

Altered Traits: Science Reveals How Meditation Changes Your Mind, Brain, and Body

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1 | The Deep Path and the Wide

- Page 6 · Location 101

An altered trait—a new characteristic that arises from a meditation practice—endures apart from meditation itself. Altered traits shape how we behave in our daily lives, not just during or immediately after we meditate.

- Page 7 · Location 110

As we see it, the most compelling impacts of meditation are not better health or sharper business performance but, rather, a further reach toward our better nature.

- Page 7 · Location 112

The further reaches of the deep path cultivate enduring qualities like selflessness, equanimity, a loving presence, and impartial compassion—highly positive altered traits.

3 | The After Is the Before for the Next During

- Page 42 · Location 550

A highly advanced practitioner effortlessly stabilizes on the healthy side, embodying confidence, buoyancy, and the like.

- Page 45 - Location 582

Valuing just the heights misses the true point of practice: to transform ourselves in lasting ways day to day.

- Page 45 - Location 588

“The true mark of a meditator is that he has disciplined his mind by freeing it from negative emotions.”

- Page 54 - Location 714

Other Greco-Roman philosophic schools used similar practices in their own paths toward flourishing. For the Stoics, one key was seeing that our feelings about life’s events, not those events themselves, determine our happiness; we find equanimity by distinguishing what we can control in life from what we cannot. Today that creed finds an echo in the popularized Twelve Step version of theologian Reinhold Niebuhr’s prayer: God, grant me the serenity to accept the things I cannot change, Courage to change the things I can, And wisdom to know the difference.

- Page 55 - Location 725

In the Greco-Roman tradition, qualities such as integrity, kindness, patience, and humility were considered keys to enduring well-being. These Western thinkers and Asian spiritual traditions alike saw the value in cultivating a virtuous life via a roughly similar transformation of being. In Buddhism, for example, the ideal of inner flourishing gets put in terms of bodhi (in Pali and Sanskrit), a path of self-actualization that nourishes “the very best within oneself.”

5 | A Mind Undisturbed

- Page 95 - Location 1241

And the study dispels doubts that all the positive traits found in long-term meditators are simply due to self-selection, where people who already had those traits choose the practice or stay with it in the long run.

- Page 97 - Location 1266

The reason: their brains had stronger operative connectivity between the prefrontal cortex, which manages reactivity, and the amygdala, which triggers

such reactions. As neuroscientists know, the stronger this particular link in the brain, the less a person will be hijacked by emotional downs and ups of all sorts.

6 | Primed for Love

- Page 104 - Location 1344

At one point Sharon told the Dalai Lama that many Westerners felt loathing toward themselves. He was astonished—he'd never heard of this. He had, the Dalai Lama replied, always assumed that people naturally loved themselves. Yet in English the word compassion, the Dalai Lama pointed out, signifies the wish that others be well—but it does not include oneself. He explained that in his own language, Tibetan, as well as in the classical tongues Pali and Sanskrit, the word compassion implies feeling this for oneself as well as others. English, he added, needs a new word, self-compassion.

- Page 107 - Location 1378

Such positive regard for a victim of suffering means we can confront and deal with their difficulty. This allows us to move along that spectrum from noticing what's going on to the payoff, actually helping them. In many East Asian countries the name Kuan Yin, the revered symbol of compassionate awakening, translates as “the one who listens and hears the cries of the world in order to come and help.” 9

- Page 108 - Location 1393

As Martin Luther King Jr. commented on the Good Samaritan tale, those who did not help asked themselves, If I stop to help, what will happen to me? But the Good Samaritan asked, If I don't stop to help, what will happen to him?

- Page 108 - Location 1400

Studies with novices learning loving-kindness reveal an early harbinger of heightened amygdala reactions to images of pain and suffering found in seasoned meditators. 10 The finding was nowhere as strong as in the long-term meditators—just a hint that the pattern can show up very soon. How soon? Maybe in mere minutes—at least when it comes to mood. One study found that just seven minutes of loving-kindness practice boosts a person's good feelings and sense of social connection, if only temporarily. 11 And the Davidson group had found that after eight or so hours of training in loving-kindness, volunteers showed strong echoes of those brain patterns found in more experienced meditators. 12 The beginners' temporary wave of mellow

feeling may be an early precursor of the more striking brain changes in people who practice loving-kindness for weeks, months, or years.

