

## Abstract

Patients with an epilepsy diagnosis who do not respond to current medical treatment often respond to Precision Ketogenic Therapy (PKT) which lowers the carbohydrate in the diet. For many of these patients, nutrition must be administered via a feeding tube. PKT recipes that are provided to families can use regular food blended to flow through the tube. Alternatively, commercial feeding products designed for low carbohydrate diets reduce the family's time needed to prepare the recipe and are available by prescription through durable medical equipment organizations (DME). During periods of product shortages, the DME may send the family a different brand, or the same brand with a slightly different name. To address the question of how using these substitute products affects the therapy being administered, we created a database of frequently used products. Our data documents that the macronutrient composition of the products is not the same and will be used to demonstrate to families and DMEs the variability introduced in the therapy when a specified PKT diet prescription is prepared with the different products. These data will be used to support the preparation of PKT recipes brand-specific for all ingredients.

## Introduction

The purpose of this research is to:

- demonstrate that macronutrients of enteral formulas differ
- highlight differences in powdered and liquid enteral formulas
- demonstrate that the ketogenic ratio using net carbohydrates differs from the ketogenic ratio using total carbohydrates
- illustrate the effect of families receiving and using different keto formulas to prepare recipes
- confirm that the PKT recipe must be prepared using brand-specific products

## Methods

Brand specific nutrition facts data from grocery stores and medical food companies were used to prepare a database. An example recipe was prepared by the PKT program and ratios calculated using the same grocery store products but different medical food products. The advertised keto ratios from medical food products using net carbohydrates were compared to the PKT ratios calculated using total carbohydrates.

Amount in 100 grams of Commercially Available Enteral Formulas

Product Name	Calories	Grams of Total Protein	Grams of Total Fat	Grams of Total Carbohydrate
• KETOCAL® 4:1 POWDER EPILEPSY	703	14.40	69.20	5.65
• Vitaflo K.Flo	150	3.40	14.72	0.98
• KETOCAL 4:1 LQ Chocolate	153	3.09	15.02	1.77
• KETOCAL® 4:1 Unflavored	150	3.09	14.81	1.73
• KETOCAL® 4:1 Vanilla	150	3.09	14.81	1.73
• KETOCAL® 4:1 POWDER	705	14.40	69.20	8.20
• KETOCAL 3:1 powder unflavored	711	15.40	68.60	8.00
• KETOVIE 4:1 Peptide	152	3.24	14.64	1.82
• KETOVIE 3:1 Unflavored	104	2.80	10.00	0.92
• KETOVIE 4:1 VANILLA	148	3.40	14.24	1.92
• KETOVIE 4:1 Plant-Based Protein Vanilla	150	3.28	14.24	2.18
• KETOVIE 4:1 Unflavored	150	3.44	14.48	2.12
• KETOVIE 4:1 Chocolate	160	3.40	15.32	2.56
• KETOCAL 2.5:1 LQ vanilla	153	4.51	14.30	2.19
• Functional Formularies Ketogenic	269	7.93	24.67	6.61
• Kate Farms Standard 1.4 Chocolate	140	6.15	5.85	15.69
• Kate Farms Standard 1.4 Plain	140	6.15	5.85	15.69
• Kate Farms Standard 1.4 Vanilla	140	6.15	5.85	15.69
• Kate Farms Standard 1.0 Chocolate	100	4.92	3.69	11.77
• Kate Farms Standard 1.0 Plain	100	4.92	3.69	11.77
• Kate Farms Standard 1.0 Vanilla	100	4.92	3.69	11.77

\*Pink highlighted sections represent powder enteral formulas

PKT Ratio of Enteral Formulas

Product Name	Advertised	Calculated
• KETOCAL® 4:1 POWDER EPILEPSY	4:1	3.45:1
• Vitaflo K.Flo	4:1	3.36:1
• KETOCAL 4:1 LQ Chocolate	4:1	3.09:1
• KETOCAL® 4:1 Unflavored	4:1	3.07:1
• KETOCAL® 4:1 Vanilla	4:1	3.07:1
• KETOCAL® 4:1 POWDER	4:1	3.06:1
• KETOCAL 3:1 powder unflavored	3:1	2.93:1
• KETOVIE 4:1 Peptide	4:1	2.89:1
• KETOVIE 3:1 Unflavored	3:1	2.69:1
• KETOVIE 4:1 VANILLA	4:1	2.68:1
• KETOVIE 4:1 Plant-Based Protein Vanilla	4:1	2.61:1
• KETOVIE 4:1 Unflavored	4:1	2.60:1
• KETOVIE 4:1 Chocolate	4:1	2.57:1
• KETOCAL 2.5:1 LQ vanilla	2.5:1	2.13:1
• Functional Formularies Ketogenic	2.43:1	1.70:1
• Kate Farms Standard 1.4 Chocolate	NA	0.27:1
• Kate Farms Standard 1.4 Plain	NA	0.27:1
• Kate Farms Standard 1.4 Vanilla	NA	0.27:1
• Kate Farms Standard 1.0 Chocolate	NA	0.22:1
• Kate Farms Standard 1.0 Plain	NA	0.22:1
• Kate Farms Standard 1.0 Vanilla	NA	0.22:1

\*PKT ratio = fat (grams) to carbohydrates (grams) plus protein (grams)

## Different Formula = Different Ratios

### Recipe From Clinic

- 204.3 g – Keto Formula
- 14.8 g - Olive Oil
- 33.3g – Applesauce

**PKT Ratio = 2.5:1**

### Recipe with Formula #1

- 204.3 g – Vitaflo K.Flo
- 14.8 g - Publix Extra Virgin Olive Oil
- 33.3g – Great Value Unsweetened Apple Sauce

**PKT Ratio = 3.6:1**

### Recipe with Formula #2

- 204.3 g – KETOCAL® 4:1 Vanilla
- 14.8 g - Publix Extra Virgin Olive Oil
- 33.3g – Great Value Unsweetened Apple Sauce

**PKT Ratio = 3.2:1**

### Recipe with Formula #3

- 204.3 g – KETOVIE 4:1 VANILLA
- 14.8 g - Publix Extra Virgin Olive Oil
- 33.3g – Great Value Unsweetened Apple Sauce

**PKT Ratio = 3:1**

### Recipe with Formula #4

- 204.3 g – Functional Formularies Ketogenic
- 14.8 g - Publix Extra Virgin Olive Oil
- 33.3g – Great Value Unsweetened Apple Sauce

**PKT Ratio = 1.9:1**

### Recipe with Formula #5

- 204.3 g – Kate Farms Standard 1.4 Vanilla
- 14.8 g - Publix Extra Virgin Olive Oil
- 33.3g – Great Value Unsweetened Apple Sauce

**PKT Ratio = 0.5:1**

## Conclusions

- Keto formulas with an advertised 4:1 ratio using net carbohydrates ranged from a 3.45:1 to a 2.57:1 PKT ratio using total carbohydrates.
- PKT recipes using the same olive oil and apple sauce but differing enteral formulas had a PKT ratio of 0.5:1 to 3.6:1.

## Future Directions

- PKT ratio calculation should be extended to include individual constituents of macronutrients.