

# Metabolic Syndrome: Addressing Root Causes

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# Outline

## Metabolic Syndrome

- Definition
- Importance
- Treating Root Causes
  - Nutrition
  - Sleep
  - Trust in God

# Definition

Criteria for Clinical Diagnosis of the Metabolic Syndrome	
Central Obesity	Waist circumference—ethnicity specific. For persons of European origin may use waist circ. $\geq 40$ inches for men and $\geq 35$ inches for women. For non-Europeans, use IDF definitions.
Elevated Triglycerides (or drug treatment for elevated triglycerides)	$\geq 150$ mg/dl (1.7 mmol/l)
Reduced HDL-C (or drug treatment for reduced HDL-C)	$< 40$ mg/dl (1.03 mmol/l) in men $< 50$ mg/dl (1.29 mmol/l) in women
Elevated Blood Pressure (antihypertensive drug treatment in a patient with a history of HTN)	Systolic $\geq 130$ mmHg OR Diastolic $\geq 85$ mmHg
Elevated Fasting Glucose (drug treatment of elevated glucose)	$\geq 100$ mg/dl (5.6 mol/l)

Harmonizing the metabolic syndrome: a joint interim statement of the International Diabetes Federation Task Force on Epidemiology and Prevention; National Heart, Lung, and Blood Institute; American Heart Association; World Heart Federation; International Atherosclerosis Society; and International Association for the Study of Obesity.

*Circulation.* 2009 Oct 20;120(16):1640-5

# Metabolic Syndrome

- Doubles the risk of developing ASCVD over the next 5 to 10 years
- Confers a 5-fold increase in risk of type 2 diabetes mellitus

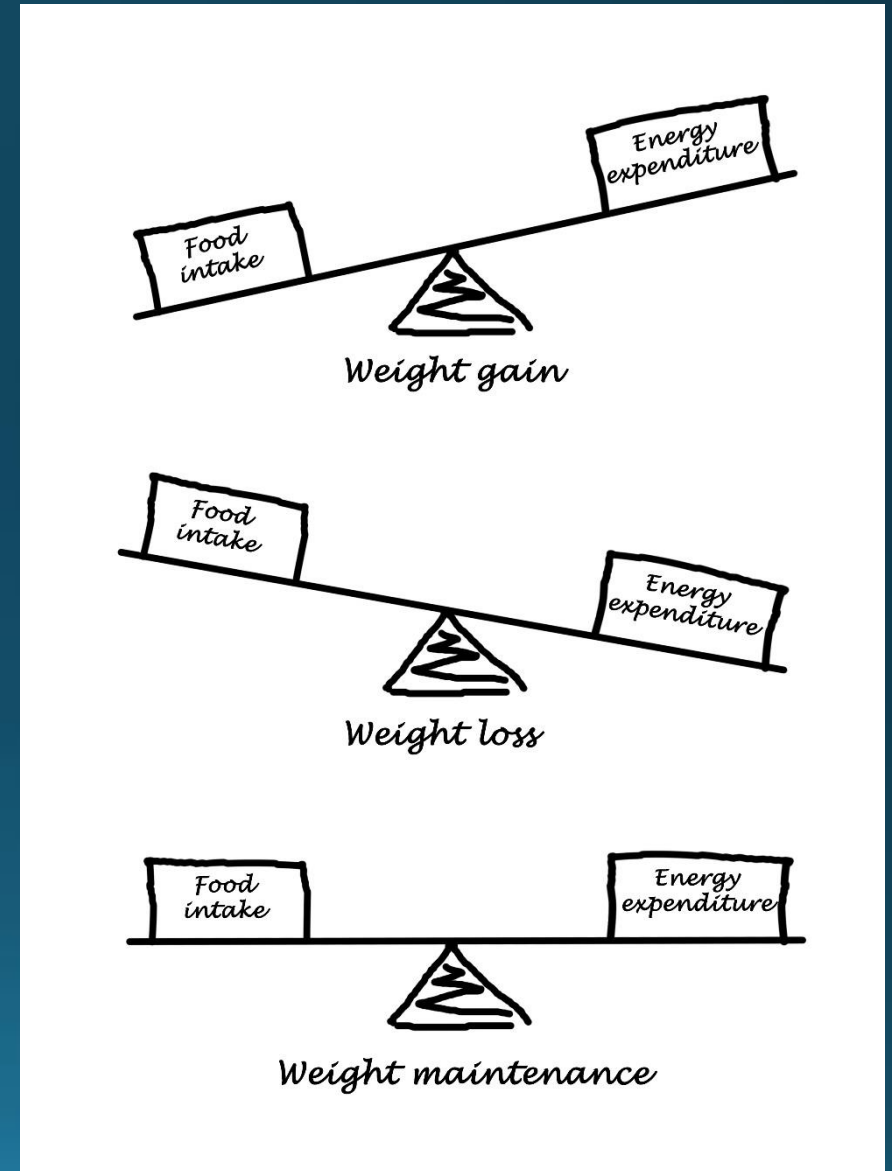
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*Circulation*. 2009 Oct 20;120(16):1640-5

