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Epigenetic Healing

Imagination is everything. It is the key to coming attractions.

—Albert Einstein

One morning a part-time employee walked into my office, at the start of a busy workday. Her name was Anabelle. Tall, slender, well dressed and poised, with commanding blue eyes and a sharp intelligence, Anabelle was a force to be reckoned with. Except for that morning...

The moment I opened the office door, Anabelle appeared to be in such obvious distress that it was clear that she was falling to pieces, emotionally. Instead of going to a desk, I took her elbow and guided her to a chair in the waiting room, where, without much prompting, she poured out her sad story.

Her stepfather, Jack, had abused her, verbally and physically, from the age of around seven. She ran away from home at the age of fifteen and rarely visited her parents after that. The last time Jack had hit her was on one of those visits. At that time, she was twenty-one years old. She never went back to the house; it had now been over fifteen years since the last incident.





CHAPTER ONE

In the previous day's mail, she had received an embossed formal invitation to a family reunion. It had been sent to her by her mother, who was still married to Jack, and who was arranging the get-together. Anabelle knew that Jack would be there.

"How could my mother send me this invitation, knowing I'd have to see him again?" she wailed. That slip of paper summarized the whole nightmare of abuse for Anabelle—plus what she saw as her mother's condoning Jack's behavior.

I asked her if I could perform an energy intervention with her that might make her feel better. She nodded wordlessly. I then asked her to remember the moment she had opened the envelope and read the invitation, and feel where in her body the sensation of distress was most concentrated.

She responded, "My tummy" and pointed at her solar plexus. I then asked her to rate her distress, as she thought again about the scene, on a scale of one to ten, with one being calm and ten being as upset as she could possibly be. "I'm a *ten!*" she said through tight lips, with flushed cheeks, her voice rising emphatically.

I performed a very fast and basic emotional energy release technique, used by thousands of doctors and therapists worldwide, and now visible on the radar of cutting-edge researchers. The entire process took less than two minutes. "Now think back on the moment you opened the envelope," I asked her. "Remember the scene. Feel your tummy. Then tell me how upset you feel, on a scale of one to ten."

"Zero." She shrugged, and looked at me with calm puzzlement. Then she added, "It was just a scrap of paper, after all."

I sat opposite Anabelle, stunned and mute. My logical mind—never usually at a loss for thoughts, judgments, observations, or words—grasped vainly for rational reasons that might explain this astonishing change. Like a fish out of water, my mouth worked and my eyes widened as I shuffled desperately through my mental cue cards for rational explanations. Even after witnessing many of these

interventions, and doing them myself often, my left brain still has trouble grasping the evidence before my eyes.

Turning Gene Research into Therapy

From all around the world, in virtually every field of the healing arts—from psychiatrists to doctors to psychotherapists to sports physiologists to social workers—stories like this are being told, as the world of psychology and medicine begins to awaken to the potential of energy medicine and its effects on the expression of our DNA. They are the first loud reports of a revolution in treatment destined to change our entire civilization, reaching into every corner of medicine and psychology...and beyond them into the structures of society itself. In the space of one generation we have discovered, or rediscovered, techniques that can make us happier, less stressed, and much more physically healthy—safely, quickly, and without side effects. Techniques from energy medicine and Energy Psychology can alleviate chronic diseases, shift autoimmune conditions, and eliminate psychological traumas with an efficiency and speed that conventional treatments can scarcely touch.

The implications of these techniques—for human happiness, for social conflicts, and for political change—promise a radical positive disruption in the human condition, one that goes far beyond health care. They have the promise of affecting society as profoundly as the rediscovery of mathematical and experimental principles during the Renaissance changed the course of European civilization. And they are at the cutting edge of science, as experimental evidence stacks up to provide objective demonstration of their effectiveness.

Along with the practical evidence accumulating from pioneers in this new medicine and new psychology, scientists are discovering the precise pathways by which changes in human consciousness produce changes in human bodies. As we think our thoughts and feel our feelings, our bodies respond with a complex array of shifts. Each thought or feeling unleashes a particular cascade of biochemicals in our organs. Each experience triggers genetic changes in our cells.

The Dance of Genes and Neurons

These new discoveries have revolutionary implications for health and healing. Psychologist Ernest Rossi begins his authoritative text *The Psychobiology of Gene Expression* with a challenge: “Are these to remain abstract facts safely sequestered in academic textbooks, or can we take these facts into the mainstream of human affairs?”¹

The Genie in Your Genes takes up Rossi’s challenge, believing that it is essential that this exciting genetic research progress beyond laboratories and scientific conferences and find practical applications in a world in which many people suffer unnecessarily. Rossi explores “how our subjective states of mind, consciously motivated behavior, and our perception of free will can modulate gene expression to optimize health.”² Nobel prizewinner Eric Kandel, M.D., believes that in future treatments, “Social influences will be biologically incorporated in the altered expressions of specific genes in specific nerve cells of specific areas of the brain.”³ Brain researchers Kemperman and Gage envision a future in which the regeneration of damaged neural networks is a cornerstone of medical treatment, and doctors’ prescriptions include, “modulations of environmental or cognitive stimuli” and “alterations of physical activity.” In other words, when the doctor of the future tears a page off her prescription pad and hands it to a patient, the prescription might well be—instead of, or in addition to, a drug—a particular therapeutic belief or thought, a positive feeling, a gene-enhancing physical exercise, an act of altruism, or an affirmative social activity. Research is revealing that these activities, thoughts, and feelings have profound healing and regenerative effects on our bodies, and we’re now figuring out how to use them therapeutically.

The Dogma of Genetic Determinism

This picture of a genetic makeup that fluctuates by the hour and minute is at odds with the picture engrained in the public mind: that genes determine everything from our physical characteristics to our behavior. Even many scientists still speak from the assumption that our genes form an immutable blueprint that our cells must for

ever follow. In her book *The Private Life of the Brain*, British research scientist and Oxford don Susan Greenfield says, “the reductionist genetic train of thought fuels the currently highly fashionable concept of a gene for this or that.”⁵

Niles Eldredge, in his book *Why We Do It*, says, “genes have been the dominant metaphor underlying explanations of all manner of human behavior, from the most basic and animalistic, like sex, up to and including such esoterica as the practice of religion, the enjoyment of music, and the codification of laws and moral strictures.... The media are besotted with genes...genes have for over half a century easily eclipsed the outside natural world as the primary driving force of evolution in the minds of many evolutionary biologists.”⁶

Medical schools have had the doctrine of genetic determinism embedded in their teaching for decades. The newsletter for the students at the Health Science campus of the University of Southern California proclaims, “Research has shown that 1 in 40 Ashkenazi women has defects in two genes that cause familial breast/ovarian cancer...”⁷ Unexamined beliefs in this or that gene causing this or that condition are part of a the foundation of many scientific disciplines in our society.

Such assumptions can be found in stories like one that aired on National Public Radio on October 28th, 2005. The announcer declared: “Scientists today announced they have found a gene for dyslexia. It’s a gene on chromosome six called DCDC2.” The *New York Times* ran a similar story the following day, under the headline, “Findings Support That [Dyslexia] Disorder Is Genetic.” Other media picked up the story, and the legend of the primacy of DNA was reinforced.

There’s only one problem with the legend: it’s not true.

Actually, there’s a second major problem with the legend: it locates the ultimate power over our health and wellbeing in the untouchable realm of molecular structure, rather than in our own consciousness. In her book *The DNA Mystique*, Dorothy Nelkin states

that, “In a diverse array of popular sources, the gene has become a supergene, an almost supernatural entity that has the power to define identity, determine human affairs, dictate human relationships, and explain social problems. In this construct, human beings in all their complexity are seen as products of a molecular text...the secular equivalent of a soul—the immortal site of the true self and determiner of fate.”⁸

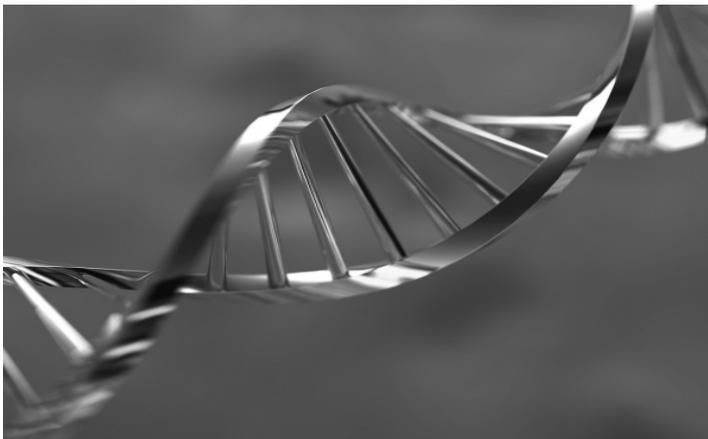
In reality, genes contribute to our characteristics but do not determine them. Blair Justice, Ph.D., in his book *Who Gets Sick*, observes that, “genes account for about 35% of longevity, while lifestyles, diet, and other environmental factors, including support systems, are the major reasons people live longer.”⁹ The percentage by which genetic predisposition affects various conditions varies, but it is rarely 100%. The tools of our consciousness—including our beliefs, prayers, thoughts, intentions, and faith—often correlate much more strongly with our health, longevity, and happiness than our genes do. Larry Dossey, M.D., observes, “Several studies show that what one *thinks* about one’s health is one of the most accurate predictors of longevity ever discovered.”¹⁰ Studies show that a committed spiritual practice and faith can add many years to our lives, regardless of our genetic mix.¹¹

How did the dogma that DNA holds the blueprint for development become so firmly enshrined? In his entertaining book *Born That Way*, medical researcher William Wright gives a detailed history of the rise to supremacy of the idea that genes contain the codes that control life—that we are who we are, and we do what we do, because we were simply “born that way.”¹² We often hear phrases like “She’s a natural born athlete,” or “He’s a born loser,” or “She has good genes,” to explain some aspect of a person’s behavior. The idea of genetic disposition has moved far beyond the laboratory to become deeply entrenched in our popular culture.

