

NutritionNotes

Daily

2017 Scientific Sessions at Experimental Biology



HIGHLIGHTS

TODAY

Global Dietary Assessment Architecture: Where Are We? Where Do We Need to Be? And How Can We Get There Faster?
8:00am - 10:00am
Room S100A

Introducing the HEI-2015: A Tool to Assess Patterns with Regard to the 2015-2020 Dietary Guidelines for Americans
10:30am - 12:30pm
Room S100A

Compelling Conversations: Partnership for Healthier America
1:30pm - 2:45pm
Room S103BC

ASN Annual Awards Ceremony
6:00pm - 7:30pm
Room S100BC

MONDAY

The Presidential Symposium: Nutrition and Carcinogenesis: Mechanisms, Clinical Care and Population Strategies for Prevention and Control
8:30am - 10:00am
Room S100BC

The Gilbert A. Leveille Lecture Public Health and a Bag 'O Tricks, Guy H. Johnson, PhD
1:45pm - 2:30pm
Room S100BC

STAY CONNECTED



nutrition.org/blog

New studies tackle key questions about children's nutrition

Saturday morning's Childhood Nutrition Epidemiology oral sessions included new research on snacking; protein and micronutrient intake; and diet composition in toddlers, young children and adolescents.

Studies included:

Dietary Intakes of the U.S. Child and Adolescent Population and Their Adherence to the Current Dietary Guidelines

Xiao Gu, BS, Brown University School of Public Health, said Brown's study of nearly 39,000 children and adolescents ages 2-18 showed that overall diet quality improved from 1999 through 2012. But there were disparities in socio-demographic subgroups.

The study encompassed seven NHANES cycles, and involved 24-hour dietary recall. Researchers found that during the study period, participants had an increase in whole fruit, whole grains, sodium, dairy, polyunsaturated fatty acid, calcium, protein, and fiber intake. There was also a decrease in sugar-sweetened beverages, total vegetables, vegetables without potatoes, fruit juice, and omega-3 intake.

Overall, average consumption of sugar-sweetened beverages dropped from 2.1 cups per day to 1.2 cups. Gu said the greatest decrease was in Mexican-American children and adolescents, along with children and adolescents from high-income families.

Total vegetable intake in non-Hispanic whites and adolescents dropped

below dietary recommendations. Overall, whole grain intakes increased, but were still below dietary recommendations. Gu said this may be because people have trouble distinguishing between whole and refined grains, so are just avoiding grains overall.

Continued on page 4



A variety of sessions and other events highlighted the first day of the 2017 ASN Scientific Sessions at Experimental Biology on Saturday.

New research unlocks nutrition and exercise's role in the mysteries of the brain

Saturday afternoon's Changing Brain session featured presentations on how brain plasticity, exercise and nutrition affect function and cognition.

Neurogenesis and Brain Plasticity in the Adult Brain

Henriette van Praag, PhD, National Institute of Aging

The old dogma is that no new neurons can be generated in the adult brain. But we now know there are two neurogenic zones in the mature, human brain. One is the hippocampus, which is highly vulnerable to neurodegenerative disease. But we can take steps to improve hippocampal neurogenesis, van Praag said.

Hippocampal neurogenesis is highly plastic. van Praag's research shows that exercise can increase regulation, and that running also improves spatial learning and memory in both young

and old mice.

van Praag said the hippocampus is not a uniform structure—the neurogenic dentate gyrus creates pattern separation. Research shows that animals that use a running wheel do better with small separation than big separation.

But is improved memory due to the local increase in new dentate gyrus neurons, or are there actual changes in the neurons? van Praag's research shows that dentate gyrus receives multiple inputs, but it also raised further questions, including where do the inputs come from, do they change as the adult brain matures and how does exercise affect this? van Praag and her team used retrovirus and rabies viruses and traced the inputs. "We found many new, beautiful cell types," she said.

The next step was to examine whether exercise changes the inputs

to these new neurons. van Praag's research found that running not only increases neurogenesis, but also reorganizes new neuron circuitry. "We think now that running rewires new neuron circuitry in a way that may protect the brain to become more robust over the lifespan," she said.

van Praag also examined how exercise improves cognitive function by looking at communication between the periphery and the brain. She analyzed studies on heterochronic

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ASN NutriLink has recently launched and is available for all active members! ASN NutriLink is an online community where members of the American Society for Nutrition can connect with each other, collaborate on ideas, and engage in meaningful conversations in a safe and interactive environment. The goals are to bring the nutrition science community together, to enhance the ASN membership experience through improved communications, and to build lasting

relationships among like-minded peers, which will ultimately contribute to the advancement of nutrition science.

