

SUMMARY OF PRODUCT CHARACTERISTICS

1. Name of the medicinal product

Ketamine 50 mg/ml Injection

2. Qualitative and quantitative composition

Ketamine Hydrochloride USP Eq to Ketamine 50mg

Water for Injection USP QS

Benzethonium Chloride USP 0.01% w/v

3. Pharmaceutical form

A clear, colorless solution

4. Clinical particulars

4.1. Therapeutic indications

Ketamine is indicated in children and in adults.

Ketamine is recommended:

As an anaesthetic agent for diagnostic and surgical procedures. When used by intravenous or intramuscular injection, Ketamine is best suited for short procedures. With additional doses, or by intravenous infusion, Ketamine can be used for longer procedures. If skeletal muscle relaxation is desired, a muscle relaxant should be used and respiration should be supported.

For the induction of anaesthesia prior to the administration of other general anaesthetic agents. To supplement other anaesthetic agents.

Specific areas of application or types of procedures:

When the intramuscular route of administration is preferred.

Debridement, painful dressings, and skin grafting in burned patients, as well as other superficial surgical procedures.products

- Patients who are receiving MAO inhibitors or who have taken them within the last 14 days (see section 4.5)
- Patients with epilepsy not adequately controlled by treatment
- For use in narcotic withdrawal treatment.

Neurodiagnostic procedures such as pneumoencephalograms, ventriculograms, myelograms, and lumbar punctures. Diagnostic and operative procedures of the eye, ear, nose, and mouth, including dental extractions.

Note: Eye movements may persist during ophthalmological procedures.

Anaesthesia in poor-risk patients with depression of vital functions or where depression of vital functions must be avoided, if at all possible.

Orthopaedic procedures such as closed reductions, manipulations, femoral pinning, amputations, and biopsies.

4.3. Contraindications:

Hypersensitivity to the active substance or to any of the excipients listed in section 6.1.

Ketamine is contra-indicated in persons in whom an elevation of blood pressure would constitute a serious hazard (see section 4.8 Undesirable effects).

Ketamine should not be used in patients with eclampsia or pre-eclampsia, severe coronary or myocardial disease, cerebrovascular accident or cerebral trauma.

4.4. Special warnings and precautions for use:

To be used only in hospitals by or under the supervision of experienced medically qualified anaesthetists except under emergency conditions.

As with any general anaesthetic agent, resuscitative equipment should be available and ready for use.

Respiratory depression may occur with overdosage of Ketamine, in which case supportive ventilation should be employed. Mechanical support of respiration is preferred to the administration of analeptics.

The intravenous dose should be administered over a period of 60 seconds. More rapid administration may result in transient respiratory depression or apnoea and enhanced pressor response.

Because pharyngeal and laryngeal reflexes usually remain active, mechanical stimulation of the pharynx should be avoided unless muscle relaxants, with proper attention to respiration, are used.

Although aspiration of contrast medium has been reported during Ketamine anaesthesia under experimental conditions (Taylor, P A and Towey, R M, Brit. Med. J. 1971, 2: 688), in clinical practice aspiration is seldom a problem.

In surgical procedures involving visceral pain pathways, Ketamine should be supplemented with an agent which obtunds visceral pain.

When Ketamine is used on an outpatient basis, the patient should not be released until recovery from anaesthesia is complete and then should be accompanied by a responsible adult.

Ketamine should be used with caution in patients with the following conditions:

- Use with caution in the chronic alcoholic and the acutely alcohol-intoxicated patient.
- Ketamine is metabolised occur in patients with cirrhosis or other types of liver impairment. Dose reductions should be considered in these patients.

Abnormal liver function tests associated with ketamine use have been reported, particularly with extended use (>3 days) or drug abuse.

- Since an increase in cerebrospinal fluid (CSF) pressure has been reported during Ketamine anaesthesia, Ketamine should be used with special caution in patients in the liver and hepatic clearance is required for termination of clinical effects. A prolonged duration of action may with preanaesthetic elevated cerebrospinal fluid pressure.

