

Comments On "A Neurobiological Model For Near-Death Experiences"

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Everyone now knows how to find the meaning of life within himself. But . . . less than a century ago, men and women did not have access to the puzzle boxes within themselves. They could not name even one of the fifty-three portals to the soul. (Vonnegut, 1959, p. 7)

Juan C. Saavedra-Aguilar and Juan S. Gómez-Jeria present a neurophysiological explanation of near-death experiences (NDEs) based on temporal lobe dysfunction and stimulation of the hippocampus and related limbic structures by endogenous endorphins released at the moment of death. Their hypothesis hinges on clinical similarities between temporal lobe seizures and NDEs. Presumably, the stress of dying would trigger endorphin release, which would lower the seizure threshold within the temporal lobe and trigger agonal seizures of a mystical nature. This theory was first outlined by Daniel Carr (1982), in this journal.

Previously, my colleagues and I proposed a similar model, based also on neuronal pathways connecting the temporal lobe, the hippocampus, and related limbic lobe structures (Morse, Castillo, Venecia, Milstein, and Tyler, 1986). Our model is based on the neurotransmitter serotonin, rather than endorphins, and attempts to integrate all clinical factors known to trigger out-of-body states and mystical hallucina-

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tions, including emotional stress, lysergic acid (LSD), ketamine, temporal lobe seizures, and the dying process itself.

Our study of acidotic and hypoxic children treated with opiates demonstrated that narcotics do not cause NDE-like hallucinations (Morse, Castillo, Venecia, Milstein, and Tyler, 1986). That clinical evidence, coupled with admittedly scanty evidence that LSD, ketamine, and emotional stress could possibly be linked by common serotonergic pathways, led to our speculating that serotonin could be a neuropeptide "portal of the soul," rather than endorphins.

Regardless of which neurotransmitter ultimately proves to be involved in NDEs, it is exciting that research groups around the world are starting to think about the neurochemistry of consciousness. The recent discoveries of complex neurotransmitters within the brain has shed new light on the complex processes of emotion and consciousness. Our previous assumptions of mind/brain processes are based on outdated theoretical constructs of brain function, and simplistic notions of consciousness and the mind.

For thousands of years, Aristotle's view of the brain as a large air conditioner for the bloodstream held sway, and the soul was thought to be located in the heart. The medieval anatomists searched for the Bone of Luz, thought to represent the indestructible nucleus of the body, from which the body was to be resurrected. In the early 1800s, Franz Joseph Gall proposed that specific mental functions could be related to neuroanatomical structures, and the modern era of neuroanatomy began (Gall and Spurzheim, 1810-1819).

Since that time, neurologists have been occupied with histopathology and neuroanatomy. The brain has been dissected in glorious detail, and electrical stimulation studies have been used to document neural connections cleanly within the brain. Our understanding of the brain has closely mimicked our own technology. With the invention and widespread use of the telephone came the telephone cable connection concept of the brain, and the use of lobotomies to sever those connections. Then the brain was compared to a giant computer, a giant adding machine, with billions of off/on switches at the heart of all we consider to be uniquely human. Since we have gained an understanding of holograms, new insights into processes such as memory and learning are now explained with holographic models. Each theory in turn has ultimately failed to explain brain processes completely, especially the most complex brain process of all, consciousness.

For example, Wilder Penfield discovered that when he electrically stimulated patients in the motor cortex to raise their arms, they would raise their arms and tell him that he "made them do it." When he

would stimulate the same motor pathway, but at higher levels of neuronal processing, the patients would not only raise their arms, but would confabulate some excuse for doing so (Penfield and Rasmussen, 1950). Clearly, some higher order element of consciousness and sense of self became integrated into the act, and yet, the precise location of that area defied easy definition. Memory, learned behaviors, and the sense of consciousness seem to be distributed widely throughout the brain, and can be retrieved from numerous different sites.

To further complicate the issue, the typical mind/body discussion presumes that the mind is some sort of unitary process. The soul, or mind, or consciousness, is often seen as a mysterious vapor that infuses matter in some completely unknown way. At death, that vapor or spirit rises out of the body, leaving the brain behind, but somehow still incorporating neuronal functions such as sight, hearing, and proprioception. Considerable effort has been expended to measure or somehow quantify this non-material aspect of a person. Eastern religions tend to see the soul as more of an essence, a set of karmic tendencies. Modern Christian thinking is heavily biased in favor of Platonic concepts of mind/body dualism, which depicts the soul as retaining all the essential elements of personality and character, but separate from the machine—the body—which it infuses with life.

But regardless of which definition of the soul we choose, we cannot ignore the fact that consciousness is not at all a unitary function. We simultaneously generate numerous states of consciousness, all of which are bound up in our concept of the soul. We simultaneously generate conscious and unconscious thoughts and actions. We can consciously choose to bring unconscious events such as blood pressure regulation under conscious control. Likewise, our unconscious life, our hidden fears and phobias, can control our conscious actions without our conscious knowledge.

