Optimal Lifestyle Choices for Reversing Insulin Resistance, the Metabolic Syndrome, and Type 2 Diabetes: What really works?

Miles Hassell, MD
Medical Director, Department of Integrative Medicine
Providence Cancer Center, Portland, Oregon
www.providence.org/integrativemedicine

Comprehensive Risk Reduction Clinic
Providence St. Vincent Medical Center, Portland, Oregon
www.goodfoodgreatmedicine.com

Co-Author: Good Food, Great Medicine

A real life example:
S.B. 52 yo male

- Presented to urgent care with blurry vision, polyuria, polydipsia
- Long history of dyslipidemia
- Strong family history of type 1 and 2 diabetes
- Consulted with Susanna Reiner, CDE at Providence
- Advised regarding Mediterranean diet, exercise, processed foods and refined carbohydrates
- Text: Good Food, Great Medicine

Initial findings
- Weight 212
- Blood pressure 137/107
- Total cholesterol 217
- HDL 13
- Triglycerides 6701
- LDL ?
- TC:HDL ratio 17
- Random glucose 939
- HbA1c 11.5%

11 months later:
- Weight 155
- Blood pressure 110/70
- Total cholesterol 152
- HDL 39
- Triglycerides 75
- LDL 98
- TC:HDL ratio 3.9
- Fasting glucose 102
- HbA1c 4.9%

S.B. took advice seriously!
Able to stop insulin, fibrates, statins, metformin. Only medicine is ASA

A real hero: S.B.

11 months elapsed between pictures

Mortality and glycemic control: a continuum, not a threshold

Selvin E. et al NEJM 2010;362:800-811

Khaw et al. BMJ. 2001;222:1.
As metabolic syndrome factors increase, so do heart and stroke risk.

Don’t wait for diagnosis of diabetes: risk starts earlier!

Cancer and insulin resistance

- Higher insulin and glucose levels associated with higher cancer mortality
  - 22% increase for every 50mg/dl glucose
  - 41% increase for those with insulin resistance compared to none

- Increased risk for cancer of: breast, colon, endometrium, liver, pancreas
  - 50% higher postop mortality

Combined lifestyle choices mortality outcomes in women

- Good diet (veg >5/d, fruit >4/d, nuts or soy daily, fish/poultry/red meat, cereal fiber >15g/d, rare hydrogenated oils, PS:S >1.0)
- BMI <25: Get a waist!
- 30min/day brisk walking or equivalent
- Light alcohol intake (Consumption of up to 1 drink /day, excluding non-drinkers)
- 31% of cancer, 12% of CAD, 23% of all cause mortality

Causes of insulin resistance

- Diets high in refined carbohydrates and sugars
- Diets low in fiber
- Certain micronutrient deficiencies, like vitamin D, magnesium, carotenoids (vegetables, whole fruit)
- Sedentary lifestyle
- Central obesity and excessive non-muscle weight
- Lack of sleep and alcohol
- Certain medications, aging, smoking
- Choosing parents poorly
And it works in Germany, too!

- 4 health habits:
  - BMI<30,
  - 3.5 h/wk of physical activity
  - High intake of fruit, veg, whole grain, low meat
  - Not smoking
- 93% less diabetes, 81% less heart disease, 50% less stroke, 36% less cancer than those without healthy choices.


The Mediterranean diet lowers:
- Lower total mortality: 8% less for every 2 points greater adherence on a 10 point scale
- Myocardial infarction and stroke: 10%
- Neurodegenerative disease 13%
- Risk of cancer, or cancer death:6% Sofi, F. AJCN 2010;92:1189-96
  - 12% lower incidence in Greek EPIC data Benetou, V. BJ Cancer 2008;99:191-95

Whole-food Mediterranean diet
- Increased use of vegetables and whole fruits daily: ‘5 a day’ is a reasonable minimum, potatoes don’t count
- Increased legumes/beans, raw nuts, coarse whole grain
- Extra-virgin olive oil typically used rather than other vegetable oils and fats
- Increased fish, especially oily fish
- Dairy variable, often whole fat
- Less preserved meats, meat, potatoes
- Not typically low in fat or cholesterol

