THE SEVENTH
International Congress on Vegetarian Nutrition

February 26-28, 2018
Loma Linda, California
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<td>Feb. 25</td>
<td>1–4 p.m.</td>
<td>Community Event: Plant Your Future  Location: San Bernardino Campus</td>
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<td>Feb. 26</td>
<td>8 a.m.</td>
<td>Welcome Address</td>
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<td>Richard Hart, MD, DrPH  Congress Chair: Joan Sabaté, MD, DrPH</td>
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<td></td>
<td>8:20 a.m.</td>
<td>Plenary: Plant Based Diet for Personal, Population, and Planetary Health</td>
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<td>Frank Hu, MD, PhD</td>
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<td>9:10 a.m.</td>
<td>Break</td>
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<td>9:30 a.m.</td>
<td>Symposium: Epidemiological Studies of Vegetarians: Updates, Making Sense of Discordant Findings Between Cohorts, and Directions for Future Research</td>
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<td>Adventist Health Study- 2  Gary Fraser, MBChB, PhD</td>
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<td>EPIC-Oxford Study</td>
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<td>Professor Timothy J. Key, PhD</td>
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<td>East Asian Cohort</td>
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<td>Tina Haseh-Ting Chiu, PhD, MD</td>
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<td>Indian Migration Study Cohort</td>
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<td>Preet K. Dhillion, PhD, MPH, MPH, BA</td>
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<td></td>
<td>11:40 a.m.</td>
<td>Lunch</td>
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<td>12 p.m.</td>
<td>Simultaneous Sessions</td>
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<td>Poster Session I</td>
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<td>Vegetarian Culinary Adventure- The Interplay of a Nutritionist and a Chef: The Roles of Grains in Vegetarian Diets</td>
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<td>Chef Cory Gheen, MD, RDN, PhD, RD</td>
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<td>Burkholder-Cooley, DPh, RDN, BA</td>
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<td></td>
<td>1:40 p.m.</td>
<td>Symposium: Plant-based Diets and Life Cycle Stages: Gestation Through Geriatrics</td>
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<td>Plant-based Diets During Pregnancy and Child Growth and Obesity</td>
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<td>Trudy Voortman, PhD</td>
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<td>DHA for Gestation and Infancy: Lessons Learned and Implications of a Vegetarian Diet</td>
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<td>Susan E. Carlson, PhD</td>
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<td>Plant-based Diets, Plant Foods and Nutrients and Telomere Length and Aging</td>
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<td>Dr. Aleix Sala-Villa, PhD</td>
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<td>Plant-based Diets and Bone Health Across the Life Course</td>
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<td>Trudy Voortman, PhD</td>
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<td>3:35 p.m.</td>
<td>Break</td>
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<td>3:55 p.m.</td>
<td>Symposium: Plant Foods, Plant Based Diets and the Gut Microbiome</td>
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<td>Gut Microbiome by Diet Patterns</td>
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<td>Michael J. Orlich, MD, PhD</td>
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<td>Gut Microbiome: Polyphenols and Cardiovascular Disease Protection</td>
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<td>Aedin Cassidy, PhD</td>
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<td>Nuts and the Gut Microbiota: Cardiovascular Disease Implications</td>
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<td>David J. Baer, PhD</td>
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<td>5:30 p.m.</td>
<td>Poster Session II</td>
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<td>5:30 p.m.</td>
<td>Reception</td>
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<td>Location: Poolside, Drayson Center</td>
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<td>Feb. 27</td>
<td>8 a.m.</td>
<td>Welcome Address</td>
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<td>Helen Hop Marashak, PhD, MCHES</td>
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<td></td>
<td>8:10 a.m.</td>
<td>Plenary: Reversing Chronic Disease with Plant-based Diets: Past, Present, Future</td>
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<td>David Katz, MD, MPH</td>
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<td>9 a.m.</td>
<td>Break</td>
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<td></td>
<td>9:20 a.m.</td>
<td>Symposium: Reversing, Managing, and Preventing Chronic Disease with Plant Based Dietary Approach</td>
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<td>Prevention of cardiovascular disease using plant-based diets with an emphasis on pulses</td>
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<td>John L. Steen, MD, PhD, FRCPC</td>
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<td>The Use of Plant-based Diets for Obesity Treatment  Dr. Neal Barnard, M.D., F.A.C.C.</td>
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<td>Plant-based Diets in the Treatment and Management of Type 2 Diabetes  Jordi Salas Salvado, MD, PhD</td>
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<td>Soy and the breast cancer survivor: Is the controversy over?</td>
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<td>Mark Messina, PhD</td>
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<td>Alice Lichtenstein, PhD, D.Sc.</td>
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<td>12:15 p.m.</td>
<td>Lunch</td>
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<td>12:30 p.m.</td>
<td>Short Oral Session I: Vegetarian Diets and Health Outcomes-I</td>
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<td>Location: Upsahl Gymnasium</td>
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<td>Short Oral Session II: Nutritional Status and Assessment of Vegetarians</td>
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<td>Location: Studio B</td>
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<td>2:30 p.m.</td>
<td>Symposium: Protein Quantity, Quality and Source Matters</td>
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<td>Protein Quality and Source, Fasting Mimicking Diets and Longevity</td>
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<td>Sebastian Brandhorst, PhD</td>
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<td>Protein and Cardiometabolic Health: What Matters?</td>
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<td>Francois Mariotti, PhD</td>
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<td>The Western Diet: Are we Killing our Patients</td>
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<td>Holly Mattix-Kramer, MD, MPH</td>
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<td>3:45 p.m.</td>
<td>Break</td>
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<td>4:15 p.m.</td>
<td>Short Oral Session II: Vegetarian Diets and Health Outcomes - II</td>
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<td>Location: Upsahl Gymnasium</td>
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<td>Short Oral Session IV: Plant-based Diets and Health Education: Person and Planet</td>
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<td>Location: Studio B</td>
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<td>6:30 p.m.</td>
<td>Banquet</td>
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<td>Location: Drayson Center, Special Events Tent on the Superfield</td>
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<td>Feb. 28</td>
<td>8 a.m.</td>
<td>Welcome Address</td>
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<td>Ron Carter, PhD</td>
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<td>8:10 a.m.</td>
<td>Plenary: Plantary Health and Vegetarian Diets: How Far We Have Come and What is Next?</td>
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<td>Joan Sabaté, MD, DrPH</td>
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<td>9 a.m.</td>
<td>Break</td>
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<td></td>
<td>9:10 a.m.</td>
<td>Symposium: Plant-based Diets for the Health of the Planet</td>
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<td>Optimization of Plant Based Diets for Planetary Health: A Modeling Approach  Professor Nick Wilson, MB ChB, DPh, MPH</td>
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<td>Consumer Attitudes Towards Meatless Diets in Relation to Planetary Health  Ruben Sanchez, PhD</td>
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<td>Exploring the impacts of animal to plant-sourced food shifts in mitigating climate change  Helen Harwatt, PhD</td>
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<td>Challenges and Controversies in Sustainable Diets</td>
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<td>11:10 a.m.</td>
<td>Break</td>
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<td>11:25 a.m.</td>
<td>Symposium: Plant Foods, Food Groups and Health Outcomes</td>
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<td>Plant foods, antioxidants and the risk of cardiovascular disease, cancer, all- mortality  Aune Dagfinn, PhD</td>
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<td>Walnuts, other plant foods, plant-based diet patterns and cognition- the WAHA study and more  Sujatha Rajaram, PhD</td>
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<td>Legumes and Beans in the Prevention of Cardiometabolic Disease  Jordi Salas Salvado, MD, PhD</td>
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<td>1 p.m.</td>
<td>Lunch</td>
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<td>1 p.m.</td>
<td>A Culinary Adventure: The Fork in The Reed Plate: The Intersection of Flavor and Health in Plant-based Eating  Wendy Bazilian, DrPH, MA, RDN</td>
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<td>4:40 p.m.</td>
<td>Closing Remarks</td>
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Dear International Congress on Vegetarian Nutrition Participants,

I’d like to welcome you to the Loma Linda University Campus for the 7th International Congress on Vegetarian Nutrition. It’s an exciting time for the field of plant-based nutrition as we continue to grow and adapt, remaining always innovative and relevant. Public health is confronting a time of many changes locally, nationally and globally. The Loma Linda University School of Public Health is meeting these changes with a sharpened focus on our vision; healthy people living in resilient communities supported by equitable systems of health.

The theme for this 7th Congress is plant-foods for the health of people, populations and the planet. Now more than ever, it is imperative that public health work to relieve the world’s burden of non-communicable diseases, and a healthy plant-based diet is central to that effort. As host of the Congress we are excited to meet and bring inspired people together in forums like this one. We encourage you to fill your plate with all this Congress has to offer around plant-based nutrition and sustainable diets.

The founding dean of our school, Dr. Mervyn G. Hardinge, advocated for vegetarian nutrition as not only safe, but as a desirable way to prevent and reverse lifestyle related chronic diseases. This year we celebrate 50 years of accredited public health education and we’re excited to continue that legacy in part by introducing our PhD program in nutrition, opening Fall of 2018-2019. We are committed to offering high quality evidence-based education on the science and practice of plant-based diets.

Before I close, I’d like to thank each of you for attending our conference and bringing your expertise to our gathering. You, as leaders and investigators, have the vision, the knowledge, and the experience to continue the science of vegetarian nutrition. Throughout this conference, I encourage you to stay engaged, keep us proactive and help us shape the future of plant-based nutrition.

My personal respect and thanks goes out to all of you.

Helen Hopp Marshak, PhD, MCHES
Dean
School of Public Health
Loma Linda University
Dear Colleagues,

It is my pleasure to welcome you to the 7th International Congress on Vegetarian Nutrition. I am excited to have you join us for another vibrant and rewarding event.

Over the next three days you will be able to review accumulated findings, be introduced to theoretical concepts, practical applications, and implications of vegetarian dietary practices on the prevention of disease and the promotion of health. You will have the opportunity to attend plenary lectures, panel discussions, and oral and poster sessions.

I encourage each one of you to use this event as a platform for fellowship with your colleagues from around the globe, and share what you know. What better place than at this event to grow a deeper understanding of plant-based nutrition, and how it affects each one of us personally and our planet. Professional interest in vegetarian nutrition has never been this high. However, scientific knowledge regarding vegetarian diets and their effect on human health are far from complete. I encourage you to take part in all that this Congress offers and learn how we can move forward together.

While I hope you enjoy the lectures and panels, I ask that you please review our program, as there are a variety of social activities as well. I also encourage you to take some time to enjoy Southern California! You are here at a perfect time of year to see and enjoy the desert, mountains and ocean, all in close proximity of Loma Linda.

I look forward to greeting you as our paths cross during the meetings. I trust that you will leave with a richer understanding of plant-based nutrition for personal, population, and planetary health.

Joan Sabaté, MD, DrPH
Congress Chairman
Chair, Department of Nutrition
School of Public Health
Loma Linda University
Advisory Councils and Organizers

International Advisory Board

Tina H. T. Chiu, PhD, RD  
Nutritional Epidemiologist  
Tzu Chi Health Study  
Tzu Chi Medical Foundation, Taiwan

Tina H. T. Chiu, PhD  
Nutritional Epidemiologist  
Tzu Chi Health Study  
Tzu Chi Medical Foundation, Taiwan

Winston Craig, PhD  
Adjunct Professor  
School of Public Health, Loma Linda University

Winston Craig, PhD  
Adjunct Professor  
School of Public Health, Loma Linda University

Penelope Duerksen-Hughes, PhD  
Associate Dean  
Basic Science  
Loma Linda University, School of Medicine

Penelope Duerksen-Hughes, PhD  
Associate Dean  
Basic Science  
Loma Linda University, School of Medicine

Gary E. Fraser, MD, PhD  
Professor  
School of Public Health  
School of Medicine  
Faculty of Graduate Studies  
Loma Linda University

Gary E. Fraser, MD, PhD  
Professor  
School of Public Health  
School of Medicine  
Faculty of Graduate Studies  
Loma Linda University

Marcel Hebbelinck, em Prof, PhD, Drhc  
Professor  
Vrije Universiteit Brussel

Marcel Hebbelinck, em Prof, PhD, Drhc  
Professor  
Vrije Universiteit Brussel

David Jacobs, PhD  
Mayo Professor of Public Health  
School of Public Health, University of Minnesota

David Jacobs, PhD  
Mayo Professor of Public Health  
School of Public Health, University of Minnesota

Patricia Johnston, DrPH  
Emeritus Professor  
School of Public Health, Loma Linda University

Patricia Johnston, DrPH  
Emeritus Professor  
School of Public Health, Loma Linda University

Timothy Key, PhD  
University of Oxford, United Kingdom  
The principal investigator of EPIC-Oxford

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University of Oxford, United Kingdom  
The principal investigator of EPIC-Oxford

Johanna W. Lampe, PhD, RD  
Full Member and Associate Division Director  
Cancer Prevention Program  
Public Health Sciences Division  
Fred Hutchinson Cancer Research Center

Johanna W. Lampe, PhD, RD  
Full Member and Associate Division Director  
Cancer Prevention Program  
Public Health Sciences Division  
Fred Hutchinson Cancer Research Center

Claus Leitzmann, PhD  
Retired Professor  
Justus Liebig University, Germany

Claus Leitzmann, PhD  
Retired Professor  
Justus Liebig University, Germany

Mark Messina, PhD, MS  
Co-Owner  
Nutrition Matters

Mark Messina, PhD, MS  
Co-Owner  
Nutrition Matters

Jordi Salas-Salvadó, MD, PhD  
Professor of Nutrition  
School of Medicine  
Rovira i Virgili University, Reus, Spain

