feature

Dr Karl L.R. Jansen

Anaesthetic apocalypse

Ketamine part 1: hits and myths

Growing non-medical use of ketamine is linked with dance culture and 'alternative spirituality'. So what's so special about K?

Calvin Stevens invented ketamine in 1962 at Parke-Davis laboratories, Michigan. Chemically it is 2-(2-chlorophenyl)-2-(methylamino)-cyclohexanone. Medically it is a dissociative anesthetic, which means the mind seems separate (dissociated) from the body. It is manufactured as Ketalar by Parke-Davis (for humans) and Ketaset by Fort Dodge (for animals); there are other brands.

Medical and paramedical staff have injected ketamine into millions of people.[1] Its advantages are fast onset and recovery, a wide safety margin and it has little effect on cough and gag reflexes (patients won't choke on their own saliva).

Ketamine acts 30 seconds after intravenous injection, 2-4 minutes after intramuscular injection, 5-10 minutes after snorting, and 10-20 minutes after swallowing. Duration varies from 10 minutes (intravenous), an hour (intramuscular), to four hours (oral), but is *much* shorter in someone with tolerance.

The experience is influenced by the dose, route (oral, nasal, injection), set (personality, history, mood, motivation, intelligence, imagination, attitude and expectations of the user) and setting (physical, social and emotional environment).

Swallowed ketamine is absorbed into blood heading for the liver, where most is changed into norketamine before reaching the brain – norketamine is more numbing.[2,3] Intranasal use can produce more substantial changes than swallowing: 'I used pure K in the NY Club scene (nasally) . . . "beyond words" experiences, deep thoughts of family, in touch with god, another dimension of "reality" . . . experimenting with K has changed my whole outlook on life, "death?", and god. I miss the deepness and extreme spirituality of the experience. At times during the trip, I reflected on my entire life, remarkably lucid visions of my birth . . .'[4]

At low doses ketamine is a stimulant. Some people can dance while effected, especially if ketamine is taken with amphetamines, ecstasy and/or cocaine as these greatly reduce the dissociative effects. A club 'bump' (dose) for snorting is 200mg, a psychedelic dose for intramuscular use is 75-150 mg, oral doses are usually 350-500mg.

Legal status

Ketamine is uncontrolled in most countries and can legally be ordered from chemical companies. On 12 August 1999 ketamine became a schedule III drug in the US because of links with 'sedate rape'. In the UK it is not a controlled drug, but under the Medicines Act is prescription only, so unauthorised supply is illegal.

Grey matter

Non-medically, ketamine is primarily a 'psychedelic', as it reveals aspects of how the mind constructs a version of reality and a sense of meaning without necessarily inducing a toxic delirium. The term 'hallucinogen' is inadequate to describe the increased empathy, insight, vivid memories, physical dissociation, ecstasy and many other effects.

Ketamine has a complex influence on neurotransmitters in the brain (chemicals involved in signalling between neurons, the main informa-

Dr Karl L. R. Jansen works for the South London and Maudsley NHS Trust at the Liaison Psychiatry Department, St Thomas' Hospital, Lambeth Palace Road, London SE1

tion carrying cells). It modifies neurotransmitter systems including: glutamate, opioid, dopamine, serotonin, noradrenaline, nitric oxide, cannabinoid, sigma, acetylcholine, endocrine and GABA (gamma amino-butyric acid), among others.

The psychedelic effects are probably due to K binding to PCP (phencyclidine) receptors in the brain. These are linked to receptors for glutamate which is an excitatory neurotransmitter. But switching off glutomate receptors with ketamine does not switch off the brain, the switched-off cell may be one which releases an inhibitory neurotransmitter such as GABA. With inhibition removed, the next cell in the chain may become over-excited. The neocortex is 'brightly lit' in brain scans at psychedelic doses.[5]

After ketamine normal mood returns gradually. Slow reduction in numbing norketamine levels provide a cushion.

