cells, including the brain cells that mediate our thoughts, feelings, memories, and emotions, are going through their own processes of death, they are still viable for a period of time after we die. So now the question is, When someone dies, what really happens to his or her psyche or soul? Is it annihilated like many believe, or does it continue to exist for a period of time, and if so, for how long?

The discovery of resuscitation science would lead to the first reports of people who had died and been brought back to life telling us what they experienced. People related their astonishing experiences in the time after they had died and before they had been brought back to life. So although we once believed that there was nothing else to question about death, that it was black and white, like a century of physicists who said there was nothing to question about Newtonian physics, some have started to argue that we may now have the need for a paradigm shift regarding what happens when we die and the period after death. These realizations have only really started to come about after humankind’s gradual discovery of the means to successfully reverse death itself—something that had always seemed impossible until now.

**The Afterlife We Know**

Firefighter Don Herbert was battling a raging fire inside a house in Buffalo, New York, on December 29, 1995, when the roof collapsed and trapped him under a pile of smoldering debris. Minutes before he nearly burned to death, members of his ladder team rescued him by pulling him out of a window, but in many ways it was too late—Don Herbert was already undergoing anoxic brain injury from having been stuck in a smoke-filled room for too long. Biologically speaking, essentially what was happening to his brain was the exact same thing that happens after a cardiac arrest and when people die: a global stroke—a stroke that is causing progressive cell damage in the whole brain and not just a part of the brain. Although potentially reversible at first, the damage eventually becomes irreversible. Herbert was rushed to the hospital, but by the time he arrived, he had slipped into a coma. He wasn’t able to respond to any verbal commands, likely due to swelling of his brain. Although today medical interventions such as cooling may have prevented the progress from reversible to irreversible brain damage
and cell death, not enough was known about it at that time, and he eventually progressed into a state of irreversible brain damage.

Though Herbert did regain consciousness for a period of time, he soon slipped back into a permanent disabled condition known as a minimally conscious state, confirming that after anoxic brain injury, a process of cell death and damage occurs over a number of hours and even days that eventually leads to irreversible brain damage and death unless an appropriate and timely intervention is made. Minimally conscious state and persistent vegetative state are two terms used to describe different points along the same spectrum of what happens to people after extensive damage to the brain areas involved with the process of consciousness and awareness. Traditionally, it has been taught that unlike a person in a vegetative state who does not exhibit any signs of consciousness, a person in a minimally conscious state, although also largely unresponsive, can muster some very limited responses to some external stimuli but is otherwise unable to perform any of the basic daily living tasks such as talking, walking, or eating without assistance from others. In short, the paradigm has always been that a minimally conscious state is a condition of severely altered consciousness in which minimal behavioral evidence of oneself or the environment is demonstrated that is completely absent in people in a vegetative state. Herbert’s situation was so severe that he could not even be fed by others so he was given a feeding tube to keep him alive. After a period of time passed with him in this condition, a neurologist determined that he would not recover, and he was placed in a twenty-four-hour nursing home.

Herbert’s case and many others like it demonstrate the devastating consequences of what happens to patients following anoxic brain injury whether from cardiac arrest and death or otherwise, without appropriate and timely interventions. His case also highlights the contrast between what happens to the Joe Tiralosis of this world and the Don Herberists of this world. Sadly, for every Joe Tiralosi, there are many more Don Herberists. The contrast is remarkable—one hardworking father goes back home and back to work functional and contributing to society, caring for his family for many years after anoxic brain injury; another is left in a dreadful disabled state, unable to communicate, and unaware, while being cared for by society through taxpayer money. Aside from the ethical and moral cost to society and the devastating consequences to families, the financial burden to society is also not insignificant. It has been estimated that the cost of caring for each person suffering with long-term consequences of brain damage ranges anywhere from $600,000 to $1,875,000, and although the provision of health care is costly, clearly every brain saved will lead to significant cost savings.

Although it highlights the absolute need to establish a system that provides optimized, high-standard care for everyone so that there will be many more Joe Tiralosis and far fewer Don Herberists, this case and many others also shed light on one of the most mysterious, fascinating, and important questions that has intrigued scholars, researchers, and the lay public alike for years—the fundamental question of who and what we are and what happens to us after death.

