

The Neurotheology Link

An Intersection Between Spirituality and Health

Andrew B. Newberg, MD

Andrew B. Newberg, MD, is board-certified in internal medicine and nuclear medicine, and is a preeminent neuroscientist who has devoted his life to studying the links among spirituality, contemplative practices, and brain function. Here, Dr. Newberg discusses the burgeoning field of neurotheology and why it is important for clinicians to understand more about this area of medicine and its potential impact on people's health.

Q: Please explain the term *neurotheology*, and share with us how this field has become recognized as an important area of medicine.

Andrew B. Newberg: From my perspective, neurotheology is an area of study that dates back thousands of years. Study of the sacred texts of Buddhist and Hindu thinking reveals a significant interest in the nature of the human psyche and how practices such as meditation affect us. Even in Western Judeo-Christian traditions, there is an emphasis on human behaviors and how our minds and brains help us to establish particular behaviors as we go through our lives. Then, about 30 years ago, with the advent of brain-imaging studies and the cognitive neurosciences, clinicians and researchers gained the opportunity to explore what is actually going on in the brain when a person engages in various religious and spiritual experiences. However, neurotheology goes far beyond just brain imaging.

Basically, in the study of neurotheology, we are trying to understand the relationships among the different areas and functions of the brain and how they help us or restrict us in terms of engaging the spiritual side of ourselves. For the term neurotheology as a concept to work, however, we need to define both parts of that term—the “neuro” side and the “theology” side—very broadly. For the neuro side, this has to include not just neuroscience, but psychology, anthropology, and medicine in general, as well as other areas of study that are involved in how our brains and our bodies interact. In terms of the theology piece, this also needs to be defined very broadly. Theology is a very specific field, which is focused on studying primary religious texts and religious ideas. Theologians ask questions,

such as: “What does the Bible mean when we read a certain passage? How do we interpret that passage and make sense of it? How does it relate to our everyday lives, for example?” While these questions are a part of the neurotheology concept, this area of study also needs to include spirituality, rituals, beliefs, and practices, such as meditation and yoga and other disciplines that help us to be spiritual as well.

The actual term neurotheology has pluses and minuses. Part of what prompted me to ultimately write a book called *Principles of Neurotheology* was because I was concerned about it as a term.¹ I thought it was important to embrace what this term meant and what this field of study could be, going forward, and determine what types of guiding principles would be involved in supporting this field of study.

Q: How did you first become interested in spirituality and the effects of contemplative practice on people's health?

Dr. Newberg: My interest is longstanding and dates back to my childhood. I asked a lot of questions about the nature of the universe and of reality, and about how human beings make sense out of their experiences of realities and develop various beliefs about those realities. As I grew up and went through my educational programs, I began to look at different approaches that people took toward helping them understand how they experience reality. Science gives us a great ability to observe the world, but I also learned that the big questions about the nature of existence and the nature of who we are as human beings were not answered easily purely on the basis of science. As a result, I also explored a variety of different philosophical, religious, and spiritual traditions to examine how these questions can be approached.

All of this came together for me in medical school while doing a year of research with Dr. Abass Alavi [MD], involving nuclear-medicine imaging, such as PET [positron emission tomography] and SPECT [single-photon emission computed tomography] to look at how the brain worked in a variety of different conditions and states. During this time, I also connected with an individual who became my mentor in neurotheology, Eugene d'Aquili [MD, PhD] who was exploring the

relationships among rituals, spirituality, religious ideas, and contemplative practices, and how they relate to the human brain.

I realized that we could merge our efforts and use science to help us to explore how our brains are affected by spiritual beliefs and practices, such as observing what happens in the brain when people meditate or pray. Brain imaging can help inform us about the nature of spiritual and contemplative experiences and how they affect us in terms of our health and well-being. Dr. d'Aquili, Dr. Alavi, and I began to merge these ideas together—the scientific and the spiritual—in a way that helped us to understand ourselves and more about our health.

Q: Why is it important for clinicians to consider the field of neurotheology and its significance in medicine?

Dr. Newberg: It is very important to establish why this field of scholarship is of relevance to human beings. In fact, there are many ways in which this field is relevant that extend from the very practical to the very esoteric. In terms of the practical, part of what we know is that there are many people who are religious or spiritual and/or who engage in practices, such as meditation, yoga, and prayer.

