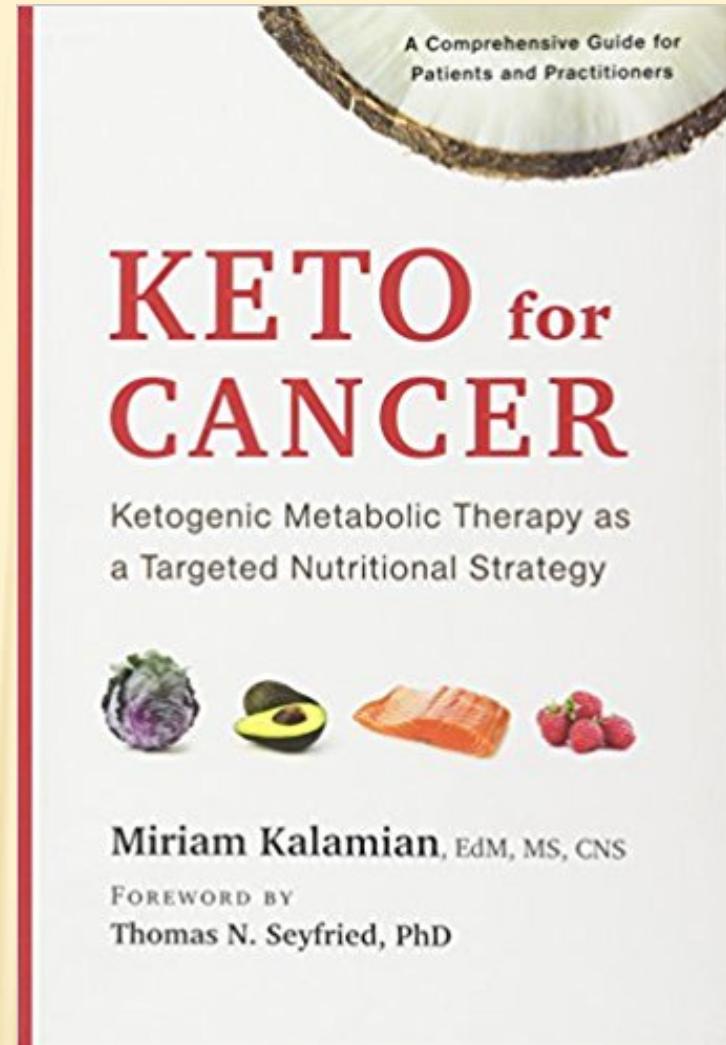


Book Club led by Angela Taylor
Integrative Nutrition Health Coach
Masters Student in Clinical Nutrition, MUIH

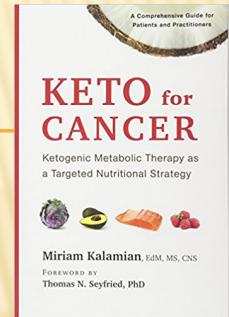


KETO FOR CANCER

WRITTEN BY MIRIAM KALAMIAN

WHAT INSPIRED KALAMIAN TO WRITE

- ✖ Kalamian's son, Raffi (aged 4), was diagnosed with a brain tumor in 2004. After three surgeries and several failed chemo/drug protocols, it was clear that the tumor was winning.

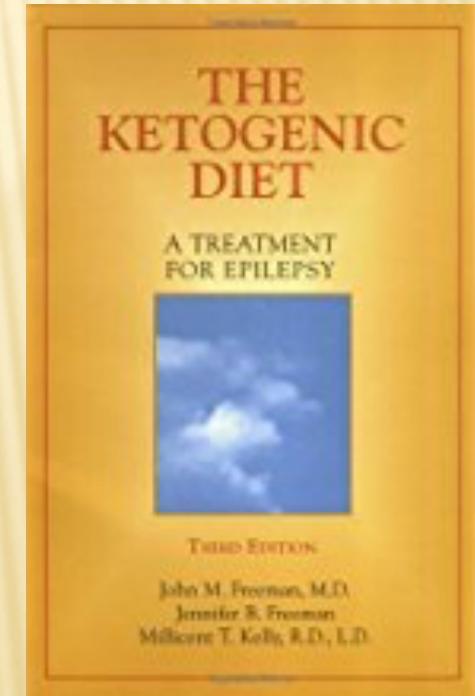


KETO WORKS FOR BRAIN TUMORS

- ✖ In 2007, Kalamian learned of Dr. Thomas Seyfried's research at Boston College. Seyfried & colleagues had just published a study demonstrating that a calorically restricted ketogenic diet could slow progression of brain tumors in mice by limiting the amount of glucose available for tumor growth [Zhou W. et al., 2007].
- ✖ Seyfried referenced an earlier case study involving 2 pediatric brain tumor patients placed on a ketogenic diet for 8 weeks. FDG-PET imaging showed the keto diet reduced glucose uptake at the tumor site by >21% [Nebeling et al., 1995].

KETO IS SAFE FOR [EPILEPTIC] CHILDREN

- ✖ Kalamian learned Johns Hopkins Hospital (and other hospitals) had a long history of safely implementing the keto diet in children with intractable epilepsy [Freeman, Kassoff, & Hartman, 2007]. Dr. Freeman had even written a book on the Ketogenic diet, which served as Kalamian's manual for this “off-label” use of keto for cancer.



RAFFI LIVED FOR 9 YEARS AFTER DIAGNOSIS (5 YEARS AFTER GOING KETO)

- With the support of his pediatrician and oncologist, Raffi began the ketogenic diet concurrent with a low-dose chemotherapy drug. (NB: Since Raffi's team was not comfortable with "diet alone", we agreed to the least toxic option open to us - a short course of a chemo drug which he had already taken without success in the previous year.)
- Amazingly, *Raffi's tumor shrank by 15% in the first 3 months!* This novel approach to cancer management succeeded where conventional therapies had failed. Eventually, his team suggested that we stop the chemo. Raffi continued with the ketogenic diet as his sole therapy for 3 more years. During that time, MRI's and clinical signs both suggested that the tumor was essentially stable. Even though the diet could not cure our son of his disease, we were thrilled to see him regain some lost ground!

