# Summary of Product Characteristics

## 1 NAME OF THE MEDICINAL PRODUCT

Glucose Intravenous Infusion BP 10% w/v, solution for infusion

## 2 QUALITATIVE AND QUANTITATIVE COMPOSITION

Each 1 ml contains 0.1 g anhydrous glucose, as glucose monohydrate.

| | 1000 ml of solution contain | 500 ml of solution contain |
|---|---|---|
| Anhydrous glucose | 100.0 g | 50.0 g |
| (equivalent to glucose monohydrate) | 110.0g | 55.0g |

For the full list of excipients, see section 6.1.

## 3 PHARMACEUTICAL FORM

Solution for infusion
Clear, colourless or almost colourless aqueous solution.

| | |
|---|---|
| Energy | 1675 kJ/l ≙ 400 kcal/l |
| Theoretical osmolarity | 555 mOsm/l |
| Acidity (titration to pH 7.4) | < 0.5 mmol/l |
| pH | 3.5 – 5.5 |

## 4 CLINICAL PARTICULARS

### 4.1 Therapeutic Indications

- Administration of glucose for caloric support
- Vehicle solution for compatible electrolyte concentrates and medicinal products
- Therapy of hypoglycaemia

### 4.2 Posology and method of administration

*Posology*
The dosage of the solution depends on the patient's individual glucose and fluid requirements.

*Adults and adolescents from 15$^{th}$ year of life*
The maximum daily dose is 40 ml per kg body weight per day, corresponding to 4 g of glucose per kg body weight per day.

The maximum infusion rate is 2.5 ml per kg body weight per hour, corresponding to 0.25g of glucose per kg body weight per hour.

Thus, for a patient weighing 70 kg the maximum infusion rate is approximately 175 ml per/-hour , resulting in a glucose intake of 17.5 g per hour.

*Paediatric population*

The maximum daily dose, in g of glucose per kg body weight and in ml of solution per kg body weight per day, is for:

| | | |
|---|---|---|
| Pre-term neonates: | 12 g per kg body weight | 120 ml per kg body weight |
| Term neonates : | 15 g per kg body weight | 150 ml per kg body weight |
| 1st – 2nd year: | 15 g per kg body weight | 150 ml per kg body weight |
| 3rd – 5th year: | 12 g per kg body weight | 120 ml per kg body weight |
| 6th – 10th year: | 10 g per kg body weight | 100 ml per kg body weight |
| 11th – 14th year: | 8 g per kg body weight | 80 ml per kg body weight |

When administering this solution, the total daily fluid intake must be taken into account: The recommended daily parenteral fluid intake for children is as follows:

| | |
|---|---|
| 1st day of life: | 60 – 120 ml per kg body weight per day |
| 2nd day of life: | 80 – 120 ml per kg body weight per day |
| 3rd day of life: | 100 – 130 ml per kg body weight per day |
| 4th day of life: | 120 – 150 ml per kg body weight per day |
| 5th day of life: | 140 – 160 ml per kg body weight per day |
| 6th day of life: | 140 – 180 ml per kg body weight per day |
| 1st month, prior to establishment of stable growth: | 140 – 170 ml per kg body weight per day |
| 1st month, after establishment of stable growth: | 140 – 160 ml per kg body weight per day |
| 2nd – 12th month of life: | 120 – 150 ml per kg body weight per day |
| 2nd year: | 80 – 120 ml per kg body weight per day |
| 3rd – 5th year: | 80 – 100 ml per kg body weight per day |
| 6th – 12th year: | 60 – 80 ml per kg body weight per day |
| 13th – 18th year: | 50 – 70 ml per kg body weight per day |

*Elderly patients*

Basically the same dosage as for adults applies, but caution should be exercised in patients suffering from further diseases like cardiac insufficiency or renal insufficiency that may frequently be associated with advanced age.

*Patients with impaired glucose metabolism*
If the oxidative metabolism of glucose is impaired (e.g. in the early post-operative or post-traumatic period or in the presence of hypoxia or organ failure), the dosage should be adjusted to keep the blood glucose level close to normal values. Close monitoring of blood glucose levels is recommended in order to prevent hyperglycaemia.

**Method of administration**

Intravenous use. The solution can be infused via a large peripheral vein.

## 4.3 Contraindications

- Hyperglycaemia, not responding to insulin doses of up to 6 units insulin/hour
- Delirium tremens if such patients are already dehydrated
- Acute states of shock and collapse
- Metabolic acidosis
- Hyperhydration
- Pulmonary oedema
- Severe renal insufficiency in absence of renal replacement therapy
- Acute cardiac failure

This container contains a significant volume of air. To avoid risk of air embolism, this product must not be administered by pressure infusion.

## 4.4 Special warnings and precautions for use

Administration of glucose solutions is not recommended after acute ischaemic strokes as hyperglycaemia was reported to worsen ischaemic brain damage and impair recovery.

