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Food Principles:
Low and Ultra-Low Carb Diets

Atkins, South Beach, Zone, Paleo, and Ketogenic Diets

Dr. Ritamarie Loscalzo

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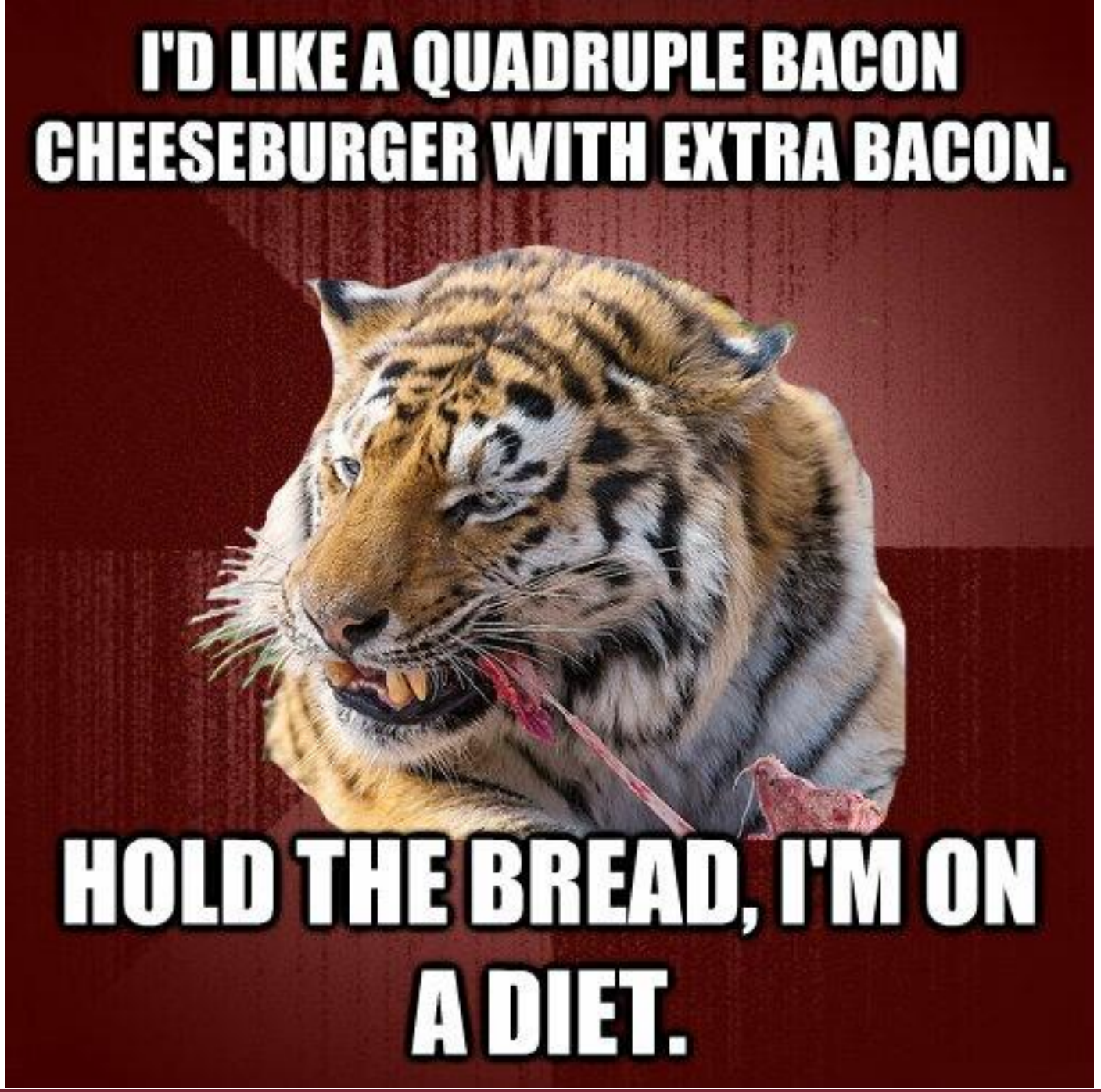

Low-Carb Diets/ Carb-Restrictive Diets

Low-Carb Diets can also be **Carb-Restrictive**

- Atkins
- Zone
- Ketogenic

Carb-Restrictive Diets are not always **Low-Carb**

- SCD
- GAPS
- FODMAPs
- Some Paleo

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- Autoimmune Paleo

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- SCD
- GAPS
- FODMAPs
- Paleo
- Primal, Hunter/Gatherer

Low-Carbohydrate Diets

- ✓ Restrict **"Net Carbs"** (total grams of carbs, minus total grams of fiber intake/day)
- ✓ Carbs restricted to a certain # of grams or a certain % of total calories
- ✓ Helpful in controlling blood sugar
- ✓ Can sometimes reduce inflammation and edema
- ✓ Help for yeast, fungal, and bacteria overgrowth
- ✓ **Some plans do not restrict the TYPES of carbs:**
  - ➢ Often uses a lot of processed foods
  - ➢ Excess meat, animal fats, and dairy
  - ➢ Use of sugar alcohols (FODMAPs - polyols)
  - ➢ May or may not include a "carb re-feed"/binge

4 Types of Carbohydrates

1. **Monosaccharides**

   Easily absorbed by the body

2. **Disaccharides**

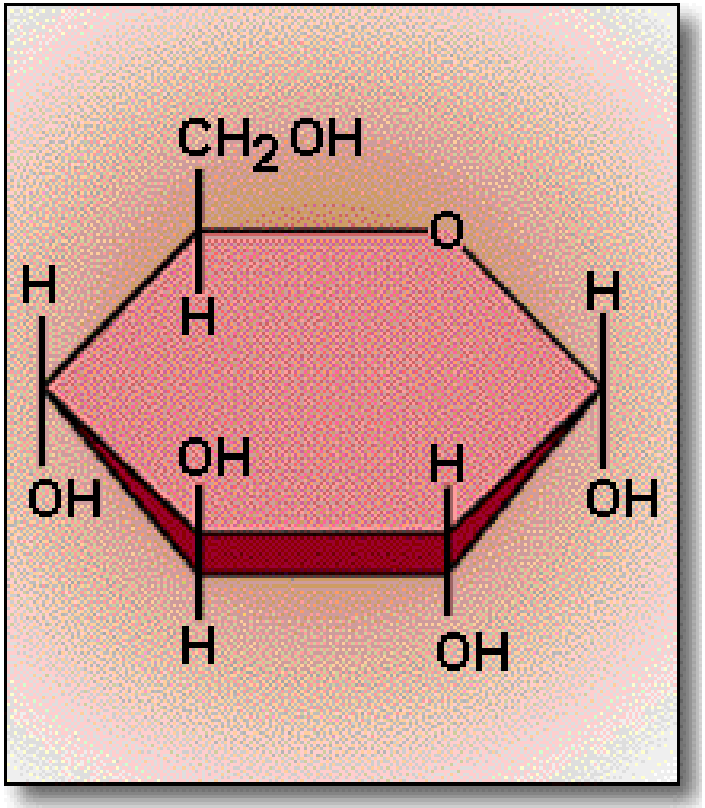
   Must be broken down into monosaccharides for absorption

3. **Oligosaccharides**

   Only partially digestible by humans; undigested portions can affect intestinal microflora, either positively or negatively

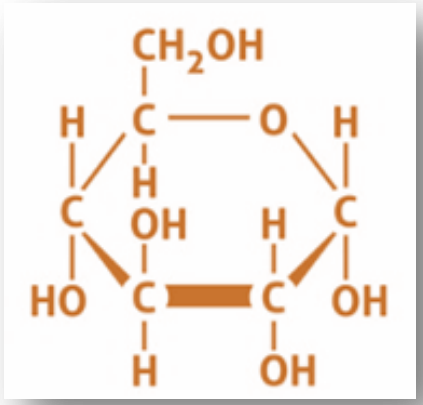
4. **Polysaccharides**

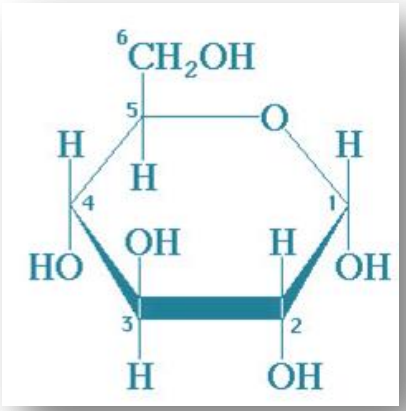
   Require specific enzymes for digestion and absorption



