their own branch of research, one that seeks to understand the power of potions and procedures that, by all rights, should be completely ineffectual.

For generations, caregivers doled out versions of the classic placebo—an inert sugar or starch pill—as a passive token of hope and compassion. It was offered to patients who desperately wanted some sort of treatment when none was available or called for. These days, placebos may be vitamins rather than sugar pills, but their purpose is the same. Even a bona fide medicine can be a placebo if it is offered in minute doses or for conditions that aren't likely to respond to it. And the practice is more common than most patients might suspect: a recent survey of U.S. internists and rheumatologists found that some 50% regularly prescribe placebos.

The use of placebos is widespread for good reason. As it turns out, placebos are "much more powerful" than previously imagined, according to Fabrizio Benedetti of the University of Turin in Italy. Not only is the placebo effect real, says Benedetti,



but "it is also a melting pot of neuroscientific concepts and ideas" that raises questions about psychology and physiology, not to mention challenges to current medical practices.

Placebos (Latin for "I shall please") are most commonly defined in terms of what they lack: active ingredients. But that is exactly the wrong way to look at them. "Placebos are not inert substances," wrote Benedetti and his colleagues in a recent paper. "They are made of words and rituals, symbols and meanings, and all these elements are active in shaping the patient's brain." And although the neuroscience is new, the knowledge that the mind can fool the body into feeling better has been a go-to tactic of healers for millennia.

What has changed is our modern need to put a label on that process, says Jon Tilburt of the Mayo Clinic. Doctors are trained to want cause-and-effect explanations. They want to be able to define the mechanisms of improvement, to see "something" rather than "nothing." But most patients, says Tilburt, whose research focuses on relationships and values in medicine, "are pragmatists, not ideologues. They want to feel better, and they don't much care how that is achieved." Placebos represent one of the paths by which patients have always come to feel better. Call that path what you will, says Tilburt, "but it is definitely not nothing."

The neuroscience is new, but the knowledge that the mind can fool the body into feeling better has been a go-to tactic of healers for millennia.

How do placebos work?

NEUROSCIENTISTS, ON THE OTHER HAND, ARE eager to dive into the complexities of those pathways. The key to understanding the mysteries of placebos, says Benedetti, author of *The Patient's Brain*, is that there is not one effect, but many. And to understand that, it's first important to recognize what placebos are not. Some people get better by themselves. Some seem to improve because they initially appeared to be sicker than they really were. And sometimes both patients and doctors kid themselves into seeing improvement when there isn't any. These are not placebo effects. Real placebo effects are genuine psychobiological phenomena in the brain that produce measurable changes in the body.

Consider the clout of expectation. What we experience depends partly on what we expect to experience, consciously or not. "Expectations," says psychologist Jane Metrik of Brown University's Center for Alcohol and Addiction Studies, "help us to recognize and classify all sorts of stimuli. There is great survival value in that." Healing value too. Expectations can activate the same neurochemical pathways triggered by our pursuit of food, water and sex. They can also drive the body's ebb and flow of stress hormones. In short, expectations produce real, physiological change, often at the speed of thought. And it doesn't matter that those expectations might be activated by a sugar pill. When a placebo works, it doesn't mean a patient's symptoms (whether they are pain, depression or anxiety) aren't real. It just

We know that when a placebo works, it doesn't mean a patient's symptoms are not real.

means that the neurochemical changes produced by the expectation of relief are just as real.

Doctors can use expectations to their advantage, even when they are administering potent drugs. Here's a scenario that plays out in emergency rooms every day. "If a patient needs pain medicine, I make sure my nurses tell the patient when he or she gets the shot," says Ginger Campbell, an ER physician and the host of the podcast *Brain Science*. "If patients are given morphine but don't know they got it, the effectiveness of the morphine is decreased. But if they are told they are getting a shot that will ease their pain, they experience relief faster than the morphine can actually take effect. What you tell patients to expect really matters."

Our brains just as eagerly and efficiently prepare us for negative outcomes. Tell a patient he will probably feel nausea, dizziness or pain after taking a medicine, and chances are good he will experience those exact side effects (this phenomenon is known as nocebo, from the Latin for "I will harm"). More often than we might realize, sometimes we just brace for the worst. So while positive expectations can rev up the neurochemical pathways that can bring relief, negative expectations can trigger those that can make us feel our pain more acutely.

The success of the placebo effect sometimes lies in the fact that humans are trainable animals. Remember that biology lesson about Russian physiologist Ivan Pavlov and how he famously conditioned dogs to salivate at the sound of a bell once they associated that bell with feeding time? Well, as far as the placebo effect is concerned, we may as well be those impressionable canines.

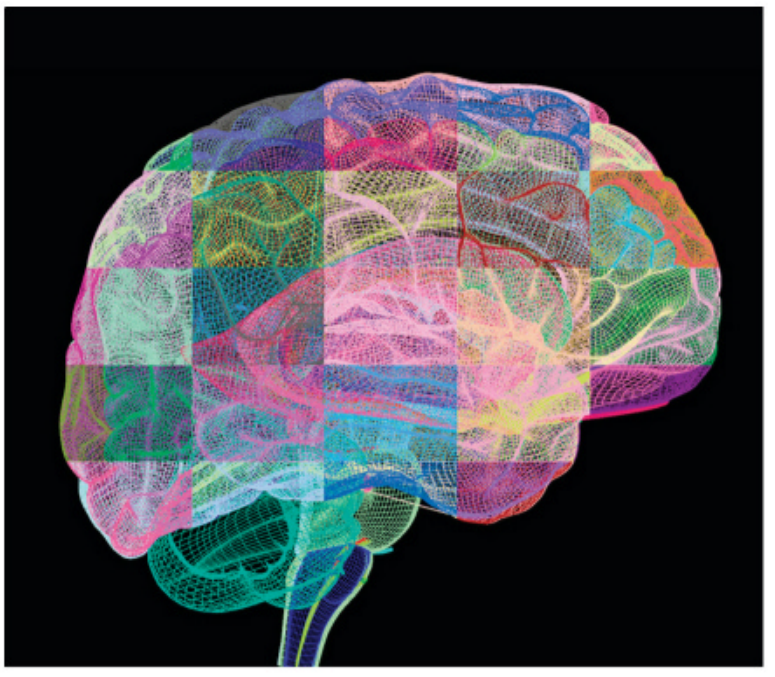
Inject someone with morphine each day for several days and then give her a saline-solution injection, and her body will respond to that injection as if it actually contained morphine. Even our immune system is susceptible to conditioning. Studies have shown that placebos can mimic the effects of the

immunosuppression drugs that lower the rejection rate in organ-transplant patients, as well as relieve cold symptoms and allergic skin reactions.

This type of conditioning is mostly unconscious: we don't have to will our bodies to think of saline as morphine. But we are also quick studies. What would a caveman make of the assortment of pills in our medicine cabinets? Absolutely nothing. But we have come to expect certain types of relief from medicines of particular shapes, sizes and colors. We also expect a certain expertise and competence when we see high-tech equipment, white lab coats and diplomas on the wall. Doctors know what they are doing, but it also helps that we believe they know what they are doing.

What we don't know

NOT ALL PLACEBO EFFECTS ARE CREATED EQUAL. In fact, a patient may not even experience them the same way each time. This is why one of the current goals of research is to accurately quantify the placebo response. Researchers are also trying to home in on the illnesses that are most receptive to placebos. Parkinson's patients, for example, produce more dopamine (a neurotransmitter in the brain that helps regulate motor function) after they are given a placebo injection that they are told will relieve their symptoms. Alzheimer's patients, on the other hand, do not seem to benefit from placebos,



There is no simple way to determine who will or who won't respond to a placebo.

probably because their disease disrupts placebo pathways.

And how long does a placebo effect last, anyway? Researchers can't answer that one for sure either, though studies so far have tracked only short-term results. Nor do we know why some people seem immune to placebos. If, after all, human bodies and brains have evolved to respond to placebos, why don't we all respond the same way? "Natural variability can certainly explain the range in response,"

When Sunny Thoughts Fall Short

There's a downside to believing a positive attitude is all you need

By David Bjerklie

It's almost an article of faith that a strong ally in the fight against cancer is a doggedly optimistic outlook. And it would seem that mounting evidence of the links between emotional and physical well-being would bolster that view. The only problem, according to Jimmie Holland, a pioneering psychiatrist at Memorial Sloan Kettering Cancer Center, is that there is little evidence to support that belief when it comes to cancer. Moreover, the "tyranny of positive thinking," as Holland, who died in 2018, called it, often becomes just one more burden for the afflicted. Cancer patients shouldn't feel obliged to smile through their suffering or feel guilty if their treatment fails, said Holland, who was a tireless advocate in supporting the emotional and psychological needs of patients.

It was research in the 1970s and '80s that first popularized the idea that attitude might sway cancer outcomes. Such research led doctors to encourage patients to think happy thoughts and visualize their immune system blasting away tumor cells. And yet, while studies have found that a positive outlook can correlate with the perception of less pain by patients—a real benefit—the evidence that coping styles play a key role in survival or recurrence is far from conclusive.

Still, the optimism theory remains seductive. And we know that mental states like depression and chronic anxiety can have physical consequences that affect

says renowned evolutionary biologist Robert Trivers, author of *The Folly of Fools: The Logic of Deceit and Self-Deception in Human Life*. "On average, we are susceptible to placebos; that doesn't mean we all are, and it definitely doesn't mean we all exhibit that trait uniformly," says Trivers. There are probably many factors, including genetic ones, at play. But the bottom line is that there is no simple way to determine who will respond and who won't.

Being able to accurately measure placebo effects is just as important as knowing who will respond. But that, too, is easier said than done. In the 1950s, when researchers first began to use placebos in standardized trials, they knew that participants in the placebo group were likely to improve (healers have always had an intuitive sense of the power of placebos), and that was OK; the group's improvement was the bar the experimental therapy had to clear to be deemed worthy. It is a standard that has served medicine well and is now, in fact, being used to equal effect to evaluate the latest complementary therapies. But serving passively as the control group in trials is no longer enough. If researchers are going to be able to tap the full potential of this approach, they need to know not only how placebos stack up against active treatment but also how they compare with no treatment at all.

