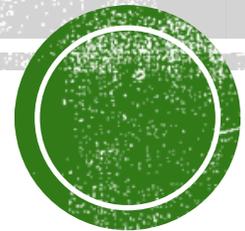


DIABETES MANAGEMENT: NUTRITION THERAPY & PHYSICAL ACTIVITY

Dawn Gustofson, RDN, LD, CDE



LEARNING OBJECTIVES:

- *Define nutrition recommendations to be translated to a person living with diabetes.*
- *List at least 3 meal planning approaches to consider with a person living with diabetes.*
- *Describe physical activity guidelines for a person living with diabetes.*
- *Describe how to assist a person living with diabetes to set appropriate physical activity goals.*



DEATHS: LEADING CAUSES - CDC

- **Heart disease: 635,260**
- **Cancer: 598,038**
- **Accidents (unintentional injuries): 161,374**
- **Chronic lower respiratory diseases: 154,596**
- **Stroke (cerebrovascular diseases): 142,142**
- **Alzheimer's disease: 116,103**
- **Diabetes: 80,058**
- **Influenza and pneumonia: 51,537**
- **Nephritis, nephrotic syndrome, and nephrosis: 50,046**
- **Intentional self-harm (suicide): 44,965**



NATIONAL DIABETES STATISTICS

- An estimated 30.3 million people of all ages - or 9.4% of the U.S. population - had diabetes in 2015
- 95% estimated to have Type 2
- 5% estimated to have Type 1
- In 2014, 7.2 million hospital discharges had diabetes diagnosis
 - 1.5 million for major cardiovascular diseases
 - 400,000 ischemic heart disease
 - 251,000 for stroke
 - 108,000 for a lower extremity amputation
 - 168,000 for diabetic ketoacidosis



HOW ARE WE DOING?

- In the year 2000 only 3% of US adults adhered to 4 healthy lifestyle characteristics (5 fruits and vegetables a day, regular physical activity, maintaining a healthy weight, and not smoking), which would be lower if moderate alcohol use had been included.
- A healthy lifestyle that combines a high quality diet, regular physical activity, maintaining a healthy weight, moderate alcohol consumption, and not smoking decreases the risk of cardiovascular events.
 - Obesity has increased from 28% to 36%; regular physical activity has decreased from 53% to 43%; eating 5 or more fruits and vegetables a day has decreased from 42% to 26% among adults age 40 – 74 years.
 - Adherence to healthy lifestyle habits is no more likely in people with Cardiovascular Disease, Hypertension, Diabetes, Hypercholesterolemia.

Reeves MJ, Rafferty AP. Healthy lifestyle characteristics among adults in the United States, 2000. Arch Intern Med. 2005;165:854-857.

Adherence to healthy lifestyle habits in US adults, 1988-2006. Am J Med. 2009 Jun;122(6):528-34.

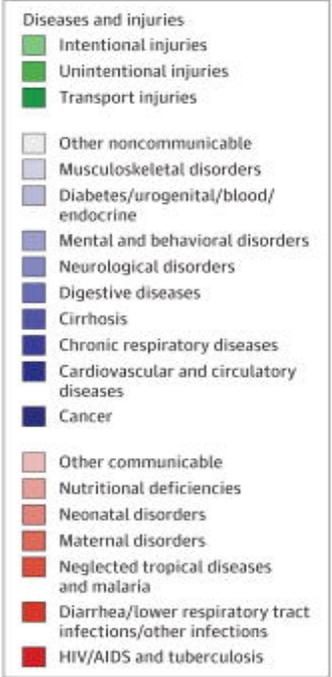
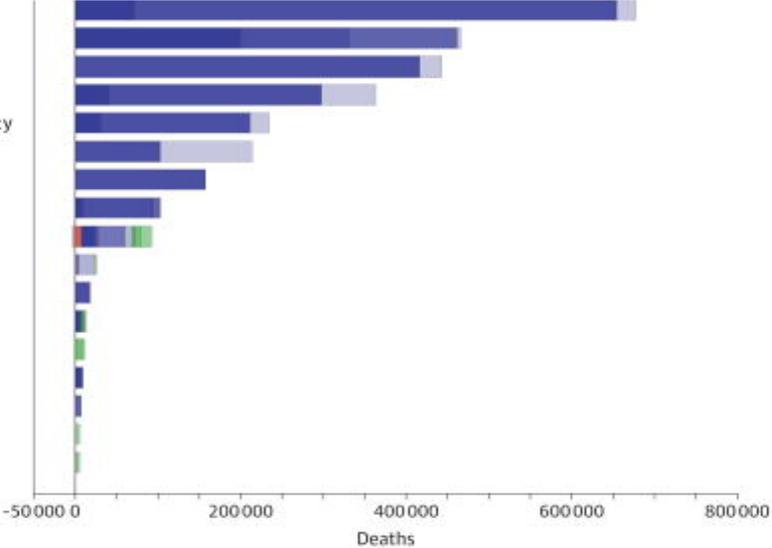