Jordi Salas-Salvadó, MD, PhD  
Professor of Nutrition  
School of Medicine  
Rovira i Virgili University, Reus, Spain

Connie Weaver, PhD  
Distinguished Professor  
Purdue University, Nutrition Science

Connie Weaver, PhD  
Distinguished Professor  
Purdue University, Nutrition Science
Scientific Program Committee

Joan Sabaté, MD, DrPH  
(Congress Chair)  
Director, Center for Nutrition, Healthy Lifestyle & Disease Prevention  
School of Public Health, Loma Linda University

Karen Jaceldo-Siegl, DrPH, MS  
Associate Professor, Center for Nutrition, Healthy Lifestyle & Disease Prevention  
School of Public Health, Loma Linda University

Michael J. Orlich, MD, PhD  
Assistant Professor  
School of Public Health, School of Medicine  
Loma Linda University

Gina Siapco, DrPH  
Assistant Professor, Center for Nutrition, Healthy Lifestyle & Disease Prevention  
School of Public Health, Loma Linda University

Sujatha Rajaram, PhD  
(Scientific Committee Chair)  
Director, SPH Doctoral Programs  
School of Public Health, Loma Linda University

Julie Jones, MD  
Graduate Student, DrPH Nutrition  
School of Public Health, Loma Linda University

Brenda Rea, MD, PT, RD  
Assistant Professor, Family and Preventive Medicine Departments  
Medical Director, Living Whole Employee Wellness Program  
School of Medicine, School of Public Health, Loma Linda University

Organizing Committee

Bess Getman  
Events Manager, Senior Wellness Coordinator  
Loma Linda University, Drayson Center

Dana M. Gonzalez  
Associate Director, Continuing Medical Education  
Loma Linda University School of Medicine

Mirna Gonzalez  
Administrative Assistant  
Loma Linda University, School of Public Health

Joy Guy, MHA, RT (R), (CV)  
Clinical Educator, Staff Development  
Loma Linda University Medical Center

Ron Mataya, MD  
Professor of Global Health, Center for Leadership in Health Systems  
Loma Linda University, School of Public Health

Samantha Orcasitas  
Marketing and Events Manager  
Loma Linda University Health, Department of Marketing

Erin Westphal, MAM  
Senior Event Specialist  
Loma Linda University Health, Department of Marketing

ICVN
7th International Congress on Vegetarian Nutrition
General Information
About the Congress

Every five years this scientific conference on the health effects of plant-based diets offers an opportunity for health professionals and researchers to learn from each other in plenary sessions, symposia, short oral and poster presentations and social gathering.

Background

Over the past 30 years the International Congresses on Vegetarian Nutrition have become the premier scientific conference on the health effects of plant-based diets. In 1987, vegetarian dietary patterns and their effects on health had become the subject of increasing scientific interest. The time seemed appropriate for a scientific congress to bring together the leading researchers active in studying vegetarians and their nutritional status along with the health professionals who must provide sound guidance to consumers who choose to be vegetarian. With a goal of integrating current knowledge, the 1st International Congress on Vegetarian Nutrition was planned to examine the evidence relative to the effects of vegetarian diets of various populations.

Subsequent Congresses in 1992, 1997, 2002, 2008 and 2013 grew in the extent of knowledge to be integrated and the practical applications to be applied. During that time, scientific interest has shifted from investigating dietary concerns held by nutritionists and other health professionals, to creative solutions for various medical conditions and preventative approaches to chronic diseases. This now includes overarching concerns outside the vegetarian community to include ecology and environmental issues. As these concerns emerged and grew, so did the content of the vegetarian congress.

Although professional interest in vegetarian nutrition has now reached unprecedented levels, scientific knowledge regarding vegetarian diets and their effects on human health is far from complete. These congresses offer a platform for health professionals, researchers and the planet to learn from each other in plenary sessions, workshops, poster presentations and social gatherings. It is our intent that the seventh edition of the Congress follows the tradition established in the last five years, and continues to add to the scientific data on nutrition while enlarging the scope of proceedings to include all aspects of public health that vegetarian nutrition might address.

Objectives

• To assess and summarize current research on plant based diets and vegetarian nutrition as it applies to disease prevention and health promotion.

• To explore and discuss the various applications of vegetarian nutrition research to clinical and public health practice.

• To increase the awareness of the health implications of plant based dietary practices.
Host & Venue
The 7th International Congress on Vegetarian Nutrition is being held on the campus of Loma Linda University (LLU) at the Drayson Center. In harmony with its heritage, Loma Linda University fosters a caring Christian environment, which emphasizes and facilitates both professional and personal balance leading to an integrated development of intellectual, spiritual, social and physical qualities of the individual.

The Drayson Center is a 100,000-square-foot, state-of-the-art recreation and wellness facility. For the Congress on Vegetarian Nutrition the Opsahl Gymnasium has been transformed into a conference center. All plenary sessions and symposia will be held in the gymnasium, while the Collins Room, across from the gymnasium houses the exhibits. All short oral presentations will be presented on the main stage and in Studio B.

The mission of LLU Drayson Center is to provide opportunities to enhance the quality of life within this community through a wide variety of social, recreational and health-building activities. The facility includes two aerobic studios that hold between 60-80 people for aerobic activities, which include high and low impact, step and hip-hop; state-of-the-art cardio weight rooms with training equipment that covers more than 5,800 square feet of area; an outdoor aquatics facility consisting of a heated 10-lane lap pool, a leisure pool and an outdoor Jacuzzi; five racquet ball and tennis courts; and a 9-plus acre super field with a running track around the perimeter. These sport facilities are all available to Congress attendees.

Planning a conference can easily consume lots of resources, considering the amount of paper, electricity, food, water and international travel associated with environmental impact and damage. To ensure that the 7th International Congress on Vegetarian Nutrition does everything possible to minimize carbon footprints, the planning committee has taken considerable initiatives and strategies to reduce energy consumption and greenhouse gas emissions.

Of course, the congress banquet and all meals served will be meatless and mainly composed of wholesome plant foods. Plant-based meals are more sustainable because they use fewer natural resources and are less taxing on the environment in comparison to meat-based meals.

The congress will use products, such as:
- 100% cotton, non-bleached, non-dyed tote bags
- Reusable name tag holders
- Potato starch utensils
- Post-consumer plates and napkins
- Recyclable cup sleeves
- 100% recycled paper content

The food and beverage consumption will thoughtfully apply:
- No water bottles
- Selecting locally grown fruits and vegetables
- Recyclable bins for plastic

Event logistics will include:
- Passenger Shuttles that provide convenience and large-based transportation
- Event Décor with fresh flowers, live plants, and biodegradable balloons
Sponsors

Premier Supporter

The Harding-Buller Foundation of Ohio
hardingheritagefdn@att.net

Since the 1st International Congress on Vegetarian Nutrition, Worthington Foods and its past President, Alan Buller, have helped to sponsor these important meetings to share the latest research on vegetarian diets. The Harding-Buller Foundation of Ohio brings together the resources of the founders of Harding Hospital and Worthington Foods with the membership of the Worthington, Ohio Seventh-day Adventist Church. Its mission is to advance the areas of Mental Health, Vegetarian Nutrition and Community Health. Contact us to learn more.

Nut Supporter

California Walnut Commission
walnuts.org/health-professionals/

California walnuts are the only nut to contain an excellent source of the essential plant-based omega-3 alpha-linolenic acid (2.5 grams/ounce). One ounce of walnuts also offers four grams of protein and two grams of fiber. With key nutrients and a mild, nutty flavor that pairs well with a variety of foods, walnuts are an ideal ingredient for satisfying plant-forward meals. Visit walnuts.org to find nutritional information, educational resources, peer-reviewed health research, and hundreds of vegetarian and vegan recipes.

Platinum Supporter

Loma Linda
LomaLindaBrand.com

The Loma Linda brand was created in Loma Linda, California, producing sustainable plant-based proteins for more than 125 years. Innovation plays an important role to meet the needs of our loyal consumer following that includes continued recipe development and our new Loma Linda Blue microwavable pouch line that support a healthy plant-based, on-the-go lifestyle.
**Bronze Supporters**

**Beso Biological Research, Inc.**
besoinc.com

Bio-technology company based in California with over 25 years of experience specializing in organic soybean fermentation. Striving to create nutritive fermented products using the widely known superfood “soy”. Soy is powerful antioxidant, high in amino acids, healthy fats and when fermented assimilates faster and easier into the bloodstream for enhanced biological activity and health promoting benefits. Our mission is to develop quality fermented soybean products to improve nutrition and good health.

**Full Plate Living**
fullplateliving.org

Full Plate Living is a non-profit organization with a simple mission: to encourage, educate, support and inspire anyone who desires to live a healthier lifestyle. We believe anyone in any situation can do something that will affect their health positively. Even the smallest actions can lead you down a healthier path. We believe living healthy doesn’t mean eating food you despise, starving yourself, or spending endless time at the gym. Nor do we believe in gimmicky diets or too good to be true lose-weight-fast pills or supplements.

**Heritage Health Food/ Worthington**
heritagehealthfood.com

The mission of Heritage Health Foods is to produce high quality, great tasting, and healthy, vegetarian products – “World’s Best!” Focusing on both the traditional vegetarian consumer and looking to expand the choices for those seeking a full-time or partial vegetarian plant based lifestyle. Also those consumers that are looking for assistance with current health issues that include Vegan, Gluten-Free, and Non Genetically Modified products.

**Nutritarian Womens Health Study**
nau.edu/nwhs

The Nutritarian Women’s Health Study (NWHS) is a long term observational study on the effect of the Nutritarian diet on overall health plus the occurrence, recurrence, and progression of chronic diseases (including all forms of cancer, diabetes, heart disease, and stroke).

**Education Grant Supporter**
Allan Buller Family
Exhibitors

Barnes and Noble
llu.bncollege.com

The Campus Store at Loma Linda University is located right down the street and features books, tech accessories, apparel and much more. For more information, please visit llu.bncollege.com.

Drayson Center Office of Preventative Care
publichealth.llu.edu/drayson-center-office-preventive-care

At the DC Office of Preventive Care, we focus on the modern lifestyles that lead to disease. Our professionals and interns will work with you individually and take care of your lifestyle needs.

Life and Health Network
facebook.com/LifeandHealthNetwork/

Life and Health Network was created by a group of doctors and dentists who all share an earnest desire to do more than the norm. True health shouldn’t be merely about diagnosing symptoms and prescribing medication—it’s so much more valuable than that. True health is about holistic wellness, pursued in a sustainable manner that limits the need to visit doctors. How? Simple—good nutrition, regular fitness, and a positive state of mind. In this age of poor health and infinite opinions on how to “fix” it, the goal of Life and Health is to simplify and inspire your health journey.

Life Long Health
myllh.org

LifeLong Health provides educational resources for promoting healthy living including Power Point presentations, lifestyle change programs, books, DVD’s, and health assessments. Health programs are developed and reviewed by health professionals to ensure high quality programs.

Loma Linda University Nutrition Academic Programs
PhD Nutrition: srajaram@llu.edu, MS Nutrition: ehaddad@llu.edu, MPH Nutrition and MPH Nutrition coordinated program with dietetics: cheskey@llu.edu, BS/MS and MS Nutrition and Dietetics coordinated programs: ckosch@llu.edu
Loma Linda University School of Public Health
llu.edu/sph
The Loma Linda University School of Public Health prepares its students for rewarding public health careers in an increasingly changing health care system. We offer 14 public health degree programs at the master’s and doctoral level. The School of Public Health also offers MPH and PhD degrees online. We create learning experiences for each generation. We translate scientific discovery into action, improve health, spread hope and promote wholeness from our neighborhood to yours.

Signs Publishing
FoodAsMedicine.cooking
Discover why every meal matters and how your food choices control the expression of your genes, which is important if you have a family history of disease. Learn how healthy diets can deliver a list of positive effects like those of medications. See why your wellbeing is affected by when you eat and why mindless eating is dangerous. If you maintain the healthy way of eating described, you might never need to diet again.

Vegetarian Nutrition Dietetics Practice Group (VN DPG) of the Academy of Nutrition and Dietetics
The Vegetarian Nutrition Dietetics Practice Group (VN DPG) of the Academy of Nutrition and Dietetics strives to empower members to be the leading authority on evidence-based vegetarian nutrition for food and nutrition professionals, health care practitioners and the public. As the leading authority on evidence-based vegetarian nutrition, our vision is to optimize global health and well-being by –

- Creating and disseminating vegetarian nutrition educational materials
- Supporting cutting edge research.
- Developing influential public policy
Continuing Education

Upon completion of the event, participants will be contacted via email with instructions on how to access their certificate(s) online. Please allow up to two weeks after the last day of the event for the certificates to be available.

Course: 7th International Congress on Vegetarian Nutrition

Summary
Continuing Professional Education credits will be available at the 7ICVN for all Symposium sessions in the following areas: CDE*, CME category 1, Registered Nurses (BRN)(ANCC), Certified Health Educators (CHES), Registered Dietitians (RD), and Respiratory Therapists. *Please note that only a selection of sessions are available for CDE. These are clearly marked on the program with CDE.

CDE – Select hours available, see individual sessions
CME – 20 max hours
CE – 24 max hours
Day 1 – 8.5 with cooking demo / 7.0 without cooking demo
Day 2 – 7.0 no cooking demo
Day 3 – 8.5 with cooking demo / 7.0 without cooking demo

Available Continuing Education
Dental Education
A selection of presentations at the 7ICVN have been approved for CDE. For reference, please see the CDE markings on the program page that designate eligible lectures. The Loma Linda University School of Dentistry is designated as a provider of California Continuing Dental Education by the Academy of General Dentistry; AGD Code 150. The event will be available for a maximum of 7.0 hours per day.