Placebo research has a long way to go. And confusing the issue is the fact that every advance comes with some concern. "This is the paradox," says Benedetti. "The more we change the meaning of placebo from negative to positive, the more quacks and shamans feel justified in using new bizarre ways to increase expectations." Yet it's not just the charlatans who complicate matters. Call it the ethics of deception. Most doctors still believe, and rightly so, that it's just not right to tell a patient he is getting a drug when he isn't. Of course, that patient could be told he is getting "treatment that has been shown to be effective in many cases," and that would be true. But what if patients are told the whole truth? Ted Kaptchuk, who directs placebo studies at Harvard Medical School, has demonstrated in clinical trials that placebos can, in fact, work even when patients know they are getting them. It's an intriguing finding, but in the real world of medical care, issues of informed consent are trickier.

For her part, ER physician Campbell wants to make sure one very important lesson isn't lost. "Placebo research highlights the importance of an aspect of medicine that is disappearing: the value of the face-to-face human interaction between the doctor and the patient," she says. Placebos remind us that what matters is not just the active ingredients in a pill. Attention is treatment too.

Who would have thought that the art of healing would one day be supported by the science of placebo effects? ◻

the progression of heart disease and diabetes. Stanford University's David Spiegel, who has studied psycho-oncology, stress and health for more than 40 years, knows that the picture is complex. "It isn't a matter of 'fix it in your mind, and you fix it in your body,' " he says, "but it would be strange if what goes on in our minds didn't affect how our bodies deal with illness."

Individuals will always bring their own dispositions—sunny, sour or sarcastic—to bear on their illness and treatment. But insisting that they be paragons of positive thinking is misguided and can cause some to hide their fears and shun support. It's clear that there are many ways to cope with illness. Despair isn't helpful, but neither is denial.

The Sound of Healing

We all know the power of music to move us, but research shows that tuneful therapy is a natural painkiller as well

BY STACEY COLINO

IMAGINE A WORLD WITHOUT MUSIC. IT WOULD BE quieter, for sure, but it might also be more painful, maybe even less healthy. Music, to put it simply, can be good medicine. And not just for the soul. "Certain selections nourish your physical body," says Hal Lingerman, author of *The Healing Energies of Music*. "Others will bring greater health to your mind."

If you've ever relied on a Foo Fighters riff to fire you up for a workout or Handel's Water Music to soothe your frayed nerves, you have an idea of what Lingerman is getting at. But those interludes don't begin to hit all the high notes. Music can relieve pain and anxiety, enhance immune function and brain function, alleviate stress and spur physical rehabilitation. From life's beginning (when it can ease the agony of childbirth and calm babies in neonatal intensive-care units) to its end (comforting those in hospice care and lightening the grief of loved ones), music isn't just the soundtrack of our existence. It can be a conductor of our well-being.

Let's be clear: music therapy isn't just a fancy way to describe your kicking back with the latest Beyoncé song. It's an evolving and seriously scientific undertaking that has been shown to induce definite changes in the central nervous system's activity. "Music helps stimulate theta and alpha waves in the brain that are more associated with creativity and insight," explains David Rakel, chair of the Department of Family and Community Medicine at the University of New Mexico. That's right: it can actually help you think more clearly. More important, the right rhythms have been shown to reduce the stress response and increase the relaxation response. And a cooler head can mean a better-functioning body.

OK, so that's not exactly a fresh idea; Aristotle and Plato both wrote about the healing powers of song. But music therapy didn't become a formalized field until after World War II. Musicians often visited veterans' hospitals to entertain those suffering the scars of war, and it didn't take long for doctors and nurses to recognize the positive effects, both physical and emotional, that the performances

had on patients. Soon facilities were training their own on-premises music makers. Only in the past two decades, though, has the treatment gained a full measure of legitimacy from patients and physicians alike. The reason is simple. "It has a nice intuitive appeal," says Debra Burns, chair of the department of music and arts technology at Purdue University, "and you'd be hard-pressed to find any documented negative side effects."

Today music therapy is conducted by specially trained practitioners. They choose or produce selections tailored to a patient's tastes and needs, whether the purpose is to ease anxiety before surgery—or distract from pain afterward—or maybe to relieve nausea from chemotherapy or mental and physical tension. No musical style is inherently more therapeutic than others, nor does any one style work for everyone. If you don't like jazz, for example, it's unlikely to provide comforting effects. In some ways, then, music therapy is an art, as therapist and patient collaborate to match the right melodies to the right situation.

Science has clearly confirmed the value of the art. Research in Finland, for instance, found that depressed patients who received music therapy in addition to standard psychotherapy showed better improvement on measures of depression, anxiety and overall functioning after three months than those who received standard psychotherapy only. And at the Mayo Clinic, patients who underwent heart surgery experienced a significant decrease in pain and an easier time relaxing in the days immediately following their procedure after listening to music that included nature sounds. As another study suggests, those results could be due to a boost in the levels of oxytocin (often referred to as the love hormone). In

Music has been shown to ease anxiety, pain and depression in cancer patients.

general, when stress levels fall, pain tolerance rises. "The areas of the brain that are related to natural painkillers can be activated by music that has emotional meaning," Burns says. And that can mean a pharmacological bonus: a decreased need for pain medications.

Music therapy has also been shown to help autistic children, improving their expressive-language skills and greasing the wheels of interaction. "Music is a social phenomenon," says Burns, "so it can teach social skills. When kids with developmental disabilities play music together, they have to attend to what the other is doing." And working together helps them learn to communicate and cooperate better. Similarly, patients with Alzheimer's and other forms of dementia who have lost the ability to speak become more socially engaged when they mouth the words to a familiar song or clap their hands to an engaging rhythm.

Music has also improved the quality of life for people with cancer, lowering levels of anxiety, pain and depression. Christina Wood, the founder and director of Healing Rhythms Music Therapy in Rochester, Minn., tells of one 50-year-old woman with terminal cancer who was referred to a music therapist by her hospice staff. To ease the woman's pain and nausea and decrease her nighttime restlessness, the therapist combined live and recorded music with deep breathing and guided imagery. The patient, who had been expected to die within weeks, lived for many months with an improved quality of life. Toward the end, the focus of her therapy shifted to choosing meaningful music for the funeral and pieces that might help loved ones as they grieved.

Most impressively, those who have suffered strokes or brain injuries have regained speech, motor skills, sensory perception and emotions after undergoing music therapy. After Arizona congresswoman Gabrielle Giffords was shot in the head in 2011, damaged language pathways in her brain caused her to lose the ability to speak. Music therapy helped train her brain to forge a different route to spoken language. She started by learning to repeat basic phrases in a singsong voice; as that became easier, she learned short songs that became chants that began to mimic the natural rhythms of speech. Eventually she was uttering phrases to the beat. It's not that much different from learning your ABCs by singing the alphabet song.

The biological phenomenon at the root of some

Music therapy has been shown to help autistic children, improving their expressive-language skills and greasing the wheels of interaction.

of these improvements is known as entrainment. To put it simply, a body's biological rhythms realign with external musical rhythms. So play a slow, soothing tempo for someone who is agitated, and his heart rate, blood pressure and respiratory rate will ease as well. In the same way, music's steady rhythm can improve gait problems in someone who has Parkinson's or who has suffered a brain injury or stroke. "The brain anticipates the space between beats and generates movement accordingly," Wood explains.

It's a finely tuned process, of course, which for best effect should be done under the supervision of a trained professional. But the safety of the therapy, in general, means that in many circumstances it can be self-administered as well. "There are so many ways to use music for wellness," Wood says. "The key is to be more intentional about how you listen to it." So the next time you're nervous about a doctor's appointment or an unpleasant procedure, bring along your tunes. Or if you're feeling down, turn up the volume. Sometimes the only doctor you need is Dr. John. ◻

Friends and Your Health

Why spending time with friends is one of the best things you can do for your health

BY JAMIE DUCHARME

WHEN SOMEONE SETS OUT TO IMPROVE THEIR health, they usually take a familiar path: starting a healthy diet, adopting a new workout regimen, getting better sleep, drinking more water. Each of these behaviors is important, of course, but they all focus on physical health—and a growing body of research suggests that social health is just as, if not more, important to overall well-being.

A recent study published in the journal *PLOS One*, for example, found that the strength of a person's social circle—as measured by inbound and outbound cellphone activity—was a better predictor of self-reported stress, happiness and well-being levels than fitness-tracker data on physical activity, heart rate and sleep. That finding suggests that the "quantified self" portrayed by endless amounts of health data doesn't tell the whole story, says study co-author Nitesh Chawla, a professor of computer science and engineering at the University of Notre Dame.

"There's also a qualified self, which is who I am, what are my activities, my social network, and all of

these aspects that are not reflected in any of these measurements," Chawla says. "My lifestyle, my enjoyment, my social network—all of those are strong determinants of my well-being."

Chawla's theory is supported by plenty of prior research. Studies have shown that social support—whether it comes from friends, family members or a spouse—is strongly associated with better mental and physical health. A robust social life, these studies suggest, can lower stress levels, improve mood, encourage positive health behaviors and discourage damaging ones, boost cardiovascular health, improve illness recovery rates and aid virtually everything in between. Research has even shown that a social component can boost the effects of already-healthy behaviors such as exercise.

Social isolation, meanwhile, is linked to higher rates of chronic diseases and mental-health conditions and may even catalyze cellular-level changes that promote chronic inflammation and suppress immunity. The detrimental health effects of loneliness have been likened to smoking 15 cigarettes a day. It's a significant problem, especially since loneliness is emerging as a public-health epidemic in the U.S. According to recent surveys, almost half of Americans, including large numbers of the country's youngest and oldest adults, are lonely.

Research indicates that our well-being depends on social as well as physical health.

A recent study conducted by health insurer Cigna and published in the *American Journal of Health Promotion* set out to determine what's driving the high rates of loneliness. Unsurprisingly, it found that social media, when used so much that it infringes on face-to-face quality time, was tied to greater loneliness, while having meaningful in-person interactions, reporting high levels of social support and being in a committed relationship were associated with less loneliness. Gender and income didn't seem to have a strong effect, but loneliness tended to decrease with age, perhaps because of the wisdom and perspective afforded by years of life lived, says Stuart Lustig, one of the report's authors and Cigna's national medical executive for behavioral health.

