

SUMMARY OF PRODUCT CHARACTERISTICS

1 NAME OF THE MEDICINAL PRODUCT

Lipoflex special emulsion for infusion

2 QUALITATIVE AND QUANTITATIVE COMPOSITION

The ready-for-use emulsion for intravenous infusion contains after mixing the chamber contents:

<i>from the top chamber (glucose solution)</i>	in 1000 ml	in 625 ml	in 1250 ml	in 1875 ml
Glucose monohydrate equivalent to glucose	158.4 g 144.0 g	99.00 g 90.00 g	198.0 g 180.0 g	297.0 g 270.0 g
Sodium dihydrogen phosphate dihydrate	2.496 g	1.560 g	3.120 g	4.680 g
Zinc acetate dihydrate	7.024 mg	4.390 mg	8.780 mg	13.17 mg

<i>from the middle chamber (fat emulsion)</i>	in 1000 ml	in 625 ml	in 1250 ml	in 1875 ml
Soya-bean oil, refined	20.00 g	12.50 g	25.00 g	37.50 g
Medium-chain triglycerides	20.00 g	12.50 g	25.00 g	37.50 g

<i>from the bottom chamber (amino acid solution)</i>	in 1000 ml	in 625 ml	in 1250 ml	in 1875 ml
Isoleucine	3.284 g	2.053 g	4.105 g	6.158 g
Leucine	4.384 g	2.740 g	5.480 g	8.220 g
Lysine hydrochloride equivalent to lysine	3.980 g 3.186 g	2.488 g 1.991 g	4.975 g 3.982 g	7.463 g 5.973 g
Methionine	2.736 g	1.710 g	3.420 g	5.130 g
Phenylalanine	4.916 g	3.073 g	6.145 g	9.218 g
Threonine	2.540 g	1.588 g	3.175 g	4.763 g
Tryptophan	0.800 g	0.500 g	1.000 g	1.500 g
Valine	3.604 g	2.253 g	4.505 g	6.758 g
Arginine	3.780 g	2.363 g	4.725 g	7.088 g

Histidine hydrochloride monohydrate equivalent to histidine	2.368 g	1.480 g	2.960 g	4.440 g
Alanine	6.792 g	4.245 g	8.490 g	12.73 g
Aspartic acid	2.100 g	1.313 g	2.625 g	3.938 g
Glutamic acid	4.908 g	3.068 g	6.135 g	9.203 g
Glycine	2.312 g	1.445 g	2.890 g	4.335 g
Proline	4.760 g	2.975 g	5.950 g	8.925 g
Serine	4.200 g	2.625 g	5.250 g	7.875 g
Sodium hydroxide	1.171 g	0.732 g	1.464 g	2.196 g
Sodium chloride	0.378 g	0.237 g	0.473 g	0.710 g
Sodium acetate trihydrate	0.250 g	0.157 g	0.313 g	0.470 g
Potassium acetate	3.689 g	2.306 g	4.611 g	6.917 g
Magnesium acetate tetrahydrate	0.910 g	0.569 g	1.137 g	1.706 g
Calcium chloride dihydrate	0.623 g	0.390 g	0.779 g	1.169 g

Electrolytes [mmol]	in 1000 ml	in 625 ml	in 1250 ml	in 1875 ml
Sodium	53.6	33.5	67	100.5
Potassium	37.6	23.5	47	70.5
Magnesium	4.2	2.65	5.3	7.95
Calcium	4.2	2.65	5.3	7.95
Zinc	0.03	0.02	0.04	0.06
Chloride	48	30	60	90
Acetate	48	30	60	90
Phosphate	16	10	20	30

	in 1000 ml	in 625 ml	in 1250 ml	in 1875 ml
Amino acid content [g]	56.0	35.0	70.1	105.1
Nitrogen content [g]	8	5	10	15
Carbohydrate content [g]	144	90	180	270
Lipid content [g]	40	25	50	75

For the full list of excipients, see section 6.1.

3 PHARMACEUTICAL FORM

Emulsion for infusion

Amino acids and glucose solutions: clear, colourless up to straw-coloured solutions

Fat emulsion: oil-in-water emulsion, milky white

	in 1000 ml	in 625 ml	in 1250 ml	in 1875 ml
Energy in the form of lipids [kJ (kcal)]	1590 (380)	995 (240)	1990 (475)	2985 (715)
Energy in the form of carbohydrates [kJ (kcal)]	2415 (575)	1510 (360)	3015 (720)	4520 (1080)
Energy in the form of amino acids [kJ (kcal)]	940 (225)	585 (140)	1170 (280)	1755 (420)
Non-protein energy [kJ (kcal)]	4005 (955)	2505 (600)	5005 (1195)	7505 (1795)
Total energy [kJ (kcal)]	4945 (1180)	3090 (740)	6175 (1475)	9260 (2215)

Osmolality [mOsm/kg]	2115	2115	2115	2115
Theoretical osmolarity [mOsm/l]	1545	1545	1545	1545
pH	5.0 - 6.0	5.0 - 6.0	5.0 - 6.0	5.0 - 6.0

4 CLINICAL PARTICULARS

4.1 Therapeutic indications

Supply of energy, essential fatty acids, amino acids, electrolytes and fluids for parenteral nutrition of patients in states of moderate to severe catabolism when oral or enteral nutrition is impossible, insufficient or contraindicated.

