

Table 4-C-IV-2 Overview Table: Type 2 Diabetes

Citation Quality Rating Location	Study Design Duration Study/Cohort	Sample Size Age Gender Race/Ethnicity	Dietary Pattern	Health Outcomes
Incidence of Type 2 Diabetes				
Mediterranean-Style Pattern				
1.	Salas-Salvado et al., 2011 Positive Spain	Randomized Controlled Trial 4 y median (inter-quartile range 3-5 y) PREDIMED Study (Mediterranean Diet) 67.3 y 58% female Not reported	Mediterranean Diet Pattern Med Diet : (a) a high consumption of grains, legumes, nuts, vegetables, and fruits; (b) a relatively high-fat consumption (up to 40% of total energy intake), mostly from MUFA (20% or more of the total energy intake); (c) olive oil for culinary use and dressing of vegetables as the principal source of fat; (d) moderate to high fish consumption; (e) poultry and dairy products (usually as yogurt or cheese) consumed in moderate to small amounts; (f) low consumption of red meats, processed meats, and meat products; (g) moderate alcohol intake, usually in the form of red wine consumed with meals. Low fat diet not described--goal total fat <35%. Med Diet Goals: Improved adherence to MedDiet (>10 points in the 14-point score), High (>2) MUFA-to-SFA ratio, high olive oil consumption (>20 g/1,000 kcal/day), high nut consumption (>10g/1,000 kcal/day), high dietary fiber intake (>14 g/1,000 kcal/day), substantial weight loss (> 5% of initial body weight), and high physical activity (> 395 kcal/day, the top tertile).	T2D Incidence: <u>Cases of incident T2D:</u> MedDiet+VOO: 10.1% (95% CI = 5.5 - 15.1) P=0.05 MedDiet+Nuts: 11.0% (95% CI = 5.9 - 16.1) P=0.05 Control: 17.9% (95% CI = 11.4 - 24.4) <u>Comparing MedDiet+virgin olive oil (VOO) and MedDiet+nuts to low-fat diet (control group):</u> MedDiet+VOO: HR=0.49 (95% CI = 0.25 - 0.97) MedDiet+Nuts: HR=0.48 (95% CI = 0.24 - 0.96) Both MedDiets: HR=0.48 (95% CI = 0.27 - 0.86)
Vegetarian Pattern				
2.	Tonstad, et al, 2013 Neutral U.S., Canada	Prospective Cohort Study 2 y Adventist Health Study-2 (Vegetarian) 58.5 y ~63% female 17.3% Black (African American, West Indian/ Caribbean, African or other Black) No % given: Non-Black (White non-Hispanic, Hispanic, Middle Eastern, Asian, Native Hawaiian/other Pacific Islander or American Indian)	Vegetarian Diet Pattern Vegetarian status: 1. Vegans—no animal products (red meat, poultry, fish, eggs, milk and dairy products <1 time/mo) 2. Lacto-ovo vegetarians—dairy products and/or eggs >1 time/mo, but no fish or meat (red meat, poultry and fish <1 time/mo) 3. Pesco vegetarians—fish >1 time/mo and dairy products and/or eggs but no red meat or poultry (red meat and poultry <1 time/mo) 4. Semi-vegetarians—dairy products and/or eggs and (red meat and poultry >1 time/mo and <1 time/wk) 5. Non-vegetarians—animal products (red meat, poultry, fish, eggs, milk and dairy products >1 time/wk). Alcohol was defined as consumption of any amount or none during the past 12 mos.	T2D Incidence: <u>Cases of incident T2D, comparing vegetarians to non-vegetarians:</u> Vegan: 0.54% (P<0.0001) Lacto-ovo: 1.08% (P<0.0001) Pesco-vegetarian 1.29% (P<0.0001) Semi-vegetarian: 0.92% (P<0.0001) <u>Comparing vegetarians to non-vegetarians:</u> Vegan: OR = 0.381 (95% CI = 0.236 - 0.617) Lacto-ovo: OR = 0.618 (95% CI = 0.503 - 0.760) Pesco-vegetarian: OR = 0.790 (95% CI = 0.575 - 1.086) NS Semi-vegetarian: OR = 0.486 (95% CI = 0.312 - 0.755) <u>Comparing Blacks to non-Blacks:</u> Black ethnicity: OR = 1.364 (95% CI = 1.093 - 1.702)