For more information about this exciting new member benefit and mentoring program, please come to the ASN NutriLink and MentorLink Kick-Off Event at EB. It will take place this afternoon from 5:00pm - 6:00pm in the McCormick Place Convention Center, South Level 1 Lobby. We hope to see you there!

Attention Members of the Nutrition Education and Behavioral Sciences and Community and Public Health Nutrition Research Interest Sections:

Please join us for our

Joint Forum and Networking Event

Sunday, 4:30pm – 6:00 pm • Room S105BCD

We will announce winners of the Emerging Leader Poster Competition, as well as present the Community and Public Health Nutrition RIS Travel Awards for Outstanding Young Scientists. Sponsored by:

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Join us for the ASN Awards Ceremony

Sunday, April 23 6:00 PM,
McCormick Place Convention Center, Room S100BC

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- ▶ **Origins and Benefits of Biologically Active Components in Human Milk**, July 16 – 21
- ▶ **Growth Hormone/Prolactin Family in Biology and Disease**, July 23 – 28

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Onsite registration is available. Arrive early to guarantee your spot. Seating is limited.

TODAY

Addressing Today's Nutrition and Public Health Challenges with Food Technology Innovations

12:45pm - 2:45pm

Room S106

Sponsored by Tate & Lyle

This program will review solutions that food technology can offer by developing ingredients that provide health benefits to meet public health needs.

Multivitamin/Mineral Supplements in the Age of Personalized Nutrition

12:45pm - 2:45pm

Room S105BCD

Sponsored by Pfizer Consumer Healthcare

This session will discuss the relationship between micronutrients and nutrigenomics and the potential role of multivitamin/mineral supplementation in personalized nutrition.

EARLY MONDAY

Dietary Treatments to Improve Insulin Sensitivity: Focus on High-Amylose Maize Starch

6:30am - 8:30 am

Room S105BCD

Sponsored by Ingredion Inc.

Clinical trials demonstrate that there is a cause-and-effect relationship between consumption of high-amylose maize (HAM) starch and reduced risk of type 2 diabetes. Replacing digestible starch with type 2 resistant starch from HAM (HAM-RS2) leads to a reduction in glycemia and has led to an approved EU Health Claim.

Further, consumption of HAM-RS2 has been shown to have a positive effect on insulin sensitivity, leading to a recently approved health claim by the FDA for diabetes prevention. This session will review data from clinical trials and interindividual variations in the metabolic response to HAM-RS2.

Prospects for a US/Multi-country Replication of PREDIMED

6:30am – 8:30am

Room S106

Sponsored by the California Walnut Commission

Do the findings from the Prevención con Dieta Mediterránea (PREDIMED) study apply in settings outside of Spain? This symposium will address several issues related to design and implementation of a replication trial.

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ASN Center
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South Level 1 Lobby

Hours: Sunday through
 Tuesday, 7:30 am - 5:30pm

Stop by the ASN Center throughout the day to discover what's new in your professional society. Learn about NUTRITION 2018, *Current Developments in Nutrition*, ASN NutriLink and much more.

Children

Continued from page 1

There was a significant increase in sodium intake in the older children—far above the recommended daily value.

Overall, Gu said the study shows that Mexican-American children eat healthier than other racial groups, and high-income families appear to be more responsive to changes in dietary guidelines.

Diet Quality Declines and Differs by Race in Early Childhood

Jessica Woo, PhD, Cincinnati Children's Hospital, said most studies don't show diet taste preferences and eating styles and behavior after age 4. Consequently, this study was designed to assess the longitudinal pattern of diet quality of children between ages 3-7, and whether it differs by race or other demographics.

The study enrolled 372 children at age 3, and assessed their diet every four months for four years. The Healthy Eating Index 2010 (HEI-2010) was used to analyze diet. About 22 percent of the children were African-American and the rest were white.

Longitudinal trends showed that

no participants achieved a good diet quality as measured by HEI-2010. African-Americans had a slightly lower diet quality, but when adjusted for maternal body mass index, that racial difference disappeared.

Woo said longitudinal trends were similar for both whites and African-Americans. Whites consumed more dairy and less sodium and refined grains. African-Americans had greater total vegetable, greens, beans, protein, and unsaturated fatty acid intakes.

Overall, the study showed that by age 3, diet is already poor, and it gradually worsens by age 7. "We see that the nutrition community, clinicians and families need to implement strategies to improve all children's diet quality before age 3," Woo said.

