# Summary of Product Characteristics

## 1 NAME OF THE MEDICINAL PRODUCT

Potassium Chloride 0.15%w/v Sodium Chloride 0.18%w/v Glucose 4%w/v Solution for Infusion

## 2 QUALITATIVE AND QUANTITATIVE COMPOSITION

Active Component
Potassium chloride
Sodium chloride

Glucose monohydrate

| Per 500 ml | Per 1000 ml |
|---|---|
| 0.75 g<br>$K^+$ 10 mmol | 1.5 g<br>$K^+$ 20 mmol |
| 0.9 g<br>$Na^+$ 15 mmol | 1.8 g<br>$Na^+$ 30 mmol |
| $Cl^-$ 25mmol | $Cl^-$ 50 mmol |
| Equivalent to 20 g anhydrous glucose 111 mmol | Equivalent to 40 g anhydrous glucose 222 mmol |

Osmolality approx. 330 mOsm/kg $H_2O$.

For a full list of excipients, see section 6.1.

## 3 PHARMACEUTICAL FORM

Solution for infusion (Intravenous Infusion)
Colourless to faintly straw-coloured solution without visible particles in bags, individually overwrapped.
pH 3.5 - 6.5.

## 4 CLINICAL PARTICULARS

### 4.1 Therapeutic indications

For correction and maintenance of fluid, potassium, sodium and chloride ion balance and as a source of energy, where oral administration is not feasible.

### 4.2 Posology and method of administration

For intravenous infusion under medical supervision.

The volume of solution needed to replenish deficits varies with hydration state, age, body weight, complementary treatment and clinical and biochemical status.

Doses may be expressed in terms of mEq or mmol of potassium, mass of potassium or mass of potassium salt:
1 g KCl = 525 mg of $K^+$ or 13.4 mEq or 13.4 mmol of $K^+$ and $Cl^-$
1 mmol $K^+$ = 39.1 mg $K^+$

**Posology**

***- Adults:***
500ml to 3000ml/24h
***- Paediatric population:***
0 – 10kg body weight: 100ml/kg/24h
10 – 20kg body weight: 1000ml + (50ml/kg over 10kg)/24h
> 20kg body weight: 1500ml + (20ml/kg over 20kg)/24h

The infusion rate should not exceed the patient's glucose oxidation capacities in order to avoid hyperglycaemia. Therefore the maximum dose ranges from 5mg/kg/min for adults to 10-18 mg/kg/min for babies and children depending on age and total body mass.

***Posology for prevention and treatment of potassium depletion***
Typical doses of potassium for the prevention of hypokalaemia and treatment of mild potassium deficiency may be up to 50mmoles per day. In severe hypokalaemia the recommended dosage is 20mmol potassium over 2 to 3 hours (i.e. 7-10 mmol/h) with ECG monitoring, but the dose and rate of administration are subject to clinical and laboratory assessment in each case.

The recommended maximal dose of potassium is 2-3mmol/kg/24h.
Patients with renal impairment should receive lower doses.

**Method of Administration**

***Route of administration***
The administration is performed by intravenous route using sterile and non-pyrogenic equipment.
Intravenous potassium should be administered in a large peripheral or central vein to diminish the risk of causing sclerosis. If infused through a central vein, to avoid localized hyperkalaemia the catheter must not be in the atrium or ventricle.

***Rate of administration***
The rate of administration of potassium containing solutions should not exceed 15 to 20 mmoles/h to avoid dangerous hyperkalaemia. Rapid infusion may be harmful.

***Monitoring***
Adequate urine flow must be ensured and careful monitoring of plasma-potassium and other electrolyte concentrations is essential. Higher dosage or high speed infusion must be performed under ECG control.
Fluid balance, serum glucose, serum sodium and other electrolytes may need to be monitored before and during administration, especially in patients with increased non-osmotic vasopressin release (syndrome of inappropriate antidiuretic hormone secretion, SIADH) and in patients co-medicated with vasopressin agonist drugs due to the risk of hyponatraemia. Monitoring of serum sodium is particularly important for physiologically hypotonic fluids. Potassium Chloride 0.15%w/v Sodium Chloride 0.18%w/v Glucose 4%w/v Solution for Infusion may become extremely hypotonic after administration due to glucose metabolization in the body (see sections 4.4, 4.5 and 4.8).