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					<p><u>Comparing vegetarians to non-vegetarians in Blacks:</u> Vegan: OR = 0.304 (95% CI = 0.110 - 0.842) Lacto-ovo: OR = 0.472 (95% CI = 0.270 - 0.825) Pesco: OR = 0.618 (95% CI = 0.352 - 1.086) NS Semi-vegetarian: OR = 0.469 (95% CI = 0.153 - 1.438) NS</p>
Impaired Glucose Tolerance and Insulin Resistance					
Mediterranean-Style Pattern					
1.	Esposito, et al, 2004 Positive Italy	Randomized Controlled Trial 2 y Mediterranean Diet	Initial N = 180 Final N = 164 Attrition = 9% Analyses included all 180 subjects 43.9 y 45% female Not reported	<p>Mediterranean Diet Pattern Intervention (Mediterranean diet): Dietary advice based on 3-day food records provided monthly with the nutritionist for 1st y and bimonthly for 2nd y.</p> <p>Diet: 50–60% CHO, 15-20% protein, <30% total fat, <10% sat fat, <300 mg cholesterol; at least 250 to 300 g of fruits (1 - 1.3 cups), 125 to 150 g of vegetables (0.5 - 0.65 cups), 25 to 50 g of walnuts (1.75 - 3.5 Tbsp), and 400 g of whole grains (14 oz; including legumes) daily and increase olive oil consumption</p> <p>Control (Prudent diet): Provided oral and written information about healthy food choices at baseline and at bimonthly sessions but not offered individualized advice; Diet: 50-60% CHO, 15-20% protein, and <30% total fat</p> <p>* The volumes listed above are approximations and depend on the actual food consumed.</p>	<p>Glucose Tolerance: <u>Comparing Mediterranean-style diet to Prudent diet (change over 2 y):</u> Plasma glucose: -6 mg/dL (95% CI = -11 to -2) P<0.001</p> <p>Insulin Resistance: <u>Comparing Mediterranean-style diet to Prudent diet (change over 2 y):</u> Serum insulin: -3.5 μU/mL (95% CI = -6.1 to -0.9) P = 0.01 HOMA-IR: -1.1 (95% CI = -1.9 to -0.3) P<0.001</p>
2.	Rallidis, et al, 2009 Positive Greece	Randomized Controlled Trial 2 months Greek Mediterranean Diet	Initial N = 90 Final N = 82 Attrition = 9% 50.4 y ~48% female Not reported	<p>Mediterranean Diet Pattern Intervention group (Greek Mediterranean diet): Daily consumption of whole-wheat grains, 2–3 portions of low-fat dairy, 2 salads (one with 1 tomato) and 3 fruits together with a concentrated fruit juice made without preservatives, 5 mL olive oil–based margarine, extra virgin olive oil as main source of fat, 45 mL extra virgin olive oil with 1 of the 2 salads, 6 whole raw almonds, 150 mL (1 glass) red wine with main meal, 1 portion of fish and at the most 1 portion of red meat weekly</p>	<p>Glucose Tolerance: <u>Comparing a Greek Mediterranean-style diet to control diet:</u> Glucose, mmol/L: P=0.95, NS</p> <p>Insulin Resistance: <u>Comparing a Greek Mediterranean-style diet to control diet:</u> Insulin, μU/mL: P=0.95, NS HOMA-IR score: P=0.07, NS</p>

