

# Adenosine

## Newborn Use Only

2021

<b>Alert</b>	Adenosine is not a maintenance antiarrhythmic agent. Infants with SVT associated with serious cardiovascular compromise such as severe hypotension and decompensated heart failure should be converted with synchronised electrical cardioversion rather than adenosine.
<b>Indication</b>	Supraventricular tachycardia. [1, 2]
<b>Action</b>	Endogenous purine analogue with rapid onset antiarrhythmic action resulting in transient AV nodal block. It has a short half-life (1–10 seconds). [3]
<b>Drug Type</b>	Antiarrhythmic
<b>Trade Name</b>	Adenocor, Adenosine Mylan injection
<b>Presentation</b>	6 mg/2 mL injection
<b>Dose</b>	1 <sup>st</sup> dose: 100 microgram/kg/dose. If no response within 2 minutes,* administer 2 <sup>nd</sup> dose: 200 microgram/kg/dose. If no response within 2 minutes,* administer 3 <sup>rd</sup> dose: 300 microgram/kg/dose.  *Often, poor response is due to incorrect method of administration. Please ensure it is administered by rapid IV push through a proximal vein followed immediately by flush.  If further doses are required, to discuss with cardiology team.
<b>Dose adjustment</b>	Not applicable.
<b>Maximum dose</b>	The first dose should not exceed 6 mg and the second dose 12 mg. [1] If multiple doses are required within 24 hours, consult cardiologist to discuss further management.
<b>Route</b>	Intravenous Successful intraosseous administration has been reported.
<b>Preparation</b>	Draw up 1 mL (3000 microgram) and add 9 mL sodium chloride 0.9% to make a final volume of 10mL with a concentration of 300 microgram/mL.
<b>Administration</b>	Intravenous as a rapid bolus through proximal vein followed immediately by 3-5 mL of sodium chloride 0.9% flush. Use a three-way stopcock and connect 2 syringes, one with adenosine and the other with sodium chloride 0.9% to ensure rapid bolus. Do not use filter. Use of filter may slow down infusion.
<b>Monitoring</b>	Adenosine should be used only where cardiac monitoring and cardiorespiratory resuscitation equipment is available for immediate use if necessary.
<b>Contraindications</b>	Known hypersensitivity to adenosine; sick sinus syndrome, second or third degree AV block (except in patients with a functioning artificial pacemaker); long QT syndrome; severe hypotension; decompensated states of heart failure. Atrial fibrillation or flutter but can be useful to unmask atrial flutter.
<b>Precautions</b>	Patients who develop high level atrioventricular block or returned to sinus rhythm at a particular dose should not be given further dosage increments. Solution must be clear at time of administration. Bronchoconstriction (Exacerbation was reported in adults) <sup>7</sup>
<b>Drug Interactions</b>	Dipyridamole was shown to produce a 4-fold increase in adenosine activity. Dipyridamole should be discontinued 24 hours beforehand or the dose of adenosine should be significantly reduced. Adenosine may interact with drugs that tend to impair cardiac conduction. Aminophylline, theophylline and caffeine are competitive adenosine antagonists and should be avoided for 24 hours prior to the administration of adenosine. Additionally their concomitant use may result in increased risk of seizures. <sup>6</sup> Adenosine has been effectively administered in the presence of other cardioactive drugs, such as digitalis, quinidine, beta-adrenergic blocking agents, calcium channel blocking agents and angiotensin converting enzyme inhibitors, without any change in the adverse reaction profile.
<b>Adverse Reactions</b>	Very rare reactions (mostly reported in adults): atrial fibrillation; ventricular fibrillation and torsades de pointes; severe bradycardia not corrected by atropine and possibly requiring temporary pacing. Hypotension has been reported. Bronchospasm. <sup>6</sup>
<b>Compatibility</b>	Fluids: Glucose 5%, sodium chloride 0.9% Y-site: No information.
<b>Incompatibility</b>	Fluids and Y-site: No information.
<b>Stability</b>	Discard remainder after use.