Lustig says the report underscores the importance of carving out time for family and friends, especially since loneliness was inversely related to self-reported health and well-being. Reviving a dormant social life may be best and most easily done by finding partners for enjoyable activities like exercising, volunteering or sharing a meal, he says.

"Real, face-to-face time with people [is important], and the activity part of it makes it fun and enjoyable and gives people an excuse to get together," Lustig says.

Lustig emphasizes that social media should be used judiciously and strategically, and not as a replacement for in-person relationships. Instead, he says, we should use technology "to seek out meaningful connections and people that you are going to be able to keep in your social sphere. It's easy enough to find groups such as Meetups, or to find places to go where you'll find folks doing what you want to do." That advice is particularly important for young people, he says, for whom heavy social-media use is common.

Finally, Lustig stresses that even small social changes can have a large impact. Striking up post-meeting conversations with co-workers, or even engaging in micro-interactions with strangers, can make your social life feel more rewarding.

"There's an opportunity to grow those kinds of quick exchanges into conversations and into more meaningful friendships over time," Lustig says. "People should take those opportunities wherever they possibly can, because all of us, innately, are wired from birth to connect"—and because doing so may pay dividends for your health. ◻

Loneliness Can Hurt Your Heart

Social isolation can increase your risk of dying early

By Jamie Ducharme

Being alone can affect your ability to recover from heart disease.

Research has shown, again and again, that emotional and physical health are inextricably linked. There are significant health benefits associated with love and friendship, supportive marriages and feelings of gratitude, for example.

And there are significant health risks linked to the opposite. A 2018 study published in the journal *Heart* looked at social isolation (being separated from other people) and loneliness (being cut off from social connection and being unhappy about it).

Researchers found that people who are socially isolated or lonely are more likely to have a heart attack or stroke, compared with people with strong personal networks. Social isolation, but not loneliness, also seems to increase the risk of death among people with a history of heart disease, the study says. The findings support several other studies that have come to similar conclusions.

"Having social support from significant others or from persons who are in a similar situation is good for your health, and socially isolated or lonely individuals might not have possibilities for this kind of support," says lead author Christian Hakulinen, a professor of psychology and logopedics at the University of Helsinki in Finland.

However, there was one surprise. Suspecting that the effects of social isolation and loneliness might be compounded by other traits common among antisocial folks, the researchers set out to determine exactly how much risk could be blamed on social causes.

To do so, they surveyed almost 480,000 adults in the U.K. about their social lives, loneliness, medical histories and lifestyle habits. They also measured health metrics including height, weight, body mass index and grip strength. Participants were then tracked for seven years.

Isolation and loneliness seemed to significantly raise a person's risk of cardiovascular problems, compared with more-social folks. Isolation was associated with a 43% higher risk of first-time heart attack and a 39% higher risk of first-time stroke. Loneliness, meanwhile, was associated with a 49% higher risk of first-time heart attack and a 36% higher risk of first-time stroke.

After accounting for biological, health and socioeconomic factors, however, the numbers looked quite different: isolation seemed to bump the risk of heart attack and stroke by only 7% and 6%, respectively, while loneliness raised heart attack and stroke risk by 6% and 4%. "This indicates that most of the excess risk was attributable to known risk factors such as obesity, smoking, low education and pre-existing chronic illness," Hakulinen says.

In the end, among people with pre-existing heart issues, only the link between social isolation and mortality remained statistically significant after adjusting for other factors. Social isolation seemed to bump a person's risk of death by 25% among those with a history of heart attack, and by 32% for those with a history of stroke. This suggests that while an empty social life may not cause heart problems, it could seriously affect your ability to recover from them, Hakulinen says.

"In theory, it might be that individuals who are feeling lonely have at least some social networks that activate after they get sick, but persons who are socially isolated don't have these kinds of social networks," Hakulinen says, although he cautions that the study did not prove cause and effect.

Still, the findings suggest that maintaining personal relationships is more than just fulfilling—it could be lifesaving.

Can God and Medicine Work Together?

Science and religion argue all the time, but they increasingly agree on one thing: a little spirituality may be very good for your health

BY JEFFREY KLUGER

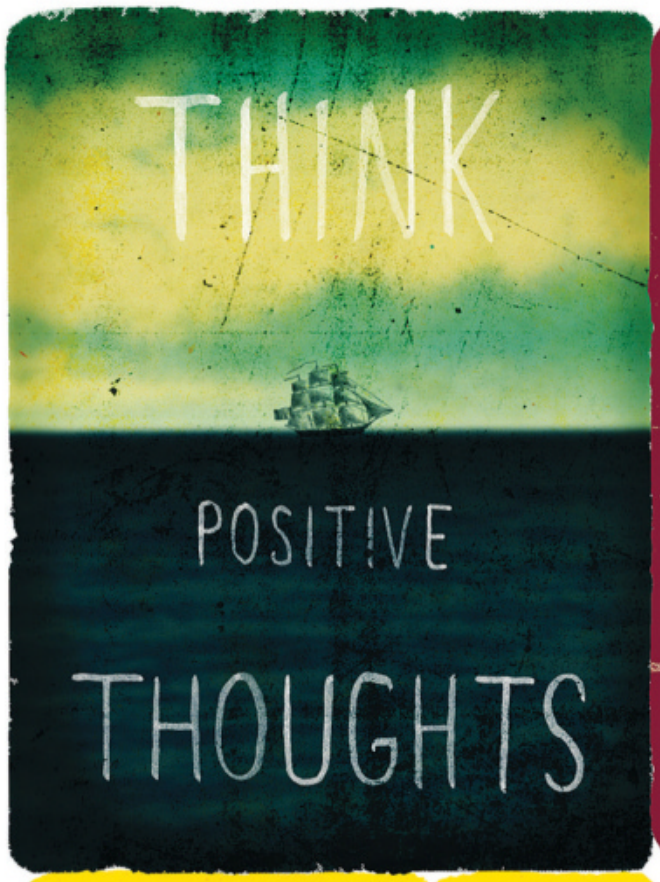
NEEDY CREATURES THAT WE ARE, HUMANS HAVE prayed over the millennia for a nearly endless number of things, from the sublime to the ridiculous. But there is likely nothing we pray for more than health, the miracles of modern medicine notwithstanding. So, while we believe our medicine is strong and our doctors are wise, we put faith in our prayers as well.

Here's what's surprising: a growing body of scientific evidence suggests that faith may indeed bring us health. People who attend religious services do have a lower risk of dying in any given year than people who don't attend. People who believe in a loving God fare better after a diagnosis of illness than people who believe in a punitive God. No less a killer than AIDS will back off at least a bit when it's hit with a double-barreled blast of belief. "Even accounting for medications," says Gail Ironson, a professor of psychiatry and psychology at the University of Miami who studies HIV and religious belief, "spirituality predicts for better disease control."

That's undeniably true up to a point. But it's also true that our brains and bodies contain an awful lot of spiritual wiring. Even if there's a scientific explanation for every strand of it, that doesn't mean we can't put it to powerful use. And if one of those uses can make us well, shouldn't we take advantage of it? Says Andrew Newberg, a professor of radiology, psychology and religious studies at the University of Pennsylvania and the co-founder of Penn's Center for Spirituality and the Mind: "The way the brain works is so compatible with religion and spirituality that we're going to be enmeshed in both for a long time."

For most believers, the element of religious life that intersects most naturally with health is prayer. Very serious theologians believe in the power of so-called intercessory prayer to heal the sick, and some very serious scientists have looked at it too: thousands of studies on the topic have been published over the past two decades.

As long ago as 1872, Francis Galton, the man behind eugenics and fingerprinting, reckoned that


