



HIGHLIGHTS OF PRESCRIBING INFORMATION

These highlights do not include all the information needed to use KABIVEN safely and effectively. See full prescribing information for KABIVEN.

KABIVEN[®]

(amino acids, electrolytes, dextrose and lipid injectable emulsion), for intravenous use

Initial U.S. Approval: 2014

-----RECENT MAJOR CHANGES-----

Boxed Warning (Removed)	5/2023
Dosage and Administration (2.1)	5/2023
Warnings and Precautions (5.1)	5/2023

-----INDICATIONS AND USAGE-----

KABIVEN is indicated as a source of calories, protein, electrolytes and essential fatty acids for adult patients requiring parenteral nutrition when oral or enteral nutrition is not possible, insufficient, or contraindicated.

KABIVEN may be used to prevent essential fatty acid deficiency or treat negative nitrogen balance in adult patients. (1)

Limitations of Use:

Not recommended for use in pediatric patients < 2 years including preterm infants because the fixed content of the formulation does not meet nutritional requirements in this age group. (1, 5.1, 8.4)

-----DOSAGE AND ADMINISTRATION-----

- For intravenous infusion only into a central vein. (2.1, 5.10)
- See full prescribing information regarding preparation, administration, instructions for use, the recommended dosage in adults, and dosage modifications for patients with renal impairment. (2.1, 2.2, 2.3, 2.4)

-----DOSAGE FORMS AND STRENGTHS-----

- KABIVEN is a sterile, hypertonic emulsion in a three-chamber container. The individual chambers contain one of the following: amino acids and electrolytes, dextrose, or lipid injectable emulsion. (3)
- KABIVEN is available in four sizes 2,566 mL, 2,053 mL, 1,540 mL and 1,026 mL. (3)

----- CONTRAINDICATIONS -----

- Concomitant treatment with ceftriaxone in neonates (28 days of age or younger). (4)
- Known hypersensitivity to egg, soybean, peanut or any of the active or inactive ingredients. (4)
- Severe disorders of lipid metabolism characterized by hypertriglyceridemia (with serum triglycerides >1,000 mg/dL. (4, 5.10)
- Inborn errors of amino acid metabolism. (4)
- Cardiopulmonary instability. (4)
- Hemophagocytic syndrome. (4)

-----WARNINGS AND PRECAUTIONS-----

- Clinical Decompensation with Rapid Infusion of Intravenous Lipid Emulsion in Neonates and Infants: Acute respiratory distress, metabolic acidosis, and death after rapid infusion of intravenous lipid emulsions have been reported. (5.1)
- Parenteral Nutrition-Associated Liver Disease: Increased risk in patients who receive parenteral nutrition for greater than 2 weeks. Monitor liver tests; if abnormalities occur, consider discontinuation or dosage reduction. (5.2)
- Pulmonary Embolism and Respiratory Distress due to Pulmonary Vascular Precipitates: If signs of pulmonary distress occur, stop the infusion and initiate a medical evaluation. (5.3)
- Hypersensitivity Reactions: Monitor for signs or symptoms and discontinue infusion if reactions occur. (5.4)
- Precipitation with Ceftriaxone: Do not administer ceftriaxone simultaneously with KABIVEN via a Y-site. (4, 5.5, 8.4)
- Infection, fat overload, hyperglycemia and refeeding complications: Monitor for signs and symptoms; monitor laboratory parameters. (5.6, 5.7, 5.8, 5.9, 5.14)

-----ADVERSE REACTIONS-----

The most common adverse reactions ($\geq 3\%$) are nausea, pyrexia, hypertension, vomiting, decreased hemoglobin, decreased total protein, hypokalemia, decreased potassium, and increased gamma glutamyltransferase. (6.1)

To report SUSPECTED ADVERSE REACTIONS, contact Fresenius Kabi USA, LLC at 1-800-551-7176 or FDA at 1-800-FDA-1088 or www.fda.gov/medwatch.

-----DRUG INTERACTIONS-----

Coumarin and coumarin derivatives, including warfarin: Anticoagulant activity may be counteracted; monitor laboratory parameters. (7.1)

See 17 for PATIENT COUNSELING INFORMATION.

Revised: 6/2023



**FRESENIUS
KABI**

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FULL PRESCRIBING INFORMATION

1 INDICATIONS AND USAGE

KABIVEN is indicated as a source of calories, protein, electrolytes and essential fatty acids for adult patients requiring parenteral nutrition when oral or enteral nutrition is not possible, insufficient, or contraindicated. KABIVEN may be used to prevent essential fatty acid deficiency or treat negative nitrogen balance in adult patients.

Limitations of Use:

KABIVEN is not recommended for use in pediatric patients under the age of 2 years, including preterm infants because the fixed content of the formulation does not meet the nutritional requirements of this age group *[see Warnings and Precautions (5.1) and Use in Specific Populations (8.4)]*.

2 DOSAGE AND ADMINISTRATION

2.1 Administration

- KABIVEN is for intravenous infusion only into a central vein *[see Warnings and Precautions (5.11)]*.
- Use a 1.2 micron in-line filter.
- Use of a vented intravenous administration set with the vent in the open position could result in air embolism.
- Use a dedicated line without any connections. Multiple connections could result in air embolism due to residual air being drawn from the primary container before administration of the fluid from the secondary container is completed.
- Do not exceed the recommended maximum infusion rate of 2.6 mL/kg/hour *[see Dosage and Administration (2.4) and Warnings and Precautions (5.1)]*.
- Ceftriaxone must not be administered simultaneously with calcium-containing intravenous solutions such as KABIVEN via a Y-site due to precipitation. However, in patients other than neonates, ceftriaxone and KABIVEN may be administered sequentially if the infusion lines are thoroughly flushed between infusions with a compatible fluid *[see Contraindications (4), Warnings and Precautions (5.5)]*.
- Do not use administration sets and lines that contain di-2-ethylhexyl phthalate (DEHP). Administration sets that contain polyvinyl chloride (PVC) components have DEHP as a plasticizer.

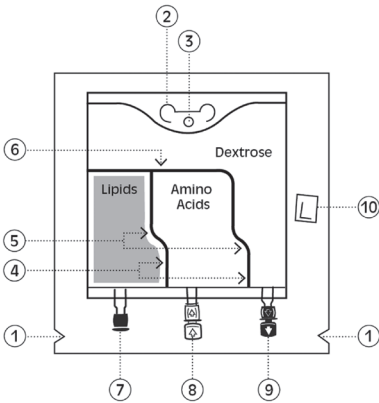
2.2 Important Preparation Instructions

- Inspect the bag prior to activation. Discard the bag in the following situations:
 - Evidence of damage to the bag
 - More than one chamber is white
 - Solution is yellow
 - Any seal is already broken
- Activate the bag *[see Dosage and Administration (2.3)]*.

