Heaven can wait - or down to earth in real time

Near-death experience revisited

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Near-death experience (NDE) is an intriguing phenomenon that invites more questions than answers. Hitherto emphasis has been laid on apparent similarities in accounts of NDE to prove a supernatural origin while in fact unique differences besides gross similarities support a neurophysiological explanation. A teleological approach is suggested to explain the neuroprotective strategies involved and accordingly a forme fruste of the biological concept of hibernation is put forward as an unifying hypothesis for clarification. (*Neth Heart J* 2008;16:359-62.)

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Near-death experience (NDE) is an intriguing phenomenon that has caught peoples' imagination throughout the ages. Dutch experience gave more insight but questions remained.¹ Aetiology, for example, is still unclear and to this very day there is much debate on the interpretation of NDE between those with a philosophical-religious attitude and those who hold an allegedly reductionistic-materialistic view. All sorts of mechanisms have been put forward to explain NDE. Even descriptive ones such as transcendence or 'subcellular' processes are mentioned in all perplexity. Socio-cultural influences have been put to the test and put aside even quicker.² Pitifully, scientific debate became somewhat clouded when mainstream media interested in appearances rather than inner truth

entered the arena. Perhaps we can learn a lesson or two from the past, guided by accounts of near-death from more than 1000 years ago.

Figure 1. Near-death experience, communication of light as a striking feature: an artist's impression (Marijke Ardon).

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History

Plato's Republic, the Myth of Er

Well, I said, I will tell you a tale; not one of the tales which Odysseus tells to the hero Alcinous, yet this too is a tale of a hero, Er the son of Armenius, a Pamphylian by birth. He was slain in battle, and ten days afterwards, when the bodies of the dead were taken up, his body was found unaffected by decay, and carried away home to be buried. And on the twelfth day, as he was lying on the funeral pile, he returned to life and told them what he had seen in the other world. He said that when his soul left the body he went on a journey with a great company, and that they came to a mysterious place at which there were two openings in the earth; they were near together, and over against them were two other openings in the heaven above. In the intermediate space there were judges seated, who commanded the just, after they had given judgement on them and had bound their sentences in front of them, to ascend by the heavenly way on the right hand; and in like manner the unjust were bidden by them to descend by the lower way on the left hand; He drew near, and they told him that he was to be the messenger who would carry the report of the other world to men, and they bade him hear and see all that was to be heard and seen in that place.³

Figure 2. Plato (429-347 BC), one of the most influential authors in the history of philosophy.

Figure 3. Bede Venerabilis: a medieval manuscript depicts Bede at work in the scriptorium, while a bird whispers something into his ear.

'A History of the English Church and People' by the Venerable Bede

The earliest English account dates from the eighth century, and tells the story of a man who was thought to be dead: He came back to life and suddenly sat up - those weeping around the body were very upset and ran away. 'I was guided by a handsome man in a shining robe,' he said. 'When we reached the top of a wall, there was there a wide and pleasant meadow, with light flooding in that seemed brighter than daylight or the midday sun. I was very reluctant to leave, for I was enraptured by the place's pleasantness and beauty and by the company I saw there. From now on I must live in a completely different way.' He later left all his worldly responsibilities and entered the Melrose monastery.⁴

Recollections of an Old Soldier: The Life of Captain David Perry

The key figure noted: While I was on board that vessel, it appears to me that I died - that I went through the excruciating pains of the separating of soul and body, and that I was immediately conveyed to the gate of Heaven, and was going to pass in; but was told by one, that I could not enter then, but in process of time, if I would behave as he directed, on the set time I should have admittance. It appeared to me that my feet stood on a firm foundation, and that I stood there for the space of about a half hour. In this time there appeared to be a continual flowing up of people, as we suppose they die; and none stopped, but all passed off, one way or the other. Just at my left hand, there appeared to be the opening of a great gulph, and the greater part of the grown people seemed to pass off there. Once in a while one passed through the gate into the Holy City. One person appeared, with whom I had been intimately acquainted, and it appeared to me that I knew him as well as ever I did: it was Doct. Matthews - [and whether I saw him or not, he died, as I afterwards learned, while I was sick on board the ship]. The one that talked with me, told me about the Revolutionary War, and showed me the British vessels in the harbour of Boston, as plainly as I saw them when they came. And during the first year of that war, I was down there in Gen. Putnam's regiment, and I went on Roxbury hill to see the shipping in the harbor, and they looked exactly as they had been shown to me many years before. This transition (as I firmly believe) from life to death, and from death to life, which took place nearly sixty years ago, is as fresh in my mind now as it was then.⁵