Lee Dugatkin, professor of biology at the University of Louisville, points out that after the basic rules governing the inheritance of characteristics across generations were made by Mendel, and the structure

of the DNA molecule was discovered, scientists became convinced that the gene was the “means by which traits could be transmitted across generations. We see this trend continuing today in research labs throughout the world as well as in the media in reports of genes for schizophrenia, genes for homosexuality, genes for alcoholism, and so on. Genes for this, genes for that.”¹³ Researcher Carl Ratner, Ph.D., of Humboldt State University draws the following analogy: “Genes may directly determine simple physical characteristics such as eye color. However, they do not directly determine psychological phenomena. In the latter case, genes produce a potentiating substratum rather than particular phenomena. The substratum is like a Petri dish which forms a conducive environment in which bacteria can grow, however, it does not produce bacteria.”¹⁴

Yet, since the 1970s, researchers have been turning up findings that are at odds with the prevailing mindset. They have accumulated an increasing number of findings that behaviors aren’t just transmitted genetically across generations; they may be newly developed by many individuals during a single generation. While the process of genetic evolution can take thousands of years, as genes throw off mutations that are sometimes successful, and often not, evolution through experience and imitation can occur within minutes—and *then* be passed on to the next generation.



The DNA spiral has become a defining icon of our civilization

Edward O. Wilson, the father of sociobiology, hinted at the very end of the twenty-fifth anniversary edition of his tremendously influential book, *Sociobiology*, that, in future research, “Learning and creativeness will be defined as the alteration of specific portions of the cognitive machinery regulated by input from the emotive centers. Having cannibalized psychology, the new neurobiology will yield an enduring set of first principles for sociology... We are compelled to drive toward total knowledge, right down to the levels of the neuron and gene.”¹⁵ The notion that the genes in the neurons of our brain can be activated by input from our emotive centers is a big new idea, and indicates a degree of interconnection and feedback at odds with the straight-line, cause-and-effect model of genetic causation.

As well as beings of matter, we are beings of energy. Electromagnetism pervades biology, and there is an electromagnetic component to every biological process. While biology has been largely content with chemical explanations of how and why cells work, there are many tantalizing preliminary research findings that show that electromagnetic shifts accompany virtually every biological process. The energy flows in neurons and genes interact with their every process. “There is matter and energy galore flowing through biological systems,” says Eldredge. “But it is in the bodies of organisms and their interactions with other organisms and the physical world, in the context of ecosystems, where all that matter and energy flows. Genes, in contrast, are about storage and utilization of information.” Researching genes without looking at the energy component of DNA is like studying a computer hard drive without plugging in the power cable. Hard drives are composed of thousands of sectors, substructures that store information.¹⁶ You can develop impressive theories about why the storage device is constructed the way it is, and the interesting way in which the sectors are arranged, but until you plug the hard drive in and watch it functioning in the context of the energy flow that animates it, you have a very incomplete picture of the way it works.

Death of a Dogma

The idea that genes are the repositories of our characteristics is also known as the Central Dogma. The Central Dogma was propounded by one of the discoverers of the helicular structure of DNA, Sir Francis Crick. He first used the term in a 1953 speech, and restated it in a paper in the journal *Nature*, entitled, Central Dogma of Molecular Biology.¹⁷ Yet for some thirty years, scientists have been turning up anomalous data that is not compatible with the Central Dogma. The outcomes of these experiments require much more complex interactions than genetic determinism can explain.¹⁸

One of many problems with the dogma, for instance, is that the number of genes in the human chromosome is insufficient to carry all the information required to create and run a human body. It isn't even a big enough number to code for the structure (let alone function) of one complex organ like the brain. It also is too small a number to account for the huge quantity of neural connections in our bodies.¹⁹ Two eminent professors express it this way: "Remembering that the information in the human genome has to cover the development of all other bodily structures as well as the brain, this is not a fraction of the information required to structure in detail any significant brain modules, let alone for the structuring of the brain as a whole."²⁰

The Human Genome Project initially was focused on cataloging all the genes of the human body. At the beginning of the 1990s, the original researchers expected to find at least 120,000 genes, because that's the minimum they projected it would take to code all the characteristics of an organism as complex as a human being. Our bodies manufacture about 100,000 proteins, the building blocks of cells. All of those 100,000 building blocks must be assembled with precise coordination in order to support life. The working hypothesis at the start of the Human Genome Project was that there would be a gene that provided the blueprint to manufacture each of those 100,000 proteins, plus another 20,000 or so *regulatory genes* whose function was to *orchestrate* the complex dance of protein assembly.

The further the project progressed, the smaller the estimates of the number of genes became. When the project finished its catalog, they had mapped the human genome as consisting of just 23,688 genes. The huge symphony orchestra of genes they had expected to find had shrunk to the size of a string quartet. The questions that this small number of genes gives rise to are these: If all the information required to construct and maintain a human being—or even one big instrument, such as the brain—is not contained in the genes, where does it come from? And who is conducting the whole complex dance of assembly of multiple organ systems? The focus of research has thus shifted from cataloging the genes themselves to figuring out how they work in the context of an organism that is in “a state of *systemic cooperation* [where] every part knows what every other part is doing; every atom, molecule, cell, and tissue is able to participate in an intended action.”²¹

The lack of enough information in the genes to construct and manage a body is just one of the weaknesses of the Central Dogma. Another is that genes can be activated and deactivated by the environment inside the body and outside of it. Scientists are learning more about the process that turns genes on and off, and what factors influence their activation. We may have lots of information on our hard drives, but at a given time we will be utilizing only part of it. And we may be changing the data as well, like revising a letter before we send it to a friend. One of the factors that affect which genes are active is our experience, a fact completely incompatible with the doctrine of genetic determinism.

Yet our experiences themselves are just part of the picture. We take facts and experiences and then assign meaning to them. What meaning we assign, mentally, emotionally, and spiritually, is often as important to genetic activation as the facts themselves. We are discovering that our genes dance with our awareness. Thoughts and feelings turn sets of genes on and off in complex relationships. Science is discovering that while we may have a fixed set of genes in

our chromosomes, which of those genes is active has a great deal to do with our subjective experiences, and how we process them.

Our emotions and behavior shape our brains as they stimulate the formation of neural pathways that either reinforce old patterns or initiate new ones. Like widening a road as traffic increases, when we think an increased flow of a thoughts on a topic, or practice an increased quantity of an action, the number of neurons our bodies requires to route the information increases. In just the way our muscles bulk up with increased exercise, the size of our neural bundles increases when those pathways are increasingly used. So the thoughts we think, the *quality of our consciousness*, increases the flow of information along our neural pathways. According to Ernest Rossi, “we could say that *meaning* is continually modulated by the complex, dynamic field of messenger molecules that continually replay, reframe, and resynthesize neuronal networks in ever-changing patterns.”²² In the succinct words of another medical pioneer, “Beliefs become biology”—in our hormonal, neural, genetic, and electromagnetic systems, plus all the complex interactions between them.²³

The Inner and Outer Environment

Memory, learning, stress, and healing are all affected by classes of genes that are turned on or off in temporal cycles that range from one second to many hours. The *environment* that activates genes includes both *the inner environment*—the emotional, biochemical, mental, energetic, and spiritual landscape of the individual—and *the outer environment*. The outer environment includes the social network and ecological systems in which the individual lives. Food, toxins, social rituals, and sexual cues are examples of outer environmental influences that affect gene expression. Researchers estimate that “approximately 90% of all genes are engaged...in cooperation with signals from the environment.”²⁴

Our genes are being affected every day by the environment of our thoughts and feelings, as surely as they are being affected by the environment of our families, homes, parks, markets, churches,

and offices. Your system may be flooded with adrenaline because a mugger is running toward you with a knife. It may also be flooded with adrenaline because of a stressful change at work. And it may be flooded with adrenaline in the absence of any concrete stimulus other than the thoughts you're having about the week ahead—a week that hasn't happened yet, and may never happen. Let's take a look at the evolutionary purpose of these physiological events, and whether they're *adaptive* (helpful to your body) or *maladaptive* (harmful to your body).

Scenario One: Ten thousand years ago, when a mugger (or a member of a hostile tribe) ran at you with a sharp blade, you quickly took action. Your blood flowed away from your digestive tract toward your muscles. Your brain became hyperactive and your reproductive drive shut down. Thousands of biochemical changes took place in all the cells of your body within a couple of seconds, enabling you to run away from the attacker, or defend yourself.

You were already one of a select group of humans who had survived the dangers of a hostile world long enough to breed. Over tens of thousands of years, those with quick responses had survived long enough to produce offspring, and those with slow responses died before they could breed. So by the time a hostile tribesman ran at you with a blade, those thousands of years of evolutionary weeding had already produced a human admirably suited to fight or flee. The changes that occurred in your body in response to a threat were *adaptive*; they were *useful* adaptations for survival.

Scenario Two: Fast-forward ten thousand years. You're in a meeting that includes all the employees of your company. The firm has just been bought by a competitor. You know that the new owner is going to consolidate the work force. They aren't going to need everybody.

The manager of your division announces that after the meeting, when you return to your desk, you'll find either a pink slip, indicating that you're terminated, or nothing at all, meaning that you've survived

the purge. Those who find pink slips are instructed to immediately clear out their desks and report to personnel for a severance check.

Suddenly, there are two tribes in the room: those that will survive, and those that will not. Worse, nobody but the manger knows who's in what tribe. The stress level in the room is unbearable. Who is your enemy? Who is your ally? You have no idea. You walk back to your desk, dreading what you will see, and dreading the lineup of fired and retained employees you will witness in the next hour.

Your desk has no pink slip. Neither does that of Harry, who works across from you. Suddenly you realize that the downsizing means you'll be thrown cheek to jowl with Harry, who though another survivor, is an incompetent liar. You look across to Helen's desk, and you see a pink slip. Helen is the most talented person in the building, someone on whom you've secretly depended for your success. Because her verbal skills are poor, the management failed to realize that she's indispensable. You realize your job has just become a lot worse, yet you will cling to it like a *Titanic* survivor gripping the last life jacket.

You've been working sixty-hour weeks for the last six months, suspecting that this Damocles' sword will eventually fall. Your body has been ready for fight or flight for all that time, not knowing what your fate will be. The employment market is tight; you know that many of the employees fired today will have to take Draconian pay cuts in menial new jobs.