THINK
POSITIVE
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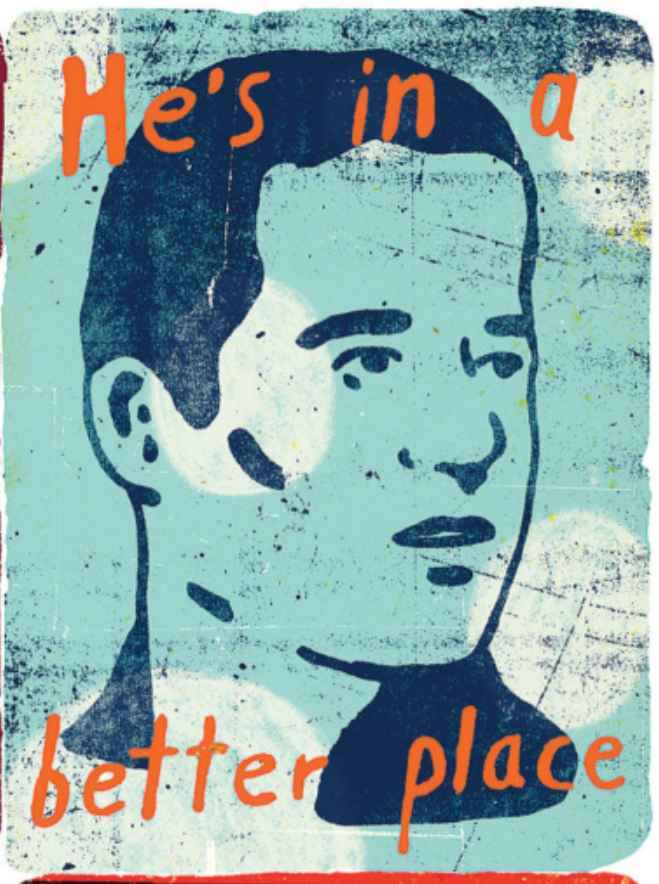
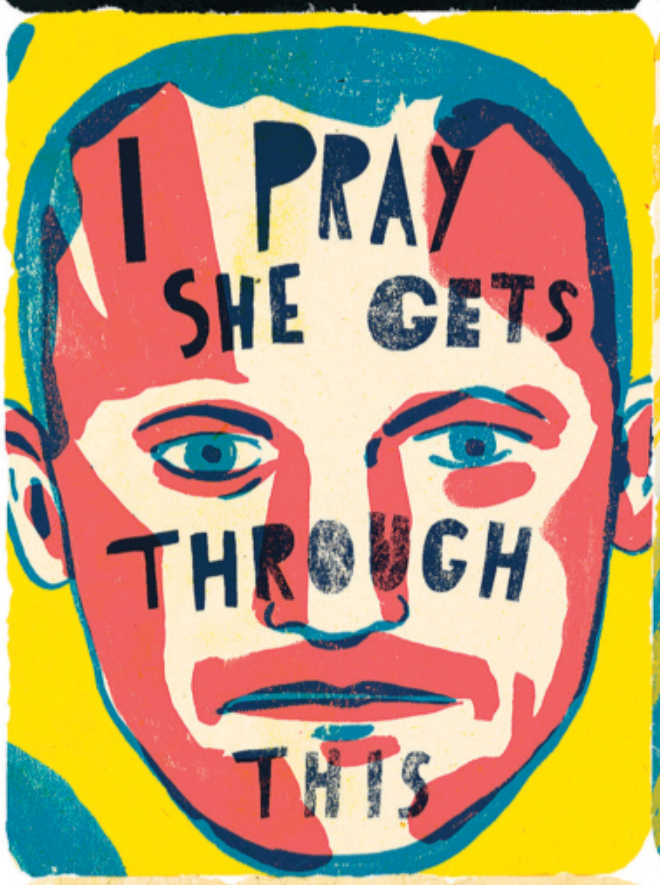
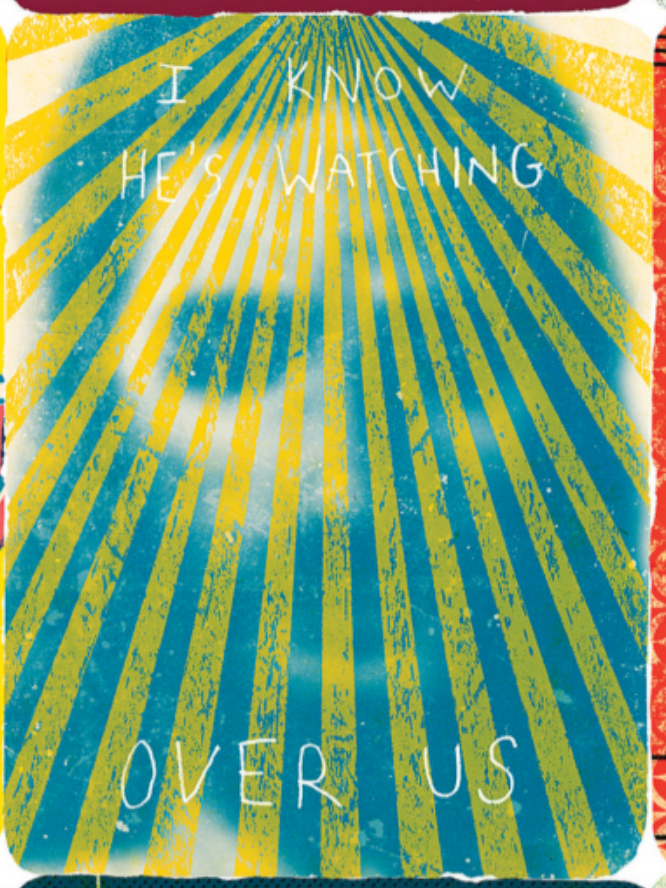
LET US ALL
JOIN HANDS


He's in a
better place


I PRAY
SHE GETS
THROUGH
THIS


I KNOW
HE'S WATCHING
OVER US


I WON'T LET THIS
DEFEAT ME


I'm at peace
with this


I'M
ON
THE
MEND


This is part of his plan
for me

monarchs should live longer than the rest of us, since millions of people pray for the health of their King or Queen every day. His research showed just the opposite—no surprise, perhaps, given the indulgent diet and underlying stress of fending off threats to the throne that royals must endure. An oft-discussed 1988 study by cardiologist Randolph Byrd of San Francisco General Hospital took a more rigorous look at the same question and found that heart patients who were prayed for fared better than those who were not. But a larger study in 2005 by cardiologist Herbert Benson at Harvard University challenged that finding, reporting that complications occurred in 52% of heart-bypass patients who received intercessory prayer and 51% of those who didn't—essentially a tie.

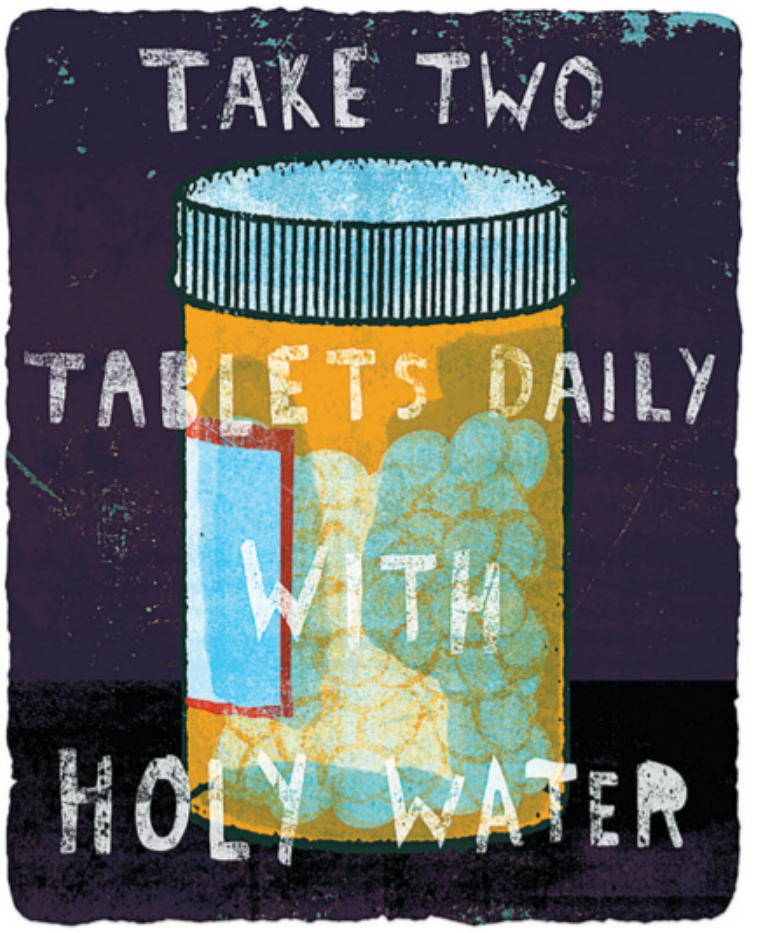
Such findings don't typically dissuade believers—not unexpectedly, perhaps, considering the centrality of prayer to faith. But there is one thing on which both camps agree: when you're setting up your study, it matters a great deal whether subjects know they're being prayed for. Give them even a hint as to whether they're in the prayer group or a control group, and the famed placebo effect can blow your data to bits.

If the value of being prayed for continues to spark arguments, the value of praying in a group—in a church or a synagogue or another house of worship—is a more settled matter. Social demographer Robert Hummer of the University of Texas has been following a population of subjects since 1992, and his results are hard to argue with. Those who never attend religious services have twice the risk of dying over the next eight years as people who attend once a week. People who fall somewhere between no churchgoing and weekly churchgoing also fall somewhere between in terms of mortality.

It's all in your head

OTHER STUDIES SHOW SIMILAR RESULTS, AND while investigators haven't teased out all the variables at work in this phenomenon, some of the factors are no surprise. "People embedded in religious communities are more likely to rely on one another for friendship, support, rides to doctor's appointments," says Hummer.

That's not all, however, and even hard scientists concede that there's a constellation of other variables at work that are far tougher to measure. "Religious belief is not just a mind question but involves the commitment of one's body as well," says Ted Kaptchuk, a professor of medicine at Harvard Medical School. "The sensory organs, tastes, smells, sounds, music, the architecture of religious buildings [are involved]." Just as the mere act of entering a hospital exposes a patient to sights and smells that can prime the brain and body for healing, so may the act of walking into a house of worship.



RELIGIOUS BELIEF
Most patients say it is fine for their doctors to ask them about their religious beliefs. And plenty of doctors have no quarrel with this. So if health care providers suggest complementary care like acupuncture to some patients, why not faith and prayer to others?

Neal Krause, a sociologist and public-health expert at the University of Michigan, has tried to quantify some of those more amorphous variables in a study of 1,500 people that he has been conducting since 1997. He has focused particularly on how regular churchgoers weather economic downturns as well as the stresses and health woes that go along with them. Not surprisingly, he has found that parishioners benefit when they receive social support from their church. And he has discovered that those people who give help fare even better than those who receive it. He has also found that people who maintain a sense of gratitude for what's going right in their lives have a reduced incidence

THE PLACEBO EFFECT
Believing in a cure can often lead to real bodily changes. The brain opens opiate receptors in response to faux pain pills; it boosts dopamine in response to sham Parkinson's surgery; and it may prod patients into recovery if they place their hope in a sugar pill.

of depression, which is itself a predictor of health.

Many scientists and theologians who study these matters advocate a system in which both pastoral and medical care are offered as parts of a whole—and that can work particularly well not just in the church but in a doctor's office or hospital too. If a woman given a diagnosis of breast cancer is already offered the services of an oncologist, a psychologist and a reconstructive surgeon, why shouldn't her doctor discuss her religious needs with her and include a pastor in the mix if that would help?

The success of that approach led Jean Kristeller of Indiana State University to develop a similar guide for doctors who want to discuss religious questions with cancer patients. The approach has not yet been tested in any large-scale studies, but in the smaller surveys Kristeller has conducted, it has been a success: up to 90% of the patients whose doctors approached them in this way were not offended by the overture, and 75% said it was very helpful. Within as little as three weeks, the people in that group reported reduced feelings of depression, an improved quality of life and a greater sense that their doctors cared about them.

