Dietary Recommendations for Diabetes Prevention and Management

Neal D. Barnard, MD
George Washington University School of Medicine
Physicians Committee for Responsible Medicine

Caroline Trapp, MSN, ANP-BC, CDE, FAANP
Premier Internists, Division of Millennium Medical Group, P.C.
Physicians Committee for Responsible Medicine
Goals

1. Prevent type 2 diabetes.
2. Improve type 2 diabetes management.
3. Reduce the risk of complications.
Limitations

1. Limited to type 2 diabetes

2. Limited to dietary intake (no guidance on body weight, physical activity, etc.)

3. Subject to revision
Suggested Nutrition Guidelines

1. Plant-based foods should be the primary diet staples.

2. Added oils and oily foods should be minimized.

3. Favor low glycemic index foods.

4. Sodium intake should be limited.

5. Have a reliable source of vitamin B12.
Plant-Based Staples

1. Vegetables, legumes (beans, peas, and lentils), fruits, and whole grains should replace meats and dairy products as primary staples of the diet.
Diabetes Prevalence in Japan

In adults over age 40:

Prior to 1980: 1-5%

By 1990: 11-12%

Adventist Health Study – 2

60,903 participants, aged ≥30, enrolled 2002-2006

Adventist Health Study – 2

Effect of Red and Processed Meats

- 37,083 men (Health Professionals Follow-Up Study)
- 79,570 women (Nurses’ Health Study I)
- 87,504 women (Nurses’ Health Study II)

- Adjusted for age, BMI, other factors

Diabetes Risk per 1 Daily Serving

Unprocessed meat: 1.12 (1.08, 1.16)

Processed meat: 1.32 (1.25, 1.40)

Total red meat: 1.14 (1.10, 1.18),

Meta-analysis for Red and Processed Meats

442,101 participants
28,228 diabetes cases

Diabetes risk per 100g serving per day

Unprocessed Red Meat

<table>
<thead>
<tr>
<th>Study ID</th>
<th>Relative Risk (95% CI)</th>
<th>% Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Song 2004 (27)</td>
<td>1.14 (1.00, 1.30)</td>
<td>10.22</td>
</tr>
<tr>
<td>Montonen 2005 (28)</td>
<td>0.87 (0.70, 1.08)</td>
<td>8.79</td>
</tr>
<tr>
<td>Villegas 2006 (29)</td>
<td>0.76 (0.66, 0.88)</td>
<td>10.11</td>
</tr>
<tr>
<td>Schulze 2007 (30)</td>
<td>1.30 (0.95, 1.79)</td>
<td>7.03</td>
</tr>
<tr>
<td>Steinbrecher 2010 (M, 31)</td>
<td>1.68 (1.54, 1.83)</td>
<td>10.84</td>
</tr>
<tr>
<td>Steinbrecher 2010 (F, 31)</td>
<td>1.62 (1.42, 1.85)</td>
<td>10.23</td>
</tr>
<tr>
<td>Mannisto 2010 (32)</td>
<td>1.32 (1.14, 1.52)</td>
<td>10.11</td>
</tr>
<tr>
<td>HPFS</td>
<td>1.18 (1.07, 1.30)</td>
<td>10.70</td>
</tr>
<tr>
<td>NHS I</td>
<td>1.11 (1.05, 1.17)</td>
<td>11.15</td>
</tr>
<tr>
<td>NHS II</td>
<td>1.20 (1.10, 1.31)</td>
<td>10.82</td>
</tr>
<tr>
<td>Overall (I-squared = 93.3%, p = 0.000)</td>
<td>1.19 (1.04, 1.37)</td>
<td>100.00</td>
</tr>
</tbody>
</table>