- Page 110 - Location 1424

For one thing, very often meditation comes in batches, not as a single practice. Vipassana meditators (the majority of those in the long-term studies reported here) on a typical retreat might mix mindfulness of breathing with loving-kindness.

- Page 110 - Location 1427

These various mind training methods drive the brain in different ways. During compassion practice, the amygdala is turned up in volume, while in focused attention on something like the breath, the amygdala is turned down. Meditators are learning how to change their relationship to their emotions with different practices.

- Page 111 - Location 1439

Those who did not avert their eyes but took in that suffering were, seven years later, better able to remember those specific pictures. In cognitive science, such memory betokens a brain that was able to resist an emotional hijack, and so, take in that tragic image more fully, remember it more effectively—and, presumably, act.

- Page 111 - Location 1441

Unlike other benefits of meditation that emerge gradually—like a quicker recovery from stress—enhancing compassion comes more readily. We suspect that cultivating compassion may take advantage of “biological preparedness,” a programmed readiness to learn a given skill, as seen, for instance, in the rapidity with which toddlers learn language. Just as with speaking, the brain seems primed to learn to love.

- Page 112 - Location 1448

Such intense resonance with others’ suffering has been found in another notable group: extraordinary altruists, people who donated one of their kidneys to a stranger in dire need of a transplant. Brain scans discovered that these compassionate souls have a larger right-side amygdala compared to other people of their age and gender. 17

- Page 112 - Location 1455

The cultivation of a loving concern for other people’s well-being has a surprising and unique benefit: the brain’s circuitry for happiness energizes,

along with compassion. 19 Loving-kindness also boosts the connections between the brain's circuits for joy and happiness and the prefrontal cortex, a zone critical for guiding behavior. 20 And the greater the increase in the connection between these regions, the more altruistic a person becomes following compassion meditation training.

- Page 113 - Location 1467

Our empathic resonance with the pain of others, she found, activates what amounts to a neural alarm that instantly tunes us to others' suffering, potentially alerting us to the presence of danger. But compassion—feeling concern for the person suffering—seemed to involve a different set of brain circuits, those for feelings of warmth, love, and concern.

- Page 114 - Location 1476

Compassion, she found, muted the empathic distress that can lead to emotional exhaustion and burnout (as happens sometimes in the caring professions like nursing). Instead of simply feeling with the other person's angst, compassion training led to that activation of completely different brain circuits, those for loving concern—and to positive feelings and resilience. 22

Highlight(yellow) - Page 115 - Location 1489

Results: the scan increased body awareness and lessened mind-wandering. Observing thoughts enhanced meta-awareness, a by-product of mindfulness. On the other hand, loving-kindness boosted warm thoughts and feelings about others. In short, if you want to increase your feelings of kindness most effectively, practice exactly that—not something else.

- Page 117 - Location 1526

But on a test of depressive thinking, the compassion group also reported being happier in general. Sharing another person's feelings of distress need not be a downer. As Dr. Aaron Beck, who designed that depression test, has said, when you focus on someone else's suffering, you forget your own troubles.

- Page 120 - Location 1565

And whether or not we attain that lofty height of love, there are other benefits along the way, like how the brain's circuitry for happiness energizes, along with compassion. As we've often heard the Dalai Lama say, "The first person to benefit from compassion is the one who feels it." The Dalai Lama recalls an encounter at Montserrat, a monastery near Barcelona, with Padre Basili, a Christian monk who had been in isolated retreat in a nearby mountain

hermitage for five years. What had he been doing? Meditating on love. “I noticed a glow in his eyes,” the Dalai Lama said, adding this indicated the depth of his peace of mind and the beauty from becoming a wonderful person. The Dalai Lama noted that he had met people who had everything they wanted, yet were miserable. The ultimate source of peace, he said, is in the mind—which, far more than our circumstances, determines our happiness. 33

- Page 121 - Location 1576

empathic concern, activates circuits for good feelings and love, as well as circuits that register the suffering of others, and prepares a person to act when suffering is encountered. Compassion and loving-kindness increase amygdala activation to suffering while focused attention on something neutral like the breath lessens amygdala activity. Loving-kindness acts quickly, in as little as eight hours of practice;

7 | Attention!

