

The Intelligent
Optimist

Special
ISSUE

REWIRED
and **INSPIRED**



**How neurofeedback can train
your brain to help reduce
stress, enhance creativity and
improve mental health**

**PLUS Exclusive course material from
neurofeedback pioneer Marty Wuttke**

Letter from the Editor

The most effective way to “re-set” yourself



REMEMBER WHAT YOU PROMISED yourself on New Year’s Day? Probably not. Only a few weeks later, most of us won’t. Every year, all our promises to better ourselves and our lives will soon be distant memories, gone from our daily routines.

Why is that? The explanation is that we are hard-wired against change. And there are good and useful reasons for that. As a child we learn how life works. We learn to talk and walk and we learn that we cannot put our hands in fire. We store all that acquired knowledge somewhere in our memory that’s operated by our

brain. Our brain automates these procedures like a computer and stores the information in our subconscious. Just imagine having to consciously think about how to walk each time you move. Without brain automation and our subconscious, our lives would be impossible.

Here’s the problem: We don’t only store the useful stuff like how to walk and talk. We also store and automate many unhelpful conclusions. As a 5-year old, we may have had some unpleasant experiences. Perhaps there was stress because your mother or father lost a job. Because of the stress you received less attention—love—from your parents and somehow you concluded that there was something wrong with you. You started feeling insecure, unloved, unworthy... Wrong conclusion. Nonetheless, in our clever system such a response gets automated too and a sense of unworthiness gets hard-wired.

Many of us have seen therapists and discovered such patterns. Yet I know from my personal experience how hard it is to change something that is, after all, part of your subconscious. Even if you consciously recognize a pattern, how do you change the subconscious “code”?

The answer is neurofeedback or neurotherapy. These practices manipulate the way the brain processes information to reduce stress, help repair damaged brains, enhance creativity and improve mental health.

Neurons, the billions of cells in our brains, transmit information through electrical and chemical signals. The brain’s electrical impulses take the form of waves that researchers categorize by frequency, the number of times they repeat each second. An overabundance or deficiency at one of these frequencies often correlates to conditions

such as stress, depression and learning disabilities. Neurotherapy reads these waves, feeds them into a computer and translates them into visual, audible or tactile form.

By seeing, hearing or touching your brain waves, you can (re) train your brain to produce desired levels of activity and you can clean up its overstressed parts or self-sabotaging processes. There is now a growing body of evidence showing neurotherapy’s potential benefits for a range of mental health issues, from seizures to learning disabilities to substance abuse.

We started writing about neurofeedback long before it got popular, and well before it acquired scientific credentials. It was back in 2003, when our magazine was still called *Ode*. We had come to learn about the work of one of the world’s leading neurotherapy pioneers, Marty Wuttke. Ever since we started I have wanted to join him for a personal neurofeedback treatment. Together with his wife, Wuttke runs the Wuttke Institute in Santa Barbara, California. Wuttke offers single neurofeedback sessions, but his signature treatment is a two-week, twice-a-day intensive that produces, in his experience, the best results in the most efficient period of time.

On a grey day in the Fall, I finally experienced the treatment, and I look back at a powerful experience with lasting effects. Midway through the program I reported to Wuttke that I sensed there was more “space” in my head. I had never experienced much pressure inside my head—I’m not a headache person—but since my neurofeedback treatments I keep feeling a new sense of relaxation. I respond differently, in a more relaxed way, to situations that used to provoke stress—a clear sign that my brain uses different pathways to process information. Wuttke is a meditation teacher as well, and he advises daily meditation to maintain (brain) health. And my meditation has benefitted—my mind becomes quiet more quickly, and I seem to reach a deeper level.

Over the years, I have searched for programs and practices that help people “get rid of their pasts,” as so many lives are sabotaged by past experiences. After my sessions with Wuttke I’m convinced that I know no more effective way to “re-set” yourself than neurofeedback. It takes an effort—mostly time—but almost everyone experiences major progress on issues from simply too much stress to addiction, and from PTSD and ADHD to self-sabotaging behavior.

I encourage you to sit back with this special issue of *The Intelligent Optimist*. It brings you the finest journalism on neurofeedback. Don’t make the mistake of leaving this issue lying around for later. Neurofeedback can be a deeply healing experience and I can’t think of a better way to support your desire to make a positive change in your life.

JURRIAAN KAMP
Editor-in-Chief, jjk@theoptimist.com

FOUNDERS Jurriaan Kamp,
Hélène de Puy

EDITOR-AT-LARGE Marco Visscher

ART DIRECTOR Andrea Mota

ASSOCIATE EDITORS Elleke Bal, Pauline Bijster

COPY EDITOR Will Palmer

PRODUCTION MANAGERS Rick Greer, Els Kwaks

CONTRIBUTING PHOTOGRAPHER
Pieter de Swart

COLUMNISTS Paulo Coelho, Amy Domini,
Elbrich Fennema, Rosamund Stone Zander

TRANSLATORS Joke de Groot, Lynn
Hooghiemstra, Laura Martz, Laurie Nesbitt,
Elise Reynolds

CHIEF OPERATING OFFICER
Hanneke Hogerheijde

NAVIGATOR Hélène de Puy

SPECIAL PROJECTS DIRECTOR Carol
Greenhouse

BUSINESS DEVELOPMENT (INTERNATIONAL)
Steven Linskens

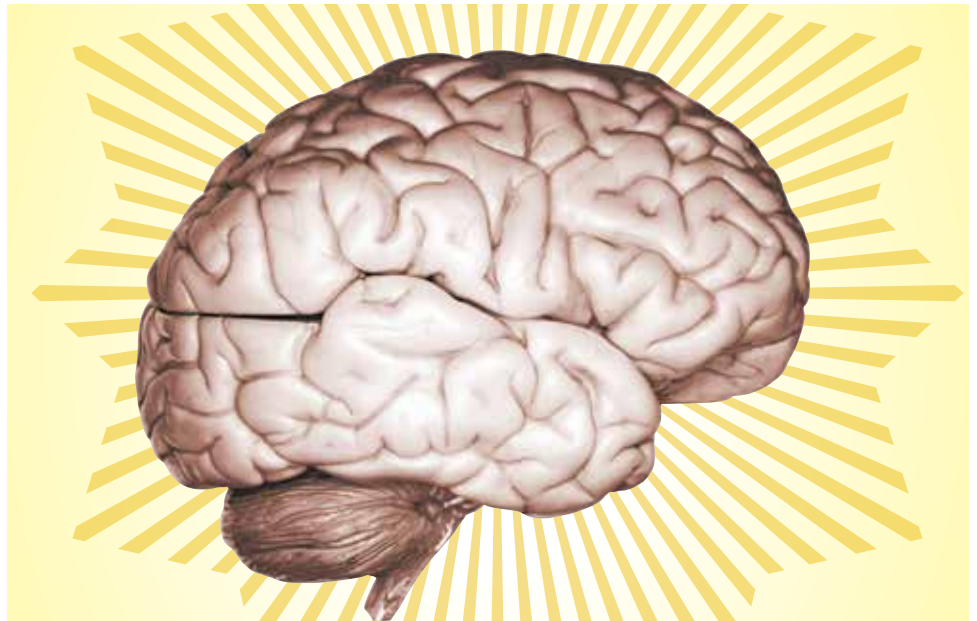
AD SALES REPRESENTATIVES Goodfellows
Publishers' Representatives Deena Brown,
Liz Dalbianco, Geoff Goldstein (510) 548-1680
Glenn Dulberg (516) 662-0681

U.S. OFFICE 268 Bush Street, #4419,
San Francisco, CA 94104
info@theoptimist.com

NETHERLANDS OFFICE P.O. Box 2402,
3000 CK, Rotterdam, Netherlands

The Intelligent Optimist (ISSN 2168-8001) is
published 4 times a year (Spring, Summer, Fall
and Winter) by Global Light Media LLC,
268 Bush Street, #4419, San Francisco, CA
94104. Periodical postage paid in San
Francisco, CA, and at additional mailing offices.
©Global Light Media LLC and Ode International
Publishers Luxembourg SNC, 2015

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In 2013, The Intelligent Optimist organized a 7-part special online course on neurofeedback, with Martin Wuttke as the teacher, hosted by Jurriaan Kamp. What follows are some transcripts, including links to video material that is available for you. Enjoy!

Mended. minds

Modern afflictions like stress, fatigue, depression and hyperactivity can affect the brain. Marty Wuttke has developed a training program that helps harmonise brain frequencies. His treatment removes most of the static so that the brain can heal. A conversation with a pioneer.

BY TIJN TOUBER

IN THE VIDEO THAT MARTY WUTTKE shows his audience, a bobsled loses control in a bend. The woman in the sled is Ann Abernathy. In painful slow motion we watch the sled begin to spin before eventually slamming against the side. Abernathy's head makes a strange cracking noise. The sled speeds on, the woman lies unconscious on the track. The audience is shocked.

Wuttke, one of the most prominent neurofeedback specialists in the world, does not flinch. He has seen the film many times. But Wuttke does not need the drama many of his fellow countrymen add to their presentations. He is a man of few words and gestures.

Later in the video we see that Ann Abernathy suffers increasingly from blackouts; she suddenly loses consciousness at the strangest times. Her co-ordination is off.

Her career and her life are ruined. A few shots later we see her sitting at a computer screen with lots of electrodes connected to her head. The screen shows three rockets in flight. Abernathy's assignment is to let the middle rocket fly ahead, while keeping the other two stable. Abernathy does not have a joystick or mouse in her hand. The rockets move to the rhythm of her brainwaves. Whenever she generates the correct waves, the rockets move in the right direction.

Wuttke explains: "A blow to the head, whiplash, excessive stress or an emotional trauma can cause damage to the brain. The brain then goes into a sort of state of shock. In general terms, it becomes locked into an abnormal wave pattern. Certain neural paths become unstable and this can result in fear, depression, irritation, fatigue, hyperactivity, mood swings, confusion and sleeping disorders, among other things."

The computer animation program with the rockets is just one of the many that Wuttke uses to help people recover from ailments like whiplash or chronic stress. According to Wuttke these afflictions originate from damage to the brain. Each affliction in turn causes another one. The treatments are directed at helping to integrate the parts of the brain that are not integrated due to emotional trauma or damage. If the brain becomes balanced again, that is, if the natural rhythm of the brainwaves is restored, then the rest of the system can repair itself.

In one of the most appealing computer programs you have to get a dolphin to swim in a smooth line. Wuttke adjusts the program for each patient so that the more a certain kind of brainwave is produced, the more smoothly the dolphin moves. "When specific brain activity increases, the memory and emotional trauma that the imbalance



causes can re-occur,” Wuttke says. “Via the electrodes, I connect the emotional memory and the rational part of the brain with each other making the two sides more identical and causing them to vibrate synchronically. By adding rational thinking to the emotionally charged events, the events are seen in a different perspective. They become less weighty and more integrated.” This process is also called “reframing the experience”.

The exercises are part of the neurofeedback, or EEG Biofeedback, training that Wuttke has helped develop with other colleagues. What makes the training interesting is that it is a subconscious learning process. It does not demand any special intelligence or awareness. You only need to be able to sit at the computer and play the game. Whenever you produce the right brainwaves, you are rewarded by the dolphin swimming without any erratic movements or the rocket going in the right direction. Generally 10 to 15 sessions of about 45 minutes are necessary for the patient to become familiar with the feelings associated with producing specific waves. Depending on the severity and type of disorder, around 40 sessions are needed to repair imbalances and generate lasting results. At this point the brain takes over and the system corrects itself.

At the end of his lecture, Wuttke takes time to clarify the complicated subject matter. His relaxed attitude is a result of the enormous library of active knowledge that Wuttke possesses on the subject. This is a man who knows what he is talking about and most importantly is able to refer to an archive of first-hand experience.

“We have now come so far,” says Wuttke, “that we can see where the damage is localized in the brain. By using what is called QEEG (Quantitative electro-encephalogram) we are able to chart the brain frequencies, which is called brain mapping. You can see exactly what part of the brain lags behind (doesn’t show enough activity) or which parts are overactive.”

The photographs Wuttke shows give volumes of information, at least for those who can read them. Experience has taught Wuttke how to discern whether, for example, someone has been abused during their childhood. Or whether they have more likely “only” been a witness to abuse. He can see if someone is under a lot of pressure and reacts to it constructively, or if someone is drowning in it. The scans tell the story. “Some people say

that they have forgiven their parents and that they love humanity. I look at the scan and have to sometimes conclude that their brain is telling another story,” says Wuttke.

MARTY WUTTKE HAS EXPERIENCED a lot in his life. After a seven-year addiction to heroin nearly killed him, he went through a spiritual experience which he would later describe as an awakening. It left him with one desire: to meditate. After several years in an ashram, he happened to stumble across a huge psychiatric institution in a nearby town. He began to give meditation classes there and quickly became a member of the staff.

