

**FUROSEMIDE** (previously known as **FRUSEMIDE**)

<b>Trade Name</b>	Frusemide- Claris Injection (AFT) Lasix Oral Solution (Sanofi-Aventis)
<b>Class</b>	Loop diuretic
<b>Mechanism of Action</b>	Inhibits sodium and chloride reabsorption in the ascending Loop of Henle.
<b>Indications</b>	Diuresis in CHF, fluid overload, pulmonary oedema. To avoid fluid overload during transfusion. Oliguria not secondary to hypovolaemia. CLD to improve pulmonary function.
<b>Contraindications</b>	Anuria. History of hypersensitivity to frusemide or sulphonamides Use with caution in infants with jaundice or Rh incompatibility
<b>Supplied As</b>	<b>IV:</b> 20mg/2mL ampoules <b>Oral:</b> 10mg/mL Lasix suspension – <b>NOT FOR USE IN NICU</b> In 2016 Lasix suspension was reformulated to contain 12.7% v/v ethanol (alcohol) ie up to 0.5 g/5mL alcohol. The safety of 12.7% ethanol preparations in infants and children has not been established¹. <b>For this reason we recommend oral administration of the furosemide injection solution if oral dosing is required for treatment of patients in the Neonatal unit. Pharmacy repacks the injection into a brown plastic bottle supplied to the NICU on a weekly basis – see stability and storage conditions below.</b>
<b>Dilution</b>	Nil required
<b>Dosage</b>	1mg/kg/dose Increasing up to 3-4 mg/kg orally if required
<b>Interval</b>	12-24 hourly Consider alternate day therapy for long term use.
<b>Administration</b>	<b>Oral:</b> Use IV solution as described above <b>IV:</b> slow push (maximum rate 4mg/minute) Administer a 0.9% saline flush on either side of furosemide given during a blood transfusion. (This will provide a separation of several centimetres of blood and furosemide in the administration tubing. Record flush in the usual way). <b>IV infusion:</b> Take 20 mg/kg (=2mL/kg) of furosemide (10mg/mL) and make up to 20mL with 0.9% sodium chloride, 5% dextrose or 10% dextrose. Start infusion at 0.1mg/kg/hr and double the dose every 2 hours until urine output of > 1mL/kg /hr is achieved. Doses of 0.4 mg/kg/hr are usually sufficient but can be increased up to a maximum of 1 mg/kg/hr. – see infusion sheet

<b>Compatible With</b>	Dextrose 5%, Dextrose 10%, Dextrose 20% Sodium chloride 0.9%, sterile water, Ringers. Lactated Ringers. <b>Y site:</b> adrenaline, amikacin, amphotericin (liposomal), atropine, aztreonam, bumetanide, calcium chloride, calcium gluconate, cefotaxime, cefuroxime, clindamycin, dexamethasone, dexmedetomidine, digoxin, ephedrine, foscarnet, ganciclovir, granisetron, heparin, hydrocortisone, lidocaine, linezolid, lorazepam, meropenem, methylprednisolone, metoprolol, metronidazole, piperacillin tazobactam, potassium chloride, sodium bicarbonate, tobramycin.
<b>Incompatible With</b>	azithromycin, benztropine, caffeine citrate, caspofungin, chlorpromazine, ciprofloxacin, droperidol, esmolol, figrastim, fluconazole, gentamicin, glycopyrrolate, haloperidol, hydralazine, ketamine, labetalol, metaraminol, metoclopramide, midazolam, milrinone, moxifloxacin, mycophenolate, ondansetron, pancuronium, pentamidine, pethidine, phentolamine, phenylephrine, promethazine, protamine, quinine, rocuronium, vancomycin, vecuronium, verapamil.  <b>*Variable compatibility with:</b> aminophylline, dopamine, dobutamine, erythromycin, insulin, magnesium, morphine, noradrenaline, phentolamine, phenylephrine, TPN, SMOFlipid vasopressin. <b>Use a separate line for furosemide if at all possible.</b>
<b>Monitoring</b>	Serum electrolytes, renal function, blood pressure (plus hearing if high doses used).
<b>Adverse Reactions</b>	Ototoxic if high levels, renal failure, or if used with aminoglycosides. Hyponatraemia, hypokalaemia, hypochloreaemic alkalosis, hypovolaemia, hypercalciuria. GI effects.
<b>Stability</b>	<b>IV:</b> Discard any unused content of ampoule immediately after use, do not use if solution yellow. <b>Oral:</b> Furosemide IV solution repacked by pharmacy into brown plastic bottles for oral use has an expiry of 7 days after repacking
<b>Storage</b>	<b>IV:</b> Store ampoules below 30°C <sup>7</sup> Protect from light. <b>Oral:</b> Store furosemide, repacked by pharmacy into brown plastic bottles for oral use, in the fridge, at 2 – 8 °C. Protect from light.
<b>Metabolism</b>	Rapid onset of effect 5-30 minutes. Peak 1-3 hours IV. Half life > 24 hours in preterms. Mainly renally excreted unchanged.
<b>Comments</b>	Extensive protein binding but bilirubin displacement is negligible when using normal doses. Increased rate of PDA observed. Thiazide addition has not been shown to prevent hypercalciuria / nephrocalcinosis.