Even before the current crisis, your body was in fight-or-flight mode as you climbed the corporate ladder. Today, it's on high alert. Your mouth is dry. You're so tense you could put your fist through the wall. You can't wait to get out of the office and have a few beers to unwind. Yet you know that tomorrow you'll be back at your desk—and now you'll have a huge new portion of the work that management has reassigned from the fired employees.

Scenario Three: It's Sunday evening. You've had a good weekend. You unwound by griping to your spouse on Friday night—then by

playing baseball with your kids in the park on Saturday morning. You went to a movie with another couple on Saturday night, a comedy, and enjoyed a lot of laughs. You had sex with your partner after you got home. Church was good on Sunday morning, and you saw all your old friends there and had a chance to socialize.

You're sitting on the porch with a beer, and you suddenly realize you're going to have to go back into that hellhole of a job in just a few hours. Your stomach knots. Your jaw clenches. You crush the beer can. You start thinking of the injustices of the previous week, wondering how you escaped the axe. Didn't management see the glaring errors in your performance? You grind your teeth as you think of the injustice of them firing Helen, after she's kept the whole division going—in her quiet way—for years. What ingratitude! What blindness! What ineptitude! How did those morons get to be managers in the first place?

Can you escape? No chance, the money's good, the pension plan's good, and no other job has comparable medical benefits—vision and dental too, plus it covers the kids, for God's sake! Do you want to be pounding the pavement looking for a job like Helen will be doing tomorrow? God forbid!

Your Body Reads Your Mind

Scenario Two and Three are—in terms of what you're doing to your body—*maladaptive* responses. “Maladaptive” means that they aren't helping you; they're responses to stress that are hurtful to you. All the stress hormones are flowing, just as they were in Scenario One, but they're doing your body no practical good. No promotion will come as a result of you overloading your system with cortisol, one of the primary stress hormones. You won't feel better after being high on adrenaline and norepinephrine, two others.

What *will* happen, though, is that the circulation of these stress hormones through your system on a regular basis will compromise your immune system, weaken your organs, age you prematurely, and contribute to activating genes that worked perfectly well for the

caveman in Scenario One, but are counterproductive to the modern person in Scenarios Two and Three. Herbert Benson, M.D., president of Harvard Medical School's Mind-Body Medical Institute, says, "The stressful thoughts that lead to the secretion of stress-related norepinephrine impede our evolutionary-derived natural healing capacities. These thoughts are often only in our minds, not a reality."²⁵ According to another report, "Bruce McEwen, Ph.D., director of the neuroendocrinology lab at Rockefeller University in New York, says cortisol wears down the brain, leading to cell atrophy and memory loss. It also raises blood pressure and blood sugar, hardening arteries and leading to heart disease."²⁶

So while the fight-or-flight response may have been adaptive ten thousand years ago, with Mother Nature cheering you on, today it's often maladaptive, and Mother Nature is saying, "Stop! You're ruining your body!" The trouble is that major evolutionary changes take a long time—sometimes thousands of years—and modern humans are having difficulty making adaptations in the short space of a single lifetime. We try and change our stress-addicted patterns in various ways. But the counteracting experiences we attempt—attending a four-evening stress clinic at the local hospital, a self-improvement workshop at a personal growth center, a weekend retreat at a church camp, or sitting in a Zen monastery for a few days—are like a tissue in a hurricane when compared to the evolutionary forces hardwired into our physiology.

Biochemically speaking, your body *cannot tell the difference* between the injection of chemicals that is triggered by an *objective* threat—the tribesman running at you with a spear—and a *subjective* threat—your resentment toward management. The biochemical and genetic effects, as far as your body is concerned, are the same. Your body can't tell that one experience is a physical reality, and the other is a replay of an abstract mental idea. *Both* are creating a chemical environment around your cells that is full of signals to your genes, several classes of which activate the proteins associated with healing.

A researcher observes: “Our body doesn’t make a moral judgment about our feelings; it just responds accordingly.”²⁷

The understanding that much of our genetic activity is affected by factors outside the cell is a radical reversal of the dogma of genetic determinism, which held for half a century that who we are and what we do is governed by our genes. Research is showing a much more interconnected reality in which our *consciousness* plays a primary role.

Recent studies performed by Ronald Glaser, of the Ohio State University College of Medicine, and psychologist Janice Kiecolt-Glaser investigated the effect that stress associated with marital strife has on the healing of wounds, a significant marker of genetic activation. The researchers created small suction blisters on the skin of married test subjects, after which each couple was instructed to have a neutral discussion for half an hour. For the next three weeks, the researchers then monitored the production of three of the proteins that our bodies produce in association with wound healing. They then instructed the same couples to discuss a topic on which they disagreed. Research staff was present during both the neutral discussion and the disagreement.

The researchers found that the expression of these healing-linked proteins was depressed in those couple who had a fight. Even those couples who had a simple discussion of a disagreement, rather than a full-fledged verbal battle, showed slower healing of their wounds. But in couples who had severe disagreements, laced with put-downs, sarcasm, and criticism, wound healing was slowed by some 40%. They also produced smaller quantities of the three proteins. “‘These are minor wounds and brief, restrained encounters. Real-life marital conflict probably has a worse impact,’ Kiecolt-Glaser adds. ‘Such stress before surgery matters greatly,’ she says, and the effect could apply to healing from any injury. In earlier studies done by Kiecolt-Glaser, hostile couples were most likely to show signs of poorer immune function after their discussions in the lab. Over the next few months, they also developed more respiratory

infections than supportive spouses.”²⁸ Rossi says, “throughout the body’s entire somatic network, emotions are triggering hormonal and genetic responses.”²⁹ The genetic effects from such environmental experiences can, in some cases, make the difference between life and death. Pharmacologist Connie Gauds, R.Ph., in her book *The Energy Prescription*, says that, “An undisciplined mind leaks vital energy in a continuous stream of thoughts, worries, and skewed perceptions, many of which trigger disturbing emotions and degenerative chemical processes in the body.”³⁰

Over two thousand years ago, the Buddha declared: “We are formed and molded by our thoughts. Those whose minds are shaped by selfless thoughts give joy when they speak or act. Joy follows them like a shadow that never leaves them.” Today’s research is reinforcing what wise students of the human condition have known for millennia. Neuroscientist Candace Pert, Ph.D., tells us that, “the molecules of our emotions share intimate connections with, and are indeed inseparable from, our physiology... Consciously, or more frequently, unconsciously, we choose how we feel at every single moment.” Practices for health and wellbeing that were once the exclusive prescriptions of sages and priests are now being reinforced by geneticists and neurobiologists.

In the tales of the Arabian Nights, when Aladdin rubbed the magic lamp, the genie appeared and granted him three wishes. In the story, once he makes his wishes, the magic vanishes. He had to think long and hard on which three things he chose to wish for.

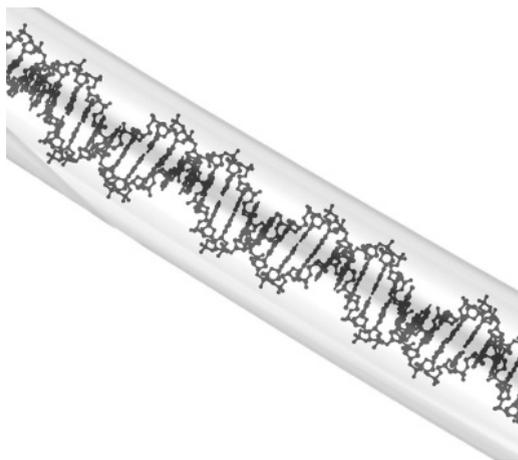
In the real world, given the lamp of our understanding and the genie in our genes, we have an unlimited supply of wishes. Whatever wishes we put into the lamp manifest genetically. If we fill our lamps with healing words, our genes rush to fulfill our wishes—within seconds. If, like the couples in the wound study above, we fill our lamps with poison, we damage the ability of our inbred genetic servants to heal us. While the mechanisms by which such differences occurred may have seemed like magic when viewed through the lens of allopathic medicine—the conventional system of treating symptoms

with agents that produce an opposing effect—the results are not. In the coming pages, we will look, in detail, at the precise genetic and electromagnetic mechanisms that make such healing magic not only possible, but scientifically predictable.

Steps in Genetic Expression

The process by which a gene produces a result in the body is well mapped. Signals pass through the membrane of each cell and travel to the cell's nucleus. There, they enter the chromosome and activate a particular strand of DNA.

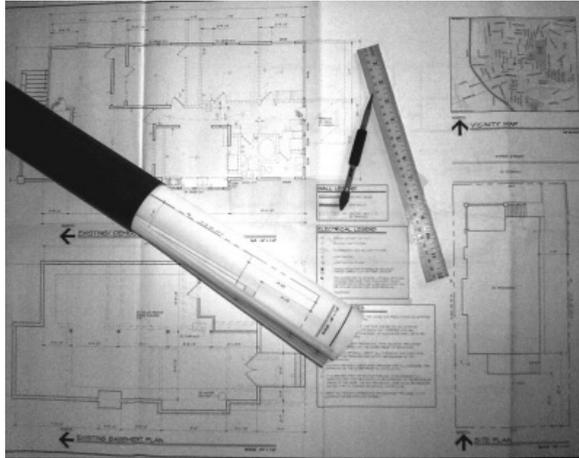
Around each strand of DNA is a protein “sleeve.” This sleeve serves as a barrier between the information contained in the DNA strand and the rest of the intracellular environment. In order for the blueprint in the DNA to be “read,” the sleeve must be unwrapped. Unless it is unwrapped, the DNA strand cannot be “read,” or the information it contains acted upon. Until the information is unwrapped, the blueprint in the DNA lies dormant. That blueprint is required by the cell to construct other proteins that regulate virtually every aspect of life.



