

KETAMINE AND THE BRAIN: WHAT'S GOING ON?

Ketamine is a dissociative anaesthetic, which means it changes how the brain connects with itself and with the body. The main way it works is by blocking the NMDA receptor, which is part of the brain's glutamate system – a key system involved in learning, memory, mood, awareness, and consciousness.

The Role of Glutamate and NMDA Receptors

Glutamate is the brain's most common excitatory neurotransmitter – think of it as the accelerator pedal in brain communication. It helps neurons fire, talk to each other, and build strong connections.

The NMDA receptor is one of the main ways glutamate does its job. It's involved in:

- ❑ *Forming memories*
- ❑ *Emotional regulation*
- ❑ *Responding to stress*
- ❑ *Developing flexible thinking and learning*

When ketamine blocks NMDA receptors:

- ❑ *It disrupts this normal signalling process.*
- ❑ *It causes a "disconnection" between different parts of the brain, especially between thinking and feeling areas.*
- ❑ *This can lead to temporary altered states of consciousness, where thoughts, time, the body, and the outside world feel distant or strange.*

Short-Term (and Potentially Therapeutic) Effects

In low doses or controlled settings (like in mental health clinics), this disruption can have *positive effects*, especially for people stuck in patterns of severe depression, PTSD, or suicidal thinking.

Here's how it may help:

1. Shuts down overactive brain loops

Many people with depression or trauma get stuck in repetitive, negative thinking patterns. Ketamine temporarily "breaks the loop" by disrupting brain activity in areas like the default mode network, which is active during rumination and self-critical thoughts.

2. Boosts neuroplasticity

While it blocks NMDA, ketamine increases activity in other glutamate pathways (like AMPA receptors). This can cause a surge in brain-derived neurotrophic factor (BDNF) – a chemical that helps the brain grow and make new connections.

→ This may explain the rapid improvements in mood some people feel – the brain becomes more flexible and open to change.

3. Loosens rigid thinking and emotional responses

People often report being able to think about difficult experiences with less emotional pain or with more curiosity. This may make it easier to do meaningful therapy work afterwards.

Recreational Use: Similar Mechanisms, Different Risks

Recreational users may also feel:

- ❑ *Emotional detachment or relief*
- ❑ *Surreal or dreamlike experiences*
- ❑ *A break from anxiety or emotional overload*

This can feel profound and pleasurable in the short term – like escaping a heavy mental load.

Long-Term Brain Effects of Frequent Use

When used frequently or in high doses, ketamine's effects on the brain start to shift. The brain isn't designed to be repeatedly disrupted like this – especially not the glutamate system, which is delicate and involved in so many functions.

Potential longer-term impacts:

1. Cognitive impairments

- a. *Trouble with memory, especially working memory and short-term recall*
- b. *Difficulty focusing, organising thoughts, or making decisions*
- c. *Slower mental processing*

These may come from chronic suppression or dysregulation of glutamate signalling, as well as reduced activity in the prefrontal cortex – the part of the brain that handles higher thinking.

2. Emotional blunting

- a. *Users may feel emotionally flat or numb between uses.*
- b. *Over time, the brain may struggle to naturally regulate emotions without ketamine, leading to more frequent low moods, detachment, or even depression.*

3. Disruption of brain networks

- a. *Repeated use may weaken the normal communication between brain regions.*
- b. *This can cause users to feel disconnected from themselves, their memories, or the world – even when not using.*
- c. *Some people describe it as feeling “foggy” or “not fully there.”*

4. Increased tolerance and rebound symptoms

- a. *The more ketamine is used, the less effect it may have, as the brain adapts.*
- b. *Between doses, people may feel worse – more anxious, more down, or more detached.*
- c. *This creates a pattern where people feel they need to use again to “feel normal,” which can increase dependency.*