MLT50303D1

KetoVie™ Peptide 4:1 (Extensively hydrolyzed whey protein, MCT enhanced, low carbohydrate, lipidbased ketogenic formula)

PRODUCT INFORMATION

KetoVie Peptide 4:1 8.5 fl oz (250 mL) carton Reimbursement Code: 24359-0503-03 Manufactured by Cambrooke Therapeutics, Inc. Ayer, MA 01432 www.cambrooke.com

DISPENSE BY PRESCRIPTION

KetoVie Peptide 4:1 is a nutritionally complete medical food for the dietary management of intractable epilepsy, glucose transporter type 1 deficiency syndrome, pyruvate dehydrogenase deficiency and other disorders where a ketogenic diet specially designed to address symptoms of gastrointestinal impairment is needed.

DESCRIPTION

KetoVie Peptide 4:1 is a liquid ready to use prescription **medical food** for the clinical dietary management of intractable epilepsy, glucose transporter type 1 deficiency syndrome (Glut-1 DS), pyruvate dehydrogenase deficiency (PDH) and other disorders that require a ketogenic diet and is specially designed to address symptoms of gastrointestinal impairment. KetoVie Peptide 4:1 is to be used only under medical supervision. KetoVie Peptide 4:1 has been developed, labeled and should be administered in accordance with the statutory and the Food and Drug Administration's (FDA's) regulatory definition of **Medical Foods**. Congress defined "**Medical Food**" in the Orphan Drug Act and Amendments of 1988 as a formulation to be administered enterally (for oral or tube feeding) under the supervision of a physician and which is intended for the specific dietary management of a disease or condition for which distinctive nutritional requirements, based on recognized scientific principles are established by medical evaluation. 21 U.S.C. 360ee(b)(3). KetoVie Peptide 4:1 is supplied in a single dose, 8.5 fl oz (250 mL) cartons, 30 cartons per case. Each carton contains a 4:1 ketogenic ratio (4 grams of fat to every 1 gram of non-fat [protein and net carbohydrate*]), 373calories, peptide based protein source derived from extensively hydrolyzed whey, 14% of total calories as medium chain triglyceride (MCT), and provides a complete micronutrient profile with enhanced amounts of selenium and carnitine. The caloric density (calories per ml) of KetoVie Peptide 4:1 is 1.5 kcal/mL.

*The net carbohydrate weight (g) is the total carbohydrate minus the total dietary fiber.

PRIMARY INGREDIENTS

Ready to Use 4:1 Ketogenic Ratio

KetoVie Peptide 4:1 contains a 4:1 macronutrient ratio by weight of fat to combined protein and net carbohydrate* weight. The classic 4:1 (ketogenic ratio) ketogenic diet is effective in the dietary management of intractable epilepsy^{1,2,3,4,5} and is considered the diet of choice for the metabolic disorders glucose transporter type 1 deficiency syndrome (Glut-1 DS)^{6,7,8} and pyruvate dehydrogenase deficiency (PDH).^{8,9}

Benefits of a liquid ready to use ketogenic **medical food**, such as KetoVie Peptide 4:1, whether as a sole source or supplemental nutrition, include: ease of diet titration, reduced risk of calculation and preparation error, and improved compliance.^{10, 11}

Peptides

The protein source of KetoVie Peptide 4:1 is 100% whey protein enzymatically broken into smaller peptide lengths and then filtered to remove any unbroken particles. Whey protein is a complete protein derived from milk. Cow and human milk contain both whey and casein protein fractions. Whey protein has been shown to improve gastric emptying time in those with poor gastric motility compared to casein dominant milk proteins.^{12,13} Impaired gastric motility can be common for those on a ketogenic diet.⁸

Peptides are extensively broken down proteins. They are classified by either degree of Hydrolysis (dH) or chain lengths measured in Daltons (d).¹⁴ The degree of hydrolysis of protein source in KetoVie Peptide 4:1 is 23-28 dH. The average chain length of peptide in KetoVie Peptide 4:1 is between 900-1100 d. Both of these measurements classify the peptides in KetoVie Peptide 4:1 as extensively hydrolyzed.