For ten years Wuttke worked at the institution applying his knowledge to patients suffering from afflictions such as depression, hyperactivity, eating disorders, addiction, chronic pain, fatigue and stress. He treated more than 1,500 patients and saw that every ailment demanded a separate type of treatment. Wuttke remembers the first days: “The results were phenomenal. I always had 35 patients at my disposal who I could treat twice a day. The successes were, and still are, incredible. In the category of present day common illnesses, chronic fatigue, ADHD and addiction, the success rate was about 70% to 80%.”

In order to understand how the healing process in neurofeedback exactly works, a certain amount of knowledge about the brain is necessary. “The brain consists of three levels,” Wuttke explains. “First you have the brain stem, the oldest part, that regulates the basic functions of the body like breathing and all the processes that you do not have to think about. This is where qualities like surviving, instinct, fear and safety are located. The second level can be called the emotional brain. This is where many of our positive and negative emotional reactions are located. The third part, the neocortex, is what distinguishes us from most animals. This is where rational thinking takes place, which enables us to see the consequences of our actions and to make comparative assessments.”

Research in prisons show that many prisoners have abnormal QEEG’s, up to 80% in the “heaviest institutions”. The abnormalities may stem from a blow to the head, but in most cases they are the result of an experience that has developed an electrical circuit in the brainstem or emotional brain. When

someone feels extremely threatened, a pattern is created which, the more often it is repeated, can grow to become an obsession or compulsiveness that stands in the way of clear thinking.

“We all know that feeling,” says Wuttke. “Why do I keep doing this?” or “Why can’t I end this relationship?” and so on and so on. These are repeated patterns that cause suffering and in the end may lead to psychiatric help or pills. By not being able to think clearly, the digit-span decreases, that is, the ability to take in a specific amount of information and to process and re-produce it. Most people are able to remember seven numbers and reproduce them when they hear them randomly called out one after another. Among criminals that average is four.

Drug abuse is one of many challenges facing today’s society. Wuttke thinks that drugs damage the ability to assess the consequences of what you do. He is working on projects for prisons to use his methods to repair the damage, so that the chances of falling back into old habits decrease. Research in the Canadian province of Ontario has shown that after the first four sessions 65% of prisoners fell back into their old patterns. By the 16th session that number had dropped to 40%. By the 34th session it was down to 20%. In the United States, judges sometimes require neurofeedback therapy as a condition for someone accused of a crime to be let out on bail or probation.

In the case of his own addiction, Wuttke needed a spiritual experience to break the cycle. “I cannot give people this kind of spontaneous insight. What we can do with neurofeedback is give the brain the ability to take on this sort of experience. We can get rid of the static and harmonize and assist the development of the brain so that you have the ability to look deep within and find yourself again. I see it happen regularly. We even have a joke about it: Who will see God today?”

Wuttke extensively studied the clear moments of deep insight because he is aware how important they can be to people’s development. “In my work in the psychiatric institution I realized that it is best to measure these types of experiences within the brain itself. In the scans you see that something is happening. You see the wave patterns change. Such experiences always have to do with surrendering, with letting go. The brain relaxes and is able to get out of the vicious

cycle of stress. Deep insight can develop as a result of this relaxation. It gives back the clarity needed to make good decisions.

The neurofeedback equipment not only provides peace and harmony, but also stimulates underdeveloped parts of the brain. When a part wakes up, people see things from a completely different perspective. “That can feel uncomfortable,” says Wuttke, “You are pulled out of this worn-in pattern and think, My God, why didn’t I realize this earlier? How could I have been so locked up?” These moments can be seen very clearly on the QEEG. These are the moments of actual change.

Wuttke’s urge to help people with mental, emotional and spiritual disorders was further boosted when his son Jacob was born with a severe brain defect. Wuttke set up a special school for him, Jacob’s Ladder, where students received specially geared lessons. As if life hadn’t tested him enough, his marriage fell apart too. But Wuttke bounced back to find the love of his life, Susan Colpitts. Colpitts, however, was on the verge of dying, due to a neurological disorder. She was suffering from a serious auto-immune disease, bone marrow dysfunction, a complete system breakdown. Wuttke was able to reanimate her by using neurofeedback along with other methods.

It has become clear to Wuttke that almost all illnesses, except for perhaps chronic pain, are a result of some kind of system breakdown. “These breakdowns take place as a result of the way the three brain parts work together,” says Wuttke. “Take smoking—the neocortex knows very well that smoking is unhealthy. But at the level of the limbic system it is a question of self-preservation. This kind of programming puts the individual into a permanent state of stress.”

Wuttke is aware that most people do not recognize the warning signs telling them that their system is on the verge of a breakdown. “For example, signals like needing to take an aspirin or indigestion tablets every day. Many people become prisoners of a vicious cycle of stress. Your sympathetic nervous system, which is also responsible for increasing the heart rate and producing adrenaline, is working overtime, should I fight or run? That causes a permanent state of stress. This can mean that the entire system breaks down which in turn causes you to become ill. But usually you first see an overcompensation reaction of the parasympathetic nervous

system, which works as a brake and makes sure that the sympathetic nervous system is not overreacting. An overcompensating parasympathetic nervous system can cause afflictions such as asthma, migraines, irritable bowel syndrome and panic attacks. The worse the trauma, the deeper it can bury itself in the brain. If it goes too deep, it will inhibit the regulatory activity of the brain stem. That’s when it gets dangerous. The body will then start to attack itself, these are the common auto-immune diseases.”

Even in these situations and in cases of serious neurological conditions like autism, Wuttke has been very successful. “One or two sessions a week are usually enough to bring about shifts in the brain. The brain is an incredible organ that can learn at any given moment. I’ve even seen huge changes in the brains of 65 year-olds.” Wuttke remembers an autistic child that could not communicate. Within two years the child was attending a normal school. CNN reported the story. “The boy still comes in once a month for servicing. He’s a ‘cool’ kid, complete with screws in his earlobes.”

Do these methods eventually make other methods of treatment superfluous? Are the days of psychotherapy, meditation and medication over? Wuttke says jokingly: “Finally, we can settle the score with psychiatrists and God.” Then more seriously: “No. But neurofeedback does speed up the process. When the famous American psychiatrist Jack Woodward saw what neurofeedback does, he commented, ‘Changes that normally demand months and years to occur are accomplished in days and weeks with this method.’ If we can recognise our own divinity by direct attention to our deepest essence, then we will be able to get in touch with the self-healing capacity of our body. This day will come. I see the signs all around me. More and more people are waking up.”

Waking up others and promoting the neurofeedback is Wuttke’s mission in life. However, he is cautious and realistic. “We don’t have any ready-made solutions for every problem yet. There are no easy answers. The neurofeedback system is just one component in an array of methods that we can apply. But after everything that I have experienced and tried, I can easily say that it is one of the most powerful components.” ■

“We can assist the development of the brain so that you have the ability to look deep within and find yourself again.”

MARTY WUTTKE



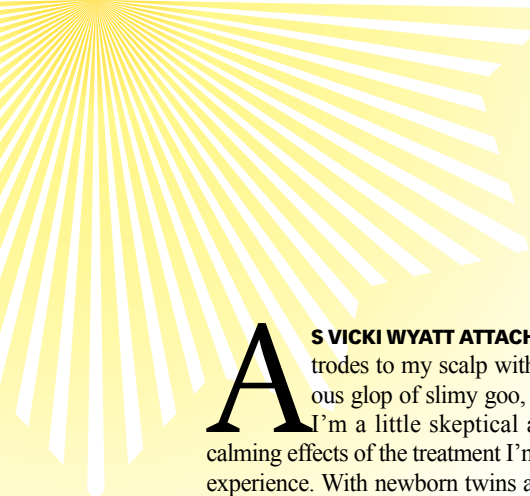
TRAIN

Neurofeedback is an emerging method that relaxes, enhances

A golden, metallic brain is the central focus, set against a bright yellow background with a white sunburst pattern radiating from behind it. The text 'YOUR BRAIN' is overlaid on the brain in a white, serif font. The word 'YOUR' is smaller and positioned to the left of 'BRAIN', which is larger and more prominent. The brain's surface is highly detailed, showing the folds and grooves of the cerebral cortex.

YOUR BRAIN

creativity and improves mental health. BY BLAINE GRETEMAN



AS VICKI WYATT ATTACHES ELECTRODES to my scalp with a generous glop of slimy goo, I'll admit I'm a little skeptical about the calming effects of the treatment I'm about to experience. With newborn twins at home, I usually have enough slime in my life and on my clothes to push anyone over the abyss. But that, says Wyatt, is precisely why I could benefit from neurofeedback, a therapeutic tool that advocates claim can reshape our brains—and our lives.

To learn more about the procedure, I've come to The Wyatt Clinic in downtown Oklahoma City. Just blocks from the memorial that marks the site of the 1995 federal building bombing, the location is aptly associated, in my mind, with both psychic trauma and healing. This is a gentrifying but hardscrabble neighborhood where Wyatt treats patients, from overstressed professionals to addicts trying to get back on their feet.

Wyatt has been a therapist for 22 years, with a research background at the University

processes electrical signals from my brain and sends them to a laptop, where they're represented graphically on the screen. Wyatt boots the laptop, opens a neurofeedback training software program and settles me into one of the comfy chairs that make her cozy, carpeted office look more like my mother's living room than the white-tiled clinic I'd expected.

After Wyatt hooks me up, I'll use my brain waves to control a video game. When I achieve the desired mental state, a small red bug will move around the screen eating flowers and emitting a happy chirping sound. To succeed at the game, I must eliminate brain waves that interfere with relaxed concentration—those associated with hyperactivity, depression and that all-too-familiar feeling of “zoning out.”

I'm coming off a sleepless night of diaper-changing, rocking and feeding, so focus isn't exactly my forte right now. But after watching the bug languish sadly for a few minutes, I begin to practice some deep,

of the world's top universities and research hospitals, suggest that neurofeedback is a promising treatment for a range of cognitive health issues: seizures, low IQ in kids with learning difficulties, vertigo and tinnitus in the elderly, and substance abuse, even with notoriously addictive, destructive drugs like crack cocaine.

Advocates say neurofeedback has emotional benefits as well. “You feel very good on this,” says John Gruzelier, a professor of psychology at the University of London's Goldsmiths College. And all these effects are generated by the patient's brain, not by drugs. No wonder some proponents describe neurofeedback's effects in spiritual, as well as physical, terms.

It all starts with those slimy electrodes attached to the scalp, which pick up a small part of the electrical symphony produced continually in our brains. Neurons, the billions of cells that make up our cerebral cortex and nervous system, transmit information by firing electrical and chemical



“We've reached a tipping point ... it's becoming much more difficult for mainstream medicine to ignore [neurofeedback]. No one can say any longer that there is no science behind it”

—JAMES R. EVANS, editor of the *Handbook of Neurofeedback*

of Oklahoma Health Sciences Center, but she has only recently embraced neurofeedback as part of her treatment regimen. “My formal education didn't really provide any alternative treatments,” she says. “It was traditional psychotherapy and talk therapy. When I look back, I think this would have benefited a lot of the children and families earlier in my career.”

The equipment looks fairly unexceptional, including the electrodes, which could pass for iPod headphones and are glued strategically to my head and temples. Wyatt clips a “ground wire” to my ear. The wires run from the electrodes to a black amplifier box the size of a small paperback. This deceptively simple-looking piece of machinery, which can cost several thousand dollars,

yogic breathing and try to stop my racing thoughts about work, home and deadlines. Sure enough, the band representing my desired brain activity jumps and the red bug begins to rouse himself from his stupor, eat a few flowers and chirp with approval.

After years on the outskirts of medical respectability, neurofeedback has been vindicated by a growing body of evidence showing its potentially remarkable benefits to everyone from elite athletes and musicians to violent criminals and children with Attention Deficit Hyperactivity Disorder (ADHD). The U.S. National Library of Medicine's database of scholarly articles, for example, contains dozens of positive scientific studies on neurofeedback published in the last two years. The results, from some

signals across synapses, the junctions where they meet. These tiny electrical pulses are central to our consciousness and bodily lives: Each time our hearts beat, we blink at a bright light or smile at a bit of good news, that action requires a flurry of electrical activity.

The brain's electrical impulses take the form of waves that researchers categorize by frequency—the number of times they repeat each second (see “Making waves” box). The slowest are the delta waves, which the brain typically produces during deep sleep. Next are theta waves, another slow undulation at four to eight cycles per second, often associated with creative and subconscious thought, which we produce when we're sleepy or daydreaming. We make alpha waves of eight

MAKING WAVES

A brief guide to brain waves and their associated mental states.

BAND	FREQUENCY	ASSOCIATED STATES
DELTA	0.5-4 Hz	Deep sleep. Can indicate the presence of pathologies such as tumors and brain lesions in waking individuals.
THETA	4-8 Hz	Drowsiness, boredom or the border between waking and sleeping. Suspected of playing a role in creativity, problem-solving and ADHD.
ALPHA	8-12 Hz	Alert relaxation. Present in athletes and performers "in the zone."
BETA	13-30 Hz	Low beta is produced during normal waking consciousness. At higher frequencies, can indicate excitement, intense concentration or anxiety.
GAMMA (OR "HIGH BETA")	Above 30 Hz	Present in sense stimulation, higher-order consciousness and deep meditation.

to 12 cycles per second when we're alert and relaxed, and still-faster beta waves when we engage in active problem-solving or become alert or anxious. The fastest patterns, above 30 cycles per second, are made by gamma waves—usually faint and difficult to detect, but associated with high-level thought.