NOTE: Weights are from random effects analysis
Processed Red Meat

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<th>Relative Risk (95% CI)</th>
<th>% Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Song 2004 (27)</td>
<td>1.60 (1.00, 2.56)</td>
<td>7.12</td>
</tr>
<tr>
<td>Montonen 2005 (28)</td>
<td>1.13 (0.91, 1.40)</td>
<td>10.86</td>
</tr>
<tr>
<td>Schulze 2007 (30)</td>
<td>1.20 (1.03, 1.40)</td>
<td>11.60</td>
</tr>
<tr>
<td>Steinbrecher 2010 (M, 31)</td>
<td>1.90 (1.72, 2.10)</td>
<td>12.14</td>
</tr>
<tr>
<td>Steinbrecher 2010 (F, 31)</td>
<td>2.31 (1.95, 2.74)</td>
<td>11.42</td>
</tr>
<tr>
<td>Mannisto 2010 (32)</td>
<td>1.12 (1.06, 1.19)</td>
<td>12.43</td>
</tr>
<tr>
<td>HPFS</td>
<td>1.67 (1.41, 1.98)</td>
<td>11.41</td>
</tr>
<tr>
<td>NHS I</td>
<td>1.53 (1.36, 1.72)</td>
<td>11.97</td>
</tr>
<tr>
<td>NHS II</td>
<td>1.55 (1.27, 1.89)</td>
<td>11.05</td>
</tr>
<tr>
<td>Overall (I-squared = 94.3%, p = 0.000)</td>
<td>1.51 (1.25, 1.83)</td>
<td>100.00</td>
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NOTE: Weights are from random effects analysis
Plant-Based Diet for Type 2 Diabetes

Low-fat low-GI vegan diet vs ADA guidelines

22-week study, 1-year follow-up

n = 99


Funding: NIDDK; Diabetes Action Research and Education Foundation
Hemoglobin A1c at Baseline and at 11 and 22 Weeks

(n = 49 vegan, 50 ADA)

Week 0 | Week 11 | Week 22
6.5    | 7.0    | 7.5
7.0    | 7.33   | 7.34
7.34   | 7.33   | 7.37
8.0    | 8.05   | 7.08
8.5    | 7.93   |

P = .089
Hemoglobin A1c at Baseline and at 11 and 22 Weeks

Individuals with no medication changes, n = 24 vegan, 33 ADA

P = 0.01

A1c (%)
Cardiac Events* per Person Over 5-Year Follow-Up

2.25
Control

0.89
Intervention

*MI, angioplasty, bypass, cardiac-related hospitalization, or cardiac-related death.

How Do Plant-Based Diets Reduce DM Risk?

Plant-based foods are typically low in fat and high in fiber and complex carbohydrate.

Reduced energy density promotes weight control.

Lower-fat foods help reduce intracellular lipid accumulation, promoting insulin sensitivity.
Plant-Based Diets Reduce CV Risk Factors

Lower body weight\(^1\)
Lower BP\(^2\)
Improved lipid profile\(^3\)


How Do Meat-Based Diets Increase Diabetes Risk?

Energy-density promotes weight gain.

Increases intracellular lipid

Heme iron

Nitrates in processed meats
What about Fish?
Fish and Diabetes Risk

- Nurses’ Health Study
- Nurses’ Health Study 2
- Health Professionals Follow-Up Study

- 195,204 adults
- Followed 14-18y

Fish and Diabetes Risk

Compared with < 1 serving/month:

2-4 servings/week: 1.17 (1.07, 1.28)

≥ 5 servings/week: 1.22 (1.08, 1.39)

2. Minimize Oil

The use of added oils and fried foods should be minimized.
Reducing Fat Intake

9 calories per gram
Reducing Fat Intake

Meta-analysis, 2012

57,735 participants

Study durations: 6m – 8y

Low-fat diets reduced weight by 1.6 kg (−2.0, −1.2).

3. Low-GI Foods

In choosing carbohydrate-containing foods, favor those with a low Glycemic Index.
GI and Glycemic Control

Meta-analysis

7 randomized trials, 457 participants

HbA1c with low-GI diet:  -0.4 % (-0.7, -0.20)

GL and Coronary Events

Meta-analysis

10 studies; 240,936 participants

CHD risk for highest GL quantile compared with lowest: RR=1.27 (1.09, 1.49)

4. Limit Sodium

Sodium intake should be limited to 1,500 milligrams per day.