DNA blueprint in protein sheath

When a signal arrives, the protein sleeve around the DNA unwraps and, with the assistance of RNA, the DNA molecule then replicates an intermediate template molecule. The blueprint that has

up to this point been concealed within the sleeve can now be acted upon. This is what scientists mean when they say that a *gene expresses*. The genetic information contained in the chromosome has gone from being a dormant blueprint into *active expression*, where it *creates other actions* within the cell by constructing, assembling, or altering products. The DNA blueprint that has up to this point been inert, concealed within the sleeve, is now revealed, providing the basis for cellular construction. Just as an architect's blueprint contains the information to build a building, the chromosomes contain the blueprints to construct aggregations of molecules. Until the architect's blueprint has been removed from its sheath, unrolled, laid flat on the builder's table, and used to guide construction, it is simply dormant potential. In the same way, the blueprints in our genes are dormant potential until the genes express and are used to guide the construction of the proteins that carry out the constructive tasks of life.

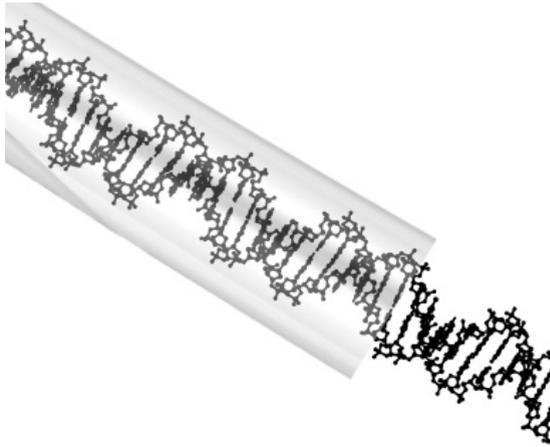


Architectural blueprint and cardboard tube

Proteins are the building blocks used by our bodies for every function they perform. Proteins control the responses of our immune systems, form the scaffolding that supports the structure of each cell, provide the enzymes that catalyze chemical reactions, and convey information between cells—among many other functions. If DNA is the blueprint, then RNA comprises the working drawings required for construction and proteins are the materials used in construction.

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They are assembled into a coherent structure by the instructions in our DNA. That structure is not only our *anatomy*—the physical form of our bodies; it is also our *physiology*—the complex dance of cellular interactions that differentiate a live human being from a dead one. A corpse has anatomy, but no physiology. Proteins are used in every step of our physiology; the word “protein” itself is derived from the Greek word *protas*, meaning “of primary importance.”



Protein sheath opens to permit gene expression

This whole chain of events starts with a *signal*. The signal is delivered through the cell membrane to the protein sleeve, which then unwraps in order to let the information in the gene move from potential (like an unbuilt building) to expression (like a finished skyscraper). And while scientists have mapped each part of the process of gene expression and protein assembly, comparatively little attention has been paid to the signals, the source of initiation for the whole process. Ignorance of the signal required to take the blueprint out of the tube is what has allowed several generations of biologists to assume that all you needed to start construction was the blueprint, giving rise to genetic determinism.

Signals From Outside the Cell

Stem cells are undifferentiated cells, “blanks” that the body can make into muscle, bone, skin, or any other type of cell. Like a piece of putty, they can be formed into whatever kind of cell the body needs. When you cut your hand and your body needs to repair the break in the skin, the trauma sends a signal to the genes associated with wound healing. These genes express, stimulating stem cells to turn themselves into healthy, fully functional skin cells. The signal results in the putty being formed into a useful shape. Such processes are occurring all over our bodies, all the time: “Healing via gene expression is documented in stem cells in the brain (including the cerebral cortex, hippocampus, and hypothalamus, muscle, skin, intestinal epithelium, bone marrow, liver, and heart.”³¹

When there is interference with this signal, which in the wound healing studies comes from the emotional states of angry subjects, the stem cells don’t get the message clearly. Not enough putty is turned into useful shapes, or the process of molding the putty takes a long time, because the body’s energy is instead being gobbled up dealing with the angry emotion. Wound healing is compromised.

Notice that these *signals do not come from the DNA*; they come from *outside* the cell. The signals tell the proteins surrounding the DNA strands to unwrap and allow healing to begin. In the journal *Science*, researcher Elizabeth Pennisi writes, “Gene expression is not determined solely by the DNA code itself but by an assortment of proteins and, sometimes, RNAs that tell the genes when and where to turn on or off. Such *epigenetic* phenomena orchestrate the many changes through which a single fertilized egg cell turns into a complex organism. And throughout life, they enable cells to respond to environmental signals conveyed by hormones, growth factors, and other regulatory molecules without having to alter the DNA itself.”³²

The word that Dr. Pennisi uses here, *epigenetics*, is new to our lexicon. The spellchecker I am using in a 2004 version of Microsoft Word does not recognize it. The issue of the prestigious journal

Science from which her quote is taken was a special issue in 2001 devoted to the new science of epigenetics. Epigenetics, referred to by *Science* as, “the study of heritable changes in gene function that occur without a change in the DNA sequence”³³ examines the sources that *control gene expression from outside the cell*. It’s a study of the signals that turn genes on and off. Some of those signals are chemical, others are electromagnetic. Some come from the environment inside the body, while others are our body’s response to signals from the environment that surrounds our body.

While studying the static structure of the hard drive gives us lots of useful information, the signals that activate different sectors of the hard drive provide the source of the activation of that information. Epigenetics looks at the sources that activate gene expression or suppression, and at the energy flows that modulate the process. It traces the signals from outside the cell that tell the genes what to do and when to do it, and looks for the forces from outside the cell that orchestrate the whole. Epigenetics studies the environment, such as the signals that initiate stem cell differentiation and wound healing.

The activation of genes is intimately connected with healing and immune system function. In the studies of wound healing and marital conflict outlined above, a clear link is seen between the consciousness of the participants in the study, and the creation of the proteins (coded by gene activation) required to promote wound healing and stem cell conversion in their bodies. The healthy mental states of functional couples enabled the individuals in these relationships to emit the signals required to turn on the expression of the genes involved in immune system health and physical wound healing. Such epigenetic signals suggest a whole new avenue for catalyzing wellness in our bodies.

Magic Precedes Science

When a revolutionary new technique or therapy is described, it can take a while for science to catch up. Funding must be obtained to conduct studies. Studies must be performed, reviewed by

committees of the researchers' peers, critiqued, refined, and replicated. This process takes years, and often decades. Much of the medical progress in the last fifty years has resulted from studies that build upon studies, from step-by-step incremental experimentation, with each step extending the reach of our knowledge a little bit further.

This evolutionary progress over the lifetimes of the last few generations has encouraged us to think that this is the way that science progresses. Yes, it is a way—but it is *not the only way*. There are scores of important medical procedures that were discovered years, or decades, or even centuries, before the experimental confirmation arrived to demonstrate the principles behind the treatment. Larry Dossey, in his book *Healing Beyond the Body*, urges us to “Consider many therapies that are now commonplace, such as the use of aspirin, quinine, colchicine, and penicillin. For a long time we knew that they worked before we knew how.... This should alarm no one who has even a meager understanding of how medicine has progressed through the ages.”³⁴ “The scientist knows that in the history of ideas,” observes Michael Gaugelin in *The Cosmic Clocks*, “magic always precedes science, that the intuition of phenomena anticipates their objective knowledge.”³⁵

The incremental approach to experimentation, with each study advancing the frontier of knowledge a little further, has served medicine well in areas such as surgery. But the incremental approach has broken down when it comes to many of the pressing afflictions rampant in our society, such as depression, Chronic Fatigue Syndrome, and autoimmune diseases. It has also made barely a dent in one of the three largest killers in Western societies: cancer. Cancer rates, when adjusted for age, have barely budged in fifty years.³⁶ Surgical procedures to excise cancer tumors have improved, individual drugs have been refined, and drug cocktails have been created, but these are minor variations on themes whose usefulness has been endlessly explored. Ralph Snyderman, eminent physician and researcher at Duke University, sums it up with these words: “Most of our nation’s investment in health is wasted on an irrational, uncoordinated, and

inefficient system that spends more than two-thirds of each dollar treating largely irreversible chronic diseases.³⁷

Total health spending in the U.S. is over two trillion dollars a year; the amount spent on *all* alternative therapies is estimated at just *two tenths of one percent* of that figure.³⁸ For every naturopath or licensed acupuncturist in the U.S., there are seventy allopathic physicians,³⁹ even though such treatments can work where mainstream medicine fails,⁴⁰ are believed effective by over 74% of the population,⁴¹ and can certainly be successful in supplementing conventional therapies.⁴² It also often works better than mainstream medicine for many of the predominant disease of post-industrial cultures, such as autoimmune conditions and cancer.⁴³ Epigenetics gives us tools to understand why our health can be affected by so many different healing modalities.

Epigenetic Medicine

We are comfortable with incremental exploration. Yet many changes are not incremental, but very sudden. The expansion of a balloon as air is injected is smooth and incremental. A balloon popping is sudden and discontinuous. Water heated in a kettle shows little change. Then, suddenly and discontinuously, it bursts into a boil. This is the kind of breakthrough of which we find ourselves on the verge. Like the first bubbles appearing in the bottom of a pan, the possibilities of epigenetic medicine, combining integrative medicine with the breakthroughs of the new psychology, are popping through the most fundamental assumptions of our current model.

We are starting, as a society, to notice the provocative research showing the effects our thoughts and emotions have on our genes. “Science goes where you imagine it,”⁴⁴ says one researcher, and leading-edge therapies are now imagining science going in the direction of some of the powerful, safe, and effective new therapies that are emerging. Hundreds of thousands of people are dying each year, and millions more are suffering, from conditions that might be alleviated by epigenetic medicine. This book is an attempt to present this new



EPIGENETIC HEALING

research in a user-friendly manner that allows its power to connect with everyday experience, and to explore the potential it holds for creating massive health and social changes in our civilization in a very short time.







2

You: The Ultimate Epigenetic Engineer

We are in a school for gods, where—in slow motion—we learn the consequences of thought.

—Brugh Joy, M.D.

“Josephine Tesauro never thought she would live so long. At 92, she is straight backed, firm jawed and vibrantly healthy, living alone in an immaculate brick ranch house high on a hill near McKeesport, a Pittsburgh suburb. She works part time in a hospital gift shop and drives her 1995 white Oldsmobile Cutlass Ciera to meetings of her four bridge groups, to church and to the grocery store. She has outlived her husband, who died nine years ago, when he was 84. She has outlived her friends, and she has outlived three of her six brothers.

