# Sugammadex
## Newborn use only

2025

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| **Alert** | It is not recommended for reversal of effects of suxamethonium or pancuronium.<br>Severe bradycardia and cardiac arrest have been reported in adults – Atropine is indicated in clinically significant bradycardia. |
| **Indication** | Reversal of neuromuscular blockade induced by rocuronium or vecuronium<br>It's use for reversal of other non-depolarising neuromuscular blocking agents (NMBAs) (e.g. pancuronium) is not recommended.[1] |
| **Action** | Sugammadex is a water-soluble synthetic gamma-cyclodextrin derivative, structurally consists of a ring with 8 negative charges. Rocuronium and vecuronium fit into the cavity of the ring, forming a 1:1 complex. Vecuronium has a 3-fold lower affinity for sugammadex than rocuronium. Higher doses of sugammadex are likely to be necessary to reverse pancuronium. Muscle relaxants from the benzylisoquinoline group (eg, cisatracurium, mivacurium) fit poorly or not at all.[1] |
| **Drug Type** | Antidote to rocuronium or vecuronium. |
| **Trade Name** | Bridion. There are several other brands. |
| **Presentation** | Vials containing 200mg/2mL or 500mg/5mL |
| **Dose** | **ANMF consensus**<br>**NOTE: Only for reversal of neuromuscular blockade induced by rocuronium or vecuronium (not for suxamethonium or pancuronium)**<br><br>2-4 mg/kg (IV)[3-7] |
| **Dose adjustment** | Therapeutic hypothermia - No information.<br>ECMO – No information.<br>Renal impairment – Refer to evidence section.<br>Hepatic impairment – No dose adjustment. |
| **Maximum Dose** | 4 mg/kg |
| **Route** | **IV bolus** |
| **Preparation** | Draw up 1mL (100mg) and add 4 mL of sodium chloride 0.9% to make a final volume of 5mL with a concentration of 20mg/mL. |
| **Administration** | IV bolus within 10 seconds. |
| **Monitoring** | Cardiorespiratory monitoring – Watch for bradycardia<br>Respiratory function (Breathing sufficiency, $SaO_2$) for any residual neuromuscular blockade<br>Recurrence of neuromuscular blockade - may recur for up to 1 hour after sugammadex.<br>Signs of laryngospasm |
| **Contraindications** | Known hypersensitivity to sugammadex or any of the product ingredients.[1] |
| **Precautions** | Ventilatory support is mandatory for patients until adequate spontaneous respiration is restored.<br>Monitor for recurrence of neuromuscular blockade. |
| **Drug Interactions** | |
| **Adverse Reactions** | Hypersensitivity reactions<br>Bradycardia – generally transient and self-limiting.<br>Severe bradycardia and cardiac arrest – Atropine is advised for clinically significant bradycardia.<br>Laryngospasm[2]<br>Vomiting<br>Residual blockade and recurrence of neuromuscular blockade (recurarization) |
| **Overdose** | AUSTRALIA<br>Contact the Poisons Information Centre on **13 11 26** for information on the management of overdose<br>NEW ZEALAND<br>Contact the National Poisons Centre on **0800 764 766** for information on the management of overdose. |
| **Compatibility** | Fluids:[15] Glucose 5%, sodium chloride 0.9%<br>PN at Y-site:[15] No information. No information on lipid emulsions.<br>Y-site:[15] **No information** |
| **Incompatibility** | Fluids: No information. No information on lipid emulsions.<br>PN at Y-site: No information |