Application of hyperosmolar glucose solutions in patients with damaged haematoencephalic barrier may lead to increase of intracranial/intraspinal pressure.

Glucose infusions should not be started before existing fluid and electrolyte deficiencies like hypotonic dehydration, hyponatraemia and hypokalaemia have adequately been corrected.

This solution should be used with caution in patients with

- hypervolaemia
- renal insufficiency
- cardiac insufficiency
- increased serum osmolarity
- manifest or known subclinical diabetes mellitus or carbohydrate intolerance for any reason.

Unstable metabolism (e.g. postoperatively or after injuries, hypoxia, organ insufficiencies) impairs oxidative metabolism of glucose and may lead to metabolic acidosis.

Effective

States of hyperglycaemia should be adequately monitored and treated with insulin. The application of insulin causes additional shifts of potassium into the cells and may therefore cause or increase hypokalaemia.

Sudden discontinuation of high glucose infusion rates can lead to profound hypoglycaemia due to the accompanying high serum insulin concentrations. This applies especially to children less than 2 years of age, patients with diabetes mellitus and other disease states associated with impaired glucose homeostasis. In obvious cases the glucose infusion should be tapered off within the last 30 - 60 minutes of the infusion. As a precaution it is recommended that each individual patient be monitored for 30 minutes for hypoglycaemia on the first day of abrupt discontinuation of parenteral nutrition.

Clinical monitoring should include blood glucose, serum electrolytes, fluid and acid-base balance in general. Frequency and kind of laboratory testing depend on the overall condition of the patient, the prevailing metabolic situation, the administered dose and the duration of treatment. Also monitor total volume and amount of glucose administered.

Parenteral nutrition in malnourished or depleted patients with full doses and full infusion rates from the very beginning and without adequate supplementation of potassium, magnesium and phosphate may lead to the refeeding syndrome, characterised by hypokalaemia, hypophosphataemia and hypomagnesaemia. Clinical manifestations may develop within a few days of starting parenteral nutrition. In such patients, infusion regimens should be built up gradually. Adequate supplementation of electrolytes according to deviations from normal values is necessary.

Special attention must be paid to hyponatraemia and hypokalaemia. Adequate supplementation of these electrolytes is absolutely mandatory.

Electrolytes and vitamins must be supplied as necessary. Vitamin B, especially thiamine, is needed for glucose metabolism.

Glucose infusions should not be administered through the same infusion equipment, simultaneously with, before, or after administration of blood, because of the possibility of pseudo-agglutination.

If signs of vein irritation, phlebitis or thrombophlebitis appear during peripheral venous infusion, change of the infusion site should be considered.

Please note: If this solution is used as vehicle solution, the safety information of the additive provided by the respective manufacturer have to be taken into account.

*Paediatric population*
Children in the 1st and 2nd year of life are especially at risk for rebound hypoglycaemia after abrupt discontinuation of high infusion rates, see above.

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

None known.

## 4.6 Fertility, pregnancy and lactation

Effective

There are no or limited data (less than 300 pregnancy outcomes) from the use of glucose monohydrate in pregnant women. Animal studies do not indicate direct or indirect harmful effects with respect to reproductive toxicity (see section 5.3).

The use of Glucose Intravenous Infusion BP 10% w/v may be considered during pregnancy, if clinically needed. Careful monitoring of blood glucose is necessary.

*Breast-feeding*
Glucose/metabolites are excreted in human milk, but at therapeutic doses of Glucose B. Braun no effects on the breast-fed newborns/infants are anticipated.

Glucose Intravenous Infusion BP 10% w/v can be used during breast-feeding as indicated.

*Fertility*
No special precautions.

## 4.7 Effects on ability to drive and use machines

Not applicable.

## 4.8 Undesirable effects

The following undesirable effects may occur when glucose is administered as an infusion:

Undesirable effects are listed according to their frequencies as follows:
Very common (≥ 1/10)
Common (≥ 1/100 to < 1/10)
Uncommon (≥ 1/1,000 to < 1/100)
Rare (≥ 1/10,000 to < 1/1,000)
Very rare (< 1/10,000)
Not known (frequency cannot be estimated from the available data)

***General disorders and administration site conditions***
Common: After a few days, vein irritation, phlebitis or thrombophlebitis may occur.

Reporting of suspected adverse reactions
Reporting suspected adverse reactions after authorisation 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 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

*Symptoms of glucose overdose*
Hyperglycaemia, glucosuria, hyperosmolarity, up to hyperglycaemic-hyperosmolar coma, and dehydration. In cases of gross overdosing lipogenesis resulting in hepatic steatosis is possible.

Effective

*Symptoms of fluid overdose*
Fluid overdose may result in hyperhydration with increased skin tension, venous congestion, oedema – possibly also lung or brain oedema – and electrolyte imbalances.