Also within the brain are many centers that trigger altered states of consciousness, including inebriation, intoxication with marijuana or hallucinogens, hypnosis, mystical visions, and the like. Are these states "real," and if so, which ones represent the true mind, the unitary soul that supposedly inhabits our bodies? Can, for example, someone see God by taking LSD, and if so, is his or her experience any less valid than that of someone else who starves his or her body into a similar biochemical state, and has a mystical vision after spending forty days alone in the desert? Any discussion of the nature of consciousness quickly bogs down in the endless complexities of this type of question.

In presenting our neurochemical model of NDEs at various conferences and lectures, I have noticed that it is usually assumed that, since

I am proposing a neurochemical explanation, I must not believe that NDEs are "real." Experiencers in particular feel strongly that I am attempting to invalidate their experiences, and often become angry. The protest that their NDEs were real, not hallucinations. This misunderstanding of my position embodies the assumption that the only medical model with which to understand NDEs is the reductionistic mind/body dualistic model that has become embedded in our culture.

The current debate about NDEs, which supposes that NDEs must be either hallucinations caused by chemical processes or real experiences of the spirit floating outside the flesh, is symptomatic of the crisis that all of medicine is facing now. Our society is in the process of searching for a new medical model that incorporates a greater understanding of the inseparability of the mind and body. At a time when the technology of medicine includes heart transplants and genetic engineering, we are also seeing a resurgence of "holistic" medical practices, such as homeopathy and naturopathy, that boast of being nonscientific. Such disciplines that use nonscientific methods to attempt to prevent disease are popular because the public has a deep craving for a holistic approach to their disease.

Although Harrison's textbook of medicine acknowledges on the very first page that patients desire a "magical exhibition" from their physicians, they do not discuss at all how to provide this exhibition, which is slowly becoming a lost art (Braunwald, Isselbacher, Petersdorf, Wilson, Martin, and Fauci, 1987). A recent editorial in the *New England Journal of Medicine* lamented the lost art of listening to heart tones with a stethoscope; the author portrayed a world in which patients are "given a sheaf of requisitions for laboratory tests" instead of a caring, sensitive physician willing to take the time to listen to the heart, which can "provide a much appreciated opportunity for the patient to express the accumulated concerns that led to the interview" (Craig, 1988).

The field of psychiatry is particularly struggling to find a balance between treating the mind with psychotherapy or treating the body with medications. The field has solidified into an unhealthy "either/or" situation. For example, the use of the major tranquilizers to treat schizophrenia has been successful in emptying hospital beds. The result has been that a large portion of the homeless people wandering our streets are schizophrenics. We need a biosocial model for disease that defines wellness not only by mental status exams, but also by the ability to hold a job and to find a warm place to sleep and access to nutritious food.

Our current reductionistic dualistic biomedical model evolved as a religious concept over one thousand years ago. The early Christian church became heavily infused with the Greek Platonic notion of a soul independent from the body. Certain consequences followed such thinking as our social institutions came to reflect our notion of reality. As the church focused on the soul as leaving the imperfect vessel of the body for other worlds, classical science readily fostered the notion of the body as machine. Disease was therefore the breakdown of the body, and the doctor's task was to repair the machine. "The scientific approach to disease began by focusing in a fractional-analytic way on biological processes, and ignoring behavioral and psychosocial processes" (Engel, 1977).

A new biosocial model must be formulated. Our current model is excellent for treating acute ear infections or for providing mechanical solutions for heart disease, but it does not even provide us with the vocabulary for treating problems such as chronic abdominal pain, and it breaks down completely with such entities as arthritis, reflex neurovascular dystrophy, and most mental diseases. As a practicing physician, I see many patients who do not have any definable disease, but rather suffer from "the razor blade of life," a concept familiar to all general practitioners.

"A Neurobiological Model for Near-Death Experiences" is an intriguing and sophisticated effort to link psychosocial processes with neurochemical events. Both that paper and my serotonergic model contain numerous speculations and unsupported assumptions. However, our standard "gating" theory for control of reaction to pain was first described in equally vague and unsupported assumptions. As more scientists speculate on these issues, the many gaps and assumptions will be filled in.

For example, after our article was published (Morse, Castillo, Venecia, Milstein, and Tyler, 1986), physicians from the U.S. Naval Hospital in Portsmouth pointed out that global hypercapnia should cause diffuse signs and symptoms, and speculated instead that ischemia at the level of the terminal supply of the vertebrobasilar circulation would more specifically account for near-death phenomena, as the posterior temporal lobe and occipital lobe are supplied by those vessels (Lewis, D. W., and Watson, M. E., personal communication, 1986). Their addition to our serotonergic model results in a biochemical localization of virtually all of the elements of the NDE.

A new discipline of the neurochemistry of consciousness is being born. Such a discipline will not discredit those who have had near-

death experiences, but rather will attempt to update outmoded assumptions about the mind and consciousness based on outdated theories of dualistic mind/brain function.

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