- Page 128 - Location 1648

Selective attention, the capacity to focus on one element and ignore others. Vigilance, maintaining a constant level of attention as time goes on. Allocating attention so we notice small or rapid shifts in what we experience. Goal focus, or “cognitive control,” keeping a specific goal or task in mind despite distractions. Meta-awareness, being able to track the quality of one’s own awareness—for example, noticing when your mind wanders or you’ve made a mistake.

- Page 131 - Location 1691

Conclusion: mindfulness (at least in this form) strengthens the brain’s ability to focus on one thing and ignore distractions. The neural circuitry for selective attention, the study concluded, can be trained—contrary to the standard wisdom where attention was assumed to be hardwired and so, beyond the reach of any training attempt.

- Page 133 - Location 1712

That higher bar was met by Clifford Saron and Alan Wallace’s study, where volunteers attended a three-month meditation retreat with Wallace as teacher. 8 They practiced focusing on their breath five hours per day and Saron tested them at the beginning of the retreat, one month into it, at the end, and finally five months later. The meditators improved in vigilance, with the greatest gains in the first month of retreat. Five months after the retreat ended, each

meditator took a follow-up test of vigilance, and, impressively, the improvement gained during retreat was still strong. To be sure, the gain was likely maintained by the hour of practice daily these meditators reported. Still, this is among the best direct tests of a meditation-induced altered trait in attention we have so far. Of course the evidence would be all the more compelling if these meditators were to show the same gain five years later, too!

- Page 135 - Location 1745

a group of researchers in Germany asked whether meditation training might offset the universal worsening with age of the attentional blink, which becomes more frequent and creates longer gaps in awareness as people get older. 10 Yes: meditators who regularly practiced some form of “open monitoring” (a spacious awareness of whatever comes to mind) reversed the usual escalation of attentional blinks with aging,

- Page 136 - Location 1753

Once the attentional blink had been shown to be reversible, Dutch scientists wondered, What’s the minimum training that still lessens the blink? They taught people who had never meditated before how to monitor their mind, using a version of mindfulness. 11 The training sessions lasted just seventeen minutes, after which the volunteers were tested on the attentional blink. They blinked less than a comparison group, who had been taught a focusing meditation that had no effect on this mental skill.

- Page 137 - Location 1765

The symbolic meaning of eye contact, of putting aside what we are doing to connect, lies in the respect, care, even love it indicates. A lack of attention to those around us sends a message of indifference. Such social norms for attention to the people we are with have silently, inexorably shifted.

Note - Page 137 - Location 1767

Sad!!!

- Page 137 - Location 1772

Attention tasks don’t really go on in parallel, as “multitasking” implies; instead they demand rapid switching from one thing to the other. And following every such switch, when our attention returns to the original task, its strength has been appreciably diminished. It can take several minutes to ramp up once again to full concentration.

- Page 138 - Location 1778

Even the ability to multitask efficiently suffers. As the late Clifford Nass, one of the researchers, put it, multitaskers are “suckers for irrelevancy,” which hampers not just concentration but also analytic understanding and empathy. 13

- Page 139 - Location 1803

Another way cognitive control helps us is in managing our impulses, technically known as “response inhibition.” As we saw in chapter five, “A Mind Undisturbed,” in Cliff Saron’s study the training upped a meditator’s ability to inhibit impulse over the course of three months and, impressively, stayed strong in a five-month follow-up. 17 And better impulse inhibition went along with a self-reported uptick in emotional well-being.

- Page 140 - Location 1812

Such awareness of awareness itself lets us monitor our mind without being swept away by the thoughts and feelings we are noticing. “That which is aware of sadness is not sad,” observes philosopher Sam Harris. “That which is aware of fear is not fearful. The moment I am lost in thought, however, I’m as confused as anyone else.” 18

- Page 141 - Location 1821

Meta-awareness allows us to track our attention itself—noticing, for example, when our mind has wandered off from something we want to focus on. This ability to monitor the mind without getting swept away introduces a crucial choice point when we find our mind has wandered: we can bring our focus back to the task at hand. This simple mental skill undergirds a huge range of what makes us effective in the world—everything from learning to realizing we’ve had a creative insight to seeing a project through to its end.