- Once the bag is activated, ensure the vertical seals between chambers are broken at least from the bend in the seals and down to the ports. The upper sections of the vertical seals above the bend and the horizontal seal may remain closed.
 - It is recommended to mix the contents thoroughly by inverting the bag upside down to ensure a homogenous admixture.
 - Ensure the vertical seals between chambers are broken and the contents of all three chambers are mixed together prior to infusion [*see Dosage and Administration (2.3)*].
 - Use KABIVEN immediately after the introduction of additives. If not used immediately, the storage time and conditions prior to use should not be longer than 24 hours at 2° to 8°C (36° to 46°F). After removal from storage at 2° to 8°C (36° to 46°F), the admixture should be infused within 24 hours. Any mixture remaining must be discarded.
 - In the absence of additives, once activated, KABIVEN remains stable for 48 hours at 25°C (77°F). If not used immediately, the activated bag can be stored for up to 7 days under refrigeration [2° to 8°C (36° to 46°F)]. After removal from refrigeration, the activated bag should be used within 48 hours.
 - For total parenteral nutrition add multivitamins and trace elements via the additive port. Any other additions to the bag should be evaluated by a pharmacist for compatibility. Questions about compatibility may be directed to Fresenius Kabi USA, LLC.
 - When introducing additives, it is recommended to use 18 to 23 gauge needles with a maximum length of 1.5 inches (40 mm) and to mix thoroughly after each addition, use aseptic technique and add after the vertical seals have been broken (i.e. bag has been activated) and the three components are mixed [*see Dosage and Administration (2.3)*].
 - Parenteral drug products should be inspected visually for particulate matter and discoloration prior to administration, whenever solution and container permit. Inspect KABIVEN to ensure:
 - Precipitates have not formed during the mixing or addition of additives.
 - The emulsion has not separated. Separation of the emulsion can be visibly identified by a yellowish streaking or the accumulation of yellowish droplets in the mixed emulsion.
- Discard the admixture if any of the above are observed.

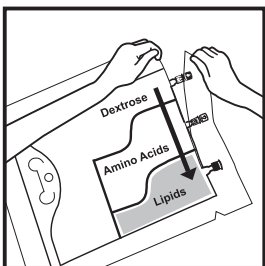


2.3 Instructions for Use



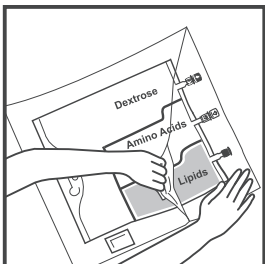
1. **Overpouch Notch**
2. **Handle**
3. **Hole** (For hanging the bag)
4. **Vertical Seals** (Must break to activate)
5. **Bends in Vertical Seals**
6. **Horizontal Seal** (May remain unopened)
7. **Blind Port** (NEVER use this port)
8. **WHITE Additive Port**
9. **BLUE Infusion Port**
10. **Oxygen Absorber** (Present between bag and inside overpouch-position may vary)

An instructional video is available at www.freseniuskabinutrition.com/products/kabiven-perikabiven/.



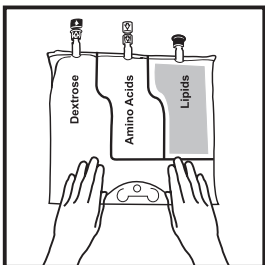
1. INSPECT BAG PRIOR TO ACTIVATION.

- KABIVEN is a 3 chambered bag:
 - One chamber is **WHITE**.
 - Two chambers are **CLEAR**.
- a) Discard bag if:
 - Overpouch is **OPENED OR DAMAGED**.
 - More than one chamber is **WHITE**.
 - Solution is **YELLOW**.
 - Seals are already **BROKEN**.



2. REMOVE OVERPOUCH.

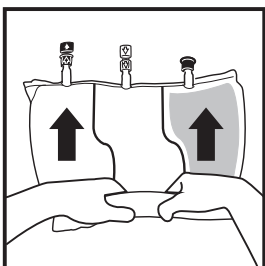
- a) Place bag on a clean, flat surface.
- b) Tear from Overpouch Notch, located close to the ports.
- c) Tear long sides open to access the inner bag.
- d) Discard Overpouch and Oxygen Absorber.



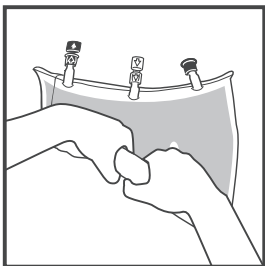
3. ACTIVATE BAG.

- a) Place bag on a clean, flat surface with text side up and ports pointing away from you.
- b) Roll **tightly** from top of bag down toward ports.
- c) **Apply pressure** until both Vertical Seals break and entire contents are white. It may take up to 5 seconds of continued pressure to break Vertical Seals.

NOTE: Both Vertical Seals must be broken from bends to ports. Upper section of Vertical Seals and Horizontal Seal may remain unbroken.



- d) After both Vertical Seals are broken, mix contents thoroughly by inverting the bag at least three times to ensure a homogenous mixture.

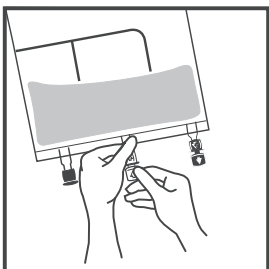


4. INSPECT BAG TO CONFIRM ACTIVATION.

- An activated bag has both Vertical Seals broken from bends to ports and entire contents are white.

5. IDENTIFY CORRECT PORT.

- Additive port is **WHITE** with arrow pointing toward bag.
- Infusion port is **BLUE** with arrow pointing away from bag.

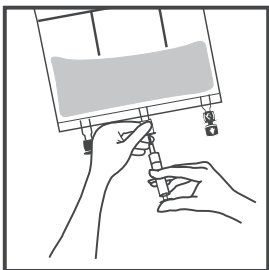


6. MAKE ADDITIONS (if prescribed).

WARNING: Ensure additives are compatible.

- Immediately before injecting additives, break off **WHITE** Additive Port cap with the arrow pointing toward the bag.
- Hold base of Additive Port horizontally.
- Insert needle horizontally through the center of Additive Port's septum and inject additives.
- Repeat as necessary using aseptic technique.
- Mix thoroughly after each addition.

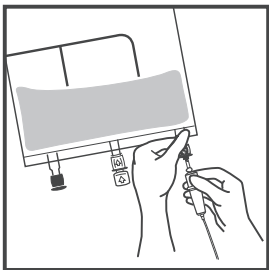
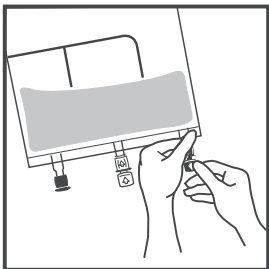
NOTE: The membrane of Additive Port is sterile at first use. Use aseptic technique for subsequent additions. The septum can be pierced up to 10 times with the recommended needle size 18 to 23 G 1½ inches (40mm).