- Use with caution in patients with globe injuries and increased intraocular pressure (e.g. glaucoma) because the pressure may increase significantly after a single dose of ketamine.

- Use with caution in patients with globe injuries and increased intraocular pressure (e.g. glaucoma) because the pressure may increase significantly after a single dose of ketamine.

- Use with caution in patients with neurotic traits or psychiatric illness (e.g. schizophrenia and acute psychosis)

- Use in caution in patients with acute intermittent porphyria.

- Use in caution in patients with seizures.

- Use in caution in patients with hyperthyroidism or patients receiving thyroid replacement (increased risk of hypertension and tachycardia)

- Use in caution in patients with pulmonary or upper respiratory infection (ketamine sensitises the gag reflex, potentially causing laryngospasm)

- Use in caution in patients with intracranial mass lesions, a presence of head injury, or hydrocephalus.

4.5. Interaction with other medicinal products and other forms of interactions:

Prolonged recovery time may occur if barbiturates and/or narcotics are used concurrently with Ketamine.

Diazepam is known to increase the half-life of ketamine and prolongs its pharmacodynamic effects. Dose adjustments may therefore be needed.

Ketamine is chemically incompatible with barbiturates and diazepam because of precipitate formation. Therefore, these should not be mixed in the same syringe or infusion fluid.

Ketamine may potentiate the neuromuscular blocking effects of atracurium and tubocurarine including respiratory depression with apnoea.

The use of halogenated anaesthetics concomitantly with ketamine can lengthen the elimination half-life of ketamine and delay recovery from anaesthesia. Concurrent use of ketamine (especially in high doses or when rapidly administered) with halogenated anaesthetics can increase the risk of developing bradycardia, hypotension or decreased cardiac output.

The use of ketamine with other central nervous system (CNS) depressants (e.g. ethanol, phenothiazines, sedating H – blockers or skeletal muscle relaxants) can potentiate CNS depression and/or increase risk of developing respiratory depression. Reduced doses of ketamine may be required with concurrent administration of other anxiolytics, sedatives and hypnotics.

4.6. Fertility, pregnancy and lactation

Pregnancy

Pregnancy

Ketamine crosses the placenta. This should be borne in mind during operative obstetric procedures in pregnancy. No controlled clinical studies in pregnancy have been conducted. The use in pregnancy has not been established and such use is not recommended, with the exception of administration during surgery for abdominal delivery or vaginal delivery.

Some neonates exposed to ketamine at maternal intravenous doses ≥ 1.5 mg/kg during delivery have experienced respiratory depression and low Apgar scores requiring newborn resuscitation.

Marked increases in maternal blood pressure and uterine tone have been observed at intravenous doses greater than 2 mg/kg.

Data are lacking for intramuscular injection and maintenance infusion of ketamine in the parturient population, and recommendations cannot be made. Available data are presented in Section 5.2.

Lactation

The safe use of ketamine during lactation has not been established, and such use is not recommended.

Fertility

Studies in animals have shown reproductive toxicity (see section 5.3).

4.7. Effects on ability to drive and use machines

Patients should be cautioned that driving a car, operating hazardous machinery or engaging in hazardous activities should not be undertaken for 24 hours or more after anaesthesia.

This medicine can impair cognitive function and can affect a patient's ability to drive safely. This class of medicine is in the list of drugs included in regulations under 5a of the Road Traffic Act 1988. When prescribing this medicine, patients should be told:

- The medicine is likely to affect your ability to drive
- Do not drive until you know how the medicine affects you
- It is an offence to drive while under the influence of this medicine

4.8. Undesirable effects:

The side effects mentioned below are listed according to MedDRA system organ classification. The frequencies are ranked according to the following convention: very common ($\geq 1/10$), common ($\geq 1/100$ to $<1/10$), uncommon ($\geq 1/1,000$ to $<1/100$), rare ($\geq 1/10,000$ to $<1/1,000$), very rare ($<1/10,000$), not known (cannot be estimated from the available data).