The most impact might come from decreasing children's empty calorie, refined grain, and sodium consumption, and increasing whole grain and unsaturated fatty acid consumption, she said.

Comparison of Fruit and Vegetable Intake from School and Packed Lunches: Intra-individual Variation Across the School Week

Jennifer Taylor, MS, University of California, Davis, said plate-waste

studies show that home-packed lunches tend to be less nutritious than school lunches. Her study looked at fruit and vegetable choices and consumption in students who eat both types of lunches.

The study involved 315 students in grades 4-6, from three schools with varied eligibility for free or reduced-price lunches, and with varied demographics. Results were adjusted for gender, grade, household income, parent education level, and school.

The students were observed over five consecutive days, using digital imaging for plate-waste analysis. Images were collected at the start and end of consumption of packed and school lunches.

Forty-five percent of the students always ate school lunch, 37 percent always ate packed lunches, and 18 percent varied their choices. Compared to a baseline of 1.0 for the always-packed group, the always-school group had fruit consumption of 1.49 and the varied group was 1.22. Vegetable consumption was 1.28 in the always-school group and 1.41 in the varied group, compared to a baseline of 1.0 for the always-packed group.

Among all lunchers, about 50 per-

cent always selected fruit, and about 40 percent always consumed it. But only about 20 percent always selected vegetables, and about 15 percent always consumed them.

Taylor said varied lunchers may score higher in fruit and vegetable consumption because they are more likely to plan lunchtime choices throughout the week, and could also have more autonomy in their choices.

Association of Snacking Frequency with Patterning of Daily Energy Intake and Weight Among U.S. Toddlers and Preschoolers

Jennifer Orlet Fisher, PhD, Temple University, said research shows that snacking provides up to one-third of daily calorie intake in children, and thus may contribute to obesity in young children. But most of what we know about this topic involves older children.

Fisher's study is the first population-representative evidence focused on young children. It used NHANES 2007-14 data involving 3,618 toddlers and preschoolers, ages 12-71 months. Demographic breakdown was 52 percent non-Hispanic whites,

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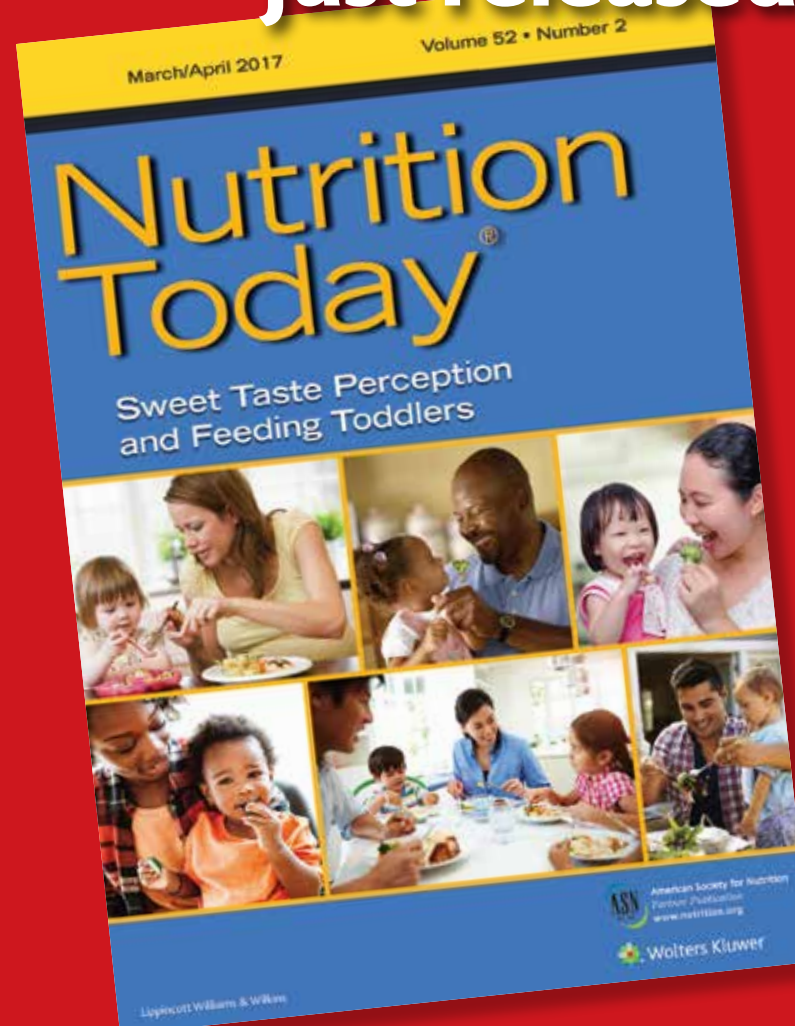
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Children

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16 percent Mexican-American and 15 percent black. About 7 percent of the toddlers were overweight, compared with 13 percent of the preschoolers. Nearly 10 percent of the preschoolers were obese.