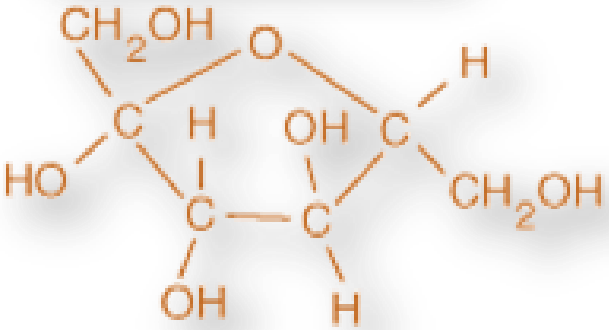
Monosaccharides

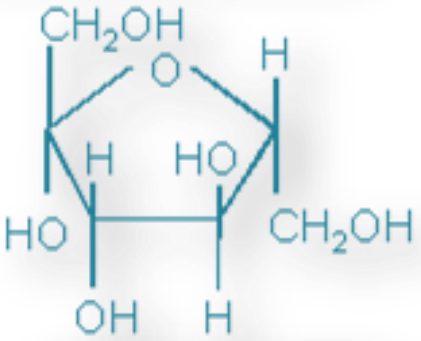
Glucose



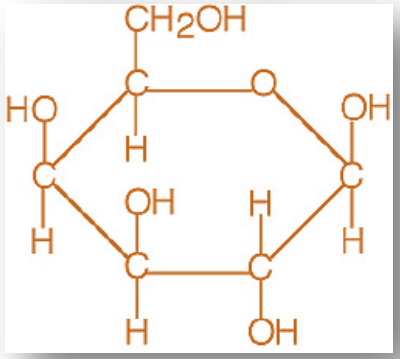


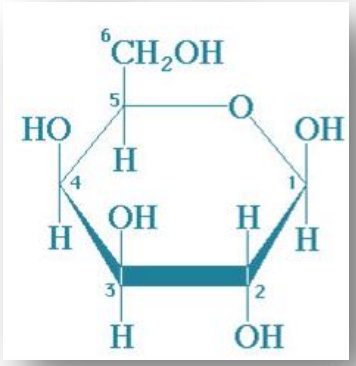
Fructose





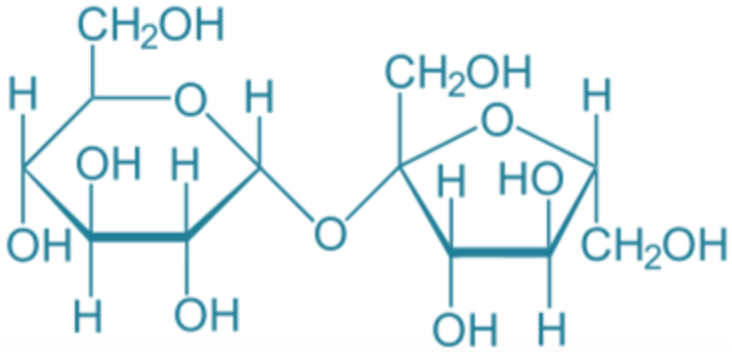
Galactose



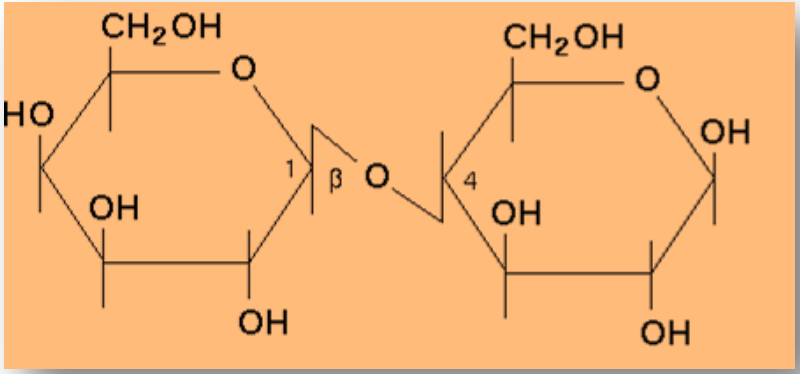


Disaccharides

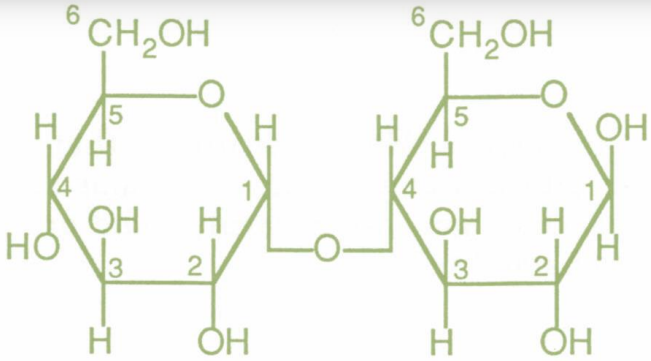
Sucrose



Lactose

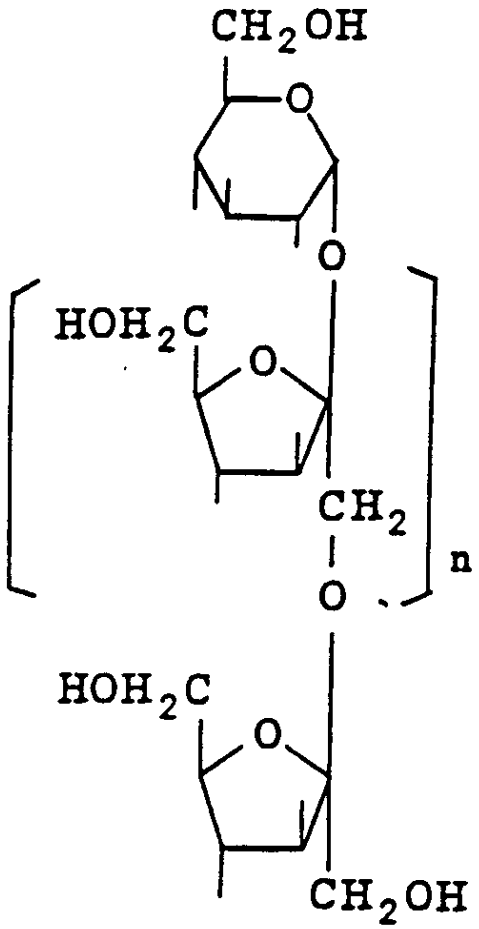


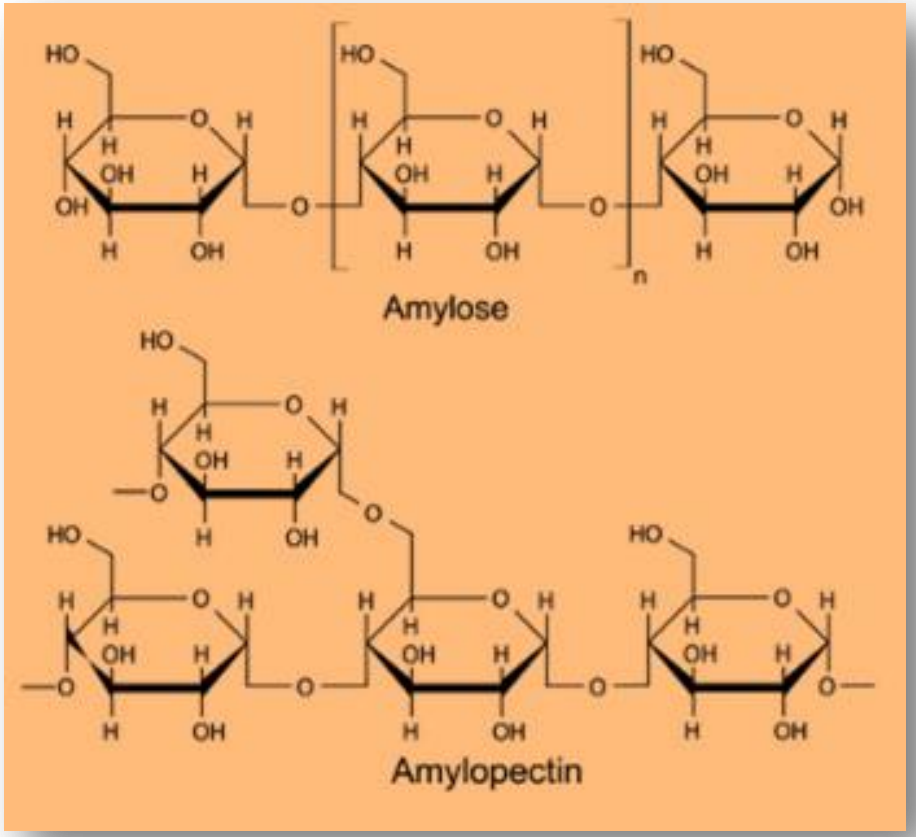
Maltose



Oligosaccharides

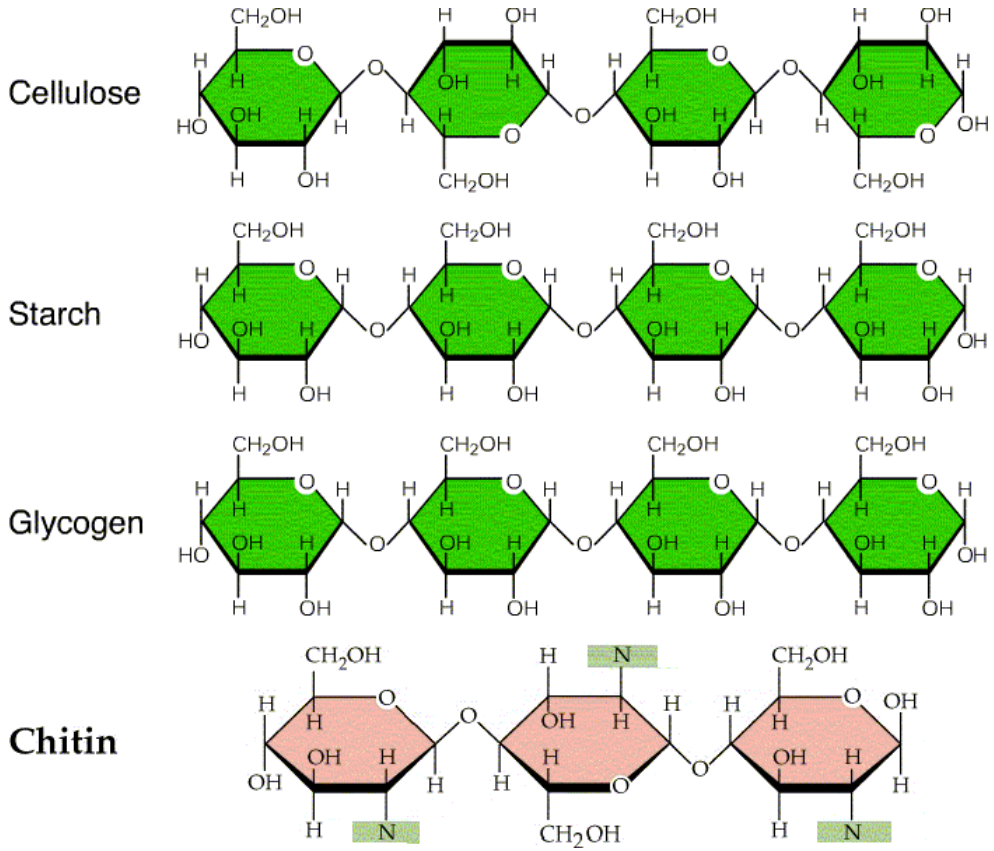
Fructooligosaccharides



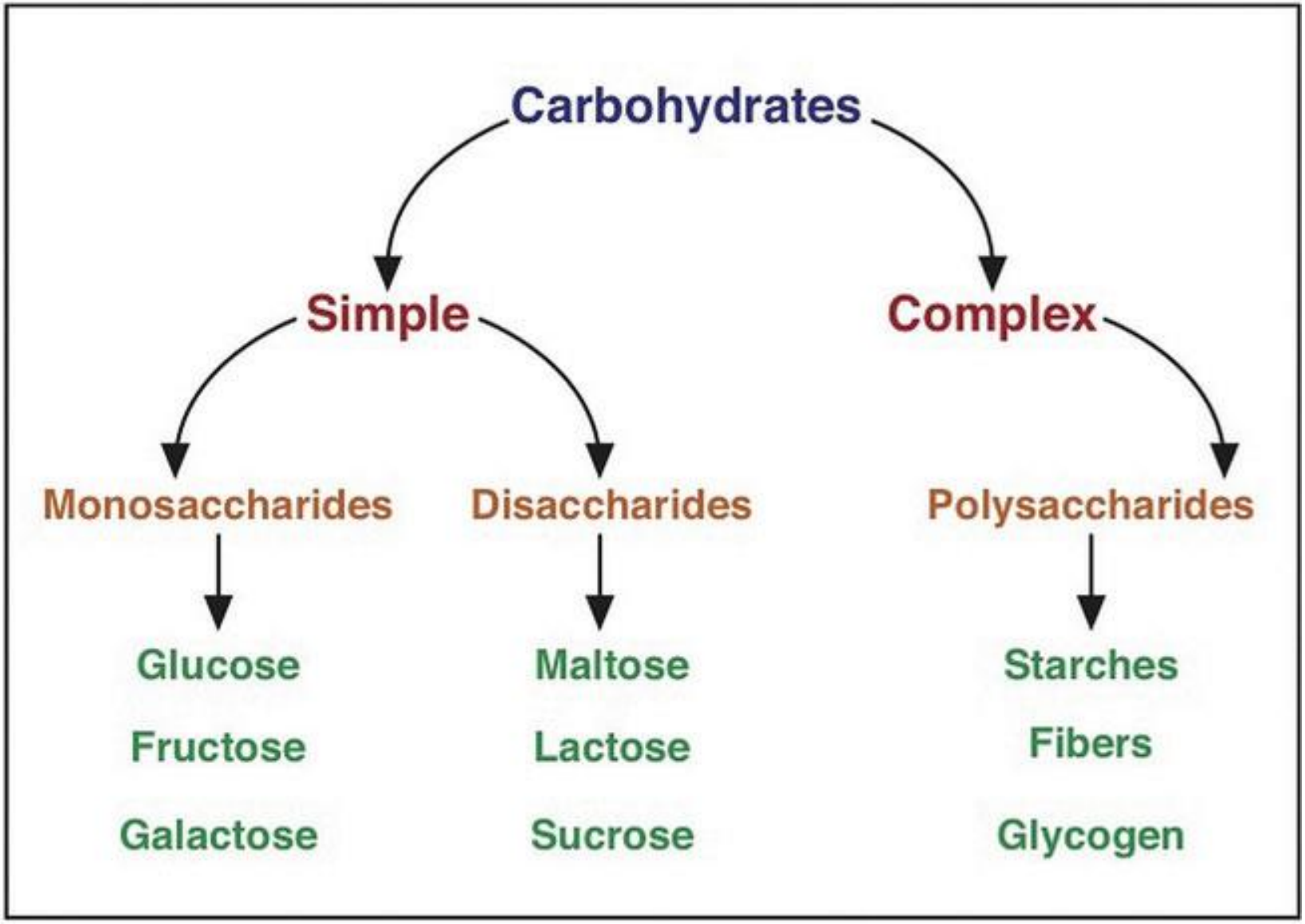


Polysaccharides

- ✓ Chains of monosaccharide or disaccharide units joined together
- ✓ Grains (Cellulose, Glycogen)
- ✓ Starches (potatoes, yams, etc)
- ✓ Inulin
- ✓ Mucilaginous fiber (Flax seed, aloe, seaweed)
- ✓ Pectin
- ✓ Dextrin
- ✓ Require specific enzymes for digestion and absorption

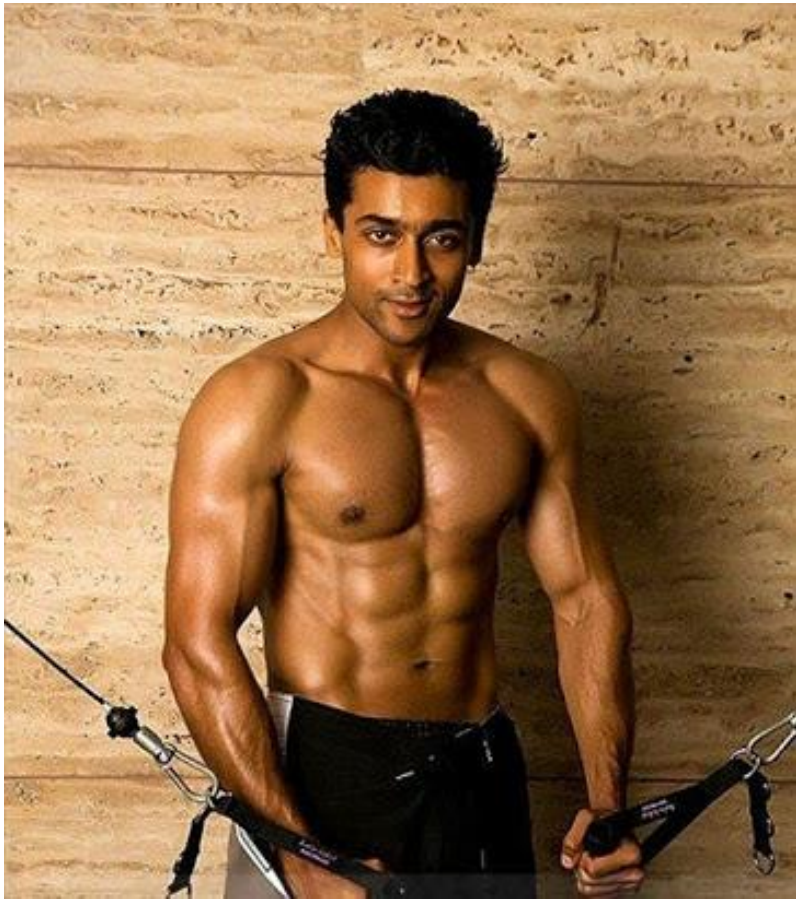


Simple vs. Complex Carbohydrates