Health Educators
Loma Linda University School of Public Health is designated as a provider of Category I continuing education contract hours in health education by the National Commission for Health Education Credentialing, Inc. The NCHEC Multiple Event Provider (MEP) number is CA0024. The event will be available for 7.0 – 24 hours depending on the sessions attended.

Physicians/CME/Category 1
Accreditation Statement
The Loma Linda University School of Medicine is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

The Loma Linda University School of Medicine designates this Live Activity for a maximum of 20.0 AMA PRA Category 1 Credit(s)™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Disclosure Statement
This program has been planned and implemented in accordance with ACCME essentials and standards. The Loma Linda University School of Medicine Office of Continuing Medical Education relies on its CME faculty to provide program content that is free of commercial
Overall Objective
The ICVN is designed to improve physician knowledge of lifestyle practices and vegetarian nutrition that can be used effectively in the treatment and prevention of chronic disease. As a result of this conference, physicians will be able to understand current research on plant based diets and vegetarian nutrition as it applies to disease prevention and health promotion; explore and discuss the various applications of vegetarian nutrition research to clinical and public health practice; and help their patients and clients to move to healthier plant based diets for optimal health and disease treatment and prevention in an efficient and effective manner.

Public Health – Certified
The Loma Linda University School of Public Health is a pre-approved provider of CPH recertification credits by the National Board of Public Health Examiners. The event will be available for 7.0 – 24 hours depending on the sessions attended.

Registered Dietitians
Loma Linda University Medical Center, Staff Development is a Continuing Professional Education Accredited Provider with the Commission on Dietetic Registration. Registered Dietitians and dietetic technicians, registered will receive from 7.0 – 24.0 continuing professional education units for completion of this program depending on the sessions attended.

Registered Nurses
Loma Linda University Medical Center, Staff Development is approved by the California Board of Registered Nursing, Provider Number 00239 to offer this event for 24.0 contact hours. Loma Linda University Medical Center is accredited as a provider of continuing nursing education by the American Nurses Credentialing Center’s Commission on Accreditation (ANCC). This event meets the qualifications for 7.0 -24.0 continuing education credits by the ANCC depending on the sessions attended.

Respiratory Therapists
Respiratory Care Practitioners reciprocate with BRN approval for 7.0 – 24.0 continuing education credits depending on the sessions attended.

Course Description
Professional interest in vegetarian nutrition has now reached unprecedented levels; however, scientific knowledge regarding vegetarian diets and their effects on human health is far from complete. The Congress on Vegetarian Nutrition is designed to provide a review of the accumulated findings, and introduce theoretical concepts, practical applications, and implications of vegetarian dietary practices for both the prevention of disease and the promotion of health, as well as for the furthering of research endeavors.

Objectives
- To assess and summarize current research on plant based diets and vegetarian nutrition as it applies to disease prevention and health promotion.
- To explore and discuss the various applications of vegetarian nutrition research to clinical and public health practice.
- To increase the awareness of the health implications of plant based dietary practices.
Course Content/ Outline

- Plant-based diet patterns and healthy aging
- Epidemiological studies of Vegetarians
- Role of nuts in disease prevention
- Why and how vegetarian diets prevent obesity
- Vegetarian diet and prevention of cancer
- Role of soy in health and disease
- The great debate: are all omega-3s created equal?
- Vegetarian diet patterns and cardiometabolic syndrome
- Environmental cost of vegetarian diet patterns
- Foods and nutrients of interest to vegetarians: The science and application
- Challenges of defining vegetarian diet
- Vegetarian studies around the globe

Successful Completion of course is defined as

- Attendance at each presentation and participant may not miss more than ten minutes of any presentation
- Provision of enrollment/CE information
- Complete program/speaker evaluation forms returned at the conclusion of the course

Conflict of Interest or Lack Thereof

The planning committee, coordinator and presenters of this class have no financial relationship in the material presented.

Commercial Support

Refer to the Supporter and Exhibitor Section

Non-endorsement of Product(s)

Please be advised that accredited status does not imply endorsements of any commercial products displaying in conjunction with this class by either Loma Linda University Medical Center or American Nurses Credentialing Center (ANCC)

Off-label Use

The participant will be told if any education class activity or topic relates to any product use for a purpose other than that of which it was approved by the Food and Drug Administration.
Planning Committee

Please refer to the International Advisory Board & Scientific Committee section

Additional continuing education reviewers include:
Dana M. Gonzalez
Associate Director, Continuing Medical Education
Loma Linda University School of Medicine

Joy Guy, MHA, R.T. (R), (CV)
Clinical Educator, Staff Development
Loma Linda University Medical Center

Kathleen Moore, MHIS
Director, Continuing Education, Alumni Association and Marketing
Loma Linda University School of Dentistry

Gwen Wysocki, DNP, RN-BC
Executive Director, Staff Development
Loma Linda University Medical Center

For questions about 7ICVN Continuing Education, please contact:
CDE Office
Continuinged@llu.edu

CME Office: Dana Gonzalez
909-558-8120 (From the LLU Campus, x88120)

All Other Continuing Education/Certificate of Attendance: Staff Development
909-558-3500 (From the LLU Campus, x33500)
**Academic Credit**

Course PHCJ 524 ST in PH PRACT: 7ICVN PLANT-BASED NUTR (1-3)
Plant-Based Diets for Healthy People, Populations, and the Planet

**Course Description**

This course is offered in conjunction with the LLU School of Public Health’s 7th International Congress on Vegetarian Nutrition. The course will provide students exposure to the most recent findings and best practices on plant-based diets and its effects on the health of individuals, populations, and the planet. Students will attend plenary lectures, symposia presentations, short oral presentations, and poster sessions.

**Course Instructor**

Gina Segovia-Siapco, DrPH, MPH
Associate Professor of Nutrition
Center for Nutrition, Healthy Lifestyle and Disease Prevention
School of Public Health, Loma Linda University
Email: gsiapco@llu.edu, Phone: 909-558-4300 ext. 47110

**Learning Objectives**

Upon attendance to the 7th International Congress on Vegetarian Nutrition and successful completion of the course, the student should be able to

- Recognize that diets associated with health promotion all have a common theme of minimally processed foods that are mostly plant-based.

- Review and discuss current evidence on the role of consuming a plant-based diet on physical and cognitive health of individuals throughout the lifespan, on public health specifically on chronic diseases and the epidemic of obesity, and on the environment and the planet.

- Summarize findings from existing large cohort studies, clinical trials, and other cohort studies that focus on vegetarian nutrition regarding diseases and conditions of public health importance, such as mental/cognitive health and reversal of certain cardio-metabolic diseases.

- Appraise scientific information on controversial issues related to plant-based nutrition and identify gaps that need further investigation.

- Review the scientific literature and write a report on a topic related to plant-based nutrition that is of personal interest.
7ICVN Social & Auxiliary Activities

**Plant Your Future**
- **Date:** Sunday, February 25, 2018
- **Time:** 1–4 p.m.
- **Cost:** Free to the community!
- **Location:** Loma Linda University Health – San Bernardino Campus

A special pre-conference session of the 7ICVN, this gathering will feature health talks (English and Spanish), a free cooking demonstration, food vendors and more.

**A Vegetarian Culinary Adventure – The Interplay of a Nutritionist and Chef: The Roles of Grains in Vegetarian Diets**
- **Date:** Monday, February 26, 2018
- **Time:** 12–1:00 p.m.
- **Cost:** $30
- **Location:** Coleman Pavilion – Shuttles will be provided

Featuring Chef Cory Gheen, MS, RDN and Nasira Burkholder-Cooley, DrPH, RDN. Whole grains have been a staple of the human diet for centuries. Despite the widespread history of grains, from rice in Asia to wheat in Europe, grains are often a subject of nutritional controversy. While it is true that overconsumption of refined grains can have unfavorable effects on health, consumption of whole grains is associated with numerous health benefits, such as reducing hypertension and protecting against atherosclerosis. For vegetarians, grains represent an important source of iron, protein, and B vitamins, and the diversity of grains offers a wide range of flavors and cuisines to explore. Through a delicious and interactive meal and presentation featuring sensational plant-based ingredients, we share practical tips and demonstrate how a vegetarian diet can be optimized with grains.

**Vegetarian Congress Reception**
- **Date:** Monday, February 26, 2018
- **Time:** 5:30 –7:30 p.m.
- **Cost:** Included with Registration
- **Location:** Poolside, Drayson Center

Get to know your fellow conference attendees through a fun reception that includes vegetarian hors d’oeuvres and live entertainment. It’s an event worth attending!

**Refresh- Morning Run!**
- **Date:** Tuesday, February 27, 2018
- **Time:** 6–7 a.m.
- **Cost:** none
- **Location:** Meet in the lobby of the Hilton Double Tree

Here’s an opportunity to jog with LLU faculty and leadership in a morning jog that will revitalize and invigorate the body! Spend a fun morning working your muscles and networking with other professionals! All levels welcome.
Vegetarian Congress Banquet
Date: Tuesday, February 27, 2018
Time: 6:30–8:30 p.m.
Cost: Ticket Required, Included in Registration, Additional guests $50
Location: Drayson Center, Special Event Tent on the Superfield

We are honored to invite you to the 7ICVN Banquet with the Loma Linda University School of Public Health. Featuring a special presentation from our executive chef. It is a meal you won’t want to miss!

Refresh- Morning Run!
Date: Tuesday, February 28, 2018
Time: 6–7 a.m.
Cost: none
Location: Meet in the lobby of the Hilton Double Tree

Here’s a second opportunity to jog with LLU faculty and leadership in a morning jog that will revitalize and invigorate the body! Spend a fun morning working your muscles and networking with other professional! All levels welcome.

A Vegetarian Culinary Adventure – The Fork in the Road Plate:
The Intersection of Flavor and Health in Plant-based Eating
Sponsored by The California Walnut Board
Date: Wednesday, February 28, 2018
Time: 1–2 p.m.
Cost: none
Location: Main Hall

Presented by Wendy Bazilian, DrPH, MA, RDN and Sponsored by The California Walnut Board. We face a sea of choices when it comes to our food today. And while health is important, flavor reigns when it comes to making choices about the foods we’ll consume. . . especially those we’ll eat not just once, but again and again over the course of our healthful lives. It appears that there’s a constant push-pull between navigating either toward health and away from taste or toward taste and away from (or at the expense of) health. Through a delicious and interactive meal and presentation featuring some of these elements – along with practical tips to see how plant-based eating is not an all-or-nothing proposition – we’ll see how beautifully flavor and health can intersect.
Special Information for Attendees

Badges
Name badges will be checked at the entrance to all Congress sessions. Participants are kindly asked to wear the name badge at all functions during the Congress. Entrance will NOT be granted without proper identification.

Certificate of Attendance/Continuing Education/Academic Credit
All registered attendees will receive a Certificate of Attendance. Up to 24 hours of Continuing Education (CE/CDE/CME) is available. Please see the CE section of this book, or the Registration Desk for more information. All preregistered academic credit students must sign in daily. For more information, please visit the Registration Desk.

Environmental Responsibility
Planning and holding a conference can easily consume plenty of natural resources. In efforts to ensure the 7ICVN minimizes its carbon footprint, the planning committee has taken considerable initiatives to reduce energy consumption and greenhouse gas emissions. Some environmentally responsible elements include: all vegetarian and mostly local organic foods provided, potato starch utensils, post-consumer plates, napkins and papers, reusable water bottle provided for all attendees, reusable name tag holders and passenger shuttles that provide convenience and large-based transportation.

Exhibits
Exhibits will be open daily from 7:00 – 8:00 a.m., during the morning and afternoon breaks and at lunchtime. Sponsored and paid exhibits are located in the Collins Auditorium, across from the main congress sessions.

Insurance/Liability
Loma Linda University and the Congress organizers cannot be held liable for accidents, loss of valuable, etc. during the congress.

Internet Service
Wifi access is available to all 7ICVN guests. Username: homecoming. Password: Homecoming18!

Language and Translation
English is the official language of the Congress. However, simultaneous translation into Spanish and Portuguese will be available for the scientific sessions. See the Registration Desk for details.

Lost and Found
For lost and found services, please see the registration desk.
Physical Activity
While attending the 7ICVN, the Drayson Center facilities are available free of charge. Your congress name badge will gain you access to the resources described above.

Refresh with a morning jog! Tuesday morning at 6:00 a.m., attendees will meet in the lobby of the Double Tree. Wednesday morning at 6:00 a.m., attendees will meet at the Drayson Center. All levels welcome.

Recordings
No audio or videotaping will be allowed during the scientific sessions. Attendees in violation of this policy are subject to removal from the congress. Individual lectures will be available for purchase of continuing education purposes beginning in May 2018. For more information on these, please return to VegetarianNutrition.org for access and more detailed information.

Transportation and Parking
Shuttle transportation will be provided each day between the Hilton Double Tree, Holiday Inn Express and Drayson Center. Shuttles will make the rounds to these three hotels beginning at 6:45 a.m. each morning. If you miss a shuttle, the next one will be by shortly to pick you up. Service will continue through 9:00 a.m. and will be available for one half hour after the final symposium each day, and before and after the social program on Monday and Tuesday night. Limited shuttle service may be available during the lunch break if warranted. Check at the Registration desk.

On-campus shuttle service is provided free of charge from the Drayson Center to any facility on campus. This shuttle will deliver you to within walking distance of our event site. Return shuttles will embark from the unloading site to at the conclusion of your event. Shuttles run about every 10 minutes from Shepardson to the Drayson Center.

If you require taxi service while at the Congress, direct the taxi driver to collect you from the Drayson Center at Loma Linda University at 25040 Stewart Street, Loma Linda. Phone Yellow Cab at 909-884-1111.