Even doctors who aren't familiar with Kristeller's script are finding it easier to combine spiritual care and medical care. HealthCare Chaplaincy is an organization of Christian, Jewish, Muslim and Zen Buddhist board-certified chaplains affiliated with more than a dozen hospitals and clinics in the New York City area. The group routinely provides pastoral care to patients as part of the total package of treatment. The chaplains, like doctors, have a caseload of patients they visit on their rounds, taking what amounts to a spiritual history and either offering counseling on their own or referring patients to others. The Rev. Walter Smith, former president and CEO of the chaplaincy and an end-of-life specialist, sees what the group offers as a health care product—one that is not limited to believers.

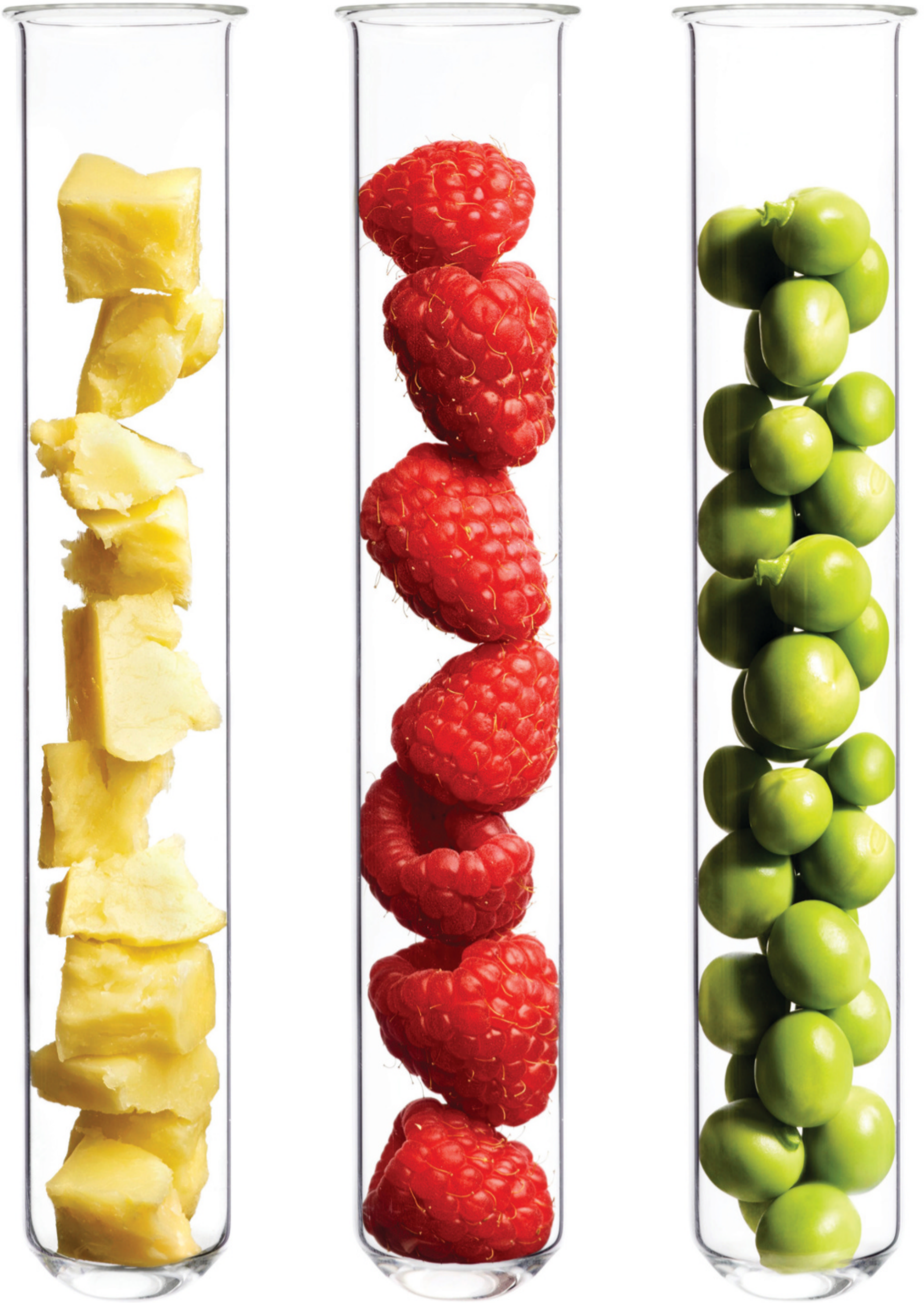
"When people say, 'I'm not sure you can help because I'm not very religious,' " Smith explains, "the chaplains say, 'That's not a problem. Can I sit down and engage you in conversation?' " Patients who say yes often find themselves exploring what they consider secular questions that touch on such primal matters of life and death that they might as well be spiritual ones. The chaplains can also refer patients to other care providers, such as social workers, psychologists and guided-imagery specialists. "People say you tell the truth to your doctor, your priest and your funeral director," says Smith, "because these people matter at the end." It's that truth—or at least a path to it—that chaplains seek to provide.

As groups like HealthCare Chaplaincy are slowly expanding, even the most literal-minded scientists have no quarrel with such a development. Says Richard Sloan, a doctor and the author of *Blind Faith*: "I think that a chaplain's job is to explore the patient's values and help the patient come to some decision. I think that's absolutely right."

Sloan's view is catching on. Few people think of religion as an alternative to medicine. The frontline tools of an emergency room will always be splints and sutures, and well-applied medicine along with smart prevention will always be the most effective way to stay well. Still, if the U.S.'s expanding health care emergency has taught us anything, it's that we can't afford to be choosy about where we look for answers. Doctors, patients and pastors battling disease already know that help comes in a lot of forms. It's the result, not the source, that counts the most. □

Food Cures

There may be no better-known adage than the cautionary advice "You are what you eat." What researchers are newly discovering, however, is just how true and valuable that insight really is.



Just What the Doctor Ordered

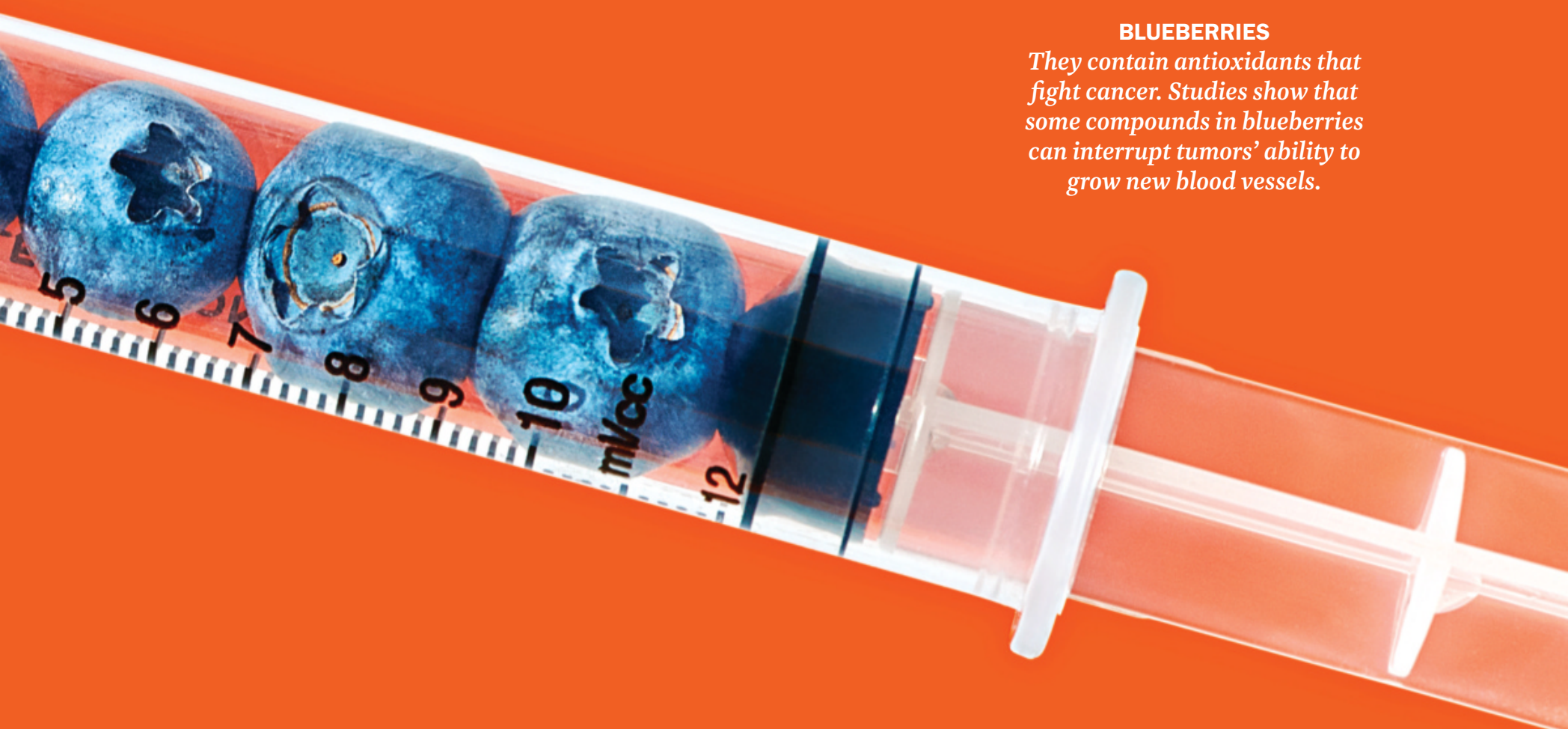
The medical community is starting to consider the possibility that food is the best medicine

BY ALICE PARK

WHEN TOM SHICOWICH'S TOE STARTED FEELING numb in 2010, he brushed it off as a temporary ache. At the time, he didn't have health insurance, so he put off going to the doctor. The toe became infected, and he got so sick that he stayed in bed for two days with what he assumed was the flu. When he finally saw a doctor, the physician immediately sent Shicowich to the emergency room. Several days later, surgeons amputated his toe, and he ended up spending a month in the hospital to recover.