A large body of research shows that all of these activities have a tremendous effect on human beings. For example, many studies have demonstrated that religious and spiritual practices have a beneficial effect on human psychology as coping strategies, and also in terms of feelings and mood. Such activities also have been shown to benefit our bodies, reducing blood pressure [BP] and heart rate [HR] while improving our immune systems. There is even evidence that these types of practices may affect human genomic expression. So, if we acknowledge these various physiologic and clinical effects, then part of the reason for conducting neurotheology research is to understand what these links are all about and find ways to optimize these studied effects. For example, in the future, we may be able to determine which practices are the most effective in a given scenario for a specific disorder.

Another perspective on why neurotheology is helpful and also practical is that it teaches us something about the complex functions and interactions of the brain and the body. When we think about how our brains work and all of the different functions the brain performs—such as producing emotions and thoughts—there are a lot of very complex processes that the brain helps us with. When we look at religious and spiritual experiences and various practices, we are talking about engaging many of these different brain functions in complex patterns.

For example, when an individual prays, that person is using language and repetition, and expressing various emotions. The individual might also make movements with the hands or the body. As a result, there are many different brain processes that are at play when an individual is engaged in some type of spiritual practice.

Then, if one looks at a brain scan of a person who is praying, activity in the motor cortex might be seen if the person is moving the hands. There might also be activity in the limbic areas if the person has a certain type of emotional response, and one might see changes of activity in the language areas if the per-

son is reciting a certain phrase or a prayer. This gives us an example of how all of these different parts of the brain interact with each other and how, ultimately, they tie into the body itself. In this field, we can explore the effects of an intense emotional response to a prayer on a person's immune system, BP, or HR. We can look at all of this and understand how the body and the brain work together at a very complex level.

Another relevant example is that, when people are engaged in a practice such as meditation, they are often concentrating intensely. If one extrapolates this, studying experienced meditators who are among the best at performing concentration tasks can help us to understand how the concentrative process occurs in the brain in other people. What is learned from such a study may then ultimately provide information that will be helpful for patients who do not concentrate as well, such as people with attention-deficit hyperactivity disorder [ADHD]. It may be determined that practices such as meditation have a benefit for these specific cases. When treating a person with ADHD, a clinician might consider that, in addition to prescribing a medication or a supplement, he or she may also recommend the practice of meditation, which will help the patient to concentrate better.

The interactions among beliefs and practices and brain functions are complex, and this field of research can help us to determine how all of these elements interact and answer such questions as: "Which are the elements that are most effective or the 'active ingredients' of contemplative or mind-body practices?" For example, when a person says a prayer, is it the words themselves that are important or is it the body movements? Is it the ritual or is it the feelings that the person experiences? We do not know for sure. Research can help break down these parts to achieve a better understanding of the effects of such practices on health.

Moving from the practical into the more esoteric, neurotheology research may also tell us something about the spiritual side of these experiences and answer such questions as: "What does it mean to be a spiritual person?" "What does it mean to be religious?" "How do we develop moral processes?" and so forth. We may even be able to discover ways for bringing spiritual communities together to engage in their practices and beliefs more effectively. For example, often, when I have lectured at a church or a synagogue, I will have the participants engage in a regular prayer that they perhaps say every day. The difference is that I ask them to slow it down. I teach them to really concentrate on the prayer and become more mindful about the process. Oftentimes, this exercise results in a much more powerful experience for each individual. There might be ways of developing more effective liturgies and rituals that could ultimately be of some value to religious and spiritual communities, as well.

Finally, what I hope—and the reason that I entered into the field of neurotheology in the first place—is to learn more about the big questions. In other words, is there some way that we can use this information that we are gathering to tell us something about how we think about our world, how we think about the nature of reality, what is right, what is wrong, what is truth, and how we as human beings make some sense out of our realities.

Many people who experience spiritual states and mystical experiences have radically different kinds of experiences about reality than what average people tend to experience during their everyday lives. If that is the case, I think we need to understand why people have these unique experiences and what they mean? Are they just illusions, delusions, or are such individuals getting glimpses of something that is a far more profound perspective on the entire universe than typically experienced? The short answer is: “We do not know.” However, I think that there are so many ways in which this field of research may be able to help lead us down that path of understanding.

Q: What are some of the most significant advances in our understanding of the mind–body or spiritual–body connection over the last decade?