*Treatment*
The primary therapeutic measure is dose reduction or cessation of infusion, depending on the severity of the symptoms. Disorders of the carbohydrate and electrolyte metabolism are treated by insulin administration and appropriate electrolyte substitution, respectively.

# 5 PHARMACOLOGICAL PROPERTIES

## 5.1 Pharmacodynamic properties

Pharmacotherapeutic group: Solutions for parenteral nutrition, carbohydrates
ATC code: B05B A03

***Mechanism of action***
Glucose is metabolised ubiquitously as the natural substrate of the cells of the body. Under physiological conditions glucose is the most important energy-supplying carbohydrate with a caloric value of approx. 17 kJ/g or 4 kcal/g. Neural tissue, erythrocytes and the medulla of the kidneys are amongst the tissues with an obligate requirement for glucose.

*Pharmacodynamic effects*
Glucose serves to maintain the blood glucose level and for the synthesis of important body components. It serves for the synthesis of glycogen, the storage form of carbohydrates. Primarily insulin, glucagon, glucocorticosteroids and catecholamines are involved in the regulation of the blood glucose concentration.

A normal electrolyte and acid-base status is a prerequisite for the optimal utilisation of administered glucose. So acidosis, in particular, can indicate impairment of oxidative glucose metabolism.

Metabolism of glucose and electrolytes are closely related to each other. Potassium, magnesium and phosphate requirements may increase and may therefore have to be monitored and supplemented according to individual needs. Especially cardiac and neurological functions may be impaired without supplementation.

## 5.2 Pharmacokinetic properties

*Absorption*
*Bioavailability:* Since the solution is administered intravenously, its bioavailability is 100% .

*Distribution*
On infusion glucose is first distributed in the intravascular space and is then taken up into the intracellular space. In adults, the concentration of glucose in the blood is 70 – 100 mg/100 ml, or 3.3 - 5.6 mmol/l (fasting).

*Biotransformation*

Effective

In glycolysis, glucose is metabolised to pyruvate. Under aerobic conditions pyruvate is completely oxidised to carbon dioxide and water. In case of hypoxia, pyruvate is converted to lactate. Lactate can be partially re-introduced into the glucose metabolism (Cori cycle).

*Elimination*
The final products of the complete oxidation of glucose are eliminated via the lungs (carbon dioxide) and the kidneys (water). Practically no glucose is excreted renally by healthy persons. In pathological metabolic conditions associated with hyperglycaemia ((e.g. diabetes mellitus, postaggression metabolism) , glucose is also excreted via the kidneys (glucosuria) when (at blood glucose levels higher than 160-180 mg/100 ml or 8.8-9.9 mmol/l) the maximum tubular reabsorption capacity is exceeded.

## 5.3 Preclinical safety data

Non-clinical data reveal no special hazard for humans based on conventional studies of safety pharmacology, repeated dose toxicity, genotoxicity, carcinogenic potential, toxicity to reproduction and development.

# 6 PHARMACEUTICAL PARTICULARS

## 6.1 List of excipients

Water for Injections

## 6.2 Incompatibilities

No other medication or substance should be added to this fluid unless it is known to be compatible. Because of its acid pH, the solution may be incompatible with other medicinal products.

Erythrocyte concentrates must not be suspended in glucose solutions because of the risk of pseudo-agglutination. See also section 4.4.

## 6.3 Shelf Life

Unopened: 3 years.
Once opened, use immediately.

## 6.4 Special precautions for storage

Do not store above 25°C.

## 6.5 Nature and contents of container

Bottles of colourless, low-density polyethylene with a welded-on closure of the same material.
The closure contains a rubber disc.
Contents: 500 ml, available in packs of 10 bottles
1000 ml, available in packs of 10 bottles.

Effective

Not all pack sizes may be marketed.

## 6.6 Special precautions for disposal of a used medicinal product or waste materials derived from such medicinal product and other handling of the product

No special requirements for disposal.
The containers are for single use only. After use discard container and any remaining contents. Do not re-connect partially used containers.

Only to be used if the solution is clear and colourless or almost colourless and the bottle and its closure are undamaged.

Administration should commence immediately after connecting the container to the giving set or infusion equipment.

Before admixing of an additive or preparing a nutrient mixture, physical and chemical compatibility must be confirmed.
When admixing additives observe usual precautions of asepsis strictly.

Nutrient mixtures or solutions with additives should be administered immediately after preparation or admixture, respectively.

# 7 MARKETING AUTHORISATION HOLDER

B. Braun Medical Ltd.
3 Naas Road Industrial Park
Dublin 12

# 8 MARKETING AUTHORISATION NUMBER

PA 179/1/28

# 9 DATE OF FIRST AUTHORISATION/RENEWAL OF THE AUTHORISATION

Date of first authorisation: 17 August 1992

Date of last renewal: 17 August 2007

# 10 DATE OF REVISION OF THE TEXT

August 2014

Effective