Lipoflex special is indicated in adults, adolescents and children older than two years.

4.2 Posology and method of administration

Posology

The dosage should be adapted to the patients' individual requirements.

It is recommended that this medicinal product be administered continuously. A stepwise increase of the infusion rate over the first 30 minutes up to the desired infusion rate avoids possible complications.

Adults

The maximum daily dose amounts to 35 ml/kg body weight, corresponding to:

2.0 g amino acids /kg body weight per day

5.04 g glucose /kg body weight per day

1.4 g lipid /kg body weight per day.

The maximum rate of infusion is 1.7 ml/kg body weight per hour, corresponding to:

0.1 g amino acids /kg body weight per hour

0.24 g glucose /kg body weight per hour

0.07 g lipid /kg body weight per hour.

For a patient weighing 70 kg this corresponds to a maximum infusion rate of 119 ml per hour. The amount of substrate administered is then 6.8 g of amino acids per hour, 17.1 g of glucose per hour and 4.8 g of lipids per hour.

Paediatric population

Newborn infants, infants and toddlers less than two years of age

Lipoflex special is contraindicated in newborn infants, infants and toddlers < 2 years of age in whom the amino acid cysteine may be considered conditionally essential (see section 4.3).

Children from 2-18 years of age

No clinical studies were performed in the paediatric population.

This medicinal product can provide only a basic nutrient and energy supply to the paediatric patients.

Depending on the individual need Carnitine supplementation may be considered in paediatric patients expected to receive PN for more than 4 weeks.

The exact dosage depends on the patient's energy expenditure and the ability to metabolize the active ingredients of this medicinal product and therefore, should be individually adapted according to age, body weight, clinical condition and underlying disease.

Due to the individual needs of paediatric patients, this medicinal product may not cover sufficiently the total energy, nutrient, electrolyte and fluid requirements. In such cases additional amino acids, carbohydrates and/or lipids, minerals and/or fluids must be provided in addition, as appropriate.

For calculation of dosage account must be taken of the hydration status of the paediatric patient.

The bag size should be chosen accordingly.

In addition, the daily fluid, glucose and energy requirements decrease with age. Thus, two age groups, from 2 to 12 years and 12 to 18 years, are considered.

Maximum daily dose

According to the paediatric guidelines the dose depends not only on the age but also on the medical condition (acute, stable and recovery phase) of the paediatric patient.

For Lipoflex special in the age group 2 to 12 years the magnesium concentration is the limiting factor for the maximum daily dose in all medical conditions.

For patients from 12 to 18 years the glucose concentration becomes the limiting factor in the acute and stable phase while in the recovery phase the magnesium concentration is limiting.

The resulting maximum daily doses are given in the table below.

	2 to 12 years				12 to 18 years			
	Recommended	Lipoflex special			Recommended	Lipoflex special		
		Acute phase	Stable Phase	Recovery phase		Acute phase	Stable Phase	Recovery phase
Maximum daily dose [ml/kg/d]		24				9.5	20	24
		corresponding to				corresponding to		
Fluids [ml/kg/d]	60 - 100	24			50 - 70	9.5	20	24
Amino acids [g/kg/d]	1.0 - 2.0 (2.5)	1.34			1.0 - 2.0	0.53	1.12	1.34
Glucose [g/kg/d]								
<i>Acute phase</i>	<i>1.4 – 3.6</i>	3.46			<i>0.7 – 1.4</i>	1.37	-	-
<i>Stable phase</i>	<i>2.2 – 5.8</i>				<i>1.4 – 2.9</i>	-	2.88	-
<i>Recovery phase</i>	<i>4.3 – 8.6</i>				<i>2.9 – 4.3</i>	-	-	3.46
Lipids [g/kg/d]	≤ 3	0.96			≤ 3	0.38	0.8	0.96
Energy [kcal/kg/d]								
<i>Acute phase</i>	<i>30 - 45</i>	28.3			<i>20 - 30</i>	11.2	-	-
<i>Stable phase</i>	<i>40 - 60</i>				<i>25 - 40</i>	-	23.6	-
<i>Recovery phase</i>	<i>55 - 75</i>				<i>30 - 55</i>	-	-	28.3
Sodium [mmol/kg/d]	1 - 3	1.29			1 - 3	0.51	1.07	1.29
Potassium [mmol/kg/d]	1 - 3	0.9			1 - 3	0.36	0.75	0.90
Calcium [mmol/kg/d]	0.25 - 0.4	0.10			0.25 - 0.4	0.04	0.08	0.10
Magnesium [mmol/kg/d]	0.1	0.10			0.1	0.04	0.08	0.10
Chloride [mmol/kg/d]	2 - 4	1.15			2 - 4	0.46	0.96	1.15
Phosphate [mmol/kg/d]	0.2 - 0.7	0.38			0.2 - 0.7	0.15	0.32	0.38

Acute phase = resuscitation phase when the patient requires vital organ support (sedation, mechanical ventilation, vasopressors, fluid resuscitation); Stable phase = patient is stable on, or can be weaned, from this vital support; Recovery phase = patient who is mobilizing.