An overabundance or deficiency at one of these frequencies often correlates to conditions such as depression and other emotional disturbances and learning disabilities. Children with ADHD, for example, often have too many slow brain waves (delta or theta) and not enough of the faster waves that allow them to focus, engage and think productively.

Neurofeedback reads these waves, feeds them into a computer and translates them into visual form—in my case, the ladybug's states of lethargy correlate to levels of electrical activity in my brain. The underlying principle is that by seeing your brain waves you can gain control over them, training your brain to produce desired levels of activity, much like you train your voice to produce certain musical notes.

And once those brain waves are in play, the desired brain state comes with them. If, for example, you've got too much anxiety-

producing beta, try inducing some theta to calm down.

That might sound like trippy science fiction, but it's based on technology that's been around since the German psychiatrist Hans Berger began using electrodes to measure and categorize human brain waves in the 1920s. The recordings of the human brain-wave activity produced by this technology—electroencephalography, or EEG—are the cornerstone of neurofeedback.

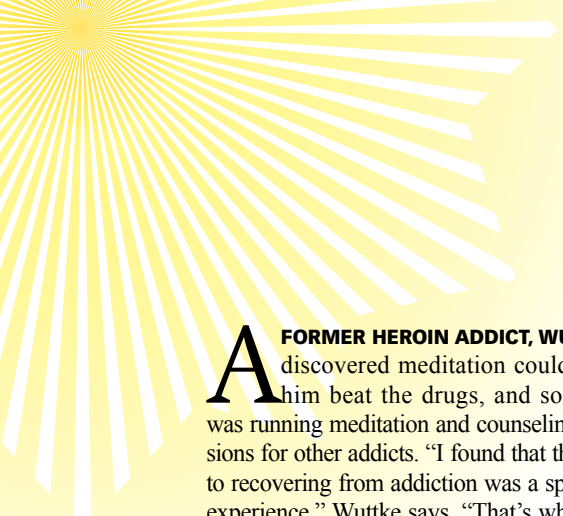
By the 1970s, it was possible to feed that information back to patients who heard a rewarding tone when they produced a pre-selected frequency of brain waves. What's new is both the sophistication of the feedback display and the precision with which therapists can target different parts of the brain wave spectrum. On top of that, neurofeedback has become cheaper, more efficient and more readily applicable to a vast array of brain disorders.

"When I was doing quantified EEG back in the 1970s, computers were the size of filing cabinets," says James R. Evans, a former University of South Carolina psychology professor and current clinician at the Sterlingworth Center in Greenville, South Carolina. Evans, who has written and edited

dozens of articles and books on neurofeedback and is a consulting editor to one of the field's flagship publications, *The Journal of Neurotherapy*, says those technological hurdles limited neurofeedback's therapeutic reach in the early years: "You had to have a large-scale grant to afford the equipment and electrical engineering people to keep it going."

By the early 1990s, the same technology that brought us personal computers and Xboxes had changed all that, and without huge research investments therapists could focus specifically on brain waves that correlate to mental states. A quantified EEG could show that a patient's brain contained waves outside the normal range, and new software made it easier to create training protocols or use existing ones to boost or reduce activity across a frequency or region of the brain. Neurofeedback began to gain a devoted following of patients and clinicians who swore by its effects.

Marty Wuttke is one of those clinicians, a neurofeedback pioneer known for getting remarkable results—starting with himself. >>



A FORMER HEROIN ADDICT, WUTTKE discovered meditation could help him beat the drugs, and soon he was running meditation and counseling sessions for other addicts. “I found that the key to recovering from addiction was a spiritual experience,” Wuttke says. “That’s what the Twelve Steps [of Alcoholics and Narcotics Anonymous] are all about, but I felt like that had gotten lost.” To facilitate that experience and give it credibility by grounding it in science, Wuttke turned to neurofeedback.

Alcoholics and drug addicts often have too many fast brain waves—which is perhaps why they seek a chemical fix to calm and soothe overactive brains, he says. With the right technology, neurofeedback practitioners believe they can wake up parts of the brain that are too sleepy and calm down regions that are spinning out of control.

For Wuttke, the results were life-changing. As people moved through his program, he says, “Their depressions went away, their pains went away, their anxieties went away.” Wuttke believes patients become less likely to backslide once they realize they have access to inner calm without

observed the feedback screen and stimulated their son when his brain produced the desired patterns. “We would be very quiet when his brain wasn’t within parameters, and then when it was, we would squeeze him and say, ‘Good work!’ and orient his brain to those moments.”

At the beginning of the process, Wuttke describes his toddler son as “hypotonic”: unable to sit on his own or hold his head upright. But “within 60 days, his brain started to come alive,” Wuttke says, and this cognitive awakening was the first step in a process that soon had his son crawling, walking and running. After witnessing the results, Wuttke and O’Dell established Jacob’s Ladder, a school for developmentally challenged children in Atlanta, Georgia, run by O’Dell. Although Jacob couldn’t retain five letters of the alphabet at age 6, by age 14 he was reading at a 12th grade level, and the school had achieved national recognition.

That experience helped Wuttke formulate his “neurodevelopmental” approach, in which he uses exercise, dietary supplements and neurofeedback in concert to establish and rewire broken pathways in the brain.

Center in Clayton, Georgia, that Ethan’s problems were cause for serious concern. “We first noticed that when you teased him, he wouldn’t understand or react normally, but would have these explosive tantrums,” she explains.

Failing socially and academically, Ethan hated school despite the efforts of his teachers and his mother to implement a program of special instruction and behavioral therapy. “He said no one liked him and he wanted to die, and when he would get really upset he would have to exhaust himself before he could get control,” Black recalls. A child psychologist labeled Ethan with ADHD and prescribed medication, but Black was desperate to avoid drugs and turned to Wuttke instead. Using an evaluative brain-wave scan, Wuttke determined that Ethan lacked normal levels of beta, the relatively fast waves associated with attention and concentrated thought.

They implemented a training program of neurofeedback and listening therapy to boost this band and improve the boy’s concentration, and within two weeks Black was a believer. “For the first time ever, he could tell



As people moved through the neurofeedback program, “their depressions went away, their pains went away, their anxieties went away”

—MARTY WUTTKE, director of the NeuroTherapy Center for Health

drugs or alcohol, an insight he describes in terms of “awakening.”

Neurofeedback’s potential hit home when Wuttke’s son, Jacob, was born with brain injuries and major developmental problems. “At age 2, he had no muscle tone and some severe difficulties,” says Wuttke, “but the pediatric neurologist couldn’t give us any answer about why or how to treat him.” Wuttke and his wife at the time, Amy O’Dell, took matters into their own hands, developing a comprehensive treatment regime incorporating neurofeedback. Facing the difficulties of asking a child so young to control his brain waves, Wuttke and O’Dell

Since then, Wuttke has trained thousands of neurofeedback practitioners and garnered a cadre of patients who describe neurofeedback in transformative terms.

Beth Black, for example, fairly raves about the way Wuttke’s neurofeedback regimen impacted her 7-year-old son. “Ethan’s a completely different kid now,” she says. When Black adopted Ethan at 5 months old, he’d already endured severe neglect and suspected pre-natal drug use by his mother, so it wasn’t entirely surprising that the boy faced challenges. Still, by the time he entered first grade at age 6 it was clear to Black, director of the Family Art Therapy

me a story in sequence; within three weeks, he was scoring 100s on his spelling tests and just blowing us and his teachers away.” After seven weeks, Ethan was able to calm himself, and the explosive anger was a thing of the past.

Black was so impressed that she applied for a grant to use neurofeedback with the juvenile offenders sent to her clinic regularly for court-assigned behavioral therapy. Counseling these young offenders had been “a waste of money,” according to Black, but the seven juvenile offenders who entered the program of intensive neurofeedback therapy flourished.

“The judge came to us at the end of this program,” Wuttke remembers, “and said, ‘What did you do to these kids?’” Within weeks those who’d dropped out were back in school, performing so well on standardized tests that their learning disabilities seemed to have disappeared.

Such stories abound. “Our whole family was in trouble because of my daughter’s depression and discipline problems,” says Joann Bullard, whose daughter received treatment at Wuttke’s clinic in the Netherlands. “She was going to have to go on medication because there just weren’t any other options,” Bullard says, but after 60 sessions of neurotherapy, “there was a total turnaround, and we’re grateful every day.”

Another father, Ben Odukwe, says he visited specialists around the world after his son Onura was diagnosed with mild autism, but saw no real results until the boy entered Jacob’s Ladder school and began a neurofeedback program under Wuttke’s supervision. Onura’s father notes that the boy’s “communication, his confidence, his handwriting and dexterity all transformed,” and at age 16, he’s entering mainstream school for the first time.

Neurofeedback doesn’t cure conditions like ADHD, depression or addiction. Instead, it enables people to produce the appropriate brain waves, which helps provide the attention, rest or contemplative awareness needed to deal with underlying issues. You can’t manufacture these brain waves by force of will. I quickly discovered that success comes from letting go. “It’s not a conscious thing,” Wuttke emphasizes. You have to “surrender to the process [and] let your brain take over. You are going to deep parts of the brain and neutralizing disruptive brain waves, and often in this extreme state of quietude, key memories and patterns come up, almost like you’re in a half dream state, and there’s sort of a rewiring that occurs.”

Wuttke likes to say our brain tends to follow certain “scripts,” patterns of thought that take us to the same place over and over. Neurofeedback, as it forges new pathways in the brain, helps us devise new scripts.

Even as the technology has advanced and the success stories have grown into a rich anecdotal lore, however, neurofeedback continues to face skepticism and resistance from parts of the medical establishment. It has only begun to gain widespread accept-

ance as a therapeutic tool recently. “It was an up-and-coming treatment modality in the 1970s,” says Evans, who has worked with the technology in academic and clinical settings. But he says neurofeedback lost scientific credibility when the early, simple equipment became associated with “hippies” in pursuit of “instant Zen.”

Neurofeedback still has its skeptics among consumers too, especially since it remains unregulated; anyone who can afford the equipment can rent an office, hang a shingle and treat patients (see “How to choose a neurofeedback practitioner” box on page 51). Today, however, Evans says, “We’ve reached a tipping point where there are hardcore science people working in neurofeedback and articles being published in good journals, and it’s becoming much more difficult for mainstream medicine to ignore. No one can say any longer that there is no science behind it.”

THE STUDIES THAT HAVE GENERATED the most enthusiasm are the ones suggesting that the treatment offers a drug-free alternative for children with ADHD. A review of the scientific literature in 2005, for example, noted that 75 percent of kids with ADHD treated with neurofeedback improved—compared to 70 percent treated with drugs—and no study has reported negative effects.

A 2007 study from the University Hospital of Tübingen in Germany showed that after a treatment regime lasting several months, children diagnosed with ADHD not only improved their behavior and increased their ability to concentrate “significantly,” but added nearly 10 points to their IQs—a result maintained six months after the study ended.

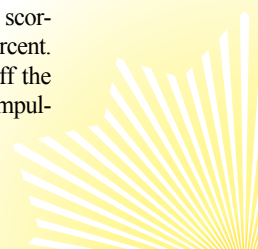
Skeptics have long argued that the benefits of neurofeedback to children with ADHD could be attributed to the placebo effect—or that the children could achieve similar improvement if they spent the same amount of time working with parents on focused tasks like assembling puzzles. By this logic, it isn’t the technology of neurofeedback that helps children with ADHD, but the attention and effort of parents and therapists working in concert to support learning and concentration. To find out the truth, Swiss researchers at the University of Zurich created a controlled study to isolate neurofeedback from other factors. One group of

children with ADHD was given neurofeedback, while another entered an intensive behavioral therapy program that used traditional techniques to teach them to focus. The results were dramatic: Children in the neurofeedback trial improved markedly on indices of attention and “metacognition” (the awareness of one’s mental processes), whereas children in the behavioral therapy group showed no significant improvement.

But there was just one caveat. The researchers noted that the results seemed “mediated by unspecific factors, such as parental support or certain properties of the therapeutic setting and content.” So, while neurofeedback works, it isn’t a magic bullet—parental support and the right clinical setting, which might include other therapies, are key to realizing its potential.

Importantly, however, that potential goes beyond the treatment of disorders. Indeed, neurofeedback seems remarkably effective at improving mental focus and concentration, even for apparently “normal” individuals. “We’ve just done a study training eye surgeons,” says Gruzelier of Goldsmiths College in London, “and we found that the rhythm that’s very effective in reducing hyperactivity in ADHD children also helped enhance surgical performance by 20 percent.” The aim was to do the surgery as quickly and accurately as possible, and neurofeedback training, which enhanced beta waves while relaxing the cerebral cortex to reduce hyperactive movements, seemed to enhance surgeons’ ability to modulate their performance. “Instead of just charging at the target,” Gruzelier says, “they were actually slightly longer and more methodical in their preparatory time, then faster and more accurate on task.”