Ketamine may trigger mania in bipolar disorder (manic-depression), as one specific action reverses that of the mood-stabilising drug lithium.[6] In 23 users, half reported lasting elevation in mood. There was equal division between positive and negative effects, with 30 per cent noting 'deeper insights'.[7]

'I can't understand why anybody would want to take the stuff. It gives you nightmares, doesn't it?'
(Consultant Psychiatrist in *Addictions*, 1996)

Hippies, New Age and dance culture

Early accounts of ketamine use described 'trance-like' effects and 'vivid dreams', which attracted the 1960's drug culture. By 1971 ketamine was sold as 'mean green' and 'rockmesc'.[8]

The Food and Drinks Administration in the US (FDA) expressed concerns about non-medical use in 1979.[9] Use has increased in the last 15 years, linked with dance culture and 'New Age alternative spirituality'. Actual figures are unknown, but rising use is noted in dance magazines, mainstream media and by the Drug Enforcement Agency.[10]

UK use changed as more people snorted K: the more pleasurable results increased its popularity.[11]

Doors of dissociation

LSD-guru Timothy Leary held ketamine to be the most potent psychedelic drug.[12] *The Essential Guide to Psychedelics* described ketamine as the 'ultimate psychedelic journey'.[13]

Effects include a sense of merging with other people. Awareness may seem to expand to include the whole universe. There may be apparent out-of-body trips; transcendence of time, including foetal, ancestral, racial and 'past life' trips and seeing future events; experiences of evolution; extension of awareness beyond consensus reality and space-time into other universes, gods and goddesses, symbols, the dead, energy fields, angels, archetypes and a merging with the 'ultimate reality' from which the 'illusions' of time, space and matter appear to be derived. Sense of time can vanish completely.

Modern magicians

Special K is used for 'magical' purposes in a similar way to plants in pre-industrial societies: *'I settled on a form which involved banishing, consecrating and performing a full invocation. I would then take a dose of K and don a pair of headphones which would play me a pre-recorded hypnotic instruction beginning with basic trance induction . . . No longer was I in my New York apartment; I was in Egypt, inside a pyramid. I was lying inside an open sarcophagus. The inside of the chamber was brightly lit, a bluish-white light adhering to everything and also radiating very strongly from me. I felt that this light, which moved through me, and radiated from me, connected me with . . . everything else through space and time, especially a moment in space-time when a man in New York was lying within a magic circle in the 20th century . . .*'[14]

The film *Contact* (starring Jodie Foster) gives a good simulation of what a K-trip can be like, although the drug doesn't feature in the film.

'. . . I'm in hyperspace, simultaneously connected to all things . . . a single point of consciousness adrift in a swirling vortex of energies, a single cell within a being of

Neurotransmitters, drugs and the nervous impulse

In simple terms, a brain cell (neuron) has a head and a long tail (the axon). The brain cell has branches called dendrites and the end of the axon also has branches, to meet dendrites of other cells. Crudely, the dendrites are the neuron's receivers, the axons the transmitter array. One brain cell is linked with many others through its dendrite branches and its axon.

When a neuron is stimulated an electro-chemical pulse passes from the dendrite down the axon to trigger a chain of events that excite or inhibit adjacent cells. The neuron fires.

The point where one neuron meets another is called a synapse. The two cells are not actually in contact, there is a gap between them called the synaptic gap. Neurotransmitters are chemicals that cross the gap to excite or inhibit the neighbouring cell.

An impulse arriving at the axon tip triggers the release of neurotransmitter molecules into the synaptic gap. These cross the synaptic gap to attach themselves to specific receptor sites on the dendrites of the next cell.

For a neurotransmitter to have any effect they have to bind to specific receptor sites. Each kind of neurotransmitter has its own receptor. A receptor only recognises the molecular shape of its own neurotransmitter or something *very* similar. Neurotransmitters can only affect neurons that have the right receptors – if there is no receptor there is no reaction. If a neuron has many of the type of right receptors, it can react more energetically than a neuron with few receptors.

If the neurotransmitter is excitory it shortens the intervals between firing in the receiving neuron (it will fire more rapidly). If the neurotransmitter is inhibitory, it slows the rate of firing in the receiving neuron (it fires less frequently).

The brain interprets the intensity of a stimulus as either the frequency of nerve impulses or the number of neurons stimulated.