“Mrs. Tesauro does, however, have a living sister, an identical twin. But she and her twin are not so identical anymore. Her sister is incontinent, she has had a hip replacement, and she has a degenerative disorder that destroyed most of her vision. She also has dementia. ‘She just does not comprehend,’ Mrs. Tesauro says.

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“Even researchers who study aging are fascinated by such stories. How could it be that two people with the same genes, growing up in the same family, living all their lives in the same place, could age so differently?”

“The scientific view of what determines a life span or how a person ages has swung back and forth. First, a couple of decades ago, the emphasis was on environment, eating right, exercising, getting good medical care. Then the view switched to genes, the idea that you either inherit the right combination of genes that will let you eat fatty steaks and smoke cigars and live to be 100 or you do not. And the notion has stuck, so that these days, many people point to an ancestor or two who lived a long life and assume they have a genetic gift for longevity.



Josephine Tesauro and her sister

“But recent studies find that genes may not be so important in determining how long someone will live and whether a person will get some diseases—except, perhaps, in some exceptionally long-lived families. That means it is generally impossible to predict how long a person will live based on how long the person’s relatives lived.

“Life spans, says James W. Vaupel, who directs the Laboratory of Survival and Longevity at the Max Planck Institute for Demographic Research in Rostock, Germany, are nothing like a trait like height, which is strongly inherited. ...‘That’s what the evidence shows. Even

twins, identical twins, die at different times.’ On average, he said, more than 10 years apart.”

This report and photos, drawn from the *New York Times* in late 2006, illustrates the dramatic difference that epigenetic factors make in health and aging. Dr. Michael Rabinoff, a psychiatrist at Kaiser Permanente hospital, says that “It is known that identical twins, despite sharing the same genes, may not manifest the same psychiatric or other illness in the same way or not at all, despite the condition being thought to be highly genetic.”¹ Same genes, different outcomes. Gary Marcus, Ph.D., associate professor of psychology at New York University, says it’s more accurate to think of genes as “providers of opportunity” or “sources of options” than as “purveyors of commands.”²

Think about your own life. What makes the difference between you living like Josephine Tesauro—or like her sister? Clearly, the big health differences between them can’t be the result of genes, because they both started life with the same genes. It’s what they did with them that counts. The epigenetic signals that make one person vibrant and the other decrepit come from outside the gene, outside the cell, and sometimes outside the body.

Cataloging the entire list of genes in the human genome is an impressive accomplishment. It’s like piecing together a jigsaw puzzle of a photograph of all the members of a giant orchestra, sitting on stage, holding their instruments, ready to play. It’s a static diagram of where everyone sits and what instrument they’re clutching. But it tells you nothing about the choices the conductor makes for the program, about the rhythm or tone of the music, about the experience of sitting in the concert hall while a piece is being played. It tells you nothing about the swirling maelstrom of notes, what they each sound like, and how they mingle to form music. It tells you nothing about their effect on the audience. In the words of the late physicist Richard Carlson, “all the genome provides is the parts list. ...How things interact is what’s more important in biology than just the things that are there. The genome tells us very little, if anything

at all, about how things interact.”³ For biologists, understanding the mechanics of enormously complex self-organizing systems like the human body is a challenge of much greater magnitude than mapping the genome itself. And tracing the epigenetic influences that govern the music of the body’s function is a challenge of even greater magnitude, though we see evidence of such epigenetic control every day.

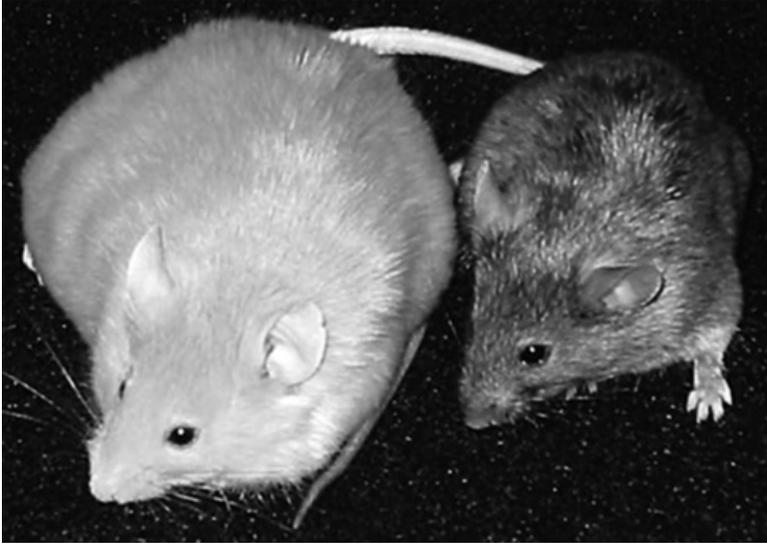
To get the right answer, you have to ask the right question. Only since the concept of epigenetic control has emerged in the last decade have scientists begun to design experiments that ask these questions. As they are published, they are starting to illuminate the precise pathways by which our body takes a signal from the external environment and turns it into a set of chemical or electromagnetic instructions for our genes. One such study has gained wide attention, because it shows some of the steps required for one such interaction.

DNA is Not Destiny

One of the first animal studies that demonstrated that an epigenetic signal can affect gene expression was done with mice. While mice and humans are very different in size, they are very similar genetically, so mice are often used as subjects in laboratory experiments. In the early 1990s, researchers discovered that a gene that had long been known to affect the fur color of mice, called the Agouti gene, was related to a human gene that is expressed in cases of obesity and Type II diabetes. As well as having yellow coats, Agouti mice ate ravenously, were subject to increased incidence of cancer and diabetes,⁴ and tended to die early. When they produce offspring, the baby mice are just as prone to these conditions as their progenitors.

Randy Jirtle, Ph.D., a professor of radiation oncology at Duke University, discovered, however, that he could make Agouti mice produce normal, slender, healthy young. He also discovered that he could accomplish this by changing the expression of their genes—but *without making any changes to the mouse’s DNA*. This neat trick was accomplished, just before conception, by feeding Agouti mothers a diet rich in a chemical known as “methyl groups.” These

molecule clusters are able to inhibit the expression of genes, and sure enough, the methyl groups eventually worked their way through the mothers' metabolisms to attach to the Agouti genes of the developing embryos.



Agouti mice (gene suppression on right)

In an interview with *Discover* magazine, Jirtle said, “It was a little eerie and a little scary to see how something as subtle as a nutritional change in the pregnant mother rat could have such a dramatic impact on the gene expression of the baby. The results showed how important epigenetic changes could be.”⁵ The article was entitled “DNA is Not Destiny: the new science of epigenetics rewrites the rules of disease, heredity, and identity.” Such reports are starting to crop up in news reports with increasing frequency, as the importance of epigenetic influences becomes clearer. “The tip of the iceberg is genomics... The bottom of the iceberg is epigenetics,” says Jirtle—and the larger scientific community is beginning to agree with him. In fact, in 2003, a Human Epigenome project was launched by a group of European scientists, and a U.S. project was proposed in December of 2005.⁶

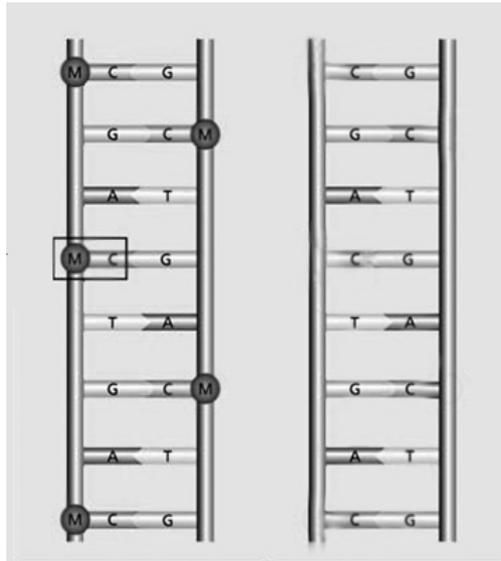
Nurturing Epigenetic Change

The pathway by which epigenetic signals affect the expression of genes has many steps. Diet is the one demonstrated by the Jirtle study. A second clue comes from a series of experiments that show that *being nurtured* generates chemical changes in the brain that trigger certain genes. Dr. Moshe Szyf is a researcher at McGill University in Montreal, Canada, who studies the interactions between mother rats and their offspring. Members of his research team noticed that some rat mothers spent a lot of time licking and grooming their pups, while other mothers did not. The pups that had been groomed as infants showed marked behavioral changes as adults. They were “less fearful and better-adjusted than the offspring of neglectful mothers.”⁷⁷ They then acted in similar nurturing ways toward their own offspring, producing the same epigenetic behavioral results in the next generation. This by itself is an important finding (confirmed by many other experiments) because it shows that epigenetic changes, once started in one generation, can be passed to the following generations without changes in the genes themselves.

When researchers examined the brains of these rats, they found differences, especially in a region of the brain called the hippocampus, which is involved in our response to stress. A gene that dampens our response to stress had a greater degree of expression in the well-adjusted rats.

The brains of these rats also showed higher levels of a chemical (acetyl groups) that facilitates gene expression by binding to the protein sheath around the gene, making it easier for the gene to express. Additionally, they had higher levels of an enzyme that adds acetyl groups to the protein sheath.

The anxious, fearful rats had different brain chemistry. The same gene-suppressing substance as in the Jirtle mouse study, methyl groups, was more prevalent in their hippocampi. It bonded to the DNA and inhibited the expression of the gene involved in dampening stress.



DNA strand with and without methyl group (in box) attached

To test their hypothesis that these two substances were causing epigenetic behavioral changes in the rats, Dr. Szyf and his team injected the brain cavities of fearful rats with a substance that raised the number of acetyls in the hippocampus. Sure enough, the behavior of the rats changed, and they became less fearful and better adjusted. They also took the offspring of loving mothers and injected their brains with methyl groups. This produced the opposite effect; these rats became more fearful and anxious, with a heightened response to stress.