Mediterranean diet, insulin resistance, and type 2 diabetes
- Mediterranean diet associated with:
  - 31% lower risk of metabolic syndrome overall Meta-analysis of 50 studies, n=534k. Kastorini, CM. JACC 2011;57:1299-313
  - 80% lower risk of developing DM2 in healthy participants Observational, high vs. low adherence, n= 13,380, 4-4y. Martinez-Gonzalez, MA. BMJ 2008;336:1348-53
  - 50% reduction in incidence of metabolic syndrome after 2 years Med diet vs. “prudent low fat diet” p<.001 Esposito, K. JAMA 2004;292:1440-46
Mediterranean diet for preventing DM2
Salas-Salvado, J. et al. PREDIMED-Reus. Diabetes Care 2011;34:14-19

- 418 people with at least 3 CV risk factors, without CV disease, average BMI 30, FPG 100 mg/dl
  - Randomized to 'low fat diet', or
  - Med diet with 7 goals including 1. Increased olive oil
  - Med diet assessed on a 14 point scale

- 51% (adjusted) risk reduction in diabetes incidence at 4y (10% in olive oil group, 11% in nut group, 17.9% in low fat)
  - 70% reduction for those with baseline HbA1c >6.1
  - 6.3% incidence in those who achieved 4+ goals, 15% in those who achieved <4 goals
- Weight loss and physical activity were not interventions, and there was no calorie restriction
- Weight loss and activity similar between groups

Exercise and Diabetes
Benefit of moderate exercise in insulin resistant and type 2 diabetes patients

- Improves β cell function [Slentz, C. Diabetes Care 2009;32:1807-11]
- 30-70% lower risk of developing DM2
- Better blood sugar control, TG
- Lower risk of cardiovascular disease
- Lower total mortality
- Less steatohepatitis [Pessayre Diabetes Care 2007;30:683-88]
- Improved endothelial function [Diabetes Care 2007;30:719]
  - And T cell populations [Diabetes Care 2007;30:716-18]

Exercise, type 2 diabetes and stayin’ alive

- High level of activity associated with >4 years longer life [Jonker Diabetes Care 2006;29:38-43]
- In DM2 men, 1 MET increased exercise capacity improved survival 10% No assoc with BMI N=831 veterans, 4.8y, [McAuley, P Diabetes Care 2007;30:1539-43]
- One fewer death yearly for every 61 diabetics who walk 2 h/week

Exercise: will they do it?

- 340 sedentary patients with DM2, randomized to usual care or 30 min counseling re exercise benefits, 15min telephone call 1mo later, clinic visits q3mo.
  - 69% vs 18% compliance with exercise
  - BMI better by 1, HbA1c by 0.5 in exercise group. [DiLoreto Diabetes Care 2003;26:404-8]

Particular targets for enhancing insulin sensitivity

If your patient doesn’t learn to minimize concentrated carbs, success will be limited

- Most sweets and sweet drinks, including juice
  - Honey (sparingly) is probably the best alternative
- Most refined and finely ground grains
  - Includes most breads, pasta, pastries, crackers
  - Cold breakfast cereals, even ‘whole grain’
- Meal replacement (‘Protein’) bars and drinks
- White rice, potatoes, corn, dried fruit
  - Brown Basmati rice or quinoa likely better

Sweet drinks are harmful: Sugar sweetened and diet drinks!

- 1 soft drink daily, regular or diet, associated with more obesity, central weight gain, higher blood sugar and blood pressure, higher triglycerides, lower HDL [Hungry, R. Circulation 2007;116:608-44]
  - 61% more vasc events [Diet soda. Gardner Int Stroke Conf. 2/11]
- Artificial sweeteners seem to increase total calorie intake through increased appetite [For rats, anyway. Southers, S. Behavioral Neuroscience 2008;122:161-73]
Probiotics, obesity and diabetes

- Probiotics: Friendly microbes, such as bacteria and yeast, in the intestinal tract: ‘gut microbiota’.
  - Prebiotics: Foods that encourage probiotics
- Supplementing pro- and pre-biotics reduce inflammation and insulin resistance
  - Associations with less obesity

