

# Cisatracurium Besylate

<b>Brand names</b>	Nimbex
<b>Medication error potential</b>	ISMP high-alert medication that has an increased risk of causing significant patient harm if it is used in error <sup>(1)</sup>
<b>Contraindications and warnings</b>	<p><b>Contraindications:</b> Hypersensitivity to cisatracurium or any of its components<sup>(2)</sup></p> <p>Multiple-dose vials are contraindicated for use in neonates due to the benzyl alcohol preservative.<sup>(2)</sup></p> <p><b>Warnings:</b> Use carefully under the supervision of experienced clinicians; personnel should be skilled in airway management, resuscitation, and respiratory support. Intubation and ventilatory support equipment, including oxygen therapy, should be readily available. Reversal agents should be readily available when giving cisatracurium.<sup>(2)</sup></p>
<b>Infusion-related cautions</b>	Hypersensitivity reactions, bronchospasm, and laryngospasm have been reported <sup>(2,3)</sup> but are rare. <sup>(2)</sup>
<b>Dosage</b>	<p><i>Respiratory function must be supported during use of this agent. Concurrent administration of a sedative is also necessary. Monitoring of neuromuscular transmission with a peripheral nerve stimulator is recommended during continuous infusion or with repeated dosing.</i><sup>(2,4)</sup></p> <p><b>Dosing adjustment for obesity:</b> In morbidly obese women, cisatracurium 0.2 mg/kg of ideal body weight provided good to excellent intubating conditions with a shorter duration of action compared to dosing based on total body weight.<sup>(5)</sup> Authors of an opinion-based review on dosing adjustments of anesthetic agents in morbidly obese patients recommend cisatracurium be dosed using ideal body weight to avoid prolonged duration of paralysis.<sup>(18)</sup> Pediatric consensus guidelines also recommend using ideal body weight for cisatracurium dosing.<sup>(19)</sup></p> <p><b>Dosing adjustment for induced hypothermia:</b> In pediatric patients undergoing mild hypothermia (mean nasopharyngeal temperature 33.7°C) during cardiopulmonary bypass, no dosage reduction was required; however, during moderate hypothermia (mean 24.8°C), a reduction of 60% was required to maintain a constant level of blockade.<sup>(6)</sup></p> <p><b>Induction and maintenance of neuromuscular blockade</b></p> <p><b>Continuous infusion:</b> 1–4 mcg/kg/min.<sup>(2,7-10)</sup> Clearance is higher in healthy pediatric patients compared to healthy <i>adult</i> patients.<sup>(2)</sup></p> <p><b>Intermittent dosing:</b> 0.1–0.15 mg/kg administered over 5 seconds followed by 0.03 mg/kg given PRN to maintain pharmacological paralysis.<sup>(2,7,10)</sup> Onset of action is faster and there is a longer duration of action in infants 1–23 months compared to children 2–12 years of age.<sup>(2)</sup></p>
<b>Dosage adjustment in organ dysfunction</b>	No dosage adjustment is required in patients with hepatic or renal dysfunction. <sup>(2,11)</sup>
<b>Maximum dosage</b>	The maximum dosage has not been established. In a study including 10 neonates and infants after congenital heart surgery, the maximum dose reached in one patient was 11.5 mcg/kg/min. <sup>(9)</sup> In another study including 19 infants and children receiving cisatracurium, the maximum infusion rate was 10 mcg/kg/min. <sup>(10)</sup> Response may vary over time, resulting in the need for dosage adjustment. <sup>(2)</sup> Patients with burns may develop resistance to nondepolarizing neuromuscular blocking agents. <sup>(2)</sup> The extent of resistance is affected by the size of the burn and time since the burn injury.
<b>Additives</b>	The multiple-dose vials (10 mL) contain benzyl alcohol as a preservative. <sup>(2,12)</sup> (See Appendix C for more specific information about potential adverse effects and/or benzyl alcohol toxicity in neonates.)