Dr. Newberg: The amount of research articles published in the last 30 years has increased exponentially, and many studies have looked at the effects of various types of practices and at the relationship between spirituality and health. Clearly, there is an effect. Of course, there is no medication that is perfect or that answers every problem in medicine. Similarly, there is no meditation or prayer practice that is going to solve every problem. However, trying to figure out some of the specifics is what the field of neurotheology research is focused on.

One of the major more-recent findings, not surprisingly, relates to the complexity of what goes on in our brains and our bodies when we engage in mind–body practices. It is not that one just begins meditating or focuses on a phrase and the body changes. That can happen, and I do not want to say that the simplistic answer is completely wrong; but, for the most part, these practices involve very complex processes and many different parts of the brain.

Concentration on a prayer or a phrase, for example, activates parts of the frontal lobe, which is involved in our ability to focus attention. If a person has a profound emotional response, we might see activations in the amygdala or in other emotional centers of the brain.

Another example involves the parietal lobe. The parietal lobe normally helps to establish the sense of self and sense of space and time. What we have typically found is that, when people lose the sense of self and have a sense of “spacelessness” or a sense of oneness of all things, that experience is associated with a decrease of activity in the parietal regions. The brain itself then is connected to the subcortical areas—such as the thalamus and the hypothalamus—which are involved in altering hormonal status and autonomic nervous system status, and changing the way in which the body responds, as well. When people ask “is there a spiritual spot or spiritual part of the brain?,” I always reply: “If there is a spiritual part of ourselves, it is the whole brain and body, because there are very integrated and complex processes involved in spiritual practices and experiences.”

I think one of the main things we have found in recent years relates to the degree of complexity and how rich and diverse all of these different kinds of experiences can be. Then,

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regarding the clinical piece, what we need to understand is that there are many different practices, beliefs, and experiences that people have. Determining which of these are the best for helping people address various conditions is something that is going to be fairly complex. On the one hand, one might say: “Well, do a simple relaxation practice or a simple yoga or meditation practice to reduce HR and lower stress.” That is a simple approach, and many practices help lower stress. However, to gather more detail about whether or not these practices improve the immune system, alter the way the cardiovascular system works, or alter risk factors for cancer, we have to delve into greater complexity.

When we start to think about this in a more clinical way, we also have to realize that there is not going to be a one-size-fits-all remedy and that various practices will be more effective for certain people, compared with others. One of the big future directions for neurotheology research, therefore, is to understand interindividual differences that might be very useful. If a patient asks, “what type of meditation should I do?,” clinicians may then be able to answer: “Based on who you are, what you are looking for, and what issues you are dealing with, these are the practices that might be the most effective for you.”

Q: What specific research findings might clinicians be interested in regarding brain imaging findings and the clinical application of this area of study?

Dr. Newberg: On a clinical level, research over the last 15 years has shown that many different types of spiritual practices or spiritually derived practices, such as meditation and prayer, have significant clinical and brain effects. Some of the research that I have done, for example, has shown that these types of practices—meditation, prayer and so forth—help reduce symptoms related to depression and anxiety, and may actually help improve the way the brain works cognitively.² Specifically, my colleagues and I conducted a study utilizing a practice known as Kirtan Kriya meditation in older individuals with mild-to-moderate memory loss.³ Results of the study showed that, compared to baseline, participants in an 8-week meditation program experienced improvement in memory by about 10%–15% and also had concomitant changes in the brain, particularly in the frontal lobes. This correlates well with the notion of being able to concentrate and utilize cognitive processes more effectively, especially as we age.

Recommended Reading

Principles of Neurotheology

By Andrew B. Newberg, MD
Burlington, VT: Ashgate Publishing, 2010

Why God Won't Go Away:

Brain Science and the Biology of Belief
By Andrew B. Newberg, MD, Eugene d'Aquili,
and Vince Rouse
New York: Random House, 2001

How God Changes Your Brain

By Andrew B. Newberg, MD, and Mark Robert Waldman
New York: Ballantine, 2009

There is also a growing body of structural brain-imaging research, which has shown that people who are long-term meditators have thicker frontal lobes than people who do not meditate.⁴ I like to use the muscle analogy that, if one goes to a gym and lifts weights, that person's muscles become thicker and stronger. In a similar way, if one lifts "mental weights" by doing a meditation practice, that person's brain literally becomes thicker, stronger, and more functional.