All parking lots and structures require parking passes except the Shepardson Lot and Lot X at the Centennial Complex. The Shepardson Parking lot is very close to the Drayson Center; we suggest you utilize this parking lot over Lot X. Parking regulations are actively enforced by our security department, and regularly patrolled. This lot is being supplied for your event use; please be safe and make sure you lock your car and do not leave valuables within sight. Loma Linda University assumes no liability for fire, theft, windstorms, water, or other damage or loss to the car or any article left in the car or for injury to any person or property in or near said vehicle.
7ICVN Shuttle Service, February 26-27, 2018

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**Afternoon Return (DC to Doubletree)**
Stop at Holiday Inn Express.

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**Special Information for Chairpersons, Speakers and Poster Presenters**

**Chairpersons and Speakers**
Session chairpersons and speakers are kindly requested to be available in the main conference room at least 15 minutes before the beginning of their symposium to finalize any arrangements. The first five rows on the left side as you enter the conference hall are reserved for speakers, chairs, and International Advisory Board Members. Chairpersons should make every effort to maintain the time schedule. A timer will be sitting in the front row during each session and will give a five minute and one minute warning. Scheduled times for oral presentations are as follows:

- **Plenary Speakers**
  40 minutes + 10 minutes Q&A

- **Symposia Speakers**
  25 minutes + 15-20 minutes Group Q&A

- **Short Oral Speakers**
  10 minutes + 3 minutes Q&A

Cell phones and pagers must be in power-off mode in the lecture rooms at all times. The chairpersons are requested to check this before the beginning of the session.
**Speaker Ready Room**

The Fritz Room will be open from 7 a.m.–4:30 p.m. each day. This room is for speakers to check their PowerPoint or presentation files. Computer equipment and technicians for this check will be provided by the Congress. If you are scheduled to speak in the morning we ask you to check and deliver your presentation files to the speaker ready room the afternoon before. For afternoon speakers please check and deliver your PowerPoint file at least two hours prior to the beginning of your session.

Please do not forget to collect your external drives after the session at the speaker ready room. Drives not collected by the end of the Congress will be disposed of.

**Posters**

Stand mounted poser boards with cork surfaces will be provided by ICVN and placed in the designated hall. Your place among the poster boards will be indicated by the number listed next to your abstract in the 7ICVN Program, e.g. P101, P201, etc. Thumbtacks will be available in the room. Participants should plan to place their materials on the poster board by 9 a.m. on Monday, February 26. Materials must be removed from the poster board no later than 5 p.m. on Tuesday, February 27. Presenters must be in person at the poster session I or II (depending on the assignment) to answer any questions. Session I: February 26 from 12–1 p.m. and Session II: February 26 from 5:30–6:30 p.m. We recommend bringing at least 50 copies of your poster for distribution for interested persons. Copies of your poster and/or all illustrative materials must be prepared by you before the conference.
Scientific Program
Program Monday, February 26, 2018

7–8 a.m.  Registration and Exhibits

8–8:20 a.m.  Welcome Address
Richard Hart, MD, DrPH
President, Loma Linda University Health

Joan Sabaté, MD, DrPH
Congress Chair, Professor of Nutrition, Director, Center for Nutrition, Healthy Lifestyle and Disease Prevention, Loma Linda University, School of Public Health

8:20–9:10 a.m.  Plenary Lecture
Chair: Joan Sabaté, MD, DrPH
[1] Plant Based Diet for Personal, Population and Planetary Health
Frank B. Hu, MD, PhD
Chair, Department of Nutrition, Professor of Nutrition and Epidemiology, Harvard T.H. Chan School of Public Health, Professor of Medicine, Harvard Medical School

9:10–9:30 a.m.  Break (Includes five minute fitness activity)
Fitness Break Host: Ernie Medina, Jr, DrPH

9:30–11:40 a.m.  Symposium: Epidemiological Studies of Vegetarians: Updates, Making Sense of Discordant Findings Between Cohorts, and Directions for Future Research
Chair: Michael Orlich, MD, PhD
Gary Fraser, MBChB, PhD
Professor of Epidemiology, Professor of Medicine, Loma Linda University

[3] EPIC-Oxford Study
Professor Timothy J. Key, PhD
Cancer Epidemiology Unit, Nuffield Department of Population Health, University of Oxford

[4] East Asian Cohort
Tina Hsueh-Ting Chiu, PhD, RD
Nutritional Epidemiologist Tzu Chi Health Study, Tzu Chi Medical Foundation, Taiwan

[5] Indian Migration Study Cohort
Preet K. Dhillon, PhD (Epidemiology, U of Washington), MPH (Epidemiology, UCLA), BA (Molecular & Cellular Biology, Political Science, UC Berkeley)
Senior Research Scientist, Public Health Foundation of India, India

Panel Discussion

11:40 – 1:40 p.m.  Lunch

12–1:00 p.m.  Simultaneous Sessions

Poster Session I
Location: Student Lounge

Special Event: A Vegetarian Culinary Adventure (Food Demonstration and Lunch) - The Interplay of a Nutritionist and a Chef: The Roles of Grains in Vegetarian Diets
Presented by Chef Cory Gheen, MS, RDN and Nasira Burkholder-Cooley, DrPH, RDN
Host: Edward Bitok, DrPH, MS, RDN
Location: Coleman Pavilion
1:40–3:30 p.m.  Symposium: Plant Based Diets and Life Cycle Stages: Gestation Through Geriatrics  
Chair: Gina Siapco, DrPH
**Trudy Voortman, PhD**
Assistant professor and PI of the Nutrition Group, Department of Epidemiology, Erasmus University Medical Center, the Netherlands

[7] DHA for Gestation and Infancy: Lessons Learned and Implications of a Vegetarian Diet  
**Susan E. Carlson, PhD**
AJ Rice Professor and University Distinguished Professor, University of Kansas Medical Center

[8] Plant Based Diets, Plant Foods and Nutrients and Telomere Length and Aging  
**Dr. Aleix Sala-Villa, PhD**
Lipid Clinic, Barcelona, Spain

[9] Plant-based Diets and Bone Health Across the Life Course  
**Trudy Voortman, PhD**
Assistant professor and PI of the Nutrition Group, Department of Epidemiology, Erasmus University Medical Center, the Netherlands

3:35–3:55 p.m.  Break (Includes five minute fitness activity)  
Fitness Break Host: Nasira Brukholder-Cooley, DrPH, RDN

3:55–5:25 p.m.  Symposium: Plant Foods, Plant Based Diets and the Gut Microbiome  
Chair: John L. Sievenpiper, MD, PhD

[10] Gut Microbiome by Diet Patterns  
**Michael J. Orlich, MD, PhD**
Assistant Professor, School of Public Health, Loma Linda University

**Aedin Cassidy, PhD**
Professor of Nutrition, University of East Anglia, England

[12] Nuts and the Gut Microbiota: Cardiovascular Disease Implications  
**David J. Baer, PhD**
Research Leader, U.S. Department of Agriculture, United States

5:30–6:30 p.m.  Poster Session II  
Location: Student Lounge

5:30–7 p.m.  Reception  
Location: Poolside, Drayson Center
Plenary Lecture
Frank B. Hu, MD, PhD

The global chronic disease burden and the food production system’s enormous environmental impact are two pressing threats to personal, population and planetary health. Fortunately, dietary modifications can alleviate both of these threats. Plant-based dietary patterns have been associated with lower risks of coronary heart disease and type 2 diabetes. However, while healthy plant-based diets (high in foods such as vegetables, fruits, whole grains and nuts) have been associated with a decreased coronary heart disease risk, unhealthy plant-based diets (high in refined grains, potatoes and added sugars) have been associated with increased risk. In addition, animal protein, red meat and saturated fat intake have all been associated with higher mortality risk. Precision nutrition can provide insight into the mechanisms behind these associations by assessing individual characteristics such as the metabolome, genome and microbiome. While precision nutrition has future potential to provide personalized diets for disease prevention, the field is still developing and thus must be balanced with public health nutrition strategies. In addition to their health benefits, plant-based diets have less environmental impact than animal-based diets. Producing animal products, especially meat, is more energy-intensive than producing plant products. Shifting global dietary patterns towards diets higher in plant-based foods and lower in meat would likely have significant personal, population and planetary health benefits.

Adventist Health Study-2
Symposium: Epidemiological Studies of Vegetarians: Updates, Making Sense of Discordant Findings Between Cohorts, and Directions for Future Research
Gary Fraser, MBChB, PhD

It is now 15 years since the Adventist Health Study-2 enrolled its first participants. More than 100 peer-reviewed papers have been published from this cohort and much more work remains. Fourteen post-doctoral fellows have worked on the study (usually for 1-2 years). Applications are presently accepted. Study results are largely consistent for Black and non-Black subjects, and strongly support the benefits of a vegetarian diet. This includes benefits to total, CVD, and cancer mortality, risk of overweight, diabetes and hypertension. Updated preliminary results comparing the health experience of vegans to lacto-ovo vegetarians will be presented. Recent analyses raise the probability that dairy has an adverse impact on risk of prostate and breast cancers but is protective against colorectal cancer. Vegetable protein may protect against CVD mortality even after accounting for intake of fatty acids. Over the lifetime body weight gains with aging are lower the fewer calories that are eaten later in the day. The diversity and identity of colonic bacteria appear to be only slightly affected by a vegetarian diet. Future emphases will also include an expanded study of effects of diet on gene expression and metabolomics, and a focus on the prevention of obesity and diabetes, and healthy aging.

EPIC-Oxford Study
Symposium: Epidemiological Studies of Vegetarians: Updates, Making Sense of Discordant Findings Between Cohorts, and Directions for Future Research
Professor Timothy J. Key, PhD

EPIC-Oxford is a prospective cohort study of approximately 65,000 men and women living throughout the United Kingdom. Recruitment was between 1993 and 2000 and targeted at vegetarians: 50% of the participants do not eat meat. After baseline collection of information on diet and other characteristics, participants have completed three follow-up questionnaires and been traced through the National Health Service for cancer, other hospital diagnoses, and causes of death. Compared to non-vegetarians, vegetarians in EPIC-Oxford have lower body mass index and plasma cholesterol, and slightly lower blood pressure. Vegetarians have a lower risk of ischaemic heart disease compared with non-vegetarians. For cancer, there is evidence that vegetarians have a lower risk for cancers of the stomach and lymphatic/hematopoietic tissue, and
that the risk for cancer of all cancer sites combined is slightly reduced. Vegetarians also have lower risks for diverticular disease and cataract, but not for gallbladder disease. Overall mortality is similar for vegetarians and non-vegetarians. These findings will be compared where possible with those from the Adventist Health Study-2, to assess how much the findings are in agreement and whether there is evidence of discordance. Finally recent analyses, including metabolomic analyses, will be described, and directions for future research presented.

[4] East Asian Cohort
Symposium: Epidemiological Studies of Vegetarians: Updates, Making Sense of Discordant Findings Between Cohorts, and Directions for Future Research
Tina Hsueh-Ting Chiu, PhD, RD

Epidemiological studies on the relationship between meat intake and chronic diseases including diabetes, ischemic heart diseases, stroke, and mortality tend to differ for Asians and Westerners. Meat intake was not associated with total or cardiovascular mortality in a pool analysis of the Asian cohorts, and was associated with a lower risk of diabetes in the Shanghai Women’s Health Study among those with normal BMI. Potential residual confounding may remain, since meat intake tends to be associated with a higher social-economic status. As vegetarianism is practiced widely among Buddhists and Taoists in Asians, religion based cohorts, such as the Tzu Chi Health Study and the Tzu Chi Vegetarian Study, are particularly valuable, as about one-third of these volunteers are true vegetarians, providing enough power to study the impact of vegetarian diets. In addition, these participants – regardless of diet – are required to avoid cigarettes and alcohol, while having similar religious and social support, thus strengthening internal validity. In our prospective studies from Taiwan, we found that a vegetarian diet is associated with a lower risk of developing diabetes, ischemic and hemorrhagic stroke, gout, cataract, dementia, and depression. Our major findings are consistent with the EPIC-Oxford and the Adventist Health Studies.

[5] Indian Migration Study Cohort
Symposium: Epidemiological Studies of Vegetarians: Updates, Making Sense of Discordant Findings Between Cohorts, and Directions for Future Research
Preet K. Dhillon, PhD, MPH, BA

In India, 30% of women and 22% of men are vegetarians, with great diversity based on geographic, religious, cultural and lifestyle choices across the nation’s landscape. We will present the profile of vegetarians living in India, and provide information on the diversity of vegetarian diets in different parts of the country based on data from several population-based studies and cohorts - both rural and urban - over time. We will present a summary of work conducted by researchers at the Public Health Foundation of India with collaborators around the world, focused on various aspects of vegetarian diets and cardio-metabolic health outcomes including fasting glucose, diabetes, triglycerides, overweight/obesity and blood pressure. We will also evaluate vegetarian and non-vegetarian dietary, nutrient and health profiles in India in comparison with international studies/cohorts. Finally, we will discuss gaps in our understanding and potential topics for further research in the future, and opportunities for such collaborations.

Symposium: Plant Based Diets and Life Cycle Stages: Gestation Through Geriatrics
Trudy Voortman, PhD

Childhood overweight and obesity are a major public health problem. Although lifestyle in childhood plays a large role, early-life influence - already from fetal life onward, also shape the trajectory of weight gain and body fatness throughout the life course. Maternal diet and lifestyle during pregnancy may have a direct effect on fetal growth, but may also have long-term effects on growth or body composition, a phenomenon commonly defined as ‘fetal programming’. In this
presentation, we will discuss an overview of the scientific evidence of potential effects of plant-based diets during pregnancy on offspring’s growth and obesity. Furthermore, new results will be presented from the Generation R Study, a population-based study in the Netherlands among almost 10,000 mother-child pairs. We measured maternal diet during pregnancy and examined not only vegetarian versus non-vegetarian diets, but also variation in the degree of having a plant-based versus animal-based diet. From the children, we obtained detailed growth and body composition measurements throughout infancy and childhood up to their age of 10 years.