THE STATE OF US HEALTH, 1990-2010: BURDEN OF DISEASES, INJURIES, AND RISK FACTORS. JAMA 2013 AUG 14;310(6):591-608.

A Risk factors and related deaths

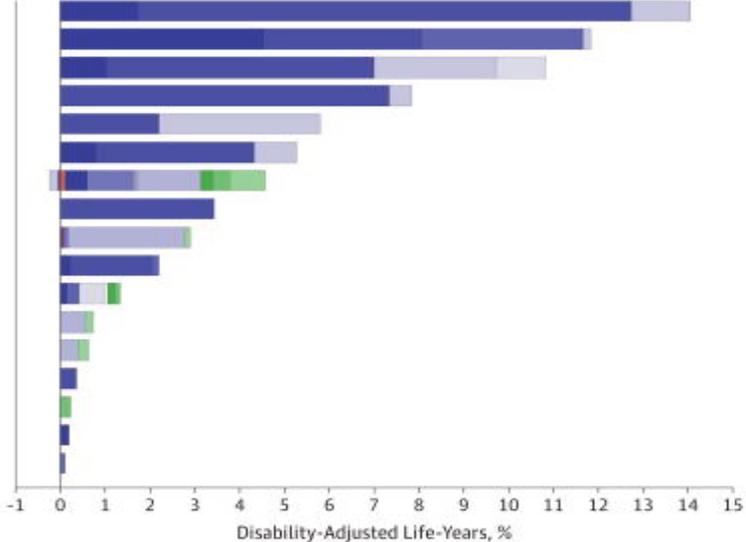
Risk Factors

- Dietary risks
- Tobacco smoking
- High blood pressure
- High body mass index
- Physical inactivity and low physical activity
- High fasting plasma glucose
- High total cholesterol
- Ambient particulate matter pollution
- Alcohol use
- Drug use
- Lead exposure
- Occupational risks
- Low bone mineral density
- Residential radon
- Ambient ozone pollution
- Intimate partner violence
- Childhood sexual abuse



B Risk factors as a percentage of disability-adjusted life-years

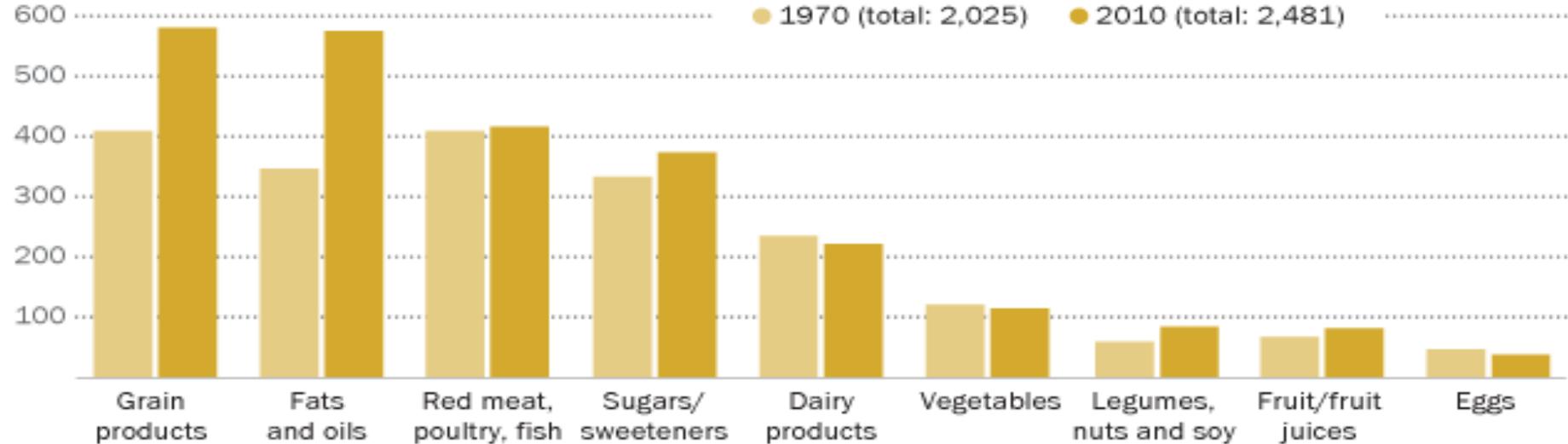
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- Intimate partner violence
- Lead exposure
- Low bone mineral density
- Residential radon
- Ambient ozone pollution



