Plant-Based Diets for Preventing & Managing Type II Diabetes

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Outline

WHY IS THIS IMPORTANT?

DIABETES REVIEW & PLANT-BASED DIET REVIEW

DISCUSS CURRENT RESEARCH

WHAT CAN THE RD DO?

Type 2 Diabetes: What

- Chronic condition that results in too much sugar in the blood
- Risk factors
  - Overweight/obese
  - Sedentary lifestyle
  - Family history
  - Age, race
- Symptoms
  - Increased hunger, thirst, urination
  - Blurred vision
  - Poor wound healing
  - Fatigue

Type 2 Diabetes: Why It Matters

- 30 million adults with T2D
- 85 million with prediabetes
- Methods to manage diabetes:
  - Regular blood glucose monitoring
  - Weight loss
  - Diet & exercise
    - Carbohydrate counting
  - Medication, insulin
    - Individual cost ~ $9,000 per year

Past Research

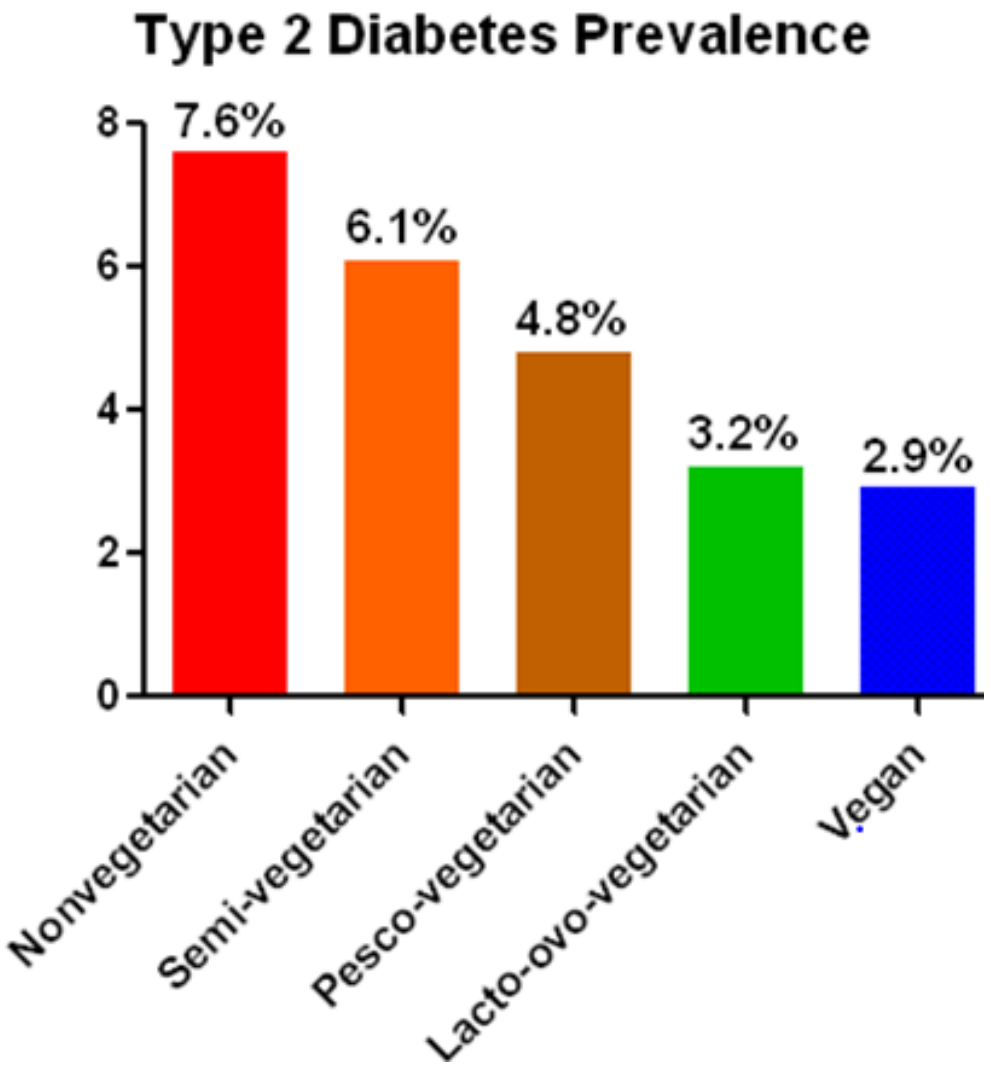


Image courtesy of Physicians Committee for Responsible Medicine

- Prevention:
  - Diabetes prevalence 46-74% lower on a plant-based diet (McMacken, 2017)
- Management:
  - Reduced glycemia
  - Reduced blood pressure & lipids
  - Weight loss

The Whole-Foods, Plant-Based Diet

- Excludes animal products
- Emphasizes primarily natural, complete foods
- Low in fat, cholesterol, calories