Raffi's life ended on April 17, 2013 at the age of 13. Ultimately, he died of complications from a large inoperable cyst that impinged on his brainstem.

Most standard-of-care brain cancer patients die within 2 years

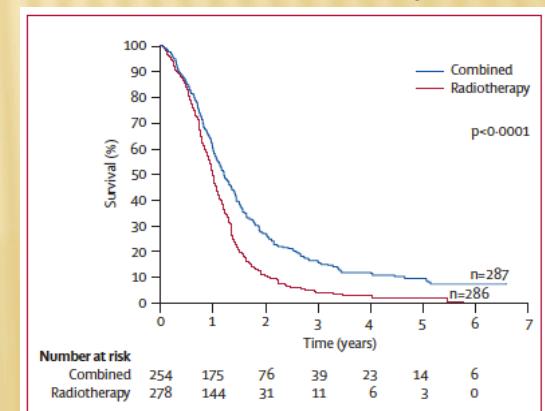
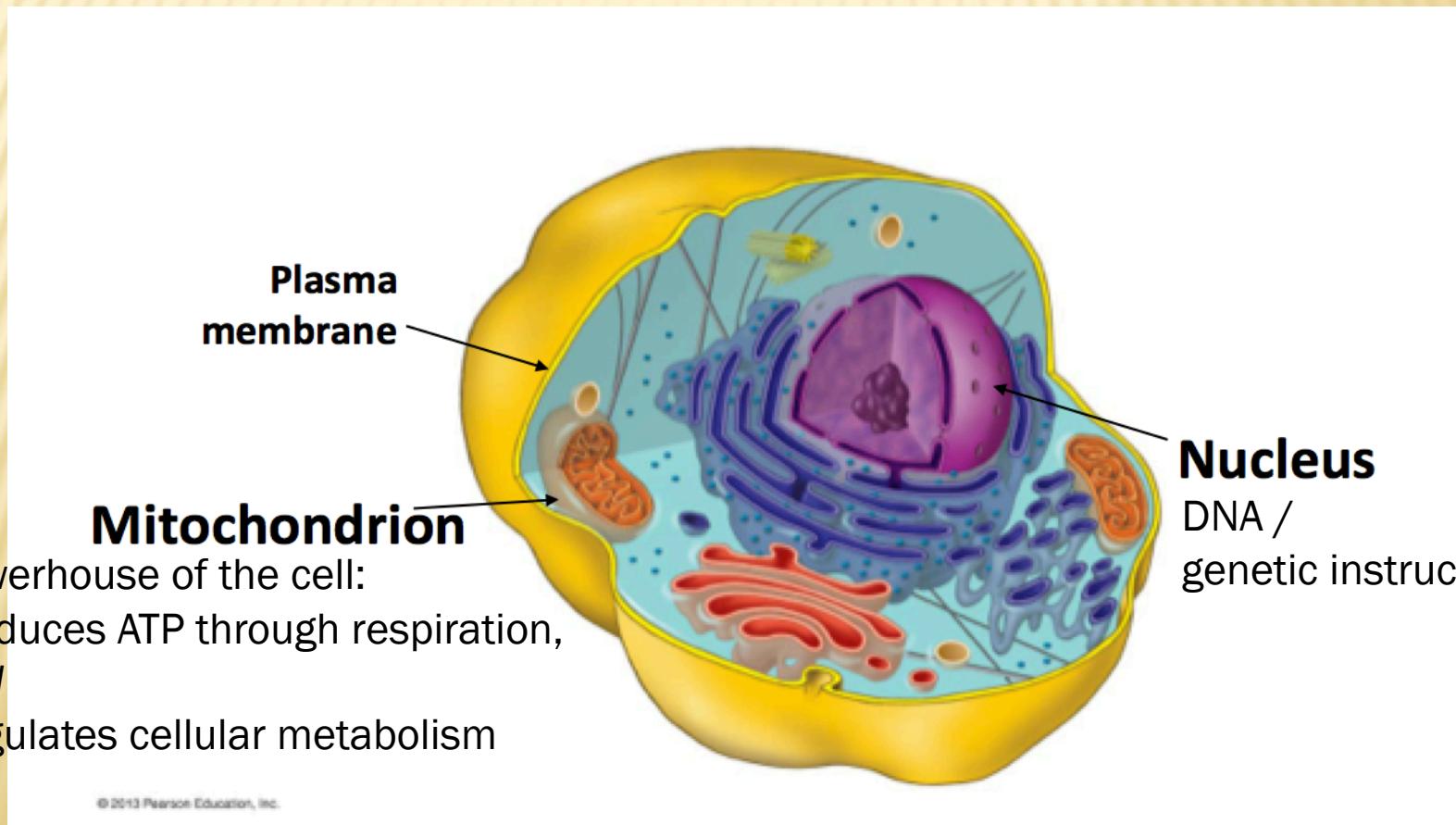


Figure 2: Kaplan-Meier estimates of overall survival by treatment group

CONFICTING VIEWS ON THE ORIGIN OF CANCER

Is cancer a [nucleus/DNA] genetic disease? or
Is cancer a mitochondrial metabolic disease?