Food consumption was measured by What We Eat in America 24-dietary recall. The researchers defined snacking as food and beverages consumed between meals.

Results showed that about 45 percent of toddlers and 56 percent of preschoolers ate the recommended two to three snacks a day (reference group). Overweight and obese children consumed a greater number of snacks daily than normal-weight children. Toddlers who snacked the most were four times more likely to be overweight or obese compared to the reference group.

In preschoolers, there were no significant weight differences between those who snacked normally versus those who snacked more. However, those who infrequently snacked had decreased incidences of overweight and obesity.

Snacking Characteristics and Patterns in the Childhood Obesity Prevention and Treatment Research Consortium

Madison LeCroy, University of North Carolina, said her study recruited predominantly low-income, Hispanic and black children, ages 2-13. Researchers used 24-hour diet recalls and defined snacks as fruits, non-starchy vegetables, starchy vegetables, dairy foods, meats, non-animal proteins, grains, savory snacks, desserts, unsweetened milk and sugar-sweetened beverages.

Results were adjusted for age, sex, highest household education, parent employment and Supplemental Nutrition Assistance Program participation. Researchers found that about 30 percent of participants' daily caloric intake was derived from snacks.

In Hispanic children, there was meal-like snacking, including high loading on non-starchy vegetables, meats, grains, unsweetened milk and sugar-sweetened beverages. Black children had high loading in non-starchy vegetables, starchy vegetables, meat and sugar-sweetened beverages.

All findings with BMI were null, LeCroy said.

Overall, dietary patterns were relatively stable between ages 3-8, but may shift slightly during mid-childhood, LeCroy said. She also noted that increased snacking was frequently associated with improved diet quality in younger children, perhaps because they consumed more calories from snacks.

Macronutrient Composition of Early Childhood Diet: Findings from the Generation R Study

Trudy Voortman, PhD, Erasmus University Medical Center, said the Generation R study started in 2002, following 9,778 women from pregnancy until their children were 10 years old.

The researchers found that macronutrient intake didn't vary based on the children's protein, fat and carbohydrate intake. Children had high protein intake at all ages. Higher protein intake in early childhood was associated with higher fat mass up to age 10, and this was irrespective of whether protein replaced carbs in the diet.

Protein Intake is Associated with Lower Body Fat and Higher Skeletal Muscle Mass in Late Adolescence

Melanie Mott, PhD, RD, Boston University, and her team used data from the National Growth and Health

Study, involving 2,370 black and white girls ages 9-10, who were followed for 10 years. Diet was assessed via three-day food records. The researchers also assessed the girls' total body fat, truncal fat and skeleton muscle mass.

Daily protein consumption categories were less than 55 grams, 65-75 grams and more than 75 grams. Mott said the high-protein consumers tended to be black, a little taller, and had lower body fat, and lower truncal fat and higher skeletal muscle mass. They also tended to eat fewer carbohydrates.

Morning protein consumption categories were less than 8 grams, 8-12 grams, 12-15 grams and more than 15 grams. Girls in the highest category consumed more overall protein, so the characteristics were basically the same as the overall protein-consumption findings, Mott said.

The researchers also found that the girls who regularly consumed some food in the morning, regardless of protein amount, had lower body fat, truncal fat and higher skeletal muscle mass. "Some of the observed benefits of consuming breakfast may be its contribution to total protein intake throughout the day," Mott said.