- High in micronutrients, fiber, water

Image courtesy of nutritionfacts.org

A Typical Day

- **Breakfast:** Avocado Toast & Smoothie
- **Lunch:** Garden Stir Fry
- **Dinner:** Vegetable & Hummus Wrap
- **Snacks:** Chia Seed Pudding, Popcorn, Fruit Salad

Images courtesy of Cooking Light

Study 1: A Plant-Based Dietary Intervention Improves Beta-Cell Function and Insulin Resistance in Overweight Adults: A 16-Week Randomized Clinical Trial

Authors: Kahleova H., Tura A., Hill M., Holubkov R., & Barnard N

Journal: Diabetes Journal

Date: July 2018

Study 1: Research Purpose

Could a plant-based dietary intervention improve beta-cell function & insulin sensitivity in overweight adults with insulin resistance, but no history of diabetes?

Study 1: Participants

- 75 participants, 25 – 75 years old
  - Inclusion:
    - Overweight / obese (BMI 25-40)
  - Exclusion:
    - History of diabetes
    - Current vegetarian or vegan diet

Study 1: Design

- Randomly assigned to intervention or control group for 16 weeks
  - No changes to physical activity or medications
  - Kept a diet record
- Intervention group:
  - n = 38
  - Low-fat, vegan diet & B12 supplement
- Control group:
  - n = 37
  - No changes to diet

Kahleova H., Tura A., et al.

