The PCOS-Diabetes Connection: Prevention and Management

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Statistics about Diabetes: Center for Disease Control 2014

- 29.1 million children and adults with diabetes in the US → 9.3% of population

- 21 million diagnosed, 8.1 million undiagnosed (27.8%)

- Number of diagnosed cases is five times higher than it was in 1980’s when there were 5.6 million cases

- Estimates are that diabetes affects 1:400 children and adolescents; 25.9% of people age 65 and older
Diabetes is an equal opportunity disease!

- 13.6% of men and 11.2% of women over age 20
- 7.6% of non-Hispanic whites
- 9.0% of Asian Americans
- 12.8% of Hispanics
- 13.2% of non-Hispanic blacks
- 15.9% American Indians/Alaskan Natives

If trends continue, according to the CDC 1 in 3 children born in 2000 will develop diabetes in their lifetime.
Diabetes could crush our healthcare system!

- In 2012 the total cost of diagnosed diabetes in the US was $245 billion \( \rightarrow \) 41% increase since 2007.

- Medical expenses for those with diabetes estimated to be **2.3 times higher** than for those without diabetes.

*Overall economic costs of dealing with diabetes is about 1/3 of what was budgeted for national defense in 2012!*
What about Prediabetes?

- Body is struggling to maintain normal glucose levels but has not yet progressed to T2 diabetes

- Though not yet diabetes, prediabetes starts to affect your circulatory system and increases your risk of heart attack, stroke, kidney disease, vascular eye problems, and possibly cognitive decline.

Without lifestyle change, 15 - 30% of people with prediabetes will be diabetic within 5 years (ultimately up to 70%).
Estimates from the Centers for Disease Control

• 79 million Americans—35% of adults aged 20 years and older (1:3) —have prediabetes.

• **Half of all Americans** 65 and older have prediabetes.

  Shockingly, about 90% of people with prediabetes are unaware they have it!
What causes prediabetes/diabetes?

- A “collision” between our Stone-age genetic tendency towards physical self-preservation and our modern day food-infused, sedentary lifestyle.

- “Good gene gone bad” – highly inflammatory diet (refined carbs, sugars, saturated fats, excess calories in general) lacking enough protective phytonutrients from plants, healthy fats, and whole, unprocessed food in general

- Sedentary lifestyle is lighter fluid on the fire
** May be diagnosed with a random glucose > 200 mg/dl in patient with classic symptoms of hyperglycemia **
PCOS and Diabetes

- Research suggests upwards of 50% of women with PCOS will have prediabetes or diabetes by age 40 *; the incidence of diabetes in adolescents with PCOS is comparable to that seen in adults.

- In the US, 40.5% of PCOS-related health care spending involves treatment and management of type 2 DM \( \rightarrow \) Androgen Excess Society recommends oral GTT every other year w/ PCOS dx.

Avoiding diabetes is the best thing you can do for your heart!

- One study from England compared women with PCOS to same age controls over twenty years and found the prevalence of heart attack in women age 45-54 was 1.9% for PCOS women compared to 0.2% in women without PCOS *

- If you have diabetes, you are at least twice as likely to have heart disease or a stroke, and they tend to occur earlier in life

- Insulin resistance and diabetes are associated with high triglycerides, high LDL cholesterol, and low high-density lipoprotein (HDL) cholesterol concentration

PCOS and Gestational Diabetes

- Women with PCOS are higher risk of gestational diabetes (GDM) due to preexisting insulin resistance

- Immediately after pregnancy, 5 to 10 percent of women with GDM are found to have diabetes, usually type 2

- Women with h/o GDM have a 35 - 60 percent chance of developing diabetes in the next 10 to 20 years, particularly if they don’t lose their baby weight

- PCOS women with a history infertility appear to be at particularly high risk for gestational diabetes

→ Children born to mom’s with GDM may be at increased risk for obesity and type 2 diabetes later in life compared to other children.

* National Diabetes Education Program http://ndep.nih.gov/media/fs_post-gdm.pdf
What causes diabetes?

*Insulin Resistance*

- Physiologic condition where pancreas produces insulin but muscle, fat, and liver cells do not respond properly to it.

- Increasing demand for insulin from pancreatic beta cells over time → beta-cell fatigue and ultimately elevated blood sugar.

- Elevated circulating levels of insulin encourage storage of “belly fat” and make people hungry!

- Major causes → excess weight (particularly visceral adiposity) and physical inactivity.

*Insulin resistance is believed to be present in the majority of women with PCOS; seen in both healthy weight and overweight women with PCOS, but worsens with weight gain.*
Why is insulin resistance so common?
Not completely understood, but prevailing theory ...

- In evolutionary history, IR was likely essential to survival by redirecting nutrients (like glucose) to critical organs (like the brain) in times where living conditions were stressful (famine, infection, injury)

  → This adaptation to an ancient lifestyle, where food scarcity and physical stress/injury were common, has driven evolution to shape and preserve a thrifty genotype.

- In modern times, this same mechanism may be inappropriately activated due to a different kind of physiologic stress – our obesogenic environment – leading to hypertension, insulin resistance and diabetes (“good gene gone bad”)
Bottom Line: It’s in our genes

- Human evolution is slowwwwww... .
- Modern life is imposing on our bodies, among other things, a lot of physiologic stress (chronic inflammation, oxidation), in the setting of a an inadequate defense due to our nutrient-poor diet and sedentary lifestyle → triggering a host of health problems, including insulin resistance/diabetes, CVD, cancer and cognitive decline.

