Sodium acetate
Newborn use only

2022

<table>
<tr><td>Alert</td><td>In Australia, it is available as sodium acetate 16.4% (2 mmol/mL of acetate). It has an osmolarity of 4000 mOsm/L.
Concentrated sodium acetate ampoules MUST BE DILUTED prior to use.(1)
It requires 1:3, 1:12.5 or 1:25 dilution with water for injection to reach an osmolarity equivalent to sodium chloride 3%, 0.9% and 0.45% respectively.(2, 3) (Refer to special comments section).</td></tr>
<tr><td>Indication</td><td>1. Metabolic acidosis: Prevention and treatment
2. Hyponatraemia: An alternative source of correction in the presence of acidosis.
3. Maintenance of arterial line patency</td></tr>
<tr><td>Action</td><td>Acetate is an alkalinising agent and can be used to increase plasma bicarbonate concentration and correct metabolic acidosis. (4) Acetate is metabolised in the liver to bicarbonate.</td></tr>
<tr><td>Drug type</td><td>Electrolyte</td></tr>
<tr><td>Trade name</td><td>DBL Sodium acetate concentrated injection</td></tr>
<tr><td>Presentation</td><td>Sodium acetate concentrated injection 10 mL glass ampoule: Contains 1.64 gram/10 mL sodium acetate. This is equivalent to sodium acetate 16.4%.(1) Each 1 mL contains 2 mmol acetate and 2 mmol sodium.</td></tr>
<tr><td>Dose</td><td>IV infusion
1-3 mmol/kg/day.
Dose beyond 3 mmol/kg/day may be used at the discretion of treating team.

Maintenance of arterial line patency
As a routine intra-arterial line infusion (prevention of metabolic acidosis) (ANMF consensus)
< 1 Kg: sodium acetate 0.45% with heparin 1 unit/mL at 0.5 mL/hour
1-1.5 Kg: sodium acetate 0.9% with heparin 1 unit/mL at 0.5 mL/hour</td></tr>
<tr><td>Dose adjustment</td><td>No information.</td></tr>
<tr><td>Maximum dose</td><td>No information.</td></tr>
<tr><td>Total cumulative dose</td><td>No information.</td></tr>
<tr><td>Route</td><td>Intravenous, intra-arterial.</td></tr>
<tr><td>Preparation</td><td>Intravenous correction for metabolic acidosis
Bodyweight ≤ 1.8 Kg
<table>
<tr><th>Strength</th><th>Dilution</th><th>24-hour infusion</th></tr>
<tr><td>Sodium acetate 0.9%</td><td>Add 2 mL/kg of sodium acetate (equivalent to 4 mmol/kg of acetate) to 24 mL/kg of water for injection to a final volume of 26 mL/kg</td><td>0.5 mL/kg/hour = 1.9 mmol/kg/day</td></tr>
<tr><td>Sodium acetate 3% (central venous access recommended)</td><td>Add 5 mL/kg of sodium acetate (equivalent to 10 mmol/kg of acetate) to 15 mL/kg of water for injection to a final volume of 20 mL/kg</td><td>0.2 mL/kg/hour = 2.4 mmol/kg/day</td></tr>
</table>
Bodyweight > 1.8 Kg
<table>
<tr><th>Strength</th><th>Dilution</th><th>24-hour infusion</th></tr>
<tr><td>Sodium acetate 0.9%</td><td>Add 1 mL/kg of sodium acetate (equivalent to 2 mmol/kg of acetate) to 12 mL/kg of water for injection to a final volume of 13 mL/kg</td><td>0.8 mL/kg/hour = 3 mmol/kg/day</td></tr>
<tr><td>Sodium acetate 3% (central venous access recommended)</td><td>Add 2.5 mL/kg of sodium acetate (equivalent to 5 mmol/kg of acetate) to 7.5 mL/kg of water for injection to a final volume of 10 mL/kg</td><td>0.2 mL/kg/hour = 2.4 mmol/kg/day</td></tr>
</table>
Maintenance of arterial line patency (heparin added) for infants ≤ 1.5 Kg
Sodium acetate 0.45% (for weight < 1 Kg):</td></tr>
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<table>
<tr><td></td><td>Draw up 2 mL of sodium acetate (equivalent to 4 mmol of acetate), add 5 mL of Heparinised Saline (50 units), and add to 43 mL of water for injection to make a final volume of 50 mL with a concentration of 0.08 mmol/mL of sodium acetate.

