

Round Table Discussion: Ketogenic Diet Therapies - Thinking Beyond Intractable Epilepsy

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Objectives:

1. Obtain awareness of other medical conditions/diagnoses that ketogenic diet therapies are being studied or used to treat or manage symptoms.
2. Understand the basic principles behind why ketogenic diet therapies may be beneficial in the treatment of brain tumors.

Key Points/Lessons to be learned

- It is important to note ketogenic diets require medical supervision including a ketogenic dietitian to administer and manage any of these diet therapies safely.
- We know that the ketogenic diet and other ketone producing diets are being used with success to treat intractable epilepsy but there are several other medical conditions in which current research suggests that the diet may be beneficial for including:
 - Brain tumors/ cancer
 - Autism
 - Parkinson's disease
 - Mitochondrial disorders
 - Alzheimer's (animal models)
 - Traumatic brain injuries Lou Gehrig's disease (ALS) (animal models/current UCLA study)
 - Obesity/diabetes/diabetic nephropathy (animal models)
- Autism
 - Currently several trials recruiting – one using LGIT.
 - Interesting case study published in 2013 in the Journal of Child Neurology 28(8) 975-982 looks at a 12y/o girl on a gluten free/casein free 1.5:1 KD with MCT oil. After 14 months on the diet her Childhood Autism Rating Scale score decreased from 49 to 17 representing a change in diagnosis to non-autistic.
- Parkinson's disease
 - Pilot trial published in Neurology (2005 Feb 22;64(4):728-30) showed 5 of 7 patients followed a ketogenic diet for 28 days and all 5 reported that their symptoms improved.
- Brain Tumors and Ketogenic Diets (Case Study: Nutrition and Metabolism 2010 Apr22;7:33)
 - Glioblastoma multiforme: very poor prognosis – most patients do not live longer than 1 year. Standard treatment is chemo (temodar) and radiation.
 - Research suggests keto diet administered concurrently with the standard treatment can weaken the tumor helping the standard treatment work more effectively.
 - **The Warburg Effect:** In 1923 Otto Warburg discovered that cancer cells prefer glucose.
 - The brain uses glucose as its primary source of fuel, however in periods where glucose is not available; the brain can switch to using ketones as its fuel source. Nearly all **healthy** cells in the body can use ketones as a fuel source when glucose is not available. However, cancer cells are thought to not be able to transition from glucose to ketone metabolism.
 - Think about practicality long term! Protocols seen in the research suggests significant kcal restriction and high diet ratios. At UCLA we do not restrict calories unless the patient is overweight/obese and we continue to meet minimum protein needs of 0.8-1.0gm/kg which limits how high a ratio we are able to achieve (generally MAD, 1:1 or 2:1).

Very Brief Case Study “Jessie”

45 y/o female with glioblastoma multiform of the brain, seizures 2/2 tumor, fatty liver. Referred to diet therapy clinic week 2 of standard chemo/RT treatment and wanted to start KD immediately. Diet education was provided that week and pt was started on KD 1.75:1 1150kcal, 101.9gm fat, 45.8gm protein and 12.4gm CHO. Pt was instructed to start day 1 - one keto meal, then day 2 two keto meals, and day 3 all three keto meals. MCT oil 1 teaspoon TID was started one week after starting the diet.

Pre-diet anthropometrics: 159.9cm, 75kg, BMI 29.3, IBW 52.3, 143%IBW, ABW 58kg

Some concerns to think about:

- Excessive weight loss/poor appetite and intakes
- Fatty liver
- Dyslipidemia
- Ability to maintain ketosis
- Quality of life/desire to maintain diet therapy

	9/25/14	11/3/14	12/11/14	2/12/15	5/7/15	10/1/15	1/14/16
Weight (kg)	75	68.5	65.5	62.1	57.2	54.9	55.5
BMI	29.3	27.8	26.6	25.1	23.1	22.2	22.4

	Pre-Diet 9/25/14	Most recent 1/6/16
Total Cholesterol	206	193
Triglycerides	128	47
HDL	64	106
LDL	116	78
AST	52	18
ALT	103	19
BHB	0.4	1.52

Update: “Jessie” has been on the diet with very good compliance since 10/2014, her MRI’s continue to be stable and she has been off of chemo since 11/2015. She is currently at a 2:1 diet ratio for 3 meals and has two 100kcal 4:1 snacks (Daily: 1625kcal, 150gm fat (83%), 54gm protein (13%), 15gm carbs (4%). She also receives 15gm MCT oil TID. She has been maintaining her weight at ~56kg. Her BHB fluctuates between 1.5 and 2.3. While she finds the diet difficult at times she feels it is helping her and she wishes to continue with it.

Helpful resources for further information:

<http://www.charlifoundation.org>

<https://clinicaltrials.gov/ct2/results?term=ketogenic+diet>

<https://youtube.com/watch?v=gzckPigO7RQ>