Note - Page 141 - Location 1825

Wow, this paragraph sums up the benefit of practicing Shamatha so very well!

- Page 142 - Location 1832

Consider unconscious bias, the prejudices we hold but do not believe we have at all (as mentioned in chapter six, “Primed for Love”). Meditation can both enhance the function of the DLPFC and lessen unconscious bias. 20

Note - Page 142 - Location 1835

Meditation for managers and employees alike!

- Page 144 - Location 1861

Our hunch would be that pushing a neural system like attention in a lasting way requires not just these short trainings and continued daily practice, but also intensive booster sessions, as was the case with those who were at the shamatha retreat and then were tested five months later in Cliff Saron's study. Otherwise the brain's wiring will regress to its previous status: a life of distraction punctuated with periods of concentration.

8 | Lightness of Being

- Page 147 - Location 1884

Focusing on just the sensations meant completely reappraising the nature of hurting: instead of fixating on the pain, the very notion of pain deconstructed into raw sensations. What went missing was just as critical: the psychological resistance to, and negative feelings about, those sensations.

- Page 150 - Location 1920

So, where are all those neurons, chatting back and forth while we do nothing in particular? Raichle identified a swath of areas, mainly the mPFC (short for midline of the prefrontal cortex) and the PCC (postcingulate cortex), a node connecting to the limbic system. He dubbed this circuitry the brain's "default mode network." 1

- Page 151 - Location 1931

By framing every event in how it impacts ourselves, the default mode makes each of us the center of the universe as we know it.

- Page 151 - Location 1937

asked thousands of people to report their mental focus and mood at random points through the day, their conclusion was that "a wandering mind is an unhappy mind."

- Page 152 - Location 1944

Managing attention, as we saw in the previous chapter, is an essential ingredient of every variety of meditation. When we become lost in thoughts during meditation, we've fallen into the default mode and its wandering mind.

- Page 154 - Location 1968

Meditative traditions of all kinds share one goal: letting go of the constant grasping—the "stickiness" of our thoughts, emotions, and impulses—that

guides us through our days and lives. Technically called “dereification,” this key insight has the meditator realize that thoughts, feelings, and impulses are passing, insubstantial mental events. With this insight we don’t have to believe our thoughts; instead of following them down some track, we can let them go.

- Page 154 - Location 1973

Many other traditions see lightening the self as the path to inner freedom. We’ve often heard the Dalai Lama talk about “emptiness,” by which he means the sense in which our “self”—and all seeming objects in our world—actually emerge from the combination of their components.

- Page 157 - Location 2011

The seasoned meditators in the Brewer study had the same strong connection between the control circuit and the default mode seen in beginners, but in addition had less activation within the default mode areas themselves. This was particularly true when they practiced loving-kindness meditation—a corroboration of the maxim that the more we think of the well-being of others, the less we focus on ourselves. 8

- Page 159 - Location 2044

Arthur Zajonc, the second president of the Mind and Life Institute, and a quantum physicist and philosopher to boot, once said that if we let go of grasping, “we become more open to our own experience, and to other people. That openness—a form of love—lets us more easily approach other people’s suffering.” “Great souls,” he added, “seem to embody the ability to engage suffering and handle it without collapse. Letting go of grasping is liberating, creating a moral axis for action and compassion.” 15

- Page 161 - Location 2070

At the third and final stage of letting go of self-referencing, we conjecture, the control circuitry’s role drops away, as the main action shifts to looser connectivity in the default mode, the home of the self. Brewer’s group found such a decrease. With a spontaneous shift to effortlessness comes a change in the relationship to the self: it’s not so “sticky” anymore. The same sorts of thoughts can arise in your mind, but they are lighter: not so compelling, with less emotional oomph, and so float away more easily. This, at any rate, reflects what we hear from the advanced yogis studied in the Davidson lab, as well as from classic meditation manuals.