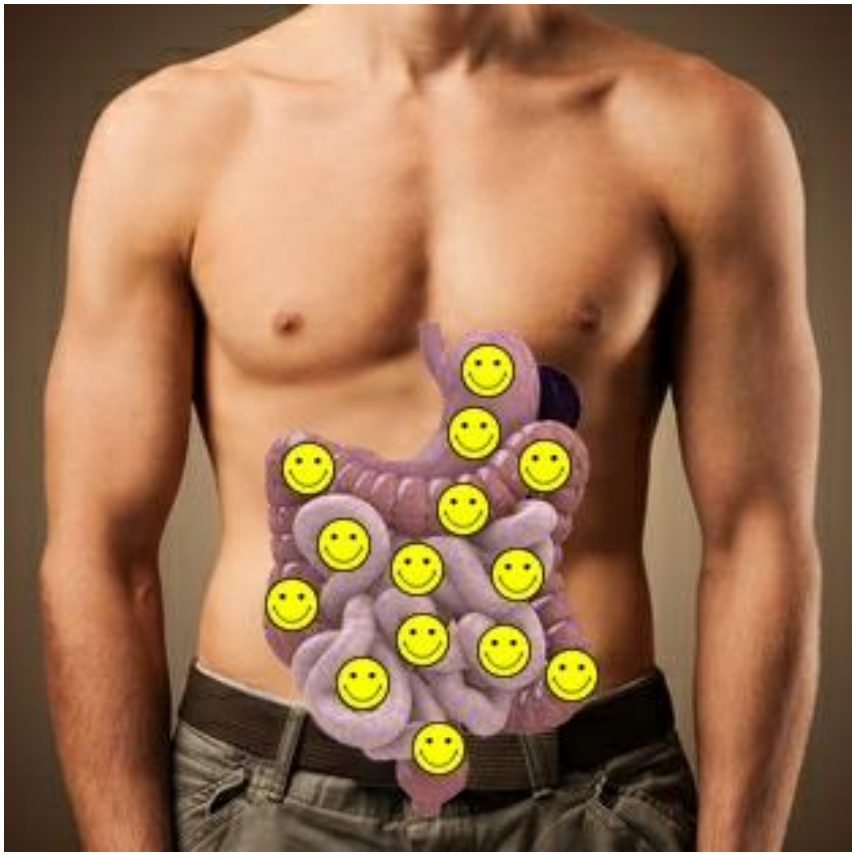
Low Carb Diets: The Ketosis Effect

- ✓ Switches metabolism from using glucose as energy to converting stored body fat to energy
- ✓ Begins when insulin levels are low
- ✓ Insulin is lowest when blood glucose levels are low
- ✓ Reduced insulin levels induce lipolysis
- ✓ Lipolysis consumes fat to produce ketone bodies



Low Carb Diets: Gut Healing

- ✓ Starve bacteria by removing di- and polysaccharides that can feed bacteria
- ✓ Reduce bacterial overgrowth symptoms
- ✓ Can relieve dysbiosis and resulting IBS symptoms
- ✓ Encourage gut healing and re-balancing of gut microbiota

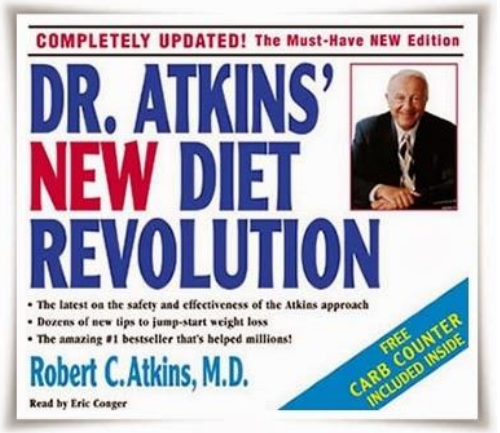


Low Carb Diets: Metabolic Effects

- ✓ Generally result in reduced blood sugar levels
- ✓ Helps in reversing insulin resistance
- ✓ The shift to using fat (ketones) as fuel can improve brain function
- ✓ Can be helpful for releasing excess weight quickly
- ✓ Level of carbs needs to be adjusted according to the person – size, age, lifestyle