# Goal

- “The greatest potential for management of the syndrome lies in reversing its root causes.”<sup>1</sup>
  - **Root causes**<sup>1</sup>
    - Overweight/obesity
    - Physical inactivity
    - Insulin resistance

1. Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III) final report. *Circulation* 2002;106:3143–3421



# Nutrition and Metabolic Syndrome

- Case-control study with 8313 Chinese subjects
- High-protein/cholesterol pattern: high intakes of animal offal, animal blood, and sausage
- High-carbohydrate/sweet pattern: high intake of candied fruits, cakes, ice cream, and juice
- Balanced pattern: intake of vegetables, mushrooms and coarse cereals
- Consumption of animal foods was associated with highest prevalence of MS.
- Consumption of vegetables, coarse cereals, fruits associated with the lowest prevalence of MS.

# Diet and Macronutrients

- 34 women with obesity
- 28-week study
- Control group
- Hypocaloric diet, resulting in 10% weight loss
  - (RDA) of protein: 0.8 grams/kg body weight → 25 to 30 percent ↑ insulin sensitivity
  - High protein: 1.2 grams/ kg body weight → no improvement in insulin sensitivity

# Nutrition

- Whole-foods plant-based diet
  - **Grains, fruits, nuts, and vegetables** constitute the diet chosen for us by our Creator. These foods, prepared in as simple and natural a manner as possible, are the most healthful<sup>1</sup>
  - That which is most conducive to health can be secured in almost every land. . . preparations of rice, wheat, corn, and oats are sent abroad everywhere, also **beans, peas, and lentils**<sup>2</sup>