Uptake and reuptake

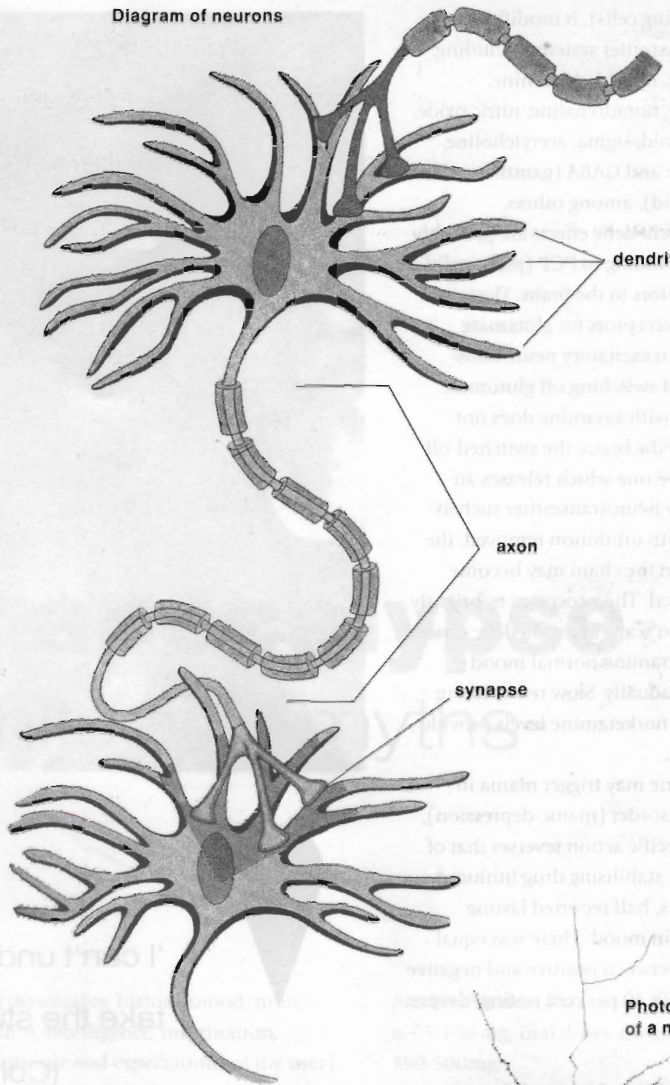
After the neurotransmitter has done its job of exciting or inhibiting, it moves from the receptor site and is probably recycled back to the neuron it came from or broken down. This is known as uptake, reuptake and metabolism.

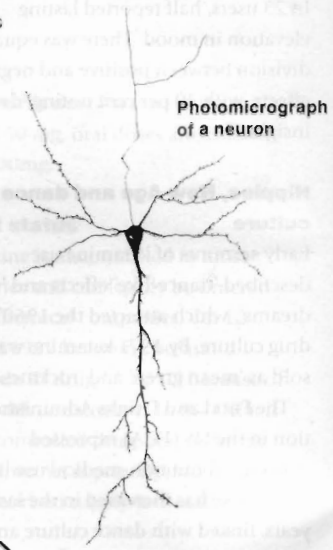
Drugs known as agonists are similar in shape to a neurotransmitter, and mimic the action of the neurotransmitter. They are able to bind with the receptor to make a change in the body. Drugs known as antagonists are also similar in shape to a neurotransmitter but they block the action of the neurotransmitter. For instance heroin is an agonist, and naloxone is an antagonist on the same receptor sites.

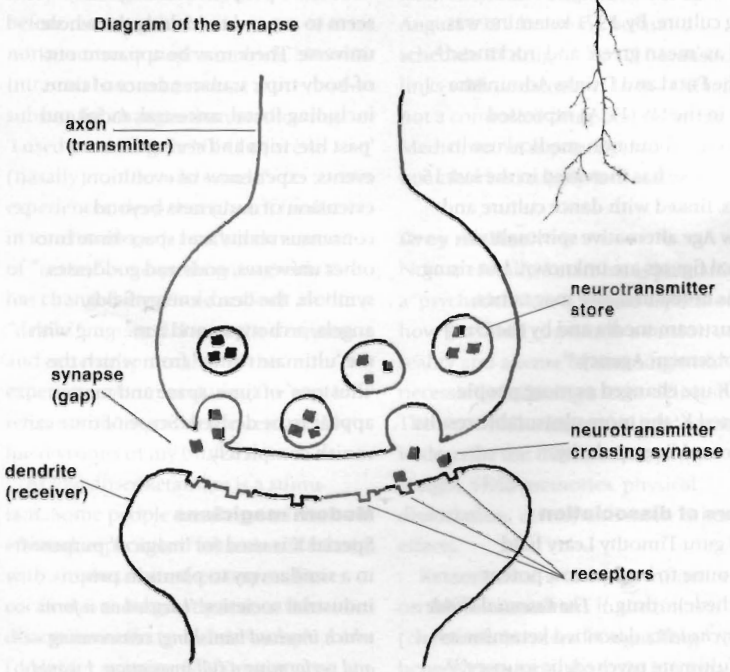
Ketamine partially blocks the action of glutamate (an excitory neurotransmitter) by binding to a receptor attached to a subtype of glutamate receptor. This is called indirect antagonism, therefore ketamine is an indirect antagonist of glutamate