HOW THE AMERICAN DIET HAS CHANGED SINCE 1970

Modern American diet has gotten bigger, heavier on grains and fat

Average daily per capita calories



Note: "Fats and oils" includes butter, cream and other dairy fats. Figures adjusted for spoilage and other losses.
Source: USDA Economic Research Service; Pew Research Center analysis



LARGEST NUMBER OF DIET RELATED DEATHS FROM CHD, STROKE, TYPE 2 DIABETES

- High sodium
- High processed meats
- High sugar-sweetened beverages
- Low vegetables
- Low fruits
- Low nuts/seeds
- Low seafood

Association between dietary factors & mortality from heart disease, stroke, and Type 2 diabetes in the US. JAMA 2017



TIMING & FREQUENCY

- **Skipping Breakfast**
 - Some association between skipping breakfast and low nutritional adequacy
 - Daily breakfast may decrease risk of adverse effects related to glucose/insulin metabolism
- **Intermittent Fasting**
 - Alternate-day vs periodic (1 – 2 days/week)
 - Short-term weight loss – sustainability is difficult
- **Meal Frequency**
 - Does not appear useful unless altering overall caloric intake
 - Increased eating episodes must be associated with calorie focus and quality
- **Timing of Eating**
 - Late night eating associated with greater risk of weight gain
 - Late night eating and then skipped breakfast had greater risk of obesity and metabolic syndrome
 - Consuming majority of calories earlier in day may reduce risk of diabetes
 - More adverse health problems with irregular eating patterns



NUTRITION THERAPY

- Proven effective (provided by knowledgeable/skilled RDN)
 - Cost Saving
 - Decrease in A1C 1.0 – 1.9% (Type 1)
 - Decrease in A1C 0.3 – 2.0% (Type 2)



NUTRITION THERAPY

- Patient centered.
 - No one-size-fits-all eating pattern.
- What is the patient willing and able to do?
 - Consider patient's personal preferences (cooking skills, traditions, culture, religion, health beliefs, economics) and metabolic goals.
- Information should be translated so a patient can develop healthy eating patterns rather than focusing on individual macronutrients.



BARRIERS

- “If it tastes good, spit it out.”
- “I can’t afford to eat healthy.”
- “I don’t have time to plan and prepare my food.”
- “I don’t know how to cook.”
- “I am so confused, I don’t know what to eat.”
- “I have tried to lose weight my whole life and I can’t stay on a diet”



VARIETY OF MEAL PLANNING OPTIONS

- ***Emphasis on nourishing foods:*** *vegetables, fruits, whole grains, nuts, seeds and legumes; may include low-fat dairy, lean poultry, fish, non-tropical vegetable oils; limit/avoid intake of sweets, sugar-sweetened beverages, red meats, and processed foods*
- **DASH** *(Ranked #1 diet for Diabetes - US News and World Report 2017)*
- **Mediterranean** *(Ranked #2 diet for Diabetes - US News and World Report 2017)*
- **Vegetarian/Vegan** *(Ranked #2 diet for Diabetes - US News and World Report 2017)*
- **DGA – Dietary Guidelines for Americans**

Trending Cardiovascular Nutrition Controversies, JACC, 2017

Recommended Dietary Pattern to Achieve Adherence to the AHA/ACC Guidelines, A Scientific Statement, Circulation, 2016