Most would agree that while we all have an external physical appearance that changes with time, each one of us is fundamentally a thinking, conscious being with a unified mental life of his or her own. It is this that in essence distinguishes who we are above and beyond our external physical appearance. Our mental life, our “self,” which remains “one” throughout our lives, whether young or old, contains an amalgamation of all our thoughts, feelings, instincts, memories, personalities, and more—in essence it contains everything that makes us into who we are. It is this entity—often referred to by scientists today as “consciousness”—that defines us. In Don Herbert’s case, his consciousness or soul was everything that made him into who he was—it was that entity which was present and manifested as his vibrant self before his accident, but was largely absent after his anoxic brain injury. While in contrast to his body, which remained physically recognizable as Herbert, his conscious-
ness, his soul, was no longer recognizable to anyone, and sadly it seemed to have been lost forever.

Ten years passed. Herbert's four sons grew up, and his wife continued to visit him daily and hold out hope of him one day talking again and being himself again. But as time passed, there was no measurable progress in his condition. He spent his days slumped over in a wheelchair, seemingly unaware of where he was or even who he was.

Then one day quite unexpectedly, Herbert regained awareness of who he was. He was more alert and though only capable of struggling to mention largely unrecognizable words, he managed to ask the nurses how long he had been gone and where his family was. When his wife and sons arrived, excitedly and in his own limited way, he kept asking how long he had been away. He was blind from the accident, but he recognized their voices. They told him that he had been gone for ten years. Utterly devastated, he began to cry in disbelief. But how amazing! Don Herbert's consciousness, his soul, had come back to view after almost ten years of absence. Although not fully recovered and still unable to communicate more than a few words at a time and even that with great difficulty, Herbert was nevertheless once again able to more meaningfully interact with his loved ones, and, more important, he was aware and conscious again, albeit severely disabled.

Sadly, Herbert eventually died after catching pneumonia. Though his story did not have a happy ending, his case and many others like it have raised profound questions regarding our understanding of consciousness, the concept of the soul, and what happens to us after death.

As already discussed, today much of our perception regarding what makes up who we are is shaped by what we have been conditioned to believe through our given cultures, our societies, or our own personal beliefs. But clearly, with so many different opinions and so many different societies and social groups, not everyone's beliefs can be correct. In trying to identify the correct opinion, we cannot even rely on the majority opinion, since history has shown that the correctness or falsity of a belief is not necessarily related to whether it is held by a majority in a given social group or society. This fact even applies to scientists and scientific beliefs. For instance, studies have shown that strongly held opinions, accepted by the majority in medical science at any given time, usually completely change as frequently as every twenty or so years. So at least with respect to defining the true reality of a given subject, one cannot necessarily always rely on the majority scientific opinion of a given time. Furthermore, when discussing a subject, much of what is being discussed is often lost in the imprecision of the actual terms used, which may have different meanings to different people and thus engender strong emotional responses that limit the ability to have a rational and reasoned discourse. This is particularly the case with understanding the nature of the self and what happens when we die.

Here is what we do know today. Through scientific study, we understand how brain cells produce proteins and different chemical molecules. We even understand how the profile of brain cell chemicals called neurotransmitters (chemicals that help transmit electrical signals between cells by moving in and out of cells) change with the changing of our thoughts and feelings. We also understand that proteins, chemicals, and electricity are fundamentally very different in nature to a thought or a feeling. Thoughts and everything else that make up a person's consciousness cannot be broken down into a protein or any other chemical molecule or even electricity. In science, we have not been able to come up with a plausible biological mechanism to account for how a cell or groups of cells working together (i.e., the brain) could possibly generate a thought or a collection of thoughts and hence ultimately the entity we call human consciousness. We know how cells make electricity through the
movement of chemical molecules, but we just don't know how they could also make thoughts from electricity or chemicals. Much of what has been stated in support of the idea of the brain producing thoughts ignores this very important point, which, according to the Australian philosopher David Chalmers, is the “hard problem of consciousness.”