Athletes and performers often associate such success with being “in the zone.” Many athletes believe neurofeedback allows them to pause racing thoughts and live wholly in the moment of the game. Prominent among them is Chris Kamen, the center for the Los Angeles Clippers basketball team, who was diagnosed with ADHD as a child and struggled in his early career, despite his imposing seven-foot height. In 2007, he discovered neurofeedback and soon improved his scoring and rebounding by more than 50 percent. As important, Kamen says, his life off the court improved as he stopped making impulsive decisions.



Kamen not only attributed the success to neurofeedback, but became a spokesperson for Hope139, a Michigan company dedicated to bringing neurofeedback technology into schools and businesses to improve performance. Neurofeedback has gained such a lustrous reputation that the Italian professional soccer team A.C. Milan has created a glassed-in “mind room,” where the team gathers for mental tune-ups. In the mind room, players watch their brain waves play out across a computer screen while a team of sports psychologists monitors their progress.

Gruzelier emphasizes that neurofeedback’s performance-enhancing results go beyond relaxation or the relief of anxiety—effects that might be achieved with sedatives

afterwards.”

Gruzelier attributes such results to the technology’s ability to allow slow waves to travel farther, uninterrupted, across the brain. That facilitates interaction between areas of the brain that don’t typically connect, he says. Normally, such a process is disrupted by the fast waves that characterize our waking life—a kind of mental static. “It’s been known for centuries that the hypnotic experience, the border between waking and sleeping, is the source of remarkable insights,” Gruzelier says.

NEUROFEEDBACK’S APPARENT ability to bring those insights into the light, however, is what

in the frontal lobes of elderly people. The frontal lobe often deteriorates as people age, which makes problem-solving, abstract reasoning and all kinds of planning more difficult. And so, as Kounios’ subjects boosted their alpha activity in this region of the brain, they demonstrated an improved ability to respond when presented with new information and to make quick decisions in cognitive tests. Such results are preliminary but exciting. Kounios emphasizes that the field needs funding for large-scale studies that can establish the basic science of neurofeedback and determine which training protocols are most effective, “but there’s no question in my mind that this has significant potential and the phenomena are real.”



“It’s very much a black box. Although neurofeedback has been around for 40 years, we still don’t have the slightest clue as to how people do this”

—JOHN KOUNIOS, professor of psychology, Drexel University

or more conventional relaxation techniques. “We’ve compared this to other techniques that have reduced anxiety but have not enhanced performance in the same way,” says Gruzelier, citing his studies of professional dancers and musicians who did neurofeedback training to quiet the brain’s fast-wave activity and produce more slow theta waves. These studies showed remarkable improvements “not only in artistry, but communication, the way people expressed themselves, the presence they have on stage.”

Elite students at the Royal College of Music in London improved their performance an average 17 percent, according to a panel of independent judges, and competitive ballroom dancers achieved “professionally significant” improvement in just five weeks. Moreover, Gruzelier notes his recent research hasn’t only replicated these results, but shown they extend to novice performers. “There are dramatic improvements,” he says. “Breath and pitch improve. Where they didn’t sing in tune to begin with, they did

seems remarkable, especially since we still don’t understand key factors about how it works—how, for example, people control their own brain waves. “It’s very much a black box,” explains John Kounios, a professor of psychology at Drexel University in Pennsylvania.

Kounios conducted a double-blind study of elderly subjects that showed neurofeedback may help improve cognitive processing speed and “executive function,” the mental operations that help us plan and organize our lives, but he admits the cognitive process underlying neurofeedback is still something of a mystery. “Although neurofeedback has been around for 40 years, we still don’t have the slightest clue as to how people do this,” Kounios says. “It’s not as if there aren’t any good theories. There are just no theories, not even bad ones—just the observation that this is something animals and humans can do.”

That sometimes makes for surprising results, as in the case of Kounios’ study, which increased the production of alpha waves

This is a common refrain among researchers and practitioners. “It works,” agrees Evans. “Almost anybody can get the equipment and get 60 percent good results. The question is, what are those people doing who get 90 percent? Some people give vitamins along with their treatment; others pray with clients or use counseling. In many respects, these people fire a shotgun and we don’t know which pellets hit.”

That’s why Wuttke is creating an institution that will train a core group of people who can replicate his results and methods. His mission is to establish a network of neurofeedback clinics and training facilities in Europe through his work with the Life-Works Foundation.

“One of the biggest risks right now is that this becomes a novelty, where people can buy some software and hook into it at home and play a game,” says Wuttke. “That’s going to happen, but it takes away from the profound clinical applications, which have to be part of a more comprehensive ap-

proach.”

Wyatt agrees. “For most patients, whether they’re suffering from depression or post-traumatic stress syndrome, I don’t believe that neurofeedback offers a complete solution any more than I believe a doctor can give you a drug that offers a complete solution. Neurofeedback can calm the brain down, but then you still often have to deal with underlying issues.”

The desire to get at those underlying issues is why Wuttke, an ordained non-denominational minister, keeps coming back to the notion of spiritual growth. “When you incorporate all these things and straighten out the brain, the ultimate goal is for people’s spiritual awareness to start manifesting itself,” he says. Indeed, recent studies of Tibetan Buddhist monks by Richard Davidson, director of the Lab for Affective Neuroscience at the University of Wisconsin-Madison, have shown links between spirituality and the processes encouraged by neurofeedback. In particular, monks who are experts in meditation seem capable of generating extraordinary levels of gamma waves as they achieve a state typically associated with “transcendence.”

From a materialist perspective, the key seems to be neurofeedback’s ability to help us connect memories and sense perceptions that have been laid down in disparate regions of the brain—to achieve the feeling of unified consciousness by unifying the brain’s electrical impulses. But if neurofeedback can foster and even enhance such a state, this begs the question of whether the phenomena we typically describe in terms of “spirituality” are just physical by-products of a material mind.

Wuttke turns such skepticism on its head. “The way I look at it,” he says, “we may be able to map an experience through physiology, whether it is a profound sense of peace or a religious sense, but that doesn’t mean the material brain is the source of those experiences.” Instead, he sees the brain as “a transformer, something that conducts energy between metaphysical and physical reality.” He admits neurofeedback can’t necessarily help any Joe off the street achieve the transcendence of a Tibetan yogi, but adds, “It has been my experience that everybody is

enlightened; they just don’t know it.”

After my first session of neurofeedback therapy, there’s little chance I’ll be confused with one of the enlightened—something my wife readily confirms. But as I watched the red bug move with increasing dexterity about the screen, it certainly felt empowering to see how much control we can exert over our minds, moods and selves. Over the next few weeks, it’s a sensation I’ll recall during moments of stress, like the long nights with my ever-wakeful children. Just

this recollection seems to have some tangible effect, slowing the quickening pulse and quieting the static I’ve seen in the graphic representations of my brain waves. As Wuttke would say, we can sometimes be locked into old scripts, reacting to our world in ways we don’t understand or seem to control. Neurofeedback’s potential is so inspiring, in part, because it can help us rescript our brains and, thus, rewrite our lives. ■



HOW TO CHOOSE A NEUROFEEDBACK PRACTITIONER

NEUROFEEDBACK REMAINS UNREGULATED IN MOST COUNTRIES. SO HOW CAN you choose a skilled practitioner? James R. Evans, who wrote and edited some of the leading neurofeedback training guidebooks, recommends looking for a therapist certified by a group like the Biofeedback Certification Institute of America (bcia.org). “Most insurance companies, for one thing, are going to require that,” he points out. But as Marty Wuttke notes, “It’s really not even as simple as that, because there are plenty of people certified by various bodies who may or may not have the best techniques or motives.” If you want a glimpse of the technique at work, check out the website of Wild Divine (wilddivine.com), a company that combines biofeedback hardware with guided meditation training to enhance wellness.

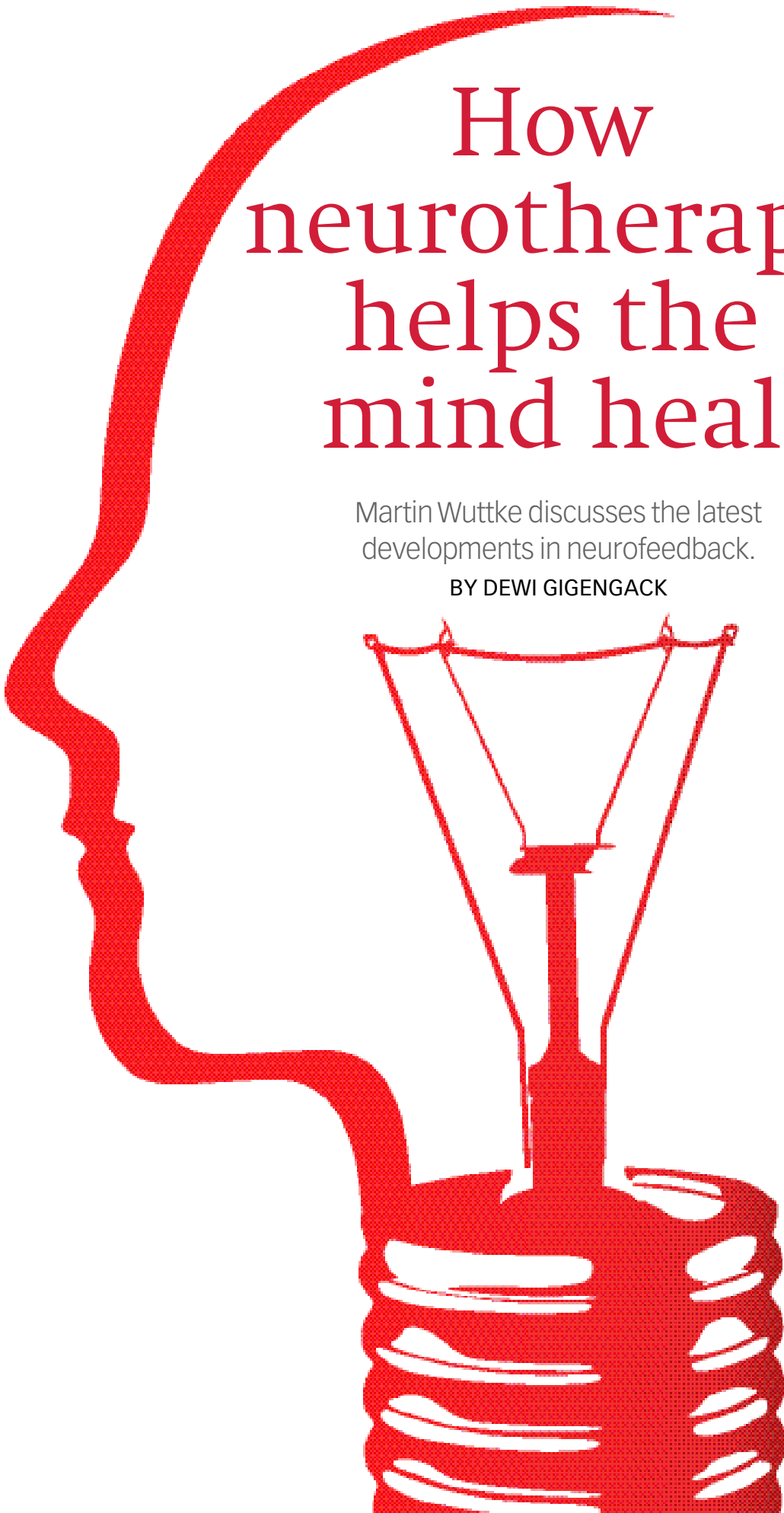
Ultimately—and perhaps appropriately for a technology lauded for unlocking a patient’s own potential—Wuttke emphasizes that prospective patients should do the research to make sure a therapist is right for them. Check out his track record by asking for references, looking at her educational and publication history or talking to other people in your community.

A typical neurofeedback session will set you back \$50 to \$120; a complete course of treatment often requires 30 or 40 sessions. Finally, after you’ve done all you can to make yourself comfortable with your neurotherapist, take comfort in the fact that the procedure itself is non-invasive. “Luckily, there seem to be few lasting side effects, except for ones that help,” says Evans. —BLAINE GRETEMAN

How neurotherapy helps the mind heal

Martin Wuttke discusses the latest
developments in neurofeedback.

BY DEWI GIGENGACK





MARTY WUTTKE BECAME A pioneer in neurotherapy—the manipulation of brain waves to reduce stress, help repair damaged brains, enhance creativity and improve mental health—out of personal necessity.

Back when he was a heroin addict, Wuttke used meditation to help him kick the drug habit. To learn more about the meditative state of mind, and to assist himself and others in achieving it, he began exploring neurotherapy. The need for neurotherapy became even more acute when Wuttke’s son, Jacob, was born with brain injuries and major developmental problems. Wuttke and his then-wife, Amy O’Dell, developed a kind of brainwave biofeedback computer game to help their son eliminate brain waves resulting from and associated with the injury—and it worked.

Neurons, the billions of cells in our brains, transmit information through electrical and chemical signals. The brain’s electrical impulses take the form of waves that researchers categorize by frequency, the number of times they repeat each second. An overabundance or deficiency at one of these frequencies often correlates to conditions such as depression and learning disabilities. Neurotherapy reads these waves, feeds them into a computer and translates them into visual, audible or tactile form. The goal: By seeing, hearing or touching your brain waves, you can learn to train your brain to produce desired levels of activity.