Study 1: Measurements

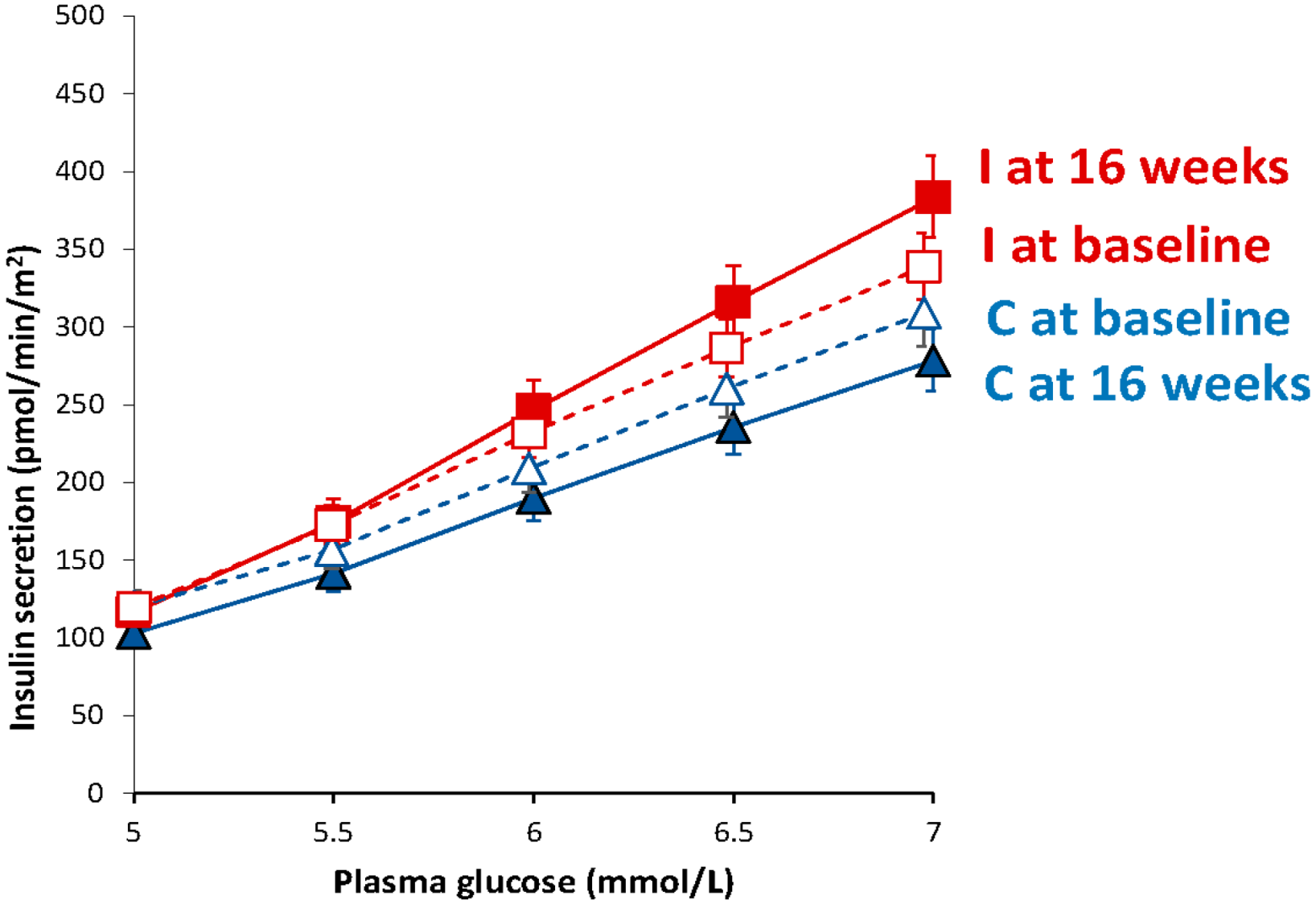
Primary outcomes

- Beta-cell function
- Insulin resistance

Secondary outcomes

- Anthropometrics
- Cholesterol
- Plasma glucose

Study 1: Results



Kahleova H., Tura A., et al.

Study 1: Results

Variable	Control Baseline	Control Week 16	Intervention Baseline	Intervention Week 16	P-value
BMI	33.6	33.4	33.1	31.2	**<0.001**
Lean Mass (kg)	49.8	48.8	50.6	48.3	**0.002**
Fat Mass (kg)	39.1	39.5	42.0	38.1	**<0.001**
Visceral Fat Volume (cm^3)	1434	1459	1289	1090	**<0.001**
Cholesterol (mmol/L)	5.4	5.3	5.4	4.8	**0.02**
Fasting Glucose (mmol/L)	5.5	5.6	5.3	4.9	**<0.001**

Kahleova H., Tura A., et al.

Study 1: Analysis

Strengths

- Randomized, parallel design
- Ample time to adjust to diet
- Low attrition
- Applicable outside research setting

Limitations

- Self-reports
- Diet records only at baseline & 16-weeks
- Doesn’t assess long-term effects

Study 1: Conclusions

A low-fat, plant-based diet for diabetes prevention addresses both pathophysiologic mechanisms of diabetes: beta-cell dysfunction & insulin resistance.

Kahleova H., Tura A., et al.

Study 2:
The BROAD Study: A Randomized Controlled Trial Using a Whole Food Plant-Based Diet in the Community for Obesity, Ischemic Heart Disease or Diabetes

Authors: Wright N., Wilson L., Smith M., Duncan B., & McHugh P.

Journal: Nutrition & Diabetes Journal

Date: March 2017

Study 2: Research Purpose

Can a community-based education program on a whole-food, plant-based diet affect BMI & cholesterol in community-dwelling adults?

Study 2: Participants

- 65 participants from general practice clinic
  - Inclusion:
    - Overweight / obese (BMI 25-40)
    - Diagnosis of 1+ :
      - T2D
      - Heart disease
      - Hypercholesterolemia or hypertension
  - Exclusion:
    - Life-threatening comorbidities
    - Mental health disorders

Wright N., Wilson, L., et al.