- Page 162 - Location 2090

Stickiness seems to reflect the dynamics of the emotional circuitry of the brain, including the amygdala and the nucleus accumbens. These regions very likely underlie what traditional texts see as the root causes of suffering—attachment and aversion—where the mind becomes fixated on wanting something that seems rewarding or on getting rid of something unpleasant. The stickiness spectrum runs from being utterly stuck, unable to free ourselves from distressing emotions or addictive wants, to the Dalai Lama’s instant freedom from any given affect. One trait that emerges from living without getting stuck seems to be an ongoing positivity, even joy.

- Page 163 - Location 2095

When the Dalai Lama once was asked what had been the happiest point in his life, he answered, “I think right now.”

9 | Mind, Body, and Genome

- Page 172 - Location 2195

And the meditators reported being in better mental health than volunteers matched for age and gender who did not meditate.

- Page 172 - Location 2196

Important: these seasoned practitioners were not meditating when these measures were taken—this was a trait effect. Mindfulness practice, it seems, lessens inflammation day to day, not just during meditation itself.

- Page 172 - Location 2199

While those new to MBSR had a mild trend toward lower cortisol, a large drop in cortisol under stress seems to kick in at some point with continued practice. Looks like there’s biological confirmation of what meditators say: it gets easier to handle life’s upsets.

- Page 172 - Location 2208

How we relate to our gloomy self-talk has a direct impact on our health.

- Page 175 - Location 2246

Sugar turns on the genes for diabetes; exercise turns them off. Sugar and exercise are “epigenetic” influencers, among the many, many factors that control whether or not a gene expresses itself. Epigenetics has become a frontier of genomic studies. And Richie thought meditation just might have epigenetic impacts, “down-regulating” the genes responsible for the

inflammatory response. As we've seen, meditation seems to do this—but the genetic mechanism for the effect was a complete mystery.

- Page 176 - Location 2256

And this epigenetic impact, remember, was a “naive” idea that countered the then prevailing wisdom in genetic science. Despite assumptions to the contrary, Richie’s group had shown that a mental exercise, meditation, could be a driver of benefits at the level of genes. Genetic science would have to change its assumptions about how the mind can help manage the body.

- Page 177 - Location 2268

Telomerase is the enzyme that slows the age-related shortening of telomeres; the more telomerase, the better for health and longevity. A meta-analysis of four randomized controlled studies involving a total of 190 meditators found practicing mindfulness was associated with increased telomerase activity. 18

- Page 179 - Location 2298

Over the course of a single day that difference in breath rate translates to more than 2,000 extra breaths for the nonmeditators—and more than 800,000 extra breaths over the course of a year. These extra breaths are physiologically taxing, and can exact a health toll as time goes on.

- Page 180 - Location 2318

And the big news about meditation for older folks comes from a study at UCLA that finds meditation slows the usual shrinkage of our brain as we age: at age fifty, longtime meditators’ brains are “younger” by 7.5 years compared to brains of nonmeditators of the same age. 27 Bonus: for every year beyond fifty, the brains of practitioners were younger than their peers’ by one month and twenty-two days.

- Page 181 - Location 2321

Meditation, the researchers conclude, helps preserve the brain by slowing atrophy. While we doubt that brain atrophy actually can be reversed, we have reason to agree it can be slowed.

- Page 183 - Location 2352

Finally, brain measures have become more precise and sophisticated since many of these studies were done. We don’t know if measurements using the newer, more stringent criteria would yield the same findings. Our hunch is that better studies will reveal positive changes in brain structure with meditation, but it’s too early to say. We’re waiting to see.

- Page 184 - Location 2367

Such findings underscore the importance for meditation researchers to distinguish among different types of practice, particularly when it comes to pinpointing related changes in the brain.

- Page 184 - Location 2377

For several years Richie pursued data on the ratio of activity in the right versus left prefrontal cortex while people were at rest. More right-side activity than left correlated with negative moods like depression and anxiety; relatively more left-side activity was associated with buoyant moods like energy and enthusiasm.

- Page 186 - Location 2398

Our current thinking holds that in later stages of meditation other mechanisms kick in, so that what changes is your relation to any and all emotions, rather than the ratio of positive to negative ones. With high levels of meditation practice, emotions seem to lose their power to pull us into their melodrama.