1. Ellen G. White, *Councils on Diet and Foods* 81.2.

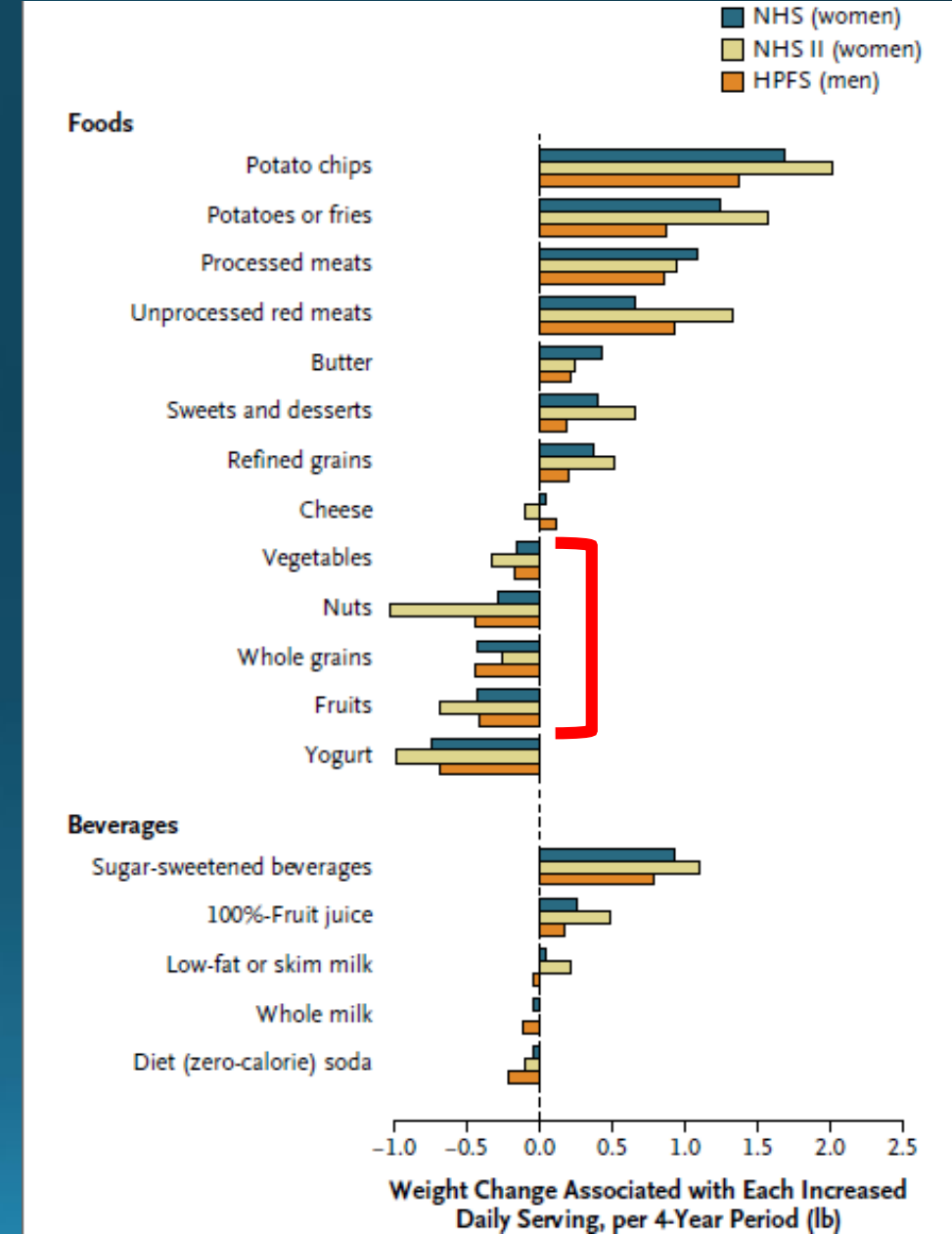
2. Ellen G. White, *Counsels on Diet and Foods* 94.4.



# Food choices and Weight gain

- Nurses' Health Study (NHS)
  - Dietary factors assessed 1986-2006
  - Final analysis included 50,422
- Nurses' Health Study II (NHSII)
  - Dietary factors assessed between 1991-2003
  - Final analysis included 47,898
- Health Professionals Follow-up Study (HPFS)
  - Dietary factors assessed 1986-2006
  - Final analysis included 22,557

Mozaffarian D, *et al.* Changes in diet and lifestyle and long-term weight gain in women and men. *N Engl J Med.* 2011 Jun 23;364(25):2392-404



# Healthy Eating

- Plant-based diet<sup>1</sup>
- Foods high in fiber and low in glycemic load<sup>2</sup>
- If overweight or obese, restrict calories with goal of 5-10% weight loss<sup>2</sup>