WARBURG THEORY OF CANCER



On the Origin of Cancer Cells

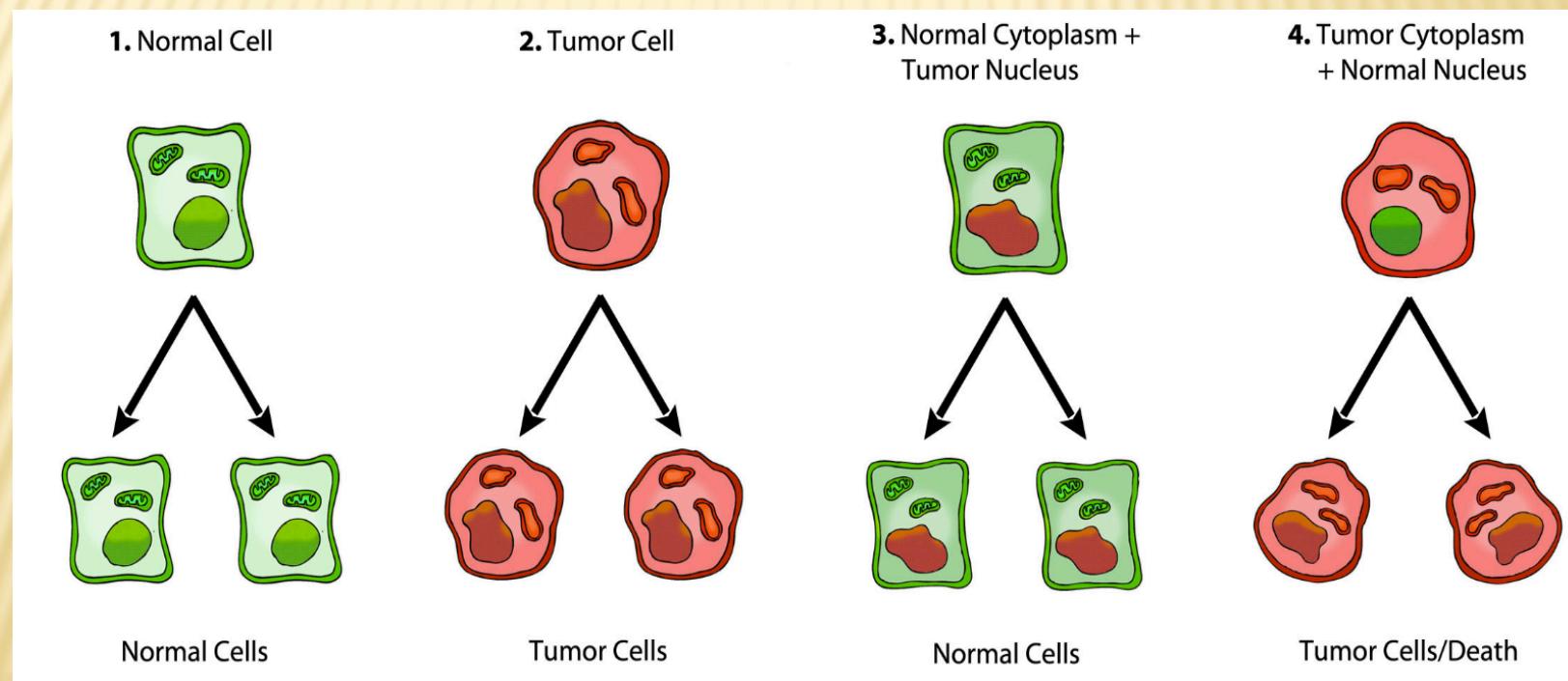
Otto Warburg (Science, 24 February, 1956)

- ✖ 1. Cancer arises from damage to cellular respiration.
- ✖ 2. Energy through fermentation gradually compensates for insufficient respiration.
- ✖ 3. Cancer cells continue to ferment lactate in the presence of oxygen (Warburg effect).
- ✖ 4. Enhanced fermentation is the signature metabolic malady of all cancer cells.