<http://health.usnews.com/best-diet>



EATING PATTERNS

- *Across studies, consistent evidence indicated that a dietary pattern higher in plant-based foods and lower in animal-based foods, as well as lower in total calories, is both **healthier** and associated with **lesser impact** on the environment.*
 - DASH (Dietary Approaches to Stop Hypertension)
 - Mediterranean
 - Vegetarian/Vegan
 - DGA - Dietary Guidelines for Americans – 8th Edition
 - Basic – Plate Method

Alignment of Healthy Dietary Patterns and Environmental Sustainability: A Systematic Review, Adv Nutr, 2016

MacLeod J, Franz MJ, Handu D, et al. Academy of Nutrition and Dietetics nutrition practice guideline for type 1 and type 2 diabetes in adults: nutrition intervention evidence reviews and recommendations. J Acad Nutr Diet. 2017;117(10):1637-1658.



CARBOHYDRATES

- Amount
 - 39% to 57% of energy without significant changes in A1c
- Type
 - Select vegetables, fruits, legumes, whole grains, and low-fat dairy products (emphasis on foods higher in fiber)
 - Avoid sugar-sweetened beverages in order to control weight, reduce risk for CVD and fatty liver
 - Minimize the consumption of processed foods with added sugar that have the capacity to displace healthier, more nutrient-dense food choices

Diabetes type 1 and 2. Academy of Nutrition and Dietetics Evidence Analysis Library website. Published 2015.

MacLeod J, Franz MJ, Handu D, et al. Academy of Nutrition and Dietetics nutrition practice guideline for type 1 and type 2 diabetes in adults: nutrition intervention evidence reviews and recommendations. *J Acad Nutr Diet.* 2017;117(10):1637-1658.

American Diabetes Association. Section 4. Lifestyle management: standards of medical care in diabetes — 2018. *Diabetes Care.* 2018;41(Suppl 1):S38-S50.



CARBOHYDRATES

- For individuals prescribed a flexible insulin therapy program (ICR), education on how to use carbohydrate counting to adjust mealtime insulin dosing is recommended.
- For individuals whose daily insulin dosing is fixed, a consistent pattern of carbohydrate intake with respect to time and amount may be recommended to improve glycemic control and reduce the risk of hypoglycemia.

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PROTEIN

■ Amount

- 20% to 30% of energy or 0.8 – 1.5 g/kg are acceptable
- In individuals with type 2 diabetes, ingested protein appears to increase insulin response without increasing plasma glucose concentrations
- Some evidence supports increased satiety with higher protein intakes
- There's no evidence to support reductions in protein intake below the RDA of 0.8 g/kg for those with chronic kidney disease

■ Type

- Select fish, lean poultry, plant-based protein (beans, peas, nuts, seeds and soy products)
- Avoid high saturated fat, processed meats/products and full-fat dairy products

American Diabetes Association. Section 4. Lifestyle management: standards of medical care in diabetes — 2018. *Diabetes Care*. 2018;41(Suppl 1):S38-S50.

MacLeod J, Franz MJ, Handu D, et al. Academy of Nutrition and Dietetics nutrition practice guideline for type 1 and type 2 diabetes in adults: nutrition intervention evidence reviews and recommendations. *J Acad Nutr Diet*. 2017;117(10):1637-1658.



FAT

- Amount

- 27% to 40% of energy may be derived from fat with no significant change in A1c, independent of weight loss

- Type

- Modify the type of fat consumed - substitute unsaturated fats for saturated and trans fat to reduce total and LDL cholesterol
- Eating foods rich in long-chain n-3 fatty acids, such as fatty fish (EPA and DHA) and nuts and seeds (ALA), is recommended to prevent or treat CVD
- Evidence does not support a beneficial role for the routine use of n-3 dietary supplements

American Diabetes Association. Section 4. Lifestyle management: standards of medical care in diabetes — 2018. *Diabetes Care*. 2018;41(Suppl 1):S38-S50.

Diabetes type 1 and 2. Academy of Nutrition and Dietetics Evidence Analysis Library website. Published 2015.

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Estruch R, Ros E, Salas-Salvado J, et al. Primary prevention of cardiovascular disease with a Mediterranean diet supplemented with extra-virgin olive oil or nuts. *N Engl J Med*. 2018;378(25):e34.