[7] DHA for Gestation and Infancy: Lessons Learned and Implications of a Vegetarian Diet
Symposium: Plant Based Diets and Life Cycle Stages: Gestation Through Geriatrics
Susan E. Carlson, PhD
Vegetarian diets in the US and around the world are generally replete in alpha linolenic acid, the 18-carbon precursor of docosahexaenoic acid or DHA, however, no study of alpha linolenic acid supplementation has demonstrated improved DHA status. In contrast, DHA status is easily improved by DHA consumption. Over the past 30 years, a large number of clinical studies have attempted to determine if DHA is required for optimal human health or physiological function. Pregnancy and infancy have been the focus of many of these studies in recognition of the fact that the fetus grows rapidly and accumulates significant amounts of DHA by term birth if DHA is replete in the mother’s diet. One goal of this lecture is to share the evidence that DHA intake is important during pregnancy and infancy. The evidence favors benefit for the infant but also for the mother and the pregnancy itself. While the quality of the evidence for some maternal benefits is limited, no harm has been associated with increased DHA intake. A second goal is to share how DHA can easily be incorporated into a vegetarian diet even though it is not found in plants.

[8] Plant Based Diets, Plant Foods and Nutrients and Telomere Length and Aging
Symposium: Plant Based Diets and Life Cycle Stages: Gestation Through Geriatrics
Dr. Aleix Sala-Villa, PhD
Promoting healthy aging is a topic of utmost importance. There is mounting evidence that attrition of telomeres, structures that help to maintain genome stability, leads to senescence of some cells. This prompted the use of telomere length, usually measured as peripheral blood leukocyte telomere length (LTL), as a marker of biological aging in nutritional epidemiology. Most of the research on the topic comes from cross-sectional studies, and randomized controlled trials are limited to seafood-derived omega-3 fatty acids. Telomeres are highly susceptible to oxidative stress, and therefore plausible targets for diets rich in plant-derived foods rich in antioxidants. The link between LTL and walnuts, a sustainable source of both omega-3 and antioxidants, remains unexplored. The Walnuts and Healthy Aging (WAHA) Study, aimed at testing the effects of walnut consumption on age-related cognitive decline and macular degeneration in free-living elders, is a unique opportunity to tackle this issue. In collaboration with the team lead by Dr. María Blasco at Centro Nacional de Investigaciones Oncológicas (CNIO) in Madrid (Spain), we investigated whether, compared to a control diet, inclusion of walnuts (15% of energy) in the diet for 2 years would induce changes in LTL in 149 elders (65-79 y).

[9] Plant-based Diets and Bone Health Across the Life Course
Symposium: Plant Based Diets and Life Cycle Stages: Gestation Through Geriatrics
Trudy Voortman, PhD
Diet is important for bone health in different phases of life. Peak bone mass is reached in young adulthood and depends in part on diet in early life affecting bone mass accrual. Diet in later life can help limit bone loss and prevent osteoporosis and lower fracture risk. In both research and public health advice, the focus is put on the importance of specific nutrients such as calcium and vitamin D and foods such as dairy for bone health. Although studies on single nutrients have
provided important insights in the relation between diet and bone health, investigating overall
dietary patterns has additional benefits because of accounts for potential additive or antagonistic
nutrient interactions within the diet. In this presentation, will present an overview of the current
evidence on effects of overall dietary patterns on bone health across the life course. Furthermore,
ew evidence will be presented on specifically plant-based dietary patterns from two large
population-based cohort studies in the Netherlands; the Rotterdam Study, among 15,000 adults
and elderly; and the Generation R Study, among almost 10,000 children. Within these two
unique datasets, we measured variation in the degree of having a plant-based versus animal-based
diet in different phases of life, from infancy to old age and we obtained detailed measures of bone
health over time.

[10] Gut Microbiome by Diet Patterns
Symposium: Plant Foods, Plant Based Diets and the Gut Microbiome
Michael J. Orlich, MD, PhD

Interest in the microbial flora of the human gut and its relationship to both diet and disease dates
back more than 100 years. Prominent early advocates of the health benefits of vegetarian diets,
including John Harvey Kellogg, hypothesized the beneficial impact of such diets in relationship
to the gut microbial flora. A century later, there is renewed scientific and popular interest in the
potential health impacts of the gut microbiota, due to dramatic technical advances in its study
using methods focused on microbial genomes (i.e. the microbiome). There is also great interest in
the impact of diet on the gut microbiome, or in potential diet-microbiome interactions. Foods and
nutrients of interest have included probiotic foods, fibers and polysaccharides, phytochemicals
such as polyphenols, non-sugar sweeteners, and animal foods such as red meat and eggs, to name
only a few. The literature examining the microbiome of persons whose usual diet is vegetarian,
compared to those with non-vegetarian diets is relatively small. Findings of this literature are here
briefly reviewed and discussed. Preliminary results of a pilot investigation of the microbiomes
of vegans, lacto-ovo vegetarians, and non-vegetarians in the Adventist Health Study – 2
are reported.

Symposium: Plant Foods, Plant Based Diets and the Gut Microbiome
Aedin Cassidy, PhD

Although evidence to support the importance of plant based-diets and plant foods in reducing the
risk of cardiovascular disease is strong, the role of the gut microbiome in this relationship is in its
infancy. Food has an impact on both the composition and function of the gut microbiome, in part
through small molecule production that may influence immune mediated and metabolic diseases.
Diet-driven alterations in the microbiome have been associated with frailty & inflammation.
Recent data also suggest that consumption of polyphenol-rich foods (tea, red wine, berries) are
associated with increased microbial diversity with specific interest in the interplay with one class
of polyphenols/flavonoids, the anthocyanin sub-class. Growing evidence from animal studies
show profound effects in gut microbial community structure following anthocyanin intake; these
changes resulted in improvements in inflammation and insulin sensitivity. This provides the first
convincing data from mice that the gut microbiome plays a substantial role in mediating the health
effects of flavonoids and/or that flavonoids enhance the health effects of the gut microbiome. Data
from clinical trials investigating the potential of the microbiome to explain associations between
anthocyanins and cardiometabolic health are completely lacking.
Nuts and the Gut Microbiota: Cardiovascular Disease Implications
Symposium: Plant Foods, Plant Based Diets and the Gut Microbiome
David J. Baer, PhD

Consumption of nuts, especially tree nuts, has been associated with reduced risk of cardiovascular disease and certain cancers. Many randomized control trials have shown that incorporating tree nuts into the diet improves the lipid profile, especially lowering LDL cholesterol which is an established risk factor for coronary heart disease. This effect of nuts is likely a direct effect on pathways of lipid metabolism although there may be other indirect effects mediated by the microbiome. Understanding the mechanisms by which diet alters risk for cancer is more difficult for many reasons. There is increasing interest in understanding the role that the microbiome has in altering biomarkers that may have a direct or indirect effect on risk for disease. Interestingly, nuts are a unique food group in that they deliver more dietary fat to the large intestine (a site of significant anaerobic fermentation in humans) than most other foods. Emerging data from dietary intervention studies suggest that tree nuts may mediate risk for cardiovascular disease and cancer through effects on the microbiome.
Tuesday, February 27, 2018

7–8 a.m.  Registration and Exhibits

8–8:10 a.m.  Welcome Address
Helen Hopp Marshak, PhD, MCHES
Dean, School of Public Health, Loma Linda University

8:10–9 a.m.  Plenary Lecture
Chair: Wayne Dysinger, MD, MPH
David Katz, MD, MPH
Yale University School of Medicine, Connecticut

9–9:20 a.m.  Break (Includes five minute fitness activity)
Fitness Break Host: Ernie Medina, JR, DrPH

9:20–11:20 a.m.  Symposium: Reversing, Managing, and Preventing Chronic Disease with Plant Based Dietary Approach
Chair: Wayne Dysinger, MD, MPH
[14] Prevention of cardiovascular disease using plant-based diets with an emphasis on pulses
John L. Sievenpiper, MD, PhD, FRCPC
Associate Professor, Department of Nutritional Sciences, Lifestyle medicine Lead, MD Program, University of Toronto, Canada
[15] The Use of Plant-Based Diets for Obesity Treatment
Dr. Neal Barnard, M.D., F.A.C.C.
Adjunct Associate Professor of Medicine, George Washington University School of Medicine
President, Physicians Committee for Responsible Medicine, Washington, D.C.
[16] Plant Based Diets in the Treatment and Management of Type 2 Diabetes
Jordi Salas Salvadó, MD, PhD
Professor of Nutrition, Rovira L Virgil University (Spain)
[17] Soy and the breast cancer survivor: Is the controversy over?
Mark Messina, PhD, MS
Adjunct Professor, Loma Linda University, Nutrition Matters, United States

11:25–12:15 p.m.  Plenary Lecture
Chair: Sujatha Rajaram, PhD
[18] Is Butter Back? Saturated Fat Controversies and Food Choices in the Context of Plant-Based Diets
Alice Lichtenstein, PhD, DSc
Gershoff Professor of Nutrition Science and Policy, Director and Senior Scientist, Cardiovascular Nutrition Laboratory, Tufts University

12:15–2:15 p.m.  Lunch
Tuesday, February 27, 2018

12:30–2 p.m.  Simultaneous Short Oral Sessions

Short Oral Session I: Vegetarian Diets and Health Outcomes-I  
Chair: Celine Heskey, DrPH, MS, RDN  
Co-Chair: Rhonda Spencer-Hwang, DrPH  
Location: Opsahl Gymnasium

Short Oral Session III: Nutritional Status and Assessment of Vegetarians  
Chair: Winston Craig, PhD, MPH  
Co-Chair: Markus Keller, PhD  
Location: Studio B

2:15–3:45 p.m.  Symposium: Protein Quantity, Quality and Source Matters  
Chair: Penny Duerksen-Hughes, PhD

[19] Protein Quality and Source, Fasting Mimicking Diets and Longevity  
Sebastian Brandhorst, PhD  
Research Associate, Davis School of Gerontology, The University of Southern California

[20] Protein and Cardiometabolic Health: What Matters?  
Francois Mariotti, PhD  
Professor of Nutrition, Human Biology and Nutrition Department, Agro Paris Tech, France

[21] The Western Diet: Are We Killing Our Patients  
Holly Mattix-Kramer, MD, MPH  
Associate Professor of Medicine and Public Health Sciences, Loyola University Medical Center, Illinois

3:45–4:05 p.m.  Break (Includes five minute fitness activity)  
Fitness Break Host: Nasira Burkholder-Cooley, DrPH, RDN

4:15–5:50 p.m.  Simultaneous Short Oral Sessions

Short Oral Session II: Vegetarian Diets and Health Outcomes - II  
Chair: Hildemar Dos Santos, MD, DrPH  
Co-Chair: Julie Jones, MD  
Location: Opsahl Gymnasium

Short Oral Session IV: Plant-based Diets and Health Education: Person and Planet  
Chair: Ron Mataya, MD  
Co-Chair: Tina Chiu, PhD, RD  
Location: Studio B

6:30–8:30 p.m.  Banquet  
Location: Drayson Center, Special Events Tent on the Superfield
Plenary Lecture
David Katz, MD. MPH

The dietary past is characterized by nutrient fixations, and the failure to focus on overall dietary pattern. The result is years, and even decades, of missed opportunity to add years to lives, and life to years. The present is characterized by a cacophony of competing opinions and agendas the obscure the fundamental truths. A path to the future in which the truth about wholesome foods, mostly plants, in sensible combinations as a primary strategy for health promotion, disease prevention, and disease reversal is common knowledge will be proposed.

[14] Prevention of cardiovascular disease using plant-based diets with an emphasis on pulses
Symposium: Reversing, Managing, and Preventing Chronic Disease with Plant Based Dietary Approach
John L. Sievenpiper, MD, PhD, FRCPC

Obesity and diabetes represent important unmet prevention challenges that contribute to increased residual risk for cardiovascular disease. Interventions targeting weight loss and improved glycemic control have largely failed to deliver the anticipated cardiovascular benefits. The alpha-glucosidase inhibitor acarbose, which effectively converts the diet to a low-glycemic (low-GI) diet, is one of the only examples of an antihyperglycemic agent that has shown a decrease in cardiovascular events. Dietary pulses (beans, peas, chickpeas, and lentils), a sustainable, affordable, and nutrient-dense group of plant foods, have been extensively exploited in low-GI interventions and may represent a nutritional analogue to acarbose. Evidence from systematic reviews and meta-analyses of randomized controlled trials of dietary pulses have shown improvements in body weight, glycemic control, blood lipids, and blood pressure, both in replacement for high-GI carbohydrate sources and as a meant alternative in replacement for animal protein. Systematic reviews and meta-analyses of prospective cohort studies have shown that these improvements in surrogate cardiometabolic endpoints, by analogy with acarbose, translate into reduced cardiovascular events. The available evidence suggests that dietary pulses may play an important role in plant-based diets in the control of cardiometabolic risk factors and prevention of cardiovascular disease.

[15] The Use of Plant-Based Diets for Obesity Treatment
Symposium: Reversing, Managing, and Preventing Chronic Disease with Plant Based Dietary Approach
Dr. Neal Barnard, M.D., F.A.C.C.