Discussion

Obviously a comparison between different stories recorded in a different period of time is a tricky business. Nevertheless, it is necessary because recorded characteristics such as the awareness of being dead, an out-of-body experience, moving through a tunnel, communication of light, meeting with deceased persons and life review, have been put forward to prove a supernatural basis of NDE, laying emphasis on the apparent similarities rather than the differences. For it is the very discrimination which suggests a real-time event and a most individual and unique experience of hallucinatory phenomena in intense unravelling of the subconscious that merges and forces itself upon the (supposedly) dying person, not necessarily giving insight into the Hereafter but rather shedding light on his personal identity. In children, for instance, NDE manifests itself in a more basic form which may include out-of-body experience, being in a tunnel and communication of light, but never depersonalisation for which mental maturation seems a prerogative.⁶

Looking at the accounts from the past, there is no doubt that they are reflections of the general philosophy of life of the day. The story of Er is a typical 'product' of Greek culture, filled with stories of healers, oracles, miracle-workers, and even 'air-travellers' visiting celestial worlds and remote earthly locations. Plato's cosmology resounds through here, in the way that traditional christian cultural characteristics clearly dominate the accounts of the venerable Bede and David Perry, not to mention the picturesque harbour scene which in itself stresses the unique feature of individual NDE.

The evolutionary neurological foundations of religious experience are detailed. Human beings have been burying and preparing their dead for the Hereafter for more than 100,000 years. These behaviours and beliefs are related to activation of the amygdala, hippocampus, and temporal lobe, which are responsible for religious, spiritual, and mystical trancelike states, dreaming, astral projection, near-death and out-of-body experiences, and the hallucination of ghosts, demons, angels, and gods.⁷ Contrarily, the frontal lobe is involved in functions such as creative thinking, planning of future actions, decision-making, artistic expression, aspects of emotional behaviour, as well as working memory, language and motor control.⁸ Altered temporal lobe functioning may be involved in NDE, and individuals who have had such experiences may be physiologically distinct from the general population, as they had altered sleep patterns relative to a control group.⁹ Involvement of the frontal lobe may explain the obvious objective and subjective change in conduct and self-awareness, not seldom seen after NDE. Reactions of the surroundings then may strengthen these feelings and contribute to the special status of an individual recovering from NDE, stipulating the extraordinary character of this event. Looking at neocortical (dys)function, a neurophysiological explanation for NDE seems altogether inevitable. Psychopharmaceuticals were able to produce hallucinations comparable with NDE,¹⁰ and the observation that visual hallucinations of varying complexity occur in normal subjects

Figure 4. In the neocortex, neurons are organised vertically in cortical columns. This hierarchical pattern enables storage of information according to relevance or (personal) interest.

after sudden, complete and prolonged visual deprivation¹¹ also supports a specific neurophysiological mechanism in NDE.

It seems that a specific anoxic time-window and a vegetative, hibernating state of especially the neocortex are a prerogative for NDE. This may also explain major differences in the prevalence of NDE in a variety of pathological conditions and after cardiopulmonary resuscitation. Genetic differences may then account for a distinct susceptibility. Because NDE is empirically untestable and backwards causation is required, a teleological approach is justified to unravel the brain-sparing mechanism involved in NDE. Do we know enough to put NDE forward as a *forme fruste* of the biological concept of hibernation with its neuroprotective mechanisms? Certainly there are similarities that justify the elaboration of an unifying hypothesis which allows admission of studies in this field to this discussion.

A unifying hypothesis

There is a lot of evidence for the presence of regulatory and compensatory mechanisms to protect the oxygen-deprived brain.¹²⁻¹⁶ They are not the issue, however, so the question remains how brain tissue survives near-death and may return to (near) normal.

To answer this question we have to turn to the hibernating Arctic ground squirrel that has a unique way of sustaining profound decreases in cerebral perfusion for a longer period of time. Tolerance to oxygen and nutrient deprivation is

attributed to intrinsic tissue properties involving NMDA (N-methyl-D-aspartate, acting as a prominent neurotransmitter) and ion channel arrest.¹⁷ Ground squirrels tolerate ischaemia and excitotoxicity linked to excess of NMDA very well. Although cellular mechanisms underlying this tolerance still remain unclear, down-regulation of NMDA receptors has been demonstrated.¹⁸

The very process of reducing neuronal activity and downsizing of neural networks towards a state of vegetation and hibernation, as a result of circulatory changes with down-regulation of neuroreceptors and ion-channel arrest, may in itself explain the sense of transition and travel or literally transcendence in humans. During this process of disintegration of neural connections and the neural network, reminiscences, memories and building stones of the personal identity are 'released' and strengthen a feeling of time travel and life review. Perhaps this situation is more or less comparable with the situation in old age when literally loss of neurons and their connections bring back 'buried' memories and reminiscences too. So pathophysiology in near-death may strongly resemble physiology in hibernation, making use of comparable and genetically determined mechanisms and susceptibilities, involving cell integrity and perhaps apoptosis as a form of programmed cell death in a multicellular environment. ■

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