Sodium acetate 0.9% (for weight 1-1.5 kg):
Draw up 4 mL of sodium acetate (equivalent to 8 mmol of acetate), add 5 mL of Heparinised Saline (50 units), and add to 41 mL of water for injection to make a final volume of 50 mL with a concentration of 0.16 mmol/mL of sodium acetate.

Sodium and acetate provided in mmol/kg/day with the above intra-arterial line infusion:
<table>
<tr><th>Weight</th><th>Sodium acetate strength</th><th>Rate</th><th>mmol/kg/day</th></tr>
<tr><td>500 g</td><td rowspan="3">0.45%</td><td rowspan="3">0.5 mL/hour</td><td>1.9 mmol/kg/day</td></tr>
<tr><td>750 g</td><td>1.2 mmol/kg/day</td></tr>
<tr><td>1000 g</td><td>0.9 mmol/kg/day</td></tr>
<tr><td>500 g</td><td rowspan="3">0.9%</td><td rowspan="3">0.5 mL/hour</td><td>3.8 mmol/kg/day</td></tr>
<tr><td>750 g</td><td>2.5 mmol/kg/day</td></tr>
<tr><td>1000 g</td><td>1.9 mmol/kg/day</td></tr>
</table>
</td></tr>
<tr><td>Administration</td><td>Continuous infusion</td></tr>
<tr><td>Monitoring</td><td>Electrolytes, acid base status (bicarbonate, base excess, pCO2)</td></tr>
<tr><td>Contraindications</td><td>Hypernatraemia
Fluid overload</td></tr>
<tr><td>Precautions</td><td>Renal impairment</td></tr>
<tr><td>Drug interactions</td><td></td></tr>
<tr><td>Adverse reactions</td><td>Metabolic alkalosis
Hypernatraemia
Fluid overload
Aluminium toxicity from leaching of aluminium from glass ampoules.(5)</td></tr>
<tr><td>Compatibility</td><td>Fluids: Glucose 5%, sodium chloride 0.9%, Amino acid solutions, lipid emulsion (6)
Y site: aciclovir, alfentanil, allopurinol, amifostine, amikacin, aminophylline, ampicillin, anidulafungin, asparaginase, atenolol, atracurium, azithromycin, aztreonam, buprenorphine, busulfan, calcium folinate, calcium gluconate, capreomycin, cefazolin, cefepime, cefotaxime, cefoxitin, ceftazidime, ceftriaxone, cefuroxime, clindamycin, dexamethasone, dexmedetomidine, digoxin, diltiazem, diphenhydramine, dobutamine, dopamine, doxycycline, enalaprilat, ephedrine, adrenaline (epinephrine), erythromycin lactobionate, esmolol, fentanyl, fluconazole, fluorouracil, foscarnet, fosphenytoin, furosemide, ganciclovir, gentamicin, heparin, hydrocortisone, imipenem-cilastin, labetalol, levofloxacin, lidocaine (lignocaine), linezolid, lorazepam, magnesium sulfate, methadone, methotrexate, methylprednisolone, metronidazole, milrinone, morphine, naloxone, netilmicin, nitroprusside sodium, octreotide, ondansetron, pamidronate, pancuronium, pentobarbital, phenobarbital (phenobarbitone), phenylephrine, piperacillin-tazobactam, potassium chloride, propranolol, ranitidine, remifentanil, rocuronium, sodium bicarbonate, suxamethonium, sulfamethoxazole-trimethoprim, tacrolimus, theophylline, ticarcillin, tobramycin, vancomycin, vasopressin, vecuronium, verapamil, voriconazole, zidovudine</td></tr>
<tr><td>Incompatibility</td><td>Fluids: No information.
Y site: Amiodarone, amphotericin B conventional colloidal and lipid complex, caspofungin, diazepam, hydralazine, mycophenolate mofetil, pantoprazole, phenytoin</td></tr>
<tr><td>Stability</td><td></td></tr>
<tr><td>Storage</td><td>Store below 30°C. Single use only. Replace syringe every 24 hours.</td></tr>
<tr><td>Excipients</td><td>Water for injection</td></tr>
<tr><td>Special comments</td><td>
<table>
<tr><th>Solution</th><th>Electrolyte (mmol/mL)</th><th>Osmolarity (mOsm/L)</th></tr>
<tr><td>Human Plasma</td><td></td><td>280-300</td></tr>
<tr><td>Sodium acetate 16.4%</td><td>2 mmol/mL of Na</td><td>4000</td></tr>
<tr><td>Sodium acetate 32.8%</td><td>4 mmol/mL of Na</td><td>8000</td></tr>
<tr><td>Sodium chloride 0.45%</td><td>0.08 mmol/L of Na</td><td>154</td></tr>
</table>
</td></tr>
</table>