1. CONSENSUS STATEMENT BY THE AMERICAN ASSOCIATION OF CLINICAL ENDOCRINOLOGISTS AND AMERICAN COLLEGE OF ENDOCRINOLOGY ON THE COMPREHENSIVE TYPE 2 DIABETES MANAGEMENT ALGORITHM –2016 EXECUTIVE SUMMARY. *Endocrine Practice*: January 2016, Vol. 22, No. 1, pp. 84-113.
2. Standards of Medical Care in Diabetes—2016. *Diabetes Care*. January 2016 Volume 39, Suppl. 1

# Water-Rich Foods

- Cucumbers 96%
- Lettuce 96%
- Celery 95%
- Tomatoes 94%
- Spinach 92%
- Broccoli 91%
- Grapefruit 91%



# Fiber Guide

## The Full Plate Fiber Guide

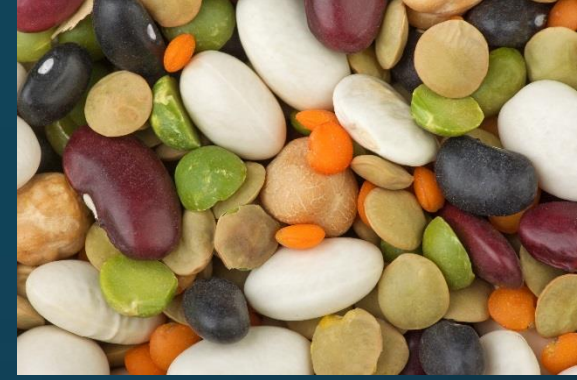
A helpful list of foods high in fiber

### Nuts and Seeds (Ideal in small amounts)

Food	Served	Serving Size	Calories	Fiber Grams
almonds	raw	1 oz (23 almonds)	163	4
brazil nuts	raw	1 oz (6)	186	2
chia seeds	raw	1 oz (5 Tbs)	138	10

Available at <https://fullplateliving.org/high-fiber-foods/list>. Accessed on 4/17/16.

# Legumes



- Adults with T2 diabetes given 3-month diet trial
- 1 cup/day of cooked beans, chickpeas or lentils
  - **Lost 5.7 lbs, ↓ A1c 0.5, ↓ triglycerides 21 points**

# Meal Frequency

- Adults with T2 diabetes
  - 3 meals with 3 snacks (6 meals)
  - 2 meals
    - 6-10 AM
    - Noon-4 PM
  - Calories restricted by 500 kcal/day for all persons

	Waist circumference	BMI	Fasting blood glucose	Insulin sensitivity
2 meals	↓ 2.02 inches	↓ 1.23	↓ 14.04 mg/dL	↑ 21
6 meals	↓ 0.53 inches	↓ 0.82	↓ 8.46 mg/dL	↑ 8.2

# Meal Frequency

The practice of eating but two meals a day is generally found a benefit to health; yet under some circumstances, persons may require a third meal.<sup>1</sup>