- Page 187 - Location 2415

As is true of all too much meditation research, the methods used in many studies of health impacts fail to clear the highest bar. That left us surprised by how little we can say with certainty, given the great excitement (and, okay, hype) about meditation as a way to boost health.

- Page 187 - Location 2417

The sounder studies, we found, focus on lessening our psychological distress rather than on curing medical syndromes or looking for underlying biological mechanisms. So, when it comes to a better quality of life for those with chronic diseases, yes to meditation. Such palliative care gets ignored too often in medicine, but it matters enormously to patients.

- Page 189 - Location 2439

MBSR and similar methods can reduce the emotional component of suffering from disease, but not cure those maladies. Yet mindfulness training—even as short as three days—produces a short-term decrease in pro-inflammatory cytokines, the molecules responsible for inflammation. And the more you practice, the lower the level becomes of these pro-inflammatory cytokines. This seems to become a trait effect with extensive practice, with imaging studies finding in meditators at rest lower levels of pro-inflammatory cytokines, along with an increased connectivity between regulatory circuitry and sectors of the brain's self system, particularly the posterior cingulate cortex.

- Page 189 - Location 2444

Among experienced meditation practitioners, a daylong period of intensive mindfulness practice down-regulates genes involved in inflammation. The enzyme telomerase, which slows cellular aging, increases after three months of intensive practice of mindfulness and loving-kindness. Finally, long-term meditation may lead to beneficial structural changes in the brain, though current evidence is inconclusive about whether such effects emerge with relatively short-term practice like MBSR, or only become apparent with longer-term practice. All in all, the hints of neural rewiring that undergird altered traits seem scientifically credible, though we await further studies for specifics.

10 | Meditation as Psychotherapy

- Page 195 - Location 2500

The Hopkins group did this meta-analysis for the Agency for Healthcare Research and Quality, whose guidelines physicians try to follow. The review's conclusion: meditation (in particular, mindfulness) can have a role in treating depression, anxiety, and pain—about as much as medications but with no side effects. Meditation also can, to a lesser degree, reduce the toll of psychological stress. Overall, meditation has not been proven better for psychological distress than medical treatments, though the evidence for stronger conclusions remains insufficient.

- Page 196 - Location 2519

And by 2016 a meta-analysis of nine such studies with a total 1,258 patients concluded that, over a year afterward, MBCT was an effective way to lower the relapse rate in severe depression. The more severe the symptoms of depression, the larger the benefits from MBCT. 6

- Page 196 - Location 2525

The reason? In a later analysis, Segal found the best outcomes were in those patients most able to “decenter,” that is, step outside their thoughts and feelings enough to see them as just coming and going, rather than getting carried away by “my thoughts and feelings.” In other words, these patients were more mindful. And the more time they put into mindfulness practice, the lower their odds of a relapse into depression.

- Page 197 - Location 2530

women who are pregnant and have a previous history of depressive episodes naturally want to be sure they do not get depressed while carrying their baby

or after the birth, and they are understandably leery of taking antidepressants while pregnant. Good news: a team led by Sona Dimidjian, another grad of the Summer Research Institute, found that MBCT could lower the depression risk in these women,

- Page 197 - Location 2540

A mindfulness program designed for teens reduced overt depression and such subtle signs, even six months after it ended.

- Page 201 - Location 2589

Still, there are many arguments for compassion practice as an antidote to PTSD, beginning with anecdotal reports like Steve's. 13 Many are practical. A large proportion of veterans have PTSD; in any given year, between 11 and 20 percent of veterans suffer from PTSD, and over a veteran's lifetime that number goes up to 30 percent. If loving-kindness practice works, it offers a cost-effective group treatment. Another reason: among the symptoms of PTSD are emotional numbness, alienation, and a sense of "deadness" in relationships—all of which loving-kindness might help reverse by the cultivation of positive feelings toward others. Still another: many vets dislike the side effects of the drugs they are given for PTSD, so they do not take them at all—and on their own are searching for nontraditional treatments. Loving-kindness appeals on both counts.

- Page 203 - Location 2617

At this point no one knows whether intensive meditation practice is in itself a danger to certain people, or if those who suffer dark nights might have had a breakdown of some sort no matter their circumstances. While Britton's case studies are anecdotal, their very existence is compelling.