The most commonly reported adverse reactions are nausea and dizziness. These occur in more than 10% of patients.

Immune system disorders

Rare: allergic reactions (e.g. dyspnoea, bronchospasm, wheezing, angioneurotic oedema) and anaphylaxis.

MedDRA System Organ Class	Frequency†	Undesirable Effects
Immune system disorders	Rare	Anaphylactic reaction*
Metabolism and nutrition disorders	Uncommon	Anorexia
Psychiatric disorders	Common	Hallucination, Abnormal dreams, Nightmare, Confusion, Agitation, Abnormal behaviour
	Uncommon	Anxiety
	Rare	Delirium* Flashback*, Dysphoria*, Insomnia, Disorientation*
Nervous system disorders	Common	Nystagmus, Hypertonia, Tonic clonic movements
Eye disorders	Common	Diplopia
	Not Known	Intraocular pressure increased
Cardiac disorders	Common	Blood pressure increased, Heart rate increased
	Uncommon	Bradycardia, Arrhythmia
Vascular disorders	Uncommon	Hypotension
Respiratory, thoracic and Mediastinal disorders	Common	Respiratory rate increased
	Uncommon	Respiratory depression, Laryngospasm
	Rare	Obstructive airway disorder*, Apnoea*
Gastrointestinal disorders	Common	Nausea, Vomiting
	Rare	Salivary hypersecretion*
Hepatobiliary disorders	Not known	Liver function test abnormal, Drug-induced liver injury**
Skin and subcutaneous tissue disorders	Common	Erythema, Rash morbilliform
Renal and urinary disorders	Rare	Cystitis*, Haemorrhagic cystitis*
General disorders and administration site conditions	Uncommon	Injection site pain, Injection site rash

† Common ($\geq 1/100$ to $<1/10$); Uncommon ($\geq 1/1,000$ to $<1/100$); Rare ($\geq 1/10,000$ to $<1/1,000$); Not known (frequency cannot be estimated from the available data)

* AE frequency estimated from post-marketing safety database

** Extended period use (> 3 days) or drug abuse

Reporting of suspected adverse reactions:

Healthcare professionals are requested to report any suspected adverse reaction via pharmacy and poisons board, Pharmacovigilance Electronic Reporting system (PvERS) <https://pv.pharmacyboardkenya.org>

4.9. Overdose

Respiratory depression can result from an overdosage of ketamine hydrochloride. Supportive ventilation should be employed. Mechanical support of respiration that will maintain adequate blood oxygen saturation and carbon dioxide elimination is preferred to administration of analeptics.

Ketamine has a wide margin of safety; several instances of unintentional administration of overdoses of Ketamine (up to 10 times that usually required) have been followed by prolonged but complete recovery.

5. Pharmacological properties

5.1. Pharmacodynamic properties

Pharmacotherapeutic group: Other general anesthetics.

ATC Code: N01A X03

Ketamine is a rapidly acting general anaesthetic for intravenous or intramuscular use with a distinct pharmacological action. Ketamine hydrochloride produces dissociative anaesthesia characterised by catalepsy, amnesia, and marked analgesia which may persist into the recovery period. Pharyngeal-laryngeal reflexes remain normal and skeletal muscle tone may be normal or can be enhanced to varying degrees. Mild cardiac and respiratory stimulation and occasionally respiratory depression occur.