What we do know is that the “self,” consciousness, psyche, or soul—which includes the mind—does exist and is clearly linked with very specific regions in the brain that are wired and linked together through electrical impulses generated by the movement of certain chemicals in and out of cells. These closely linked regions in the brain, while not necessarily producing thoughts, demonstrate certain specific changes in association with our thoughts, feelings, and changes in our level of awareness of the external world. So if you feel sad or happy, jealous or benevolent; whether you enjoy listening to music or watching an opera or a game of football; and even when you feel love for your children, we can identify the biological correlates or “fingerprints” of all those feelings and thoughts through changes in blood flow and metabolism in the groups of cells that reside in specific areas of the brain. Of course, in the same way that a “fingerprint” is not a finger, the change in metabolism in cells or the change in blood flow in a brain region in association with a thought or feeling is not the same as a thought or feeling itself.

Researchers and doctors have now delved into what happens to human consciousness and its relationship with activity in the specific regions of the brain. Putting aside the debate regarding the nature of human consciousness (or soul) and how it comes to be, and while acknowledging that brain cells may not have the specificity to be able to produce thoughts, there is much evidence that demonstrates that consciousness is nonetheless modulated by specific regions of the brain. Everyone has experienced this in daily life, particularly during sleep, which is the classic state where modulation of our consciousness takes place every day. When we sleep, we all lose consciousness and awareness of our surroundings, albeit temporarily.

A report by the National Institute of Health has summarized what happens during sleep very well. It states: “Nerve-signaling chemicals called neurotransmitters control whether we are asleep or awake by acting on different groups of nerve cells, or neurons, in the areas of the brain. Neurons in the brainstem, which connects the brain with the spinal cord, produce neurotransmitters such as serotonin and norepinephrine that keep some parts of the brain active while we are awake. Other neurons at the base of the brain begin signaling when we fall asleep. These neurons appear to ‘switch off’ the signals that keep us awake. Research also suggests that a chemical called adenosine builds up in our blood while we are awake and causes drowsiness. This chemical gradually breaks down while we sleep.”

Many different neurotransmitters or chemicals are involved in the modulation of our level of consciousness and awareness in the brain, but interestingly they are not unique to consciousness or even the brain for that matter. They are some of the same common signaling chemicals found in other organs of the body. One example of a transmitter involved with our sleep/wake cycle is histamine, which is also involved in allergies. Histamine helps us remain conscious, awake, and alert, and this is why when we take some antihistamines, say for an allergy, we become sedated and sleepy. A reduction in histamine levels in the brain causes us to fall asleep, and lose consciousness and awareness of our surroundings, whereas a reduction in histamine levels in the nose causes us to stop sneezing and reduces nasal symptoms during the allergy season.

Another transmitter that is involved with manifesting consciousness is acetylcholine, which is also found all over the body; when altered outside the brain, it can cause a dry mouth and diarrhea, among other things. Serotonin is yet another example of a transmitter that modulates our level of consciousness by making us
sleep, wake up, or become completely unconscious (depending on the levels), but it also has many other effects too. Changes in the level of serotonin in certain parts of the brain can cause depression, while in the gut serotonin helps our intestines move more regularly. This is why we give people with certain gastrointestinal disorders such as irritable bowel syndrome “antidepressant” drugs because they increase serotonin. But the same exact drug is also prescribed to people with depression.

Finally (although I have not provided an exhaustive list), another modulator of our level of consciousness is dopamine; if altered in the parts of the brain that deal with consciousness, dopamine can impact our level of wakefulness and consciousness. However, if reduced in other parts of the brain (areas involved with movement), it leads to Parkinson’s disease. Outside the brain, dopamine increases blood pressure and heart rate (among other things). In fact, in the intensive care unit we commonly use dopamine drips to increase the blood pressure in critically ill patients, while neurologists give drugs that increase dopamine levels in specific parts of the brain to treat people with movement disorders such as Parkinson’s disease.

So what can we conclude? First, aside from the fact that a chemical is not the same as a thought, or a feeling, or the sense of awareness and consciousness that we experience every day, we also can’t say that any state of consciousness or even feeling such as depression or happiness is the same as the specific chemical transmitter that modulates it since those transmitters are found all over the body. However, we do know that being aware, alert, and conscious as opposed to being in a sleep, or an unconscious state and coma, takes place in response to specific changes in neurotransmitters in very specific regions of the brain that modulate our level of consciousness. Some changes cause consciousness to “disappear” by leading us to go to sleep or lose consciousness entirely (this is what a coma is), while an alternative change in the same transmitters causes consciousness to “reappear” by leading us to wake up or become fully conscious again after a coma. Thus, external awareness and a state of consciousness is orchestrated through activity in specific, complex brain circuits. This takes place through chemical regulation in the brain.