Atkins Diet ™

- ✓ Promoted by **Robert Atkins**
- ✓ Based on a 1958 JAMA paper: *"Weight Reduction"*, by Alfred W. Pennington
- ✓ Popular in 2003-2004
- ✓ "Low Carb Craze" or "fad diet"; evolved over time
- ✓ Initial controversial argument: "Burning fat takes more calories, so you expend more calories"; disproved by study. (2)
- ✓ Short term vs. long term weight reduction
- ✓ Atkins Nutritionals Co. (1989) markets the foods
- ✓ Atkins died at age 72 in 2003; controversy:
  - ➢ Epidural hematoma resulting from a fall on the ice
  - ➢ Or heart attack? He had a history of heart disease…



Atkins Diet™

- ✓ **Classic Atkins approach (Atkins 20):**
  - **Phase 1:** 20-25 gr net carbs daily
    2-week minimum
  - **Phase 2:** 25-50 gr net carbs daily
    until within 10 lbs. of goal weight
  - **Phase 3:** 50-80 gr net carbs daily
    until goal reached/maintained 1 mo.
  - **Phase 4:** 80-100 gr net carbs daily
    permanent weight maintenance

- ✓ **Atkins 40:**
  - If < 40 lbs. to lose; pregnant; special health issues
  - Starts with 40 gr net carbs daily (10 gr x 3 meals + two 5 gr snacks)
  - When 10 lb. from goal weight, add 10 gr net carbs/wk.
- ✓ **Eating every 2-3 hours;** claim is "you're never hungry"
- ✓ **No need for exercise to lose weight (they claim)**

Protein & Fats: Atkins 20 & 40 Plans

Protein:

- ✓ 3 servings/day
- ✓ 4- 6 oz./serving

Fats:

- ✓ 3 servings/day of added fats

Food Examples

- ✓ **Allowed on Atkins Phase 1:**
  - Leafy greens/low carb vegetables
  - Beef
  - Poultry
  - Seafood
  - Pork
  - Eggs
  - Packaged meats:
    - Bacon
    - Sausage
    - Deli meat
    - Avoid fillers, added sugar, MSG, sulfites, nitrates when possible
  - Cream/sour cream
  - Most hard cheeses
  - Butter
  - Salad dressing and mayonnaise
  - Olive, canola, grapeseed, coconut, flaxseed, safflower oil

Foods to Be Avoided

Atkins Diet

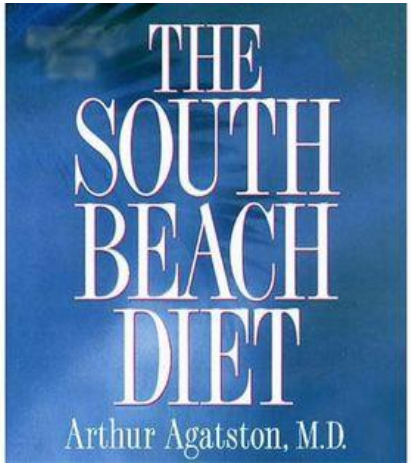
- Chestnuts or high carb nuts
- Watermelon or high carb fruits
- Starchy vegetables
- Fruit juices
- Dried fruits
- White flour
- Sugar
- Refined carbs
- Alcohol
- Personal “trigger foods” that cause cravings

Atkins Foods Post-Phase 1:

- ✓ Nuts and seeds (but not chestnuts)
- ✓ Berries, cherries, and melon (but not watermelon)
- ✓ Whole milk yogurt and fresh cheeses, such as cottage cheese and ricotta
- ✓ Legumes, including chickpeas, lentils, etc.
- ✓ Tomato and vegetable juice “cocktail”
- ✓ Other fruits (but not fruit juices or dried fruits)
- ✓ Higher-carb vegetables: winter squash, carrots, peas, etc.
- ✓ Alcohol in moderation

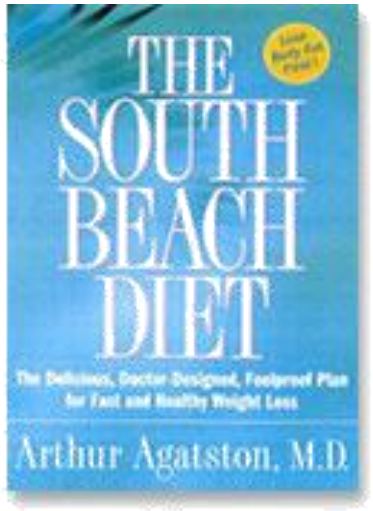
South Beach Diet ™

- ✓ Promoted by **Dr. Arthur Agatston** in mid-1990s
  - ➢ Cardiologist at Mt. Sinai Medical Center, Miami Beach, FL
  - ➢ Developed for his heart patients
  - ➢ The AMA's low-fat, high carb diet was not lowering patients' cholesterol, weight, or blood sugar…
  - ➢ ….But the Atkins diet was!
  - ➢ Removed the saturated fats and added more lean protein and fiber
- ✓ Originally called the Modified Carbohydrate Diet
- ✓ "Right Fats, Right Carbs" vs. "Low Fats, Low Carbs"
- ✓ Focused on the glycemic impact of foods
- ✓ South Beach Diet book released in April 2003



South Beach Diet™

- ✓ Doesn't limit carbs to specific grams/day; focuses instead on percentages.
- ✓ Comparison: CDC recommends 45 – 65% of calories from carbs = 225 to 325 gram/2000 calories
- ✓ **3 Phases:**
  - **Phase 1: <** 10% of daily calories in carbs; Approx. 50 gr of carbs daily for a 2000 calorie diet
  - **Phase 2: <** 25% of daily calories in carbs Approx. 135 gr of carbs daily for a 2000 calorie diet
  - **Phase 3: <** 30% of daily calories in carbs Approx. 140 gr of carbs daily for a 2000 calorie diet
- ✓ Also has its own line of processed foods and snacks
- ✓ Newest website allows for meal delivery



Protein & Fats: South Beach Diet

Protein

- ✓ Lean beef
- ✓ Lean poultry
- ✓ Seafood
- ✓ Eggs
- ✓ Dairy – no or low fat
- ✓ Cheese – low fat, i.e., cottage

"Good Fats"

- ✓ Canola oil
- ✓ Extra-virgin olive oil
- ✓ Avocado
- ✓ Nuts
- ✓ Monounsaturated fats (MUFAs)
- ✓ Omega-3 fats

"Bad Fats"

- ✓ Trans fats
- ✓ Saturated fats
- ✓ Butter
- ✓ Animal fats
- ✓ "Partially hydrogenated"

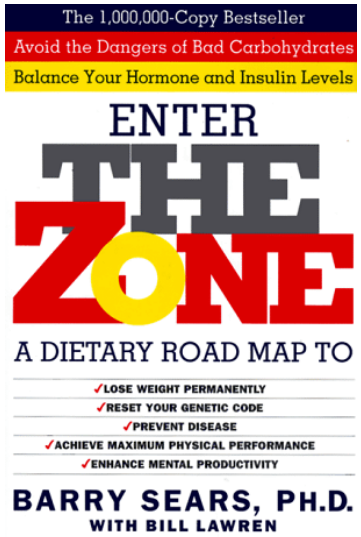
Foods to Avoid

South Beach Diet

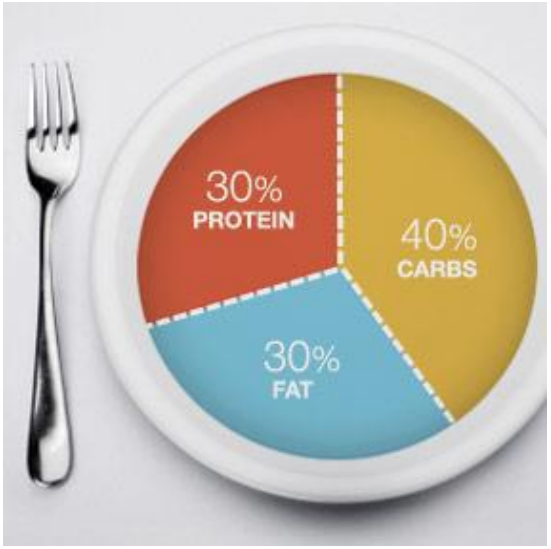
- "Bad" fats
- Starchy vegetables in Phase 1
- Fruit juices
- Dried fruits
- White flour
- Sugar
- Refined carbs
- Alcohol
- New Phase 1 is gluten-free
- Personal "trigger foods" that cause cravings