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Dietary cholesterol lowers risk of type 2 diabetes in the Framingham offspring study. *Boston University School of Medicine (167.3)^{1,2}*

Consumption of up to three eggs per day increases dietary cholesterol and choline while plasma LDL cholesterol and trimethylamine n-oxide concentrations are not increased in a young, healthy population. *University of Connecticut (447.3)^{1,2}*

Protein intake is associated with lower body fat and higher skeletal muscle mass in late adolescence.
Boston University School of Medicine (29.7)²

A genome-wide analysis of placental epigenetic markers in response to maternal choline supplementation.
Cornell University (301.6)²

Vitamin D derived from dietary whole egg is more effective than supplemental vitamin D3 in maintaining vitamin D balance in type 2 diabetic rats. *Iowa State University (436.1)²*

Whole egg consumption as a dietary prevention and treatment intervention increases serum 25-hydroxyvitamin D concentrations in rats with DSS-induced colitis. *Iowa State University (436.2)²*

Nutrient inadequacy among nutritionally vulnerable populations in the US.
US Department of Agriculture, Agricultural Research Service (445.1)²

For information on our grant program, visit EggNutritionCenter.org

Brain

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parabiosis, compounds that activate skeletal muscle and peripheral factors produced by skeletal muscle (myokines).

One study shows that giving AICAR, an AMPK agonist, to sedentary animals, enhances endurance, spatial memory and neurogenesis in young, female mice. This means the benefits of exercise for cognition may originate in muscles, van Praag said.

She also looked at the effect of exercise on the levels of a new myokine called cathepsin B (CTSB). Running didn't enhance spatial memory or adult neurogenesis in CTSB knockout mice. But in humans, running increased CTSB levels, which improved contextual memory and pattern separation.

The Relation of Exercise, Fitness and Adiposity to Cognitive and Brain Health

Charles H. Hillman, PhD,
Northeastern University

Hillman and his team analyzed markers of health behaviors and scholastic performance in 260 kids in third to fifth grade. The more laps the children ran, the better they performed on math and reading tests. But higher body mass index was related to a small decrease in scores.

In terms of fitness and brain structure, Hillman's research shows higher-fit 9- and 10-year-olds have greater thinning of brain matter, leaving strong neurons and connections. Math achievement tests show thinning of the frontal cortex as well, meaning it may be a marker of academic achievement.

Hillman also examined relational memory, which is hippocampal-dependent and exhibits neurogenesis throughout life. Higher-fit 9- and 10-year-olds have more hippocampus

volume, and also outperform lower-fit kids on item accuracy and relational accuracy.

Higher-fit kids have more volume in components of the basal ganglia, which is involved in executive function, Hillman said. Increased fitness is also linked to faster and better responses on executive function tests.

Hillman discussed his FITKids Randomized Trial, which included 221 children participating in an after-school physical activity program on 150 of 170 school days. The intervention included about 70 minutes of moderate-to-vigorous, intermittent activity accounting for about 5,000 steps.

Kids who attended the most exercise sessions increased their scores on flanker and switch cognitive tasks and also showed a change in P3 amplitude. They also had better school attendance.

Hillman said the second FITKids trial is almost finished, and includes data on physical activity and blood-oxygen-level dependent contrast imaging.

He also cited research showing that an increase in saturated fat consumption decreases kids' memory performance. Other research shows that higher body weight results in more unstable performance ability. Kids with as little as one metabolic syndrome risk factor perform more slowly in cognition tests. Obese kids perform more poorly on inhibition tasks. And increases in adiposity relate to decreases in spelling, reading and arithmetic performance.

Based on these results, schools are well-placed to improve children's health behaviors, Hillman said, but there need to be more randomized, controlled trials with generalizable samples of children. Lab research and real-world applications also need to become more closely tied.

Neuroinflammatory Processes in Cognitive Disorders: Is There a Role for Nutrients in Counteracting Their Detrimental Effects?

Sophie Laye, PhD,
Universite Bordeaux

Laye focused on long-chain polyunsaturated fatty acid (PUFA), which accumulate in the brain during the perinatal period and are instrumental in brain growth.

It's well known that decreased PUFA, especially omega-3s, are linked to mood and cognitive disorders. But how? Laye said research shows omega-3s are anti-inflammatory and can work specifically on neural receptors. Omega-6s are eicosanoid and endocannabinoid precursors.

PUFAs may also influence synaptic plasticity and affect microglial cells, which are important in shaping neurons during brain development.

Laye said microglia are activated in the brains of adult omega-3-deprived mice, and LPS administration activates proinflammatory cytokine expression in the hippocampus of omega-3 deprived mice. Dietary

omega-3 deficiency impairs emotional behavior and memory in mice, and also synaptic plasticity in the hippocampus and prefrontal cortex in mice.

When the diet is rich in omega-6 and poor in omega-3, it regulates microglia function during development, sensitizes the brain to inflammation-induced memory deficit and sustains pro-inflammatory cytokines, Laye said.

Exercise, Nutrition and Brain Function: What are the Steps Toward Dietary Recommendations?