Researchers have discovered and charted the circuitry in the brain that modulates our consciousness. To simplify, it starts on the brain stem at the base of the brain, proceeds up the middle of the brain, and then goes into the frontal areas of the brain. The continuous circuit that activates it makes a person awake and alert, and if it shuts down for any reason, consciousness is lost, until the process causing the circuit to shut down is resolved. So consciousness can either be temporarily or permanently lost depending on what event has impacted or damaged the brain circuit that modulates consciousness.

Many events affect the brain regions that are involved in modulating consciousness, leading to a loss of consciousness and coma that, when reversed, lead a person to come out of unconsciousness. This is how sedative and general anesthetic drugs work. There are times when doctors want to purposefully shut down those pathways in order to medically treat a patient, such as during surgery. These drugs impact the pathways of the brain and take away pain perception, as well as take down memory circuits and consciousness circuits. That’s why people can have surgery and not suffer horrible pain. Even though we can’t see the patient’s consciousness during that time, just as happens with sleep we know it is still there, and after the surgery we can bring the patient out from under the anesthesia and return the person to a fully conscious state. A commonly used drug that modulates the areas of the brain involved in consciousness is propofol. Although this drug received a great deal of media attention after the death of pop star Michael Jackson, critical care doctors and anesthesiologists have been using propofol in the ICU or before surgery for a very long time.

Aside from drugs, any medical condition that affects the chemical balance in those same specific brain regions will make a person’s
consciousness disappear too. In fact, any condition that leads to inflammation in the body and the release of specific inflammatory molecules in the body will alter the region of the brain that modulates consciousness. A simple everyday example of this is catching a cold or flu. This is why we become more sleepy and drowsy in general when we are ill. This is also why people may go into a coma when they become seriously ill and the level of inflammation becomes very high. These conditions include traumatic brain injury, vascular disease and stroke, brain infections such as meningitis, and liver failure. Infections cause a loss of consciousness and coma when viruses or bacteria (or the toxins produced by them) enter the brain and bind onto those areas of the brain that deal with consciousness. Severe liver failure causes coma due to an accumulation of toxins in the bloodstream (which the liver normally would dispose of, but cannot because it is not functioning properly). When these toxins reach the brain, they cause loss of consciousness by affecting the circuit that modulates consciousness. All these drugs and medical conditions share a common pathway: they cause changes in the chemical balance in those areas of the brain affecting consciousness.

Aside from the modulation of the chemical neurotransmitters that work on the specific regions of the brain involved with consciousness, whether due to a drug or due to an illness or even a loss of oxygen to the brain cells (anoxic brain injury), another mechanism leading to loss of consciousness is simply physical damage to the underlying cells that make up the brain circuit that modulates consciousness, such as occurs as a result of severe trauma. Thus, in Don Herbert’s case, his almost complete absence of consciousness for ten years was initially due to the impact of a lack of oxygen being delivered to the cells, followed by the permanent damage that arose from anoxic brain injury in the specific areas of the brain that modulate consciousness. Even if the changes in the chemical profile are extensive, in many of these conditions the underlying brain cell structure is preserved and that is why when the condition (e.g., severe infection) has been resolved, a person’s consciousness returns. However, cells permanently and irreversibly damaged cannot even respond to changes in their corresponding neurotransmitters, or they simply lose the ability to produce the neurotransmitters.

It is as if the biological switch has been turned off permanently and thus human consciousness or the soul appears lost forever. As a result, Herbert had become permanently confined to a state of unconsciousness—his consciousness had “disappeared” and could never “reappear” because the circuitry needed to enable it to appear again had been damaged by the consequences of a lack of oxygen and was not functioning properly; when irreversible brain injury sets in, generally not much can be done. The key is to intervene before the damage has become irreversible. This is why Herbert’s neurologist had thought his condition would be permanent.

However, incredibly and quite unexpectedly for Herbert and his doctors, after ten years, something changed in the structure of his brain that modulates consciousness, and his consciousness “reappeared” and he became fully aware of his surroundings. It is as if the switch was turned back on again. It was not clear why and how his brain had partially repaired itself and enabled his consciousness to “reappear,” but clearly during the previous ten years, Herbert’s consciousness, soul, or psyche, the entity that made him who he was, his unified self, had not completely disappeared—it was always there, just not visible to the outside world and unable to communicate with it.