Study 2: Design

- Randomly assigned to intervention or control group for 12 weeks
- Intervention group:
  - n = 33
  - Attend plant-based nutrition education program
  - Follow non-energy restricted, plant-based diet & B12 supplement
- Control group:
  - n = 32
  - Receive normal medical care

Wright N., Wilson, L., et al.

Study 2: Measurements

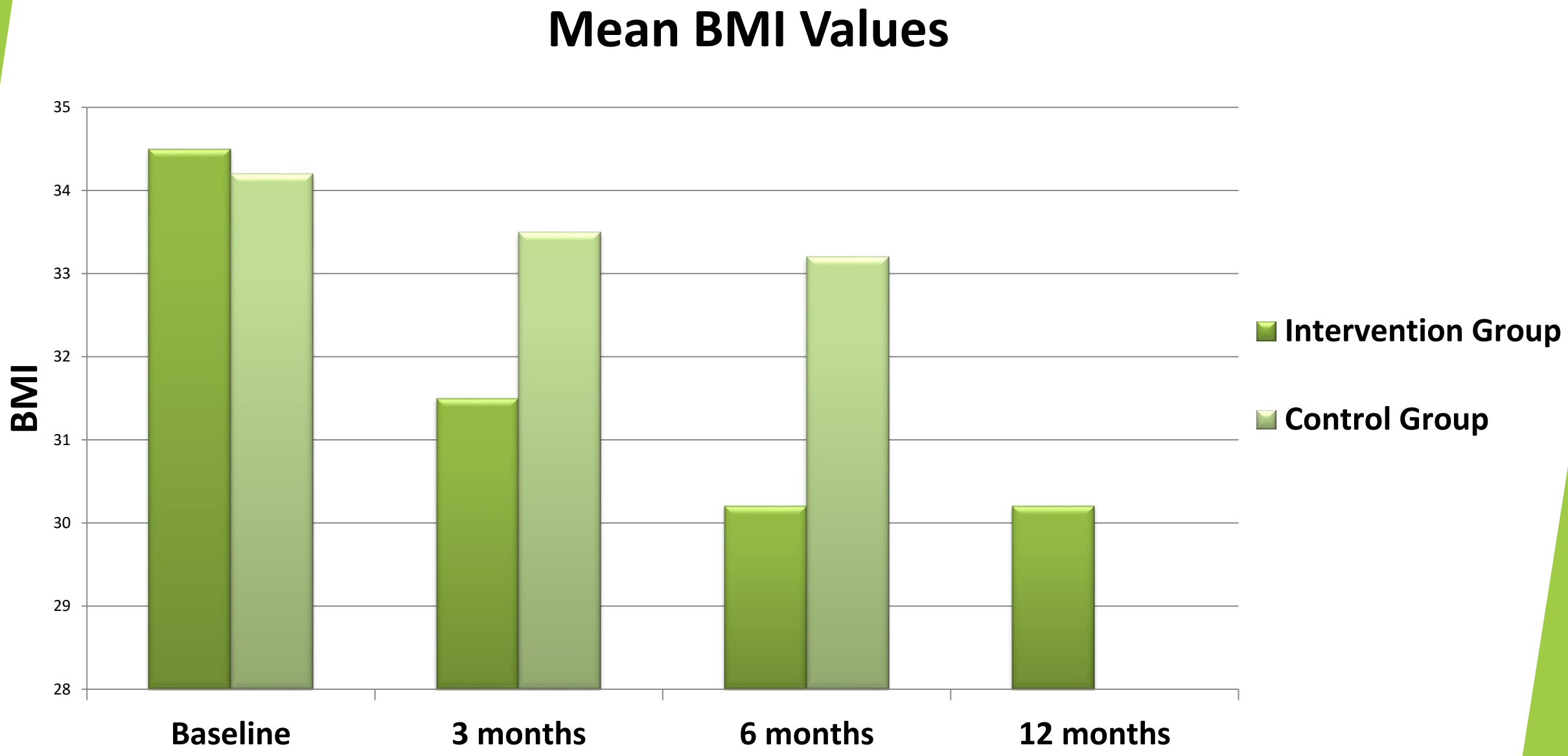
Primary outcomes

- BMI
- Cholesterol