Yogurt, kefir, sourdough, sauerkraut, kimchi, fresh whole foods

Dairy foods and type 2 diabetes risk

- Dairy food consumption associated with lower risk of type 2 diabetes
  - Enhances weight loss
  - 9% lower risk per daily serving
  - Insulinotropic effects or increased magnesium?
  - Dairy (incl. whole fat!) associated with less adiposity, lower insulin resistance, dyslipidemia
  - 60% less incident diabetes for highest vs. lowest consumption

Why I think full-fat dairy is OK

- Milk fat biomarkers in blood are associated with a LOWER rate of first heart attacks, especially in women
- CLA, a common dairy fat in cows fed on pasture, associated with lower rates of heart attacks
- So eat low fat dairy if you prefer, but we don’t know of any reason to
  - Eating low fat dairy does not seem to lead to weight loss

Saturated fat is of uncertain risk

- Both epidemiological and randomized prospective studies of dietary saturated fat have had inconsistent results
- Meta-analysis of prospective studies showed no significant association between saturated fat and heart disease
- Increasing evidence suggests that dietary refined carbohydrate may be a greater concern

Nuts and type 2 diabetes

- Less type 2 diabetes (even peanut butter!)
  - 5oz/week, 21-27% reduction
- Almonds improve metabolic syndrome vs pasta, equivalent calories, HgA1c, BMI, girth, fat mass, SBP better
- All nuts, including peanuts, lower cholesterol
  - LDL down 7.4% and TG 10% with 67g of nuts daily
  - Replacing CHO with 75gmounces of nuts daily improves glycemic control and lipids

Another ‘good fat’:

- Fish, fish oil and type 2 diabetes
  - Higher consumption of fish associated with less heart disease in diabetic patients
  - Greatest benefit in those who ate fish 5X/week: 31% less CHD, 37% less mortality
  - No adverse effect on HbA1c
  - 3g (EPA+DHA) reduces triglycerides 30%
  - Tuna salmon, herring, sardines, mackerel.
Red meat in moderate amounts looks OK, preserved meat harmful

- Studies of meat and risk of heart disease, stroke and diabetes
  - 20 studies, 1 million people, 10 countries
- No association between red meat 3-4 oz/day and heart disease, stroke or diabetes
  - <18oz/week red meat safe for cancer risk (AICR 2007) and heart disease (Bernstein, A. Circulation 2010;122:876-883)
- Preserved (‘cured’) meats associated with more heart disease and diabetes
  - Sausages, ham, bacon, lunchmeats
  - Each 50g = 42% more heart disease, 19% more diabetes  – Micha R Circulation 2010 doi:10.1161

Alcohol and type 2 diabetes

- Moderate alcohol consumption associated with lower risk of diabetes
  – Compared to no- or heavy alcohol, Bujuanus, D. Diabetes Care 2009;32:2123-32
- Blood insulin levels and HbA1c lowest with 3-6 drinks/week
  – >50% less risk of heart disease death 1 drink/day.
- Rare drinkers who begin drinking have 25% less risk of DM2. Health Prof Study. Johnston, M. Diabetes 2011;60:74-79
- Serving: 4-5oz wine, 12oz beer, 1.5oz spirits

Coffee, Tea and type 2 diabetes

- DM2 incidence 30-50% lower with coffee:
  – Each cup of coffee associated with 7% less risk
  – Tea and decaffeinated coffee appear to have similar benefit
  – Mochas and caramel lattes are not coffee

Insulin resistance and vinegar

- 20 ml (about 1 tablespoon) apple cider vinegar in water before a meal significantly improved whole body insulin sensitivity in patients with insulin resistance, trend towards benefit in patients with type 2 diabetes
  – Lower post-prandial blood sugars and insulin
  – n=31, single meal, crossover trial, Johnston, Diabetes Care 2004;27:281-2

Chocolate and insulin resistance

- Dark chocolate with polyphenols associated with significantly better
  – Blood sugar and insulin levels with oral glucose tolerance test, systolic blood pressure (108 vs 114 mmHg)
  – Crossover trial, 134, 10g chocolate vs. white chocolate, Grassi Am J Clin Nutr 2005;81:611-14
- Similar study showed increase in HDL and Chol:HDL, but not insulin resistance. Mellor, D. Diabetes Care 2010;33:1316-21
- Eat 70% or higher cocoa content.