So while people in a minimally conscious or vegetative state have had permanent damage to those particular pathways involved in the modulation of consciousness, what is important to acknowledge is that just as when we are asleep, or after we have been given a general anesthetic, taken a heavy sedative, or suffered a severe infection, we can’t say we have “lost” our consciousness in the true sense of the word (i.e., our consciousness hasn’t actually left us and disappeared into the ether or even become annihilated). Instead, the circuit that modulates it is not active and so it is not visible and in contact with
the outside world. Under these conditions, it also cannot modulate internal or external stimuli such as pain or experience memories, which is precisely why we don’t experience anything, whether it be pain, memories, hearing, vision, or touch, when we are in a deep coma. It is almost like a person’s consciousness—the self or soul—goes into a sort of hibernation mode. It exists but doesn’t have meaningful interactions anymore. Therefore, in Don Herbert’s case, while he seemed destined to stay in that state forever, something unexpected and incredible happened; somehow the damaged areas of his brain that modulate consciousness changed after ten years, and as that happened, his consciousness—his real self—“reappeared” and started to communicate with the external world, while having no idea how long he had been gone for.

For decades, in fact for as long as we have known scientifically, it was believed that once someone had completely lost his or her consciousness and the switch was turned off after irreversible brain damage, such as that which occurs after anoxic brain injury, there was no consciousness present at all. Thus, the dogma had been that people who end up in a persistent vegetative state after brain damage have permanently and completely lost their consciousness (self or soul). But a series of incredible and very interesting observations and discoveries a few years ago started to challenge this long-held belief.

What if deep inside the brain, consciousness continues to exist even if there is no outward appearance of it?∗ What if conscious-

∗Although there is a condition referred to as locked-in syndrome, where the problem is not due to damage affecting the regions that modulate consciousness, we are not referring to this condition. In locked-in syndrome, brain damage has caused paralysis while sparing the areas that modulate consciousness, so the person is not unconscious at all but just unable to move. Therefore the person appears to the outside world to be unconscious, while fully alert but trapped and unable to communicate. Here we are referring to conditions such as persistent vegetative state in which the centers that modulate consciousness have been permanently damaged and so consciousness is really absent.

ness is not lost at all, even in people with extensive brain damage who appear unresponsive and in a permanent coma? Despite the brain areas modulating consciousness seemingly being shut down forever, what if there are ways to awaken those areas and bring out the entity of consciousness? Scientists have started to explore the very real possibility that consciousness can go into sleep mode like a laptop computer and then can be awakened days, months, or years later in people who appear to have suffered damage to the areas that modulate consciousness. This research could result in major breakthroughs and have implications not just for neuroscience and resuscitation science but also for all of society.

Dr. Nicholas Schiff has done extensive work in this area. Schiff, who was named one of the hundred most influential people in the world by Time magazine, serves as director of the Laboratory of Cognitive Neuro modulation at the Weill Cornell Medical Center in New York. For a 60 Minutes television report on the treatment of minimally conscious patients, Schiff studied Herbert’s case and said that his awakening may have been caused by a Parkinson’s drug. In other words, Herbert’s damaged brain had become depleted of dopamine (one of the neurotransmitters that, as discussed, is involved in modulation of consciousness). Furthermore, Herbert was destined to permanently remain in a minimally conscious state due to the unrecognized depletion of the dopamine levels in the circuit that modulates consciousness—until he was administered a Parkinson’s disease drug, which increases the level of dopamine in the brain. This had inadvertently corrected the deficit in Herbert’s brain and hence Herbert’s consciousness; his soul had suddenly “reappeared.” His doctors and everyone else had assumed it was a sudden miraculous recovery because they had never considered such a thing possible. Doctors had always assumed once permanent damage has set in, nothing can be done.

This case and others like it have opened the door for other drugs to be tried in other people in the hope that doctors may manipu-
late the levels of neurotransmitters involved in the modulation of consciousness and perhaps "awaken" people who have been living as husks of their former selves. Although this line of investigation is still in its infancy, several successful cases of patients treated with certain drugs are now beginning to come to light and new research is under way.