For children, it might be necessary to start the nutritional therapy with half of the target dosage. The dosage should be increased stepwise according to the individual metabolic capacity up the maximum dosage.

Maximum infusion rate

According to the paediatric guidelines the maximum infusion rate depends not only on age but also on the medical condition (acute, stable and recovery phase) of the paediatric patient. For Lipoflex special the glucose infusion rate is the limiting factor for both paediatric age groups in all medical conditions.

The resulting maximum hourly infusions rates are given in the table below.

	Paediatric age group							
	2 to 12 years				12 to 18 years			
	Recommended	Lipoflex special			Recommended	Lipoflex special		
		Acute phase	Stable Phase	Recovery phase		Acute phase	Stable Phase	Recovery phase
Maximum infusion rate [ml/kg/h]		0.63	1.25	1.67		0.42	0.83	1.25
		corresponding to				corresponding to		
Amino acids [g/kg/h]	≤ 0.1	0.035	0.07	0.094	≤ 0.1	0.024	0.046	0.07
Glucose [g/kg/h]								
<i>Acute phase</i>	0.09	0.09	-	-	0.03 – 0.06	0.06	-	-
<i>Stable phase</i>	0.09 - 0.18	-	0.18	-	0.06 – 0.12	-	0.12	-
<i>Recovery phase</i>	0.18 - 0.24	-	-	0.24	0.12 – 0.18	-	-	0.18
Lipids [g/kg/h]	≤ 0.15	0.025	0.05	0.067	≤ 0.15	0.017	0.033	0.05

Patients with renal/hepatic impairment

The doses should be adjusted individually in patients with hepatic or renal insufficiency (see also section 4.4).

Duration of treatment

The duration of treatment for the indications stated is not limited. During the administration of Lipoflex special it is necessary to provide an appropriate amount of trace elements and vitamins.

Duration of infusion of one single bag

The recommended duration of infusion for a parenteral nutrition bag is maximum 24 h.

Method of administration

Intravenous use. For central venous infusion only.

4.3 Contraindications

- hypersensitivity to the active substances, to egg, peanut or soya protein or to any of the excipients listed in section 6.1
- inborn errors of amino acid metabolism
- severe hypertriglyceridaemia (≥ 1000 mg/dl or 11.4 mmol/l)
- severe coagulopathy
- hyperglycaemia not responding to insulin doses of up to 6 units insulin/hour
- acidosis
- intrahepatic cholestasis
- severe hepatic insufficiency
- severe renal insufficiency in absence of renal replacement therapy
- aggravating haemorrhagic diatheses
- acute thrombo-embolic events, lipid embolism

On account of its composition, this medicinal product must not be used in newborn infants, infants and toddlers under 2 years of age.

General contraindications to parenteral nutrition include:

- unstable circulatory status with vital threat (states of collapse and shock)
- acute phases of cardiac infarction and stroke
- unstable metabolic condition (e.g. severe postaggression syndrome, coma of unknown origin)
- inadequate cellular oxygen supply
- disturbances of the electrolyte and fluid balance
- acute pulmonary oedema
- decompensated cardiac insufficiency

4.4 Special warnings and precautions for use

Caution should be exercised in cases of increased serum osmolarity.

Disturbances of the fluid, electrolyte or acid-base balance must be corrected before the start of infusion.

Too rapid infusion can lead to fluid overload with pathological serum electrolyte concentrations, hyperhydration and pulmonary oedema.

Any sign or symptom of anaphylactic reaction (such as fever, shivering, rash or dyspnoea) should lead to immediate interruption of the infusion.

The serum triglyceride concentration should be monitored when infusing this medicinal product.

Depending on the patient's metabolic condition, occasional hypertriglyceridaemia may occur. If the plasma triglyceride concentration exceeds 4.6 mmol/l (400 mg/dl) during administration of lipids it is recommended to reduce the infusion rate. The infusion must be interrupted if the plasma triglyceride concentration exceeds 11.4 mmol/l (1000 mg/dl), as these levels have been associated with acute pancreatitis.

Patients with impaired lipid metabolism

This medicinal product should be administered cautiously to patients with disturbances of lipid metabolism with increased serum triglycerides, e.g. renal insufficiency, diabetes mellitus, pancreatitis, impaired hepatic function, hypothyroidism (with hypertriglyceridaemia), sepsis and metabolic syndrome. If this medicinal product is given to patients with these conditions, more frequent monitoring of serum triglycerides is necessary to assure triglyceride elimination and stable triglyceride levels below 11.4 mmol/l (1000 mg/dl).