Shicowich lost his toe because of complications of Type 2 diabetes as he struggled to keep his blood sugar under control. He was overweight and on diabetes medications, but his diet of fast food and convenient, frozen processed meals had pushed his disease to life-threatening levels.

After a few more years of trying unsuccessfully to treat Shicowich's diabetes, his doctor recommended that he try a new program designed to help patients like him. Launched in 2017 by the Geisinger Health System at one of its community hospitals, the Fresh Food Farmacy provides healthy foods—heavy on fruits, vegetables, lean meats and low-sodium options—to patients in Northumberland County, Pennsylvania, and teaches them how to incorporate those foods into their daily diet. Each week, Shicowich, who lives below the federal poverty line and is food-insecure, picks up recipes and free groceries from the Farmacy's food bank and has his nutrition questions answered and blood sugar monitored by the dietitians and health-care managers assigned to the Farmacy. In the first year and a half after he joined the program, Shicowich lost 60 pounds, and his A1C level, a measure of his blood sugar, dropped from 10.9 to 6.9, which means he still has diabetes but it's out of the dangerous range.



BLUEBERRIES
They contain antioxidants that fight cancer. Studies show that some compounds in blueberries can interrupt tumors' ability to grow new blood vessels.

"It's a major, major difference from where I started from," he says. "It's been a life-changing, lifesaving program for me."

Geisinger's program is one of a number of groundbreaking efforts that finally consider food a critical part of a patient's medical care—and treat food as medicine that can have as much power to heal as drugs. More studies are revealing that people's health is the sum of much more than the medications they take and the tests they get—health is affected by how much people sleep and exercise, how much stress they're shouldering and, yes, what they are eating at every meal. Food is becoming a particular focus of doctors, hospitals, insurers and even employers who are frustrated by the slow progress of drug treatments in reducing food-related diseases like Type 2 diabetes, heart disease, hypertension and even cancer. They're also encouraged by the growing body of research that supports the idea that when people eat well, they stay healthier and are more likely to control chronic diseases and perhaps even avoid them altogether. "When you prioritize food and teach people how to prepare healthy meals, lo and behold, it can end up being more impactful than medications themselves," says Jaewon Ryu, the president and CEO of Geisinger. "That's a big win."

The problem is that eating healthy isn't as easy as popping a pill. For some, healthy foods simply aren't available. And if they are, they aren't affordable. So more hospitals and physicians are taking action to break down these barriers to improve their patients' health. In cities where fresh produce is harder to access, hospitals have worked with local grocers to provide discounts on fruits and vegetables when patients provide a "prescription" written by their doc-

tor; the Cleveland Clinic sponsors farmers' markets where local growers accept food-assistance vouchers from federal programs like WIC as well as state-led initiatives. And some doctors at Kaiser Permanente in San Francisco hand out recipes instead of (or along with) prescriptions for their patients, pulled from the organization's Thrive Kitchen, which also provides low-cost monthly cooking classes for members of its health plan. Hospitals and clinics across the country have visited Geisinger's program to learn from its success.

But doctors alone can't accomplish this food transformation. Recognizing that healthier members not only live longer but also avoid expensive visits to the emergency room, insurers are starting to reward healthy eating by covering sessions with nutritionists and dietitians. In 2019, Blue Cross Blue Shield of Massachusetts began covering tailored meals from the nonprofit food program Community Servings for its members with congestive heart failure who can't afford the low-fat, low-sodium meals they need. In 2018, Congress assigned a first-ever bipartisan Food Is Medicine working group to explore how government-sponsored food programs could address hunger and also lower burgeoning health-care costs borne by Medicare when it comes to complications of chronic diseases. "The idea of food as medicine is not only an idea whose time has come," says Dariush Mozaffarian, a cardiologist and the dean of the Friedman School of Nutrition Science and Policy at Tufts University. "It's an idea that's absolutely essential to our health-care system."

ORANGES
They're rich in vitamin C, which can increase the production of certain immune cells in the body. These cells can control overactive immune reactions in autoimmune diseases such as lupus.

Ask any doctor how to avoid or mitigate the effects of the leading killers of Americans, and you'll likely hear that eating healthier plays a big role. But knowing intuitively that food can influence health is one thing, and having the science and the confidence to back it up is another. And it's only relatively recently that doctors have started to bridge this gap.

It's hard to look at health outcomes like heart disease and cancer that develop over long periods of time and tie them to specific foods in the typical adult's varied diet. Plus, foods are not like drugs that can be tested in rigorous studies to determine cause and effect in a simple, straightforward manner. Imagine how difficult it would be, for example, to execute a two-year study comparing a thousand people who eat a cup of blueberries a day with a thousand who don't in order to determine if the fruit can prevent cancers.

FISH
Certain fish are rich in omega-3 fatty acids. Omega-3 oils can reduce blood pressure and inhibit growth of plaques in arteries.

Foods aren't as discrete as drugs when it comes to how they act on the body either—they can contain a number of beneficial, and possibly less beneficial, ingredients that interact in complex and, in many cases, poorly understood ways in the body's various organ systems. This physiological complexity can also be seen in studies that compare the health impact of foods versus the impact of isolated specific vitamins. While getting the right nutrients in the right quantities from food is associated with a longer life, the same isn't true for nutrients from supplements, according to Fang Fang Zhang, of Tufts University Friedman School of Nutrition Science and Policy. "For the general population, there's no need to take dietary supplements."

Doctors also know that we eat not only to feed our cells but also because of emotions, such as feeling happy or sad. "It's a lot cheaper to put someone on three months of statins [to lower their cholesterol] than to figure out how to get them to eat a healthy diet," says Eric Rimm, a professor of epidemiology and nutrition at the Harvard T.H. Chan School of Public Health. But drugs are expensive—the average American spends $1,400 a year on medications—and if people can't afford them, they go without, increasing the likelihood that they'll develop complications as they progress to severe stages of their illness, which in turn forces them to require more—and costly—health care. What's more, it's not as if the medications are cure-alls; while deaths from heart disease are declining, for example, the most recent report from the American Heart Association showed that the prevalence of obesity increased from 30.5% in 1999–2000 to 37.7% in 2013–2014, and 40% of adults have high total cholesterol.

What people are eating contributes to those stubborn trends, and making nutrition a bigger priority in health care instead of an afterthought may finally start to reverse them. Although there aren't the same types of rigorous trials proving food's worth that there are for drugs, the data that do exist, from population-based studies of what people eat as well as from animal and lab studies of specific active ingredients in food, all point in the same direction.

The power of food as medicine gained scientific credibility in 2002, when the U.S. government released results of a study that pitted a diet and exercise program against a drug treatment for Type 2 diabetes. The Diabetes Prevention Program compared people assigned to a diet low in saturated fat,

BROCCOLI
This vegetable is loaded with glucosinolates, which convert to compounds that can slow breast-cancer cells from growing in the lab.

sugar and salt that included lean protein and fresh fruits and vegetables with people assigned to take metformin to lower blood sugar. Among people at high risk of developing diabetes, those taking metformin lowered their risk of actually getting diabetes by 31% compared with those taking a placebo, while those who modified their diet and exercised regularly lowered their risk by 58% compared with those who didn't change their behaviors, a near doubling in risk reduction.

Studies showing that food could treat disease as well soon followed. In 2010, Medicare reimbursed the first lifestyle-based program for treating heart disease, based on decades of work by University of California, San Francisco, heart expert Dean Ornish. Under his plan, people who had had heart attacks switched to a low-fat diet, exercised regularly, stopped smoking, lowered their stress levels with meditation and strengthened their social connections. In a series of studies, he found that most followers lowered their blood sugar, blood pressure and cholesterol levels and also reversed some of the blockages in their heart arteries, reducing their episodes of angina.

In recent years, other studies have shown similar benefits from adopting healthy eating patterns like the Mediterranean diet—which is high in good fats like olive oil and omega-3s, nuts, fruits and vegetables—in preventing repeat events for people who have had a heart attack. "It's clear that people who are coached on how to eat a Mediterranean diet high in nuts or olive oil get more benefit than we've found in similarly conducted trials of statins [to lower cholesterol]," says Rimm. Researchers found similar benefits for people who have not yet had a heart attack but were at higher risk of having one.

Animal studies and analyses of human cells in the lab are also starting to expose why certain foods are associated with lower rates of disease. Researchers are isolating compounds like omega-3s found in fish and polyphenols in apples, for example, that can inhibit cancer tumors' ability to grow new blood vessels. Nuts and seeds can protect parts of our chromosomes so they can repair damage they encounter more efficiently and help cells stay healthy longer.

If food is indeed medicine, then it's time to treat it that way. In his 2019 book *Eat to Beat Disease*, William Li, a heart expert, pulled together years of accumulated data and proposes specific doses of foods that can treat diseases ranging from diabetes to breast cancer. Not all doctors agree that the science supports administering food like drugs, but he's hoping the controversial idea will prompt more researchers to study food in ways as scientifically rigorous as possible and generate stronger data in coming years. "We are far away from prescribing diets categorically to fight disease," he says. "And we may never get there. But we are looking to fill in the gaps that have long existed in this field with real science. This is the beginning of a better tomorrow."

And talking about food in terms of doses might push more doctors to put down their prescription pads and start going over grocery lists with their patients instead. So far, the several hundred people like Shicowich who rely on the Fresh Food Farmacy have lowered their risk of serious diabetes complications by 40% and cut hospitalizations by 70% compared with other diabetic people in the area who don't have access to the program. On the basis of its success so far, the Fresh Food Farmacy is tripling the number of patients it supports.

Shicowich knows firsthand how important that will be for people like him. When he was first diagnosed, he lost weight and controlled his blood sugar, but he found those changes hard to maintain and soon saw his weight balloon and his blood-sugar levels skyrocket. He's become one of the program's better-known success stories and now works part time in the produce section of a supermarket and cooks nearly all his meals. He's expanding his cooking skills to include fish, which he had never tried preparing before. "I know what healthy food looks like, and I know what to do with it now," he says. "Without this program, and without the support system, I'd probably still be sitting on the couch with a box of Oreos." ◻

Vitamins Can't Replace a Balanced Diet

A study finds that food beats supplements hands down

By Jamie Ducharme

Roughly 90% of American adults do not eat enough fruits and vegetables. That's the reality. And so it's understandable that many of these same folks are trying to make up for it by popping pills. According to the Council for Responsible Nutrition, three quarters of American adults take a dietary supplement of some kind. Multivitamins, many people believe, are an easy and surefire way to get all the essential nutrients they need.