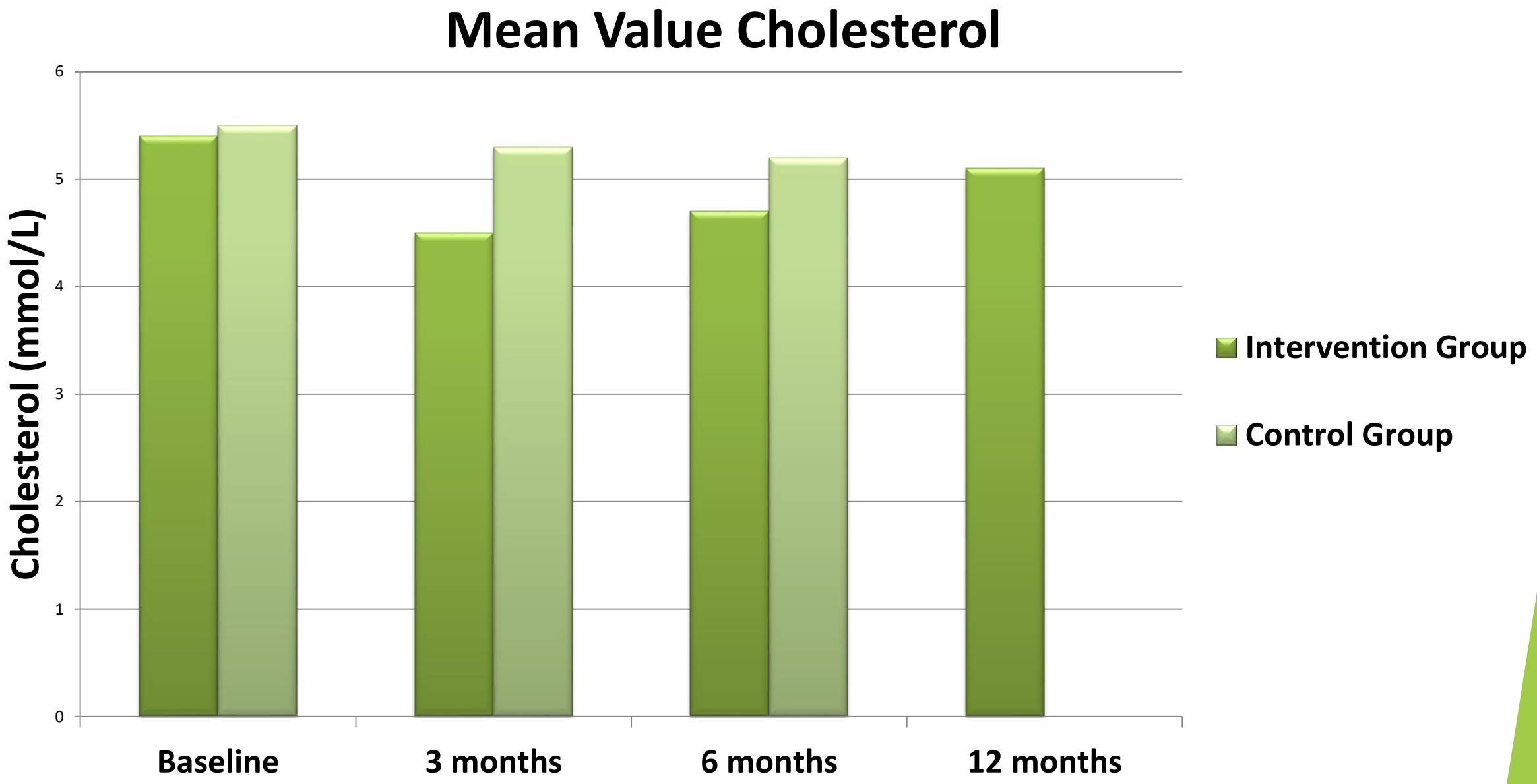
Secondary outcomes

- Changes in medication use
- Quality of life
- CVD risk factors

Study 2: Results



Study 2: Results



Study 2: Results

- Control Group:
  - 8% increase in medications
  - QoL: physical improvement at 6 months
- Intervention Group:
  - 29% decrease in medications
  - QoL: physical & mental improvement at 6, 12 months
  - Decreased CVD risk factors (p=0.02)

Wright N., Wilson, L., et al.