There is a growing body of evidence showing neurotherapy’s potential benefits for a range of mental health issues, from seizures to learning disabilities to substance abuse. The latest development in the field is low-resolution electromagnetic tomography (Loreta), a type of electroencephalography (EEG), which records electrical activity from the scalp. Combining Loreta with a range of fast-acting brain stimulation techniques, Wuttke and therapists around the world are learning how to change the brain by changing how the brain processes information via its electrical connections.

Why is Loreta so important?

“The whole field of neurotherapy is evolving. We are focusing on Loreta and its ability to isolate and transform specific parts of the brain that traditional ‘surface’ neurofeedback could not go deep enough to reach.

With Loreta, we are able to look at depth into the brain. With 19 electrodes and advanced mathematical modeling, we can determine what’s happening in someone’s brain, which frequently drives persistent problems that have been difficult to treat in the past. Patients can now train those deeper parts of the brain.

“Loreta has recently become almost as good as fMRI [another brain imaging technique] in the precise localization of brain dysfunction. But its response time, its ability to ‘feed back’ information to the patient, is much faster, so much so that the patients’ ability to recognize and transform the brain’s electrical activity is vastly superior. More to the point, Loreta neurofeedback treatment systems cost a tiny fraction of what multi-million-dollar fMRI feedback units cost.

The U.S. military is currently doing a large study using Loreta neurofeedback in Fort Campbell, Kentucky. They focus on military-duty-related brain injuries and post-traumatic stress disorder. The data that is emerging is truly convincing.”

And the results?

“In my experience, and in the experience of many of my colleagues, treatment times appear to be half of what traditional neurofeedback requires. Certain EEG-guided brain stimulation techniques can cut treatment times in half when the problem is excessive ‘slow-wave’ activity, as we see in some forms of ADHD or seizure disorders. The power of Loreta neurofeedback is that it can match those results yet work on a much wider and complete range of EEG problems and symptoms. It is much more of a complete solution. Also, it achieves its results on a much more scientifically solid and transparent basis.

“The first client I treated with Loreta was a woman with a 30-year-long alcoholic condition that had claimed the life of her father. Usually, the standard protocol for that is, at minimum, 30 sessions. After the fifth session, she told me, ‘I haven’t had any craving to drink since the first session!’ That impressed me, and it motivated me to use it more. My observation is, I was able to target and shift the activity in the insular cortex, which is an integral part of the brain reward network that appears to be important to the addiction process. That was almost three years ago, and she is still clean and sober.

Keep in mind everyone is unique in their recovery process, but such results have impelled me to examine this more extensively.”

How did your own struggles with addiction lead you to neurotherapy?

“I am one of the people who made it through a significant addiction. I was in a desperate place; I overdosed so many times. I knew that I was on a path that had one inevitable result: death. But in 1978, I had my first awakening experience. I remember, it was October 28 and I was sleeping on my sister’s couch in New York. I woke up early and I had an awareness of a presence that overwhelmed me. I literally cried out to the universe. I surrendered myself. And it started. I couldn’t fight it. It was a transformative experience in which I felt the presence of unconditional love. It was life-changing. I realized that I am here for a reason, and I had to do something important for myself and for humanity. It helped me put into practice my own spiritual truth. I went through a spontaneous spiritual enlightenment and transformation that impelled to serve others, as I came to realize the unity among us all. As much as I appreciate and respect science and technology, these high-tech tools are just a means to an end. At the heart of my work is the recognition of a spiritual process that is the birthright of every living being.”

What are your goals for the future of neurotherapy?

“Neurotherapy helps speed the process of learning how to meditate, how to quiet and calm down the brain, but it doesn’t replace it. There is a lot of research that shows the profound benefit of meditation to the brain, the immune system and the aging process. Neurotherapy has had some remarkable results with depression, anxiety, sleeping problems, stress, attention issues and autism . . . the list goes on. Neurotherapy helps meditation to become an option for more people by directly quieting the mind by giving people a mirror of their actual brain activity in the moment. It’s that simple and yet that profound. This work has important implications for society—for education, prisons, health and mental health systems, and in the evolution of healthy brain function itself. The ability to see what our brains are doing or not doing in the moment is transformative in and of itself.” ■

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How I got into neurofeedback

A personal introduction by Marty Wuttke.

I **BEGAN USING DRUGS AT THE AGE OF** 13. I grew up just outside New York City and I was not a terrible trouble-maker type of teenager, but just got into the usual milieu of going from alcohol to marijuana and then on and on into harder and harder drugs. By the time I was 14 or 15 I got into narcotics and by the time I was 17, I was into heroin.

That was a very rough period for me in my life. I went through the usual routes of treatment—addiction treatment, treatment centers, psychiatric counseling. Back then, a lot of the addiction treatment approach was based on trying to rebuild the addict’s personality from whatever the paradigm that particular treatment program followed. Nothing was really working for me. My addiction kept getting worse and worse. By 1978, I was in a very rough physical shape, rough mental shape, and obviously rough spiritual shape.

I had pretty much lost everything. I was at a critical point where I had to surrender; I had to either die or surrender. I didn’t have any choice at that point in my life. I was homeless. My father had passed away. Drugs were running my life. I didn’t have any place to turn anymore, so one day in October, I ended up crashing at one of my sister’s houses. The next morning I woke up and I had a spiritual experience. It was an ex-

perience that only lasted about 90 seconds, but the transformation was total.

The best I can describe it was a saturation of divine presence, I became aware that there is a divine presence and that we are in that divine presence—always. The only thing that separates us from that is our ego-sense of separation. It was an entire transformation.

I still tried to use drugs, but at that point I didn’t desire them anymore. I realized that I was here for a reason (and that we all are here for a reason without exception) and I had to do something with my life that would contribute to the betterment of society. It had to involve healing and it had to involve trying to pass on what had happened to me in terms of the spiritual awakening.

I moved from New York and went to a chiropractic school in Georgia. About half way through my training there at school I became obsessed with this notion of my spiritual experience. How did that happen? How can I facilitate that in other people? I began obsessively studying the more esoteric spiritual teachings, including mystical christianity, yogic science, and a few other ‘enlightenment’ traditions. I moved up to North Georgia and lived at a spiritual retreat center where the primary emphasis was on yogic science and meditation in the Kriya Yoga teaching tradition. I was trying to de-

cide if I wanted to go into a monastery, be a monk or just what I was going to do with the spiritual urges that I was having. I spent a couple of years in a semi monastic setting. One day I found out that there was a very plush psychiatric hospital/addiction treatment center just a few miles away from the town that I lived in. So I went to the center and I took a look around and asked the clinical director there if I could volunteer to teach meditation to the patients.

WORKING WITH ADDICTS

The center had about 35 beds, a mixture of alcoholics, drug addiction, eating disorders with depression, anxiety, post traumatic stress disorder among the diagnosis. They gave me a small group of people to work with, it was about half a dozen of the alcoholics and I started to teach and lead meditation sessions. I came in 3 times a week and what happened was after about 2 weeks, the medical director of the hospital pulled me aside and he said, “who are you and what are you doing with these people?” I told him who I was, my background and that I was teaching them meditation as I had been taught by my teacher/guru. He said that those patients who were attending meditation were having rather remarkable relief from their chronic pain, sleep problems, their anxieties, their depression, cravings

and so on. At that point they asked me to go to work there at the treatment center and to design a meditation-stress management program that would run in tandem with their addiction treatment program.

Their addiction treatment program was essentially based on the 12-step program model that many are familiar with—the 12 steps are basically a spiritual path, a recovery program. However, I needed to give more scientific validation to what I was doing. My primary motive at that point in teaching meditation to these addicts and alcoholics was to create or at least facilitate the spiritual awakening process, essentially to duplicate the same thing that happened to me.

I began to explore the research around meditation. The transcendental meditation field had a lot of research and tools. Most of those tools were based on biofeedback. Biofeedback is easy to define—any biological mechanism that we can measure in the human body. Any mechanism whether it be heart beat, blood pressure, skin

sure inside the skull to decrease as the blood flows out to the extremities—very successful, works quite well. That is one type of biofeedback.

There's also muscle tension biofeedback for people with chronic muscular issues, blood pressure biofeedback, breathing types of biofeedback, et cetera. While there was a lot of research on those types of biofeedback and meditation, none of it was really conclusive. In 1983, I learned that there is one real marker for meditation and also a marker for what we call the spiritual awakening or spiritual unfoldment process. That marker has to do with the brain and the changes that occur in the meditators brain as they progress in the practice. That is what led me into neurofeedback.

Neurofeedback means that we are measuring brain waves for the feedback training (neuro-feedback). In this way, we're measuring the electrical activity that is occurring in the brain. Instead of skin temperature the feedback is the actual brain waves so that the person can see or hear some kind of rep-

THE 4 BANDWIDTHS OF BRAIN WAVES

Brain waves are basically the electrical activity that we pick up on the scalp of a person. We use an EEG cap to measure brain waves. Inside the cap are little electrodes that work like sensors. The cap sits over the individual's head. The sensors have gel in them so as to make contact with the individual's scalp like tiny microphones amplifying the brainwaves so the computer can read them. EEG is short for electroencephalography.

By using a cap with these different electrodes measuring multiple locations (essentially the whole brain), we can take a snapshot of what the brain is doing. That snapshot will give us quantitative information in regard to the many parameters that are being measured including brain wave power, coherence, phase, connectivity, asymmetry and many other indicators that all have a normative database. We can predict levels of depression, trauma that has occurred in the brain, whether or not there is a learning disability, and many other correlates. We can look at autism, attention deficit disorder, posttraumatic stress disorder, or addictions. All kinds of things can be quantitatively measured in the EEG. The brain waves are measured, filtered and categorized by their frequency.

When you see or hear what your brain is doing, it's a matter of time before change can happen.

temperature, muscle tension, even the movement of the digestive tract, any biological mechanism that we can measure and then give the individual feedback (bio-feedback) about exactly what that mechanism is doing, it is just a matter of time before the individual can learn how to control that mechanism.

For instance, there is biofeedback that's used for migraine headaches. Migraine headaches typically occur when there's too much blood engorged in the brain and it creates tremendous amount of pressure. So skin temperature biofeedback is actually a very successful type of biofeedback used for migraines. That's where we have to take a little temperature gauge and put it on the patient's fingertip and if the person can see their temperature in real time, it's just a matter of time by applying different relaxation techniques until they can learn to literally increase the blood flow to the fingertips. Then what happens is you are learning to encourage vasodilation in the hands and opening of the blood vessels. That allows the pres-

resentation of exactly what their brain is doing. When a person can see or hear exactly what their brain is doing and when they are guided in a particular direction to change something, it's just a matter of time before change or optimization can happen.

If you look at trauma for instance, and the way the brain functions, you begin to see that from the earliest age even into when we were still in our mother's womb, trauma begins to change the electrochemistry and therefore the development of the brain. As that electrochemistry is affected, it changes the way the brain functions. What we measure and the tool that we use is the actual brain waves themselves because the brain waves will reflect the health, chemistry and function of the brain. So if there is trauma that too will reflect in the brain waves. Trauma and other markers of brain dysregulation, are the primary things that we're looking at when we talk about neurofeedback training. In effect it is technically a training; a training in self-regulation.

1. DELTA

The first bandwidth of brain waves that we look at is called delta. Delta brain waves are the slowest brain waves that are measured in an EEG. Roughly they fall between one and four cycles per second, so between 0 and 4 Hz. Delta is a very important bandwidth of brainwave activity for a number of reasons. One, it is like the base player in the orchestra. It keeps the background rhythm going so that the rest of the brain can do its job correctly. Delta is a brainwave that you really shouldn't see as dominant in an adult waking EEG. If you do see it as being dominant relative to the other bandwidths being measured, it can indicate some kind of pathology or brain injury.

Delta occurs in stage 4 sleep and if you do not enter delta sleep, your body does not go through the rebuilding and regenerating process. You only really go into delta at night within the first 3 hours, sometimes more, but essentially you kind of go in and out of delta during those first 3 hours and spend a total of maybe an hour and a half or two in delta. This is where the body releases its important

neurohormones and neurochemicals. Take growth hormone. If you didn't have that growth hormone secreted during delta sleep, your body would not make new cells, it would not recharge, it would not grow new cells where new cells need to be grown.

The problem that we see with this delta sleep is that it is essential for us to be healthy and stay young and that there's a lot of things that block it. For instance, some sleep medications may actually prevent delta sleep. So in effect you can sleep for 12 hours, but in that 12 hours of sleep you never quite hit that delta and you may wake up more tired than you were before you went to bed. Alcohol is another substance that will block delta sleep. That's why you'll see alcoholics who may be 40 years old and look like they were 75 years old. Methamphetamine the same thing. The other thing that can block or interrupt delta sleep is coffee or any type of caffeinated beverage.