The 60 Minutes report also reviewed the case of George Melendez, another man who entered a minimally conscious state after nearly drowning, which is another example of anoxic brain injury. Melendez's wife was told by doctors that he would never recover from the brain damage he sustained. She moved him to their house to care for him. Melendez's baseline state was essentially that he would make frequent incomprehensible and loud moaning sounds, which were particularly troubling at night. His persistent moaning would keep her awake frequently, and so one night, sleepless and exhausted, she decided to give George a dose of the sleeping pill Ambien (zolpidem) through his feeding tube, in the hope it would lessen his moaning. As expected, he quieted down. She then entered his room a short while later to check on him, but instead of finding him completely sedated, she found quite the opposite: George was wide awake, alert, and could even talk to her!

She was shocked and couldn't explain what was going on. She was told that his condition would be permanent, but against all the odds, her husband had awakened years after his consciousness had seemed lost forever. Then as quickly as it had come, a few hours later his consciousness disappeared again and Melendez went back to being his old self again—only able to moan and groan but with no other visible signs of being aware or conscious. Unable to explain or understand what was going on, Melendez's wife suspected it must have been related to the sleeping pill. She proceeded to give him another dose of Ambien, and the same thing happened again. For the first time in years, he had become alert and began to answer basic questions again. The Ambien became a daily routine that maintained Melendez's consciousness.

Schiff conducted a brain scan on Melendez to study exactly how the Ambien was affecting his brain. Under the scanner, the front lobe of the brain was yellow without any Ambien in Melendez's system, indicating greatly reduced activity. After Melendez was given the Ambien, the frontal lobe of the brain (front part of the brain) became bright red, indicating that the metabolic activity in his brain had increased by two- to threefold. It was clear that Ambien somehow made Melendez's frontal brain regions, which deal with the modulation of consciousness, come alive (the brain circuit that deals with consciousness includes, among other structures, the frontal sections of the brain). It appears that in Melendez's case the main impairment to being conscious and aware was damage to the frontal regions, which would be transiently corrected with the administration of the sleeping pill; when the effect of the pill wore off, his consciousness would also disappear. Through the use of Ambien, Melendez, like Herbert, progressed from being minimally conscious to being aware again, albeit severely disabled. So in Herbert's case, the anoxic brain injury had caused a deficit in dopamine levels, whereas in Melendez's case, anoxic brain injury had caused a deficit in the functioning of the frontal portion of his brain. Either way, the result had been that each man's consciousness, self, or soul had disappeared until serendipity had made it reappear.

Clinical trials are now under way to study the so-called Ambien awakenings. Researchers attribute Ambien's effect on awakened patients to a phenomenon called paradoxical excitation, the condition that has linked Ambien to sleepwalking, sleep eating, and sleep driving. Though there has been no definitive conclusion about which patients the drugs will help, it is clear that a number of people who were declared to be in a vegetative state (with no chance of recovery and completely absent consciousness) can now be categorized
as being in a minimally conscious state or even fully conscious. To ascertain the difference, the patients must be examined repeatedly through the day over a period of time.

"The one liner you get [in medical school] about brain injury was damage done," Schiff said in the 60 Minutes interview. "We know enough now to know that there are some minimally conscious-state patients where that statement is false."

Approximately two hundred thousand people in the United States are classified to be in a vegetative state, but several researchers now believe as high as 40 percent of those may need to be rediagnosed. Traditionally, a person was declared to be in a permanent vegetative state after three months of brain inactivity for injury resulting from oxygen deprivation and after twelve months for injury caused by trauma. But recent Ambien awakenings and other similar cases are causing doctors and researchers to reclassify many patients in a vegetative state as actually being in a state where evidence of consciousness and awareness can be found even though it had been thought to have been lost forever.

Since the Ambien awakenings research, many other drugs have been found to impact people who seemingly appear to have no consciousness present by altering some specific component of the overall circuitry involved with the modulation of consciousness—to make consciousness "reappear." The difficulty is understanding what specific neurotransmitter or area of the brain circuit needs to be manipulated in each case. This is the most challenging part, since while some people respond to these drugs, others do not because the injury may have affected some other area that is not obvious to researchers.