Study 2: Analysis

Strengths

- Randomized trial
- 2-week washout period
- Applicable outside research setting
- Low attrition

Limitations

- All participants received some plant-based diet education
- Control group received increased testing

Wright N., Wilson, L., et al.

Study 2: Conclusions

A 12-week plant-based nutrition program lead to significant & sustainable reduction of metabolic comorbidities at all measurement points, compared to those receiving normal care.

Wright N., Wilson, L., et al.

Study 3: A Plant-Based Meal Stimulates Incretin & Insulin Secretion More Than an Energy- & Macronutrient-Matched Standard Meal in Type 2 Diabetes: A Randomized Crossover Study

Authors: Kahleova H., Tura A., Klementova M., Thieme L., Haluzik M., Pavlovicova R., Hill M., & Pelikanova T.

Journal: Diabetes Journal

Date: February 2019

Study 3: Research Purpose

What are the effects of M-meal versus a V-meal that are energy & macronutrient matched on postprandial incretin & insulin secretion?

Study 3: Participants

- 20 men, aged 30 – 65 years
  - Inclusion:
    - T2D diagnosis for 1+ years
    - 3+ symptoms of metabolic syndrome
  - Exclusion
    - Renal, liver, thyroid disease
    - Significant weight loss in last 3 months

Study 3: Design

- Randomly assigned to V-meal or M-meal
- Overnight fast, no diabetic medications

Meal	M-meal	V-meal
Energy (kcal)	513.6	514.9
Carbohydrates (g) (%)	55 (44.8%)	54.2 (44.0%)
Sugar (g) (%)	21 (17%)	4 (3%)
Proteins (g) (%)	20.5 (16.7%)	19.9 (16.2%)
Lipids (g) (%)	22 (38.6%)	22.8 (39.8%)
Saturated fat (g)	8.6	2.2
Fiber (g)	2.2	7.8