<b>Storage</b>	Store below 25°C. Protect from light. Do not refrigerate –crystallisation may occur.
<b>Excipients</b>	Sodium chloride, water for injections.
<b>Special Comments</b>	Treatment of any prolonged adverse effects should be individualised and directed to specific symptoms.
<b>Evidence</b>	<p><b>ARC 2010 treatment recommendations for supraventricular tachycardia:</b> If hemodynamically stable (adequate perfusion and blood pressure), initial treatment of SVT for infants and young children should be application to the face of a plastic bag filled with iced-water. [LOE IV; GOR B]. If drug therapy required, adenosine is the drug of choice. It has a very short half-life and must be given as a rapid intravenous or intraosseous bolus and flushed with 0.9% sodium chloride into the circulation. A dose in the range of 0.1 to 0.3 mg/kg converts most cases to sinus rhythm [LOE IV; GOR B]. The initial recommended dose is 0.1 mg/kg but if this is ineffective, the dose should be increased to 0.2 mg/kg. The first dose should not exceed 6 mg and the second dose 12 mg. [1]</p> <p><b>Pharmacokinetics:</b> Adenosine is an endogenous purine analogue with rapid onset and the short half-life (1–10 sec). Adenosine exerts its antiarrhythmic actions by activation of A<sub>1</sub> adenosine receptors located in the sinoatrial and atrioventricular nodes, as well as in activated ventricular myocardium.[3]</p> <p><b>Safety:</b> A few cases of adenosine-induced tachyarrhythmia e.g. torsades de pointes, have occurred.[1]</p>
<b>Practice points</b>	
<b>References</b>	<ol style="list-style-type: none"> <li>1. Australian Resuscitation C, New Zealand Resuscitation C. Management of specific dysrhythmias in paediatric advanced life support. ARC and NZRC Guideline 2010. Emergency medicine Australasia : EMA. 2011;23:409-11.</li> <li>2. de Caen AR, Kleinman ME, Chameides L, Atkins DL, Berg RA, Berg MD, Bhanji F, Biarent D, Bingham R, Coovadia AH, Hazinski MF, Hickey RW, Nadkarni VM, Reis AG, Rodriguez-Nunez A, Tibballs J, Zaritsky AL, Zideman D, Paediatric B, Advanced Life Support Chapter C. Part 10: Paediatric basic and advanced life support: 2010 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations. Resuscitation. 2010;81 Suppl 1:e213-59.</li> <li>3. Szentmiklosi AJ, Galajda Z, Cseppento A, Gesztelyi R, Susan Z, Hegyi B, Nanasi PP. The Janus face of adenosine: antiarrhythmic and proarrhythmic actions. Current pharmaceutical design. 2015;21:965-76.</li> <li>4. Alabed S, Sabouni A, Providencia R, Atallah E, Qintar M, Chico TJA. Adenosine versus intravenous calcium channel antagonists for supraventricular tachycardia. Cochrane Database of Systematic Reviews 2017, Issue 10. Art. No.: CD005154. DOI:10.1002/14651858.CD005154.pub4.</li> <li>5. Greco R, Musto B, Arienzo V, et al. Treatment of paroxysmal supraventricular tachycardia in infancy with digitalis, adenosine-5'-triphosphate and verapamil: a comparative study. Circulation 1982;66:504-8. [</li> <li>5. Australian Injectable Drugs Handbook. Accessed on 16 June 2021.</li> <li>6. Micromedex online. Accessed on 16 June 2021.</li> <li>7. Phelps SJ, Hagemann TM, Lee KR and Thompson AJ. Pediatric Injectable Drugs 11th Edn 2018. Adenosine monograph p.22 Published by the American Society of Health-System Pharmacists.</li> </ol>

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#### Authors Contribution

<b>Original author/s</b>	David Osborn, Srinivas Bolisetty
<b>Evidence Review</b>	Srinivas Bolisetty
<b>Expert review</b>	Hiroko Asakai
<b>Nursing Review</b>	Eszter Jozsa, Kirsty Minter
<b>Pharmacy Review</b>	Jessica Mehegan, Joanne Malloy, Thao Tran
<b>ANMF Group contributors</b>	Nilkant Phad, Bhavesh Mehta, John Sinn, Mohammad Irfan Azeem, Michelle Jenkins, Simarjit Kaur, Helen Huynh, Priya Govindaswamy
<b>Final editing and review of the original</b>	Ian Whyte
<b>Electronic version</b>	Cindy Chen, Ian Callander
<b>Facilitator</b>	Srinivas Bolisetty