**4.3 Contraindications**

Hyperkalaemia such as is associated with severe renal insufficiency or adrenocortical insufficiency.
Hyperchloraemia, uncompensated cardiac failure, uncompensated diabetes, other known glucose intolerances (such as metabolic stress situations, thionine (Vit B1) deficiency), hyperosmolar coma, hyperglycaemia, hyperlactatemia. Acute ischaemic stroke. Head trauma (first 24 hours). Patients with fluid and sodium retention, congestive heart failure, or severely impaired renal function.

**4.4 Special warnings and precautions for use**

Potassium Chloride 0.15%w/v Sodium Chloride 0.18%w/v Glucose 4%w/v Solution for Infusion is a hypertonic solution, with an approximate osmolarity of 330mOsm/l.

Potassium replacement must be used with caution to patients with conditions associated with high potassium levels including cardiac disease, oedema, renal dysfunction, hepatic insufficiency or digitilisation, acute dehydration, acute acidosis, extensive tissue destruction as occurs with tissue trauma and severe burns, haemolysis, rhabdomyolysis or hepatic insufficiency.

Sodium salts should be administered with caution to patients with hypertension.
Use with caution in patients with diabetes mellitus; insulin requirements may be modified.
Solutions containing glucose should not be used for initial treatment of potassium depletion because glucose may cause a further decrease in plasma potassium concentration.

Glucose infusions are incompatible with blood for transfusion as haemolysis or clumping can occur; do not administer through the same infusion equipment as blood or blood components for transfusion (either before, during or after their administration).

Fluid replacement therapy should be administered with caution to very young and elderly patients who have reduced capacity to compensate for fluctuations in fluid and electrolyte balance.

Administration should be carried out under regular and careful surveillance. Regular monitoring of clinical status, plasma potassium, blood and urinary glucose level, serum and/or urinary electrolytes, plasma creatinine levels, BUN level, acid-base balance and ECG is essential in patients receiving potassium therapy, particularly those with cardiac or renal impairment. Plasma electrolyte concentrations should be carefully monitored especially in patients with pre-existing imbalances or conditions predisposing to hyperkalaemia, such as renal or adrenal insufficiency.

High volume infusion must be used under specific monitoring in patients with cardiac or pulmonary failure.

Adequate urine flow must be ensured and fluid balance should be monitored.

Blood glucose concentration should be closely monitored during intracranial hypertension episodes.

If hyperglycaemia occurs, the rate of infusion should be adjusted or insulin administered.

During long-term treatment, a convenient nutritive treatment supply must be given to the patient.

Glucose intravenous infusions are usually isotonic solutions. In the body, however, glucose containing fluids can become extremely physiologically hypotonic due to rapid glucose metabolization (see section 4.2).
Depending on the tonicity of the solution, the volume and rate of infusion and depending on a patient's underlying clinical condition and capability to metabolize glucose, intravenous administration of glucose can cause electrolyte disturbances most importantly hypo- or hyperosmotic hyponatraemia.

Hyponatraemia:
Patients with non-osmotic vasopressin release (e.g. in acute illness, pain, post-operative stress, infections, burns, and CNS diseases), patients with heart-, liver- and kidney diseases and patients exposed to vasopressin agonists (see section 4.5) are at particular risk of acute hyponatraemia upon infusion of hypotonic fluids.
Acute hyponatraemia can lead to acute hyponatraemic encephalopathy (brain oedema) characterized by headache, nausea, seizures, lethargy and vomiting. Patients with brain oedema are at particular risk of severe, irreversible and life-threatening brain injury.
Children, women in the fertile age and patients with reduced cerebral compliance (e.g. meningitis, intracranial bleeding, and cerebral contusion) are at particular risk of the severe and life-threatening brain swelling caused by acute hyponatraemia.

**4.5 Interaction with other medicinal products and other forms of interaction**

**Drugs leading to an increased vasopressin effect**
The below listed drugs increase the vasopressin effect, leading to reduced renal electrolyte free water excretion and increase the risk of hospital acquired hyponatraemia following inappropriately balanced treatment with i.v. fluids (see sections 4.2, 4.4 and 4.8).
• Drugs stimulating vasopressin release, e.g.:
Chlorpropamide, clofibrate, carbamazepine, vincristine, selective serotonin reuptake inhibitors, 3.4-methylenedioxy-N-methamphetamine, ifosfamide, antipsychotics, narcotics
• Drugs potentiating vasopressin action, e.g.:
Chlorpropamide, NSAIDs, cyclophosphamide
• Vasopressin analogues, e.g.:
Desmopressin, oxytocin, vasopressin, terlipressin

Other medicinal products increasing the risk of hyponatraemia also include diuretics in general and antiepileptics such as oxcarbazepine.