7. SPIKE AND HANG BAG.

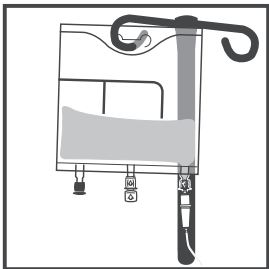
- Immediately before inserting the infusion set, break off **BLUE** Infusion Port cap with the arrow pointing away from the bag.
- Use a non-vented infusion set or close the air-inlet on a vented set. It is recommended to use 1.2 µm in-line filter.
- Close the roller clamp of the infusion set.
- Hold the base of Infusion Port.
- Insert spike through Infusion Port by rotating your wrist slightly until the spike is inserted.
- Lift and hold the bag with both hands.
- Hang the bag by Hole below Handle.

NOTE: The membrane of Infusion Port is sterile at first use. Use infusion sets (according to ISO Number 8536-4) with an external spike diameter of 5.5 to 5.7 mm.



8. FOR SINGLE USE ONLY.

- Discard unused portion.





2.4 Dosing Considerations

The dosage of KABIVEN should be individualized based on the patient's clinical condition (ability to adequately metabolize amino acids, dextrose and lipids), body weight and nutritional/fluid requirements, as well as additional energy given orally/enterally to the patient.

KABIVEN is a combination of amino acids, electrolytes, dextrose, and lipids in a fixed volume and concentration. The dosage selection is based upon fluid requirements which can be used in conjunction with the nutritional requirements to determine final dosage [see Table 1]. KABIVEN meets the total nutritional requirements for protein, dextrose and lipids in stable patients, and can be individualized to meet specific needs with the addition of nutrients. The maximum infusion rate is based upon the dextrose component.

Prior to administration of KABIVEN, correct severe fluid, electrolyte and acid-base disorders. Before starting the infusion, obtain serum triglyceride levels to establish the baseline value.

Recommended Adult Dosage

The recommended dosage of KABIVEN in adults is 19 to 38 mL/kg/day. The amount of macronutrients provided by KABIVEN are shown in Table 1.

The maximum daily dosage of KABIVEN in adults should not exceed 40 mL/kg/day.

In patients with serum triglyceride concentrations above 400 mg/dL, stop the KABIVEN infusion and monitor serum triglyceride levels. Once the triglycerides are <400 mg/dL, restart KABIVEN at a lower infusion rate and advance rate in smaller increments towards target dosage, checking the triglyceride levels prior to each adjustment [see *Contraindications (4) and Warnings and Precautions (5.13)*].

Table 1: Macronutrient Content of KABIVEN Based on Recommended Dosage

	Nutrition Provided by KABIVEN recommended dosage
Fluid mL/kg/day	19 to 38
Protein* g/kg/day	0.6 to 1.3
Nitrogen g/kg/day	0.1 to 0.2
Dextrose** g/kg/day	2.1 to 4.1
Lipids g/kg/day	0.7 to 1.5
Total Energy Requirement kcal/kg/day	16 to 32

* Protein is provided as amino acids. When infused intravenously amino acids are metabolized and utilized as the building blocks of protein.

** As Dextrose monohydrate

Treatment with KABIVEN may be continued for as long as is required by the patient's condition.

Dosing in Renal Impairment

In patients with renal impairment, the dosage of KABIVEN should be the recommended adult dosage (see above). Prior to administration, correct severe fluid or electrolyte imbalances. Closely monitor serum electrolyte levels and adjust the volume of KABIVEN administered as required [see *Warnings and Precautions (5.12)*].

Renal patients not needing dialysis require 0.6 to 0.8 g of protein/kg/day. Patients on dialysis or continuous renal replacement therapy should receive 1.2 to 1.8 g of protein/kg/day up to a maximum of 2.5 g of protein/kg/day based on nutritional status and estimated protein losses. The KABIVEN dosage can be adjusted based on the treatment for the renal impairment, supplementing protein as indicated. If required, additional amino acids may be added to the KABIVEN bag or infused separately.

Infusion Duration and Rate

The recommended duration of infusion for KABIVEN is between 12 and 24 hours, depending on the clinical situation.

The maximum infusion rate of KABIVEN is 2.6 mL/kg/hour. This corresponds to 0.09 g/kg/hour of amino acids, 0.28 g/kg/hour of dextrose (the rate limiting factor) and 0.1 g/kg/hour of lipids.

Dosing Instructions

1. Determine the fluid requirements (19 to 38 mL/kg/day) and the patient's nutritional requirements to be delivered, and then select the corresponding KABIVEN bag.
2. Determine the preferred duration of infusion (12 to 24 hours).
3. Ensure that the rate of infusion (KABIVEN dosage in mL/kg/day divided by the preferred duration of infusion (hours)) does not exceed the maximum infusion rate for the patient (i.e., 2.6 mL/kg/hour). The infusion rate may need to be reduced and duration of infusion increased in order not to exceed the maximum infusion rate.
4. Once the infusion rate in mL/kg/hour has been selected, calculate the infusion rate (mL/hour) using the patient's weight.
5. Compare the patient's nutrient requirements with the amount supplied by KABIVEN. Discuss with a pharmacist any additions that may be required.

3 DOSAGE FORMS AND STRENGTHS

KABIVEN is a sterile, hypertonic emulsion in a three-chamber container. The individual chambers contain one of the following respectively: amino acids and electrolytes, dextrose, or lipid injectable emulsion. Table 2 describes the individual components of KABIVEN.

Table 2: Contents of KABIVEN when mixed

How Supplied	2,566 mL	2,053 mL	1,540 mL	1,026 mL
Composition of KABIVEN				
Soybean Oil, USP (g/100 mL)				3.9
Dextrose Monohydrate, USP (g/100 mL)				10.8
Amino Acids, USP (g/100 mL)				3.31
Total Nitrogen (mg/100 mL)				526
Essential amino acids (mg/100 mL)	Lysine, USP (added as the hydrochloride salt)	263		
	Phenylalanine, USP	231		
	Leucine, USP	231		
	Valine, USP	213		
	Histidine, USP	199		
	Threonine, USP	164		
	Methionine, USP	164		
	Isoleucine, USP	164		
	Tryptophan, USP	55		
Nonessential amino acids (mg/100 mL)	Alanine, USP	467		
	Arginine, USP	330		
	Glycine, USP	231		
	Proline, USP	199		
	Glutamic Acid	164		
	Serine, USP	131		
	Aspartic Acid, USP	99		
	Tyrosine, USP	6.7		
Electrolytes (mg/100 mL)	Sodium Acetate Trihydrate, USP	239		
	Potassium Chloride, USP	174		
	Sodium Glycerophosphate Anhydrous	147		
	Magnesium Sulfate Heptahydrate, USP	96		
	Calcium Chloride Dihydrate, USP	29		
Electrolyte Profile ¹ (mEq/L)	Sodium ²	31 (31 mmol/L)		
	Potassium	23 (23 mmol/L)		
	Magnesium	7.8 (3.9 mmol/L)		
	Calcium	3.8 (1.9 mmol/L)		
	Phosphorous ³	N.A. (9.7 mmol/L)		
	Acetate ⁴	38 (38 mmol/L)		
	Chloride ⁵	45 (45 mmol/L)		
	Sulfate ⁶	7.8 (3.9 mmol/L)		
Calorie Content (kcal/L)	From Dextrose ⁹	367		
	From Lipid	390 ⁷		
	From Amino Acids	132		
	Total	889		
pH ⁸	5.6			
Osmolarity (mOsm/L)	1060			