2. THETA

The next bandwidth is 4-8 Hz. That's called theta. Theta is a very interesting brain wave. It can have negative connotations—a lot of problems like attention deficit disorder, post-traumatic stress disorder, many anxiety disorders, dissociative disorders, some types of depression can be associated with an excess of theta activity in the brain.

Theta can be an indicator of activation or deactivation of the cortex. The cortex is the big outer layer of the brain versus the lower sub-cortical portions of the brain. Theta is an indication that the cortex is not being appropriately activated. That's why you see it in problems like attention deficit disorder.

While theta may have some negative connotations, there is also another side to theta. It can be a gateway to the inner source of creativity. We've heard that Albert Einstein visualized himself riding on a beam of light through the universe. Well, when you visualize, you can go into theta. Many of the best-known inventors say that their best inventions happened when they were nodding off, when they were going into that reverie state.

Theta is a brain wave bandwidth that is a gateway between the conscious mind and the unconscious mind. What we believe about the unconscious mind is that it's not only a personal unconscious but there's also a collective unconscious, so what what I've heard some very advanced yoga mediators say, is that theta is the doorway to the infinite

library within. If you can learn how to consciously go into theta, you can access a tremendous amount of information that is not just personal to you, but also a storehouse of collective knowledge.

Theta is also our personal memory bank, it's the doorway to all of the experiences that we've had in our lives. So if we've had traumas, if we've had personal experiences that really shaped us for our lifetime, we can often gain access to those experiences in theta.

What we found, working in the psychiatric hospital as we began to apply brain wave biofeedback in the 1980s, is that if we took the patients through a training program where they were guided by the computer to encourage more alpha and at a certain point, more theta activity in their brain, the recovery rates were significantly improved. Addiction recovery rates are usually pretty dismal. At best they are about 16% to 20%, depending on the program. But recovery rates when this is added to treatment programs as a complementary intervention, can go as high as 80%. And that was just with 30 sessions. This obviously shows that this is an extremely powerful technology. Or more accurately, what is really powerful here is the human brain. Technology provides a way to simply learn how to gain access to the brain and the potential there.

3. ALPHA

The next bandwidth is called alpha. Alpha is 8-12 Hz. Alpha is a mid range neutral brain wave state. If we were measuring your EEG when you close your eyes and relax, we would see this huge burst of alpha activity as your brain quieted and calmed down. Alpha just means that all neural circuitry is quieting, calming, going into neutral. What we've seen over the years as we measure peoples EEG's and look at peoples brain waves is that there is often an epidemic of deficient alpha in persons who are stressed out or tend towards addiction - not always but quite frequent. If we are not actively pursuing some relaxation skill, or self-regulation, through meditation or something like that, we can be deficient in alpha.

Alpha is another brain wave that is restorative. It has an intimate connection with the autonomic nervous system. The autonomic nervous system is the portion of the peripheral nervous system that runs through your body and is responsible for the activation and deactivation of all the organs and

systems of your body. Alpha can be like the regulator of the autonomic nervous system.

The two parts of the autonomic nervous system that are responsible for activation versus deactivation are called sympathetic and parasympathetic, so the sympathetic portion of the autonomic nervous system activates us, stimulates us, gets our body to pump some adrenaline out, wakes us up in the morning, gets us going, pupils dilate, digestion slows down, worst case scenario, digestion shuts down. I'm sure you've heard of the fight, flight or freeze response. That's the sympathetic reactive response to a perceived threat.

The other side of the autonomic nervous system is the parasympathetic portion. The parasympathetic job is to turn off and quiet down the sympathetic portion. So these two parts of the autonomic nervous system are doing a dance all day long. Sympathetic is going up as we get stressed and as we get more active. Then towards the end of the day the parasympathetic comes up to become dominant and hopefully quiet things down before we go to bed.

But we do funny things to our autonomic nervous system. We give it a little bit of boost in the morning with a cup of coffee, so caffeine obviously stimulates the autonomic nervous system. Then by 4 or 5 o'clock in the afternoon, we need to give the parasympathetic a little boost, and the obvious thing most people turn to is that cocktail hour, so alcohol will stimulate or trigger the parasympathetic portion of the nervous system. Here is the problem though. If those two parts of the nervous system are constantly doing this see-saw, the parasympathetic has to start working overtime to compensate for the sympathetic nervous system over-activation. The result can be a lot of stress in the mind-body and can potentially lead to disease and illness.

It has been verified that auto immune illness is the result of the back and forth that goes on between the nervous system, this speeding up and slowing down, speeding up, slowing down. Some researchers say auto immune illness is essentially at the root of heart disease, Alzheimer's, and many of the diseases that we see occurring now because auto immune essentially produces inflammation. We know that inflammation is the beginning stage of many diseases perhaps all the way to Alzheimer's.

Alpha can be a very important brainwave state to learn how to get into and to learn

how to reinforce. Whenever you hear athletes talk about being in the zone or flow where they perform at their best, that's what alpha is. Alpha sets up the whole cortex for optimum performance. That's why athletes need to spend time to learn relax. The calmer they can be, the more they can get into that alpha state. Often this begins by learning how to breathe correctly. Most of us don't breathe correctly. When you breathe in a slow rhythmic fashion, when your inhalation and exhalation flow in a nice smooth sine wave, your brain starts to go into alpha rhythm.

4. SENSORIMOTOR

The next brainwave above alpha is called sensorimotor rhythm. That's a bandwidth of activity between 12 and 15 Hz. This is another very important bandwidth of brainwave activity because it has very specific effects in the brain. This is the bandwidth of brainwave activity that is anti seizure. Neuroscientists discovered that many disorders are the result of subclinical seizure activity. It's not like the person has epilepsy and is having overt seizures, but there can be little bursts of epileptiform activity that do not necessarily create grand mal seizures, but create electrical instability in the brain.

This electrical instability in the brain can manifest as problems like bipolar disorder, Tourette's syndrome, many types of oppositional defiant disorders now. The medications that are being prescribed for these disorders are anti-seizure medications. They do work in many instances, they inhibit this type of activity. However researchers found that when you find the source of the seizure activity and you give that part of the brain feedback and teach it to make more of this particular sensorimotor rhythm, it is seizure inhibitory. That's why neurofeedback is being used quite a lot now for bipolar disorder, Tourette's and the other disorders as well as certain types of seizure disorders.

Sensorimotor rhythm is also a sleep cycle regulator. So we use that as a feedback training when we have people with chronic types of sleep disorders, insomnia and so on. It's a very important rhythm and has an effect on the entire body, lowers blood pressure, lowers most of the stress mechanisms that we see occurring in individuals.

5. BETA

The next bandwidth of brainwave activity as we move up from 15 Hz up into 32 Hz

encompasses what we call beta activity. Essentially what happens as the brain moves up in activity from 15 to 32 Hz, it's getting more and more active, more and more processing is occurring throughout the cortex, so the higher the frequency, the more active the cortex. In some instances when it gets too fast as well as too dominant in terms of relationship with the other bandwidths of brain waves, up to say 30 Hz, then you may see some significant posttraumatic stress disorder issues, anxiety disorders, panic disorders and so on.

6. GAMMA

Above that, there is some more brainwave activity. One particular bandwidth that has received a lot of attention in the last few years is called gamma. Gamma is a high frequency brainwave activity. Roughly it falls around 40 Hz.

Years ago, the Dalai Lama allowed a few of his most advanced Tibetan meditators to undergo EEG measurement. A group of neuroscientists jumped on the opportunity to put wires on their heads and see what their brains were doing. At first, the hypothesis was that we were going to see a lot of slow activity. The assumption was that we were going to see activity down delta and theta range and that was going to be the indicator for enlightenment or whatever it is we were looking for in these advanced meditators. But what they found was quite different. What they found was a predominance of very fast brainwave activity in the gamma range. These advanced meditators had much more activity in this range than the normal person and they had it all the time not just during meditation.

We all go in and out of gamma. It is known as a binding frequency. When you see gamma in the brain, many different areas of the brain are connected. When you are walking down the street and somebody is walking towards you who seems vaguely familiar, and then you think, "Ah! I know who that is!", that is probably a burst of gamma activity once there is recognition. You connected lots of different memory centers in your brain and you put it all together.

Our brain is essentially a lazy organ, it needs to conserve energy, it doesn't want to have to do a lot of work, but it also potentially keeps us quite unconscious and the default mode network's job is to always keep referencing the past in order to gauge what to do now. So the default mode network is

the series of connected parts of the brain that keeps us referencing back to old scripts or unconscious patterns that may or may not be a problem for us but are automatic reactive patterns nevertheless. It appears and it just may be that gamma actually interrupts the default mode network. Gamma is also associated with a very strong degree of conscious presence. When one is present it appears gamma activity is an essential ingredient for the brain to be free of the automatic perceptions. Gamma allows us to be fully where we are without the influence of all of the patterns and scripts, leftover memories that we have from the past and that's why this is a marker for advanced meditators. They have learned through meditation and various practices how to live in the moment, how to be fully present and that makes life an entirely different experience for them.

It's not as easy as simply teaching our brain how to make more gamma and therefore become enlightened just like the Tibetan meditators achieved after 60 years of meditation. The 60 years of self discipline are in fact essential to the brains transformation process. Gamma is this incredible intensity of energy that the brain will experience. When there is gamma activity everything is magnified and just like a magnifier, or just like the sunlight, it's irrespective of the flowers and the weeds, the 'virtues and vices'. So it's going to magnify all the positive attributes and experiences of that individual but it's also going to magnify the negative ones.

So that's why to approach these states of consciousness one has to really go through an alchemical process of transforming the nervous system stepwise before one can handle this higher energy that is facilitated or reflected by gamma. If you are not ready for it, it may cause a problem, so we have to approach it cautiously and we have to take our time getting there. The moral observances and restraints that certain spiritual paths adhere to encourage a transformation of brain areas that ultimately prepare our nervous systems to experience and accommodate higher states of consciousness. ■

In 2013, The Intelligent Optimist organized a 4-part online introductory course on neurofeedback with Marty Wuttke. This story and the stories on the following pages are based on Wuttke's teachings in that online course. The full course is available at <http://be.theoptimist.com/neurofeedback/>

The causes of brain injury

THE PRIMARY PROBLEM IS LACK of oxygen. But here are other causes as well. Such as high fevers, drowning, cardiac arrest head injuries, whiplash, blood clot. Quite a few have to do with pregnancy and labor—poor prenatal care, prenatal complications, premature, postmaturity, delayed labor, labor under two hours or longer than eight hours, cesarian, obstetrical difficulties such as forceps, or cord around the neck.

It makes sense that this our very first moments in our lives play such an important role. When a baby is born, the child's skull is moving through the birth canal. There are many, many changes in pressure in the skull. This is actually preparing the brain to enter the world and start the developmental process. It's a delicate process.

So the nine months that we spend in our mother's womb, and, the birth process and so on, all these are really the basis of how our brain is going to function. The brain is remarkably resilient, but when we look at children and adults with autism, learning disabilities or chronic depression and many emotional issues, we may find that they have one or more of these indicators.

I think we need to talk about vaccination a bit more. It's one of the controversies of the past few years. Some believe vaccinations cause autism, and I'd like to give a different perspective on that. There is a good evidence that our gene pool is getting a little scrambled. Maybe we could say that there is more of a weakness being passed down genetically, which may be due to the chemical exposures in our environment.

Vaccinations put such a load on a child's liver, immune system and on his nervous system, especially when multiple vaccinations are given one time, that this will ultimately cause a reaction and brain injury. It's not that the vaccines directly cause autism. The weakness was probably already there, and vaccines were just too much. These children may be predisposed like the "canary in

the coal mine", being extremely sensitive and susceptible to toxic overload.

I can't tell you how many times I have heard parents come to me and say their child was fine, until he had his vaccinations and then a week later, he or she didn't talk anymore or look them in the eye. So there's a relationship but it's not causative, I believe.

CHARACTERISTICS OF TRAUMATIC BRAIN INJURY

These are the problems that will show up:

- attention
- long term memory
- short term or working memory
- executive functioning
- reasoning and problem solving
- insomnia
- hyper verbal speech
- tangential speech
- confabulation
- expressive speech or language
- receptive language

The majority of people don't know that they have had a Traumatic Brain Injury. Take concussions that are occurring with our high school football players, college football players, and professional football players. Their frequent head injuries are being associated with dementia and extreme neurological problems occurring later on. We tend to think, *Oh, he will be okay*, but we know now that concussion is a serious issue and needs clear treatment.

I always ask if people have been in a car wreck. If so, did they hit their head in the car? No? Did they have whiplash? A whiplash can create brain injury. You see, the brain has the consistency of jello, and it's encased in the hard bony skull. When there is an impact or momentum, the brain bounces around inside the skull and when it bounces, around, inside the skull a couple of things can happen. The axons, that connect can shear, depending on the force or the brain literally rubs against inside the skull and the bony fossae and bony fossae can cause le-

sions and problems. The worst is when the brain starts to swell.

EMOTIONAL TRAUMA

Emotional trauma can cause traumatic brain injury at any age. You can actually see it on an EEG much later in life, particularly in the temporal lobes. There are parts of the brain that literally record our experiences, especially the traumatic experiences. They record them, and then they become like a scanner that pays attention to the environment, to make sure that the similar situation or person or experience is not a threat.