A recent article in the October/November 2006 issue of *Scientific American Mind*, notes depressed and antisocial behavior in mice, accompanied by methyl groups sticking to genes. It also extends this research to human beings; the brains of schizophrenic patients also show changes in methylation of genes, or acetylation of their protein sheaths.⁸

Mapping the protein pathways by which behaviors such as nurturing facilitate or suppress gene expression helps us understand the implications of our behavior and beliefs, and their role in our health and longevity. The poet William Butler Yeats said, “We taste and feel

and see the truth. We do not reason ourselves into it.” But the huge extent to which childhood nurturing affects adult health might come as a shocking surprise to you.

Childhood Stress Results in Adult Disease

Experiments have shown a striking link between childhood stress and later disease. One large-scale, authoritative research project known as ACE, or Adverse Childhood Experiences, was done by the Kaiser Permanente Hospital in San Diego, California, in collaboration with the Centers for Disease Control. The researchers conducted detailed social, psychological, and medical examinations of 17,421 people enrolled in Kaiser’s health plans over a five-year period. The study showed a strong inverse link between emotional wellbeing, health, and longevity on the one hand—and early life stress on the other. It emphasizes that there are some negative experiences that we don’t just “get over,” and that time does not heal.

The physicians at Kaiser scored patients on various measures of family functionality. Stressors included an alcoholic parent, divorced or separated parents, a parent who was depressed or who had a mental illness, and domestic violence. Over half the participants had experienced one or more of the defining childhood stressors, and where one stressor was present, there was an 80% chance that others were too, leading to a web of family dysfunctionality. A low score meant few stressors; a high score indicated several. The average age of study participants was fifty-seven, so in most cases it had been *fifty* years since the events occurred.

The study found that a person raised in such a family had *five times* the chance of being depressed than one raised in a functional family. Such a person was *three times* as likely to smoke. Participants who scored high on the family dysfunctionality scale were at least *thirty times more likely to attempt suicide* than those who scored low. A man with a high score was 4600% more likely to use illegal intravenous drugs. Ailments more common in those who grew up in dysfunctional families included obesity, heart disease, lung disease,

diabetes, bone fractures, hypertension, and hepatitis. The genetic links between nurturing and gene expression in children is also now being traced; “one recent study suggests that children with a certain version of a gene that produces an enzyme known as MAO-A (which metabolizes neurotransmitters such as serotonin and dopamine) are significantly more likely to become violent—but only if they were mistreated as children.”⁹ As research proceeds, it is likely that the genetic effects of the treatment children receive will be mapped, and the epigenetic effects of parenting will be more fully understood. As a society, we will then have the understanding required to tackle social problems at their sources in childhood, rather than merely trying to ameliorate their effects played out in adulthood.

The study’s authors compared our current medical practice of treating diseases to a fireman trying to get rid of billows of smoke—the most visible aspect of the problem—because of a failure to grasp that it’s the underlying fire that’s causing the smoke.¹⁰ So while a study of rat pups might seem like an Ivory Tower exercise in epigenetics, the reality of nurturing in the real world makes a difference in the health and wellbeing of millions of people.

It’s the Gene Show, and You’re the Director

There are certainly lifestyle factors that make a big difference in our health and longevity. Having a Body Mass Index of twenty-five or less, eating a diet rich in fruits and vegetables, daily aerobic exercise, avoiding smoking and excess alcohol—all these contribute to living to a ripe old age. There may be an epigenetic component to each of them too. Yet there is mounting evidence that invisible factors of consciousness and intention—such as our beliefs, feelings, prayers, and attitudes—play an important role in the epigenetic control of genes.

The old view that our genes contain indelible instructions governing the functioning of our bodies is, in the scornful words of my offspring, “So twentieth century.” We now understand that a host of other factors determine which genes are expressed. Some of these

are physical, like diet, exercise, and lifestyle. Others are metaphysical, like beliefs, attitudes, spirituality, and thoughts. It's taken science a long time to figure out that something as seemingly immaterial as a belief can take on a physical existence as positive or negative changes in our cells. But it turns out that these factors can affect health and longevity dramatically. Josephine Tesauro and her sister were born with an identical collection of instruments in their genes. The music they played in their first years may have been indistinguishable. But the finale of each of their life concerts is quite different.

As we hold the scale of health in our hands, with good health on one side and decrepitude on the other, we can tilt the outcome. If we can add a brick to the side of good health, we can tilt it in our favor. Let's take a look at some of the bricks we can drop on our scale. Each of these is based on sound scientific research and holds lessons we can apply from this day forward.

Beliefs and Biochemistry

A landmark study linking belief to health was reported recently by Gail Ironson, M.D., Ph.D., a leading mind-body medicine researcher, and Professor of Psychology and Psychiatry at the University of Miami. Dr. Ironson runs the Positive Survivors Research Center at the university, and has been awarded several grants from the National Institutes of Health. It is one of the first studies to link particular beliefs with particular changes in the immune system.¹¹

Dr. Ironson measured several indicators of health in HIV patients over the course of a four-year period. One measure was their viral load—the quantity of the AIDS virus in a sample of blood. She also counted the concentration of a type of white blood cell responsible for killing invading organisms. The concentration of these “helper T-cells” (also known as CD₄ cells) in the blood is one measure of the progression of AIDS. If the concentration of helper T-cells drops, our bodies are less able to fend off other diseases like pneumonia. That's why the “I” and “D” in AIDS stand for Immune Deficiency; as AIDS patients lose their T-cells and their immunity to disease drops, they

are more susceptible to the kinds of invading organisms—opportunistic infections—that healthy immune systems easily fend off.

Studies like those conducted by Dr. Ironson are especially meaningful to physicians and biologists because they identify key *biological* markers of illness, as opposed to *subjective* measures such as the patient's level of depression, the number of doctor visits, and the dosage of medication required.

In her studies, Dr. Ironson found that there were two particularly interesting predictors of how fast HIV progressed in the bodies of her research participants. The first was their view of the nature of God. Some believed in a punishing God, while others believed in a benevolent God. She observes that, "People who view God as judgmental God have a CD4 (T-helper) cell decline more than twice the rate of those who don't see God as judgmental, and their viral load increases more than three times faster. For example, a precise statement affirmed by these patients is 'God will judge me harshly one day.' This one item is related to an increased likelihood that the patient will develop an opportunistic infection or die. These beliefs predict disease progression even more strongly than depression."

Dr. Ironson was surprised to find that many people reported a spiritual transformation subsequent to their diagnosis. This transformation was characterized by a sense of self that was profoundly changed, and resulted in different behaviors. Many kicked their habits of street drugs like cocaine and heroin, or legal ones like alcohol. Some went through such a transformation only after hitting rock bottom. Carlos, one of them, describes his experience of getting to the end of his rope:

I was planning to finish my BA, moving to New York. I found out that my ex partner had been doing drugs and cheating with other relationships. I was very scared, and I didn't deal with it. For six months I didn't get tested. When I did find out, I had no friends in New York so I had to deal with it on my own. I turned to cocaine, my life changed dramatically; I was sort of spiraling down hill, near the lowest point in my life. It changed



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everything, it changed my behavior, it changed my ambition, I didn't have the same drive that I had going in after school to pursue my career. Things were so bad that any belief that I had in a higher being or in a spiritual presence was completely extinguished. I was on a course down hill. I just didn't care.¹²

After being diagnosed as HIV positive, Carlos's infection progressed rapidly into full-blown AIDS. He suffered from serious opportunistic infections, and had very low levels of T-cells, and high levels of viral load, despite taking HIV medication.

A common gateway to spiritual transformation was having a spiritual experience. After helping a drunk white man in distress, John, a gay African-American man with a college education, described the following experience:

I felt like I was floating over my body, and I'll never forget this, as I was floating over my body, I looked down, it was like this shriveled up prune, nothing but a prune, like an old dried skin. And my soul, my spirit was over my body. Everything was so separated. I was just feeling like I was in different dimensions, I felt it in my body like a gush of wind blows. I remember saying to god, "God! I can't die now, because I haven't fulfilled my purpose," and, just as I said that, the spirit and the body, became one, it all collided, and I could feel this gush of wind and I was a whole person again.

That was really a groundbreaking experience. Before becoming HIV-positive my faith was so fear based. I always wanted to feel I belonged somewhere, that I fit in, or that I was loved. What helped me to overcome the fear of God and the fear of change was that I realized that no one had a monopoly on God. I was able to begin to replace a lot of destructive behavior with a sort of spiritual desire. I think also what changed, my desire to get close to God, to love myself, and to really embrace unconditional love.¹³

John's story points to the second major factor Dr. Ironson noted: A participant's personal relationship with God. Her study found that patients who did not believe that God loved them lost helper T-cells "three times faster than those who believed God did love them."¹⁴ Another correlation she found was that those who felt a sense of peace also had lower levels of the body-damaging stress hormone cortisol.¹⁵

Dr. Ironson, in her recent article published in the *Journal of General Internal Medicine*, showed a fairly high number of people increase their spirituality in the year after they are first diagnosed with HIV/AIDS. 45% showed an increase in spirituality, 42% stayed the same, and 13% had a decrease in spirituality. The study showed an enormously strong association between spirituality and the progression of HIV.¹⁶

"I was surprised that so many people had an increase in spirituality, because being diagnosed with HIV/AIDS can be a devastating event. I could hardly believe the figures, until I saw that another article in the same issue of the journal found an increase in spirituality of 41% of newly diagnosed patients. Perhaps a life-threatening illness, not just HIV, but cancer or a heart attack, can stimulate a person to reexamine their connection to the sacred."

Dr Ironson summarizes by saying that, "If you believe God loves you, it's an enormously protective factor, even more protective than scoring low for depression, or high for optimism. A view of a benevolent God is protective, but scoring high on the *personalized* statement 'God loves me' is even stronger."¹⁷

This echoes another study that found that, "Patients who believed that God was punishing them, didn't love them, didn't have the power to help, or felt their church had deserted them, experience 19% to 28% greater mortality during the 2-year period following hospital discharge."¹⁸

Unfortunately, many more Americans believe in the God of thunderbolts and retribution than believe in a benevolent God. In

a study done by Baylor University's Institute for Studies in Religion, researchers found that 31% of Americans see God that way. The number of people believing in Authoritarian God goes high as 44% of the population in the country's Southern states.