1. Balanced by ions from amino acids
2. Contributed by sodium glycerophosphate and sodium acetate
3. Contributed by sodium glycerophosphate and phospholipids
4. Derived from sodium acetate and glacial acetic acid (for pH adjustment)
5. Contributed by calcium chloride, lysine hydrochloride, and potassium chloride
6. Derived from magnesium sulfate
7. Total caloric value including lipid, phospholipid and glycerin
8. pH of amino acid with electrolyte solution was adjusted with glacial acetic acid, USP and pH of lipid emulsion was adjusted with sodium hydroxide, USP
9. Calculated on the basis of 3.4 kcal/g of dextrose, monohydrate

4 CONTRAINDICATIONS

The use of KABIVEN is contraindicated in:

- Neonates (28 days of age or younger) receiving concomitant treatment with ceftriaxone, even if separate infusion lines are used, due to the risk of fatal ceftriaxone calcium salt precipitation in the neonate's bloodstream [see *Limitations of Use (1), Warnings and Precautions (5.5), Use in Specific Populations (8.4)*].
- Patients with known hypersensitivity to egg, soybean, peanut or any of the active or inactive ingredients in KABIVEN [see *Warnings and Precautions (5.4)*].
- Patients with severe disorders of lipid metabolism characterized by hypertriglyceridemia (serum triglyceride concentration >1,000 mg/dL) [see *Warnings and Precautions (5.10)*].
- Patients with inborn errors of amino acid metabolism
- Patients with cardiopulmonary instability (including pulmonary edema, cardiac insufficiency, myocardial infarction, acidosis and hemodynamic instability requiring significant vasopressor support)
- Patients with hemophagocytic syndrome

5 WARNINGS AND PRECAUTIONS

5.1 Clinical Decompensation with Rapid Infusion of Intravenous Lipid Emulsion in Neonates and Infants

In the postmarketing setting, serious adverse reactions including acute respiratory distress, metabolic acidosis, and death have been reported in neonates and infants after rapid infusion of intravenous lipid emulsions. Hypertriglyceridemia was commonly reported.

Preterm and small for gestational age infants have poor clearance of intravenous lipid emulsion and increased free fatty acid plasma levels following lipid emulsion infusion.

5.2 Parenteral Nutrition-Associated Liver Disease and Other Hepatobiliary Disorders

Risk of Parenteral Nutrition-Associated Liver Disease

Parenteral nutrition-associated liver disease (PNALD), also referred to as intestinal failure-associated liver disease (IFALD), can present as cholestasis or hepatic steatosis, and may progress to steatohepatitis with fibrosis and cirrhosis (possibly leading to chronic hepatic failure). The etiology of PNALD is multifactorial; however, intravenously administered phytosterols (plant sterols) contained in plant-derived lipid emulsions, such as Intralipid (included in KABIVEN), have been associated with development of PNALD.

In a randomized study of neonates and infants expected to be treated with PN for at least 28 days, parenteral nutrition-associated cholestasis (PNAC), a precursor to PNALD, developed more frequently in Intralipid-treated patients than in patients treated with a 4-oil mixed lipid emulsion [see *Adverse Reactions (6.1), Use in Specific Populations (8.4)*].

Monitor liver tests in patients treated with KABIVEN and consider discontinuation or dosage reduction if abnormalities occur.

Other Hepatobiliary Disorders

Hepatobiliary disorders including cholecystitis and cholelithiasis have developed in some PN-treated patients without preexisting liver disease.

Monitor liver tests when administering KABIVEN. Patients developing signs of hepatobiliary disorders should be assessed early to determine whether these conditions are related to KABIVEN use.

5.3 Pulmonary Embolism and Respiratory Distress due to Pulmonary Vascular Precipitates

Pulmonary vascular precipitates causing pulmonary emboli (including some fatalities) and respiratory distress have been reported in patients receiving parenteral nutrition.

Excessive addition of calcium and phosphate increases the risk of the formation of calcium phosphate precipitates; however, precipitates have been reported even in the absence of phosphate salt in the solution. Precipitation following passage through an in-line filter and suspected in vivo precipitate formation has also been reported.

Visually inspect the prepared solution, the infusion set, and catheter for precipitates, prior to administration as well as periodically during the administration. If signs of respiratory distress or pulmonary embolism occur, stop the KABIVEN infusion and initiate a medical evaluation.

5.4 Hypersensitivity Reactions

KABIVEN contains soybean oil, which may cause hypersensitivity reactions. Cross reactions have been observed between soybean and peanut. KABIVEN is contraindicated in patients with known hypersensitivity to egg, soybean, peanut or any of the active or inactive ingredients in KABIVEN. If a hypersensitivity reaction occurs, stop infusion of KABIVEN immediately and initiate appropriate treatment and supportive measures.

5.5 Precipitation with Ceftriaxone

Precipitation of ceftriaxone-calcium can occur when ceftriaxone is mixed with calcium-containing parenteral nutrition solutions, such as KABIVEN in the same intravenous administration line. Do not administer ceftriaxone simultaneously with KABIVEN via a Y-site. However, in patients other than neonates, ceftriaxone and KABIVEN may be administered sequentially if the infusion lines are thoroughly flushed between infusions with a compatible fluid *[see Dosage and Administration (2.1)]*.

Deaths have occurred in neonates (28 days of age or younger) who received concomitant intravenous calcium-containing solutions with ceftriaxone resulting from calcium-ceftriaxone precipitates in the lungs and kidneys, even when separate infusion lines were used *[see Contraindications (4), Pediatric Use (8.4)]*.



5.6 Infections

Parenteral nutrition, such as KABIVEN, can support microbial growth and is an independent risk factor for the development of catheter-related bloodstream infections. To decrease the risk of infectious complications, ensure aseptic techniques are used for catheter placement, catheter maintenance, and preparation and administration of KABIVEN.