Supplements and insulin resistance

- Vitamin D: Higher serum vitamin D associated with improved insulin resistance
  – If little sun give Vitamin D 1-2,000 IU daily. Look for 25-OH D >30 ng/ml. JACN 2004;79:820-5; Diabetes Care 2006;29:650-56
- Chromium and Vanadium: Very inconsistent data, I have not observed value
- Cinammon: early study was odd but promising, subsequent studies showed little or no benefit
Television and health

• Every hour of daily TV:
  – 11% increased risk of premature death,
  – 18% more cardiac death,
  – 9% more cancer deaths  Dunstan D.W. Circulation 2010;121:384-91
  – 19% greater risk of metabolic syndrome  Gao, X. Diabetes Care 2007;30:894-910

• For every 2 hours of daily TV
  – 23% more obesity, 14% more Diabetes (DM2)
  – While 1h/d brisk walking associated with 24% less obesity, 34% less diabetes  Nurses Health, 6y follow up. Hu. JAMA 2005;293:1784-1791

• More TV
  – greater unhappiness  Robins Social Indicators Research 2008

Laugh!

• 20 patients with type 2 diabetes, hypertension, dyslipidemia
  – Control vs. 30 min/day self-selected humor
  – At one year, laughter group had
    – 20% increase HDL
    – 66% lower CRP vs. +3%, -26% in controls. p values not given. Berk, L. Am Physiological Soc. 17 April 2009.
  • “A merry heart doeth good like a medicine…”  Prov 17:22 KJV

Get sleep!

• Experimental sleep restriction causes impaired glucose tolerance  Healthy subjects. Donga, E. J Clin Endocrin 2010;95:2963-68
• Insomnia + sleeping less than 6 h/night had 2-3x risk of DM2  Vgontzas, A. Diabetes Care 2009;32:1980-85
• Often less sleep due to
  – TV, Internet, occupational work  Gotlib Anti-sleep Med 2006;7:487-491
  – Sleep apnea  Touma, C. Cleveland Clin J. 2011;78:1-49
• Excessive sleep also increases DM2 risk 9-10 h. Yaggi Diabetes Care 2006;29:57-61

Create a plan for the patient

• What are the patient’s goals?
  – Discuss life in 10, 20 years
• Educate regarding the disease, complications, and modest benefits of pharmacological therapy
• Review the power of diet and exercise
  – Educate regarding whole-food Med diet
  – It need not be low fat!
• Written plan, with specific goals, frequent follow-up

Modified Whole Food Mediterranean Diet

• Emphasize: vegetables, nuts, seeds, fish, dairy, beans/legumes, other animal proteins, minimally processed whole grains
• Minimize refined grain foods and concentrated starches (‘high glycemic load’): Breads, pasta, polenta, potatoes, rice
• Avoid sweets, sweet drinks, even if ‘diet’.
• Mixed meal effect: fat and protein with every meal and snack
• Second meal effect: Frequent small meals

Exercise

• The best exercise: the one the patient does
• What will patient do? What do they like?
  – Consider pedometer
  – 10 minutes 3 times/day might be a great start
• Exercise for health, not weight loss
• Exercise daily
• Tell the patient what YOU do!
Weight loss

• Take a dietary history – I use 3 day history
  – Food and activity journal helps
• Daily weights, call weights to office weekly
  – 1lb/week weight loss
• Bring own lunch to work, make own food
• Frequent follow up with a health professional, and/or a sturdy unpaid buddy
  – Ask: What did and didn’t work, and why?
• Cut all portions 10-20%

How health care professionals can make a difference…

• Be an example of good lifestyle choices
• Have written materials for the patient
• Clarify for the patient why the management of Insulin Resistance and Type 2 Diabetes needs more than medication
• Put the patient in charge, hold them accountable
• Avoid dumb rules from big committees

Recommended reading

• The New Mediterranean Diet Cookbook A Delicious Alternative for Lifelong Health - Nancy Harmon Jenkins
• Food Rules, An Eater’s Manual – Michael Pollan
• The Schwarzbein Principle – Diana Schwarzbein, MD
• The South Beach Diet – Arthur Agatston, MD
• The Diabetes Solution - Richard Bernstein, MD
• Good Food, Great Medicine - Miles Hassell, MD and Mea Hassell
  – See recommended reading on page 34 for additional book reviews and recommendations