MORE NUTRITION CONCEPTS

- Encourage fiber intake of 14 g per 1,000 calories.
- Reduce added sugars to less than 10% of calories.
- Limit sodium consumption to 2,300 mg/day, although further restriction may be indicated for those with both diabetes and hypertension.
- Adults who drink alcohol should do so in moderation (no more than one drink per day for women and two drinks per day for men). Alcohol consumption may place people with diabetes at risk for hypoglycemia, if taking insulin or insulin secretagogues.

American Diabetes Association. Section 4. Lifestyle management: standards of medical care in diabetes — 2018. *Diabetes Care*. 2018;41(Suppl 1):S38-S50.

US Department of Agriculture, US Department of Health and Human Services. *Dietary Guidelines for Americans, 2015-2020*. 8th ed. Published December 2015.

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MacLeod J, Franz MJ, Handu D, et al. Academy of Nutrition and Dietetics nutrition practice guideline for type 1 and type 2 diabetes in adults: nutrition intervention evidence reviews and recommendations. *J Acad Nutr Diet*. 2017;117(10):1637-1658.



MORE NUTRITION CONCEPTS

- There is no clear evidence that dietary supplementation with vitamins, minerals, herbs, or spices can improve outcomes in people with diabetes who do not have underlying deficiencies. There may be safety concerns regarding the long-term use of antioxidant supplements such as vitamins E and C and carotene.
- Metformin use has been associated with B12 deficiency, and periodic testing is recommended, especially for those with anemia or peripheral neuropathy.
- The use of nonnutritive sweeteners may have the potential to reduce overall calorie and carbohydrate intake if substituted for caloric (sugar) sweeteners and without compensation by intake of additional calories from other food sources.

American Diabetes Association. Section 4. Lifestyle management: standards of medical care in diabetes — 2018. *Diabetes Care*. 2018;41(Suppl 1):S38-S50.



MORE NUTRITION CONCEPTS

- Low- and very low-carbohydrate diets have shown benefits in the short term, but over time these diets are similar in efficacy to moderate-carb diets. Research shows most people with diabetes report a moderate intake of carbohydrate ranging from 44% to 46% of calories.
- Studies lasting longer than 12 weeks report no significant impact of glycemic index or glycemic load on A1c, independent of weight loss. There's mixed evidence of improvement in fasting glucose and endogenous insulin levels.
- Drastic dietary changes are difficult to maintain, and most people with diabetes will return to their usual macronutrient distribution.

Evert AB, Boucher JL, Cypress M, et al. Nutrition therapy recommendations for the management of adults with diabetes. *Diabetes Care*. 2013;36(11):3821-3842.

MacLeod J, Franz MJ, Handu D, et al. Academy of Nutrition and Dietetics nutrition practice guideline for type 1 and type 2 diabetes in adults: nutrition intervention evidence reviews and recommendations. *J Acad Nutr Diet*. 2017;117(10):1637-1658.

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PHYSICAL ACTIVITY — BENEFITS ALL

- Health benefits despite only modest weight loss, study participants who exercised more (even without changing their diets) experienced:
 - reduced blood pressure and triglycerides in their blood
 - reduced the risk of Type 2 diabetes, stroke, and heart attack
- Lowers risk of developing cognitive impairment from Alzheimer's and dementia. Higher scores on cognitive ability tests.
- If weight loss achieved, exercise can also help weight maintenance when it's used along with watching calorie intake.

Physical Activity of Moderate Intensity and Risk of Type 2 Diabetes. Diabetes Care 2007 Mar; 30(3): 744-752.

Long-term health benefits of physical activity – a systematic review of longitudinal studies. Reiner et al. BMC Public Health 2013, 13:813

Increased Physical Activity Associated with Less Weight Regain Six Years After “The Biggest Loser” Competition. Obesity. 30 October 2017



PHYSICAL ACTIVITY - BENEFITS WITH DIABETES

- Structured exercise interventions of at least 8 weeks' duration have been shown to lower A1C by an average of 0.66% in people with type 2 diabetes, even without a significant change in BMI.
- Considerable data for the health benefits (increased cardiovascular fitness, greater muscle strength, improved insulin sensitivity) of regular exercise for those with type 1 diabetes.
- Higher levels of exercise intensity are associated with greater improvements in A1C and in fitness.
- Physical activity and exercise should be recommended and prescribed to all individuals with diabetes as part of management of glycemic control and overall health.