Monitor for signs and symptoms of infection including fever and chills, as well as laboratory test results that might indicate infection (including leukocytosis and hyperglycemia). Perform frequent checks of the intravenous catheter insertion site for edema, redness, and discharge.

5.7 Fat Overload Syndrome

Fat overload syndrome is a rare condition that has been reported with intravenous lipid formulations and is characterized by a sudden deterioration in the patient's condition (e.g., fever, anemia, leukopenia, thrombocytopenia, coagulation disorders, hyperlipidemia, hepatomegaly, deteriorating liver function, and central nervous system manifestations such as coma). A reduced or limited ability to metabolize lipids, accompanied by prolonged plasma clearance (resulting in higher lipid levels), may result in this syndrome. Although fat overload syndrome has been most frequently observed when the recommended lipid dose or infusion rate was exceeded, cases have also been described when the lipid formulation was administered according to instructions.

If signs or symptoms of fat overload syndrome occur, stop KABIVEN. The syndrome is usually reversible when the infusion including the lipid emulsion is stopped.

5.8 Refeeding Syndrome

Administering PN to severely malnourished patients may result in refeeding syndrome, characterized by the intracellular shift of potassium, phosphorus, and magnesium as patients become anabolic.

Thiamine deficiency and fluid retention may also develop. To prevent these complications, closely monitor severely undernourished patients and slowly increase their nutrient intake.

5.9 Diabetes and Hyperglycemia

Administration of dextrose at a rate exceeding the patient's utilization rate may lead to hyperglycemia, hyperosmolar coma, and death. Monitor blood glucose levels and treat hyperglycemia to maintain optimal glucose levels while infusing KABIVEN. Insulin may be administered or adjusted to maintain optimal blood glucose levels during KABIVEN administration.

5.10 Hypertriglyceridemia

The use of KABIVEN is contraindicated in patients with hypertriglyceridemia with serum triglyceride concentrations >1,000 mg/dL.

Patients with conditions such as inherited lipid disorders, obesity, diabetes mellitus, or metabolic syndromes have a higher risk of developing hypertriglyceridemia with the use of KABIVEN. In addition, patients with hypertriglyceridemia may have worsening of their hypertriglyceridemia with administration of KABIVEN. Excessive dextrose administration may further increase such risk. Evaluate patients' capacity to eliminate and metabolize the infused lipid emulsion by measuring serum triglycerides before the start of infusion (baseline value), with each increase in dosage, and regularly throughout treatment. If triglyceride levels are above 400 mg/dL in adults, stop the KABIVEN infusion and monitor serum triglyceride levels to avoid clinical consequences of hypertriglyceridemia such as pancreatitis.

To minimize the risk of new or worsening of hypertriglyceridemia, assess high-risk patients for their overall energy intake including other sources of lipid and dextrose, as well as concomitant drugs that may affect lipid and dextrose metabolism.

5.11 Vein Damage and Thrombosis

The infusion of hypertonic nutrient injections into a peripheral vein may result in vein irritation, vein damage, and/or thrombosis. KABIVEN is only approved for administration into a central vein, such as the superior vena cava [see *Dosage and Administration (2.1)*]. Remove the catheter as soon as possible if thrombophlebitis develops.

5.12 Electrolyte Imbalance and Fluid Overload in Patients with Decreased Renal Function

Patients with decreased renal function, including those with pre-renal azotemia, renal obstruction, or intrinsic renal disease, may be at increased risk of electrolyte and fluid volume imbalance when receiving PN, including KABIVEN. In patients with decreased renal function with electrolyte imbalance or fluid overload, the KABIVEN dosage (e.g., fluid, protein, and electrolyte content) may require adjustment.

Monitor renal function parameters. Patients developing signs of decreased renal function should be assessed early by a clinician knowledgeable in renal disease in order to determine the appropriate KABIVEN dosage.

5.13 Aluminum Toxicity

KABIVEN contains no more than 25 mcg/L of aluminum.

The aluminum contained in KABIVEN may reach toxic levels with prolonged parenteral administration in patients with impaired kidney function. Preterm infants are at greater risk because their kidneys are immature, and they require large amounts of calcium and phosphate solutions that contain aluminum. Patients with impaired kidney function, including preterm infants, who receive parenteral levels of aluminum at greater than 4 to 5 mcg/kg/day, accumulate aluminum at levels associated with central nervous system and bone toxicity. Tissue loading may occur at even lower rates of administration of total parenteral nutrition products.

5.14 Monitoring/Laboratory Tests

Monitor fluid status closely in patients with pulmonary edema or heart failure.

Throughout treatment, monitor serum triglycerides [see *Warnings and Precautions (5.13)*], fluid and electrolyte status, serum osmolarity, blood glucose, liver and kidney function, blood count (including platelets), and coagulation parameters.

KABIVEN contains Vitamin K that may counteract anticoagulant activity [see *Drug Interactions (7)*].

The lipids contained in KABIVEN may interfere with some laboratory tests (e.g., hemoglobin, triglycerides, lactate dehydrogenase, bilirubin and oxygen saturation) if blood is sampled before the lipids have cleared from the bloodstream. Conduct these tests at least 6 hours after stopping the infusion.

6 ADVERSE REACTIONS

The following serious adverse reactions are discussed in greater detail in other sections of the prescribing information.

- Clinical Decompensation with Rapid Infusion of Intravenous Lipid Emulsion in Neonates and Infants [see *Warnings and Precautions (5.1)*].
- Parenteral Nutrition-Associated Liver Disease and Other Hepatobiliary Disorders [see *Warnings and Precautions (5.2)*].
- Pulmonary Embolism and Respiratory Distress due to Pulmonary Vascular Precipitates [see *Warnings and Precautions (5.3)*].
- Hypersensitivity Reactions [see *Warnings and Precautions (5.4)*].
- Precipitation with Ceftriaxone [see *Warnings and Precautions (5.5)*].
- Infections [see *Warnings and Precautions (5.6)*].
- Fat Overload Syndrome [see *Warnings and Precautions (5.7)*].
- Refeeding Syndrome [see *Warnings and Precautions (5.8)*].
- Diabetes and Hyperglycemia [see *Warnings and Precautions (5.9)*].
- Hypertriglyceridemia [see *Warnings and Precautions (5.10)*].
- Vein Damage and Thrombosis [see *Warnings and Precautions (5.11)*].
- Electrolyte Imbalance and Fluid Overload in Patients with Decreased Renal Function [see *Warnings and Precautions (5.12)*].
- Aluminum Toxicity [see *Warnings and Precautions (5.13)*].

6.1 Clinical Trials Experience

Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed in the clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in practice.

The clinical data described for KABIVEN reflects exposure in 145 patients exposed for 7 days to 4 weeks in 7 active-controlled trials. The pooled population exposed to KABIVEN was 25 to 87 years old, 35% female, 99% Caucasian. The enrolled patients had varied underlying conditions such as gastrointestinal disorders (41%) neoplasms (48%), vascular disorders (35%) and other surgical procedures (21%). Most patients received central intravenous infusion doses of $\geq 80\%$ of their target mean daily exposure.