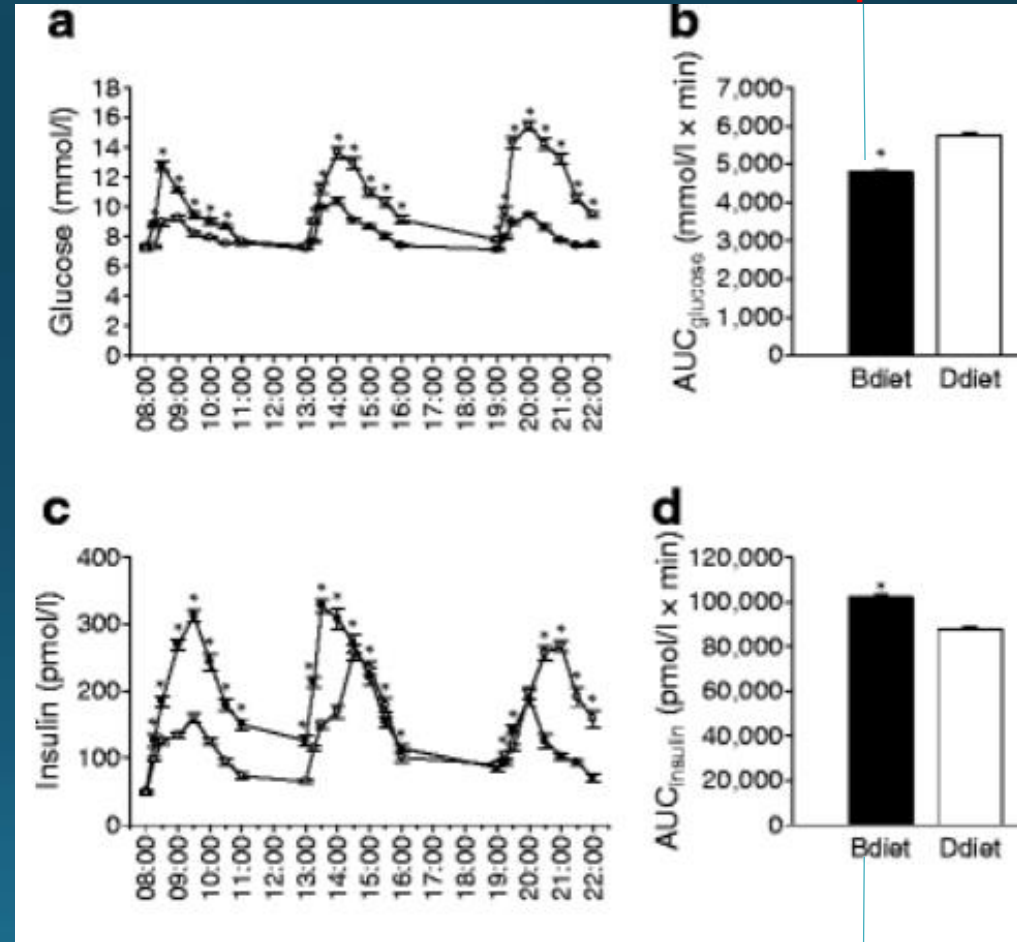
- Health Professionals Follow-Up Study <sup>2</sup>
- Over 29,000 men
- Snacking  
(eating more than 3 meals per day)  
→ increased risk of T2 diabetes was linked with higher BMI.

1. Ellen G. White, *Counsels on Diet and Foods* 176.2

2. Mekary RA, et al. (2012) Eating patterns and type 2 diabetes risk in men: breakfast omission, eating frequency, and snacking. *Am J Clin Nutr* 95:1182–1189

# Diabetes: Meal Composition

- Adults with T2 diabetes
- Breakfast Diet:
  - 703 kcal breakfast
  - 602 kcal lunch
  - 205 kcal dinner
- Dinner Diet:
  - 205 kcal breakfast
  - 602 kcal lunch
  - 703 kcal dinner