Just 23% of the population believes in Benevolent God, according to the study, while the rest fall in the middle. They believe in a Critical God (16%), Distant God (24%), or are atheists (5%).¹⁹ Since our view of God can have such huge effects on our health, it's worth examining our beliefs, and if our religion or spiritual orientation permit such recalibration, adjusting them to fit the most loving vision of God of which we are capable. Carlos, the young man who hit bottom in Ironson's HIV/Spirituality study,²⁰ says,

You don't have to believe in any God that doesn't love you or any God that isn't here to help you. Because I had a Catholic background, during my addiction I felt like I was being judged, that I was being punished. I thought I was going to die for my sins. So when I went to this service and I heard [the minister talk about choosing a loving God, it] changed my God to one that was loving and helpful. It was revolutionary.

Shortly thereafter, Carlos went to Alcoholics Anonymous and became sober. And while you and I are probably not in the same dire straits as he was, our bodies will be deeply grateful for us having enough faith in them to adjust our religious faith in the direction of a loving God.

Psychology Becomes Physiology

What we believe about what is happening to us enhances the facts. A 2007 Harvard study examined the difference between physical exertion, and physical exertion plus belief. The researchers recruited eighty-four maids who cleaned rooms in hotels. The sample was divided into two groups. One group heard a brief presentation explaining that their work qualifies as good exercise. The other group did not.

Over the next thirty days, the changes in the bodies of the women who had heard the presentation were significant: “The exercise-informed women perceived themselves to be getting markedly more exercise than they had indicated before the presentation. Members of that group lost an average of 2 pounds, lowered their blood pressure by almost 10 percent, and displayed drops in body-fat percentage, body mass index, and waist-to-hip ratio.”²¹

This marked physiological change occurred in just thirty days, and followed one brief session in which the researchers exposed the women to new beliefs about their level of physical activity. Imagine the effect of the background music of our own self-talk, running in a continuous loop in our heads for many hours a day, as we perform our daily routines. Making even small changes in the program can lead to significant changes in our health.

Prayer

Prayer is one of the most powerful forms in which intention may be packaged. Prayer has been the subject of hundreds of studies, most of which have demonstrated that patients who are prayed for get better faster.

One such study was done by Thomas Oxman and his colleagues at the University of Texas Medical School. It examined the effects of social support and spiritual practice on patients undergoing heart surgery. It found that those with large amounts of both factors exhibited a mortality rate *just one-seventh* of those who did not.²² Another was done at St. Luke’s Medical Center in Chicago. It examined links between church attendance and physical health. The researchers found that patients who attended church regularly, and had a strong faith practice, were less likely to die and had stronger overall health.²³

These are not isolated examples. Larry Dossey, in *Prayer is Good Medicine*, says that there are over 1,200 scientific studies demonstrating the link between prayer and intention, and health and longevity. Meta-analyses in the *Annals of Internal Medicine*²⁴ and *The Journal of*



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*Alternative and Complementary Medicine*²⁵ have compiled the results of many studies and found that prayer, distant healing, and intentionality have significant effects on healing.

Even a recent confounding study published in the *American Heart Journal* tells us more about the limits of scientists' understanding of prayer than it tells us about prayer itself. Under headlines like the one in the *Washington Post* on March 31, 2006: "Strangers' prayers didn't help heart patients heal," stories about this large-scale study of 1,800 patients undergoing heart bypass surgery reported that those who were prayed for had as many complications as those who did not.

A variety of explanations were advanced for why prayer had appeared to fail in this study, and some scientists opposed to prayer studies argued that it was so conclusive that further money should not be put into a consciousness-based intervention that had been so thoroughly debunked.

I was most surprised at the study's results, until I read the fine print. It turned out that, in order to "standardize" what was meant by prayer, the researchers had designed the study so that patients were prayed for only starting the day of surgery (or the evening before), and continuing for fourteen days afterward. In addition, a standard eleven-word prayer was used for every patient: "For successful surgery with a quick healthy recovery and no complications."²⁶

Such sterilized prayer cannot be as successful as heartfelt, spontaneous prayer. Other studies have shown that the skill and fervor of the person praying has a marked effect on the subject of prayer. One controlled, randomized, double-blind study reported in Dossey's *Prayer is Good Medicine* measured the ability of people to increase the growth of yeast in test tubes. Three of the people were healers (one an M.D. who practiced spiritual healing) and the other four were student assistants. The results showed that mental concentration and intention definitely affected the growth of the yeast. "Analysis revealed that there were fewer than two chances in a hundred that the positive results could be obtained by chance. The bulk of the positive scores

was credited to the three healers. When their scores were analyzed separately, there were fewer than four chances in ten thousand that the results could be due to chance...”

In a careful study of distant healing prayer, the healers used their own unique methods, which ranged from putting photos of the patient on an altar with a statue of the Virgin Mary, to Sioux peace pipe ceremonies, to the “projection of qi.”²⁷ Also, the healers repeated their intentions daily for ten weeks. In other tests in which prayers sought to influence the germination rate of seedlings, “the more experienced practitioners produced the more powerful outcomes. These studies indicate that practice, interest, and experience make a difference in spiritual healing, which for most healers is based in prayer.”²⁸

The failure of the cardiac prayer study to show an improvement was due, I believe, to the scripted and structured nature of the “prayer” designed so carefully by the researchers, but which squeezed out any fervor, passionate intent, or personalization by the person doing the praying. To be powerful, intent must be deeply, personally, and sincerely engaged. The researchers in the cardiac study were not studying the effects of prayer: they were studying the effects of their own belief of what prayer comprises.

Doing Good Does You Good

Besides helping the person prayed for, it is likely that prayer benefits the person doing the praying. Studies show that regular acts of altruism prolong our lives and improve our own happiness.²⁹ Prayer is good medicine for the person doing the praying as well as the receiver.

In her book *The Energy Prescription*, pharmacist Constance Grauds, R.Ph., describes one such study done in Michigan. It included a large sample, 2,700 men, and it studied them over a long period—ten years. It found that the men who engaged in regular volunteer activities had death rates half of those who did not. She says that, “altruistic side effects include reduced stress; improved immune

system functioning; a sense of joy, peace, and wellbeing; and even relief from physical and emotional pain. These effects tend to last long after the helping encounter, and...increase with the frequency of altruistic behavior.”³⁰

Seven Minutes of Spirituality

A study that demonstrates the effect of spiritual nurturing was performed by Jean Kristeller, Ph.D., a psychologist at Indiana State University. She reported that when doctors spent time talking with critically ill cancer patients about their *spiritual* concerns, follow up revealed that after three weeks, the patients reported a better quality of life and less incidence of depression. Patients who had been talked to also felt that “their physicians cared more about their health, which was in contrast to those patients in the study whose physicians did not discuss spiritual matters with them.”³¹

And the length of time of the discussion that so affected patients’ lives for weeks afterwards? A mere *five to seven minutes!*

Meditation

The benefits of meditation are so numerous, and the subject of so many studies,³² that it’s hard to know where to start. Dr. Robert Dozor, co-founder of the Integrative Health Clinic of Santa Rosa, California, says, “Meditation—all by itself—may offer more to the health of a modern American than all the pharmaceutical remedies put together.”³³ Recently, neuroscientist Richard Davidson, Ph.D., of the University of Madison at Wisconsin, has published a series of experiments using PET scans and EEG recordings to study the areas of the brain that are active during meditation.

When comparing the results obtained by novice meditators against those of experienced meditators such as Tibetan Buddhist monks, it was found that the monks, “showed greater increases in gamma waves, the type involved in attention, memory, and learning, and they had more brain activity in areas linked to positive emotions like happiness. Monks who had spent the most years meditating had

the greatest brain changes.”³⁴ This means that we are bulking up the portions of our brains that produce happiness when we meditate. Another report noted that, “In a pilot study at the University of California at San Francisco, researchers found that schoolteachers briefly trained in Buddhist techniques and who meditated less than 30 minutes a day improved their moods as much as if they had taken antidepressants.”³⁵ Love and compassion are health-skills in which we can train ourselves.

Epigenetic Visualizations

The use of visualizations to help patients cope with cancer was pioneered by Carl Simonton and others in the 1970s. I vividly remember an interview I did with a woman in 1989. She impressed me as someone with great strength of will and courage.

Nancy had been diagnosed with metastacized Stage IV uterine cancer in 1972. Though her condition was terminal, she had rejected conventional medical therapy entirely, reasoning, “My body created this condition, so has the power to uncreate it too!” She quit work, exercised as much as her physical energy allowed, and spent hours lying in the bath. She came up with a visualization that tiny stars were coursing through her body. Whenever the sharp edge of a star touched a cancer cell, she imagined it puncturing the cancer cell, and the cancer cell deflating like a balloon. She imagined the water washing away the remains of the dying cancer cells. She focused on what she ate, how far she could walk, her baths, and the stars, and little else.

Nancy began to feel stronger, and her walks became longer. She began to visualize what her future might look like many years from that time. She went back to see her doctor three months after the diagnosis. She did not make the appointment until she had a firm inner conviction that the cancer was completely gone. To the astonishment of her physicians, tests revealed her to be cancer-free. Curiously, many patients who use similar techniques report an inner

knowing that the disease is gone, long before it is confirmed by medical tests.³⁶ They also use highly individualized images that work for their particular psyche.

Many years later, Nancy was still in excellent health, and she would occasionally still visualize the stars rushing through her body, carrying away whatever traces of cancer might still remain.

It's that last detail that points to the preventive possibilities in epigenetic medicine. Meta-analysis of large bodies of research indicates that many genes express differently in cancer patients than they do in people without cancer.³⁷

It's possible that Nancy's ongoing "star-cleaning" visualizations, long after she was diagnosed as cancer-free, helped keep her genetic profile favorable to cancer remission. Such visualizations are also free, safe, and non-invasive. Their ongoing effectiveness could be verified with DNA screening, biomarkers, and other non-intrusive tests.