Product	Protein Source	Degree of Hydrolysis (dH)	Filtration	Mean Molecular Weight (d)
KetoVie Peptide	100% Whey	23-28	Yes	900-1100

The shorter chain lengths in an extensively hydrolyzed peptide improve absorption and decrease GI upset.¹⁵ Peptides are considered less allergenic than whole proteins, but should not be used for those with identified milk protein allergy.¹⁴ When feeding past the duodenum, peptides are more readily absorbed because of their shorter chain lengths and reduced need for digestive enzymes.¹⁶ Peptide based formulas are commonly recommended for patients with duodenal or jejunal feeding tubes, malabsorption, chronic diarrhea, and delayed gastric emptying.¹⁶

Fat and Medium Chain Triglycerides

KetoVie Peptide 4:1 contains a blend of saturated fats, polyunsaturated fats and monounsaturated fats. Refer to the Fat Profile Table below for a more detailed breakdown. KetoVie Peptide 4:1 has a saturated fat component with 50% contribution from medium chain triglycerides (MCTs). MCTs are fats with 6-12 carbon length fatty acid chains. MCT can be beneficial to ketogenic diet management in that it is directly absorbed in the intestines and more efficiently processed into ketones in the liver compared to long chain triglycerides (LCTs). MCTs also have a laxative effect, which can be helpful for bowel regularity.¹⁷ Algae-sourced long chain omega three fatty acid docosahexaenoic acid (DHA) is added at 140 milligrams per serving to promote healthy brain and eye development. KetoVie Peptide 4:1 is additionally supplemented with essential fatty acids linoleic and α -linolenic acid.

FAT PROFILE				
	Measurement per 250 mL serving	KETOVIE PEPTIDE 4:1		
Total Fat	grams	37		
Saturated Fat	grams	12		
MCT	grams	6		
Monounsaturated Fat	grams	18		
Polyunsaturated Fat	grams	7		
Linoleic Acid	milligrams	5850		
α-Linolenic Acid	milligrams	780		
DHA	milligrams	140		

Carnitine

Carnitine is a conditionally essential amino acid necessary for transporting fatty acids into the cell's mitochondria for oxidation and is crucial for energy and ketone production. Carnitine deficiency is common among children and adolescents with epilepsy, especially among those receiving valproic acid therapy, a common medication used to treat seizures.^{18,19} KetoVie Peptide 4:1 contains 50 mg of carnitine per 250 mL serving.

Selenium

Selenium is an essential trace element with many critical roles in the body. Selenium deficiency has been associated with ketogenic therapy. A serious complication of selenium deficiency is cardiomyopathy, which can be fatal.²⁰ Intakes of at least 20 mcg per day of selenium have been found to be protective against selenium deficiency related cardiomyopathy in adults.¹⁹ KetoVie Peptide 4:1 contains 23 mcg of selenium per serving. The Reference Dietary Allowance (RDA) of selenium is 15-55 mcg per day depending on age with upper limits ranging between 45-400 mcg per day.²¹

Supplemental Fiber

One of the most common complications related to ketogenic diet therapy is GI disturbance, involving nausea/vomiting, gastroesophageal reflux, diarrhea, or constipation.⁸ KetoVie Peptide 4:1 contains 1.1g of inulin soluble fiber per 250 mL tetra.²² Prebiotic inulin fiber helps support digestive health and calcium absorption.

Micronutrients and Macronutrients

Patients utilizing ketogenic therapy follow a severely restricted diet to minimize carbohydrate intake and provide the necessary fats at the desired ketogenic ratio for the production of ketone bodies. As such, there is meaningful risk and challenges in receiving recommended daily intake of many nutrients.²³ Many commercially available vitamin and mineral supplements also contain carbohydrate which must be factored into the diet. To compensate for this, KetoVie Peptide 4:1 includes a full profile of micronutrients and macronutrients, as well as the enhanced levels of selenium and carnitine as noted above. With a documented potential risk of bone fractures when on ketogenic therapy²⁴ along with the challenge of meeting recommended micronutrients noted above, KetoVie Peptide 4:1's formulation contains a special blend of vitamins and minerals important for bone health including: Vitamin D3, calcium, phosphorus, magnesium, and Vitamin K2 - menaquinone-7. The use of oral citrates has been shown to be an effective preventative supplement against kidney stones (renal calculi) in children who receive the ketogenic diet.²⁵ KetoVie Peptide 4:1 contains potassium citrate at 10 mEq per tetra.