In observational studies, individuals following vegetarian, particularly vegan, diets have healthier body weights, on average, compared with those following omnivorous diets. In clinical trials, vegetarian and vegan diets lead to significant weight loss, even in the absence of physical exercise or limits on energy intake. The mechanisms for weight loss with these plant-based diets appear to be (1) reduced dietary energy density, as a result of their high fiber content and low fat content, and (2) increased postprandial energy expenditure (the thermic effect of food). The degree of weight loss associated with plant-based diets in clinical trials is at least as great as that with other popular diet patterns, and favorable changes in overall nutrition, plasma lipid concentrations, and blood pressure are also observed. Acceptability and adherence with vegan diets has been studied in varied populations in clinical trials and is similar to that of other therapeutic diets.
[16] Plant Based Diets in the Treatment and Management of Type 2 Diabetes
Symposium: Reversing, Managing, and Preventing Chronic Disease with Plant Based Dietary Approach

Jordi Salas Salvadó, MD, PhD

The prevalence of type 2 diabetes (T2D) is increasing worldwide. This complex and multifactorial metabolic condition affects both quality and expectancy of life in adults. Therefore, appropriate lifestyle strategies are needed to develop and implement in order to reduce disease’s health burden. Plant-based diets, characterized by high consumption of fruits, vegetables, whole grains, legumes, nuts and seeds and minimal of animal products, have been suggested as a dietary approach not only to prevent but also to control T2D and related micro- and macro-vascular complications. This narrative review summarizes epidemiologic and clinical trial evidence on the role of different plant-based diets in T2D management and its complications. Furthermore, their potential underlying mechanisms are discussed. Plant-based diets appear to confer beneficial effects on glycemic control in different diabetic populations. Several components of a plant-based diet might confer benefits on glycemia, counterbalancing the detrimental effects of animal-based foods. Besides this, limited evidence exists regarding related T2D complications, making difficult to draw solid conclusions.

[17] Soy and the breast cancer survivor: Is the controversy over?
Symposium: Reversing, Managing, and Preventing Chronic Disease with Plant Based Dietary Approach

Mark Messina, PhD, MS

For two decades the impact of post-diagnosis soy intake on the prognosis of breast cancer survivors has been rigorously debated. Rodent studies published beginning in the late 1990s, which showed soybean isoflavones stimulate the growth of existing mammary tumors in ovariectomized athymic mice implanted with ER+ human breast cancer cells, first raised concerns. Definitive data to resolve the soy and breast cancer controversy are not available as no clinical trial has evaluated the impact of soy consumption on breast cancer recurrence or mortality. However, considerable human data suggest that soyfood consumption by breast cancer survivors is not only safe but potentially beneficial. Clinical studies show that soy consumption, even when exceeding typical Japanese intake, does not adversely affect markers of breast cancer risk, including mammographic density and breast cell proliferation. In contrast, combined hormone therapy (estrogen plus progestin), which is known to increase breast cancer risk, markedly increases breast cell proliferation. Importantly, prospective epidemiologic data, which involves >11,000 Chinese and American breast cancer survivors, show that consuming soy after a diagnosis of breast cancer reduces recurrence and mortality. Collectively, the evidence indicates soy intake recommendations aimed at healthy women are applicable to breast cancer survivors.

[18] Is Butter Back? Saturated Fat Controversies and Food Choices in the Context of Plant-Based Diet
Plenary Lecture

Alice Lichtenstein, PhD, DSc

The topic of dietary fat has become more rather than less murky in the recent past. Early guidance for the prevention and treatment of cardiovascular disease formulated in the early 1960’s was to replace food sources of saturated fat and with unsaturated fat. This guidance was supported by the results of dietary intervention trial biomarker and outcome data. Sometime thereafter the emphases shifted from replace dietary saturated fat with unsaturated fat to reduce total fat. Associated with this shift was an increase in carbohydrate intake, primarily refined carbohydrate. The accompanying dyslipidemia resulted in a renewed emphasis on substitution – replacing saturated fat with unsaturated fat, rather than decreasing total fat. Critical but sometimes lost in assessing the relationship between dietary saturated fat and cardiovascular disease risk is distinguishing among the replacement macronutrients. Also critical in the evaluation is
determining whether all sources of dietary saturated fat have similar effects on biomarkers and outcomes. Recently, this question has increased in prominence with respect to comparisons of meat fat to dairy fat, and also meat fat to plant sources of saturated fat. Currently, the predominance of the data supports the recommendation to replace foods high in saturated fat with those high in unsaturated fat.

[19] Protein Quality and Source, Fasting Mimicking Diets and Longevity
Symposium: Protein Quantity, Quality and Source Matters
Sebastian Brandhorst, PhD

Prolonged fasting promotes stress resistance, but its effects on longevity are poorly understood. Calorie restriction or major dietary composition changes can have profound effects on healthy aging but the inability of many subjects to adhere to chronic and extreme diets together with the potential of adverse effects limit their application. We developed a very low calorie/low protein fasting-mimicking diet (FMD) and tested its effects in a preclinical and clinical trial. In mice, the FMD lowered IGF-1 levels, extended longevity, lowered visceral fat, reduced cancer incidence and skin lesions, rejuvenated the immune system, and decreased the size of multiple organs/systems, followed upon re-feeding by an elevated number of progenitor/stem cells and regeneration. Further, the FMD promoted hippocampal neurogenesis and improved cognitive performance. In a randomized clinical trial, markers/risk factors for metabolic syndrome and other age-related diseases were favorably impacted after completion of 3 FMD cycles. These effects were larger in participants at risk for age-related diseases. We conclude that the FMD was safe and feasible in rodent and human studies. Larger studies on patients with diagnosed diseases are necessary to determine its impact on diabetes and cardiovascular disease treatment.

[20] Protein and Cardiometabolic Health: What Matters?
Symposium: Protein Quantity, Quality and Source Matters
Francois Mariotti, PhD

In this presentation, we will be illustrating the broad topic of plant and animal proteins and their relationships with cardiometabolic health from a variety of standpoints, which include basic science such as amino acid metabolism, clinical trials on the intermediary endpoints of cardiovascular health, and nutritional epidemiology to decipher the potential effects of plant/animal protein intakes. We will present the latest advances in this field. These different issues will be addressed at different levels of understanding – from specific amino acids to overall nutritional diet adequacy. We will show that emerging science suggest that plant protein per se, i.e. their amino acids, may have beneficial effect on cardiometabolic health; that plant protein foodstuffs, more than protein per se, have been shown to have beneficial effects on intermediary endpoints; and that diets rich in plant protein have been associated with lower risk of cardiovascular diseases and type-2 diabetes. However, more studies are needed. Lastly, it remains unknown to what extent the association between plant and animal protein intakes and cardiometabolic risk could be ascribed to the large cluster of nutrients and other substances that they directly or indirectly convey.

[21] Protein Quantity and Quality for Chronic Kidney Disease
Symposium: Protein Quantity, Quality and Source Matters
Holly Mattix-Kramer, MD, MPH

Characteristics of the Western diet that fueled the obesity epidemic may also impact kidney disease incidence and progression. Enlarging portion sizes over the past half century has been accompanied by increased intake of protein, sodium, and processed foods while consumption of fruits and vegetables has declined. Overall dietary patterns play a strong role for chronic disease risk including chronic kidney disease. While dietary patterns high in fresh fruits and vegetables and low in red meats, such as the Mediterranean diet, decrease the risk of chronic diseases, the
Western diet, characterized by high intake of red meat, animal fat, sweets, and desserts and low intake of fresh fruits and vegetables and low-fat dairy products, increases risk of chronic diseases. In this article, we review the potential mechanisms whereby several key characteristics of the typical Western diet may impact kidney disease incidence and progression. We also discuss a public health policy initiative to improve dietary choices. Reducing protein intake to the recommended daily allowance of 0.8 g/kg/day and increasing intake of fruit and vegetables and fiber may mitigate kidney disease progression and reduce risk of cardiovascular disease and mortality.
Wednesday, February 28, 2018

7–8 a.m. Registration and Exhibits

8–8:10 a.m. Welcome Address
Ronald L. Carter, PhD
Provost, Loma Linda University

8:10–9 a.m. Plenary Lecture
Chair: David Jacobs, PhD
[22] Planetary Health and Vegetarian Diets: How Far We Have Come and What is Next?
Joan Sabaté, MD, DrPH
Congress Chair, Professor of Nutrition, Director, Center for Nutrition, Healthy Lifestyle and Disease Prevention, Loma Linda University, School of Public Health

9–9:10 a.m. Break

9:10–11:10 a.m. Symposium: Plant-Based Diets for the Health of the Planet
Chair: Joan Sabaté, MD, DrPH
[23] Optimization of Plant Based Diets for Planetary Health: A Modeling Approach
Professor Nick Wilson, MB ChB, DIH, MPH
Research Professor, University of Otago, New Zealand
[24] Consumer Attitudes Towards Meatless Diets in Relation to Planetary Health
Ruben Sanchez, PhD
Núcleo Científico Tecnológico en Ciencias Sociales y Humanidades, Universidad de La Frontera, Chile
[25] Exploring the impacts of animal to plant-sourced food shifts in mitigating climate change
Helen Harwatt, PhD
Planet Friendly Food, United Kingdom
[26] Challenges and Controversies in Sustainable Diets
Marco Springmann, PhD
Researcher, James Martin Fellow, University of Oxford, England

11:10–11:25 a.m. Break (Includes five minute fitness activity)
Fitness Break Host: Ernie Medina, JR, DrPH

11:25 a.m.–1 p.m. Symposium: Plant Foods, Food Groups and Health Outcomes
Chair: Karen Jaceldo, DrPH, MS
[27] Plant foods, antioxidants and the risk of cardiovascular disease, cancer, all-cause mortality
Aune Dagfinn, PhD
Research Associate, Faculty of Medicine, School of Public Health, Imperial College, United Kingdom
[28] Walnuts, other plant foods, plant-based diet patterns and cognition- the WAHA study and more
Sujatha Rajaram, PhD
Chair, Scientific Programs Committee, Director, SPH Doctoral Programs, School of Public Health, Loma Linda University
[29] Legumes and Beans in the Prevention of Cardiometabolic Disease
Jordi Salas Salvador, MD, PhD
Professor of Nutrition, Rovira i Virgili University (Spain)
Wednesday, February 28, 2018

1–2:30 p.m.  Lunch

1–2 p.m. A Culinary Adventure: The Fork in The Road Plate: The Intersection of Flavor and Health in Plant-based Eating
Prepared by Wendy Bazilian, DrPH, MA, RDN
Sponsored by The California Walnut Board
Host: Fay Kazzi, MS, RDN
Location: Opsahl Gymnasium

2:30–4:40 p.m. Symposium: A Vegetarian Client: Applications for Health Professionals
Chair: Brenda Rea, MD, PT, RDN

Brenda Rea MD, DrPH, PT, RD
Assistant Professor, Loma Linda University
Wes Youngberg, DrPH, MPH, CNS, FACLM
Assistant Clinical Professor, School of Public Health, Assistant Clinical Professor, Preventive Medicine, Loma Linda University
Brenda Davis, RD
Private Practice Nutrition Consultant, British Columbia, Canada

[31] The Vegetarian Athlete
Matthew Ruscigno, MPH, RD
Chief Nutrition Officer at Nutrinic, United States

Vestanto Melina, MS, RD
Consultant, Vancouver BD, Canada
Winston J. Craig, PhD, MPH
Adjunct Professor, School of Public Health, Loma Linda University

[33] Vegetarian Diets in the Context of Different Cultures
Sharon Palmer, RDN
The Plant-Powered Dietitian, United States

[34] What Replaces Meat?
Nasira Burkholder-Cooley, DrPH, RDN
Adjunct Professor, Chapman University, CA

4:40–4:50 p.m. Closing Remarks
[22] Planetary Health and Vegetarian Diets: How Far We Have Come and What is Next?
Plenary Lecture
Joan Sabaté, MD, DrPH

To maintain planetary health, we must limit the use of Earth’s resources within finite boundaries and avoid environmental degradation. Food systems and dietary choices account for a substantial use of natural resources and contributes disproportionally to biodiversity loss, deforestation, climate change, degradation of land, contamination of water and poor air quality. These alterations in turn threaten human health through food insecurity, limited access to drinking water and increased spread of infectious disease. Additionally, diets based on animal products, refined foods and excessive calories contribute to obesity and related comorbidities. Technological changes can achieve significant resource savings and environmental protection, however to obtain the necessary levels of efficiency, and as a way to resolve the diet-environment-health trilemma, changes to dietary choices are essential. We explore simultaneously the health outcomes and environmental sustainability of vegetarian diets, in terms of the associated morbidities as resource requirements and environmental impacts. Greenhouse gas emissions resulting from vegetarian diets are about 30% lower than non-vegetarian diets and concurrently mortality rates of vegetarians are about 20% lower and even greater decreases in chronic diseases and conditions. While this demonstrates the human health and environmental sustainability advantages of vegetarian diets, questions remain about the individuals’ challenges and political will to adopt meatless diets as the social norm.

[23] Optimization of Plant Based Diets for Planetary Health: A Modeling Approach
Symposium: Plant-Based Diets for the Health of the Planet
Professor Nick Wilson, MB ChB, DIH, MPH

In modeling work using linear programing, we identified optimal dietary patterns that would meet nutritional guidelines for health, involve low food costs, and have low greenhouse gas (GHG) emission profiles. The healthy low-cost diets and the healthy/low-cost/low-GHG diets were nearly all vegetarian or vegan (just one of these eight diets had a small amount of fish). Similarly three out of four of the Asian style and Mediterranean style diets were all vegetarian. The optimized diets had much lower GHG emission profiles compared with the estimate for the ‘typical New Zealand diet’ eg, as low as 1.62 kg CO2 equivalents per day (CO2e/d) (95% simulation interval = 1.39 to 1.85 kg CO2e/d) compared with 10.1 kg CO2e/d, respectively. These results appear to be consistent with the international literature whereby vegetarian diets are typically healthier and more sustainable (GHG emissions, land use, water use etc) than typical western diets. Possible priorities for future research include further improvements in metrics (eg, land use impacts), consideration of wider health risks (eg, zoonotic pandemic influenza), and modeling interventions that make diets healthier and more sustainable. The latter include taxes (eg, on agricultural GHGs, junk food) and subsidized vouchers for farmers markets.