Finally, as these practices reduce stress for people, there is also evidence that this translates into genomic expression, and telomere length may actually increase by engaging in these practices.⁵ Therefore, not only are there clinical responses that people may experience through these practices, such as reduced BP and improved mood and emotional status, but there also may be a fundamental biologic shift that occurs and affects human beings at the genetic level.

Q: What advice do you have for clinicians regarding their recommendations to patients about contemplative, spiritual, or religious practices to engage in for better health?

Dr. Newberg: One of the big take-home pieces for all of this, which takes us back to the complexity issue, is that there is no one-size-fits-all formula. Each person needs to explore and find the practices and approaches that work best for him or her. To some extent, each person needs to take stock in who he or she is as a person. What does the individual like to do? Does the person like to sit quietly? Do she or he like to move? Does the person like to concentrate? Does the individual like to let his or her mind wander? Or does he or she have a particular religious or spiritual tradition that is important? If the latter is so, prayer might be more effective than engaging in a random meditation practice. Other questions to consider are what are the individual's goals? What does one hope to get out of a spiritual or meditative practice? Is one simply looking to reduce stress and anxiety, or is one looking for some type of spiritual feeling or experience?

People also then need to do their homework and explore different practices by talking with their friends, families, clergy, health care providers, and teachers of various practices, and ask what these people recommend. Practices, such as mindfulness meditation, Transcendental Meditation,TM Kirtan Kriya meditation, prayer, and saying the rosary may

all help in terms of improvements in mood, relaxation, stress reduction, and other factors. The question, though, is which one is most appropriate for a given individual because it is important to point out that all of these practices do not work for every individual person.

Clinicians also want to avoid some of the pitfalls associated with these practices. For example, there are some case reports about people who have had very negative experiences with meditation. There is the occasional report of a person who has had a psychotic episode related to meditation, but this is very unusual, except for during intense practices. On the less-extreme side, sometimes people can just feel frustration from difficulties engaging in the practice. They might feel that it is not working for them, or they may not like the experience. Clinicians want to make sure that the recommended practice is not creating an internal conflict or going against certain belief systems, which may cause additional stress and anxiety for a person.

There are also other interesting negatives. For example, we should be very cautious about either the health care provider or the patient coming to some conclusion that the reason that a person became sick was because the patient was not spiritual enough. We also do not want to suggest that religion or spirituality is like a medication. That is not why people are religious. They are religious because it has meaning to them, not because they think it is going to reduce their risk of developing cardiovascular disease by 15%. While we may utilize the various practices that benefit us, we have to be cautious about adopting an approach that sounds like: "Take two prayers, and call me in the morning."

Q: What final advice do you have for clinicians in terms of advising their patients about spiritual practices and about the field of neurotheology?

Dr. Newberg: It is important for clinicians to understand the sum total of their patients. Human beings are not just biologic, but are also psychologic, social, and spiritual beings. It is therefore important for clinicians to find out, in an unobtrusive and inoffensive way, whether or not people have religious and/or spiritual beliefs, how they utilize those beliefs in the context of their health care, and whether or not we might learn something about how these beliefs and practices help these patients. If particularly religious individuals are going to have surgery, then it may be appropriate to help such patients stay in touch with that side of themselves and to remind them that staying connected to their religious communities may be very valuable.

We need to be sensitive to every person's beliefs. Obviously, it is not wise to tell an atheist to start praying because there was a research study that showed that prayer helps reduce anxiety levels. We have to think clearly about who our patients are and about their belief systems, and then, with the data that are available, help these patients select practices that might be applicable in certain situations.

Then, of course, we also need to remind patients that there is no one-size-fits-all mind-body or spiritual practice, and even

though a clinician thinks a particular practice might be a good option, that does not mean it will work. Patients may need to be encouraged to try various practices, see what works, report back to their clinicians, and then aim toward finding paths that work best for them. Ideally, these would be paths that take them to a level of happiness and healthfulness that helps patients to engage their psychological, spiritual, and biologic parts of themselves as effectively as possible and in an integrated way. ■

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5. Hoge EA, Chen MM, Orr E, et al. Loving-Kindness Meditation practice associated with longer telomeres in women. *Brain Behav Immunol* 2013; 32:159–163.

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