Adverse reactions occurring in at least 1% of patients who received KABIVEN are shown in Table 3.

Table 3: Adverse Reactions in >1% of Patients Treated with KABIVEN

Adverse reaction	KABIVEN N=145 (%)
Nausea	22 (15)
Pyrexia	13 (9)
Hypertension	12 (8)
Vomiting	8 (6)
Hemoglobin decreased	8 (6)
Protein total decreased	6 (4)
Hypokalemia	6 (4)
Blood potassium decreased	6 (4)
Gamma-glutamyltransferase increased	6 (4)
Hyperglycemia	3 (2)
Blood alkaline phosphatase increased	2 (1)
Blood calcium decreased	2 (1)
Prothrombin time prolonged	2 (1)
Pruritus	2 (1)
Tachycardia	2 (1)

* Terms as reported in clinical studies

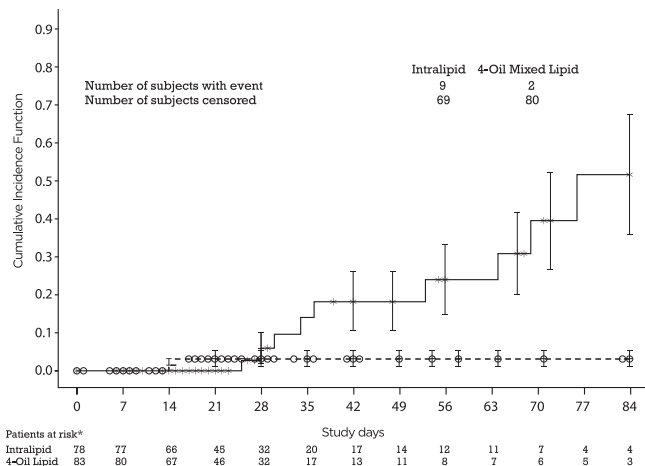
Less common adverse reactions in $\leq 1\%$ of patients who received KABIVEN were hyperkalemia, hypertriglyceridemia, headache, dizziness, dysgeusia, rash, eczema, blood glucose increased, and increase in blood triglycerides.

In a randomized active-controlled, double-blind, parallel-group, multi-center study that included 152 neonates and 9 patients ranging in age from 29 to 153 days who were expected to require PN for at least 28 days, parenteral nutrition-associated cholestasis (PNAC), a precursor to PNALD, developed more frequently in Intralipid-treated patients than in patients treated with a 4-oil mixed lipid emulsion. Intralipid is the lipid emulsion component of KABIVEN.

PNAC (defined as direct bilirubin >2mg/dl with a second confirmed elevation >2mg/dl at least 7 days later) occurred in 11.5% (9/78) of Intralipid-treated patients and 2.4% (2/83) of patients treated with a 4-oil mixed lipid emulsion. Most PNAC events occurred in patients who were treated for longer than 28 days.

The estimated cumulative incidence of PNAC is shown in the Kaplan-Meier cumulative incidence curve in Figure 1.

Figure 1: Cumulative Incidence Curve of Time to Parenteral Nutrition-Associated Cholestasis (PNAC) with Standard Error Bars



*There is increasing uncertainty in the estimate of the cumulative incidence as fewer patients are at risk.

Monitor liver tests in patients treated with KABIVEN and consider discontinuation or dosage reduction if abnormalities occur.

6.2 Postmarketing Experience

The following additional adverse reactions have been identified during post-approval use of KABIVEN in countries where it is registered. Because these reactions are reported voluntarily from a population of uncertain size, it is not always possible to reliably estimate their frequency or establish a causal relationship to product exposure.

- Hepatobiliary disorders: cholestasis
- Infections and infestations: infection
- Nervous system disorders: subependymal hemorrhage

7 DRUG INTERACTIONS

7.1 Ceftriaxone

Precipitation of ceftriaxone-calcium can occur when ceftriaxone is mixed with calcium-containing parenteral nutrition solutions, such as KABIVEN, in the same intravenous administration line.

Do not administer ceftriaxone simultaneously with KABIVEN via a Y-site. However, ceftriaxone and KABIVEN may be administered sequentially if the infusion lines are thoroughly flushed between infusions with a compatible fluid *[see Dosage and Administration (2.1)]*.

Deaths have occurred in neonates (28 days of age or younger) who received concomitant intravenous calcium-containing solutions with ceftriaxone resulting from calcium-ceftriaxone precipitates in the lungs and kidneys, even when separate infusion lines were used *[see Contraindications (4), Use in Specific Populations (8.4)]*.

7.2 Coumarin and Coumarin Derivatives

The soybean oil present in KABIVEN has vitamin K₁. Vitamin K₁ can reverse the anticoagulant activity of coumarin and coumarin derivatives, including warfarin, which work by blocking recycling of vitamin K₁. Monitor laboratory parameters for anticoagulant activity in patients who are on both KABIVEN and coumarin or coumarin derivatives.

8 USE IN SPECIFIC POPULATIONS

8.1 Pregnancy

Risk Summary

The limited available data on the use of KABIVEN in pregnant women are not sufficient to inform a drug-associated risk. However, there are clinical considerations if KABIVEN is used in pregnant women *[see Clinical Considerations]*. Animal reproduction studies have not been conducted with KABIVEN.

The estimated background risk of major birth defects and miscarriage for the indicated population are unknown. In the U.S. general population, the estimated background risk of major birth defects and miscarriage in clinically recognized pregnancies is 2 to 4% and 15 to 20%, respectively.

Clinical Considerations

Disease-Associated Maternal and/or Embryofetal Risk

Severe malnutrition in a pregnant woman is associated with preterm delivery, low birth weight, intrauterine growth restriction, congenital malformations and perinatal mortality. Parenteral nutrition should be considered if a pregnant woman's nutritional requirements cannot be fulfilled by oral or enteral intake.

8.2 Lactation

Risk Summary

There are no data available to assess the presence of KABIVEN and/or its active metabolite(s) in human milk, the effects on the breastfed child or the effects on milk production. The developmental and health benefits of breastfeeding should be considered along with the mother's clinical need for KABIVEN, and any potential adverse effects of KABIVEN on the breastfed child or from the underlying maternal condition.

8.4 Pediatric Use

The safety and effectiveness of KABIVEN has not been established in pediatric patients of any age.

In the postmarketing setting, clinical decompensation with rapid infusion of intravenous lipid emulsion in neonates and infants, sometimes fatal has been reported *[see Warnings and Precautions (5.1)]*. Patients, particularly preterm infants, are at risk for aluminum toxicity *[see Warnings and Precautions (5.13)]*.