Mechanism of Action:

Ketamine induces sedation, immobility, amnesia and marked analgesia. The anaesthetic state produced by ketamine has been termed “dissociative anaesthesia” in that it appears to selectively interrupt association pathways of the brain before producing somesthetic sensory blockade. It may selectively depress the thalamoneocortical system before significantly obtunding the more ancient cerebral centres and pathways (reticular-activating and limbic systems). Numerous theories have been proposed to explain the effects of ketamine, including binding to N-methyl-D-aspartate (NMDA) receptors in the CNS, interactions with opiate receptors at central and spinal sites and interaction with norepinephrine, serotonin and muscarinic cholinergic receptors. The activity on NMDA receptors may be responsible for the analgesic

as well as psychiatric (psychosis) effects of ketamine. Ketamine has sympathomimetic activity resulting in tachycardia, hypertension, increased myocardial and cerebral oxygen consumption, increased cerebral blood flow and increased intracranial and intraocular pressure. Ketamine is also a potent bronchodilator. Clinical effects observed following ketamine administration include increased blood pressure, increased muscle tone (may resemble catatonia), opening of eyes (usually accompanied by nystagmus) and increased myocardial oxygen consumption

5.2. Pharmacokinetic properties

Absorption

Ketamine is rapidly absorbed following intra-muscular administration.

Distribution

Ketamine is rapidly distributed into perfused tissues including brain and placenta. Animal studies have shown ketamine to be highly concentrated in body fat, liver and lung.

In humans at an intravenous bolus dose of 2.5 mg/kg, the distribution phase of ketamine lasts about 45 minutes, with a half-life of 10 to 15 minutes, which is associated with the duration of the anaesthetic effect (about 20 minutes). Plasma ketamine concentrations are about 1.8 to 2.0 μ g/mL at 5 minutes after an intravenous bolus injection of 2 mg/kg dose, and about 1.7 to 2.2 μ g/mL at 15 minutes after an intramuscular injection of 6 mg/kg dose in adults and children.

In parturients receiving an intramuscular dose of 250 mg (approximately 4.2 mg/kg), placental transfer rate of ketamine from maternal artery to umbilical vein was 47% at the time of delivery (1.72 versus 0.75 μ g/mL). Average delivery time for these parturients was 12 minutes from the time of ketamine injection to vaginal delivery of a newborn.

Biotransformation

Biotransformation takes place in liver. Termination of anaesthetic is partly by redistribution from brain to other tissues and partly by metabolism. CYP3A4 enzyme is the primary enzyme responsible for ketamine N-demethylation to norketamine in human liver microsomes; with CYP2B6 and CYP2C9 enzymes as minor contributors.

Elimination

Elimination half-life is approximately 2-3 hours, and excretion renal, mostly as conjugated metabolites.

5.3. Preclinical safety data

Published studies in animals (including primates) at doses resulting in light to moderate anaesthesia demonstrate that the use of anaesthetic agents during the period of rapid brain growth or synaptogenesis results in cell loss in the

developing brain that can be associated with prolonged cognitive deficiencies. The clinical significance of these nonclinical findings is not known.

6. Pharmaceutical particulars

6.1. List of excipients

Benzethonium chloride

Disodium EDTA

Water for injections

6.2. Incompatibilities

Ketamine is chemically incompatible with barbiturates and diazepam because of precipitate formation. Therefore, these should not be mixed in the same syringe or infusion fluid.

6.3. Shelf life

3 years.

For single use only. Discard any unused product.

After dilution the solutions should be used immediately.

6.4. Special precautions for storage

This medicinal product does not require any special temperature storage conditions. Do not freeze. Store in the original container.

Store below 30°C.

6.5. Nature and contents of container

10 ml Amber Vial USP type 1 packed in a monocarton along with PIL.

6.6. Special precautions for disposal and other handling

For single use only. Discard any unused product.

7. MARKETING AUTHORISATION HOLDER

CIRON DRUGS AND PHARMACEUTICALS PVT. LTD.

C-1101/1102, Lotus Corporate Park, Graham Firth Steel Compound, Jay Coach Junction, Western Express Highway, Goregaon (East), Mumbai-400 063. INDIA

8. MARKETING AUTHORISATION NUMBER(S)

H2026/CTD12465/26802

9. DATE OF FIRST AUTHORISATION / RENEWAL OF THE AUTHORISATION

Date of first authorisation: 18.01.2026

10. DATE OF REVISION OF THE TEXT

18.01.2026