[24] Consumer Attitudes Towards Meatless Diets in Relation to Planetary Health
Symposium: Plant-Based Diets for the Health of the Planet
Ruben Sanchez, PhD

The increasing scientific evidence regarding the environmental impacts of meat production has already pushed scientists to explore consumer attitudes towards meatless diets in order to find strategies to reduce meat consumption in the Western world. We present a review of the scientific literature that has pursued to answer the following questions: what are the main determinants taken by people into account when choosing meatless diets? How much do environmental reasons matter when deciding whether to eat meat? And finally, when faced with the scientific evidence regarding the environmental impacts of meat production, are consumers willing to, if not go vegetarian, reduce meat consumption at least?
[25] Exploring the impacts of animal to plant-sourced food shifts in mitigating climate change
Symposium: Plant-Based Diets for the Health of the Planet
Helen Harwatt, PhD

The most significant climate change treaty in history, the Paris Agreement, aims to keep global average temperate ‘well below’ 2 °C above pre-industrial levels, and ideally to no more than 1.5 °C. Current climate change mitigation plans are consistent with up to a 3.7°C rise this century. If current commitments to the Paris Agreement are implemented, by 2030 the emissions budget for 1.5°C will be depleted and the budget consistent with staying below 2°C will be almost exceeded. For the Paris Agreement to remain achievable, strong and rapid pre-2020 and pre-2030 mitigation is urgently required, in addition to enhanced longer term commitments. Given the expected growth of methane (CH4) emissions over this time frame, and its intense warming potential, it is imperative to consider CH4 reductions in addition to other major greenhouse gases (GHGs). The main source of global CH4 emissions, the livestock sector, has so far laid relatively low in climate discourse, with CO2 emissions from the fossil fuel sector receiving most attention. This presentation demonstrates the necessity and impact of also adopting near term mitigation options in the livestock sector, via animal to plant-sourced food shifts, to deliver the best chance of meeting the Paris Agreement.

[26] Challenges and Controversies in Sustainable Diets
Symposium: Plant-Based Diets for the Health of the Planet
Marco Springmann, PhD

There is general agreement that predominantly plant-based diets are healthier and more environmentally sustainable than diets with high portions of meat and dairy. However, some controversies persist and country-case studies have shown instances where plant-based diets can be higher in emissions, water use, land use, price, and lead to increases in micronutrient deficiencies. In my presentation, I address those issues by using a harmonised global dataset with country-level detail for emissions, land use, water use, prices, and nutrient content of food consumption. I find that selective specification of plant-based diets and inclusion of extreme data points, as well as mis-specified optimization approaches can explain the apparent contradictions. I suggest that controversies in sustainable-diet research can best be addressed by integrated analyses based on consistent and publicly available global datasets with regionally comparative detail.

[27] Plant foods, antioxidants and the risk of cardiovascular disease, cancer, all-cause and cause-specific mortality: results from systematic reviews and meta-analyses of prospective studies
Symposium: Plant Foods, Food Groups and Health Outcomes
Aune Dagfinn, PhD

A high intake of plant foods has been recommended to reduce the risk of chronic diseases, however, questions remain with regard to the amount and subtypes of plant foods that may be most beneficial for primary prevention. We therefore conducted meta-analyses of fruits, vegetables, whole grains, nuts and antioxidants and risk of cardiovascular disease, cancer, all-cause and cause-specific mortality with an aim to clarify the amounts and subtypes that may be most beneficial. A high intake of fruits and vegetables was associated with reduced risk of coronary heart disease, stroke, cancer and all-cause mortality, and there were reductions in risk observed up to an intake of 800 g/d. Apples, pears, citrus fruits, cruciferous vegetables, green yellow vegetables and green leafy vegetables appeared to be particularly beneficial. Both intake of whole grains and nuts was associated with reduced risk of cardiovascular disease, cancer, and mortality from all causes, respiratory disease, infections and diabetes and the greatest reductions in risk were observed up to 210-225 grams per day of whole grains and 15-20 grams per day of nuts. Blood concentrations of antioxidants had a more linear inverse association with cardiovascular disease, cancer and mortality than dietary intake of antioxidants.
[28] Walnuts, other plant foods, plant-based diet patterns and cognition- the WAHA study and more
Symposium: Plant Foods, Food Groups and Health Outcomes
Sujatha Rajaram, PhD

The expanding aging population worldwide and the increase in lifespan has resulted in a steady rise of debilitating diseases related to aging, including neurodegenerative conditions. Age-related cognitive decline is considered a precursor to dementia and is becoming a major public health challenge. Evidence points to the role of modifiable lifestyle factors such as diet as part of the prevention strategies. Epidemiological studies suggest a strong association of Mediterranean diet with lower risk of cognitive decline, mild cognitive impairment, and dementia. In a recent clinical trial, Mediterranean diet enriched with extra virgin olive oil or walnuts improved cognition compared to low-fat diets. These foods are rich in antioxidants such as polyphenols which may have neuroprotective effects through lowering oxidative stress and inflammation. Polyphenol rich foods and urinary polyphenols, a biomarker for polyphenol intake, were associated with better cognition in elderly subjects at high cardiovascular disease risk. While studying a single bioactive like omega-3 fatty acids or polyphenol is important to understanding the neuroprotective mechanisms, research focus on foods such as walnuts that has a rich matrix of bioactives may have practical implications for the public. Recently, the WAHA study (Walnuts and Healthy Aging Study), a dual center (Barcelona, Spain and Loma Linda, USA), clinical trial was conducted in free-living elderly individuals. Participants were randomized to either walnut group (consuming 1-2 ounces/d of walnuts) or control group (abstaining from walnuts) for 2 years. Both groups followed their habitual diet. Cognitive function was one of the primary outcomes of this clinical trial and the results on the neurocognitive battery of tests performed in this study at baseline and year 2 will be presented. The evidence up to date on the role of plant-based diets, plant foods, and specifically walnuts will be discussed in the context of the findings from the WAHA study.

[29] Legumes and Beans in the Prevention of Cardiometabolic Disease
Symposium: Plant Foods, Food Groups and Health Outcomes
Jordi Salas Salvadó, MD, PhD

Legumes are key components of plant-based diets and are well recognized for their wide range of potential health effects. Previous systematic reviews and meta-analyses have summarized the evidence regarding legume consumption and the risk of cardiometabolic outcomes, such as cardiovascular disease (CVD) and type-2 diabetes (T2D). However, these studies did not differentiate between non-soy and soy legumes, which have a different nutritional profile. Therefore, the aim of this updated review was to summarize and meta-analyze evidence regarding legume consumption (differentiating non-soy and soy legumes) and cardiometabolic diseases. We also reviewed randomized control trials assessing the effect of legume consumption on CVD risk factors. The results revealed a significant inverse association between total legume consumption and CVD and coronary heart disease risk, while a non-significant association was observed with T2D, stroke and death from CVD. Regarding legume subtypes, only non-soy legumes were associated with lower risk of T2D. Unfortunately, due to the few studies analyzing legumes and CVD, it was not possible to stratify the analysis. Because of the considerable heterogeneity observed for most of the outcomes and the few studies included in some analyses, further prospective studies are warranted to determine the role of legume consumption on CVD and T2D.
Symposium: A Vegetarian Client: Applications for Health Professionals
Brenda Rea MD, DrPH, PT, RD
Wes Youngberg, DrPH, MPH, CNS, FACLM
Brenda Davis, RD
This session highlights two case studies that demonstrate reversal of heart disease, type 2 diabetes and renal disease using carefully designed whole-food, plant based diets. The cases clearly demonstrate reversal of the clinical signs of the diseases, as well as complications associated with the diseases. The dietary protocols used to achieve these results are outlined. While all patients may not be willing to make the lifestyle changes necessary to achieve disease reversal, all patients have a right to know that lifestyle medicine is a highly effective treatment option. Although significant lifestyle changes are needed to achieve disease reversal, moderate changes can produce valuable clinical improvements. The more the patient changes; the greater the expected results.

[31] The Vegetarian Athlete
Symposium: A Vegetarian Client: Applications for Health Professionals
Matthew Ruscigno, MPH, RD
Vegan ... athlete? Long considered contradictory terms, interest in veganism among athletes has recently skyrocketed. It behooves nutrition professionals to understand their motivations, dietary requirements, and food options. Iron, protein, and calorie needs will be discussed along with practical applications of the science.

Symposium: A Vegetarian Client: Applications for Health Professionals
Vestanto Melina, MS, RD
Winston J. Craig, PhD, MPH
A vegetarian diet is not only healthier for humans, it is also more friendly for the planet compared with the diet consumed by omnivores due to its lower use of water, fossil fuels, pesticides and fertilizers. Vitamin B12 is critical for the health of vegetarians and must be regularly consumed in fortified foods or as a supplement. Regular monitoring of the B12 status of vegans is also important. There is a need to emphasize the consumption of whole foods rich in polyphenolics and other phytochemicals, as well as minimally processed plant foods to secure the maximum benefit towards chronic disease prevention.

[33] Vegetarian Diets in the Context of Different Cultures
Symposium: A Vegetarian Client: Applications for Health Professionals
Sharon Palmer, RDN
Plant-based diets are increasing in popularity across the planet, yet it’s important to apply these healthful eating patterns within the context of cultural eating traditions. Indeed, most traditional diets are based on plants, and reconnecting people with their culinary roots is one strategy that can yield success. In this presentation, Sharon Palmer, RDN, The Plant-Powered Dietitian explores the plant-based traditions of many cultures, and offers inspiration on how to make plant-based diets more culturally sensitive.
[34] What Replaces Meat
Symposium: A Vegetarian Client: Applications for Health Professionals
Nasira Burkholder-Cooley, DrPH, RDN

There is substantial diversity in the nutritional equivalence between foods of animal and plant origin that comprise the meat alternatives food group. Notable differences in greenhouse gas emissions derived from production of various meat alternatives also exist. Health practitioners should encourage consumption of meat alternatives that maximize nutrition benefits and equate to lower greenhouse gas emissions. A strategic approach including appropriate combinations of legumes, nuts and seeds should be considered.
Short Oral Presentations
### February 27, Session I: Vegetarian Diets and Health Outcomes - I
**Location: Opsahl Gymnasium**

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<td>S101</td>
<td>A vegetarian diet is associated with lower stroke risk</td>
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<td>12:45 p.m.</td>
<td>Bradbury, K.</td>
<td>S102</td>
<td>Intake of high-protein foods and other major foods in people of different diet groups in the UK Biobank</td>
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<td>1 p.m.</td>
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<td>S103</td>
<td>Meat and egg intake and type 2 diabetes risk: results from the Adventist Health Study - 2</td>
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<tr>
<td>1:15 p.m.</td>
<td>Gomes, E.</td>
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<td>Vegetarian diets vs. non-vegetarian diet in the ADVENTO Study: Findings on cognitive functions</td>
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<tr>
<td>1:30 p.m.</td>
<td>Chang, C.</td>
<td>S105</td>
<td>Vegetarian diet and cataract risk</td>
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<td>Lap, L.</td>
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<td>Higher vegetarian lifestyle index scores is associated with lower risk of all-cause morality</td>
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### February 27, Session III: Nutritional Status and Assessment of Vegetarians
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<td>Martins, M.</td>
<td>S301</td>
<td>Body composition of Brazilian Adventists exposed to different vegetarian dietary patterns</td>
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<tr>
<td>12:45 p.m.</td>
<td>Weder, S.</td>
<td>S302</td>
<td>Nutrient intake and growth indices of vegetarian, vegan and omnivorous children (1-3 y) in Germany</td>
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<tr>
<td>1 p.m.</td>
<td>Pawlak, R.</td>
<td>S303</td>
<td>Clinical significance of vitamin B12 status among vegan and vegetarian adults.</td>
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<tr>
<td>1:15 p.m.</td>
<td>Miles, F.</td>
<td>S304</td>
<td>Biomarkers of dietary intake differentiate vegetarian and non-vegetarian dietary patterns</td>
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<tr>
<td>1:30 p.m.</td>
<td>Khayef, G.</td>
<td>S305</td>
<td>Protein and amino acid consumption and their association with body composition in adolescents</td>
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### February 27, Session II: Vegetarian Diets and Health Outcomes - II
**Location: Opsahl Gymnasium**

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<td>Chen, O.</td>
<td>S201</td>
<td>The effect of almonds on vitamin E status and cardiovascular risk factors in Korean adults: A randomized trial</td>
</tr>
<tr>
<td>4:30 p.m.</td>
<td>Gomes, E.</td>
<td>S202</td>
<td>Vegetarian diets as protective to subclinical atherosclerosis evaluated by clinical imaging</td>
</tr>
<tr>
<td>4:45 p.m.</td>
<td>Tong, T.</td>
<td>S203</td>
<td>Risk of ischemic heart disease and stroke in UK meat eaters, fish eaters, vegetarians and vegans</td>
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<tr>
<td>5 p.m.</td>
<td>Shelechi, M.</td>
<td>S204</td>
<td>Fasting-mimicking diet and risk factors for aging, diabetes, cancer and cardiovascular disease</td>
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<td>5:15 p.m.</td>
<td>Turner-McGievy, G.</td>
<td>S205</td>
<td>Impact of a one year plant-based diet intervention on diet and the dietary inflammatory index</td>
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<tr>
<td>5:30 p.m.</td>
<td>Papanikolaou, Y.</td>
<td>S206</td>
<td>Grain patterns are associated with dietary fiber intake, diet quality and weight-related measures</td>
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### February 27, Session IV: Plant-based Diets and Health Education: Person and Planet
**Location: Studio B**