Colberg SR, Riddell MC. Physical activity: regulation of glucose metabolism, clinical management strategies, and weight control. In American Diabetes Association/JDRF Type 1 Diabetes Sourcebook. Peters A, Laffel L, Eds. Alexandria, VA, American Diabetes Association, 2013

Boul'e NG, Kenny GP, Haddad E, Wells GA, Sigal RJ. Meta-analysis of the effect of structured exercise training on cardiorespiratory fitness in type 2 diabetes mellitus. *Diabetologia* 2003;46: 1071–1081



BARRIERS

Internal

- Uncomfortable (physical or mental)
- Negative emotions (depression)
- Lack of self-motivation
- No interest
- Lack of confidence in their ability
- Fear of injury
- Health problems
- Lack of knowledge about exercise
- Lack of time

External

- Lack of transportation
- Cost
- Weather
- Cultural barriers
- Lack of support/motivating companionship
- No safe/convenient locations

Korkiakangas EE et al. Health Promot Int 24:2009

Qui S-H et al. Diabetes Metab J 36:2012



MINIMIZING EXERCISE-RELATED ADVERSE EVENTS

- Pre-exercise medical clearance is generally unnecessary for asymptomatic individuals prior to beginning low- or moderate-intensity physical activity not exceeding the demands of brisk walking or everyday living.
- To gain more health benefits from physical activity programs, participation in supervised training is recommended over non-supervised programs.
- Older adults with diabetes or anyone with autonomic neuropathy, cardiovascular complications, or pulmonary disease should avoid exercising outdoors on very hot and/or humid days to prevent heat-related illnesses.



MINIMIZING EXERCISE-RELATED ADVERSE EVENTS

- Insulin or insulin secretagogues may increase the risks of exercise-related hypoglycemia and doses may need to be adjusted. Carbohydrate intake could also be used to prevent exercise-related hypoglycemia.
- Risk of nocturnal hypoglycemia following physical activity may be mitigated with reductions in basal insulin doses, inclusion of bedtime snacks, and/or use of continuous glucose monitoring.
- Exercise-induced hyperglycemia is more common in type 1 diabetes but may be modulated with insulin administration or a lower intensity aerobic cooldown.
- Exercising with hyperglycemia and elevated blood ketones is not recommended.



PHYSICAL ACTIVITY - HEALTH COMPLICATIONS

- Physical activity with *vascular diseases* can be undertaken safely but with appropriate precautions.
- Physical activity done with *peripheral neuropathy* necessitates proper foot care to prevent, detect, and prevent problems early to avoid ulceration and amputation.
- The presence of *autonomic neuropathy* may complicate being active; certain precautions are warranted to prevent problems during activity.



PHYSICAL ACTIVITY - HEALTH COMPLICATIONS

- Vigorous aerobic or resistance exercise; jumping, jarring, head down activities; and breath holding should be avoided in anyone with severe *non-proliferative* and unstable *proliferative diabetic retinopathy*.
- Exercise does not accelerate progression of *nephropathy* and can be undertaken safely, even during dialysis sessions.
- Regular stretching and appropriate progression of activities should be done to manage *joint changes* and diabetes-related *orthopedic* limitations.
- Exercise training should progress appropriately to minimize risk of injury.



AEROBIC

ADULTS – TYPE 1 & TYPE 2

- Engage in 150 minutes or more of moderate to vigorous intensity aerobic activity per week.
 - Spread over at least 3 days/week, with no more than 2 consecutive days without activity.
- Shorter durations (minimum 75 min/week) of vigorous intensity or interval training may be sufficient for younger and more physically fit individuals.
- All adults, and particularly those with type 2 diabetes, should decrease the amount of time spent in daily sedentary behavior. Prolonged sitting should be interrupted every 30 minutes for blood glucose benefits.



STRENGTH/FLEXIBILITY/BALANCE ADULTS - TYPE 1 & TYPE 2

- Engage in 2 to 3 sessions/week of resistance exercise on nonconsecutive days.
- Flexibility training and balance training are recommended 2 to 3 times/week for older adults with diabetes.
- Yoga and tai chi may be included based on individual preferences to increase flexibility, muscular strength, and balance.



