



# Awakenings

Awakening damaged brains... with a sleeping pill! By **Petrie Jansen van Vuuren**

**A**llow me to introduce you to yourself or, more specifically, to your brain. I am referring, of course, to a generalised example of a brain. Surveillance technology has not progressed to the point where images of our brains are kept somewhere in enormous data archives without our knowledge. The image to follow simply illustrates what lies within the confines of your skull. The vast interconnections formed by your neurons give rise to your hopes, dreams, memories and vitally, your ability to interact with your surroundings or, in short, the essence of 'you'.

Despite the protection that evolution has provided in the form of the skull, the membranes surrounding the brain as well as liquid scaffolding of

circulating cerebrospinal fluid, the brain remains incredibly sensitive to disturbances both from the outside world and within. A sufficiently severe knock from a car, sporting accident or something as insidious as a stroke may, in an instant, change your life forever.

At present, modern technology can do very little to repair or replace lost neurological tissue. For the most part, as far as recovery is concerned, your brain is left to its own devices, therefore recovery of function can take months to years. Occasionally, following severe neurological insult, patients regain full function and lead perfectly normal lives. Yet for many, not favoured by Lady Luck on a given day, injuries are localised to important segments of the brain and the prognosis is significantly worse.

Estimates for the incidence of severe brain damage in South Africa have been calculated to be as high as 300 000 individuals per annum. For a single patient, the average cost for a year of palliative treatment and intense rehabilitation averages around R200 000. Sadly very few people can afford these measures, leaving them in search of alternatives or, very often, without necessary care. Without factoring in income lost due to disability, it is already clear from the costs alone that brain damage places a significant burden, both on families as well as the economy as a whole.

But what if I told you that a little sleeping pill called zolpidem may represent hope for approximately 6 - 10% of brain-damaged individuals? Selling at just over R7 per 10 mg tablet, zolpidem, originally marketed as Stilnox in South Africa, was developed by the French pharmaceutical corporation Sanofi-Aventis as a sleeping pill. In healthy individuals, it decreases the amount of time required to fall asleep (known as sleep latency). But if the pill is given to someone with brain damage something miraculous happens. Often it's a small change, an improvement in speech, reduced muscle spasms or improved gait. In dramatic cases, patients regain sensory functions, use of limbs or are even roused from vegetative states, returning to consciousness after

many months, even years, of being completely unresponsive.

A South African doctor by the name of Dr HW Nel, in conjunction with Prof. R Claus, set this whole field of research in motion when they made a startling observation during the early 2000s. Dr Nel responded to a call from the mother of a patient in a chronic vegetative state, reporting that her son steadily became increasingly aware after administration of the drug, but it wore off again roughly an hour thereafter. Believing this to be impossible he made his way to the patient's place of residence, only to find that, miraculously, this was exactly the case.

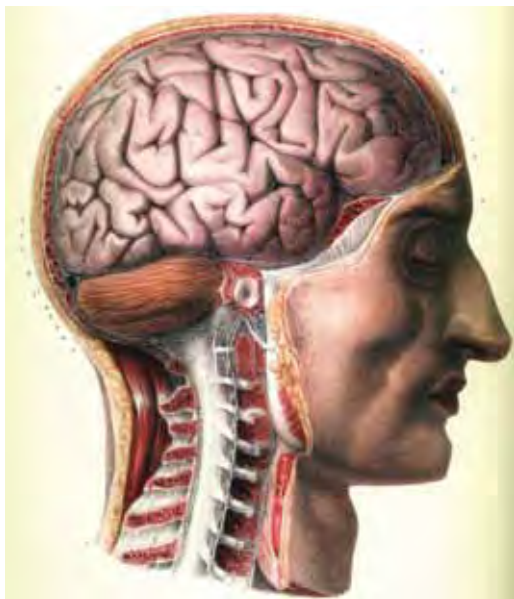
Frustratingly, this trend of a temporary improvement holds true for all patients that respond favourably to the drug. An initial increase in function wears off as the drug is metabolised. Despite this caveat, any new neurological connections made while under the effect of drugs, during a rehabilitation programme for example, seem to be permanent. This suggests that zolpidem may allow for new neurological pathways to be formed by transiently reactivating previously dormant regions that would otherwise have remained inactive.

The exact mechanisms behind this miraculous discovery remain largely theoretical at this stage, but our research team along with many others around the globe, are working feverishly in an attempt to elucidate the exact physiological pathways involved in an effort to provide more effective treatment options for brain-damaged patients. **Q**

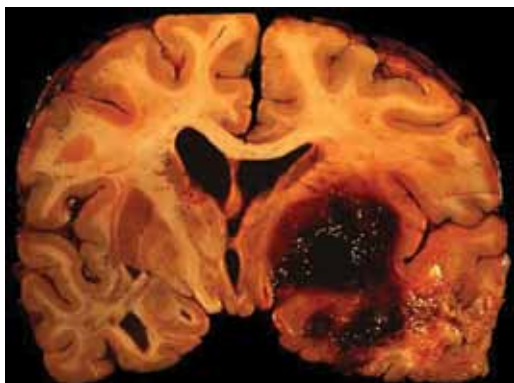
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*Petrie Jansen van Vuuren is a postgraduate neurophysiology researcher, affiliated with the Department of Physiology at the University of Pretoria. His research interests include neuropharmacology, brain-damage as well as visual skills. He is currently studying medicine at the University of the Witwatersrand.*

This article and the one on page 23 were the winning contributions in SAASTA's Young Science Communicators competition.



An illustration of the human brain.  
Image: NH Jacob, Wikimedia Commons



Bleeding within the brain following external trauma.  
Image: Medpic.org