So, if you find yourself hyper vigilant for instance, you are walking in a room and you feel the sort of uneasiness, or if you don't sleep very well at night, or if you find yourself very much on guard, or if you know what's going on behind you all the time, then you may have this going on.

Obviously, this refers to diagnoses we call post traumatic stress disorder as well. We all know about US soldiers coming back from Afghanistan and Iraq. Their nervous systems had to be on alert 24 hours a day. The problem is, it doesn't turn off and so they come back home and experience enormous problems. They don't understand why these very primitive levels of brain are on constant alert. That's really tough and may explain why we have an epidemic of suicide amongst former soldiers. It's very difficult to deprogram this survival mode in the brain, but it can be done.

But I believe we all have situations or people in our life that we have a lot of resistance to and that we unconsciously may perceive as "threat". Usually, you can find the source of this resistance somewhere. It may not be conscious, but your brain decided at some point that this situation, person, place or thing is potentially a threat. That scanner inside your brain makes you avoid this. ■

The story of my son

How Jacob became an inspiration for many people.

IN 1992, MY WIFE, NOW EX-WIFE, GOT pregnant with our second child, a boy. She had an extremely challenging pregnancy. She had a very rare condition on the placenta called a chorioangioma, which is essentially a tumor in the placenta. So, my son was at risk the entire 9 months of pregnancy. He was traumatized in the womb because of this tumor that was cutting off blood flow and also creating or forcing the placenta to create too much amniotic fluid.

When she was 5 months pregnant, she was blown up like she was beyond term. The amniotic fluid had to be drained several times. It was a very challenging and stressful time. At my son's birth in 1993, he came out and was clearly not in good shape. Jacob had to go to the neonatal ICU and spend several days there. We started to explore if there were any parents out there who could relate to this. We started to go through that stressful time of trying to figure out what was wrong with our child and what to do about it.

At this point, neurotherapy and EEG biofeedback was not being used with children younger than 7 years old. The reason was that the brain is doing exponential growth from 0 to 7 years old. At 7 years old, it starts to slow down a bit, but still continues rather rapid and strong intermittent growth spurts until our 20s. We used to think that we did not want to intervene on what the young brain was doing. I was cautious about applying these techniques to my son.

So, we went through a year of specialists. Since I'm in the health care field, we had access to some of the top people in Atlanta, Georgia at Emory—a pediatric neurologist, a sensory integration therapist, an occupational therapist, a developmental therapist, you name it. Jacob was hypotonic, so he had no muscle tone. His eyes would always be almost completely closed. His nervous system was not getting the charge that it needed to start the development or the developmental process for him, so he couldn't roll over.

He wasn't crawling, creeping and so on.

After a year, we knew we had a serious problem and visiting these various specialists, wasn't getting us anywhere. It was very frustrating for me being a recognized brain specialist and yet feeling impotent in regards to doing something for my son. So his file of diagnosis was getting thicker and thicker and yet no intervention seemed to help. And we thought, we had to try this. I was going to figure out what to do for him and how to do it and I was going to create an ongoing therapy for him.

The source of a lot of this information was the Domans, specifically Bob Doman Jr., who was the head of the National Association For Child Development, and his uncle Glenn Doman, who had written a book, *What to do About Your Brain Injured Child*. Their work paved the way for an entirely different approach to brain rehabilitation and optimal brain function. My ex-wife and I began to study their work and develop our own angle on it and modified approach according to our study and experience. We started a program named after our son, Jacob's Ladder Neurodevelopmental Center.

Jacob was a year old when I contacted one of my mentors. She said, well, you are not getting anywhere with traditional medicine. You're not getting any answers. What do you have to lose? So, I started working with him using EEG biofeedback. Now, how do you treat a hypotonic child with EEG biofeedback—a child who is barely aware of his environment? You make his mother the feedback.

So I had my ex-wife hold him on her lap and I would explain to her what the EEG on the screen meant and I would explain to her when his brain was doing the right thing. I would tell her to gently shake him and stimulate him in those moments. So, we diligently did that for a month. At the end of that month's time, Jacob started to come alive and awake. He started to develop muscle

tone. His eyes started to open up. His EEG started to show indications that his brain was starting to engage. We knew at that point we had something.

EEG biofeedback creates plasticity and flexibility in the brain, especially in the parts of the brain that you are training. It's like the blacksmith fire. It makes the metal malleable so that you can shape it, but the important part of that is how do you shape that metal, what do you shape it with. So, as my son's brain began to wake up, it began to orient itself to the environment and to the world around him. We knew that we had to come in and shape it. That is where the neurodevelopmental approach came from.

Jacob didn't crawl. He missed so many of the developmental mile stones that are extremely important for brain development. When you watch your baby go through this stage of rolling over, sitting up, creeping on the belly and then crawling on hands and knees, you are actually seeing a reflection of different levels of the brain coordinate, connect and attach. If anyone of those foundations are missing, it's going to show up later on as higher brain functions start to become functional and connect. Many things don't connect till 7, 8, 9 years old and maybe even beyond that, so many problems that started way back in the development of stages, don't show up until much later. Many parents aren't aware of that.

So we realize that we had to go back and put Jacob through those developmental stages. And now? Jacob is doing great. When he was born, the specialist didn't give us much hope whatsoever, but now he's a remarkable guy. I'm about six foot three. Now that he's 21, he's six foot three. He's probably going to be even bigger than me. Yes, he has had some physical challenges, some hard issues, but we were able to work through them. He has become an inspiration for many people and a teacher at Jacobs Ladder Center. ■

The pillars of health

Ways to protect yourself.

FUNDAMENTALLY OUR BODIES ARE designed to support health to heal themselves into age. Obviously, that is part of our physiology. But for whatever reasons, we have developed this arrogance where we don't believe in the body's innate intelligence anymore. We think that we have to control it and change it. We have deviated from this natural design. Yes, medical science has made remarkable advances in many ways but this fundamental truth is often overlooked.

With GMO, we have potentially done a lot of damage to the environment and our food crops. We have created manmade neurotoxins. Our bodies are not prepared to handle some of these substances. Mind you, some 88% of the corn in the United States is genetically modified. A collective call to action is necessary because there is growing evidence that these genetically modified foods can cause lots of problems.

But if we adhere to a few rules about what I call the pillars of health, we can strengthen ourselves so that we can be resistant to some of these things that are out there that have inadvertently been created. The pillars of health revolve around the following factors:

- Diet, clinical nutrition, and detoxification.
- Exercise.
- The environment, our lifestyle.
- Body work.
- Neurotherapy, meditation, relaxation and then deep sound sleep.

DIET

Diet, clinical nutrition and detoxification really all boil down to a few basic concepts. We can get very detailed with this but allow me to titrate it down and take out the most important pieces that you can apply very quickly. Essentially, we can take all the vitamin mineral supplements we can get our hands on, but if our digestion is not working correctly these will not help.

For many of us once we hit 40 years old, digestion does start to become compromised for many reasons—eating wrong, overuse of antibiotics, stress, et cetera. You know you have poor digestion if you have bowel

issues—either gas after meal coming from the gut or intestinal gas. Whenever these things happen we know that digestion is clearly compromised. Constipation and diarrhea are other indicators as well.

Amongst the most popular over-the-counter non-prescription medication are the antacids. The ironic thing about the use of antacids is that the real problem is usually a deficiency of hydrochloric acid and not an excess. So here we go dumping antacids into an environment that actually needs more acids that would fix the situation.

There are certain things on the market now that are being hyped. The problem with vitamins and minerals supplements, fish oils etceterais that there is no such thing as a one-size-fits-all model. That definitely applies to diet and clinical nutrition and detoxification as well. We all have different body types. If you are familiar with Ayurvedic medicine, you know we are categorized into three types and then different subtypes; Vata, Pitta, and Kapha. Ayurvedic medicine points out that what is good for one type may be poison for another type. Different types have different requirements.

So I'm going to try to stick to general rules that will apply across the board. For digestive support there are great products on the market, like digestive enzymes. I don't want to be pushing any brand here, but there is one called Enzymedica, which is quite good. Most good health food stores carry them. They have very specific digestive enzymes for lactose, for grains, for gluten and then the whole spectrum of digestive enzyme support. Some will need hydrochloric acid, others need pancreatic enzymes. That is an individual thing, and with a good professional practitioner in nutrition that can be determined.

There are also a large variety of digestive stimulants such as fresh ginger and some mild spices, particularly the Indian spices are very good digestive aids. Cumin, turmeric, coriander—these are excellent digestive spices in Ayurvedic medicine. There are even antidotes to the wrong foods that we eat. Cardamom is one. Cardamom will

counter the effects of caffeine according to Ayurveda.

If you are a meat eater, it is important not to combine meat with carbohydrate, so the old all American sandwich or meat and potatoes diet creates havoc in the gut and can create lots of problems as time goes on including irritable bowel syndrome and colitis. There is some speculation that it leads to bacterial changes in the gut that can lead to Crohn's disease too, which is a severe issue.

High protein meals in the morning are a good idea because they stabilize blood sugar. In the evening we want to lean more towards carbohydrate meals because that will allow serotonin to be created in the brain and serotonin converts to melatonin and of course then we go to sleep.

The liver has two phases of detoxification. Because we have created so many toxins in our environment, our liver is having to work overtime. It's important to keep the liver healthy. Things to support liver function also happen to be anticancer—it's the group of vegetables that fall into the brassica family, the cruciferous vegetables. The reason they are so remarkable is because of these three chemicals that they contain—di-indolylmethane, sulforaphane, and selenium. Sulforaphane is an important detoxification component. It's extremely high in broccoli and especially in broccoli sprouts. Kale, spinach, broccoli, Brussels sprouts, asparagus, onions, garlic, cauliflower, and cabbage are extremely important for the diet. All this will help our liver detoxify.

Certain supplements that we should all include is coenzyme Q10 and in particular the Kaneka variety. Kaneka is a much more absorbable patented form of CoQ10, alpha-lipoic acid or R-lipoic acid, powerful antioxidant. It spares vitamin C and vitamin E, so it allows them to be recycled. And then, of course selenium, those three just about anybody can use.

There is a brand that I highly recommend. It's called Standard Process. Their products are only available to licensed professionals. If you know a chiropractor, you can get these through them. The products are exceptional.

They were created by a man way ahead of his time: Dr. Royal Lee, back in the 1940s and 50s. He was a genius. He took whole foods to turn them into supplements. That's what the brand still does.

What's different? Royal Lee believed that nature in its infinite wisdom knew more about combining all of the ingredients in the whole food rather than taking one specific vitamin or mineral out of that food and using it almost like a medicine. Royal Lee believed that you needed to include the whole food where you are extracting the vitamin or the mineral from because the whole food contains unknown parts and ingredients that we have not identified yet.

For example, ascorbic acid is what we call vitamin C but Royal Lee said vitamin C is not just ascorbic acid, it's a whole array of other constituents as well. We know now about bioflavonoids and other components that are usually included along with ascorbic acid because we know they all support each other, but Royal Lee went even further and said there are even more than the bioflavonoids that should be included with ascorbic acid in order for it to work biologically, in order for the body to actually use it correctly.

Standard Process Betacol formula is a remarkable liver cleanser. There is a brand that goes along with Standard Process. It's called MediHerb. They have three in particular for the liver—LivCo, Livton and Silymarin, the active extract of milk thistle which is another liver protector. I highly recommend any or all of these. Also, there's an excellent supplement called TA-65. Problem is, it's very expensive right now, but it is showing evidence of having a powerful effect on the immune system and on telomerase activity, working against aging.

Then comes the "don't do" list. At the very top is sugar. Our bodies just were not designed to handle sugar in the form that we have it available to us now. High-fructose corn syrup is one of the culprits. We were just not designed by nature to handle that and so many of the chronic illness and diseases now—heart disease, diabetes, even Alzheimer's—are being traced back to the sugar problem. Alzheimer's now is being looked at as the result of diabetes, not type 1 or type 2, but a new type 3 diabetes. We really need to avoid pure sugar in any form and in any product that we take in. Sugar is a toxin. It is poison for the body.

The other is obvious: monosodium glutamate MSG, a neurotoxin. White flour,

flour that has been bleached, used in pasta and white bread for example. Another substance to avoid is excessive alcohol. In the US the gluten and wheat products are mostly GMO as well as certain dairy products. We shouldn't be drinking milk at least in large amounts and even certain types of cheeses we have to be cautious with.

Whenever I get a child with autism or attention deficit disorder, the first thing we do is take them off of gluten and dairy. Many times we see this clears up some of the symptoms. These foods can cause a lot of inflammation and a lot of reactions. An exception to the dairy is ghee. Ghee is clarified butter, the Indian form and this is actually quite good for you.

EXERCISE

Another pillar of health is exercise. I highly recommend the book, *The First 20 Minutes* by Gretchen Reynolds. According to this book, 150 minutes per week is the ideal. There is a funny thing about exercise that she points out in this book: A lot of the exercise fads that are out now are backfiring because the worst thing we can do is go to the gym for 45 minutes every morning, work out, and then go sit sedentary for 8 hours and then go home and sit for another 3 or 4 hours in front of the TV. That is back firing. The worst thing that we can do is to be sedentary all day long. The best thing we can do is to spread out our exercise throughout the day.