The Zone Diet ™

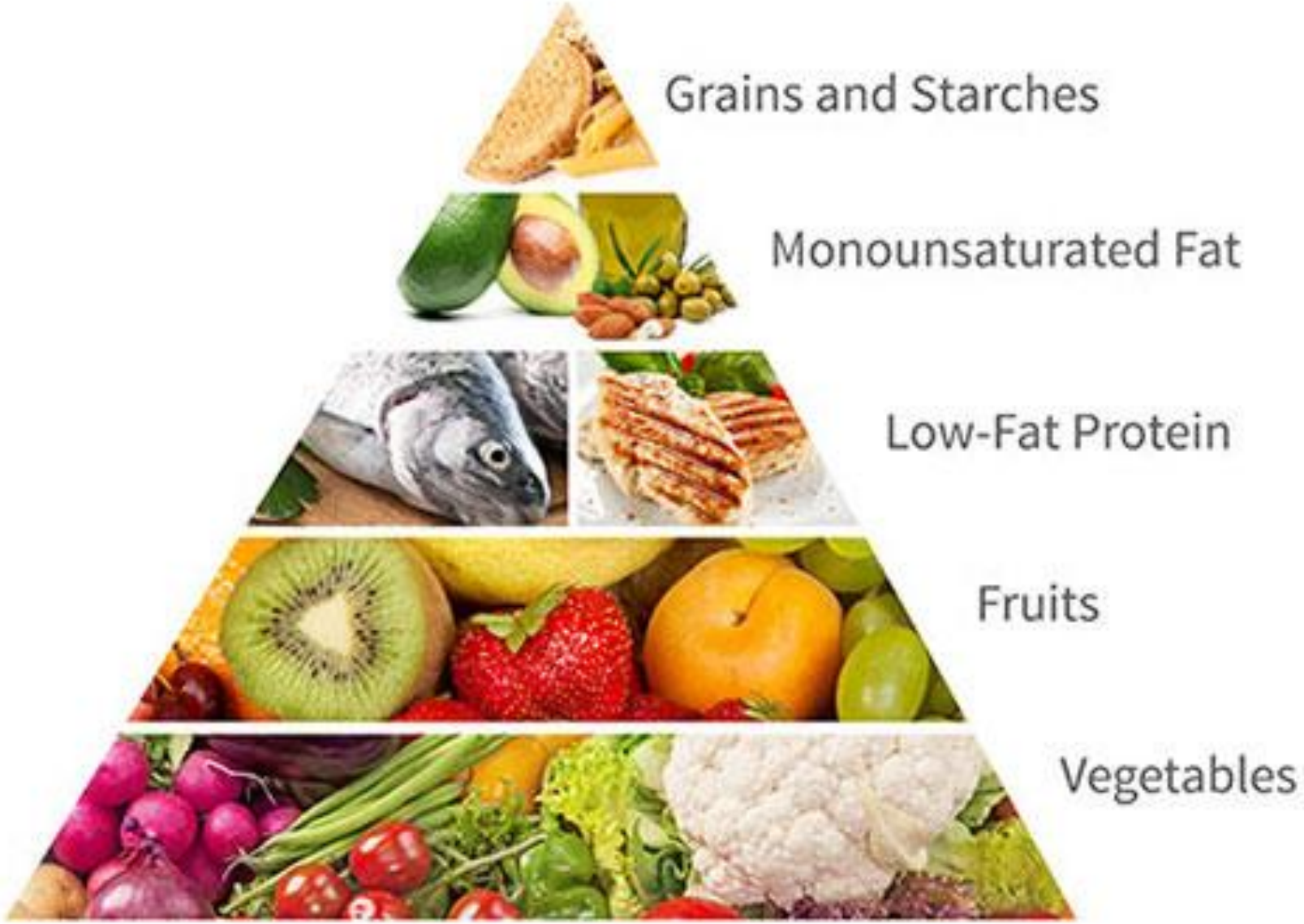
- ✓ Developed by **Barry Sears, PhD**
- ✓ The Zone Diet book released in 1999
- ✓ Biochemist with focus on weight loss
- ✓ Meals constructed for maximum satiety
- ✓ Ratio: 30% proteins/40% carbs/30% fats
- ✓ "The Zone": insulin/glucagon ratio for fat burning
- ✓ Eat 5 times/day w/no more than 5 hours between meals
- ✓ Size of the palm used to measure protein portion
- ✓ Size of two big fists = portion of "good" carbs
- ✓ Size of one big fist = portion of "bad" carbs
- ✓ "Zone Blocks" and "Mini Blocks" used to measure ratios easily



The Zone Diet™



- ✓ **"The Zone"**
  - Defined by the macronutrient ratio of each meal
  - Also physiological state in the body that can be measured in clinical tests
- ✓ **Three clinical markers that define The Zone:**
  - **TG/HDL ratio is <1** (insulin resistance in liver)
  - **AA/EPA ratio: 1.5 – 3** (inflammation marker)
  - **HbA1c: <** 5 % Advanced Glycosylated End products (AGE) tied to blood glucose
- ✓ **Also has its own line of processed foods and snacks**
- ✓ **3 Parts of the program:**
  - The Zone Plate
  - Omega-3 Fatty Acids
  - Polyphenols



Zone Food Pyramid

Food Examples

✓ Protein:

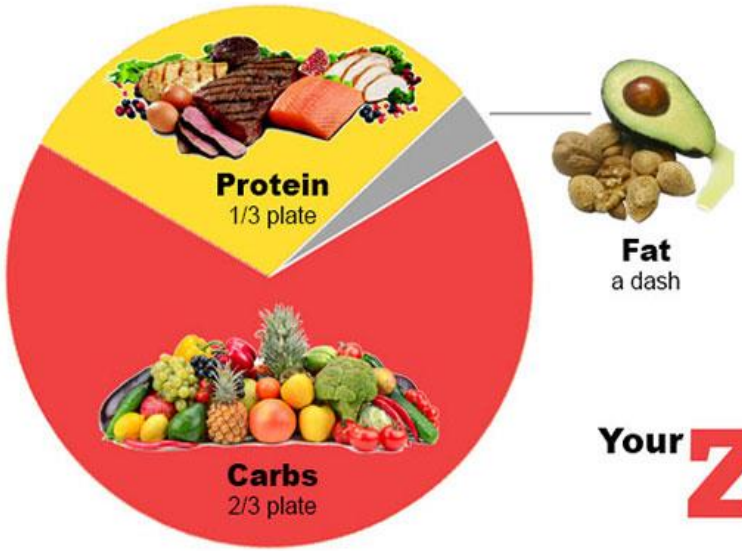
- 1/3rd of plate
- Lean protein
- Egg whites
- Fish
- Poultry
- Lean beef
- Low-fat dairy

✓ Fat:

- Add a little of monounsaturated fat
- Olive oil
- Avocado
- Almonds

✓ Carbohydrates:

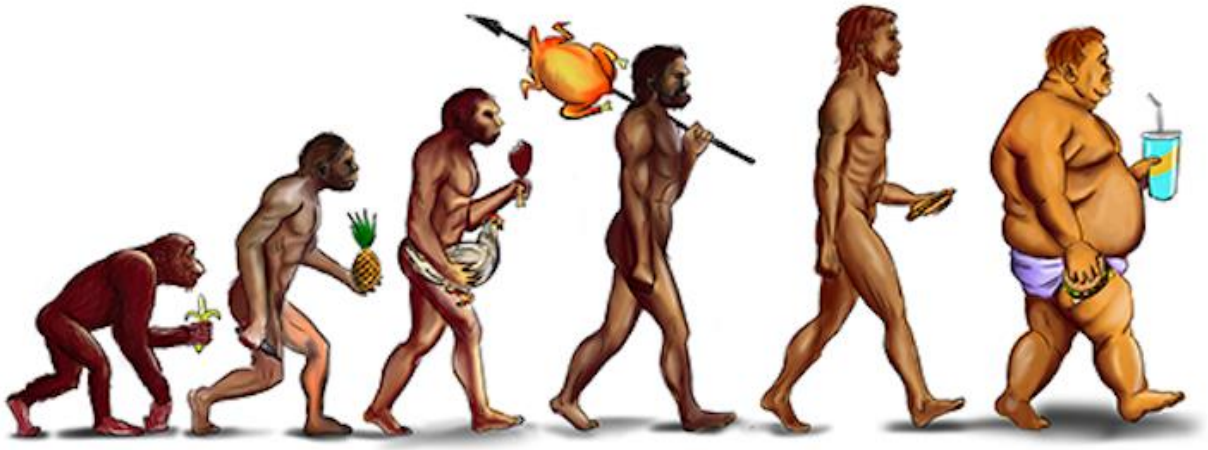
- 2/3rds of plate
- Add a lot of colorful vegetables and a little fruit
- Fruits and vegetables to avoid are those that are high in sugar
  - Bananas
  - Carrots
  - Grapes (raisins)
  - Starchy (potatoes, corn)



Your ZONE Plate

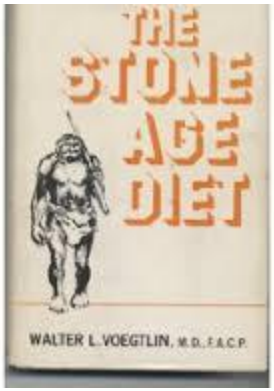
Paleo Diets

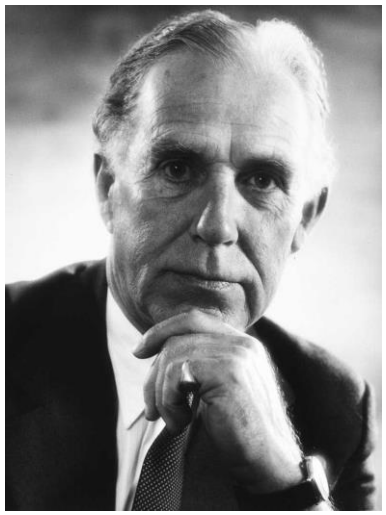
- ✓ Based on foods available to Paleolithic era humans
- ✓ Common paleo macros: 40% fat/20% carbs/40% protein per meal
- ✓ Wide variations and interpretations of this diet
- ✓ Some advocate use of caffeine
- ✓ Used for rapid weight loss and to control inflammation
- ✓ May be acid forming, depending on the diet
- ✓ Variations of paleo diets:
  - ➢ Ancestral
  - ➢ Hunter-Gatherer
  - ➢ Caveman
  - ➢ NeanderThin Diet
  - ➢ Primal Diet
  - ➢ Warrior Diet
  - ➢ Auto-Immune Paleo

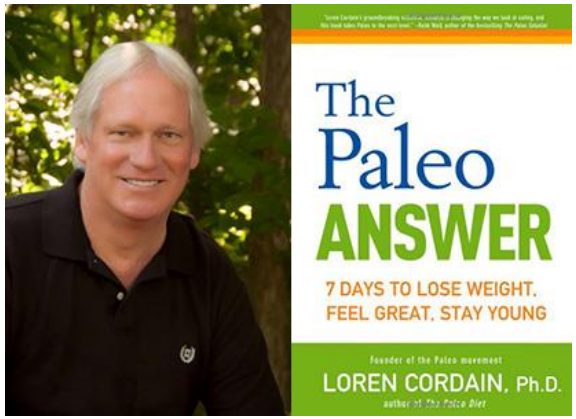


Paleo Diet History

- ✓ 1975 book, ***The Stone Age Diet***
- ✓ Written by gastroenterologist Walter Voegtlin
- ✓ Reaction to "diseases of affluence"
- ✓ Avoids modern processed foods
- ✓ Also avoids foods from after the Neolithic Revolution: when humans transitioned from hunter-gatherer lifestyles to settled agriculture
- ✓ Popularized by Loren Cordain, PhD in 2002 book, ***The Paleo Diet***
- ✓ in 2013 the paleo diet was Google's most searched-for weight-loss method



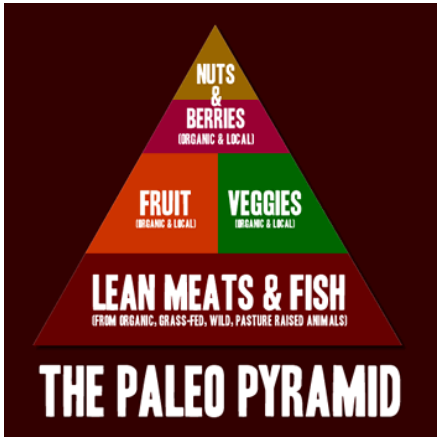




General Paleo Foods:

✓ Allowed

- Vegetables
- Roots
- Nuts
- Fruits
- Organ meats
- Meats
- Seafood
- Eggs



✓ Excluded

- Dairy
- Processed foods
- Grains
- Added sugar
- Legumes
- Processed oils
- Added salt
- Alcohol
- Coffee

Ketogenic Diets

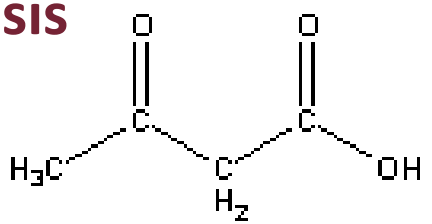
- ✓ Ultra low carb; high fat
- ✓ Common macros: 70% fat/10% carbs/20% protein per meal
- ✓ Produce ketone bodies
- ✓ May or may not include weekly carb re-feeds (cyclical ketosis)
- ✓ Some advocate use of caffeine
- ✓ Urine or blood test to monitor quantity of ketones
- ✓ Can be used for a variety of autoimmune, neurologic conditions and for weight loss.
- ✓ May be acid forming, depending on the diet
- ✓ Examples of ketogenic diets:
  - ➢ Carb Nite Solution ; Carb Backloading
  - ➢ MCT Oil Diet
  - ➢ Wahls Protocol
  - ➢ Bulletproof Diet
  - ➢ Some Paleo Diets

Ketogenic Diet History

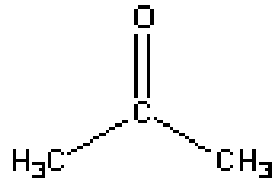
- ✓ Designed in 1924 to treat epilepsy
- ✓ Dr. Russell Wilder of the Mayo clinic
- ✓ Anti-seizure medications developed in 1940s halted more ketogenic diet research
- ✓ 2012: Dominic D'Agostino of KetoNutrition.org
- ✓ Researcher at University of South Florida
- ✓ Published 32 papers
- ✓ Studies Navy SEALS using keto diet to fight hyperbaric oxygen toxicity that impacts deep-water divers

Ketogenic Diet Theory

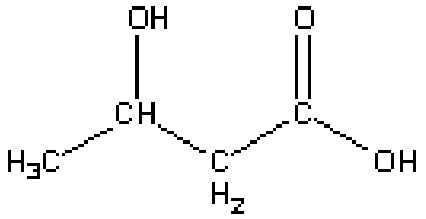
- ✓ Fat is converted in the liver into fatty acids and ketone bodies
- ✓ Ketones are water-soluble molecules that the liver makes when metabolizing fats, particularly when carbohydrate intake is low
- ✓ Ketones can be used for energy by most tissues in the body, including the brain (which cannot use fatty acids directly)
- ✓ **Ketosis:** Elevated level of ketone bodies in the blood
- ✓ **Ketoacidosis is not the same as Ketosis**
- ✓ **Ketoacidosis:**
  - ➢ Type 1 diabetics
  - ➢ Not enough insulin
  - ➢ Ketones levels rise too high
  - ➢ Blood becomes acidic
- ✓ Lowers glucose levels
- ✓ Improves insulin resistance
- ✓ Reduces occurrence of epileptic seizures
- ✓ Keto-adaptation period



Acetoacetate



Acetone



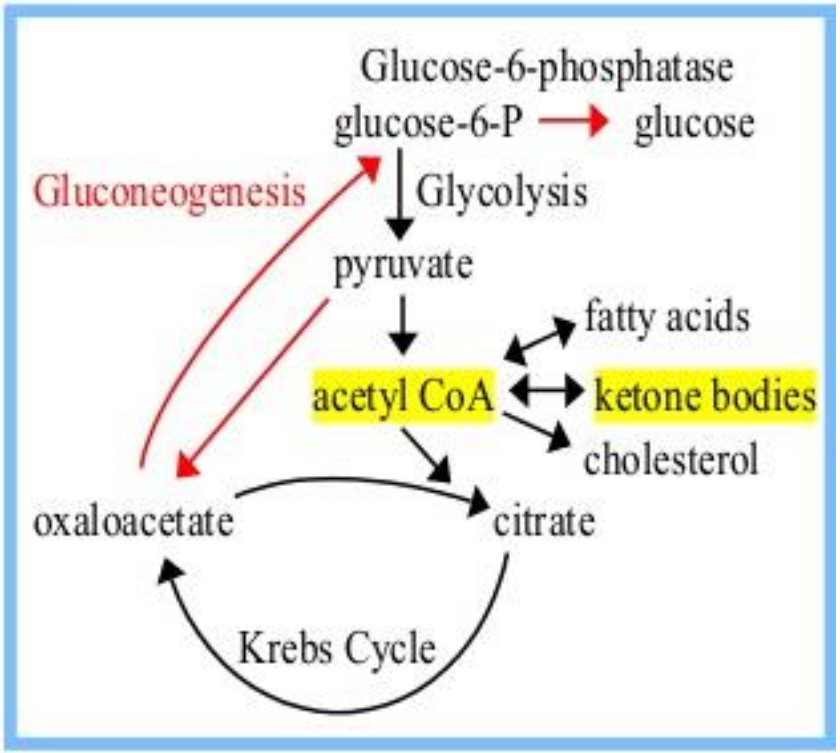
B-hydroxybutyrate

Fat as Fuel

- ✓ Carbohydrate metabolism yields 36 ATP molecules from one 6 C glucose molecule
- ✓ Fat metabolism yields approximately 40 ATP molecules from one 6C fatty acid molecule
- ✓ Each acetoacetate molecule produces 22 ATP molecules

Metabolism of Ketone Bodies

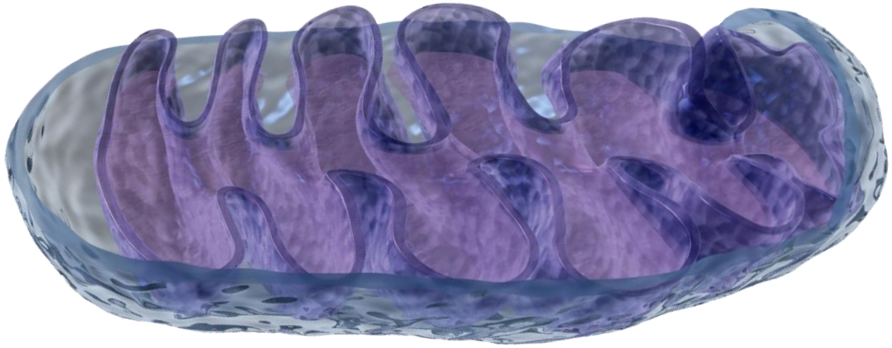
- ✓ Ketone synthesis mainly occurs in the mitochondria of liver cells
- ✓ Synthesized from Acetyl CoA
- ✓ During prolonged fasting, and very low carbohydrate intake, oxaloacetate is depleted in liver due to gluconeogenesis



- ✓ This impedes entry of acetyl COA into the Krebs cycle
- ✓ Acetyl CoA is converted to ketone bodies – acetone, acetoacetate, and beta-Hydroxybutyrate

Mitochondria and Fat Burning

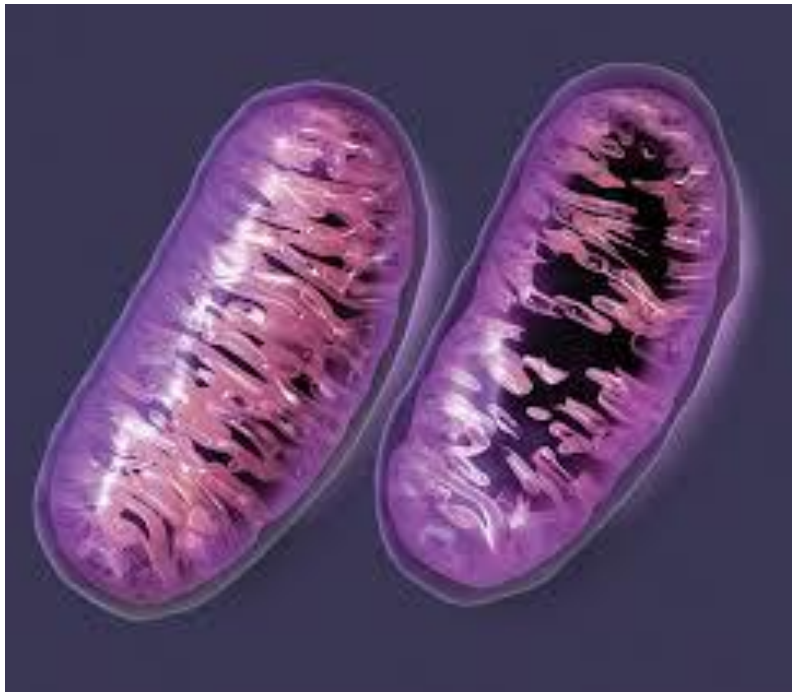
- ✓ Burning of fat by the mitochondria is called beta-oxidation
- ✓ Acetyl CoA can be converted to ketones
  - Stabilize over excitation and oxidative stress in the brain
  - Causes epigenetic changes that produce healthy and energetic mitochondria
  - Decreases the overproduction of damaging and inflammatory free radicals



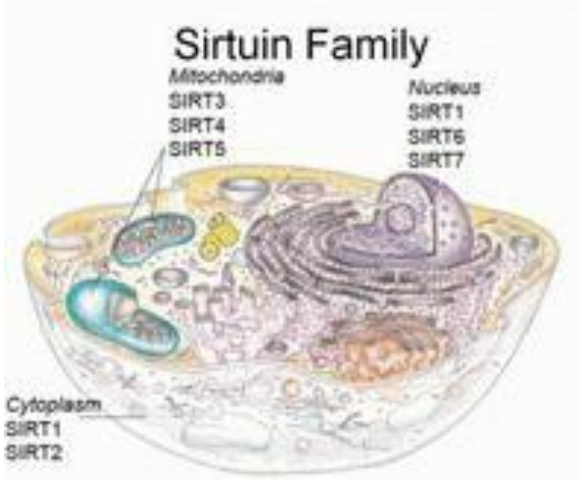
http://www.drritamarie.com/go/KetogenicDietMitochondria

Conditions Linked to Mitochondrial Dysfunction from Oxidative Stress

- ✓ Autism
- ✓ ADHD
- ✓ Parkinson's disease
- ✓ Depression
- ✓ Anxiety
- ✓ Bipolar disease
- ✓ Neurodegeneration
- ✓ Congestive heart failure
- ✓ Type 2 diabetes
- ✓ Autoimmune disorders
- ✓ Cancer