<b>References</b>	<ol style="list-style-type: none"> <li>1. Cochrane library: Brion LP; IV or enteral loop diuretics for preterm infants with CLD : 2000, issue 2.</li> <li>2. <a href="http://www.medsafe.govt.nz/profs/datasheet/lasixsolnHDinf.pdf">www.medsafe.govt.nz/profs/datasheet/lasixsolnHDinf.pdf</a></li> <li>3. Neofax 1999 (12th ed) pg 148.and in <a href="http://www.micromedexsolutions.com">www.micromedexsolutions.com</a></li> <li>4. Pediatric dosage handbook 1999-2000 (6th ed) pg 46</li> <li>5. NZHPA Notes on Injectable Drugs 5<sup>th</sup> Edition and in <a href="http://www.noids.nz">www.noids.nz</a></li> <li>6. <a href="http://www.ems1.com/ems-products/consulting-management-and-legal-services/articles/390568-Furosemide-Lasix-Drug-Whys/">www.ems1.com/ems-products/consulting-management-and-legal-services/articles/390568-Furosemide-Lasix-Drug-Whys/</a></li> <li>7. <a href="http://www.medsafe.govt.nz/profs/datasheet/f/frusemideclarisinj.pdf">www.medsafe.govt.nz/profs/datasheet/f/frusemideclarisinj.pdf</a></li> <li>8. <a href="http://www.anmfonline.org">www.anmfonline.org</a></li> <li>9. <a href="http://www.starship.org.nz">www.starship.org.nz</a></li> </ol>																
<b>Updated By</b>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">Dr R Martin</td> <td>June 2000</td> </tr> <tr> <td>K Simonsen</td> <td>June 2003</td> </tr> <tr> <td>P Schmidt, B Robertshawe</td> <td>December 2004</td> </tr> <tr> <td>A Lynn, B Robertshawe, F Robertson</td> <td>May 2009</td> </tr> <tr> <td>A Lynn, B Robertshawe</td> <td>June 2012 (re-order profile)</td> </tr> <tr> <td>A Lynn B Robertshawe</td> <td>Aug 2016 (use of injection orally)</td> </tr> <tr> <td>A Lynn, B Robertshawe</td> <td>March 2021 (review/updatecompatibilities)</td> </tr> <tr> <td>A Lynn, B Robertshawe</td> <td>November 2022 (add in IV infusion and further compatibility update)</td> </tr> </table>	Dr R Martin	June 2000	K Simonsen	June 2003	P Schmidt, B Robertshawe	December 2004	A Lynn, B Robertshawe, F Robertson	May 2009	A Lynn, B Robertshawe	June 2012 (re-order profile)	A Lynn B Robertshawe	Aug 2016 (use of injection orally)	A Lynn, B Robertshawe	March 2021 (review/updatecompatibilities)	A Lynn, B Robertshawe	November 2022 (add in IV infusion and further compatibility update)
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