Objectives

Review current state of diabetes epidemic

Understand influences promoting obesogenic environment

Highlight lifestyle characteristics across diverse cultures that promote longevity

Discussion of plant based dietary components and benefits

Highlight strategies to support plant based diets in clinical practice and everyday life across cultures
**Diabetes Epidemic**

**CDC Facts**

- **30.3 MILLION** Americans are living with diabetes.
- **84.1 MILLION** people have diabetes.
- **$237 BILLION** is spent annually on diabetes-related health care.

**WHO Facts**

- **Prevalence:** 422 million in 2014, 8.5% of population
- **Mortality:** 7th leading cause of death in 2016
- **Healthy diet, regular physical activity, maintaining a normal body weight** are ways to prevent or delay the onset of DM2
- **Diabetes can be treated and its consequences avoided or delayed with diet, physical activity medication, and regular screening and treatment of complications**
Nebraska facts

Almost 1 in 11 (8.8%) Nebraska adults were diagnosed with diabetes in 2016.

Only 6.0% of Nebraskan adults are aware of having prediabetes.

Highest prevalence in Nebraskans 55 years and older, those with less education and lower incomes, and in non-Hispanic multiracial individuals.

In 2016, 2,327 inpatient hospitalizations occurred among Nebraska residents due to diabetes.

Nebraska's top ten causes of death in 2016 included diabetes at #7.

In 2016, diabetes claimed the lives of 501 (out of 16,207 deaths) residents in Nebraska.

*Obesity Trends* Among U.S. Adults

BRFSS, 1990, 2000, 2010

("BMI ≥30, or about 30 lbs. overweight for 5’4” person")

Source: Behavioral Risk Factor Surveillance System, CDC.
Obesogenic Environment

“The sum of influences that the surroundings, opportunities, or conditions of life have on promoting obesity in individuals or populations”
Image: “Plant-Based Diets for Diabetes”
nutritionfacts.org
Dr. Michael Greger
Whole food plant based diets are keystones of health and longevity

- Whole grains
- Beans and other legumes
- Fruits and vegetables
- Nuts and seeds
- Healthy fats
- Clean water

Nutrient dense, synergistic properties
- High in fiber, protein, and complex carbs
- Anti-inflammatory components
- Phytonutrient rich
- Poly- and monounsaturated fatty acids
- Affordable and multi-cultural
- Environmentally sound
Medical nutrition therapy (MNT): fundamental in the overall diabetes management plan, is a covered Medicare benefit, and the need for MNT should be reassessed frequently by health care providers in collaboration with people with diabetes across the life span.

DPP: Strongest evidence for DM2 prevention: demonstrating intensive lifestyle intervention resulting in weight loss could reduce incidence of DM2 for overweight/obese adults and IGT by 58% over 3 years.

Hemoglobin A1c reductions from MNT: similar or greater than expected with treatment using currently available medication for type 2 diabetes.

Strong evidence supports the effectiveness of MNT interventions for improving A1C, with absolute decreases up to 2.0% (in type 2 diabetes) and up to 1.9% (in type 1 diabetes) at 3–6 months.
emphasized advice for all: increase vegetables, reduce sugars and refined grains, and choose whole foods over processed foods

Table 1—Goals of nutrition therapy
- To promote and support healthy eating patterns, emphasizing a variety of nutrient-dense foods in appropriate portion sizes, in order to improve overall health and specifically to:
  - Improve A1C, blood pressure, and cholesterol levels (goals differ for individuals based on age, duration of diabetes, health history, and other present health conditions. Further recommendations for individualization of goals can be found in the ADA Standards of Medical Care in Diabetes [345])
  - Achieve and maintain body weight goals
  - Delay or prevent complications of diabetes
- To address individual nutrition needs based on personal and cultural preferences, health literacy and numeracy, access to healthful food choices, willingness and ability to make behavioral changes, as well as barriers to change
- To maintain the pleasure of eating by providing positive messages about food choices, while limiting food choices only when indicated by scientific evidence
- To provide the individual with diabetes with practical tools for day-to-day meal planning

ADA 2019 Standards of Care

The Mediterranean, Dietary Approaches to Stop Hypertension (DASH), and plant-based diets are all examples of healthful eating patterns that have shown positive results in research, but individualized meal planning should focus on personal preferences, needs, and goals.