Mary Ann Johnson, PhD, University of Georgia

Research show that medical interventions could result in a 41 percent lower prevalence of Alzheimer's disease by 2050, Johnson said. But does that include nutrition and exercise?

There are three meta-analyses related to nutrients' effects on dementia or cognition, and less than 25 meta-analyses on the role of physical activity or exercise. "Evidence is emerging, but in my opinion is really not ready for federal guidance," Johnson said.

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Postdoctoral position in Iron Metabolism and Erythropoiesis

UW-Madison-Nutritional Sciences

Applicants are sought for studies on how dysregulation IRP1-HIF-2 α axis contributes to diseases of erythropoiesis and iron metabolism (Cell Metabolism 17:282). We study the iron- and oxygen regulated RNA binding protein IRP1 that coordinates the fate of mRNA controlling iron metabolism with those involved in erythropoiesis. A central focus is how IRP1 links alterations in cellular iron and oxygen status to changes in the translational of the mRNA encoding the transcription factor HIF-2 α and the ensuing transcriptional output it dictates. Goals of our studies include new paradigms through which integrated control of HIF-2 α synthesis and action in physiological and pathophysiological scenarios influences human health. Contact: Prof. Rick Eisenstein, UW-Madison-Nutritional Sciences; (Eisenstein@nutrisci.wisc.edu).

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Postdoctoral Position in Nanomedicine and Obesity

University of Illinois at Urbana-Champaign

An NIH-funded postdoctoral position focused on nanomedicine and obesity is available in the laboratory of Dr. Kelly Swanson at the University of Illinois at Urbana-Champaign (<https://nutrsci.illinois.edu/directory/ksswanso>).

The funded research aims to develop and test nanomaterial-based prodrugs that efficiently target adipose tissue macrophages to reduce inflammation, diabetic phenotype, and off-target side effects (ACS Nano; 2016; 10:6952-6962). Ideal candidates will have a PhD with a background in rodent model experimentation and molecular techniques.

To apply, send a cover letter and CV including the names of 3 references to Kelly Swanson (ksswanso@illinois.edu).

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ASN Sponsored Satellite Program

Prospects for a US/Multi-Country Replication of PREDIMED

Organized and sponsored by the California Walnut Commission

Monday, April 24, 2017 6:30AM-8:30AM

McCormick Place Convention Center, Room S106

Program Description

The Prevención con Dieta Mediterránea (PREDIMED) study randomized a large sample of high risk Spaniards to one of three diets: 1) Mediterranean diet with extra virgin olive oil 2) Mediterranean diet with nuts made up of 50% walnuts, 25% almonds, and 25% hazelnuts 3) a control group advised to consume a lower fat diet. Researchers found that the two Mediterranean diet groups had 30% lower cardiovascular disease events after five years. Whether these findings apply in settings outside of the Mediterranean region is an important question. This symposium will address several issues related to design and implementation of a replication trial in the United States.

Learning Objectives

At the end of this session, attendees will be able to:

- Discuss recommendations of NHLBI workshop and issues which must be resolved before performing a replication trial
- Identify the dietary differences between PREDIMED treatment and control groups in practical terms and implications for what can and can't be replicated outside of Spain
- Describe principles of a Mediterranean diet which should be included in a replication treatment program

Agenda



Report of a Workshop: Recommendations for Testing the Effects of a Mediterranean Dietary Pattern on Cardiovascular and Other Disease Morbidity and Mortality in Adults in the United States

Holly Nicastro, PhD, MPH
National Heart, Lung, and Blood Institute - Bethesda, MD



A Diet Plan to Replicate PREDIMED: Report of a Group of Scientific Advisors to the California Walnut Commission

David R. Jacobs, Jr., PhD, FAHA, FACN, Session Chair
University of Minnesota - Minneapolis, MN



Dietary Distinction Between the Mediterranean and Control Diet Groups in PREDIMED

Emilio Ros, MD, PhD, FACC
Hospital Clinic of Barcelona - Barcelona, Spain



Mediterranean Diet Recommendations in the US Compared with PREDIMED

Penny M. Kris-Etherton, PhD, RD, FAHA, FNLA, FASN, CLS
Pennsylvania State University - State College, PA



US Dietary Changes Necessary to Achieve Adherence to the PREDIMED Mediterranean Diet

Lyn M. Steffen, PhD, MPH, RD, FAHA
University of Minnesota - Minneapolis, MN

Panel discussion with Q & A

Moderator: David R. Jacobs, Jr., PhD, FAHA, FACN

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