# Cisatracurium Besylate

**Suitable diluents** D5W, D5NS, NS, D5LR may also be used as a diluent in final concentrations of 0.1–0.2 mg/mL only.<sup>(2,12)</sup> Do not use LR.<sup>(2,12)</sup>

**Maximum concentration** 2 mg/mL for IV push; 0.4 mg/mL for infusion.<sup>(2)</sup>

**Preparation and delivery** *Parenteral products should be visually inspected for particulate matter and discoloration before use. Refer to appropriate references for more information on compatibility with other drugs and solutions, compatibility following Y-site delivery, and suggested storage and extended stability.*<sup>(12)</sup>

Cisatracurium is an acidic solution; do not administer with alkaline solutions.<sup>(2,12)</sup>

Not compatible with propofol<sup>(2)</sup>

**IV push** 2 mg/mL administered over 5–10 seconds<sup>(15)</sup>

**Intermittent infusion** Not administered by this method

**Continuous infusion** 0.1–0.4 mg/mL<sup>(2)</sup>

**Other routes of administration** No information is available to support administration by other routes.<sup>(2)</sup>

**Comments** **Significant adverse effects:** Prolonged paralysis has been reported after long-term infusion of neuromuscular blocking agents, including cisatracurium and may be affected by concomitant therapies.<sup>(7,13,14)</sup> (See Drug Interactions below.) Other factors that potentiate the duration of neuromuscular blockade include acidosis, hyponatremia, hypocalcemia, hypokalemia, and hypermagnesemia.<sup>(2,7)</sup>

Patients with neurological diseases such as myasthenia gravis may exhibit increased sensitivity. Decreased sensitivity to cisatracurium may occur in patients with severe burns.<sup>(2)</sup>

**Drug interactions:** Enflurane and isoflurane anesthesia may potentiate effects of cisatracurium; during long surgical procedures under enflurane and isoflurane anesthesia, up to 30% to 40% reduction in dose may be necessary.<sup>(2)</sup> Concomitant administration of corticosteroids with neuromuscular blockers is a risk factor for prolonged paralysis.<sup>(7)</sup> Likewise, concomitant administration with certain antibiotics (e.g., aminoglycosides, clindamycin, and vancomycin) may prolong neuromuscular blockade.<sup>(2,7,15)</sup> Consult appropriate resources for additional information on drug interactions.

**Other:** Cisatracurium, in weakening and incompletely paralyzing doses (0.04–0.14 mg/kg/hr [0.7–2.4 mcg/kg/min]) along with intermittent benzodiazepine therapy, has been used to facilitate an isoflurane wean and treat isoflurane withdrawal symptoms in a 4-year-old, critically ill patient.<sup>(16)</sup>

For neonatal nonemergent intubations, AAP recommends that vagolytic and muscle relaxant agents should be considered and that analgesic agents or anesthetic doses of a hypnotic agent should be administered. Rocuronium or vecuronium is preferred over other available neuromuscular blocking agents.<sup>(17)</sup>

## REFERENCES

1. Institute for Safe Medication Practices. List of high-alert medications in acute care settings. <https://www.ismp.org/recommendations/high-alert-medications-acute-list>. Accessed October 11, 2015.
2. Nimbex [prescribing information]. North Chicago, IL: Abbvie Inc; January 2013.
3. Legros CB, Orliaguet GA, Mayer MN, et al. Severe anaphylactic reaction to cisatracurium in a child. *Anesth Analg*. 2001;92(3):648-649.
4. Rowlee SC. Monitoring neuromuscular blockade in the intensive care unit: the peripheral nerve stimulator. *Heart Lung*. 1999;28(5):352-362; quiz 363-364.
5. Leykin Y, Pellis T, Lucca M, et al. The effects of cisatracurium on morbidly obese women. *Anesth Analg*. 2004;99(4):1090-1094.