Care should be taken in the concurrent use of drugs containing potassium, potassium-sparing diuretics such as spironolactone and triamterene, and drugs which have the potential for inducing hyperkalaemia, ACE (angiotensin converting enzyme) inhibitors, angiotensin II receptor antagonists, tacrolimus and cyclosporine, as well as drugs which promote sodium retention such as corticosteroids.

Check compatibility of medicinal products with the solution before use.

**4.6 Fertility, pregnancy and lactation**

Administration of intravenous fluids to pregnant and lactating women requires consideration of the consequences of possible unwanted effects in relation to the desired therapeutic objective.

Sodium salts should be administered with caution to patients with pre-eclampsia.

It has been suggested that if used during labour the glucose load on the mother may lead to foetal hyperglycaemia, hyperinsulinaemia, and acidosis, with subsequent neonatal hypoglycaemia and jaundice. Others have found no evidence of such an effect.

Hyperkalaemic and hypokalaemic serum levels lead to impaired cardiac function of the maternal and foetal hearts. Therefore, maternal electrolyte levels must be controlled regularly. As long as the maternal electrolyte serum levels are kept within the physiological range, there are no potential concerns regarding administration of Potassium Chloride 0.15%w/v Sodium Chloride 0.18%w/v Glucose 4%w/v Solution for Infusion during pregnancy and lactation.

Potassium Chloride 0.15%w/v Sodium Chloride 0.18%w/v Glucose 4%w/v Solution for Infusion should be administrated with special caution for pregnant women during labour particularly if administered in combination with oxytocin due to the risk of hyponatraemia (see sections 4.4, 4.5 and 4.8).

**4.7 Effects on ability to drive and use machines**

Not applicable.

**4.8 Undesirable effects**

Adverse reactions may be associated with the technique of administration and include febrile response, infection at the site of injection, local pain or reaction, vein irritation, venous thrombosis or phlebitis extending from the site of injection, extravasation and hypervolemia.
Metabolism and nutrition disorders: hospital acquired hyponatraemia*(frequency not known)
Nervous system disorders: hyponatraemic encephalopathy *(frequency not known)
* Hospital acquired hyponatraemia may cause irreversible brain injury and death due to development of acute hyponatraemic encephalopathy (see sections 4.2 and 4.4).

**Reporting of suspected adverse reactions**
Reporting suspected adverse reactions after authorization of the medicinal product is important. It allows continued monitoring of the benefit/risk balance of the medicinal product. Healthcare professionals are asked to report any suspected adverse reactions via the national reporting system:

**For United Kingdom**
**Yellow Card Scheme**
Website: www.mhra.gov.uk/yellowcard

**For Ireland**
**HPRA Pharmacovigilance**
Earlsfort Terrace
IRL - Dublin 2
Tel: +353 1 6764971
Fax: +353 1 6762517
Website: www.hpra.ie
E-mail: medsafety@hpra.ie

**4.9 Overdose**

Prolonged or rapid intravenous infusion may lead to venous irritation and thrombophlebitis at the infusion site.

Excessive or rapid administration of potassium-containing solutions may cause hyperkalaemia with hypotension, cardiac arrhythmias, heart block, ECG abnormalities and cardiac arrest, mental confusion, and neuromuscular dysfunction such as muscle weakness, paraesthesia and paralysis.

ECG changes are important indicators of potassium toxicity, including tall, peaked T-waves, depression of S-T segment, disappearance of the P-wave, prolongation of the Q-T interval, and widening and slurring of the QRS complex. Excessive or rapid administration of sodium chloride solution may lead to fluid and electrolyte imbalances such as hypervolaemic haemodilution, also hypertension, tachycardia, and oedema. Excessive administration of chloride salts may cause a loss of bicarbonate with an acidifying effect.

In the event of accidental over infusion, treatment should be discontinued.