- Page 206 - Location 2651

While the research establishment remains somewhat skeptical of the potency of meditation as a treatment for DSM-level disorders, the widening pool of psychotherapists enthusiastic about bringing together meditation and psychotherapy continues to grow. Although researchers await randomized studies with active controls, psychotherapists already offer meditation-enriched treatments for their clients.

- Page 207 - Location 2661

Although meditation was not originally intended to treat psychological problems, in modern times it has shown promise in the treatment of some, particularly depression and anxiety disorders. In a meta-analysis of forty-

seven studies on the application of meditation methods to treat patients with mental health problems, the findings show that meditation can lead to decreases in depression (particularly severe depression), anxiety, and pain—about as much as medications but with no side effects. Meditation also can, to a lesser degree, reduce the toll of psychological stress. Loving-kindness meditation may be particularly helpful to patients suffering from trauma, especially those with PTSD.

12 | Hidden Treasure

- Page 230 - Location 2932

Like Mingyur, they entered the specified meditative states at will, each one marked by a distinctive neural signature. As with Mingyur, these adepts have shown remarkable mental dexterity, instantly and with striking ease mobilizing these states: generating feelings of compassion, the spacious equanimity of complete openness to whatever occurs, or laser-sharp, unbreakable focus.

- Page 230 - Location 2935

They entered and left these difficult-to-achieve levels of awareness within split seconds. These shifts in awareness were accompanied by equally pronounced shifts in measurable brain activity. Such a feat of collective mental gymnastics has never been seen by science before.

- Page 233 - Location 2977

In the yogis, gamma oscillations are a far more prominent feature of their brain activity than in other people. Our usual gamma waves are not nearly as strong as that seen by Richie's team in yogis like Mingyur. The contrast between the yogis and controls in the intensity of gamma was immense: on average the yogis had twenty-five times greater amplitude gamma oscillations during baseline compared with the control group. We can only make conjectures about what state of consciousness this reflects: yogis like Mingyur seem to experience an ongoing state of open, rich awareness during their daily lives, not just when they meditate. The yogis themselves have described it as a spaciousness and vastness in their experience, as if all their senses were wide open to the full, rich panorama of experience. Or, as a fourteenth-century Tibetan text describes it, . . . a state of bare, transparent awareness; Effortless and brilliantly vivid, a state of relaxed, rootless wisdom; Fixation free and crystal clear, a state without the slightest reference point; Spacious empty clarity, a state wide-open and unconfined; the senses unfettered . . .1

- Page 236 - Location 3014

Recall that the yogis show a pronounced elevation in gamma activity during the open presence and compassion meditations, far greater than in the controls. This elevation in gamma activity was a change from baseline, their everyday levels—marking another state-by-trait effect. What’s more, while they rest in “open presence,” the very distinction between a state and a trait blurs: in their tradition, the yogis are explicitly instructed to mingle the state of open presence with their everyday life—to morph the state into a trait.

- Page 237 - Location 3034

The yogis showed a huge boost in these circuits. The involvement of neural regions for action, particularly the premotor cortex, seems striking: to emotional resonance with a person’s suffering it adds the readiness to help.

- Page 238 - Location 3044

Some of the yogis later explained that their training imbued them with preparedness for action, so the moment they encounter suffering they are predisposed to act without hesitation to help the person. This preparedness, along with their willingness to engage with someone’s suffering, counters the normal tendency to withdraw, to back away from a person in distress.

- Page 240 - Location 3067

For instance, intense worry about something like an upcoming painful medical procedure can in itself cause us anticipatory suffering, just imagining how bad we will feel. And after the real event we can continue to be upset by what we have gone through. In this sense our pain response can start well before and last long after the actual painful moment—exactly the pattern shown by those volunteers in the comparison group.

- Page 240 - Location 3078

For these highly advanced meditators, the recovery from pain was almost as though nothing much had happened at all.

- Page 241 - Location 3088

As with any skill we sharpen, within the first weeks of meditation practice, beginners notice increased ease. For instance, when volunteers new to meditation practiced daily for ten weeks, they reported the practice progressively got easier and more enjoyable, whether they were focusing on their breath, generating loving-kindness, or just observing the flow of their thoughts. 10