Limiting Sodium Reduces BP

Meta-analysis
34 trials, 3230 participants

Modest salt reduction ≥4 weeks:

Systolic: -4.18 mmHg (-5.18, -3.18)
Diastolic: -2.06 mmHg (-2.67, -1.45)

Limiting Sodium Prevents CV Events

Trials Of Hypertension Prevention
TOHP I: 744 participants
TOHP II: 2382 participants
Sodium reduction of 25-35%
Risk of CV event: 0.70 (0.53, 0.94)

5. Vitamin B12

A reliable source of vitamin B12, such as fortified foods or a supplement providing at least the recommended daily allowance (2.4 mcg per day for adults), should be taken daily.
Causes of Low B12

Older age
Use of acid-blockers
Use of metformin
Vegan diets
Bariatric surgery
Celiac disease
Crohn’s disease
Call to Action

17 YEARS??!!

RESEARCH ➞ PRACTICE

17.9 million ➞ 51.7 million

NEW CASES 2015 ➞ NEW CASES 2030

IOM, 2001, p 364
Evidence Supports the Acceptability of Plant-Based Diets

- No calorie limits
- No portion limits
- No carbohydrate counting*
- Health benefits foster adherence

Nutritional Adequacy

- Protein
- Iron
- Omega 3 Fatty Acids
- Calcium
- Vitamin D

A Lesson from Tobacco

20,679* Physicians say "LUCKIES are less irritating"

"It's toasted"
Your Throat Protection against irritation against cough

"I'm going to grow a hundred years old!"

More Doctors smoke Camels than any other cigarette!

According to a recent nationwide survey
Tobacco Today

WARNING
TOBACCO SMOKE HARMS YOUR BABY

MICHIGAN SMOKER’S QUIT KIT

PCRM
Where to begin? 7 Best Practices

• Involve the whole family.
• Walk the walk.
• Diet is first-line, medications as “alternative.”
• Be optimistic.
• Everyone needs some nutritional counseling.
• Find an expert.
• Keep it evidenced-based.

Type 2 diabetes and the vegetarian diet

... Nevertheless, it is for the reduction of cardiovascular risk that plant-based diets have attracted the most interest in LDL cholesterol of 25–30% in healthy subjects on vegan diets based on... in the diets of vegetarians and more particularly in the diets of vegans compared with...

Cited by 154 Related articles All 11 versions Cite Save

A low-fat vegan diet improves glycemic control and cardiovascular risk factors in a randomized clinical trial in individuals with type 2 diabetes
ND Barnard, J Cohen, DJA Jenkins... - Diabetes Care, 2006 - Am Diabetes Assoc

... soleus muscle intramyocellular lipid concentrations were significantly lower in a group of 21 vegans compared with... to 22 weeks for full sample: P = 0.01 for medication-stable participants (vegan vs... G, Lanou AJ, Glass J: The effects of a low-fat, plant-based dietary intervention on...

Cited by 182 Related articles All 23 versions Cite Save

Type of vegetarian diet, body weight, and prevalence of type 2 diabetes
S Tonstad, T Butler, R Yan, GE Fraser - Diabetes Care, 2009 - Am Diabetes Assoc

... Some evidence indicates a temporal relationship between initiating plant-based diets and... of dietary exposures and included one of the largest numbers of vegans studied in... Diabetes may have been underreported in the vegan and other vegetarians because of...

Cited by 147 Related articles All 15 versions Cite Save

A low-fat vegan diet and a conventional diabetes diet in the treatment of type 2 diabetes: a randomized, controlled, 74-wk clinical trial

... In clinical trials, the use of plant-based diets is associated with weight re... A vegan diet may also be associated with reductions in intramyocellular lipid, which is strongly...
Ask, “What will you eat today?”

- Breakfast
  - Images of breakfast foods
- Lunch
  - Images of lunch foods
- Dinner
  - Images of dinner foods
Final Considerations for Practice

• With diet change medications may produce:
  – Low blood sugar
  – Low blood pressure

• Consider greens and blood thinners

• Instruct patient to work with HCP on medication adjustments.

• Remember Vitamin B12
Resources for Patients

• Free downloadable resources (PCRM.org/Lit)
• 21-Day Kickstart (21DayKickstart.org)
• Books, DVDs, etc. (PCRM.org/shop)
• Food for Life classes (PCRM.org/FFL)
Resources for HCP

- Nutrition education curriculum (PCRM.org/Curriculum)
- Free continuing education credits (NutritionCME.org)
- Nutritional considerations for various disease states (NutritionMD.org)
- Posters and literature to promote healthful eating (PCRM.org/Nurses and PCRM.org/lit)
- Breaking Medical News alerts
- Conferences on nutrition and health
Thank You
Diabetes Nutrition Guidelines Summary

- Plant-based foods should be the primary diet staples.
- Added oils and oily foods should be minimized.
- Favor low glycemic index foods.
- Sodium intake should be limited.
- Have a reliable source of vitamin B12.
Diabetes Nutrition Guidelines Summary

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