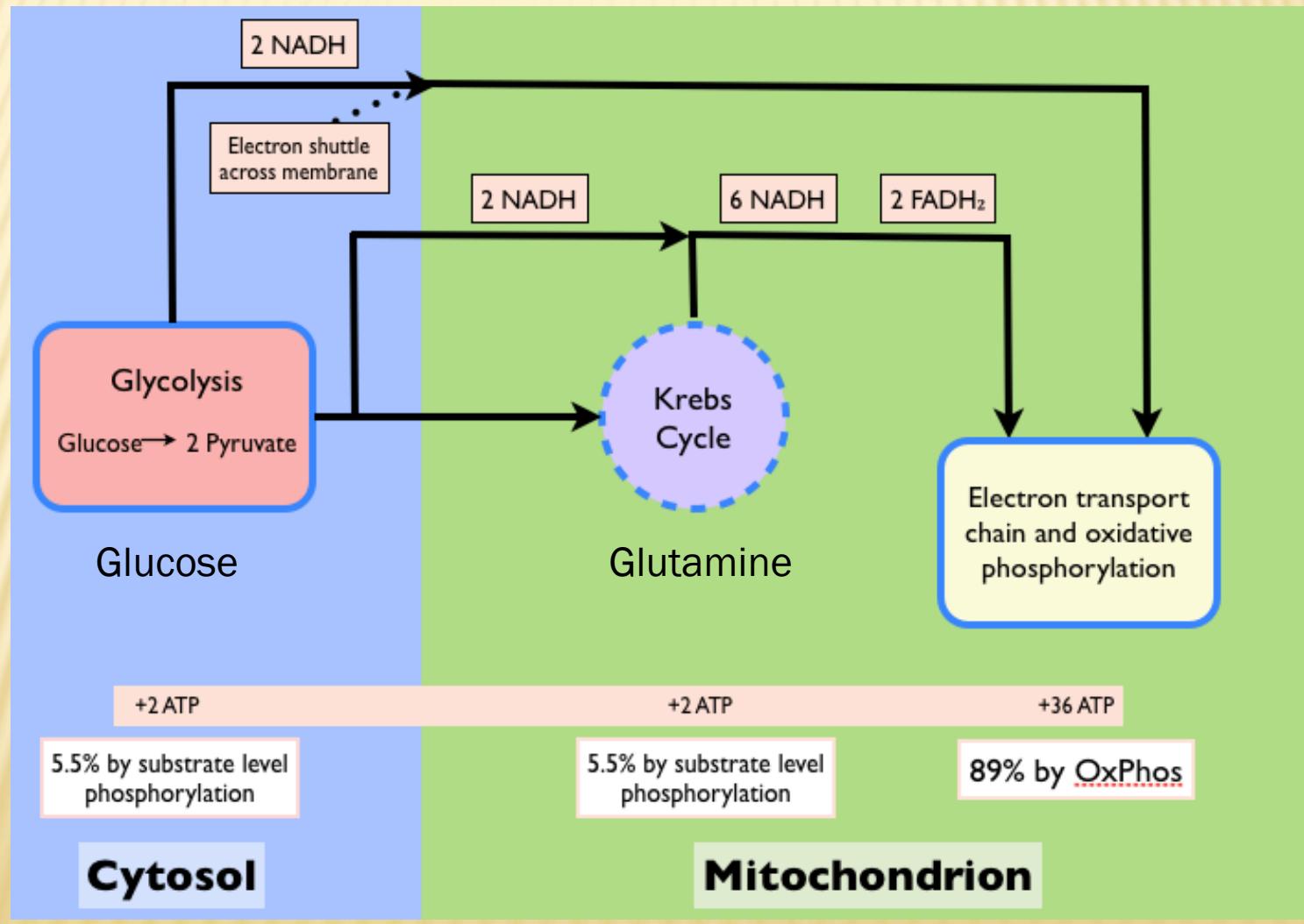
BAD MITOCHONDRIA = CANCER

✗ Bad Nucleus [Genetics/DNA] ≠ Cancer

✗ [Seyfried, 2012] [Seyfried et al., 2014]

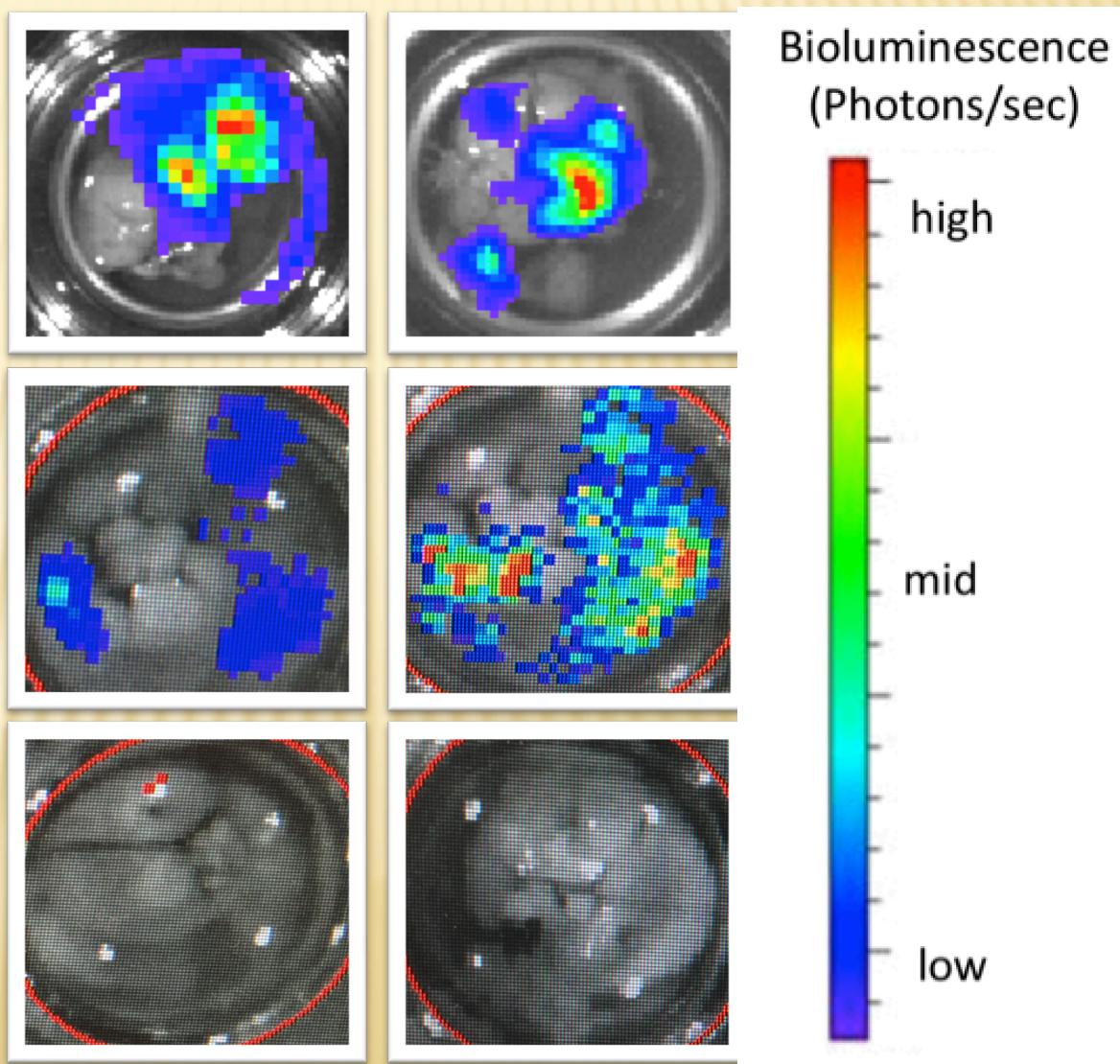


GLUCOSE AND GLUTAMINE FEED CANCEROUS MITOCHONDRIA



TARGETING GLUCOSE & GLUTAMINE USING KETO & 6-DIAZO-5-OXO-L-NORLEUCINE (DON)

- ✖ Standard Diet (SD)