Glucose 20% ↓  
1-2 hr post-meal

Insulin 20% ↑

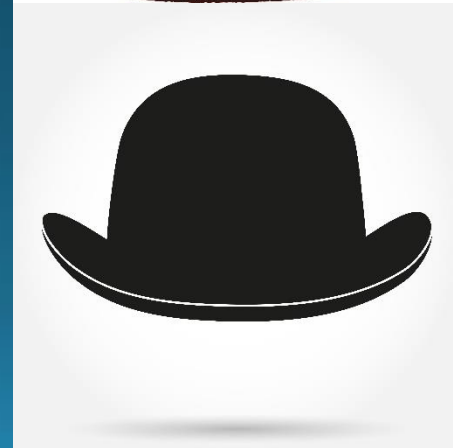
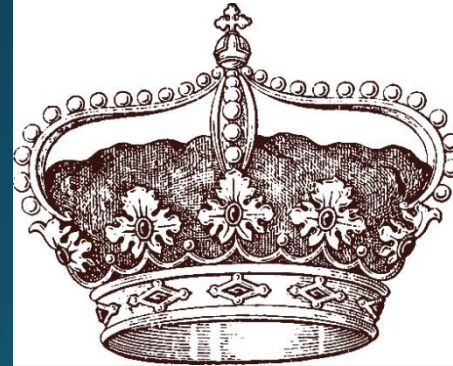
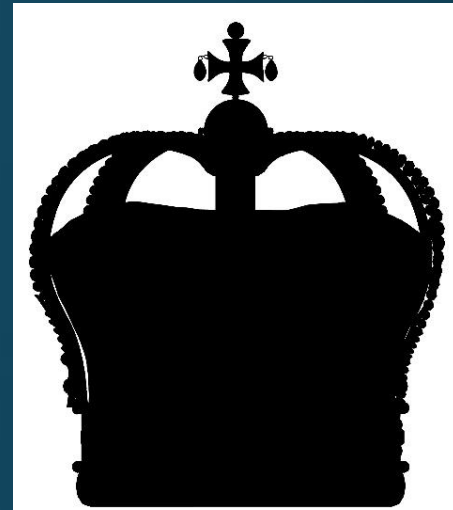


# Meal Composition

- At breakfast time the stomach is in a better condition to take care of more food than at the second or third meal of the day. . . . Make your breakfast correspond more nearly to the heartiest meal of the day.

# Meal Composition

- Breakfast like a king
- Lunch like a queen
- Supper like a commoner



## Sample Meal Plan

### Breakfast

- Healthy starch (carbs): 1-3 servings
  - ½ cup oatmeal, or other cooked whole grain cereal (i.e., amaranth, millet, buckwheat, barley).

(May make whole grain cereal by cooking 1 cup grain with 3 cups water and ¼ t salt overnight on low heat in crockpot. 1 cup grain makes 3 cups cooked.)

  - ¾ cup unsweetened Cheerios or ½ cup unsweetened shredded wheat.
  - 1 slice 100% whole grain bread
- Fruit: 2 servings (1 serving = 1 apple, peach, pear, 2 plums, 1 cup fresh/frozen blueberries or raspberries, 2/3 cup fresh/frozen strawberries, 2/3 cup cherries, orange, ½ banana)
- Healthy fat: 1 tablespoon nut butter (peanut, cashew, almond) OR 2 tablespoons seeds or chopped nuts OR 1/4<sup>th</sup> avocado, OR 10-15 olives
- Protein: 1 cup unsweetened soymilk or ½ cup cooked legumes (beans, peas, lentils)

### Lunch

- Large salad (mounded plate full) with several types of greens, beans (cooked kidney, black, garbanzo, edamame, etc.) olives, and every color of vegetable you can find. Use no-oil dressing.
- Healthy Starch (carbs): 2-3 servings: 1 large baked potato OR baked sweet potato OR baked winter squash OR 1-1 ½ cup cooked brown rice OR cooked quinoa OR other cooked whole grain OR 2-3 slices 100% whole grain toast OR 1-1 ½ cup 100% whole grain pasta.
- 1 tablespoon seeds OR chopped nuts OR 1 tablespoon nut butter OR 1/4<sup>th</sup> avocado, OR 10-15 olives

