

Magical Mem-brains?

Cell biologist Bruce Lipton says our lives are not ruled by our genes but by our cell membranes — which respond to our thoughts. Has he found the key to mind–body healing? Listen to his remarkable conversation with veteran science writer Jill Neimark.

The mystic healer Edgar Cayce once said, “Remember that thoughts are things, and as their currents run, they can become crimes or miracles.” Now cell biologist Bruce Lipton, formerly at University of Wisconsin and Stanford medical schools, suggests that Cayce was right. Lipton, author of *Biology of Belief: Unleashing the Power of Consciousness, Matter, & Miracles*, contends that our thoughts can activate changes in the activity of the cell membrane, and thus alter our health and life.

Genes, proteins, and hormones all are players at the gates of the cell’s membrane, says Lipton, where consciousness and matter interact. In fact, he states bluntly that by changing our subconscious programming we can influence membrane function, and therefore, “We are not victims of our genes, but masters of our fate.”

Though Lipton may be reaching too far in some of his claims, his book has sparked interest not only from hypnotherapists and energy healers, but from cell biologists working on cancer at places like the University of Illinois at Chicago, where researchers have already published findings consistent with his emphasis on the cell membrane.

—Jill Neimark

JN: Early in your book, you describe a kind of eureka! insight where you realize that the cell membrane is the equivalent of each cell’s brain. Later in your book, you write that interacting with the cell membrane will enable us to change our lives, health, maybe even the activity of our genes. By changing our deepest beliefs, you say, we can change the signals reaching the cell membrane, and thus our entire bodies from the cellular level on up. But before we get into all that, “brain” is a loaded word. What exactly do you mean by brain when you speak of the “magical mem-brain”?

BL: I mean the cell membrane functions as the active intelligence of the cell. At any given time, every cell membrane contains hundreds of thousands of switches, and the behavior of a cell can only be understood by considering the activities of all the switches. So I asked myself, Where does the cascade of activity for a cell start? And it starts at the membrane. In contrast, genes are remarkable molecules, but they are only blueprints that are activated by signals from the cell membrane. Genes are not our fate. Of course, a very

small percentage of people actually arrived on this planet with defective genes, and in those rare cases the blueprint itself is inappropriate.

JN: Scientists have long known that genes are influenced by signals from their environment. There is the famous book *The Beak of the Finch*, which shows us that evolution is happening right before our eyes in just a few generations of birds on the Galapagos Islands. The length of the finch beak changes according to climate change, which affects the type of seeds that grow on the island and the type of beak a finch needs. So haven't we known for a while that genes are flexible and responsive?

BL: I fully agree and do say in my book that if you're a leading-edge scientist, this will not be news. But if you ask the average person on the street what controls life, they will tell you genes control life. It was Nobel Prize winner Francis Crick who suggested that genes are both the blueprint for the body's proteins and that DNA controls its own replication. The first is true but the second is not. Genes are indeed blueprints. But a gene cannot cause or control its own expression. It is not self-regulatory. If genes don't control life, then what is in charge of life? I say it's the cell membrane. This is the "brain" equivalent. The membrane is the physical structure that interfaces internal "self" and external "not-self." It is an interface that dynamically reads and interprets environmental cues and responds by generating signals that enable the cell to function and survive. And science supports this. One of the remarkable studies I mention in my book shows that a cell whose nucleus — with all its genes — is removed will keep functioning for as long as a month! This was a shock to me at first, since I was trained as a nucleus-centered biologist as surely as Copernicus was trained as an Earth-centered astronomer. It was truly a jolt when I realized the nucleus does not program the cell. On the other hand, if the cell membrane is damaged, the cell will immediately become dysfunctional and, frequently, die very quickly.

JN: You sent me a very interesting article on stem cells from *Nature*, which you jokingly titled, "It's the stem cells, stupid!" It describes how the body is like an ecosystem, and the activity of a cell depends on its ecological niche, or where it lives. Stem cells, which are the subject of so much hope and controversy today, are influenced by their environment to become a neuron or a blood cell or any other kind of cell. But all this fascinating new research actually reinforces my view that every molecule of the body is intelligent in its own way. Genes, receptors, stem cells, hormones, all are key players and intelligent. The synergy of our minds and bodies seems more like an Escher painting to me, where the beginning loops around to the end and around again to the beginning. I think you are overemphasizing the membrane. Just out of curiosity, how do you think life began — do you think it began with RNA, DNA, cell membranes, or something else?

BL: I think the membrane was a very important part of the beginning of biological life. If I take fats called phospholipids and shake them up in water, they spontaneously form membranes. And these membranes undergo fission — in other words, they separate into two. They seem to "grow" like cells. Now, lipids are nothing but a container, and that's not life itself. But once we have a container we can define inside and outside and start to regulate the conditions inside. The ability to regulate our internal domain is required for life, since we must have very specific environmental conditions for certain biochemical responses. For instance, a cell needs to maintain a certain pH and salt balance. I believe that when ancient RNA and other proteins in the primeval soup became encapsulated within membranes, we had a breeding ground for life.

JN: You state that we're mostly controlled by subconscious programming, and that if we can change this programming, we can actually change the signals the membrane sends into the cell. First, how are you defining subconscious? A lot of work has been done in recent years showing which specific brain structures are involved in states like fear, compassion, or the peaceful cosmic consciousness felt by

experienced meditators. Are you using subconscious as a metaphor like Freud did, or are you referring to particular places in the brain?