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| | Y site: No information |
| **Stability** | Stability varies between brands. Check product information. |
| **Storage** | Store below 25 degrees Celsius. Protect from light. |
| **Excipients** | All brands: hydrochloric acid, sodium hydroxide, water for injection. |
| **Special Comments** | |
| **Evidence** | **Background**<br>Infants under 2 years of age are particularly sensitive to neuromuscular blocking agents (NMBAs) due to underdeveloped neuromuscular junctions and immature clearance systems. This can prolong the effects of NMBAs and increase the risk of residual neuromuscular blockade (NMB) after surgery. Furthermore, their immature respiratory systems render them more susceptible to complications from residual paralysis such as respiratory failure.[2] One of the challenges with conventional reversal agents (acetylcholinesterase inhibitors), such as neostigmine is that even with appropriate dosing, it has a slower onset and residual NMB, and associated with a wide range of side effects, including bradycardia, increased secretions, and the need for concomitant anticholinergic drugs (atropine) to mitigate these effects.[1-3] Prospective trials on sugammadex in both adult and paediatric patients showed a more rapid and more complete reversal of rocuronium-induced NMB than neostigmine. Unlike neostigmine, sugammadex effectively reverses intense or complete NMB. It may also be effective in situations where reversal of NMB is problematic including patients with neuromyopathic conditions or when acetylcholinesterase inhibitors are contraindicated.[3]<br>**Efficacy**<br>Tobias et al summarised the outcomes of 5 prospective trials involving 287 paediatric population. The mean dose used in these trials were 2 mg/kg in 4 studies and 4 mg/kg in one study. These studies demonstrated various clinical advantages of sugammadex over neostigmine including a more rapid recovery and a shorter time to tracheal extubation.[3] None of these trials included neonates.<br>Clinical data in neonates is limited. A retrospective study by Gaver et al included 18 neonates among the study cohort of 968 paediatric patients. The general recommendation of the dose followed in the study was 2-4 mg/kg. Neonates receiving sugammadex left the operating room faster than neostigmine. No adverse effects and no difficulties with reversal of NMB were noted in neonates.[4]<br>There is a case report of a 3-day old neonate with a giant ovarian cyst who received a dose of sugammadex 4 mg/kg to reverse a rocuronium-induced NMB. A fast and efficient recovery from neuromuscular block was achieved within 90 seconds. No adverse events or other safety concerns were observed.[5] Another case report of 2 neonates showed effective reversal of rocuronium induced NMB with sugammadex (2–4mg/kg). No adverse effects were noted.[6] Alonso et al presented, in abstract form, data regarding the reversal of NMB with sugammadex in 23 neonates.[7] The study cohort included 8 neonates who were 1 day old and 15 neonates who were 1 to 7 days old. Sugammadex 4 mg/kg was used to reverse the NMB. Reversal was rapid within 2-3 minutes of administration.[7] Wakimoto et al, described a newborn weighing 1.77 kg at 34 weeks of gestation who experienced ventilation difficulties after administration of 1 mg/kg of rocuronium and subsequently resumed spontaneous breathing after receiving 8 mg/kg of sugammadex.[8]<br>**Pharmacokinetics**<br>The elimination half-life is approximately 2 hours. Following administration, both sugammadex and sugammadex–NMBA complex are cleared unchanged via glomerular filtration without tubular secretion, absorption or metabolism.[9]<br>**Renal impairment:** In adults with severe renal impairment, exposure to sugammadex was prolonged. Low levels were detectable for at least 48 hours, and up to 7 days in patients with severe renal impairment.[10] Sugammadex use is not recommended in patients with severe renal impairment, as reversal is slowed. Safety data are insufficient to recommend sugammadex in this population.[1]<br>**Safety**<br>Hypersensitivity reactions varying from isolated skin reactions to serious systemic reactions (including anaphylactic reactions), have occurred in 0.3% in adult population.[1] A systematic review identified hypersensitivity reactions within 5 minutes of sugammadex administration.[11] Close observation for at least 5 minutes post-administration is essential.[2] The most commonly reported hypersensitivity reactions in adults were nausea, pruritus, and urticaria; all showed a dose-response relationship, |