- Very low prevalence of CV disease
  - Accumulating evidence supports 5 areas of benefit:
    - Lipid lowering effects
    - Protection against oxidative stress
    - Modification of hormones and growth factors that promote cancer
    - Supporting a healthy gut microbiome
    - Inhibition of nutrient sensing pathways by specific amino acid restriction

**Table of Health Benefits**

<table>
<thead>
<tr>
<th>Health Benefits*</th>
<th>Reduced risk of Diabetes</th>
<th>A1C Reduction</th>
<th>Reduced Risk of Heart Disease (CVD)</th>
<th>Weight Loss</th>
<th>Lowered Blood Pressure</th>
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</thead>
<tbody>
<tr>
<td>Mediterranean Diet</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td>✓</td>
</tr>
<tr>
<td>Vegetarian &amp; Vegan Diets</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Low-Carb &amp; Very Low-Carb Diets</td>
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<tr>
<td>Low-fat Diet</td>
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<tr>
<td>Very Low-fat Diet</td>
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<td>✓</td>
</tr>
<tr>
<td>DASH Diet (Dietary Approach to Stop Hypertension)</td>
<td>✓</td>
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<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

*Sources: Random Clinical Trials (RCTs), Meta-Analyses, Observational Studies, non-randomized single-arm studies, cohort studies
Nutrition Therapy for Adults With Diabetes or Prediabetes: A Consensus Report
Evert et al., Diabetes Care Apr 2019
The Mediterranean Diet:
A whole food, plant-based diet
- Reduced risk of diabetes
- A1c reduction
- Lowered triglycerides
- Reduced risk of CV events

Vegetarian & Vegan Diet Pyramid
- Reduced risk of diabetes
- A1c reduction
- Weight loss
- Lowered LDL-C and non-HDL-C
**Whole foods: basic principles**

Building blocks of healthy diet for all: Whole, unprocessed foods without additives, with avoidance of pesticides/herbicides

Primary components: fruits, vegetables, whole grains, nuts, seeds, beans, and legumes

Provides nutrient building blocks: protein, carbohydrates, fat, vitamins, and minerals PLUS fiber and phytochemicals

Glycemic load: estimation of how much a given food will increase blood glucose, taking into account the amount of carbohydrate in the food

Synergies: highly integrated reactions and events of innumerable food substances working in concert

Many health promoting nutrients yet to be identified – avoid reductionist approach

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**Ethnobotany**

The study of the relationship between plants, people, and culture

10-20% of plants have been screened for biological activity

1-5% have been thoroughly screened for all of their potential medicinal activities

Potential impact of environmental destruction and loss of ecosystems on human health and advancement of medicine, pharmaceutical development, and science
**Phytonutrients/Phytochemicals**

Naturally occurring plant compounds that exert physiologic effects and provide many health benefits

Thousands of bioactive chemicals found in fruits, vegetables, nuts, and whole grains providing many health benefits

Secondary metabolites in plants used as defense mechanisms to protect against radiation, insects, viruses, etc.

Pigments that give fruits, vegetables, and flowers their hues

21st century observational studies: importance of complex array of phytonutrients in whole foods and impact on health and disease

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**Phytonutrients**

There are four groupings of secondary metabolites in plants:

- **Phenolics.** Phenolics is a diverse grouping of compounds that includes flavonoids, tannins, lignins and salicylic acid.
- **Terpenoids.** Terpenoids include aromatic compounds in plants such as essential oils and resins, and also contain waxes, steroids and carotenoids.
- **Alkaloids.** Alkaloids are typically used as a part of a plant's defense against predators and include nicotine, caffeine, capsaicin, cocaine and strychnine.
- **Sulfur-containing compounds.** These compounds are typically used by the plant for antioxidation and include glutathione, glucosinolates, and allin.
**Phytonutrient spotlight: flavonoids**

Large class of polyphenolic compounds provide much of the flavor and color of various foods, plentiful in fruits, vegetables, deeply pigmented berries, teas, and chocolate.