	Sodium chloride 0.9%	0.15 mmol/mL of Na	308
	Sodium chloride 3%	0.51 mmol/mL of Na	1027
	Sodium acetate 0.45%	0.08 mmol/mL of Na and acetate	160
	Sodium acetate 0.9%	0.16 mmol/mL of Na and acetate	320
	Sodium bicarbonate 8.4%	1 mmol/mL of Na and bicarbonate	2000
	Sodium bicarbonate 4.2%	0.5 mmol/mL of Na and bicarbonate	1000

Evidence

Background

Sodium acetate is similar to bicarbonate in its ability to restore blood pH and plasma bicarbonate.(7) It can also be used as the source of sodium in parenteral nutrition solution in preterm neonates.

Efficacy

In a prospective study by Ekblad et al, 11 infants ≤ 34 weeks were supplemented with sodium acetate added to the daily intravenous fluids from day 1 of life. Sodium acetate was used as the sole source of sodium on day 1 of life and both sodium chloride and sodium acetate were used in equal amounts as the source of sodium from day 2 of life. Actual intakes of sodium acetate on day 1 and thereafter were 3 mmol/kg/day and 1.5 mmol/kg/day respectively. They demonstrated an improvement in metabolic acidosis (less number of infants with pH < 7.3) without any worsening in PCO_2. Serum sodium was normal in all infants.(8) In a double blind randomised controlled trial, Ali et al compared the parenteral nutrition (PN) solutions containing sodium acetate or sodium chloride on biochemical parameters and clinical outcomes in 52 infants < 33 weeks including 29 extremely low birth weight infants <1000 g. PN was prepared based on 2005 ESPGHAN guidelines. The intervention arm received sodium acetate as the entire source of sodium whereas the control arm received sodium chloride as the source of sodium. In the first 6 days of life, intervention arm received mean intake of sodium (and acetate) 4 mmol/kg/day. Blood pH and base excess rose to normal values after 3 days of PN in the acetate group. There was no significant difference in pCO_2 between groups. There was a significantly lower incidence of bronchopulmonary dysplasia in the acetate group. There was also a trend towards lower incidence of severe intraventricular haemorrhage.(7)

Pharmacokinetics

Following administration acetate is metabolised in liver to bicarbonate.

Practice points

References

1. Sodium acetate injection, USP. Fresenius kabi. Product info. March 2008. http://editor.fresenius-kabi.us/PIs/Sodium_Ace_Inj_45828E_Mar_08.pdf.
2. 0.45% sodium chloride injection, USP. Accessdata.fda.gov.
3. 0.9% sodium chloride injection, USP. Accessdata.fda.gov.
4. DBL Sodium Acetate Concentrated Injection. Accessed via MIMS online on 8 February 2022. [Internet].
5. Sodium acetate. IBM Micromedex. Accessed online on 14 February 2022.
6. Sodium acetate. Australian Injectable Drugs Handbook. Accessed online on 14 February 2022.
7. Ali A, Ong E-Y, Singh BKS, Cheah F-C. Comparison between sodium acetate and sodium chloride in parenteral nutrition for very preterm infants on the acid-base status and neonatal outcomes. Pediatric Gastroenterology, Hepatology & Nutrition. 2020;23(4):377.
8. Ekblad H, Kero P, Takala J. Slow sodium acetate infusion in the correction of metabolic acidosis in premature infants. American journal of diseases of children. 1985;139(7):708-10.

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