Water

KetoVie Peptide 4:1 contains 79% free water.

Complete Ingredients

Water, high oleic canola oil, whey protein hydrolysate, medium chain triglycerides, citric acid ester of mono and di-glycerides, vitamin and mineral blend (tricalcium phosphate, calcium lactate, choline bitartrate, sodium ascorbate, magnesium phosphate, L-carnitine L-tartrate, niacinamide, vitamin E acetate, zinc sulfate, D-calcium pantothenate, manganese sulfate, ferrous sulfate, riboflavin, pyridoxine HCl, thiamin HCl, folic acid, vitamin A palmitate, potassium iodide, copper gluconate, sodium selenite, sodium molybdate, vitamin K1 phytonadione, vitamin K2 menaquinone-7, chromium chloride, biotin, potassium chloride, calcium citrate, sodium phosphate, vitamin D3cholecalciferol, cyanocobalamin, myo-inositol), natural flavors, cellulose gel, inulin, mono and di-glycerides, DHA algal oil, sodium hexametaphosphate, taurine, L-tyrosine, L-phenylalanine, stevia. Contains milk.

Low in lactose: <0.5g/250 mL serving.

GENERALLY RECOGNIZED AS SAFE

The ingredients in KetoVie Peptide 4:1 are Generally Recognized As Safe (GRAS). This is the statutory safety standard of the U.S. Food and Drug Administration (FDA). The use of an ingredient may be established as GRAS based on documented widespread common use of the ingredient in foods prior to January 1, 1958, or based on scientific procedures. GRAS status based on scientific procedures requires technical evidence of safety (i.e., a reasonable certainty of no harm under the conditions of intended use), and evidence of general recognition of such safety amongst qualified experts.

MEDICAL FOOD STATUS

KetoVie Peptide 4:1 has been developed, labeled and should be administered in accordance with FDA statutory and regulatory definition of **Medical Foods**. Congress defines "**Medical Food**" in the Orphan Drug Act and Amendments of 1988 as a formulation to be administered enterally (for oral or tube feeding) under the supervision of a physician and which is intended for the specific dietary management of a disease or condition for which distinctive nutritional requirements, based on recognized scientific principles are established by medical evaluation.

INDICATIONS FOR USE

For the dietary management of intractable epilepsy, glucose transporter type 1 deficiency syndrome (Glut-1 DS), pyruvate dehydrogenase deficiency (PDH) and other disorders where a ketogenic diet is indicated. KetoVie Peptide 4:1 should always be used under medical supervision. KetoVie Peptide 4:1 may be used as sole source nutrition or as a supplement.

AMOUNT OF KETOVIE PEPTIDE 4:1 NEEDED TO MEET 100% MICRONUTRIENT NEEDS ²⁶			
Age (years)	Amount		
1-3	660 mL (990 kcal)*		
4-8	900 mL (1,350 kcal)**		
Older children and adults	Varies based on age and gender		

*Except for Vitamin D, Vitamin E, potassium, and chloride. **Except for potassium and chloride.

CLINICAL EXPERIENCE

Ketogenic diet therapy has been used in the treatment of seizures since 1921. There has been a resurgence in its use in recent years.²⁷ Several recent meta-analysis reviews have looked at ketogenic diet therapy and have shown that ketogenic diet therapy is an effective treatment in reducing the number of seizures in children with intractable seizures, though not every patient will respond.^{45,28} One of the meta analysis studies pooled data from over 1,084 pediatric epileptic patients and found the ratio of treatment success (>50% seizure reduction) to diet discontinuation was 2.25 (95% confidence interval 1.69-2.98), indicating a high level of efficacy for ketogenic diet therapy and seizure reduction.⁵ A 2008 randomized control trial (Neal, et al.) of 145 children and adolescents with intractable epilepsy found 38% of patients achieved >50% reduction of seizures after 3 months of ketogenic diet therapy indicate ketogenic diet therapy to be equally efficacious in these groups.²⁴ There are studies showing benefit of ketogenic diet therapy to several different seizure types and other conditions.⁸²⁹