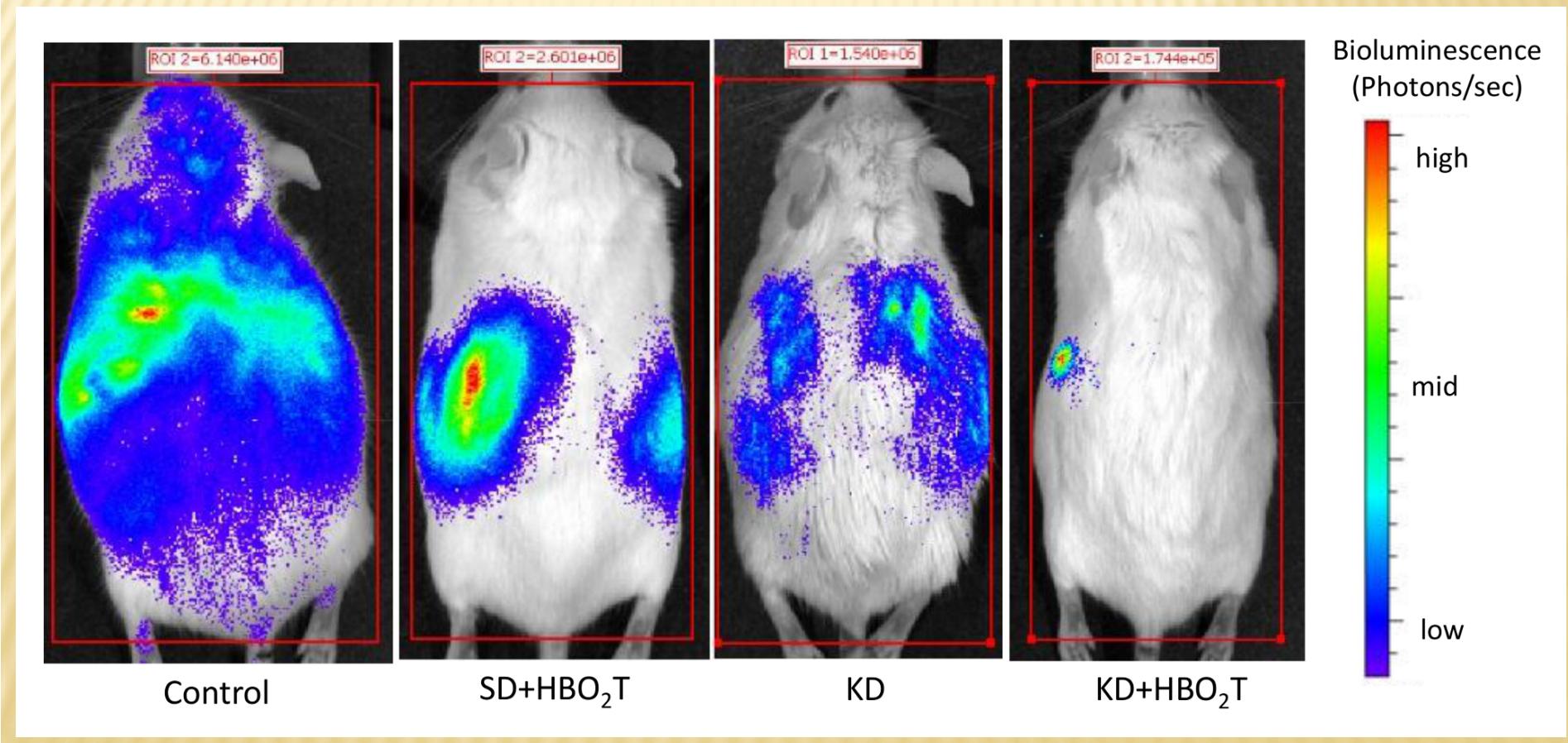
- ✖ Ketogenic Diet (KD-R)

- ✖ Ketogenic + DON (1.0mg/kg)

✖ [Mukherjee & Seyfried unpublished]

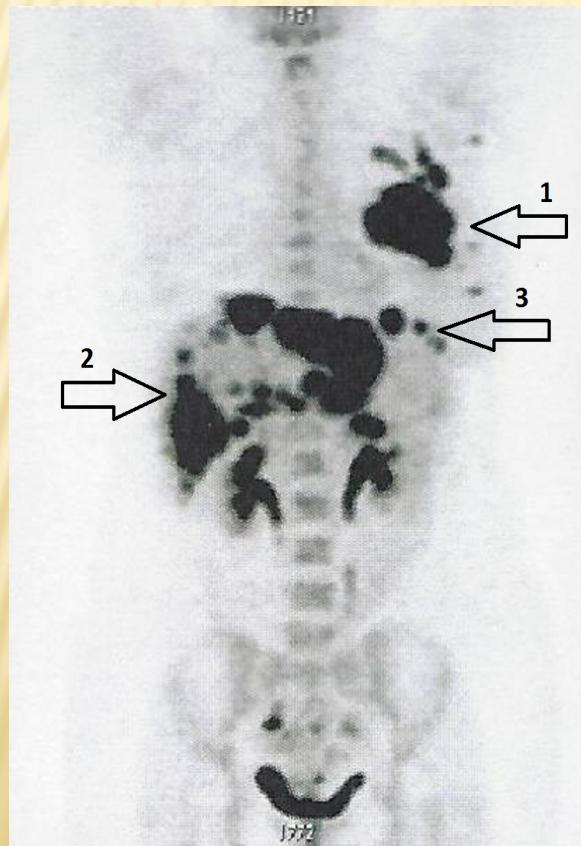
KETO DIET + HYPERBARIC OXYGEN THERAPY

- ✖ Labeled tumor cells implanted subcutaneously in flank
- ✖ [Poff, Ari, Seyfried, D'Agostino, 2013]