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| | occurring more frequently after a sugammadex 16 mg/kg dose compared with 4 mg/kg or placebo. The incidence of bradycardia is lower with sugammadex than with neostigmine. Bradycardia is relatively short and requires little or no special intervention.[2] However, marked bradycardia, including cases resulting in cardiac arrest, has been observed within minutes of sugammadex administration. Patients should be closely monitored for hemodynamic changes during and after reversal. Treatment with atropine is advised for clinically significant bradycardia.[1] There are reports of transient laryngospasm occurring after reversal of NMB with sugammadex. Laryngospasm is attributed to a rapid increase in upper airway tone induced by sugammadex.[2] There are cases of residual blockade or recurarization in children, after prolonged use of NMBAs or administration of lower than the recommended doses of sugammadex.[12] However, recurrence of NMB, even when using recommended doses, can occur due to the redistribution of NMBAs or potential interactions with other medications. Recurarization can occur as late as 52 minutes after surgery. Younger age and lower body weight are associated with an increased risk of residual weakness. Therefore, meticulous monitoring up to one hour after surgery should be considered in paediatric patients despite the use of the recommended doses.[2,12-14] |
| **Practice points** | |
| **References** | 1. Cada DJ, Levien TL, Baker DE. Sugammadex. Hospital Pharmacy. 2016;51(7):585-96.<br>2. Lee S, Chung W. Sugammadex for our little ones: a brief narrative review. Anesthesia and Pain Medicine. 2024;19(4):269-79.<br>3. Tobias JD. Sugammadex: Applications in pediatric critical care. Journal of Pediatric Intensive Care. 2020;9(03):162-71.<br>4. Gaver RS, Brenn BR, Gartley A, Donahue BS. Retrospective analysis of the safety and efficacy of sugammadex versus neostigmine for the reversal of neuromuscular blockade in children. Anesthesia & Analgesia. 2019;129(4):1124-9.<br>5. Carlos RV, Torres MLA, Boer HDd. Rocuronium and sugammadex in a 3 days old neonate for draining an ovarian cyst. Neuromuscular management and review of the literature. Revista Brasileira de Anestesiologia. 2016;66(04):430-2.<br>6. Cárdenas VHG, González FDM. Sugammadex in the neonatal patient. Colombian Journal of Anesthesiology. 2013;41(2):171-4.<br>7. Alonso A, De Boer H, Booij L. Reversal of rocuronium-induced neuromuscular block by sugammadex in neonates: 10AP1-3. European Journal of Anaesthesiology\| EJA. 2014;31:163.<br>8. Wakimoto M, Burrier C, Tobias JD. Sugammadex for rapid intraoperative reversal of neuromuscular blockade in a neonate. Journal of Medical Cases. 2018;9(12):400-2.<br>9. Peeters P, Passier P, Smeets J, Zwiers A, de Zwart M, van de Wetering-Krebbers S, et al. Sugammadex is cleared rapidly and primarily unchanged via renal excretion. Biopharmaceutics & drug disposition. 2011;32(3):159-67.<br>10. Panhuizen I, Gold S, Buerkle C, Snoeck M, Harper N, Kaspers M, et al. Efficacy, safety and pharmacokinetics of sugammadex 4 mg kg− 1 for reversal of deep neuromuscular blockade in patients with severe renal impairment. British journal of anaesthesia. 2015;114(5):777-84.<br>11. Tsur A, Kalansky A. Hypersensitivity associated with sugammadex administration: a systematic review. Anaesthesia. 2014;69(11):1251-7.<br>12. Raval AD, Anupindi VR, Ferrufino CP, Arper DL, Bash LD, Brull SJ. Epidemiology and outcomes of residual neuromuscular blockade: a systematic review of observational studies. Journal of Clinical Anesthesia. 2020;66:109962.<br>13. Lorinc AN, Lawson KC, Niconchuk JA, Modes KB, Moore JD, Brenn BR. Residual weakness and recurarization after sugammadex administration in pediatric patients: a case series. A&A Practice. 2020;14(7):e01225.<br>14. Carollo DS, White WM. Postoperative recurarization in a pediatric patient after sugammadex reversal of rocuronium-induced neuromuscular blockade: a case report. A&A Practice. 2019;13(6):204-5. |

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