In combined hyperlipidaemias and in metabolic syndrome, triglyceride levels react to glucose, lipids and overnutrition. Adjust dose accordingly. Assess and monitor other lipid and glucose sources, and drugs interfering with their metabolism.

The presence of hypertriglyceridaemia 12 hours after lipid administration also indicates a disturbance of lipid metabolism.

Like all solutions containing carbohydrates, the administration of this medicinal product can lead to hyperglycaemia. The blood glucose level should be monitored. If there is hyperglycaemia, the rate of infusion should be reduced or insulin should be administered. If the patient is receiving other intravenous glucose solutions concurrently, the amount of additionally administered glucose has to be taken into account.

An interruption of administration of the emulsion may be indicated if the blood glucose concentration rises to above 14 mmol/l (250 mg/dl) during administration.

Refeeding or repletion of malnourished or depleted patients may cause hypokalaemia, hypophosphataemia and hypomagnesaemia. Adequate supplementation of electrolytes according to deviations from normal values is necessary.

Controls of the serum electrolytes, the water balance, the acid-base balance, and of blood cell counts, coagulation status, hepatic and renal function are necessary.

Substitution of electrolytes, vitamins and trace elements may be necessary as required. As Lipoflex special contains zinc, magnesium, calcium and phosphate, care should be taken when it is co-administered with solutions containing these substances.

This medicinal product should not be given simultaneously with blood in the same infusion set due to the risk of pseudoagglutination (see also section 4.5).

This medicinal product is a preparation of complex composition. It is, therefore, strongly advisable not to add other solutions (as long as compatibility is not proven – see section 6.2).

As with all intravenous solutions, especially for parenteral nutrition, strict aseptic precautions are necessary for the infusion of this medicinal product.

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 diabetes mellitus, impaired cardiac or renal function

Like all large-volume infusion solutions, this medicinal product should be administered with caution to patients with impaired cardiac or renal function.

There is only limited experience of its use in patients with diabetes mellitus or renal failure.

This medicinal product contains 771 mg sodium per 625 ml bag, equivalent to 39% of the WHO recommended maximum daily intake of 2 g sodium for an adult.

The maximum daily dose of this product for a 70 kg adult is equivalent to 151% of the WHO recommended maximum daily intake for sodium.

Lipoflex special is considered high in sodium. This should be particularly taken into account for those on a low salt diet.

Guidelines for parenteral nutrition recommend a daily supply of 60 – 150 mmol (1.0 – 1.5 mmol/kg/d) of sodium. Lipoflex special provides between 33.5 to 100.5 mmol of sodium.

Interference with laboratory tests

The fat content may interfere with certain laboratory measurements (e.g. bilirubin, lactate dehydrogenase, oxygen saturation) if blood is sampled before fat has been adequately cleared from the blood stream.

4.5 Interaction with other medicinal products and other forms of interaction

Some drugs, like insulin, may interfere with the body's lipase system. This kind of interaction seems, however, to be of only limited clinical importance.

Heparin given in clinical doses causes a transient release of lipoprotein lipase into the circulation. This may result initially in increased plasma lipolysis followed by a transient decrease in triglyceride clearance.

Soya-bean oil has a natural content of vitamin K₁. This may interfere with the therapeutic effect of coumarin derivatives, which should be closely monitored in patients treated with such drugs.

Potassium-containing solutions like Lipoflex special should be used with caution in patients receiving drugs that increase serum potassium concentration, such as potassium-sparing diuretics (triamterene, amiloride, spironolactone), ACE inhibitors (e.g. captopril, enalapril), angiotensin-II-receptor antagonists (e.g. losartan, valsartan), ciclosporin and tacrolimus.

Corticosteroids and ACTH are associated with sodium and fluid retention.

This medicinal product should not be given simultaneously with blood in the same infusion set due to the risk of pseudoagglutination (see also section 4.4).

4.6 Fertility, pregnancy and lactation

Pregnancy

There are no or limited amount of data from the use of Lipoflex special in pregnant women. Animal studies are insufficient with respect to reproductive toxicity (see section 5.3). Parenteral nutrition may become necessary during pregnancy. Lipoflex special should only be given to pregnant women after careful consideration.

Breast-feeding

Components/metabolites of Lipoflex special are excreted in human milk, but at therapeutic doses no effects on the breastfed newborns/infants are anticipated. Nevertheless, breast-feeding is not recommended for mothers on parenteral nutrition.

Fertility

No data from the use of this medicinal product available.

4.7 Effects on ability to drive and use machines

Lipoflex special has no or negligible influence on the ability to drive and use machines.

4.8 Undesirable effects

Under conditions of correct use, in terms of dosing monitoring, observation of safety restrictions and instructions, undesirable effects may still occur. The following listing includes a number of systemic reactions that may be associated with the use of Lipoflex special.