WHAT WORKS FOR ADULTS

- Must think and then see the benefits from activities
- Feel the activities can be done correctly and safely
- Have regular access to the activities
- Can fit the activities into daily schedule
- Find that the activities are affordable and enjoyable



Exercise & Activity: Your Everyday Guide from The National Institute on Aging



APPROPRIATE ACTIVITY GOALS

- Patient centered.
 - No one-size-fits-all physical activity plan.
- Adults with type 2 diabetes should initially set tolerable targets for steps/day before progressing toward higher goals.
- Identify barriers – assist with problem solving
 - Is increasing physical activity a priority?
 - What has and hasn't worked in the past?
 - Safe location to be active?
 - Any social or financial challenges?
 - What physical activities make them uncomfortable?
 - What physical activities are enjoyable?



APPROPRIATE ACTIVITY GOALS

- Targeted behavior change strategies should be used to increase physical activity in adults with type 2 diabetes.
 - Self-monitoring using step counters/pedometers/watches have been widely studied as a behavior-change tool by prompting activity and providing feedback.
 - Pedometer use in adults with type 2 diabetes increased their daily steps by 1,822, but did not improve A1C.
- For adults with type 2 diabetes, internet-delivered interventions for physical activity promotion may be used to improve outcomes.



DIFFICULTIES WITH WEIGHT MANAGEMENT

- Genetics
- Environment
- Weight regulated by neural, hormonal, and metabolic factors – *remained 1 year after initial weight reduction (13.5 +/-0.5 kg over 10 weeks)*
 - Decrease in leptin, peptide YY, cholecystokinin and amylin
 - Increase in ghrelin, gastric inhibitory polypeptide and pancreatic polypeptide
 - Adaptive thermogenesis (decrease in resting metabolic rate)
 - Compensatory mechanisms protect against weight loss

Sumithran, P, et al N Eng J Med. 2011

Camps et al. Am J Cl Nutr 2013;97-990



AT THE INDIVIDUAL LEVEL

- National Weight Control Registry
 - (a study that has currently more than 10,000 members)
- Common behaviors to maintain weight reduction:
 - They weigh themselves at least once a week – a key behavior
 - They restrict their calorie intake, stay away from high-fat foods, and watch their portion sizes
 - They also exercise regularly

A descriptive study of individuals successful at long-term maintenance of substantial weight loss *The American Journal of Clinical Nutrition*, Volume 66, Issue 2, 1 August 1997, Pages 239–246

Consistent Self-monitoring of Weight: A Key Component of Successful Weight Loss Maintenance. *Obesity*. 06 September 2012

Physical Activity Patterns in the National Weight Control Registry. *Obesity*. 06 September 2012



FINAL GUIDING PRINCIPLES

- Diabetes is complex and challenging involving many factors and variables.
- The stigma attached to a diagnosis of diabetes can contribute to stress and feelings of shame and judgement.
- We are more effective through being respectful, inclusive and using patient-centered approach.
- Person-first, strengths-based empowering language can improve communication and enhance motivation, overall health and well-being.
- Focus on healthy behaviors instead of weight loss
 - Decrease guilt
 - Improve health outcomes
 - Strengthen relationship between patient and provider

Diabetes Language Statement: The Language We Use Can Impact Diabetes Care. Practical Diabetology. Vol 37. No.4. 9

Dollar, E. Berman et al, Do No Harm: Moving Beyond Weight Loss to Emphasize Physical Activity at Every Size. Preventing Chronic Disease, 14: E34, 2017



QUESTIONS?

- Thank you all for attending.



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Reeves MJ, Rafferty AP. Healthy lifestyle characteristics among adults in the United States, 2000. Arch Intern Med. 2005;165:854-857.

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The state of US health, 1990-2010: burden of diseases, injuries, and risk factors. JAMA 2013 Aug 14;310(6):591-608.

Circulation 2017;135:e96-e121; AHA Scientific Statement

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Exercise & Activity: Your Everyday Guide from The National Institute on Aging 

Physical Activity/Exercise and Diabetes: A Position Statement of the American Diabetes Association *Diabetes Care* 2016;39: 2065–2079

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