In fact, these newly discovered cases resemble earlier similar cases also discovered by serendipity. In his landmark book Awakenings, Dr. Oliver Sacks recounted the remarkable story of a group of patients who contracted sleeping sickness during an epidemic after World War I. Frozen for decades in trancelike states, these men and women were written off as permanently "gone" due to brain damage. In 1969, Sacks gave them a new drug called L-dopa. The drug had an astonishing and explosive "awakening" effect. It activated their dopamine pathways, and their dormant consciousness was brought out. It all makes sense now, since dopamine is among the many neurotransmitters involved in the modulation of consciousness.

Dr. Adrian Owen, a prominent British neuroscientist, believes that new technology may help doctors properly diagnose more cases. In 2006, in one of the most pivotal and groundbreaking studies, which put to question much of the previously held paradigm regarding minimally conscious and vegetative states, Owen and his colleagues at the University of Cambridge asked people in a persistent vegetative state, as well as normal people in a control group, to imagine they were playing tennis. Owen performed brain scans on the people as they pictured themselves rallying on the Centre Court at Wimbledon. While expecting to see no changes in the brains of people suffering with persistent vegetative states (since they had by definition been considered not to have any consciousness or awareness and had not shown any visible external signs of consciousness in the past), astonishingly the resulting brain images showed that the motor cortex (part of the brain that regulates movement) was activated in almost the same manner in those people who were in a vegetative state as those who had normal functioning brains. Those in vegetative states had completely understood the instructions being given to them by the researchers and could imagine themselves playing tennis just like healthy people. In effect, contrary to everyone's beliefs, their consciousness had always been present, even though appearing to be gone forever. However, it was only through the advent of new research techniques and technologies that doctors had managed to identify subtle evidence that these individuals' consciousness, self, or soul was still there somewhere. More important, consciousness, although seemingly absent, had been present and had
never actually been “lost” in the true sense of the meaning—even after extensive and permanent damage to the areas of the brain that modulate it.

Owen, who has since moved his research team to the University of Western Ontario in Canada, conducted another study in 2011 that found brain activity in patients who had been declared in a persistent vegetative state. Using an EEG, Owen and his team measured brain activity in sixteen people in vegetative states and twelve healthy people in response to verbal commands to wiggle their toes or make a fist with their right hands. Remarkably, three people in the vegetative state showed activity in the area of the brain that plans body movement, again confirming that the entity of consciousness, self, or soul was present and had not been lost forever. It was just not visible to the outside world and would never have been discoverable if it hadn’t been for the progress in scientific methods and techniques.

How can this be? These were people who had been declared in persistent vegetative states and in whom consciousness was no longer present. The common belief, even among doctors today, is that when someone has a persistent vegetative state due to brain damage such as occurs after anoxic brain injury, there is no consciousness remaining and it will never return. Yet in the case of Melendez and Herbert, the numerous other case reports of “awakenings” (using various drugs), and Dr. Owen’s cases, the self or soul and consciousness had been present even if seemingly lost to the outside world.

These new findings have started to challenge even the most strongly held opinions and beliefs regarding what happens to consciousness in people after suffering the effects of anoxic injury states. Consciousness is not lost, and the brain may be manipulated enough to reveal the hidden consciousness even in people assumed to be in vegetative states and without any consciousness many years after it was thought lost. This suggests that the brain and consciousness are linked, but an even bigger question is, What can we surmise regarding what happens to consciousness, the psyche, or the soul after anoxic brain injury when the heart has stopped? What happens to the human mind and consciousness when we die?*

As we have seen, death is by definition the state that follows after the heart has stopped beating, and there is thus no blood flow or oxygen being delivered to the organs in the body, including the brain. When a person dies, there is no visible sign of life. All bodily functioning, and in particular brain functioning, ceases within seconds of the heart stopping. There is thus no heartbeat, no respirations, and the pupils of the eye become fixed and dilated (due to a lack of blood flow to the brain).

But the big question is, Does consciousness, the self, or the soul become lost, in the true sense of the word, immediately after death? Does it become annihilated forever as an entity at that point?