But recent research published in the *Annals of Internal Medicine* suggests that vitamins and supplements may not be enough to keep you healthy. Nutrients consumed via supplements do not improve health and longevity as effectively as those that are consumed through foods, according to the study, which tracked 30,000 adults from 1999 to 2010. To be most effective, nutrients, it appears, should come from food.

Getting enough vitamin A, vitamin K, magnesium, zinc and copper, for instance, were all associated with a lower risk of dying early, the researchers found—but only when those nutrients came from food, according to co-author Fang Fang Zhang, associate professor of epidemiology at the Tufts University Friedman School of Nutrition Science and Policy.

In fact, some supplements even appeared to come with health risks, according to the study. People who took high doses of calcium via supplement had a 53% higher risk of dying from cancer than people who were not taking supplements. But excess calcium from food was not associated with a similar uptick in mortality risk. Similarly, people who took vitamin D supplements but were not deficient in vitamin D had a higher risk of dying.

The study author does make the point, however, that some populations may indeed benefit from certain supplements, including the elderly—who often struggle to absorb nutrients from food—and those with dietary restrictions that may lead to deficiencies. But for most people, the best bet on a healthy future is to eat a balanced diet, not handfuls of supplements.

Your Friendly Microbes

Turns out your body is host to a whole world of organisms. How to make probiotics work

BY ALICE PARK

SCIENCE HAS LEFT FEW FRONTIERS UNCHARTED IN the human body. CT and PET scans allow us to peer through flesh into bones and organs. Genetic tests help us decipher the molecular instructions that guide cell growth. We can even watch the brain at work with MRIs that record neurons as they fire in the perfected choreography of cognition. Yet one vast universe remains largely unexplored, a world where interlopers outnumber homegrown cells by a factor of 10, and the DNA of which is composed of a whopping 8 million genes (humans, in comparison, have a paltry 23,000). It's the microbial kingdom, an invisible ecosystem that can have profound effects on our health, influencing everything from our risk of cancer and obesity to immune disorders, asthma, colds, flu and maybe even autism.

We tend to think of this unseen underworld as an army of disease-carrying invaders—bacteria, viruses and other pathogens that have us sniffling in bed or moaning in the emergency room. The fact is, though, evildoing microbes are the exception. The vast majority of bugs that live in, on and around us are good

neighbors—allies, actually—performing functions essential to good health. "Tens of thousands of species of microorganisms live with us," says Lita Proctor, who coordinated the Human Microbiome Project, launched in 2007 by the National Institutes of Health (NIH). "They belong there, they're good for us, and they support health and well-being."

Consider the microbes that reside in the gut, by far the human body's largest community of tiny tenants. Most are bacteria with odd-sounding names like *Firmicutes* and *Bacteroidetes*, but they perform the vital function of producing enzymes that break down plant fibers. Without them, we wouldn't be able to absorb the nutrients and vitamins found in leafy vegetables and legumes. Other bacteria ferment digested food in our intestines, helping transform what we eat into the energy our cells need.

The goal of so much of the medicine we take and therapies we undergo is to rid the body of microbes. But now that we are beginning to realize the benefits of these organisms, scientists are developing treatments that do just the opposite: seed the body with them. This blossoming field, known as probiotics, shares its name with the class of "good" bacteria it uses, and its potential as a wellness tool is virtually limitless.

Our relationship with beneficial microbes goes back a long way, to our very first moments in the world. The womb is a sterile environment; delivery is a newborn's first confrontation with germs. Over the course of a pregnancy, the makeup of the bacteria in the vagina—the vaginal microbiome—changes, and by the end of nine months it's a well-represented community of bugs that an infant is likely to encounter in the outside world. This initial inoculation primes a baby's immune system to identify potentially troublesome pathogens and mount appropriate immune responses against them.

The journey through the birth canal is an important one. Intriguing preliminary evidence suggests that the makeup of the vaginal microbiome can influence a child's later health, possibly causing, for instance, the development of asthma and allergies. Similarly, scientists hope to tease out microbial "profiles" that characterize babies who might be susceptible to certain illnesses; some re-

Babies arrive in the world inoculated with microbes that prime the immune system.

A Helping of Probiotics

Scientists are learning that the microbial communities in our guts are linked to everything from body weight to asthma to acne. Having the right balance is key.

Although the study of probiotics continues, early indications are that most people tolerate them well. (Children, the elderly and those with compromised immune systems may want to stay away until we know more.) Here are some ways to add a little probiotic flavor to your everyday diet.

› Mix plain yogurt or kefir (a fermented milk drink) with fruit and a little sweetener for a snack or dessert or as a base for smoothies and ice cream.

› Use miso, a soy-based seasoning, in soups, marinades and salad dressings. Another soy product, tempeh, can sub for meat in sandwiches, spaghetti or chili.

› Top a sandwich or accompany an entree with sauerkraut.

› Feel free to treat yourself to a bar of good-quality dark chocolate or a glass of wine—but only once in a while.

› Thirsty? Search out probiotic soy beverages and fruit drinks in your local supermarket.

› Probiotic supplements, in capsule and powder forms, are available. But use them only as directed and after consulting a caregiver.

› Antibiotics may go after your body's good bacteria as well, so when your doctor prescribes them, ask about taking a probiotic supplement too. But be sure to take the medications at least two hours apart.

› Similarly, some foods may promote the growth of your local flora. These "prebiotics" include wheat, barley, oats, chicory root, artichoke, banana, garlic, onion and honey.

—Charla Schultz

search indicates that gut microbes adjust to what we eat and react to the air we breathe and illnesses we encounter.

Figuring out how these microbial populations respond to stimuli will open whole new treatment paths—and maybe even help us avoid sickness in the first place. Over the span of a decade, the NIH invested $170 million in the Human Microbiome Project, which ended in 2016. Modeled after the Human Genome Project, which sequenced the body's genes, the Human Microbiome Project sequenced about 3,000 bacterial genomes from samples collected from more than 300 people.

Good germs, bad germs

SOME BUGS DESERVE THEIR BAD REPUTATIONS, while others do not. Our bodies have both kinds in abundance. Researchers hope to create a database of microbes that will help link particular communities to either disease or improved health. "This is a vast territory we've never studied," says George Weinstock, professor of and director for microbial genomics at Jackson Laboratory in Farmington, Conn.

Why has so much remained out of reach until now? For starters, many of the bacteria are difficult, if not impossible, to grow outside the inviting confines of the human body. That has made it challenging for microbiologists to get an accurate tally of what resides within us, much less figure out what the organisms do. But advances in DNA sequencing now allow researchers to bypass culturing altogether. Essentially, they use genetics to take bacterial attendance, filtering out recognizable human genes from a sample and then logging the remaining DNA. The latest investigations have uncovered some tantalizing clues about the dramatic effects this microworld can have on our health. Scientists have learned, for example, that obese people and people of normal weight harbor different bacteria in their intestines and that the composition of bacterial communities changes depending on what you eat. People who favor high-fat, low-fiber diets tend to house more *Bacteroidetes* bugs, while those who eat less animal fat show higher concentrations of *Prevotella* microbes. From a therapeutic perspective, it would be important to know if this relationship works the other way too; that is, can different types of gut flora influence or even change eating habits?

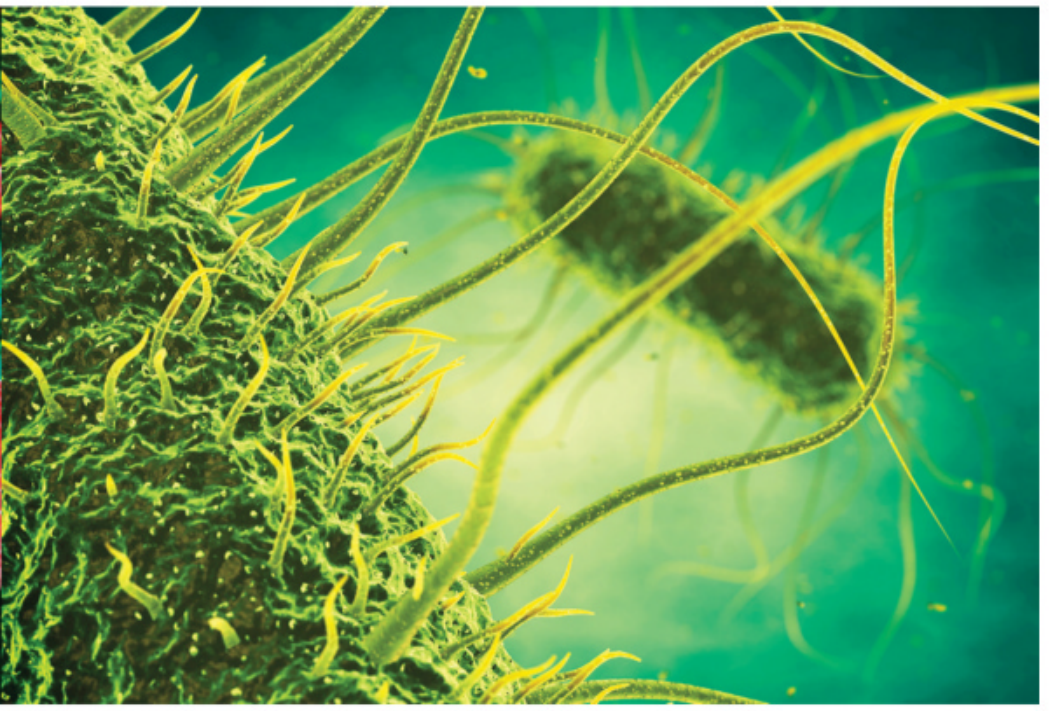
What does seem to be true is that tweaking a person's microbial profile can improve his health.