For easy to absorb information on the way drugs affect the brain: Pellerin C. *Trips – how hallucinogens work in your brain*. New York: Seven Stories Press. 1998.

Neil Bell







'That 22 minute journey to becoming the intelligence at the heart of the universe remains the most powerful and cosmic experience of my life.' (Ketamine user, 1997)

galactic proportions . . . I become the center point through which all these energies pass. The experience is of titanic proportions in the merging of energy, intent, and awareness . . . I do not experience any fear . . . I come to an apex . . . my will determines whether or not I exist, and whether or not the universe exists . . . I could toggle between existence and non-existence many times within a second . . . Memory of the experience is difficult . . .'[15]

Music may not be heard at all or it can seem very loud with selection of particular frequencies.[16] There may be repetition of the same word or phrase at great length, as if it had magical properties or held the secret of the universe.

Some 'alternative spirituality' users believe that ketamine is a 'quantum transporter', 'retuning the brain' so awareness can enter the 'quantum sea' and travel faster than light.

Being a god

Marcia Moore was a top Harvard graduate who first took ketamine in 1976, aged 48. She noted that it produced a 'higher, clearer and more real trip' than LSD, and described herself as 'priestess of the goddess Ketamine'.[17] Marcia vanished one night in 1979. Her skeleton was found two years later. She had walked into a forest near her house and frozen to death after injecting herself with all of the K she had.

'Marcia became addicted to ketamine . . . The drug is dangerous and its use should not be encouraged . . . I told her that it was a seductress, not a goddess.' Howard Alltounian MD, anaesthetist and former husband.[18]

John Lilly MD, has spent decades exploring his psyche with large quantities of ketamine.[19] He believes that the drug allows him access to fascinating 'alternative realities'.

Despite several admissions to hospital with paranoid psychosis, John was still using ketamine at the age of 84 (He is now 85).

Near-death experience

Near-death experience is a common result of higher doses.[20] In 1973 an anaesthetist had ketamine intravenously, as part of a respiratory research study: 'I had no warning. I heard a dull buzzing and then, within seconds, I was unconscious . . . I was a mind suspended in space . . . I was not afraid, I was more curious. "This is death. I am a soul, and I am going to wherever souls go . . . '[21]

On ketamine, near-death experience is usually not physically near death; heart rate usually rises. Awareness seems to leave the body and travel through a tunnel towards 'the light'. There may be a conviction that one has died; communion with god; entrance to other realities; emergence of memories; a life review; euphoria; fear; ringing/buzzing/whistling sounds followed by apparent travel at high speed; inability to feel pain; and visions of landscapes, angels, people, and religious and mythical figures. It is also possible to 'emerge' into hell, rather than paradise.

Loss of contact with external reality and the sense of being part of other, more 'fundamental' realities can be very strong. Some people who had a near-death experience during an emergency have described their resuscitation in detail. Surgical patients given Ketalar have reported in detail what was said and done during the operation.[22] 'Hovering above the scene' is a known feature of ketamine experiences.

It is a myth that ketamine is a 'bad trip' drug taken only by masochists. Ketamine is the drug of choice for some, who enjoy a positive experience. It will be difficult for drug workers to help those who might end up with ketamine-related problems while this misconception persists ■

Part 2 will look at ketamine as an addictive drug

Dr Karl Jansen is interested in hearing from all persons with a story to tell about the use, users and consequences of ketamine, from any perspective. These should be sent to K@BTInternet.com, or Department of Liaison Psychiatry, St Thomas' Hospital, Lambeth Palace Road, London SE1.

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A list of further reading is available from ISDD