Deaths have occurred in neonates (28 days of age or younger) who received concomitant intravenous calcium-containing solutions with ceftriaxone resulting from calcium-ceftriaxone precipitates in the lungs and kidneys, even when separate infusion lines were used. *[see Contraindications (4), Warnings and Precautions (5.5)]*.

KABIVEN is not recommended for use in pediatric patients under the age of two years, including preterm infants, as the fixed content of the formulation does not meet the nutritional requirements of this age group due to the following reasons:

1. Calcium and dextrose needs are not met and lipids, protein and magnesium exceed requirements.
2. The product does not contain the amino acids cysteine and taurine, considered conditionally essential for neonates and infants.

Patients, including pediatric patients, may be at risk for PNALD *[see Warnings and Precautions (5.2)]*.

Newborns – especially those born premature and with low birth weight – are at increased risk of developing hypo – or hyperglycemia and therefore need close monitoring during treatment with intravenous dextrose solutions to ensure adequate glycemic control in order to avoid potential long term adverse effects. Hypoglycemia in the newborn can cause prolonged seizures, coma and brain damage. Hyperglycemia has been associated with intraventricular hemorrhage, late onset bacterial and fungal infection, retinopathy of prematurity, necrotizing enterocolitis, bronchopulmonary dysplasia, prolonged length of hospital stay, and death.

8.5 Geriatric Use

Clinical studies of KABIVEN did not include sufficient numbers of patients aged 65 and over to determine whether they respond differently from other younger patients. Other reported clinical experience has not identified differences in responses between the elderly and younger patients. In general, dose selection for an elderly patient should be cautious, usually starting at the low end of the dosing range, reflecting the greater frequency of decreased hepatic, renal, or cardiac function, and of concomitant disease or drug therapy.

10 OVERDOSAGE

In the event of overdose, serious adverse reactions may result *[see Warnings and Precautions (5.1, 5.7)]*. Stop the infusion of KABIVEN to allow lipids to clear from serum.

The effects are usually reversible after the lipid infusion is stopped. If medically appropriate, further intervention may be indicated. The lipid administered and fatty acids produced are not dialyzable.

11 DESCRIPTION

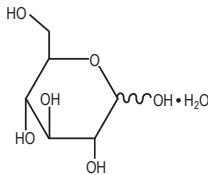
KABIVEN is a sterile, hypertonic emulsion, for central venous administration, in a Three Chamber Bag. The product contains no added sulfites.

Chamber 1 contains Dextrose monohydrate solution for fluid replenishment and caloric supply.

Chamber 2 contains the Amino Acid solution with Electrolytes, which comprises essential and nonessential amino acids provided with electrolytes.

Chamber 3 contains Intralipid® 20% (a 20% Lipid Injectable Emulsion), prepared for intravenous administration as a source of calories and essential fatty acids. See below for formulations of each chamber and Table 2 for strength, pH, osmolarity, ionic concentration and caloric content of KABIVEN when all the chambers are mixed together.

Chamber 1: Contains sterile, hypertonic solution of Dextrose, USP in water for injection with a pH range of 3.5 to 5.5. Dextrose, USP is chemically designated D-glucose, monohydrate ($C_6H_{12}O_6 \cdot H_2O$) and has the following structure:




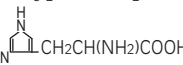

Dextrose is derived from corn.

Chamber 2: Contains a sterile solution of amino acids and electrolytes in water for injection. In addition, glacial acetic acid has been added to adjust the pH so that the final solution pH is 5.4 to 5.8. The formulas for the individual electrolytes and amino acids are as follows:


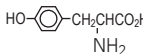
Electrolytes

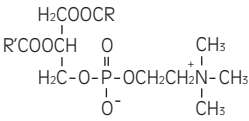
Sodium Acetate Trihydrate, USP	$\text{CH}_3\text{COONa} \cdot 3\text{H}_2\text{O}$
Potassium Chloride, USP	KCl
Sodium Glycerophosphate	$\text{C}_3\text{H}_5(\text{OH})_2\text{PO}_4\text{Na}_2 \cdot x\text{H}_2\text{O}$
Magnesium Sulfate Heptahydrate, USP	$\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$
Calcium Chloride Dihydrate, USP	$\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$

Essential Amino Acids

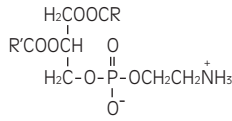
Lysine (added as the hydrochloride salt)	$\text{H}_2\text{N}(\text{CH}_2)_4\text{CH}(\text{NH}_2)\text{COOH} \cdot \text{HCl}$
Phenylalanine	
Leucine	$(\text{CH}_3)_2\text{CHCH}_2\text{CH}(\text{NH}_2)\text{COOH}$
Valine	$(\text{CH}_3)_2\text{CHCH}(\text{NH}_2)\text{COOH}$
Histidine	
Threonine	$\text{CH}_3\text{CH}(\text{OH})\text{CH}(\text{NH}_2)\text{COOH}$
Methionine	$\text{CH}_3\text{S}(\text{CH}_2)_2\text{CH}(\text{NH}_2)\text{COOH}$
Isoleucine	$\text{CH}_3\text{CH}_2\text{CH}(\text{CH}_3)\text{CH}(\text{NH}_2)\text{COOH}$
Tryptophan	

Nonessential Amino Acids

Alanine	$\text{CH}_3\text{CH}(\text{NH}_2)\text{COOH}$
Arginine	$\text{H}_2\text{NC}(\text{NH})\text{NH}(\text{CH}_2)_3\text{CH}(\text{NH}_2)\text{COOH}$
Glycine	$\text{H}_2\text{NCH}_2\text{COOH}$
Proline	
Glutamic Acid	$\text{HOOC}(\text{CH}_2)_2\text{CH}(\text{NH}_2)\text{COOH}$
Serine	$\text{HOCH}_2\text{CH}(\text{NH}_2)\text{COOH}$
Aspartic Acid	$\text{HOOCCH}_2\text{CH}(\text{NH}_2)\text{COOH}$
Tyrosine	



Phosphatidylcholine



Phosphatidylethanolamine

Glycerin is chemically designated $\text{C}_3\text{H}_8\text{O}_3$ and is a clear colorless, hygroscopic syrupy liquid. It has the following structural formula:



The container-solution unit is a closed system and is not dependent upon entry of external air during administration. The container is overwrapped to provide protection from the physical environment and to provide an additional oxygen and moisture barrier when necessary. An oxygen absorber is placed between the inner bag and the overpouch.

The container is not made with natural rubber latex or polyvinyl chloride (PVC). KABIVEN contains no more than 25 mcg/L of aluminum.

12 CLINICAL PHARMACOLOGY

12.1 Mechanism of Action

KABIVEN is used as a supplement or as the sole source of nutrition in patients, providing macronutrients (amino acids, dextrose and lipids) and micronutrients (electrolytes) parenterally.