It's not a good idea to sit in a chair for more than 20 minutes at a time. There are changes that occur in the blood stream with the fatty acids that cause problems, so it's quite important to try to move every so often and even just standing up, having the muscles of the thighs and the buttocks muscles activate because that will change the fatty acid content of the blood stream. In some offices, they use architect draft tables so that employees stand up for a certain part of their day rather than sit all day long.

The real point of exercise is not so much what it does to the body but rather what it does to the brain. It increases the size of the hippocampus as well as improved blood flow and oxygenation. If you are not exercising, then start a program. Do some light exercise two times a day, walk on a treadmill. Walking is probably better than a treadmill because it's more natural. Weight training is also extremely important to include. You don't have to become a body builder, but weight training challenges the

bony structure and will build bone density. Virtually everybody that we work with, we put them on an exercise program—more for their brain health than anything else.

ENVIRONMENT

Try to make your environment electrically clean. We created an environment that some people call electrically polluted. This is challenging because it depends on where you live, you are exposed to a lot of noisy electrical influence around you. We have many patients who are extremely environmentally or chemically sensitive. You will see that the electrical pollution is a factor also and when you clean that up, they begin to feel a lot better. There are many devices that can clean up the electrical noise. There are devices that you can actually plug into your outlets. There is one made by a company Stetzer.

We have to avoid a lot of the pesticides, herbicides, and cleaning fluids that we use and try to get things that are more natural. The toxins and bleach and then many of the typical household chemicals are really far more damaging than we realize. Obviously fresh air, fresh water, environment that is calm and serene.

We also support daily sunlight exposure as long as somebody doesn't have melanoma or some other problem where they need to totally avoid sun exposure. It's very important to keep up the vitamin D levels so we don't succumb to SAD. Some of you may have sunlight effective disorder, which occurs in January and February when there is less sunlight. In fact, there is an epidemic of vitamin D deficiency here in United States, so I think we've gotten paranoid about the sun and use excessive amounts of sun screen. We do need that sunlight again early in the morning, and late in the afternoon.

BODYWORK

Bodywork is another pillar of health. We are big proponents and believers in cranial sacral osteopathy. Some massage therapists do cranial sacral work, which is very powerful. It tunes up the body, gets the cerebrospinal fluid flowing correctly. It can produce remarkable effects for the brain. Acupuncture, massage, Qigong, and Hatha yoga are all excellent tools and forms of bodywork that have a profound effect on the brain and brain health.

The brain can continue to rebuild and repair itself and continue to change its pathways as life goes on.

NEUROTHERAPY

Neurotherapy encompasses a lot now. It has become quite a large movement both here in United States and in Europe. There are several different schools of thought in regard to neurofeedback, different types of equipment, different types of protocols, different types of applications, different types of trainings. So if you are looking for a practitioner please keep in mind that not all neurofeedback is created equal.

There are some people doing great things. There are some people that may not be doing such great things. A lot depends on the practitioner, their training and so on. I have been doing it for 30 years and I've stayed on the cutting edge of the newest applications and the newest one is called LORETA Z-score training. LORETA is an acronym for low resolution electromagnetic brain tomography. It's extremely advanced and extremely powerful form of neurofeedback. It's fairly new, but what LORETA has enabled us to do is to pinpoint deep levels of the brain three dimensionally and to train those levels of the brain fairly quickly, much more rapidly than we could do with the older types of neurofeedback.

There is something also called NeuroField, which was invented by a friend of mine, Dr. Nick Dogris out in Bishop, California. This is a type of pulsed electromagnetic frequency that we will use for treatment-resistant patients, for patients with specific or severe problems that may or may not respond to neurofeedback, may need something stronger.

This is not pseudoscience, but very real and powerful applications that are proven. Neurofield is FDA approved for anxiety, depression, and insomnia. NeuroField is different from neurofeedback. With neurofeedback, the client or patient is actually engaged with a training process. They are learning how to change their brain. NeuroField is different. It is actually doing something to the brain, coaxing or gently moving the brain to change. Neurofield can be passive whereas neurofeedback is volitional.

There is also something called sound therapy, which we employ. We use something called integrated listening systems, which we've found to be the most effective. It's basically a great grandchild of the Tomatis method. Other types of biofeedback are heart rate variability, and peripheral skin temperature. Those are also included in this holistic approach. ■

Developing and sustaining a spiritual practice

All about the four aims of life.

UNTIL WE HAVE HAD OUR OWN personal experience of enlightenment, we can base our faith on the words and teachings of enlightened sages and saints. They tell us that we are a manifestation of that which is known as the ultimate reality or God. You and I are individualized units of this whole consciousness. We have our personality, ego, our identity, our bodies, but that's just a covering because beneath that is our real identity: pure divinity—God as yourself, God as myself, God as the self of every being. It is recommended as a constant practice for us to bring ourselves back to that awareness as often as we can. Nothing outside of us changes when we awaken, become clear and enlightened. The only thing that changes is our own perception and awareness. We simply behold things as they are without illusion. We grow to experience and understand that we are living in a reality that is quite different than what the normal definition of reality is. Let's look at the four aims of life.

1. LEARN TO LIVE IN ACCORD WITH THE PRINCIPLES (LAWS) OF NATURE (DHARMA)

Discover your role and your purpose in life. Understanding what you are here for. What is your mission? Never forgetting that the number one reason we are here is to awaken to our own divinity, and awaken to the awareness of divinity in everyone and everything we see. We all have some kind of a mission or duty in life to fulfill. It may be raising wonderful children, it may be work-

ing a useful job, it may just be being a good steward of all that we have been given. ... It is less a matter of desperately searching for purpose and more a matter of just examining what our innate skills might be and how we can use them for higher purposes.

Examine your temperament and choose a spiritual path that is in harmony with it. We all have different temperaments, different innate inclinations. In the yogic teachings there are different paths that different temperaments will be more inclined to follow. A person who is more emotional, and more devotional, may follow Bhakti Yoga, the yoga of love and devotion. A person who is more intellectual may follow Jnana yoga, the yoga of discernment and intellect. A person who loves to serve others may be more involved in karma yoga - performing self-less actions without attachment to the results. There is Raja (The Royal Way) yoga as well. There are different paths for different temperaments. The ideal, of course, is to borrow a little from each to be in balance.

Determine your Ayurveda body type and apply the principles according to your type. The recommendations that Ayurveda makes are not so much about giving you bodily health, although we do of course want to be as healthy as possible so that we can function at our peak. The primary purpose for the Ayurvedic body type recommendations is to prepare the physical body for spiritual unfoldment.

Tune your mind and consciousness to the intelligently directed Power that nurtures the universe. There is an intelligence operating

and it directs the universe, nurtures all of the creation. Through our meditation practice we can learn to be conscious of that Power and source of abundance.

2. LEARN TO HAVE YOUR LIFE-ENHANCING DESIRES EASILY FULFILLED

This is our birthright. Maybe your desire is to have total health, complete well-being, harmonious relationships and a meaningful purpose in life. When we define those desires, writing them down can be quite useful. It will help to clarify in your consciousness, and this will attract the resources, people, and events that seem to come out of nowhere. If you can be very clear about your 'appropriate and constructive' desires, the universe will respond accordingly.

3. LEARN TO HAVE ALL OF YOUR REAL NEEDS EFFORTLESSLY SATISFIED

When you are established in the awareness of wholeness you realize that nothing in this universe is disconnected and nothing is coincidental. There is a wholeness, a perfect balance, going on in every atom. When you are established in the awareness of this wholeness of the universe that is in perfect balance, and always seeking that balance, and know that you are an individual aspect of the one consciousness, living in accord with the processes of nature, the impulse of God's grace will spontaneously provide the resources and supportive events and relationships that you need. That's where the effortless part comes in. That is where we just open ourselves to the goodness and the intelligence and supportive events that will naturally unfold as we live in that process. We call that God's grace.

4. AWAKEN TO SELF- AND GOD-REALIZATION

This is also referred to as dharmic living; easy fulfilment of desires, which enhance life; always being in the flow of resources and supportive circumstances will enable you to live efficiently and avoid suffering and misfortune. The karmic law is clearly operational in everyone's life. There is no place that it's not operational. To fulfill your soul destiny, avidly aspire to awaken to complete Self- and God-realization—the primary purpose for you being in this world—and engage in practices, which will enable you to do so as quickly as possible. ■

How to practice superconscious meditation

This cornerstone of our spiritual practice can be applied and embraced by any spiritual path.

FEEL GROUNDED TO THE EARTH. I think it's important when we meditate that we make conscious contact with the earth. We are temporary residents of these physical bodies and of this earth. Our bodies are made of the substance of the earth and stars and are kind of like transmission towers on this planet. We are involved in a vast cosmic cycle of energy that flows through the vast heavens, the stars, the sun, the planets, moons and through our bodies. If you have been sitting cross legged for meditation try just putting your feet flat on the floor and instead of having that earth energy go right up into your spine, allow it to go into the soles of your feet. This way the earth energy is refined as it travels through various meridians before it enters the spinal pathway.

Invoke or acknowledge your relationship as one with the infinite. So start your meditation sessions with some kind of acknowledgement or invocation or awareness of the presence of the Infinite, also acknowledge your teachers or if you have a guru, at the beginning of the meditation.

Direct attention to the spiritual eye. The spiritual eye, also known as the third eye, may correspond to the prefrontal lobes. This is a very important area of the brain because it is the seat of higher order thinking, concentration, focus, the executive functions of the brain. So we want to try to keep our attention there when we meditate. When the eyes are focused on one point and held steady, that steady gazing will contribute to steady concentration. So if you are having trouble concentrating when you are meditating, pay attention to where your eyes are going, and when your eyes actually drop below

the horizon when they go down, you tend towards more subconscious state. If you are falling asleep when you meditate notice where your eyes are going, try to keep the eyes up, as if you are looking up and out through that point with eyelids closed.

Observe the natural flow of breath. Introduce a mantra "mentally listened to" with inhalation and exhalation. The inhalation and exhalation should be approximately the same length. There should be no pauses between inhalation and the exhalation. We don't mentally repeat, or repeat out loud, we 'listen' to it in our mind. The purpose of the mantra is, with focused repetition, to eventually allow the thoughts to settle so that we can experience pure awareness beyond thought. A widely used sanskrit mantra is "so-hum."

For example, mentally listen to "so" as you inhale, "hum" as you exhale. When the mind quiets, disregard the mantra and rest in the calm alert (superconscious) state for as long as you can. It is in that state that the healing occurs and that the transformation process is accelerated. Superconsciousness is tangible. It may take some time, but when you reach it, you will know when you experience it. It is a profound quiet thoughtless state — pure awareness. It is also referred to as the fourth state of consciousness, from which you can witness the other three states.

Before concluding, expand your awareness to embrace infinite space and radiate compassionate good-will to all beings everywhere. | [DOWNLOAD MARTIN WUTTKE'S FREE GUIDED MEDITATION: WWW.WUTTKEINSTITUTE.COM](http://WWW.WUTTKEINSTITUTE.COM) | [WATCH WUTTKE EXPLAIN THE SUPERCONSCIOUS MEDITATION: WWW.THEOPTIMIST.COM/NEUROFEEDBACKSPECIAL](http://WWW.THEOPTIMIST.COM/NEUROFEEDBACKSPECIAL)

Your inner smile

THE INNER SMILE IS A TECHNIQUE WE USE TO find an internal sense of peace. It's a tool that's very simple to practice and learn. The inner smile can be used at any time, particularly when we're feeling stressed, when we are feeling anxiety, when we wake up in the night with worries and concerns, and any situation where our composure is challenged. It's a way of changing your state, of turning your attention inside yourself, accessing this positive energy and beginning to essentially disconnect the source of our feeling good from the outside and make that source of feeling come from the inside.

The inner smile is a remarkable tool that has its roots in Qigong . This is a technique that's perhaps thousands of years old that the Taoist Monks found to be remarkably effective not just for balancing the nervous system but for the entire awakening process. There are three types of smiles.

One is called the cortical smile. The cortical smile is when you meet somebody, say hello and shake their hand. Not that it is a fake smile but it's sort of forced from your cortex. You're not really feeling it deeper in your being.

The second smile is the limbic smile. This smile is the belly laugh that you might have when you witness something funny or hear a good joke.

The third is the whole body smile, which you feel when you really experience something that is uplifting and you feel it all over your body — kind of a warm glow.

The way that you can tell the difference between the three happens to be in the muscles around the eyes, not around the mouth. So when you practice the inner smile, we first imagine we are gathering smiling energy behind our eyes. Let this energy permeate the brain, move it down through the body through the nervous system and then we are going to go through the internal organs, the bones, the cells, of the body and then finally and most importantly smile to the universe and all beings everywhere.

Feel a sense of deep gratitude and appreciation as you do this. | **WATCH WUTTKE TEACH THE INNER SMILE TECHNIQUE:**
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