Undesirable effects are listed according to their frequencies as follows:

Very common ($\geq 1/10$)

Common ($\geq 1/100$ to $< 1/10$)

Uncommon ($\geq 1/1,000$ to $< 1/100$)

Rare ($\geq 1/10,000$ to $< 1/1,000$)

Very rare ($< 1/10,000$)

Not known (frequency cannot be estimated from the available data)

Blood and lymphatic system disorders

Rare: Hypercoagulation

Not known: Leucopenia, thrombocytopenia

Immune system disorders

Rare: Allergic reactions (e.g. anaphylactic reactions, dermal eruptions, laryngeal, oral and facial oedema)

Metabolism and nutrition disorders

Uncommon: Loss of appetite

Very rare: Hyperlipidaemia, hyperglycaemia, metabolic acidosis

The frequency of these undesirable effects is dose-dependent and may be higher under the condition of absolute or relative lipid overdose.

Nervous system disorders

Rare: Headache, drowsiness

Vascular disorders

Rare: Hypertension or hypotension, flush

Respiratory, thoracic and mediastinal disorders

Rare: Dyspnoea, cyanosis

Gastrointestinal disorders

Uncommon: Nausea, vomiting

Hepatobiliary disorders

Not known: Cholestasis

Skin and subcutaneous tissue disorders

Rare: Erythema, sweating

Musculoskeletal and connective tissue disorders

Rare: Pain in the back, bones, chest and lumbar region

General disorders and administration site conditions

Rare: Elevated body temperature, feeling cold, chills

Very rare: Fat overload syndrome (details see below)

Should adverse reactions occur, the infusion must be stopped.

Should the triglyceride level rise to above 11.4 mmol/l (1000 mg/dl) during infusion, the infusion must be stopped. With levels above 4.6 mmol/l (400 mg/dl), the infusion may be continued at a reduced dosage (see section 4.4).

If the infusion is restarted, the patient should be carefully monitored, especially at the beginning, and serum triglycerides should be determined at short intervals.

Information on particular undesirable effects

Nausea, vomiting and lack of appetite are symptoms often related to conditions for which parenteral nutrition is indicated, and may be associated with parenteral nutrition at the same time.

Fat overload syndrome

Impaired capacity to eliminate triglycerides can lead to 'fat overload syndrome', which may be caused by overdose. Possible signs of metabolic overload must be

observed. The cause may be genetic (individually different metabolism) or the fat metabolism may be affected by ongoing or previous illnesses. This syndrome may also appear during severe hypertriglyceridaemia, even at the recommended infusion rate, and in association with a sudden change in the patient's clinical condition such as renal function impairment or infection. The fat overload syndrome is characterised by hyperlipidaemia, fever, fat infiltration, hepatomegaly with or without icterus, splenomegaly, anaemia, leucopenia, thrombocytopenia, coagulation disorder, haemolysis and reticulocytosis, abnormal liver function tests and coma. The symptoms are usually reversible if the infusion of the fat emulsion is discontinued.

Should signs of a fat overload syndrome occur, the infusion of this medicinal product should be discontinued immediately.

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 the Yellow Card Scheme at: www.mhra.gov.uk/yellowcard.

4.9 Overdose

Symptoms of fluid and electrolyte overdose

Hyperhydration, electrolyte imbalance and pulmonary oedema.

Symptoms of amino acid overdose

Renal amino acid losses with consecutive amino acid imbalances, sickness, vomiting and shivering.

Symptoms of glucose overdose

Hyperglycaemia, glucosuria, dehydration, hyperosmolality, hyperglycaemic-hyperosmolar coma.

Symptoms of lipid overdose

See section 4.8.

Treatment

Immediate cessation of infusion is indicated for overdose. Further therapeutic measures depend on the particular symptoms and their severity. When infusion is recommenced after the symptoms have declined, it is recommended that the infusion rate be raised gradually with monitoring at frequent intervals.

5 PHARMACOLOGICAL PROPERTIES

5.1 Pharmacodynamic properties

Pharmacotherapeutic group: Solutions for parenteral nutrition, combinations
ATC code: B 05BA10

Mechanism of action

The purpose of parenteral nutrition is to supply all necessary nutrients and energy for the growth and/or regeneration of tissue as well as for the maintenance of all body functions.

Amino acids are of particular importance since some of them are essential components for protein synthesis. The simultaneous administration of energy sources (carbohydrates/lipids) is necessary to reserve amino acids for tissue regeneration and anabolism and prevent their utilisation as energy source.

Glucose is ubiquitously metabolised within the organism. Some tissues and organs, such as CNS, bone marrow, erythrocytes, tubular epithelium, cover their energy requirement exclusively from glucose. In addition glucose acts as a structural building block for various cell substances.

On account of their high energy density, lipids are an efficient form of energy supply. Long-chain triglycerides provide the organism with essential fatty acids for the synthesis of cell components. For these purposes the fat emulsion contains medium-chain and long-chain triglycerides (deriving from soya-bean oil).