Study 3: Measurements

Primary outcomes

- Postprandial insulin & incretin secretion

Secondary outcomes

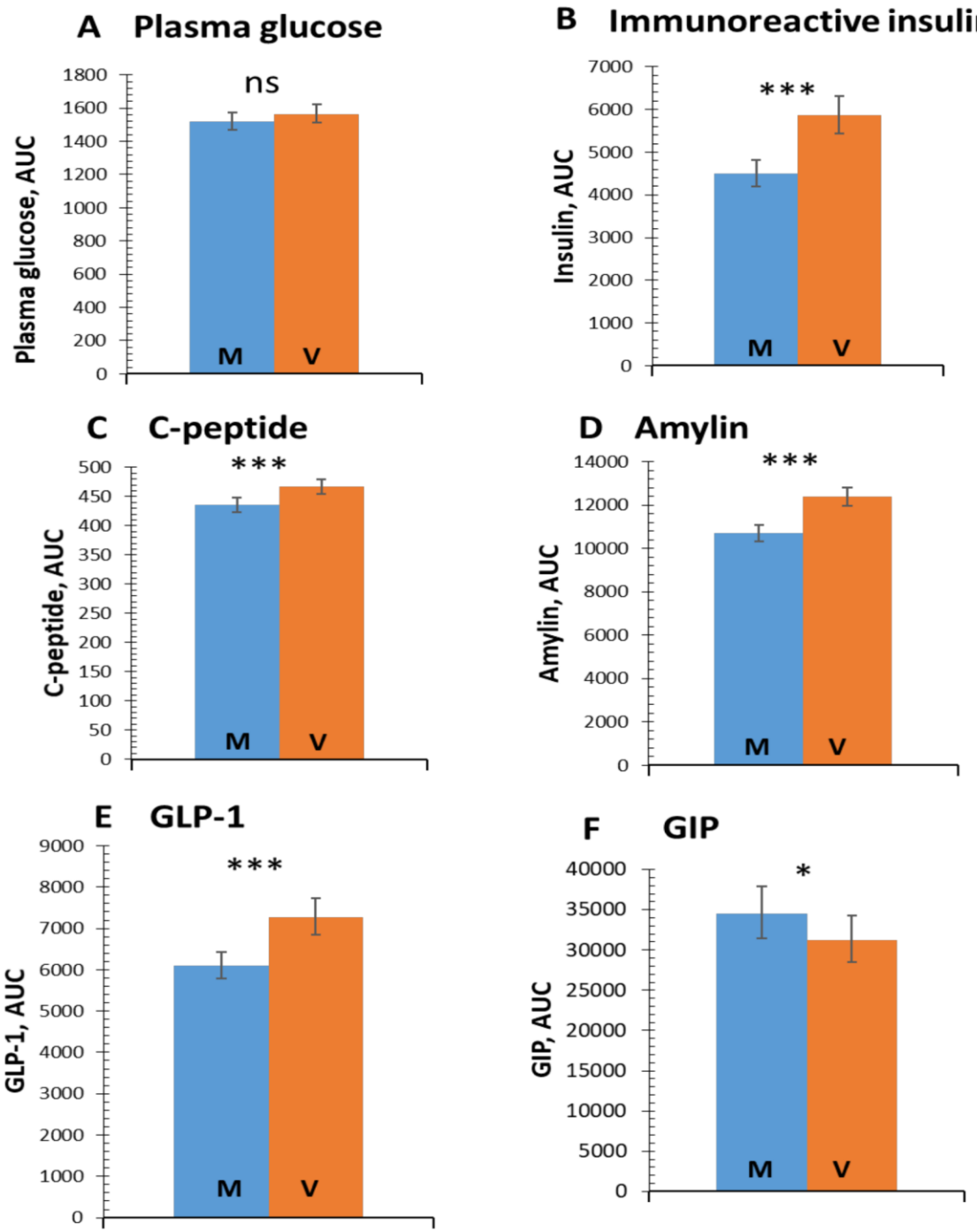
- Insulin resistance
- Beta-cell function

Terms to Know

- **GIP & GLP-1:**
  Incretin hormones that stimulate insulin secretion
- **Amylin:**
  Secreted with insulin; satiety agent
- **C-peptide:**
  Helps to form insulin; secreted at equal concentrations with insulin

Kahleova H., Tura A., et al.

Study 3: Results



P-values are marked as ns for $p \geq 0.5$,
* $p < 0.05$,
and *** $p < 0.001$.

Study 3: Analysis

Strengths

- Randomized
- Commonly consumed meals
- Repeated measurements

Limitations

- Short-term diabetes diagnosis
- Doesn’t reflect habitual dietary patterns
- Small sample size

Kahleova H., Tura A., et al.

Study 3: Conclusions

Improvement of postprandial incretin & insulin secretion was found in T2D patients following a plant-based meal, suggesting the immediate, therapeutic effect of a plant-based diet in improving beta-cell function.

Kahleova H., Tura A., et al.

Other Research

- Effect of a Brown Rice Based Vegan Diet & Conventional Diabetic Diet on Glycemic Control of Pts with T2D
  - 16-weeks
  - HgbA1c significantly lower in vegan group than conventional diabetic diet

- A Low-fat Vegan Diet & Conventional Diabetes Diet in the Treatment of T2D
  - 74-weeks
  - Both diets showed sustained changes in weight & lipid reductions
  - Vegan diet showed glycemia reductions

What Can We Do?

Image courtesy of Academy of Nutrition & Dietetics

- Offer plant-based diet as prevention & treatment option
- AND endorses use of plant-based diets
  (Vesanto, et al, 2016)
- Provide education
  - Recipes
  - Food sources of vital nutrients
  - Supplements

Try It Out!

www.plantbasedonabudget.org

www.vegetariannutrition.net

www.plantbaseddietitian.com

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Questions?

Thank You!

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