The amino acids provide the structural units that make up proteins and are used to synthesize proteins and other biomolecules or are oxidized to urea and carbon dioxide as a source of energy.

The administered dextrose is oxidized to carbon dioxide and water, yielding energy.

Intravenously administered lipids provide a biologically utilizable source of calories and essential fatty acids. Fatty acids serve as an important substrate for energy production. The most common mechanism of action for energy derived from fatty acid metabolism is beta-oxidation. Fatty acids are important for membrane structure and function, precursors for bioactive molecules (such as prostaglandins), and as regulators of gene expression.

12.3 Pharmacokinetics

The infused lipid particles provided by KABIVEN are expected to be cleared from the blood stream in a manner thought to be comparable to the clearing of chylomicrons. In healthy volunteers, the maximum clearance rate of the triglycerides after fasting overnight has been found to be 3.8 ± 1.5 g/kg per 24 hours. Both elimination and oxidation rates are dependent on the patient's clinical condition; elimination is faster and utilization is increased in postoperative patients, in sepsis, burns and trauma,

while patients with renal impairment and hypertriglyceridemia may show lower utilization of exogenous lipid emulsions. Due to differences in elimination, patients with these conditions should be closely monitored during KABIVEN administration [see *Warnings and Precautions* (5.12, 5.13)].

The disposition of infused amino acids, dextrose and electrolytes are essentially the same as those supplied by ordinary food.

A clinical study in healthy volunteers employing high intravenous doses (80 mmol) of either sodium glycerophosphate used in KABIVEN or reference, inorganic sodium phosphate demonstrated that both compounds resulted in comparable serum inorganic phosphate concentrations after a single intravenous dose. Changes from baseline in the serum levels of sodium, potassium and total calcium were comparable across the two phosphate sources in this study.

13 NONCLINICAL TOXICOLOGY

13.1 Carcinogenesis, Mutagenesis, Impairment of Fertility

Long-term animal studies have not been conducted to evaluate carcinogenic potential of KABIVEN or its effect on fertility. Genotoxicity studies have not been conducted with KABIVEN to assess its mutagenic potential.

16 HOW SUPPLIED/STORAGE AND HANDLING

KABIVEN is a sterile emulsion available in the following 4 sizes:

<u>NDC</u>	<u>Volume</u>
63323-712-25	2,566 mL
63323-712-20	2,053 mL
63323-712-15	1,540 mL
63323-712-10	1,026 mL

Exposure of pharmaceutical products to heat should be minimized. Avoid excessive heat. Protect from freezing. If accidentally frozen, discard the bag. It is recommended that the product be stored at 5°C to 25°C (41°F to 77°F).

Do not remove container from overpouch until intended for use.

After breaking the vertical seals, chemical and physical in-use stability of the mixed three chamber bag has been demonstrated for 48 hours at 25°C (77°F). If not used immediately, the activated bag can be stored for up to 7 days under refrigeration [2° to 8°C (36° to 46°F)]. After removal from refrigeration, the activated bag should be used within 48 hours.

The product should be used immediately after the introduction of additives. If not used immediately, the storage time and conditions prior to use should not be longer than 24 hours at 2° to 8°C (36° to 46°F). After removal from storage at 2° to 8°C (36° to 46°F), the admixture should be infused within 24 hours. Any mixture remaining must be discarded.

17 PATIENT COUNSELING INFORMATION

When initiating KABIVEN administration, discuss the following information with the patient or caregiver:

Parenteral Nutrition-Associated Liver Disease and Other Hepatobiliary Disorders

Inform patients and caregivers that use of parenteral nutrition may result in parenteral nutrition-associated liver disease and/or other hepatobiliary disorders *[see Warnings and Precautions (5.2)]*.

Pulmonary Embolism and Respiratory Distress due to Pulmonary Vascular Precipitates

Inform patients and caregivers that pulmonary vascular precipitates causing pulmonary emboli (including some fatalities) and presenting as respiratory distress have been reported in patients receiving parenteral nutrition. If KABIVEN is infused at home, instruct patients or caregivers to visually inspect the prepared solution, the infusion set, and catheter for precipitates, prior to administration as well as periodically during the administration *[see Warnings and Precautions (5.3)]*.

Hypersensitivity Reactions

Inform patients and caregivers that KABIVEN may cause hypersensitivity reactions. If KABIVEN is infused at home, instruct patients or caregivers to stop the infusion of KABIVEN immediately and seek medical attention if a hypersensitivity reaction occurs *[see Warnings and Precautions (5.4)]*.

Infections

Inform patients and caregivers that patients who receive KABIVEN are at risk of infection. If KABIVEN is infused at home, instruct patients or caregivers to ensure aseptic techniques are used for the preparation and administration of KABIVEN and to monitor for signs and symptoms of infection *[see Warnings and Precautions (5.6)]*.

Fat Overload Syndrome

Inform patients and caregivers that fat overload syndrome has been reported with the use of intravenous lipid emulsions. If KABIVEN is infused at home, instruct patients or caregivers to stop KABIVEN if signs or symptoms of fat overload syndrome occur *[see Warnings and Precautions (5.7)]*.

Refeeding Syndrome

If the patient is severely malnourished, inform patients and caregivers that administering parenteral nutrition including KABIVEN may result in refeeding syndrome *[see Warnings and Precautions (5.8)]*.

Diabetes and Hyperglycemia

Inform patients and caregivers that administration of dextrose at a rate exceeding the patient's utilization rate may lead to hyperglycemia, hyperosmolar coma, and death *[see Warnings and Precautions (5.9)]*.

Hypertriglyceridemia

Inform patients and caregivers about the risks of hypertriglyceridemia with KABIVEN use *[see Warnings and Precautions (5.10)]*.

Electrolyte Imbalance and Fluid Overload in Patients with Decreased Renal Function

For patients with decreased renal function, inform them or their caregivers that the patient may be at increased risk of electrolyte and fluid volume imbalance when KABIVEN is being administered *[see Warnings and Precautions (5.12)]*.

Aluminum Toxicity

Inform patients and caregivers that prolonged PN administration in patients with renal impairment, including preterm neonates, may result in aluminum reaching toxic levels associated with central nervous system and bone toxicity *[see Warnings and Precautions (5.13)]*.

Preparation and Administration Instructions

If it is acceptable for a patient or caregiver to administer KABIVEN at home, then the patient or caregiver must be trained on the following: how to inspect and prepare, add compatible additives (when appropriate), administer, and store KABIVEN *[see Dosage and Administration (2.1, 2.2, 2.3)]*. Inform patients or caregivers not to deviate from the administration instructions given by the healthcare provider.

Manufactured by:



Uppsala, Sweden

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www.freseniuskabinutrition.com/products/kabiven-perikabiven/

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