E. COLI: *This is a much-maligned bacterium, and for good reason: it can cause deadly disease. But that's not the whole story. Some strains, naturally occurring in our abdominal tract, aid digestion and keep bad microbes at bay.*

ENTEROCOCCI: *Found in the vaginal and intestinal regions of 40% to 80% of people, some strains of this bacterium cause infection, but many others make our immune system more efficient.*

Studies hint that probiotics, in particular lactic-acid bacteria and *bifidobacteria*, can thwart cold and flu viruses, resulting in 12% fewer respiratory infections among children and adults given them, compared with a control group. More encouraging, probiotics may help cold and flu sufferers reduce their antibiotic dosage—a huge plus given the growing problem of antibiotic-resistant bugs.

In another recent treatment advance, patients with *C. difficile* infections, which can cause persis-



SALMONELLA: *Unlike* E. coli, *salmonella deserves its reputation. A lot of what we call food poisoning comes from strains that are found mostly in raw eggs and chicken but can turn up almost anywhere. In the worst cases, salmonella poisoning kills.*

LACTOBACILLUS: *This bacterium ferments milk into yogurt by converting lactose, a sugar found in milk, into lactic acid, which acts as a preservative and gives yogurt its tart flavor.*

tent diarrhea, abdominal cramping and fever, have been administered fecal transplants. Yes, that is just what it sounds like: infusions of feces from an uninfected, usually related, donor.

In a paper published in 2017, researchers led by Dina Kao, a gastroenterologist at the University of Alberta in Canada, reported that fecal matter manufactured into a capsule was as effective as delivery by colonoscopy. Another delivery vehicle is a tube inserted through the nose into the stomach. "The biggest question in this area has always been, what's the best way to deliver the transplant?" says Kao. The treatment remains experimental and has not yet received FDA approval, but it is widely considered very promising and is gaining momentum.

Similarly, doctors at some cancer centers advise patients to bank stool samples—essentially, a concentrated form of their microbiome—before chemotherapy, just as they might store blood for transfusions, to replenish what the toxic treatment wipes out. Early studies show that patients who do this rebound quicker from their chemo course than those who don't.

Then again, doctors don't expect fecal transplants to become as common as flu shots. "I think that in the not-too-distant future we will be able to have probiotics or dietary supplements to support beneficial microbes," says Proctor. Some of those may be composed entirely of strains of probiotics, while others, known as synbiotics, may be combinations of probiotics and prebiotics. Prebiotics aren't microbes at all but rather indigestible parts of the foods we eat (say, the fiber in whole grains) that nourish the good bacteria.

Some consumer-ready probiotics may already exist in your grocer's dairy case. The makers of Activia yogurt say their product eases digestive disorders by repopulating the stomach with healthful bacterial colonies. Then again, they may have gotten a little ahead of themselves, having landed in court as defendants in a class-action suit that alleged false and misleading advertising claims.

That doesn't mean those claims won't eventually be proved true, though. Once we fully understand how microbes morph in response to what we do and what we eat, not to mention environmental factors, we will be able to manipulate them to our benefit. Further, many of these bacteria interact with each other to produce enzymes, digest food and fight inflammation, intimately connecting them to the body's metabolic processes. Playing on that field—tweaking the pathways by which compounds and chemicals pass back and forth—will lead to the most significant advances.

Imagine being able to overcome obesity simply by adjusting the makeup of the gut's ecosystem, or saving patients from a fatal infection by giving them some microbes to ingest. That's the promise of the human microbiome, the hidden world that isn't likely to remain out of sight for long. ◻

Secrets About Dietary Cleanses

From fasts to flushes, many of us will do whatever it takes to cleanse our body of toxins. But what if we don't have to do anything at all?

BY PEG ROSEN

"I JUST FINISHED A DETOX, AND I FEEL AMAZING."

Many of us have heard some version of that sentiment from friends, family or someone at work. Or maybe we've read about a celebrity touting the benefits of a cleanse, the practice of subsisting for days on green shakes, highly restrictive diets or even plain water to rid the body of impurities. We can certainly understand the motivation, and we might even believe that a person who has undergone such a regimen does indeed feel amazing. But the reality is that there is little research that endorses the notion that attempts to "detox"—unless the toxins, are, say, addictive substances like drugs or alcohol—are effective. Or even necessary.

That's because the human body does a decent job of scrubbing itself clean all on its own. Our liver, kidneys, lungs and skin exist in large part to filter out impurities, eliminating them in sweat, urine, breath and feces. Bacteria in the colon neutralize food waste, and that organ's mucous lining prevents potentially harmful organisms and waste products from seeping back into our system. And while some toxins are absorbed by fat cells—where they can take up permanent residence—there's scant evidence to suggest that we can forcibly flush them out.

Cleansing, though, is no fad. Versions of the practice have been championed for millennia. Ancient Egyptians purged their colons at specific times during the lunar cycle. The Greeks believed that eating allowed "demonic forces" to enter the body and embraced fasting as an antidote. A vast array of religions and spiritual traditions have also incorporated fasting into various ceremonies and rites. Twentieth-century guru Paramahansa Yogananda, who was born in India and died in Los Angeles, said simply, "Fasting is a natural method of healing." Perhaps it's no surprise, then, that today, therapeutic cleansing basks in a continuous cultural limelight, thanks to an ever-changing but endless parade of A-list celebrity enthusiasts.

All hype aside, the idea that dramatically restricting what goes into the body, at least for a limited

time, may be beneficial isn't totally unreasonable. "There is a decent amount of research on fasting. Threads of evidence suggest there may be some benefits," says Mary Beth Augustine, a consulting integrative nutritionist. Animal studies have shown that intermittent fasting slows brain aging and reduces cancer risk. There is also research suggesting that periodic fasting may trigger changes in metabolism that lower the risk of coronary heart disease and diabetes.

Is less more?

BUT THAT HARDLY JUSTIFIES THE SWEEP OF THE assertions made in best-selling detox books. Many juice fasts claim to offer weight loss, relief from bloating, the elimination of unspecified toxins, a general boost to the immune system and, in some cases, a reduced risk of cancer and other diseases. One modified juice fast, the Master Cleanse (also known as the "lemonade diet" because it features a concoction of lemon juice, maple syrup, cayenne pepper and water), purports to flush undigested food and built-up waste from the body.

Food-based detox diets, which regiment the intake of solid foods and are sometimes accompanied by supplements and laxatives, allegedly expunge targeted disease-causing bacteria or cleanse particular organs of stored impurities. The draw of colonics, also known as colonic irrigation or colonic hydrotherapy, is even more visceral. The goal of this process, in which up to 15 gallons of fluid are flushed through the colon by means of a tube inserted in the rectum, is to remove fecal matter that has built up in the digestive tract. Backers of the treatment buy into the theory of "autointoxication," which holds that fecal toxins leach back into the body, causing a range of maladies from fatigue to allergies.

It can all sound pretty persuasive. And sure, otherwise healthy individuals may feel less bloated or lose weight on many of these routines. But think about it: these fasts and diets by definition restrict

A cleanse has a definite appeal, but for a real overhaul, try cleaning out the fridge.

caloric intake and specifically exclude processed foods, caffeine, alcohol, fatty animal protein and excess sodium. What health professional would argue with that regimen? If you feel good on a juice fast, it's probably because of what you are not consuming.

On the plus side, few of the therapies are especially risky—with the exception of colon therapy. An improperly administered colonic may result in a host of complications, ranging from bowel perforation and infection to reduced kidney function, electrolyte abnormalities and possibly even heart and kidney failure. Vomiting, dehydration and the obliteration of helpful bacteria that keep the bowel environment in healthy balance have also been reported.

Also of concern can be liver flushes, which may lead to explosive diarrhea. In rare instances, a flush may cause cramping that dislodges a gallstone that then dangerously becomes stuck in a bile duct. Really, though, the biggest downside of these flushes, specifically when they are used to eradicate gallstones, is that they delay individuals from seeking more conventional treatment.

But those are worst-case scenarios of more-extreme therapies. For people in generally good health who aren't pregnant, breastfeeding or severely underweight, juice fasts of a few days or even weeklong restricted cleanse diets won't hurt. In fact, they might even do some good. Many cleansers experience post-treatment exhilaration. It might be little more than a placebo effect, but that's OK; you can ride that feeling and jump-start more permanent dietary and lifestyle changes. "It's one reason why—even if it's not my choice as a first-line treatment—I support my patients who want to try it," says Augustine. Because in the end, of course, it's long-term, consistently maintained dietary changes that make us healthier. Anyone in the cleansing game for a quick fix is wasting his time. And that's mostly because the majority of cleansers revert to old habits after treatment, often with a vengeance. Whatever pounds were lost are gained right back. Worse, that can trigger a vicious cycle of yo-yo dieting in an effort to hold one's ground.

"My clients often come in telling me they want to do a cleanse to get back on track," says Andrea Giancoli, a nutrition communications consultant, who understands the impulse to start big. "But why not just do something that gets you on track and allows you to stay there? If you really want to do a cleanse, cleanse your fridge and your pantry." ◻

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Ancient Wisdom

Thinkers have been musing on the nature of medicine, and those who administer it, for centuries

"The doctor of the future will give no medicine, but will interest his patients in the care of the human frame, in diet, and in the cause and prevention of disease."

THOMAS EDISON

"THE ART OF MEDICINE CONSISTS OF AMUSING THE PATIENT WHILE NATURE CURES THE DISEASE."

VOLTAIRE

"It is more important to know what sort of person has a disease than to know what sort of disease a person has."

HIPPOCRATES

"The competent physician, before he attempts to give medicine to the patient, makes himself acquainted not only with the disease, but also with the habits and constitution of the sick man." —CICERO

"He's the best physician who knows the worthlessness of most medicines."

BENJAMIN FRANKLIN

"A man may esteem himself happy when that which is his food is also his medicine."

HENRY DAVID THOREAU

"THE ART OF HEALING COMES FROM NATURE AND NOT FROM THE PHYSICIAN. THEREFORE, THE PHYSICIAN MUST START FROM NATURE WITH AN OPEN MIND."

PARACELSUS

As medicine explores more holistic and less-invasive ways to heal, there has never been a better time to enjoy good health, high energy and renewed strength—often through easy adjustments in everyday life.