Medium-chain triglycerides are more rapidly hydrolysed, eliminated from the circulation and completely oxidised than long-chain triglycerides. They are a favoured energy substrate, particularly when there is disturbance of the degradation and/or utilisation of long-chain triglycerides, e.g. when there is a lipoprotein lipase deficiency and/or a deficiency in lipoprotein lipase cofactors.

Unsaturated fatty acids derived from the long-chain triglyceride fraction serve primarily for prophylaxis and treatment of essential fatty acid deficiency.

5.2 Pharmacokinetic properties

Absorption

This medicinal product is infused intravenously. Hence, all substrates are available for metabolism immediately.

Distribution

The dose, rate of infusion, metabolic situation and individual factors of the patient (level of fasting) are of decisive importance for the maximum triglyceride concentrations reached. When used according to the instructions with due regard to the dosage guidelines the triglyceride concentrations do not, in general, exceed 4.6 mmol/l (400 mg/dl).

Medium-chain fatty acids have a low affinity to albumin. In animal experiments administering pure medium-chain triglyceride emulsions, it has been shown that medium-chain fatty acids can cross the blood-brain barrier, if overdosed. No adverse effects were observed with an emulsion providing a mixture of medium-chain triglycerides and long-chain triglycerides, as long-chain triglycerides have an inhibiting effect on medium-chain triglyceride hydrolysis. Therefore, toxic effects on the brain can be excluded after the administration of this medicinal product.

Amino acids are incorporated in a variety of proteins in different organs of the body. In addition each amino acid is maintained as free amino acid in the blood and inside cells.

As glucose is water-soluble, it is distributed with the blood over the whole body. At first, the glucose solution is distributed in the intravascular space and then it is taken up into the intracellular space.

No data are available concerning transport of the components through the placental barrier.

Biotransformation

Amino acids that do not enter protein synthesis are metabolised as follows. The amino group is separated from the carbon skeleton by transamination. The carbon chain is either oxidised directly to CO₂ or utilised as substrate for gluconeogenesis in the liver. The amino group is also metabolised in the liver to urea.

Glucose is metabolised to CO₂ and H₂O via the known metabolic routes. Some glucose is utilised for lipid synthesis.

After infusion, triglycerides are hydrolysed to glycerol and fatty acids. Both are incorporated in physiological pathways for energy production, synthesis of biological active molecules, gluconeogenesis and resynthesis of lipids.

Elimination

Only minor amounts of amino acids are excreted unchanged in urine.

Excess glucose is excreted in urine only if the renal threshold of glucose is reached.

Both the triglycerides of soya-bean oil and medium-chain triglycerides are completely metabolised to CO₂ and H₂O. Small amounts of lipids are lost only during sloughing of cells from skin and other epithelial membranes. Renal excretion does virtually not occur.

5.3 Preclinical safety data

Non-clinical studies have not been performed with this medicinal product.

Toxic effects of mixtures of nutrients given as substitution therapy at the recommended dosage are not to be expected.

Reproductive toxicity

Phytoestrogens such as β -sitosterol can be found in various vegetable oils, especially in soya-bean oil. Impairment of fertility was determined in rats and rabbits after subcutaneous and intravaginal administration of β -sitosterol. According to the current state of knowledge the observed effects in animals do not seem to have relevance for clinical use.

6 PHARMACEUTICAL PARTICULARS

6.1 List of excipients

Citric acid monohydrate (for pH adjustment)

Glycerol

Egg phospholipids for injection

Sodium oleate

all-rac-alpha-tocopherol Water for injections

6.2 Incompatibilities

This medicinal product must not be mixed with other medicinal products for which compatibility has not been documented. See section 6.6.

This medicinal product should not be given simultaneously with blood, see sections 4.4 and 4.5.

6.3 Shelf life

Unopened
2 years

After removing the protective overwrap and after mixing of contents of the bag

Chemical and physicochemical in-use stability of the mixture of amino acids, glucose and fat was demonstrated for 7 days at 2-8 °C and additional 2 days at 25 °C.

After admixture of compatible additives

From a microbiological point of view, the product should be used immediately after admixture of additives. If not used immediately after admixture of additives, in-use storage times and conditions prior to use are the responsibility of the user.

After first opening (spiking of the infusion port)

The emulsion is to be used immediately after opening of the container.

6.4 Special precautions for storage

Do not store above 25 °C.

Do not freeze. If accidentally frozen, discard the bag.

Keep the bag in the protective overwrap in order to protect from light.