The answer that is coming out more and more seems to suggest that it doesn’t. Consciousness or the soul, while down and thus invisible to the outside world, is not lost forever as an entity—just as we have seen in anoxic brain injury, which is what is happening after death and causes progressive cell damage and death in the brain over time. So while the circuits are clearly down, it is most likely that as we have seen with people who have experienced transient loss of consciousness due to the effects of drugs or any severe medical illness on the brain circuit that modulates consciousness, or even those who have suffered permanent long-term damage to those brain circuits, consciousness is not “lost” in the true sense of the word. In fact, we can study what happens to consciousness in

*We can ask these questions because, biologically speaking, anoxic brain injury leading to a stroke is the same as what happens after death. For instance, the main difference between a case such as Herbert’s and someone who dies is that Herbert had been saved before his heart had stopped, but the effect of anoxic brain injury on the areas of the brain that modulate consciousness would be similar.
people even after permanent brain damage to the circuits that modulate consciousness (and other parts of the brain) from anoxic brain injury has taken place, but where the heartbeat has been preserved (such as Herbert, Melendez, and some of the patients described in Adrian Owen's study who were suffering with persistent vegetative state but remained alive).

Clearly from a scientific perspective, we can't answer the ultimate question of whether or not eternal permanency with respect to consciousness, the self, or the soul continues, not least of all because today we don't have the means to directly measure and detect consciousness and we thus cannot test such a possibility. What we can say, however, is that at least for the first few hours after death, which is the time where we can study things today and also bring a person back to life, the mind, consciousness, psyche, or soul—whatever term we wish to use for the "self"—continues to exist. In the cases where we manage to reverse the process of death and resuscitate the person "back to life," even many hours after death, the person's consciousness, self, or soul will also come back. So by definition there has to be some sort of "afterlife," even if only for a few hours after death. We cannot comment with certainty beyond that point now, since that is the longest period today in which we can reverse death and bring someone back to life, but the idea that when we die there is nothing that remains seems at best premature.

Michael Cordy's _The Lucifer Code_, I would not be surprised if scientists do eventually manage to discover a type of scanner that can detect and measure what we call human consciousness. This will help us not only understand what happens when we die but also enable us to better treat people who are living seemingly without their soul or consciousness present, such as we have seen in the cases of people suffering with persistent vegetative states. It will also help us understand once and for all how thoughts, consciousness, psyche, or soul are related to the brain.

In the meantime, when we examine the evidence accumulated so far from resuscitation science through studies of the brain during and after cardiac arrest, objectively speaking we have to at least consider the possibility that the human mind and consciousness could be a separate, undiscovered scientific entity that is not produced by the brain. However, it interacts with the brain and thus continues to exist after biological death has started. Evidence is mounting that those who are brought back from death through resuscitation techniques can tell us what they experienced as well as specific details relating to their own periods of resuscitation—such as conversations or actual events that took place—even though the brain was in a state in which it was unable to function.

This also explains what has long been called a near-death experience, which, as discussed, is better renamed an actual-death experience, at least in the context of people who have suffered a cardiac arrest, since they are not near death but have actually died.

Clearly, understanding the nature of consciousness, the psyche, or the soul would be nothing short of revolutionary for philosophy, science, and medicine—and for humanity as a whole. However, until the direct discovery of the nature of consciousness and its relationship with the brain, one way to go forward would be to study consciousness during the period after the heart has stopped and a person has gone through death, but before they are resuscitated.
back to life. This would allow us to determine whether objective
evidence regarding the continuation of consciousness can be found.
This is what ultimately led a group of scientists and researchers to
try and undertake such a study, AWARE (AWAREness during RE-
suscitation), which is aimed at studying the brain and consciousness
during cardiac arrest to discover through science more about what
really happens when we die.

**CHAPTER 10**

**The AWARE Study**

September 11, 2008, was an important day in New York. It was
hard to escape the somber memory of the devastating events that
had shaken the city and the world seven years earlier. While many
commemorations were taking place at Ground Zero, where the
lives of all those who had passed away were being celebrated, an-
other important event was also taking place not far from Ground
Zero. A symposium entitled “Beyond the Mind-Body Problem:
New Paradigms in the Science of Consciousness” was being held
at the United Nations Headquarters in New York. The daylong
program was sponsored by the NGO Section of the United Nations
Department of Economic and Social Affairs (DESA), the Nour
Foundation, and the University of Montreal. In many ways, this
symposium represented the antithesis of all that had led to the events
of 9/11, and it mirrored the mission of the Nour Foundation—to
establish a universal platform upon which to draw human beings
from all walks of life together in a greater spirit of unity, tolerance,
and understanding. The symposium was also an acknowledgment