Conditions Shown to Respond to Ketogenic Diet Therapy

PHARMACOKINETICS

- Glucose transporter protein 1 (GLUT-1) deficiency
- Pyruvate dehydrogenase deficiency (PDHD)
- Myoclonic-astatic epilepsy (Doose syndrome)
- Tuberous sclerosis complex
 Rett syndrome
- Severe myoclonic epilepsy of infancy (Dravet syndrome)
- Lennox Gastaut syndrome
- Infantile spasms
- Selected mitochondrial disorders
- Glycogenosis type V
- Landau-Kleffner syndrome
- Lafora body disease
- Subacute sclerosing panencephalitis (SSPE)

Ketogenic diet therapy is meant to put the body into a state of ketosis by using ketone bodies for energy. Ketone bodies are the by-product of fat metabolism and can be used as an alternative to glucose as a fuel source for the brain. Ketosis is brought about by the oxidation of body fat stores, such as during times of prolonged fasting, or when the body is fed a diet primarily made up of fats. KetoVie Peptide 4:1 is a specially formulated ketogenic medical food at a classic 4:1 ketogenic ratio has been found to be effective in achieving the desired level of ketosis.⁸ Fats are metabolized in a metabolic pathway known as beta oxidation. In this multi-step process, fatty acids are taken up by cells and transported into the mitochondria by a carnitine shuttle, hence carnitine's important role in fatty acid metabolism. In the mitochondria, the activated fatty acids are converted into acetyl-CoA. Acetyl-CoA can then be further processed into energy via the tricarboxylic acid cycle (TCA cycle) or taken to the liver to be turned into ketone bodies. Ketone bodies can pass through the blood brain barrier and may play a role in ketogenic diet therapy's suppression of seizure activity in the brain. Included in the KetoVie Peptide 4:1 formulation is 14% of calories from medium chain triglycerides (MCTS). MCTs are fats with 6-12 carbon length fatty acid chains. MCTs are particularly beneficial to achieving the desired level of ketosis in the body as they are absorbed directly from the intestines and sent directly to the liver for efficient processing into ketone bodies.

Precautions and Contraindications

KetoVie[™] Peptide 4:1 contains a protein hydrolysate made from whey, a milk protein. Therefore,

it is not appropriate for those with cow's milk protein allergy.¹⁴There are certain conditions in which a ketogenic diet may be contraindicated. These may include but are not limited to the conditions listed in the chart below.8

Conditions Contraindicated to Use of Ketogenic Diet Therapy

- Carnitine deficiency (primary)
 Carnitine palmitoyltransferase (CPT) I or II deficiency
- Carnitine translocase deficiency
- Beta-oxidation defects

- Long-chain 3-hydroxyacyl-CoA deficiency
 Medium-chain 3-hydroxyacyl-CoA deficiency
- Pyruvate carboxylase deficiency
- Porphyria Inability to maintain adequate nutrition

Noncompliance

- Medium-chain acyl dehydrogenase deficiency (MCADD)
- Long-chain acyl dehydrogenase deficiency (LCADD)
- Short-chain acyl dehydrogenase deficiency (SCADD)

Adverse Reactions

There are no known incremental adverse reactions for the use of KetoVie Peptide 4:1 as a part of a ketogenic diet. Ketogenic diets have been associated with certain adverse reactions. These can include metabolic abnormalities, gastrointestinal distress (vomiting, constipation, diarrhea, abdominal discomfort,) secondary carnitine deficiency, hypercholesterolemia, renal calculi, delayed linear growth in children and increased risk of bone fractures.^{3,29,30,31,32,33} Close medical supervision is required.

Drug Interactions

KetoVie Peptide 4:1 when prescribed as supplemental or sole source nutrition may impact how some drugs are metabolized. All medications should be discussed with a physician or pharmacist. Medical supervision by a physician is required.

Toxicity

None known.

SPECIAL POPULATIONS

KetoVie Peptide 4:1 is indicated for patients 12 months and older requiring a ketogenic diet. Always check with physician for proper dosage recommendations.

DOSAGE AND ADMINISTRATION

Use as directed by physician. Must be administered under medical supervision only. Ready to use. Shake well. Store in a cool, dry place. Refrigerate after opening and store refrigerated up to 24 hours. Once opened, product should be kept for no longer than 4 hours at room temperature. Do not freeze.

HOW SUPPLIED

KetoVie Peptide 4:1 is supplied in a single dose, 8.5 fl oz (250 mL) cartons, 30 cartons per case. Keep in a cool, dry place until ready to use. Reimbursement Code: 24359-0503-03.

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