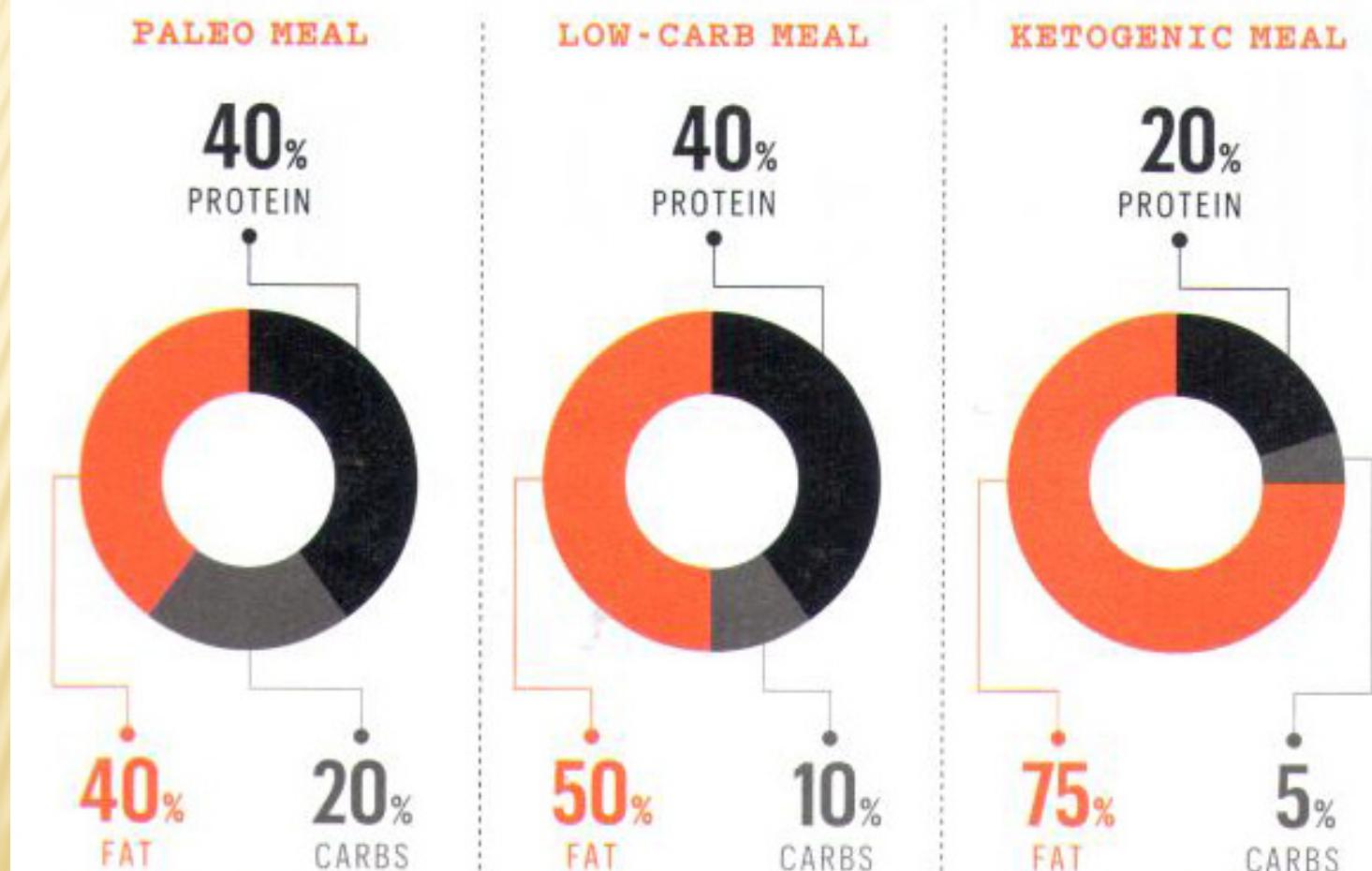


Efficacy of Metabolically Supported Chemotherapy Combined with Ketogenic Diet, Hyperthermia, and Hyperbaric Oxygen Therapy for Stage IV Triple-Negative Breast Cancer

Mehmet Salih İyikesici ¹, Abdul Kadir Slocum ², Ayshe Slocum ², Ferhan Bulent Berkarda ²,
Miriam Kalamian ³, Thomas N. Seyfried ⁴



HOW THE KETOGENIC DIET STACKS UP



Source: Men's Health, September 2017

GLYCEMIC INDEX

- ❖ Ranks foods on a scale from 1 to 100 based on their effect on blood-sugar levels



< 55

Yam = 37
Cherries = 22
Cashews = 22
Peanuts = 13
Broccoli = 10
Hummus = 6

Between 55-70

Whole Wheat Bread = 69
Special K = 69
Kraft Macaroni and Cheese = 64
Coca-Cola = 63
Raisin Bran = 61
Banana = 55

Over 70

Fruit Roll Ups = 99
Gatorade = 89
Baked Potato = 85
Cornflakes = 81
Jelly Beans = 80
Bagel = 72
White Rice = 72

WHAT CAN I EAT?

- ✖ Non-starchy vegetables and greens
- ✖ Limited high-carb vegetables
- ✖ Berries and low-sugar fruits
- ✖ Avocados, olives, and cacao
- ✖ Proteins
- ✖ High fat dairy products (but, there is the casein conundrum)
- ✖ Nuts and seeds
- ✖ Fats and oils (MCT Oil is especially easy for the body to utilize)
- ✖ Stevia
- ✖ Salt & Spices
- ✖ Baking powder & baking soda
- ✖ Beverages include water & tea (be aware that coffee can spike blood glucose, so be careful...)



NET CARBS

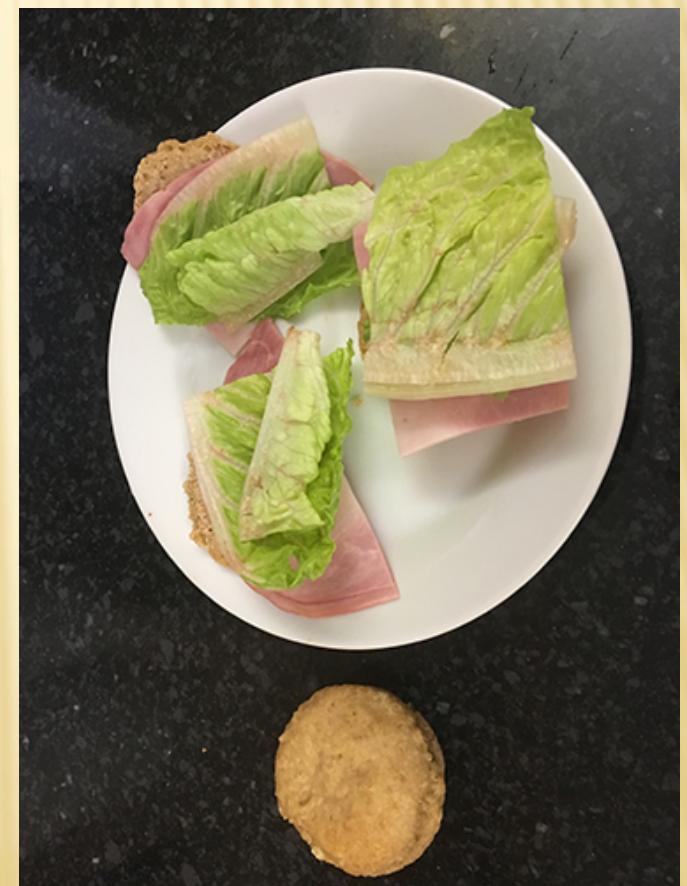
- Cancer patients should lower net carb intake to 12-20 net carbs/day