6.5 Nature and contents of container

Lipoflex special is supplied in flexible multichamber bags of multilayer foil. The inner layer in contact with the solution consists of polypropylene. The twin base port is made of polypropylene and styrene ethylene butylene styrene. The multichamber bags contain:

- 625 ml (250 ml of amino acids solution + 125 ml of fat emulsion + 250 ml of glucose solution)
- 1250 ml (500 ml of amino acids solution + 250 ml of fat emulsion + 500 ml of glucose solution)
- 1875 ml (750 ml of amino acids solution + 375 ml of fat emulsion + 750 ml of glucose solution)

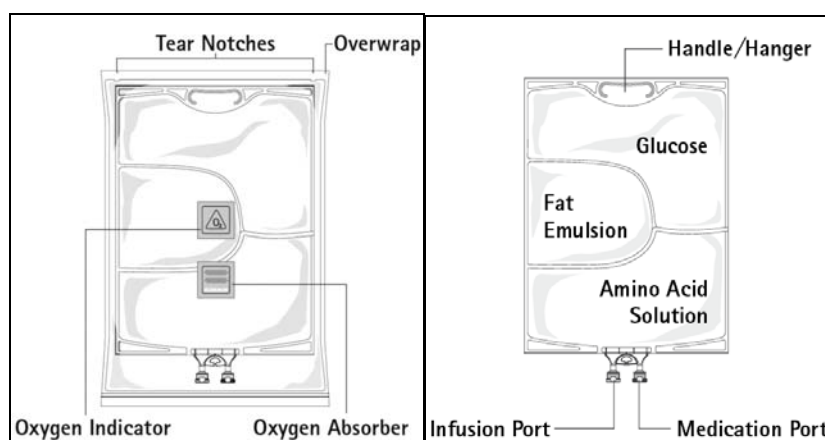


Figure A

Figure B

Figure A: The multichamber bag is packed in a protective overwrap. An oxygen absorber and an oxygen indicator are placed between the bag and the overwrap; the oxygen absorber sachet is made of inert material and contains iron hydroxide.

Figure B: The top chamber contains a glucose solution, the middle chamber contains a fat emulsion, and the bottom chamber contains an amino acid solution.

The top chamber and the middle chamber can be connected with the bottom chamber by opening the intermediate seams (peel seams).

The design of the bag permits mixing of the amino acids, glucose, lipids and electrolytes in a single chamber. Opening the peel seams results in sterile mixing to form an emulsion.

The different container sizes are presented in cartons containing five bags.

Pack sizes: 5 x 625 ml, 5 x 1250 ml and 5 x 1875 ml

Not all pack sizes may be marketed.

6.6 Special precautions for disposal

No special requirements for disposal.

Parenteral nutrition products should be visually inspected for damage, discolouration and emulsion instability before use.

Do not use bags which are damaged. Overwrap, primary bag and the peel seams between the chambers should be intact. Only use if the amino acid and glucose solutions are clear and colourless up to straw-coloured and the lipid emulsion is homogenous with milky white appearance. Do not use if the solutions contain particulate matter.

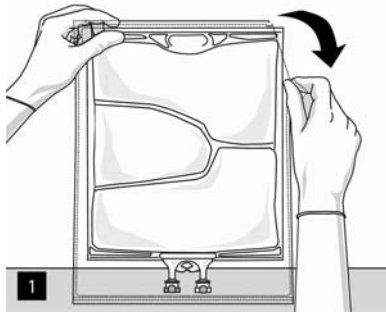
After mixing the three chambers, do not use if the emulsion shows discolouration or signs of phase separation (oil drops, oil layer). Stop the infusion immediately in case of discolouration of the emulsion or signs of phase separation.

Before opening the overwrap, check the colour of the oxygen indicator (see Figure A). Do not use if the oxygen indicator turned pink. Use only if the oxygen indicator is yellow.

Preparation of the mixed emulsion

Strict adherence to aseptic handling principles must be complied with.

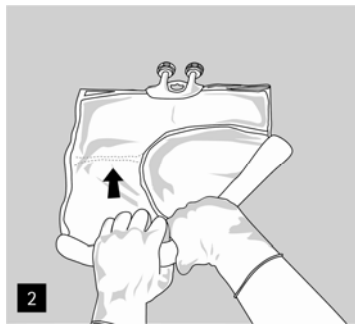
To open: Tear overwrap starting from the tear notches (Fig. 1). Remove the bag from its protective overwrap. Discard overwrap, oxygen indicator, and oxygen absorber.



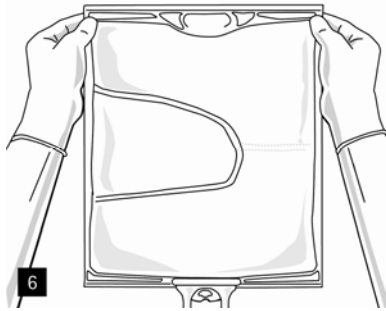
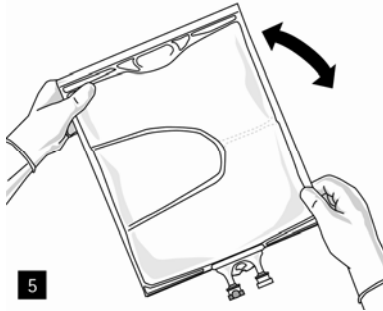
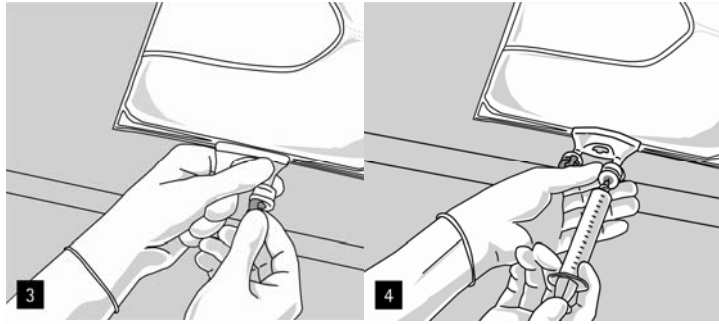
Visually inspect the primary bag for leaks. Leaky bags must be discarded, since the sterility cannot be guaranteed.