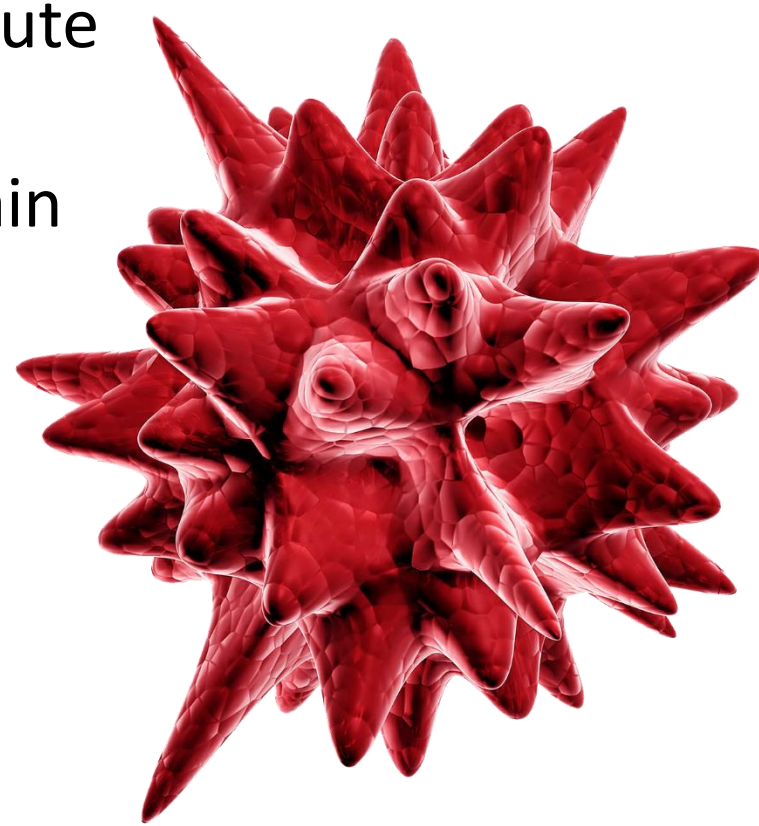
Sirtuins and Mitochondrial Protection



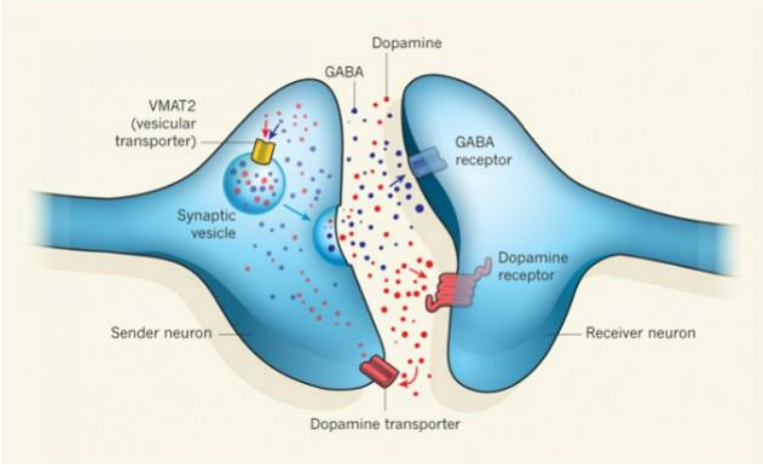
- ✓ Known as housekeeping genes
- ✓ Regulate key functions like mitochondrial protection, telomere length, cell defense, metabolism, and reproduction
- ✓ Overexpression the sirtuin-6 gene (*SIRT6*), can lengthen lifespan in male mice by as much as 15%
- ✓ "SIRT" foods include kale, blackberries, green tea, fish oil, olives, onions, chocolate, parsley, and turmeric
- ✓ Positively influenced by a diet that is non-glycating, i.e., a low carb diet vs high carb diet

Ketones and Latent Viral Infections

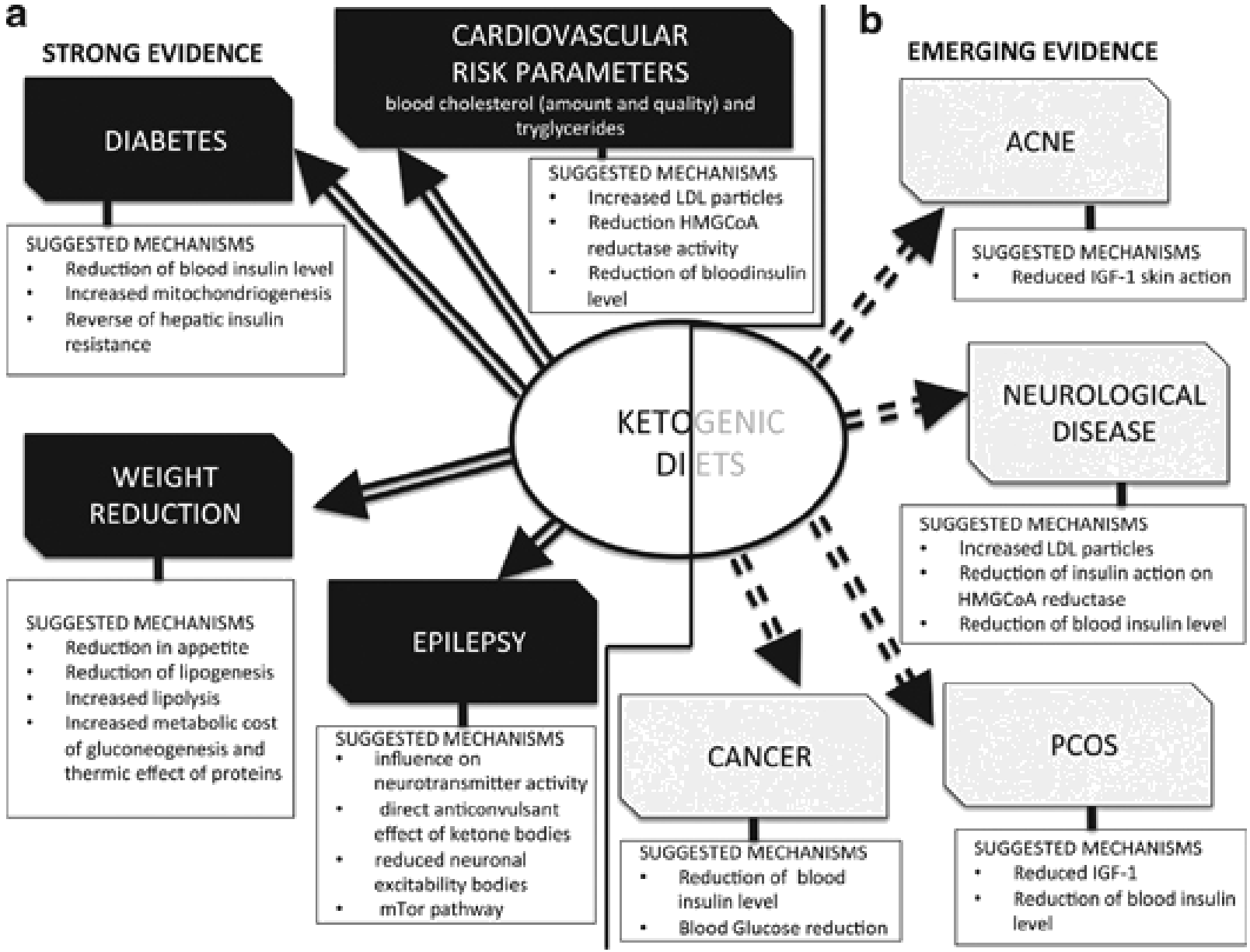
- ✓ Latent viral infections like herpes virus family (i.e., CMV and EBV) contribute to mitochondrial dysfunction
- ✓ Latent viral infection can drive brain cell loss in neurodegenerative diseases such as Alzheimer's
- ✓ Latent viral diseases can lead to disease or cancer
- ✓ A ketogenic diet can help stabilize mtDNA
- ✓ Alzheimer's has been found to be powerfully helped by a ketogenic diet



Other Benefits of the Ketogenic Diet



- ✓ Increases GABA - calms down over excitation which is at core of major neurodegenerative diseases
- ✓ Increase mitochondrial NADH used in over 450 vital biochemical reactions – including the cell signaling and assisting of DNA repair
- ✓ Increases antioxidant pathways including glutathione
- ✓ Enhances anti-inflammatory pathways
- ✓ Cleans from cells the proteins that act like “debris” and contribute to ageing by disrupting a proper functioning of the cell - autophagy



Longevity Benefits of Ketogenic Diet

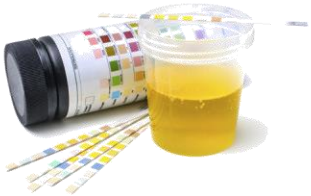
- ✓ Calorie restriction causes the body to shift to fat-burning metabolism within mitochondria
- ✓ With a ketogenic diet, fat-burning metabolism is achieved without restricting caloric intake
- ✓ A ketogenic diet is not a high-protein diet, which can stimulate insulin
- ✓ Promotes the codification of genes which creates mitochondria in the hippocampus, making more energy (ATP) available, which improves resilience to stress by as much as 60% in some studies

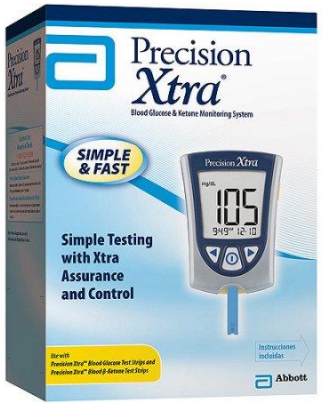
Keto-Adaptation

- ✓ Also known as the “keto flu” if symptoms are uncomfortable
- ✓ Process of switching the body from burning glucose to burning fat
- ✓ Can take weeks or months of staying in ketosis to adapt
- ✓ Electrolyte balance is essential: potassium, sodium, magnesium
- ✓ Body sheds excess fluids
- ✓ Symptoms:
  - ➢ Headaches
  - ➢ Insomnia
  - ➢ Constipation
  - ➢ Fatigue and lethargy
- ✓ Dependent upon:
  - ➢ Thyroid function
  - ➢ Liver function
  - ➢ Adrenal function
  - ➢ Kidney function