- $16 \text{ grams carbs} - 1 \text{ gram dietary fiber} = 15 \text{ grams net carbs}$

NET CARBS

This mix makes 12 dinner rolls. 1 roll can be sliced into 3 slices:



12 grams carbs - 2 gram dietary fiber = 10 grams net carbs

PROTEIN

- Because excess protein can convert into glucose, limit protein to: 0.8 g/kg of Ideal Body Weight (IBW)

(Weight in kg) X 0.8 = grams of protein daily

Ex: 125 lbs -> 45 g protein

165 lbs -> 60 g protein

Ground beef, 3 oz = 21 g protein

Egg = 6 g protein

Salmon, 3 oz = 21 g protein

Almonds, 1 oz = 6 g protein

Protein Food and Serving Size	Calories	Net Carbs	Protein grams
Bacon, 1 medium slice, (6 grams) cooked	40		2
Beef, Sirloin Steak, 1 ounce, broiled	77		8
Beef, Ground, 4% fat, 1 ounce, broiled	34		7.5
Beef, Ground, 15% fat, 1 ounce, broiled	80		6.1
Beef, Roast, 1 ounce, baked	67		8
Chicken, white meat, 1 ounce	33		7
Chicken, dark meat, 1 ounce	40		7
Egg, 1 small, 38 g	65	.27	4.7
Egg, 1 medium, 44 g	70	.32	5.5
Egg, 1 large, 50 g	75	.36	6.3
Egg, 1 extra-large, 56 g	81	.4	7
Egg, 1 jumbo, 63 g	90	.45	7.9
Fish, Cod, 1 ounce	30		6.5
Fish, Flounder, 1 ounce	27		5
Fish, Sole, 1 ounce	27		5
Fish, Salmon, 1 ounce	60		7
Ham, smoked, 1 ounce	40	1	5.3
Hot dog, beef, 1.25 ounce	148	1.8	5
Lamb, ground, 1 ounce	80		4.7
Lamb chop, 1 ounce	70		7
Nuts, Almonds, roasted, 1 ounce	170	3.6	6.2
Nuts, Cashews, roasted, 1 ounce	165	9.1	4.3
Nuts, Macadamia, roasted, 1 ounce	205	1.2	2.2
Nuts, Pecans, 1 ounce, raw	192	2.3	2.6
Nuts, Pistachios, 1 ounce, roasted	170	4	5.3
Nuts, Walnuts, 1 ounce	175	4	2
Pork, chop, 1 ounce	60		7
Pork, roast 1 ounce	60		7

<https://www.ketogenic-diet-resource.com/protein-chart.html>

FAT

- After meeting these macros:

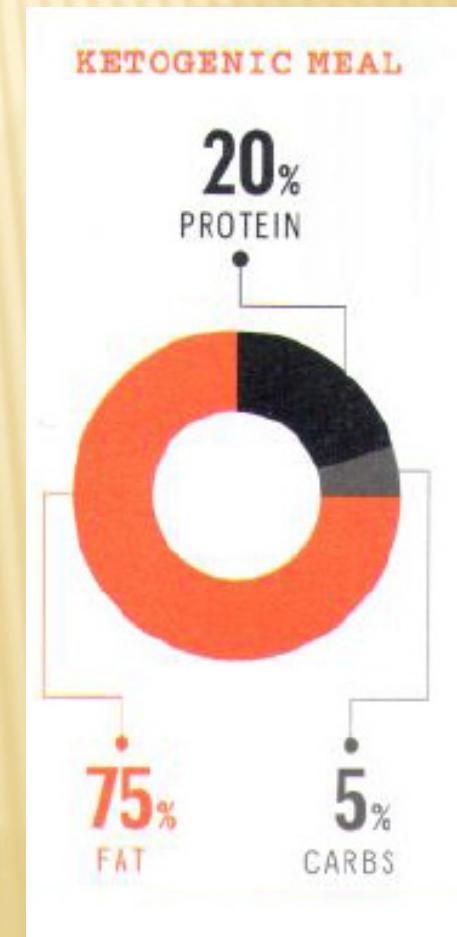
12-20 g net carbs

45-60 g protein (approx)

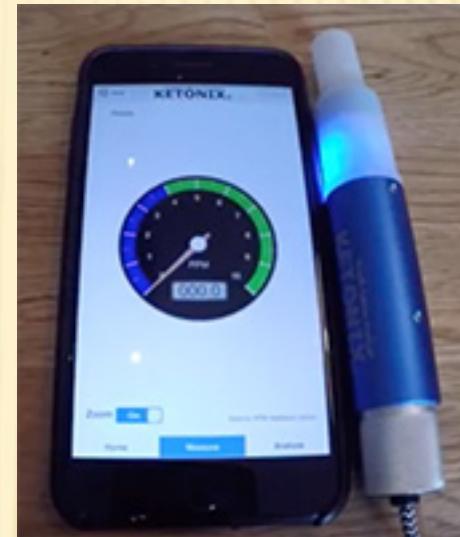
The remainder of your daily calories will come from fat.

For a grand total of 1,200-1,500 calories (women)

1,600-2,000 calories (men)



HOW WILL I KNOW IF I'M IN KETOSIS?