Protect plants against UV radiation and infection and regulate growth.

Diverse health infections, i.e., anti-inflammatory effects.

Flavonoids may inhibit pancreatic amylase and glucosidase and reduce glucose absorption and post-prandial glucose levels and may improve insulin sensitivity.

Rainbow of phytonutrients: Eat as great a variety of colors as possible to achieve maximum nutrition.
Beans and Legumes

High in vegetable protein and fiber, low digested starch, excellent source of minerals, low glycemic index compared to bread

Improve blood glucose regulation with lowering of blood glucose levels (Simpson, 1981; Jenkins, 2012)

Incorporation of legumes as part of a low-GI diet improved both glycemic control and reduced calculated CHD risk score in type 2 DM (Jenkins, 2012)

Lower serum cholesterol levels (Anderson, 1995) and blood pressure

Meta-analysis of 25 observational studies: decreased risk of ischemic heart disease (Afshin, 2014)

Decrease CRP and hs-CRP (Salehi-Abargouei, 2015)

Everyday Tips: inexpensive stable, explore Asian grocery stores and multitude of bean and legume varieties, soak overnight, and experiment with spices and pressure cookers

<table>
<thead>
<tr>
<th>Color</th>
<th>Active Compounds</th>
<th>Foods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>Lycopene (carotenoid) &amp; betacyanins</td>
<td>Tomatoes, watermelon, guava, grapefruit, papaya, beets, red grapes, chard, cabbage, and elderberry</td>
</tr>
<tr>
<td>Orange</td>
<td>Carotenoids (beta-carotene, alpha-carotene, lycopene, beta-cryptoxanthin, lutein, zeaxanthin)</td>
<td>Cantaloupe, sweet potatoes, grapefruit, orange beets, butternut squash, carrot, bell peppers, peach, nectarine, pumpkin, apricot</td>
</tr>
<tr>
<td>Yellow</td>
<td>Lutein &amp; zeaxanthin (carotenoid)</td>
<td>Pineapple, lemon, mango, onion, peppers, cauliflower, corn, parsnips, squash, chard, bananas</td>
</tr>
<tr>
<td>Green</td>
<td>Chlorophyll</td>
<td>Kale, spinach, artichokes, broccoli, celery, cabbage, peppers, cucumbers, lettuce, edamame, okra, peas, squash, avocado, cucumbers, grapes, kiwi, honeydew, herbs, bok choy, watercress</td>
</tr>
<tr>
<td>Blue/Purple</td>
<td>Anthocyanins, saponins, resveratrol, ellagic acid, pterol alcohol, phenolic acid</td>
<td>Berries, grapes, figs, eggplant, potatoes, cabbage, radicchio, pole beans, cauliflower, plum</td>
</tr>
<tr>
<td>White/tan</td>
<td>Allicin (sulfur containing compounds)</td>
<td>Garlic, onion, cauliflower, parsnips, leek, shallots</td>
</tr>
</tbody>
</table>
Whole grains

Seeds of certain plants, largely cereal grasses, containing potential of a whole new plant. Bran and germ are removed when whole grains are refined.

**BRAN**
- Multi-layered outer skin of the edible kernel.
- Protects the seed.
- Antioxidants
- B vitamins
- Fiber.

**ENDOSPERM**
- The germ’s food supply, which provides essential energy to the young plant.
- Carbohydrates, proteins, B vitamins and minerals.

**GERM**
- The embryo which has the potential to sprout into a new plant.
- B vitamins, Vitamin E, some protein, minerals, healthy fats, phytochemicals.

Whole grains contain fiber, lignans, magnesium, zinc, B vitamins, and vitamin E.

Whole grain consumption: decreased risk of diabetes, stroke, CV disease, decreased SBP and body fat, decreased CRP and IL-6, positive associated with longevity.