Assessing State of Ketosis

- ✓ Intake of carbs
  - ➢ Under 100 g
  - ➢ Under 50 g
  - ➢ Under 10 g
- ✓ Macronutrient ratios: lots of conflicting info
- ✓ Measure
  - ➢ Urine – not reliable
  - ➢ Blood – reliable but expensive



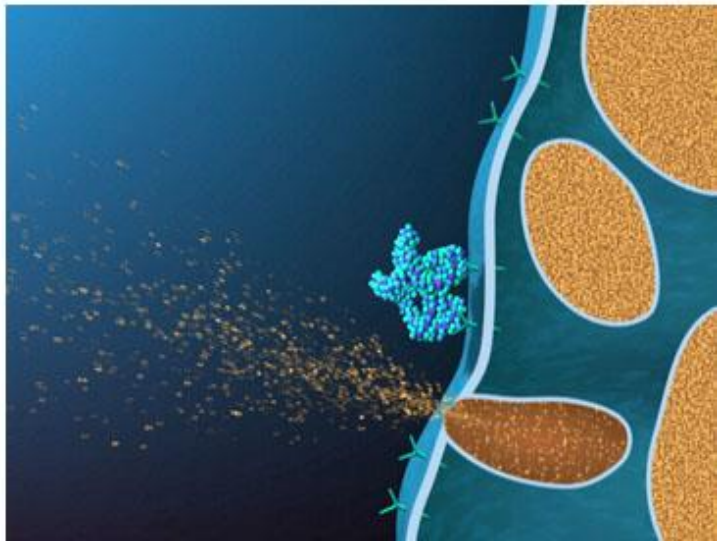


Pros of Ketogenic Diet

- ✓ Controls blood sugar
- ✓ Can improve memory and mental clarity
- ✓ Reduces seizures
- ✓ Can help with chronic IBS and gut inflammation
- ✓ Ketones are the preferred fuel for the brain
- ✓ Improves mitochondrial function
- ✓ Decreases insulin

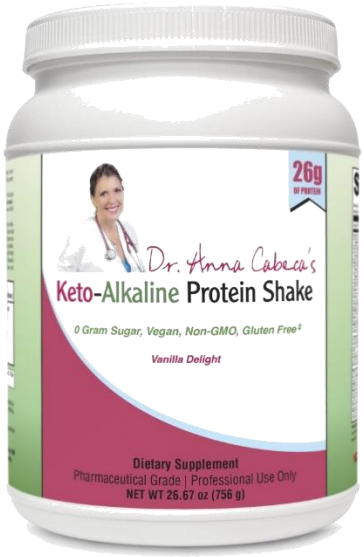
Cons of Ketogenic Diet

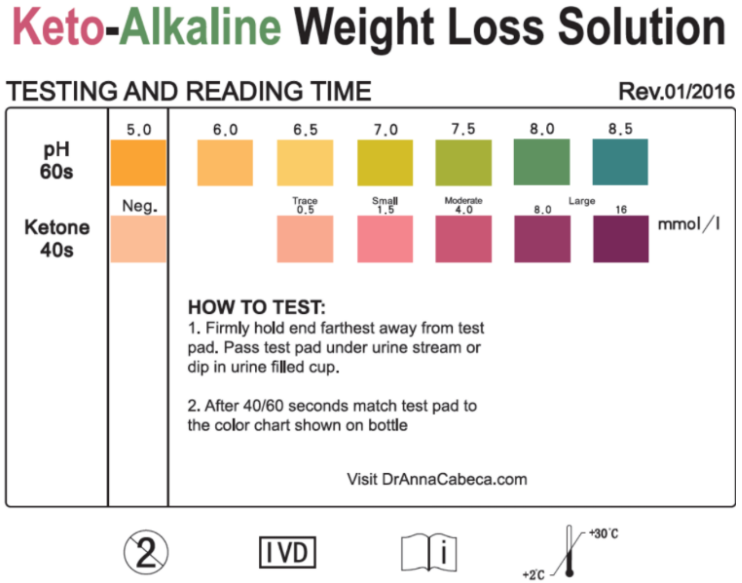
- ✓ Can be acid forming if caffeine and too many animal products are used
- ✓ Very restrictive; compliance may be difficult
- ✓ High fat can be hard on liver
- ✓ Bone broths and fermented foods are high in amines; problematic for those with histamine issues
- ✓ Bones/cartilage broths are high in FODMAPs
- ✓ Bone broths contain glycine; can convert to oxalates
- ✓ Cautions:
  - ➢ Compromised kidney function
  - ➢ Extreme adrenal fatigue
  - ➢ Poor thyroid function
  - ➢ Poor electrolyte balance

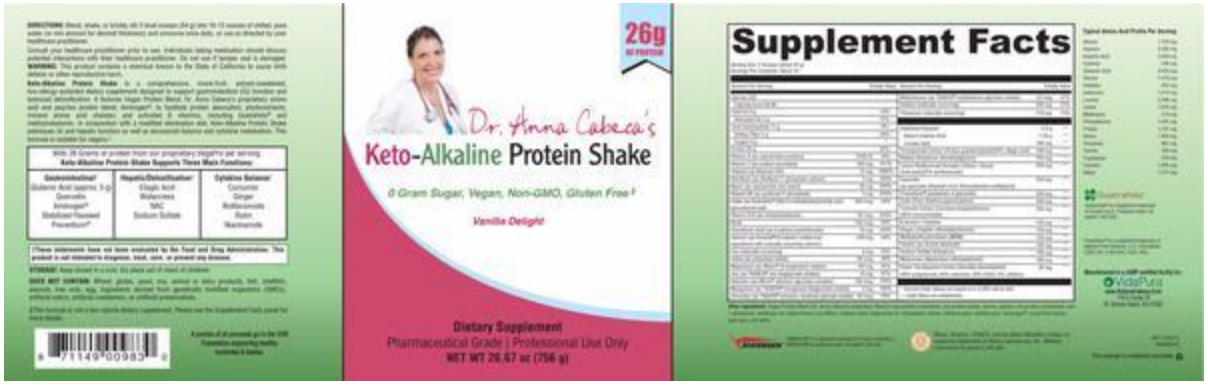


Ketogenic Diet Modifications

Dr. Anna Cabeca's Keto-Alkaline Diet

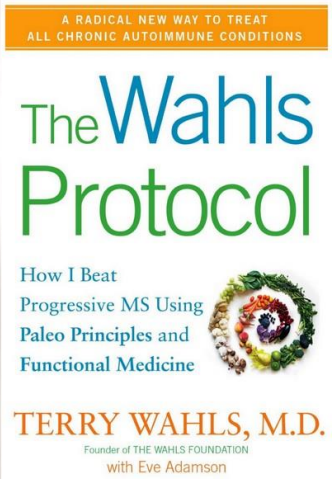






Keto Diet Modifications

Dr. Terry Wahl's high vegetable version



To accelerate healing, remove for 30 days-2+ years:

- Eggs
- Nuts
- Seeds
- Nightshades
- Fruit
- Alcohol
- All food additives

2 meals a day; fast in between:

1 cup w. a meal after intensive exercise

Herbs & spices

Roots & squash

Coconut oil (+MCT oil)

High omega6 meats: poultry & pork

1 c. berries

Fermented foods

Bone broth

6-12oz meat/day. Pastured/wild/high omega3: 16oz fish (wild salmon)/wk; 12oz organ meat/wk; game; lamb; beef, seafood

6-9 cups low-carb vegetables (per day)

- 1½-3 cups sulfur rich
- 3 cups green leafy
- 1½-3 cups coloured (red, green, midnight, sunset)

Out of bounds~ Paleo:

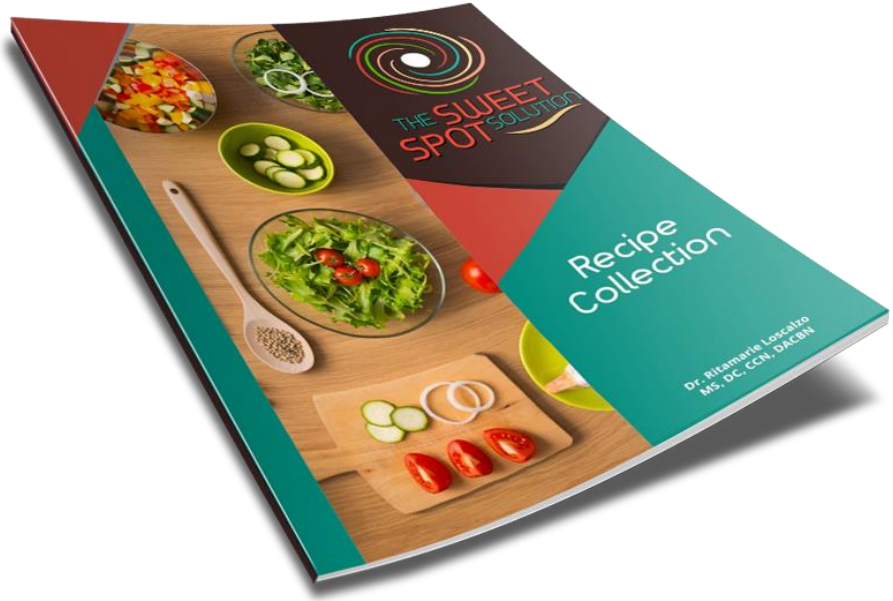
- Grains
- Beans & legumes

Herbs & spices include (fresh or dried): Basil, Bay, Chives, Cilantro, Cinnamon, Cloves, Curry Leaves, Dill, Garlic, Ginger, Mace, Marjoram, Parsley, Oregano, Rosemary, Sage, Savory, Tarragon, Thyme & Turmeric

Ketogenic Diet Modifications

Dr. Ritamarie's plant-powered version

- ✓ Lots of non-starchy vegetables – as many as your body can tolerate
- ✓ Protein powder
- ✓ Fermented foods
- ✓ Coconut and MCT oil
- ✓ Moderate amounts of germinated nuts and seeds
- ✓ Test blood sugar and ketones



Exogenous Ketones

- ✓ Beta-hydroxybutyrate
- ✓ Caffeine-free
- ✓ Can do a lower fat diet
- ✓ Can achieve ketosis in 60 minutes
- ✓ Can use as part of a cleanse
- ✓ Take 45 minutes before workout with MCT oil – 25 calories

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