### Supper

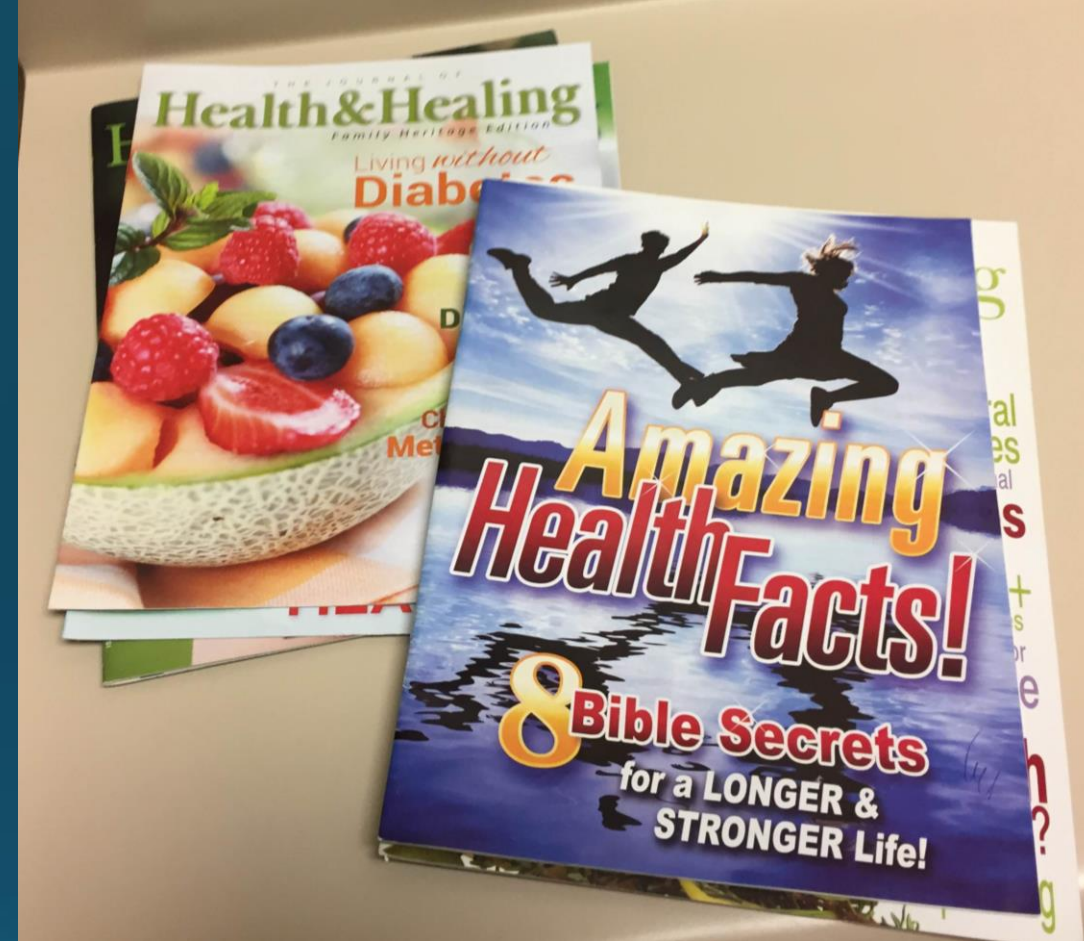
- 2 cups of vegetables of different colors and more salad, if desired.
- OR 1-2 pieces of fruit
- Healthy Starch: 1-2 servings: See list under Lunch.

We do not mark out any precise line to be followed in diet.<sup>1</sup>

1. Ellen G. White, *Counsels on Diet and Foods* 95.4

# Tools

- Sample meal plan
- Recipe file
- Apps—Calorie King, etc.
- <https://www.supertracker.usda.gov>
- Fiber guides
- Magazines
- EHR documentation: saved findings, i.e.
  - “Recommend 3 meals per day, making breakfast the largest meal and supper the smallest.”
  - “Recommend consuming water only between meals unless snacking to treat hypoglycemia.”