The possibilities of visualization for epigenetic healing are indicated by a recent study that examined how the expectations of seventh grade students affected their math scores. Stanford University research psychologist Carol Dweck, Ph.D. noticed that students had beliefs about the nature of intelligence, and it had an effect on their performance. Some students believed that intelligence is a fixed quantum, like the number of inches in your height, or the number of teeth in your mouth. Others believed that intelligence can grow and develop, like a plant. She then compared the math scores of the two groups over the course of the following two years.

She found that students who believed that intelligence can grow had increasing math scores. The math scores of those who believed that intelligence is fixed decreased.

Dweck then wondered, "If we gave students a growth mindset, if we taught them how to think about their intelligence, would that benefit their grades?" She took a group of one hundred seventh graders who were all performing badly in math and divided them, at random, into two groups. The first group received instruction in good study

skills. The second group received information about the ways our brains grow and form new neural connections when confronted with novelty and challenge. They, “learned that the brain actually forms new connections every time you learn something new, and that, over time, this makes you smarter.” At the end of the semester, those students who had received the mini-course in neuroscience had significantly better math grades than the other group. Dweck says, “When they worked hard in school, they actually visualized how their brain was growing.”³⁸ This visualization had concrete effects on their academic performance. It’s not unreasonable to assume that visualization can have the effect of increasing health. What we imagine, we can create. Filling our minds with positive images of wellbeing can produce an epigenetic environment that reinforces the healing process.

Attitude Is Everything

“Attitude is everything with aging,” says Dr. Andrew Weil, author of *Spontaneous Remission* and several other books. He cites studies that show that negative perceptions about aging can shorten our lives, while positive beliefs prolongs them: older people with positive attitudes about aging were found to live 7½ years longer than those with negative attitudes. He also reminds us that optimism heals: “A study of nearly 1,000 older adults followed for nine years concluded that people with high levels of optimism had a 23% lower risk of death from cardiovascular disease and a 55% lower risk of death from all causes compared to their more pessimistic peers.” Positive older people also have better memories and stay healthier. Overall physical fitness is reflected in walking speed; positive elders were found to walk 9% faster than negative ones.³⁹

Neurosurgeon Norman Shealy, M.D., Ph.D., in his book *Life Beyond 100*, summarizes four personality types and—based on many studies—links them to longevity. The first type has a lifelong pattern of hopelessness. The second group has a lifelong pattern of blame or anger. The third group bounces between hopelessness and anger. And the fourth group is self-actualized. They believe that “happiness is an inside job.”

He reports that people in the fourth category tend to die of old age, and that less than 1% of people in this category die of cancer or heart disease. About 9% of people in the third group die of one of those two conditions.

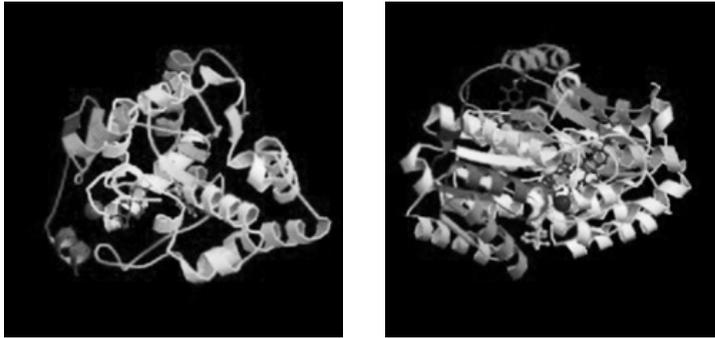
By way of contrast, he finds that 75% of people who die of heart disease, and 15% of those who die of cancer are members of the Lifelong Anger Club, group two. And group one, those with lifelong patterns of hopelessness, tend to die thirty-five years younger than those in group four. Seventy-five percent of them die of cancer, and 15% of heart disease.⁴⁰

While attitudes such as optimism and positivity were once regarded as accidents, research like that of Richard Davidson is demonstrating that they are also learned skills. They can be cultivated. Knowing that we are having powerful genetic effects on the production of healing proteins in our bodies provides a strong incentive to learn techniques for improving our attitudes, a therapeutic tool that can exceed the promise of most conventional therapies. As you contemplate the fork in the road between positive and negative attitudes, imagine yourself splitting into two genetically identical individuals. Both are you at the present moment. Then fast forward twenty years. Imagine that one of the twins has taken conscious control of attitude, and the other has not. Which one would you rather be?

Why Stress Hurts

What you are thinking, feeling, and believing is changing the genetic expression and chemical composition of your body on a moment-by-moment basis. The stress hormone cortisol has the same chemical precursor as DHEA, which is associated with many protective and health-promoting functions, and contributes to longevity. When that precursor is being used to make cortisol, production shifts away from making DHEA. When our cortisol levels are low, the raw materials from which our bodies manufacture life-giving DHEA are freed up, and production of DHEA increases. As one researcher puts it: “When our energy reserves are continually channeled into the

stress pathway, there isn't enough energy left to support regenerative processes that replenish the resources we've lost, repair damage to our bodies, or protect us against disease. ...The repair and replacement of most kinds of cells is diminished; bone repair and wound healing is slowed, and levels of circulating immune cells and antibodies fall. ...In high levels the stress hormone cortisol kills our brain cells."⁴¹ Cortisol has been shown to reduce muscle mass, increase bone loss and osteoporosis, interfere with the generation of new skin cells, increase fat accumulation around the waist and hips, and reduce memory and learning abilities.⁴² Low levels of DHEA have been linked to a multitude of diseases.



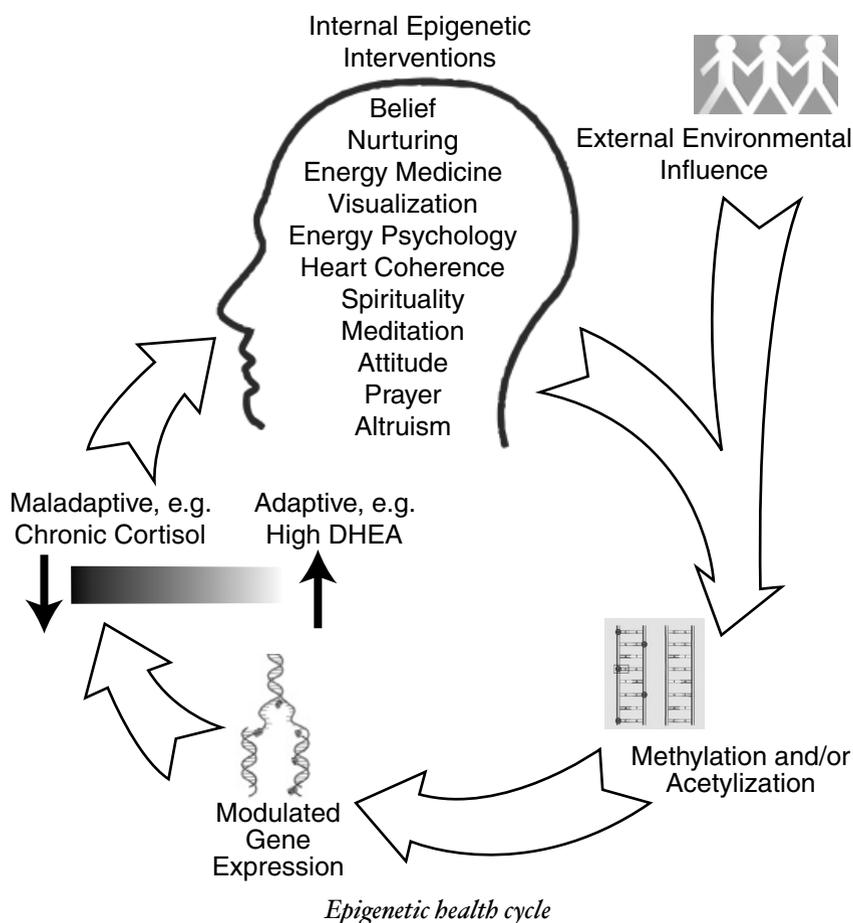
DHEA (left) and cortisol (right) are manufactured by the body using the same precursors

Engineering Your Cells Consciously

The body's stress response encompasses far more than shunting production away from DHEA to produce cortisol. Over 1,400 chemical reactions and over thirty hormones and neurotransmitters shift in response to stressful stimuli. So by de-stressing ourselves using attitude, belief, nurturing, self-talk, and spirituality, we are taking a role in determining which instruments in our genetic symphony predominate. This knowledge opens up a panorama for self-healing as vast as the number of moments left in your life. When you understand that *with every feeling and thought, in every instant, you are performing epigenetic engineering on your own cells*, you suddenly have a degree of leverage over your health and happiness that makes all the difference. How you use that knowledge can determine whether your unique

symphony comes to an early and discordant end, or whether you play beautiful music to a long finale.

When you choose beliefs, feelings and other epigenetic influences that benefit your health, you can create a virtuous cycle of epigenetic health. In an epigenetic health cycle, you intervene consciously with positive emotions, thoughts and prayers. Besides making you feel good psychologically, these benefit your body, modulating your gene expression in the direction of the highest peak of health available to you.





YOU: THE ULTIMATE EPIGENETIC ENGINEER

This peak of health differs from person to person, and there is little value in looking at your personal peak and comparing it to that of someone else, even an identical twin. For there are external influences that are beyond our control, and they can have profound epigenetic impact: Consider, for instance, two identical twins, one of which receives more nurturing than the other. Or think about twins living in different towns, one of which has severe environmental pollution while the other does not. Like the car that rams into you from behind on the freeway, there are random life situations that are beyond our control.

Yet no matter how well or sick we may currently be, we still have the ability to choose our thoughts and feelings, and select those that support peak vitality. I call this the *epigenetic health cycle*.

In an epigenetic health cycle, we select positive beliefs, prayers and visualizations that support peak health. We avoid those that do not. In this way, we consciously intervene to send epigenetic signals to our cells. These signals can reduce stress, and promote the synthesis of life-enhancing hormones like DHEA, as well as thousands of other beneficial substances.

We've seen how powerful each of these little bricks can be in tipping the scale of our health. Positive self-talk, nurturing beliefs, altruism, attitude, meditation, and prayer can add brick after brick to the scale. But what if we had at our disposal truckload of bricks to dump on the side of good health? Some of the emerging new therapies promise just this kind of decisive intervention, as we will see in the coming pages.