*We need to learn how to*

*work with our genetics when our environment works against us!*
Diabetes: The 800# Gorilla of Healthcare - time to take it seriously!

“It wasn’t really insulin. You don’t have diabetes yet. It was just a warning shot.”
NOW FOR THE GOOD NEWS!!!

DIABETES IS
LARGELY PREVENTABLE!!!

Any delay in the development of diabetes is worth it!
Diabetes Prevention Program (DPP)

Followed on the heels of the 1986 Da Qing study (577 subjects) and the 1993-2001 Finnish Diabetes Prevention Program (522 subjects)

- DPP 3234 non-diabetic patients with prediabetes from 27 US clinical centers
- Average age 51, mean BMI 34
- 45% from minority groups at higher risk of DM
- Treatment arms:
  - Lifestyle recommendations plus metformin
  - Lifestyle recommendations plus placebo
  - Intensive lifestyle intervention in diet, activity and behavior modification

*Long-Term Benefits From Lifestyle Interventions for Type 2 Diabetes Prevention, Jaakko Tuomilehto, Diabetes Care, Vol 34, suppl 2, May 2011
http://care.diabetesjournals.org/content/34/Supplement_2/S210.full
DPP continued ....

- Goal of the lifestyle intervention was **7%** weight loss through low cal, low fat diet; exercise 150 minutes per week taught through a 16 week curriculum spread over 24 weeks followed by monthly follow up

- Program designed to be flexible and individualized

- Average fu 2.8 years
Incidence of diabetes was **58% lower** in the intensive lifestyle intervention group

Diabetes 31% lower in the metformin group

Over the almost 3 year period:

- 28.9% of the placebo group and 21.7% of the metformin group developed diabetes, compared to only 14.4% of intensive lifestyle group

- Weight loss was primary influence

- For those 65 and older, *DM down by 71%*

- Additional f/u 5 & 10 years later showed continued benefits
Best diet therapy for diabetes prevention in PCOS?

- Basically whatever works for weight loss - though research suggests higher protein/lower carb diets emphasizing low Glycemic Load (GL) choices may facilitate fat loss and improve metabolic dysfunction.

- Protein promotes satiety, requires less insulin, helps preserve lean mass during weight loss.

- Important to encourage high intake of vegetables and whole fruits, as well as healthy fats, to help curb intake of excessive starch-based carbs and refined sugars.

- Research does not support high protein/low carb diets which may be high in animal fat and promote hypoglycemia/binging.

- Avoid all beverages with added sugars!
“God sent Adam and Eve out of the garden because of the apple. Apples have carbs and carbs are evil!”
Muting post-meal glucose/insulin response is key → goal should be “rolling hills” glucose fluctuations where too often we get mountains and valleys!
“Balanced Plate”

ChooseMyPlate.gov
For the Balanced Plate to work, focus on Low GL Foods and the Two Q’s: Quality and Quantity

- Larger portions of carbs spike glucose/insulin levels
- Mediterranean or DASH dietary pattern moderate in carbs
- Encourage experimentation with alternative whole grains
- Whole fruit associated with reduced risk DM *
- Load up on **non-starchy** vegetables; know your starchy vegetables!
- Encourage healthy fat intake → Mediterranean diet sources, fish
- *Eating sweets can encourage ongoing cravings* → dose dependent glucose/insulin response

* Fruit consumption and risk of type 2 diabetes: results from three prospective longitudinal cohort studies, **BMJ.** 2013 Aug 28;347 http://www.ncbi.nlm.nih.gov/pubmed/23990623
Carbohydrate Distribution

B: 45-60 gm  L: 45-60 gm  D: 45-60 gm

S: 15-30 gm  S: 15-30 gm

- Pair carbs with lean protein/healthy fats whenever possible
- Per meal carb goals may be higher with men or active women

** Efficacy of this approach dependent on good understanding of portions and label reading
Ditch the Cheese It’s and Nutrigrain Bars! Snacking on straight carbs will only make you more hungry!

Opt for carb/protein snacks:

- ½ ounce whole grain crackers and an ounce of reduced fat cheese or T peanut butter
- ½ c 1% or nonfat cottage cheese and fruit or crackers
- ½ turkey sandwich on light whole grain bread
- Small whole wheat pita and 2 T hummus
- 1 T peanut butter on an apple or small banana
- Plain non-fat Greek yogurt flavored with pureed fruit
Exercise and Insulin Resistance

- Exercise naturally encourages cell glucose absorption
- Exercise helps quell inflammation *
- Strongly encourage strengthening exercise in addition to cardio → more muscle a body has, the more glucose it can burn to control blood glucose levels.


Take Home Message:

- The same things you do to lose weight will help reverse prediabetes, manage PCOS and improve fertility.
- Many people find it’s easier to eat less/lose weight if they eat a bit more protein/healthy fat as it helps curb carbohydrate cravings (and blunt their insulin response).
- Exercise is a necessary function of the human body to maintain health and prevent disease.
- Behavior change is a flawed process that requires us to learn from mistakes, not use them as a reason to stop trying to make change.
- If you treat your body according to the genetic “manual” we’re all born with, you will feel better in your body every day!
The PRE-DIABETES DIET PLAN

How to Reverse Prediabetes and Prevent Diabetes through Healthy Eating and Exercise

HILLARY WRIGHT, M.Ed, RD
Foreword by Elizabeth M. Ward, MS, RD

THE PCOS Diet Plan
A Natural Approach to Health for Women with Polycystic Ovary Syndrome

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Foreword by Alice Domar, PhD, Director of Mind/Body Services at Boston IVF