Mixing of the bag and additions of additives

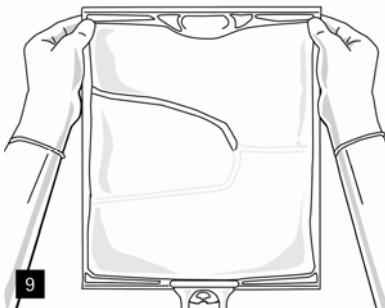
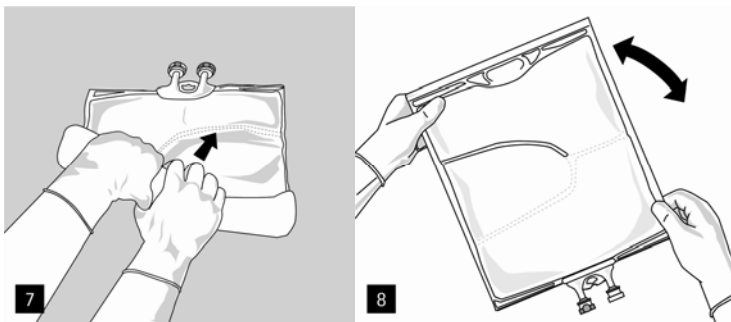
To open and mix the chambers sequentially, roll the bag with both hands, starting first by opening the peel seam that separates the top chamber (glucose) and the bottom chamber (amino acids) (Fig. 2).



After removing the aluminium seal (Fig. 3) one can add compatible water-soluble additives via the medication port (Fig. 4) to the clear aqueous solutions. Mix the contents thoroughly (Fig.5) and visually inspect the mixture for precipitations (Fig. 6). Only clear solution must be used.



Then continue applying pressure so that the peel seam separating the middle chamber (lipids) and the bottom chamber opens (Fig. 7). The mixture is a milky white homogenous oil-in-water emulsion. After all chambers are mixed one can add compatible additives via the medication port (Fig. 4). Mix the contents thoroughly (Fig. 8) and visually inspect the mixture (Fig. 9).

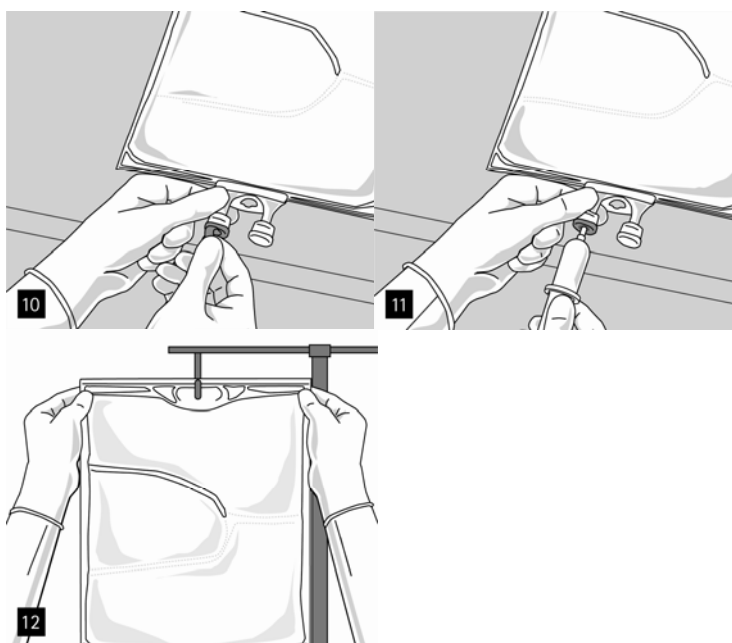


Compatibility data for different additives (e.g. electrolytes, trace elements, vitamins) and the corresponding shelf life of such admixtures can be provided on demand by the manufacturer.

Preparation for infusion

The emulsion should always be brought to room temperature prior to infusion.

Remove the aluminium foil (Fig.10) from the infusion port and attach the infusion set (Fig. 11). Use a non-vented infusion set or close the air vent when using a vented set. Hang the bag on an infusion stand (Fig. 12) and carry out infusion using the standard technique.



For single use only. Container and unused residues must be discarded after use.

Do not reconnect partially used containers.

If filters are used they must be lipid-permeable (pore size $\geq 1.2 \mu\text{m}$).

7 MARKETING AUTHORISATION HOLDER

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