- ✖ Best Way: Blood Meter (i.e. Keto Mojo)
- ✖ Urine test strips
- ✖ Ketonix Breathalyzer + App
- ✖ Eventually you'll be able to “feel” ketosis

GKI = GLUCOSE : KETONE INDEX

- ✖ Aim for therapeutic range between 2:1 – 1:1
- ✖ To calculate GKI: convert the blood glucose reading from mg/dL to mmol/L by dividing by 18

GKI Example:



Glucose = 89 mg/dL Ketones = 3.4 mmol/L

$$\frac{\text{Glucose} / 18}{\text{Ketone}} = \frac{89 / 18}{3.4} = 1.45 \text{ GKI}$$

- ✖ GKI < 2 Strong level of ketosis. Used for cancer (and epilepsy).
- ✖ GKI 3-6 Moderate ketosis. Insulin resistance, obesity, type II diabetes.
- ✖ GKI 6-9 Low ketosis, appropriate for weight loss.

TRACK YOUR FOOD INTAKE

✗ Cron-O-Meter

The screenshot shows the Cron-O-Meter website interface. At the top, there's a navigation bar with tabs: DIARY (which is active), TRENDS, FOODS, PROFILE, PRO, and HELP. Below the navigation is a date selector showing "January 17, 2018". To the right of the date are buttons for ADD FOOD, ADD EXERCISE, ADD BIOMETRIC, and ADD NOTE, along with a settings icon.

The main content area displays a food diary for January 17, 2018. The diary lists various food items with their descriptions, amounts, units, and calorie counts. A photo of a woman, Angela Taylor Health Coaching, is displayed below the calendar.

Description	Amount	Unit	Calories
calisthenics (e.g., situps, abdominal crunches), light effort	12 minutes		-19.63
Cucumber, Raw, With Peel	30 g		4.5
Carrots, Raw	25 g		10.25
Red Wine Vinaigrette	10 g		45.06
Crustless Quiche, Sausage Quinoa Mozzarella & Asiago	200 g		340
Pear, Raw	1 medium - 2 1/2" diameter		101.46
Simple Mills, Almond Flour Mix, Chocolate Muffin & Cake	1 × 2 brownies		110
Heavy Whipping Cream	1 tbsp		51
Lettuce, Romaine or Cos	2 cup, chopped		15.98
Avocado, Black Skin, California Type	70 g		116.9
Red Wine Vinaigrette	3 tsp		67.6
Butternut Squash	20 g		8
Avocado Oil	3 g		26.52
Salmon, Atlantic, Wild, Cooked from Fresh or Frozen	2 oz		103.19
Beets, Raw	0.5 cup		60.76
Animal Fat, Bacon Grease	1.5 tsp		57.86
Simple Mills, Almond Flour Mix, Chocolate Muffin & Cake	1 × 2 brownies		110
Heavy Whipping Cream	1 tbsp		51
Spring Water	8 cup		0

Below the diary, there's a "Calories Summary" section with a circular icon for consumed calories (1280 kcal) and another for burned calories (1627 kcal). It also includes sections for Activity, Basal Metabolic Rate, Biomarkers (Energy, Protein, Glucose), and a Calorie Breakdown chart.

READY TO EXPERIMENT?

- ✖ How does one make the transition to a ketogenic approach?
- ✖ Re-teaching the body to burn ketones for fuel takes a bit of time.
 - Few days = those with strong metabolisms
 - Few weeks = those with insulin resistance
- ✖ For those who prefer a gradual approach to start your transition to keto:
 - ✖ In the morning when you wake, consume only water.
 - ✖ Workout while you are fasted.
 - ✖ Morning: when feel hungry mix up a powdered ketone drink (add MCT oil)



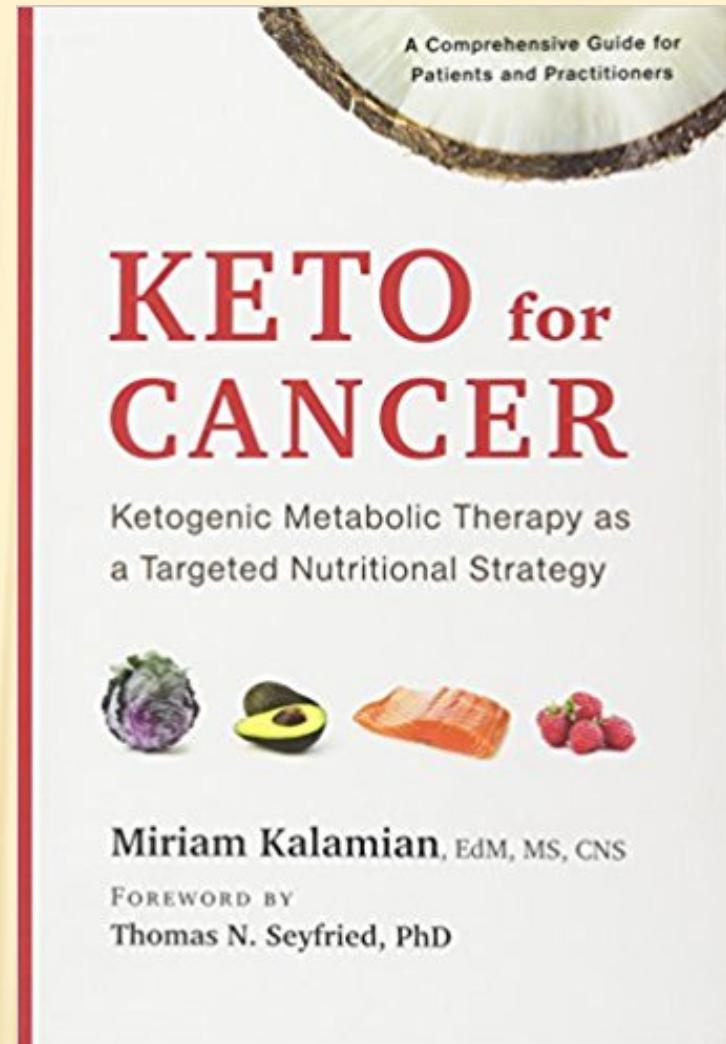
- ✖ Lunch / Dinner: Eat low-glycemic paleo meals with liberal healthy fats.
- ✖ To all meals: You may need to add a digestive enzyme capsule (containing lipase) to help with fat digestion

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For more information please refer to
Keto for Cancer and/or your physician



KETO FOR CANCER

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