Refined, finely ground, milled grains are more rapidly digested than coarsely ground/whole grains and are of less nutritional value.

**Example:** Refining whole wheat to white flour depletes most fiber and decreases vitamins and minerals.

- >75% loss of thiamine, riboflavin, niacin, vitamin E, magnesium, potassium, iron, zinc, and manganese.
- >50% loss of betaine which lowers homocysteine levels and may impact CV disease.
Fruits and vegetables

Classified as macronutrient “carbohydrate” but deserve stand-alone status as nutritional powerhouses

Biochemically complex, rich in phytonutrients, fiber, vitamins, and minerals with synergistic effects

Estimated that Americans consume only 1.6 servings of vegetables per day and only 1 fruit daily. <10% of Americans eat enough fruits and vegetables.

High nutrient/fiber to calorie ratio

The foundation of healthy diet

Mushrooms: Forest fungi in traditional culinary medicine

More closely related to humans than plants with common ancestor >460 million years ago and may have developed defenses against mutual microbial threats

Traditional use of culinary and medicinal mushrooms for thousands of years particularly in Asian and Far East cultures

Rich in active compounds including polysaccharides, phenolic and indolic compounds, carotenoids, vitamins, fatty acids, ergosterols

Prebiotics stimulating gut microbiota

Polysaccharide complexes may have a role in macrophage activation, cytokine gene expression, and immunomodulation

Partially broken down by digestive enzymes, cooking before ingestion increases bioavailability

**Fats**

- Use healthy fats in sensible portions, including nuts and seeds
- Replace saturated fat with unsaturated fats (MUFAs & PUFAs)
- Polyunsaturated fatty acids (particularly omega-3): Significant reduction of total and LDL cholesterol and anti-inflammatory properties and cardiovascular benefits. Plant sources of omega-3 a-linoleic acid (ALA) include flax, walnuts, avocado, marine vegetables, and soy
- Monounsaturated fat from plants (olive oil & nuts): reduces CVD risk through anti-oxidant, anti-atherogenic, anti-inflammatory, and anti-platelet mechanisms
- Avoid trans fats: associated with increased all-cause mortality, total CHD, and CHD mortality, increase in total and LDL-C and decrease in HDL

**Plant based diets: everyday tips**

Whole, unprocessed, colorful foods take center stage, eat a variety of colors daily,

Shop locally – farmer’s markets, CSA, purchase in season produce

Start a container garden or backyard vegetable plot or join a community or school garden

Have fun with public library free seed banks

Frozen fruits and vegetables: flash frozen for high nutrient content, less waste

Eat more whole grains and legumes: Dried beans are an inexpensive, healthy choice, soak overnight and try a pressure cooker

Eliminate trans-fats and replace sweetened beverages with clean water and healthy teas (green and white for highest antioxidant properties)

Food prep and meal planning, communal cooking and meals

Eat mindfully and use the Okinawan 80% principle regarding portion size

Have fun – enjoy your own culture but explore others and incorporate spices - Indian, Japanese, Mediterranean styles, etc. Ethnic grocery stores often are less expensive

Enjoy the practical magic and simple pleasure of a healthy home cooked meal!

Health care provides: Explore motivational interviewing and write a prescription for increased plant consumption and activity – your words are powerful!
Sustainable food on a budget

Price tags are not put on the environmental and health costs of using herbicides and insecticides and nitrogen based fertilizers in food production, however, if they were, sustainable food is actually less expensive.

Farm run off is a real cost on human and environmental health.
Plant Based Nutrition in Clinical Practice

Conveys powerful message that nutrition is key to good health, vitality, and longevity

Safe intervention if consistent with healthy guidelines

Harmonizes with related lifestyle improvements such as increased activity, stress reduction, smoking cessation, and sense of self-worth

Touchstone of improved health with decreased chronic disease burden and decreased health care cost

Saturday, October 19, 2019
9am - 5pm
Omaha, NE

More information and registration at: healthyforalifetime.org

Registration ends October 8th

Healthy for a Lifetime faculty includes:

[Pictures of faculty members]