Treatment depends on the individual clinical situation but involves administration of calcium to counteract the effects of hyperkalaemia on cardiac excitability, the use of agents such as insulin or sodium bicarbonate to promote cellular uptake of potassium, and enhanced potassium excretion with exchange resins or dialysis. Administration of excessive amounts of 4% glucose may result in hyperglycaemia. Treatment is symptomatic.

Discontinue infusion if adverse reaction occurs.

## 5 PHARMACOLOGICAL PROPERTIES

### 5.1 Pharmacodynamic properties

Pharmacotherapeutic group (ATC code): "electrolytes with carbohydrates" (B05BB02).

Potassium Chloride 0.15%w/v Sodium Chloride 0.18%w/v Glucose 4%w/v Solution for Infusion is a hypertonic solution, with an approximate osmolarity of 330 mOsmol/l.

The pharmacodynamic properties of this solution are those of its components (potassium, sodium, chloride and glucose). Potassium is predominantly an intracellular cation, primarily found in muscle; only about 2% is present in the extracellular fluid. It is essential for numerous metabolic and physiological processes including nerve conduction, muscle contraction, and acid-base regulation.

Sodium is mainly an extracellular cation. Chloride is mainly an extracellular anion.

Intracellular chloride is in high concentration in red blood cells and gastric mucosa.

Glucose is the principal source of energy in cellular metabolism.

### 5.2 Pharmacokinetic properties

The pharmacokinetic properties of this solution are those of its components (potassium, sodium, chloride and glucose).

Intravenous administration of the solution provides an immediate supply of electrolytes and glucose to blood. Factors influencing potassium transfer between intracellular and extracellular fluid such as acid base disturbances can distort the relationship between plasma concentrations and total body stores. Potassium is excreted mainly by the kidneys; it is secreted in the distal tubules in exchange for sodium or hydrogen ions. The capacity of the kidneys to conserve potassium is poor and some urinary excretion of potassium continues even when there is severe depletion. Some potassium is excreted in the faeces and small amounts may also be excreted in sweat.

The two main metabolic pathways of glucose are gluconeogenesis (energy storage) and glycogenolysis (energy release). Glucose metabolism is regulated by insulin.

### 5.3 Preclinical safety data

Preclinical safety data of Potassium Chloride 0.15%w/v Sodium Chloride 0.18%w/v Glucose 4%w/v Solution for Infusion in animals are not relevant since potassium chloride, Sodium Chloride and glucose are physiological components of the body. Toxic effects are not to be expected if serum electrolytes are kept within physiological range.

## 6 PHARMACEUTICAL PARTICULARS

### 6.1 List of excipients

Water for Injections in bulk.

**6.2 Incompatibilities**

In the absence of compatibility studies, this medicinal product must not be mixed with other medicinal products.

**6.3 Shelf life**

2 years.
Use immediately on removal from overwrap.

**6.4 Special precautions for storage**

Do not store above 25ºC. Do not freeze. Store in the original outer container (over-wrap) to prevent moisture loss to the air.

**6.5 Nature and contents of container**

Flexible COSINUS$^{PVC}$ bags containing 500ml or 1000ml solution, individually overwrapped in transparent polypropylene laminate.

Not all pack sizes may be marketed.

**6.6 Special precautions for disposal and other handling**

Do not use unless the solution is clear and the container undamaged.

Discard any unused solution. For single use only.

The space between the bag and the overwrap is not guaranteed sterile.

Before use, remove the bag from the plastic overwrapping. Remove the twist-off protector of the infusion site and connect by clamping to the administration set.

Addition of medicinal products:
Confirm additive compatibility before addition through the injection port.

Clean the injection site using antiseptic solution.

Carefully introduce the sterile needle into the sterile chamber in the injection site, attach the needle to the container with the medicinal product, introduce the needle through the second membrane into the bag and inject the medicine.

Carefully withdraw the needle.

Mix thoroughly with the solution.

Use immediately.

**7 MARKETING AUTHORISATION HOLDER**

Carelide
Rue Michel Raillard
59420 Mouvaux
France

**8 MARKETING AUTHORISATION NUMBER**

PA22859/007/001

## 9 DATE OF FIRST AUTHORISATION/RENEWAL OF THE AUTHORISATION

Date of first authorisation: 02 December 2005
Date of last renewal: 07 May 2009

## 10 DATE OF REVISION OF THE TEXT

October 2022