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3.	Salas-Salvado, et al, 2008 Positive Spain	Randomized Controlled Trial 1 y PREDIMED Study (Mediterranean Diet)	Initial N = 1,264 Final N = 1,224 Attrition = 3% 67.4 y 55% female Not reported	Mediterranean Diet Pattern MedDiet: high intake of cereals, vegetables, fruits, and olive oil; a moderate intake of fish and alcohol, mostly wine; and a low intake of dairy products, meats, and sweets MedDiet + VOO (1 L/wk) MedDiet + nuts (30 g/d) Control (advice about low-fat diet)	<u>Comparing MedDiet+Virgin Olive Oil (VOO) and MedDiet+Nuts to low-fat diet (control group):</u> Elevated fasting glucose, reduction at 1 y: MedDiet+VOO: NS MedDiet+nuts: NS
DASH/modified DASH Pattern					
4.	Blumenthal, Babyak, Sherwood, et al., 2010 Positive U.S.	Randomized Controlled Trial 4 mos ENCORE (Exercise & Nutrition interventions for Cardiovascular Health)- DASH	Initial N = 144 Final N = 138 4% attrition Mean: 52±10 y 67% female 60% White 39% Black 1% Asian	Dietary Approaches to Stop Hypertension (DASH) Pattern Control diet (UC): Participants maintained their usual diet and exercise habits; 34% E from fat, 15% from protein; K, Mg, Ca and fiber levels ~ 25th percentile of U.S. consumption. DASH diet: Rich in fruits and vegetables (8-10 svgs/d), and low-fat dairy foods; reduced amounts of saturated fat, total fat, and cholesterol; K, Mg, Ca content at ~ 75th percentile of US consumption, high amounts of fiber and protein; 27% E from fat, and 18% E from protein. Sodium content: 2400 mg/2000 kcal. DASH diet alone (DASH-A): Subjects received instruction to meet DASH guidelines, told not to exercise or attempt to lose weight; met weekly in a small group for coaching on diet.	Glucose Tolerance: <u>Comparing DASH-A to UC:</u> Fasting glucose P=0.21, NS Glucose AUC: P=0.98, NS Insulin Resistance: <u>Comparing DASH-A to UC:</u> Fasting insulin: P=0.71, NS Insulin sensitivity (ISI): P=0.98, NS QUICKI: P=0.85, NS
5.	Gadgil et al, 2013 Positive U.S.	Randomized Controlled Trial 6 wks OmniHeart (Optimal Macronutrient Intake Trial for Heart Health) – modified DASH	Initial N = 164 Final N = 164 Mean: 53.6 y 45% female 55% African-American, 40% Non-Hispanic White, 5% Other	Healthful Pattern 3 healthful diets that model the principles of the Dietary Approaches to Stop Hypertension (DASH) dietary pattern. Each study diet differed in the amount of carbohydrates, protein, and unsaturated fat while keeping the calorie levels the same. Each diet was reduced in saturated fat, cholesterol, and sodium, and rich in fruits, vegetables, fiber, potassium, and other minerals at recommended levels.	Glucose Tolerance: <u>Comparing changes in Fasting Glucose (mg/dL):</u> Carb: 0.84 (95% CI, -1.29 to 2.97), NS Unsat: 0.11 (95% CI, -2.25 to 2.47), NS Protein: 0.28 (95% CI, -1.37 to 1.93), NS Unsat vs. Carb: -0.77 (95% CI, -2.18 to 0.73), NS Prot vs. Carb: -0.56 (95% CI, -2.23 to 1.20), NS Unsat vs. Prot: -0.16 (95% CI, -2.11 to 1.77), NS Insulin Resistance: <u>Comparing changes in Insulin Sensitivity: QUICKI:</u> Carb: 0.002 (95% CI, -0.003 to 0.007), NS Unsat: 0.007 (95% CI, 0.002 to 0.012), P<0.5 Protein: 0.004 (95% CI, -0.002 to 0.009), NS Unsat vs. Carb: 0.005 (95% CI, 0.000 to 0.009), P=0.04 Prot vs. Carb: 0.001 (95% CI, -0.004 to 0.007), NS

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					Unsat vs. Prot: 0.003 (95% CI, -0.002 to 0.009), NS HOMA-IR: Carb: 0.03 (95% CI, -0.07 to 0.12), NS Unsat: 0.14 (95% CI, 0.02 to 0.26), P<0.5 Protein: 0.06 (95% CI, -0.04 to 0.17), NS Unsat vs. Carb: 0.11 (95% CI, 0.03 to 0.20), P<0.05 Prot vs. Carb: 0.04 (95% CI, -0.07 to 0.14), NS Unsat vs. Prot: 0.08 (95% CI, -0.05 to 0.20), NS Comparing changes in Fasting Insulin (µIU/mL): Carb: -0.41 (95% CI, -1.72 to 0.91), NS Unsat: -0.77 (95% CI, -1.75 to 0.21), NS Protein: -0.06 (95% CI, -1.64 to 0.40), NS Unsat vs. Carb: -0.36 (95% CI, -1.64 to 0.92), NS Prot vs. Carb: -0.22 (95% CI, -1.56 to 1.12), NS Unsat vs. Prot: 0.14 (95% CI, 1.0 to 0.67), NS
Nordic Pattern					
6.	Adamsson et al., 2011 Positive Sweden	Randomized Controlled Trial 6 wks NORDIET (Nordic Diet)	Initial N = 88 Final N = 86 2% attrition Mean: ~53 y ~63% female Not reported	Nordic Diet Pattern Dietary goals: Consume Nordic Diet (ND) based on Nordic nutrition recommendations. ND rich in high-fiber plant foods from fruits, berries, vegetables, whole grains (oats and barley), rapeseed oil, nuts, fatty fish, and low-fat dairy products, but low in salt, added sugars, and saturated fats. Contains some poultry, red meat, fish, and low-fat milk. Macronutrient distribution: 27%, 52%, 19%, and 2% of energy from fat, carbohydrate, protein, and alcohol, respectively.	Glucose Tolerance: <u>Comparing the Nordic diet to the control diet:</u> Change in plasma glucose: Control = 0.05±0.34 mmol/L; Nordic diet = 0.00±0.41mmol/L (P=0.52), NS Insulin Resistance: <u>Comparing the Nordic diet to the control diet:</u> Change in plasma insulin: Control = 0.90±2.88 mU/L; Nordic diet = 0.51±2.25 mU/L (P=0.01) Change in HOMA-IR: Control = 0.22±0.64; Nordic diet = 0.11±0.51 (P=0.01)