BL: By conscious mind, I mean the part of the brain that is self-reflective and self-observing, which is governed by the more recently evolved prefrontal cortex of the brain. By subconscious, I mean the part of the brain that is more ancient and doesn't necessarily require conscious attention. It's the programmable "hard drive" into which our life experiences are downloaded. The programs are fundamentally hardwired stimulus-response behaviors. This is so automatic that people often refer to the fact that somebody has "pushed their buttons" — leading to an instinctive response.

JN: How does subconscious programming influence the cell membrane?

BL: When I have a thought, my mind sends out signals, in the form of growth factors, hormones, or other chemicals. Thoughts can also initiate rapid oscillations of nerve cells in unison, which creates a kind of field effect that influences other cells and neurons almost instantaneously. Now, what's interesting, and what I found out in my research at Stanford, is that your brain can veto what's going on in other places in your body. The signals sent out by your central nervous system actually override the function of cell membrane receptors that are responding to signals in their immediate environment. That means the brain can ultimately control the activity of tissues and organs. I believe that the most powerful information processing by the brain is in the domain of the subconscious and that it can shape tissue responses. These signals can actually influence the membrane to engage selected genes that then actively respond.

When part of the brain senses stress, for example, it initiates a complex signal cascade that directs the body's cells to launch a protection response, particularly through a stress hormone called cortisol.

Now, let's look at what happens to, say, a typical liver cell, which has receptors on its membrane that bind to cortisol. When it does this, the membrane sends information to the genes inside the nucleus of the cell to shut down their ability to break down a form of sugar called glycogen. The genes stop doing this, and extra sugar is released into the blood. That sugar is used as energy to counter the stress. This cascade could have been started by a real stress, or by a belief that causes stress even if it is a misperception.

I actually think this system explains how the placebo effect works. And a recent article on the placebo effect on pain in the *Journal of Neuroscience* confirms this. When researchers used sophisticated imaging of the brain, they found that placebos that were believed to quench pain activated parts of the brain that directly affected opioid membrane receptors. That's how a "belief" results in the chemical cascade that results in the placebo effect — and in this case, a reduction in pain. For hundreds of years we've been discussing the mind-body duality. What I'm proposing is a mechanism for its power.

JN: The description is fascinating and makes sense, but I think our frameworks are very different. I still don't see a top-down hierarchy from the brain to the membrane. I see us as a web that has no weaver, that weaves itself, and the act of weaving is us. Nobody has yet explained how physical processes give rise to conscious experience in the first place. We don't know how a stimulus turns into the blueness of blue, the sweetness of sweet, the sentience of anything from a cell to a person. So it seems a leap to say that we now know how conscious experience modulates physical processes. What brought you to this work?

BL: My dad was an immigrant from Russia who came here at age 11, and by the time he was 16, he and his brother owned their first supermarket in New York City. I was born in 1944, and shortly after that we moved up to Chappaqua, the town where the Clintons now live. My mother told me that at that time there was a sign at the entrance to the town that read, "No Jews, no blacks, and no dogs." We were Russian Jews and

completely displaced into an environment that disapproved of us. I had one friend down the block, and that was it. That's why the first time I looked into a microscope, in the second grade, I was so mesmerized. Here was another world with living creatures and it had nothing to do with my own troubled world. I remember spending an entire summer with an old Brownie camera trying to take a picture of cells in my microscope.

JN: How has your belief in belief changed your own life?

BL: My sense of humor has saved me. Years ago, after my divorce, I fell deeply in love with a woman and one day she said, "I think I need some space," and what seemed like 10 minutes later, she moved in with a cardiac surgeon. I pined away for nearly a year. I'd come home from work and just be alone and have this imaginary conversation with Barbara. I missed her all the time. Then one night, I was alone in my dark living room in the typical cold, grey Wisconsin winter and missing Barbara and I yelled out, "Just leave me alone, Barbara!" And all of a sudden the pure absurd humor of it struck me. I said to myself, "Well, she has left you alone and that's the problem." The next time I started missing Barbara I thought about the absurd humor of it, and I started laughing.

Humor has had the same impact on the rest of my life. In a very similar way, I was berating myself one day for not being good enough. And right in the middle of all my negative self-talk it was as if a voice offstage said, "Isn't there anything more fun to do than this?" It was like I was in a stand-up comedy routine and I laughed out loud then and there. I'd been willingly engaging in "not-good-enough" programming from my subconscious, and there was something different I could do and I did it right then. I went to a movie. And the next time I got into a negative spiral of self-talk, the humor struck me again, and it just transcended my self-talk. That laughter was almost like a switch. Eventually, over time, the negative self-talk just stopped.

JN: What's the one take-home message from the biology of belief?

BL: That we're not, as individuals or societies, the pawns of our genes, or stuck in a vicious cycle of violence and competition. You can reinvent your life. The global community can reinvent itself, too. A study last year by two biologists, Robert M. Sapolsky and Lisa J. Share, showed this in a troop of baboons. The aggressive males happened to die out from foraging contaminated meat from a garbage pit. In the wake of their deaths, the females in the troop helped steer the remaining, less aggressive males into a more peaceful, cooperative community. We are all spiritual beings who need love as much as we need food. We can use the intelligence of our own cells to change our lives. ❖

Jill Neimark is a contributing editor of *S&H*. She is currently finishing a book on love and health with bioethicist Stephen Post.