# Ellen White on Sleep

- The importance of regularity in the time for eating and sleeping should not be overlooked. Since the work of building up the body takes place during the hours of rest, it is essential, especially in youth, that sleep should be **regular** and **abundant**.<sup>1</sup>
- Sleep is worth far more before than after midnight. Two hours' good sleep **before twelve o'clock** is worth more than four hours after twelve o'clock.<sup>2</sup>

1. Ellen G. White, *Child Guidance* 363.2

2. Ellen G. White, *Manuscript Releases Volume 7*, 224.3

# Sleep Duration and Metabolic Syndrome

- 7-8 hours of sleep/night associated with a lower prevalence of metabolic syndrome.<sup>1</sup>
- Those who report a sleep duration <5 hours have a 1.5 higher odds of having metabolic syndrome.<sup>2</sup>



1. Chaput JP, *et al.* Seven to eight hours of sleep a night is associated with a lower prevalence of the metabolic syndrome and reduced overall cardiometabolic risk in adults. *PLoS One.* 2013 Sep 5;8(9):e72832.
2. Sleep Duration and Metabolic Syndrome. An Updated Dose-Risk Metaanalysis. *Ann Am Thorac Soc.* 2015 Sep;12(9):1364-72.

# Social Jet Lag

- Difference between one's naturally-preferred and socially-imposed sleep schedules<sup>1</sup>
- Social Jet Lag<sup>2</sup>
  - > 60 minutes linked with
    - lower HDL-C
    - higher triglycerides
    - insulin resistance
    - higher waist circumference
    - higher BMI

1. Available at: <http://www.medpagetoday.com/Endocrinology/MetabolicSyndrome/54766>. Accessed on 10/26/16.

2. Wong PM, et al, Social Jetlag, Chronotype, and Cardiometabolic Risk. *J Clin Endocrinol Metab.* 2015 Dec;100(12):4612-20.

# Morningness/Eveningness and Met Synd

- Study of 1620 persons: Morning Type, Evening Type or Neither Type

- Morning Type: Bedtime 10:50 PM, Wake time 5:38 AM

- Evening Type: Bedtime 12:53 AM, Wake time 7:32 AM

No significant difference  
in sleep duration

- **Evening Chronotype** associated with increased risk of
  - Diabetes Mellitus
  - Metabolic syndrome
  - Sarcopenia



# Goal Setting in Clinic

- Specific
- Measurable
- Achievable
- Results-focused
- Timely

Shaw RL, *et al.* Be SMART: examining the experience of implementing the NHS Health Check in UK primary care.  
*BMC Fam Pract.* 2015 Jan 22;16:1

# Trust in God—Bible perspective

- Patient lost 80 lbs over 6 months.
  - Through a church-based program
  - Claimed Bible promises when tempted
- In order rightly to understand the subject of temperance, we must consider it from a Bible standpoint.<sup>1</sup>

1. Ellen G. White, *Child Guidance* 28.3

# Biblical Philosophy & Lifestyle Intervention

- Body as temple of God (I Cor 6:19).
- Taking care of your physical body is a spiritual act of worship. (Rom 12:1).
- Your body is bought with a price, paid for by Jesus. Therefore glorify God in all that you do including what you eat. (I Cor 6:20).
- From the beginning, God did not want humans to eat too much fat or blood. Man's original diet was plants (Gen 1:29, 3:18).
- Strength to eat healthy comes from Christ (Phil 4:13).
- Whatever you do, don't lean on your own understanding-acknowledge God, pray to Him, be willing to listen to Him and He will direct your paths (Prov 3:5.6).
- The righteous falls 7 times and gets up (Proverbs 24:17).
- Whatever you eat or drink, do all to the glory of God (I Cor 10:31).
- The race is not to the swift or the strongest (Eccl 9:11) but to those who endure and lean on the Lord.

The WORD (Wholeness, Oneness, Righteousness, Deliverance): design of a randomized controlled trial testing the effectiveness of an evidence-based weight loss and maintenance intervention translated for a faith-based, rural, African American population using a community-based participatory approach. *Contemp Clin Trials*. 2015 Jan;40:63-73.

# Trust in God—Prayer

- Patient's story
  - T<sub>2</sub>DM
  - BG log improved at follow-up
  - Attributed glycemic improvement to God's power and prayer