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<td>Renati, S.</td>
<td>S401</td>
<td>Sociodemographic and health behavior determinants of vegetarianism among Adventist youth in India</td>
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<tr>
<td>4:30 p.m.</td>
<td>Davey, M.</td>
<td>S402</td>
<td>Making traditional and popular soul food recipes more healthful while maintaining cultural relevance</td>
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<td>4:45 p.m.</td>
<td>Acosta-Navarro, J.</td>
<td>S403</td>
<td>Scientific publications on vegetarian nutrition in the past 109 years: A systematic review</td>
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<td>5 p.m.</td>
<td>Mejia, A.</td>
<td>S404</td>
<td>Effect of vegetarian diets on planetary and population health outcomes</td>
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<td>5:15 p.m.</td>
<td>Fresan, U.</td>
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<td>Sustainability of different dietary patterns according to health, environment and price: Results from the SUN project</td>
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<td>5:30 p.m.</td>
<td>Hawkins, I.</td>
<td>S406</td>
<td>Protecting biodiversity with healthy soil, healthy seeds and our plate</td>
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[S101] A vegetarian diet is associated with lower stroke risk
Chin-Lon Lin¹, Ling-Yi Wang², Huai-Ren Chang²–³, Ming-Nan Lin¹, Tina H. T. Chiu¹
¹Department of Internal Medicine, Family Medicine and Nutritional Therapy, Dalin Tzu Chi Hospital, Taiwan, ²Department of Medical Research and Internal Medicine, Buddhist Tzu Chi General Hospital, Taiwan, ³School of Medicine Tzu Chi University, Hualien, Taiwan

**Background:** Many large Western prospective cohort studies found protective associations between vegetarian diets and cardiovascular diseases, certain cancers and all-cause mortality, but the association between a vegetarian diet and stroke incidence has not been investigated. This study aims to investigate the relationship between a vegetarian diet and stroke incidence in a Taiwanese Buddhist population. **Methods:** The Tzu Chi Vegetarian Study followed 3,054 vegetarian and 6,423 non-vegetarian Buddhists free of stroke from recruitment (2005) to end of 2014. Diet was assessed through a food frequency questionnaire and incidence of stroke, along with other baseline comorbidities, were identified through linkage to the National Health Insurance Database at the Health and Welfare Data Science Center in Taiwan. Hazard ratio and 95% confidence intervals of stroke in vegetarians versus non-vegetarians were estimated by Cox regression with adjustment for age, gender, education, associated comorbidities and relevant lifestyle covariates. We also investigated whether the effects of diets are the same across hemorrhagic and ischemic stroke by competing risk analysis. **Results:** During the 87,537 person-years of follow-up, 171 participants were diagnosed with stroke. Stroke incidence in vegetarians and non-vegetarians are 1.3 (0.9-1.8) and 2.2 (1.9-2.6) per 1,000 person-years, respectively. Compared with non-vegetarians, vegetarians experienced lower risk of overall stroke (HR: 0.55, 95% CI: 0.37-0.83), ischemic stroke (HR: 0.48, 95% CI: 0.25-0.90) and hemorrhagic stroke (HR: 0.31, 95% CI: 0.11-0.90). In the subgroup analysis, vegetarian diet is significantly associated with protection among women (HR: 0.52, 95% CI: 0.31-0.88) and in those age >= 50 years (HR: 0.58, 95% CI: 0.32-1.12) and those with age < 50 (HR: 0.46, 95% CI: 0.19-1.12). **Conclusion:** Taiwanese vegetarian diet is associated with a lower risk of overall, hemorrhagic and ischemic strokes.

[S102] Intake of high-protein foods and other major foods in people of different diet groups in UK Biobank
Kathryn E Bradbury¹, Tammy YN Tong¹, Timothy J Key¹
¹Cancer Epidemiology Unit, Nuffield Department of Population Health, University of Oxford, UK

**Background:** Vegetarian diets are defined by the absence of meat and fish but differences in the intake of other foods between meat-eaters and low or non-meat eaters are also important to document. **Study methods:** We examined intakes of high-protein foods (meat, poultry, fish, legumes, nuts, vegetarian protein alternatives, dairy products and eggs) and other major food groups (fruit, vegetables, bread, pasta, rice, snack foods and beverages) in regular meat-eaters (n=90,742), low meat-eaters (n=97,124), poultry-eaters (n=2,259), fish-eaters (n=5,701), vegetarians (n=3,870) and vegans (n=248) of white ethnicity participating in UK Biobank who had completed at least one web-based 24-hour dietary assessment. **Results:** In regular meat-eaters, around 25% of total energy came from meat, fish, dairy and plant milk, cheese, yogurt and eggs. In vegetarians, around 20% of energy came from dairy and plant milk, cheese, yogurt, eggs, legumes, nuts and vegetarian protein alternatives. In vegans, around 15% of protein came from milk, legumes, vegetarian alternatives and nuts. Low and non-meat eaters had higher intakes of fruit and vegetables and lower intakes of roast or fried potatoes compared to regular meat-eaters. **Conclusions:** Low and non-meat eaters partially replaced meat with high-protein vegetarian alternatives. There were also differences between regular meat-eaters and low and non-meat eaters.
in the intakes of many other foods. The differences in the intakes of meat, plant-based high-protein foods and other foods between meat-eaters and low and non-meat eaters in UK Biobank may contribute to differences in health outcomes.

[S103] Meat and egg intake and type 2 diabetes risk: Results from the Adventist Health Study-2

Nasira Burkholder-Cooley1,2, Gina Siapco1, Keiji Oda1, Joan Sabaté1
1Center for Nutrition, Healthy Lifestyles and Disease Prevention, School of Public Health, Loma Linda, California, 2Food Science & Nutrition Program, Chapman University, Orange, California

Background: Studies have indicated that egg intake may increase the risk of type 2 diabetes (T2D), however, the observed associations may be due to concurrent consumption of eggs with meat. We attempted to disentangle the purported associations of meat and egg consumption with T2D incidence. Methods: We assessed and validated habitual dietary intake in 96,469 participants of the Adventist Health Study-2 cohort. Egg intake was characterized as never, occasionally (<1x/wk), regularly (2-4x/wk) or daily. Meat intake was categorized as none, low (<25 g/d), medium (25 to < 70 g/d) or high (70 g/d). Incident cases of T2D were identified based on responses to two follow-up questionnaires administered between 2008 and 2015. We used multivariate logistic regression adjusting for known confounders to evaluate associations between egg and meat intake and incident T2D. Results: During a mean 5.3 years of follow up, incident T2D cases were 2,774. Meat intake 70 g/d was associated with significantly higher risk compared to no meat intake (odds ratio [OR], 1.65; 95% CI], 1.39-1.96, Ptrend < 0.0001). The frequency of egg consumption, from never to daily, did not change the risk of diabetes across the categories of non-vegetarians. Among vegetarians, those consuming eggs occasionally or a few times per week had no increase in diabetes risk; however, daily egg consumers had an OR (95% CI) of 1.52 (1.09, 2.12) compared to those who never consume eggs. Conclusion: Meat consumption is associated with higher odds of T2D in a step-wise fashion. At every level of meat consumption, egg intake does not predict the risk of diabetes, except among vegetarians consuming eggs daily. In US populations, the purported effect of egg intake on T2D risk is likely confounded by meat intake.

[S104] Vegetarian diets vs non-vegetarian diets in the ADVENTO study: Findings on cognitive functions

Naomi Vidal Ferreira1, Everton Padilha Gomes1, Alexandre Pereira1, Paulo Lotufo2, Isabela Benseñor2, Maria Cláudia Irigoyen1
1Heart Institute, São Paulo University, University Hospital, São Paulo University, Brazil, 2University Hospital, São Paulo University, São Paulo, Brazil

Background: Dietary practices have been associated with cognition in cohort and intervention studies (1, 2, 3). Seventh-day Adventist (SDA) vegetarian dietary patterns have been shown to be protective to physical health, once they associate with lower rates of chronic diseases such as cardiovascular diseases (4) and cancer (5) and higher rates of longevity (6). Little is known, however, about the relationship between diet and cognition among the SDA populations. Study Method: The present study analyzes the cognitive performance data from the ADVENTO Study, a cross-sectional research targeting the SDA population from São Paulo State, Brazil, conducted between March 2014 and August 2016. Subjects: 1,404 SDA members living in São Paulo State, were divided into three groups: vegan group (individuals who eat red meat, chicken, fish, dairy products and eggs less than once a month; n=235); ovo-lacto-vegetarian group (individuals who eat dairy or eggs more than once a month and red meat or chicken less than once a month; n=623); non-vegetarian group (individuals who eat red meat or chicken more than once a month; n=543). We assessed the individual diet patterns using a food-frequency questionnaire validated for the Brazilian diet (7), in order to classify the participants within the study groups, and the dietary characteristics such as fast-food, barbecue, fruits and vegetable daily intake using
a structured questionnaire. We verified the cognitive functions using three subtests from the Brazilian version of the CERAD (Consortium to Establish a Registry for Alzheimer’s Disease) (8): verbal memory subtest, verbal fluency subtest and executive functions subtest. ANOVA with Bonferroni correction was used to compare the performance among the three groups of the study, and partial correlations were used to verify the association between diet and cognition in each of the study groups. Age, education and household income were used as co-variables. Results: The non-vegetarian group presented worse performance on verbal memory and verbal fluency when compared to the ovo-lacto vegetarian group, and on the executive functions, when compared to both ovo-lacto-vegetarian and vegan groups. In the vegan group, verbal memory performance was positively associated with fruit consumption. In the ovo-lacto-vegetarian group, verbal memory performance was negatively associated with the consumption of fast food and verbal fluency performance was positively associated with fruit consumption. In the non-vegetarian group, verbal memory performance was negatively associated with barbecued food consumption and verbal fluency performance was positively associated with fast food consumption. Conclusion: In our sample of SDA individuals, when compared to both vegetarian groups, the non-vegetarian group presented worse cognitive performance, especially on the executive functions. In the vegetarian groups, better cognitive performance was associated with increased fruit consumption and decreased fast food consumption. In the non-vegetarian group, better cognitive performance was associated with decreased barbecued food consumption and increased fast food consumption.

[S105] Vegetarian diet and cataract risk
Chia-Chen Chang¹, Tina H. T. Chiu², Ming-Nan Lin², Chin-Lon Lin³
¹Department of Medical Research, Buddhist Dalin Tzu Chi Hospital, Chiayi, Taiwan, ²Department of Nutrition Therapy, Department of Family Medicine, Buddhist Dalin Tzu Chi General Hospital, Chiayi, Taiwan, ³Department of Cardiology, Buddhist Dalin Tzu Chi General Hospital, Chiayi, Taiwan

Background: A previous study in the UK showed that the incidence of cataract is inversely associated with vegetarian diets. However, there is no relevant research conducted among Asians. Study aim: The aim of this study was to examine the association between vegetarian diet and risk of cataract development in a Taiwanese cohort study. Study methods: We used the data from the Tzu Chi Health Study (TCHS), a prospective cohort of 6,002 Taiwanese adults who were recruited during 2007-2009 from Dalin Tzu Chi Hospital. Dietary data was collected through a valid food frequency questionnaire (FFQ). The baseline data of the cohort were linked to Taiwan National Health Insurance Research Database (NHIRD), which has medical claim records of each person, to find out incidence case of cataract. Cataract cases were defined using the International Classification of Diseases Ninth Revision, Clinical Modification (ICD9-CM) codes: 366. Cataract risk by diet groups was analyzed using Cox proportional hazards models. Results: During a follow-up period of 25,270 person-years, 507 participants were diagnosed with cataract. After adjustment for age, gender, education, alcohol drinking, smoking and exercise habits, body mass index, hypertension, diabetes and hyperlipidemia, vegetarians had a 21% lower risk (HR: 0.79; 95% CI: 0.65-0.97) of cataract development than did nonvegetarians. We also found that smoking, diabetes and hyperlipidemia were associated with increased risk of cataract. In the subgroup analysis, vegetarian diet was associated with a strong protection (HR: 0.17; 95% CI: 0.05, 0.54) in participants who have ever smoked. Conclusion: Vegetarian diet is associated with lower risk of cataract development.
[S106] Higher vegetarian lifestyle index scores is associated with lower risk of all-cause mortality

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Background: No studies have evaluated the relation between vegetarian diet quality and lifestyle behaviors concurrently over time on the risk of all-cause mortality from cardiovascular diseases (CVD), ischemic heart disease (IHD), cancers and diabetes. Objective: Our objective is to evaluate the Vegetarian Lifestyle Index (VLI) on mortality risk in a large Adventist cohort, a population that is unique and diverse in dietary patterns and lifestyle behaviors. Method: Cox proportional-hazards models were used to calculate hazard ratios (HR) for all-cause mortality among 79,930 participants in the Adventist Health Study-2 (AHS-2), between 2002-2013. Diet quality and lifestyle practices were assessed with the VLI score using data from the AHS-2 comprehensive questionnaires. Results: Among an analytic sample of 79,930 participants with an average follow-up of 12.8 years, there were a total of 4,318 deaths. The hazard ratios for all-cause mortality among participants over an average of 12.8 years as compared to the lowest Quintile 1 were the following: 0.78 (95% CI: 0.58, 1.05) for Quintile 2; 0.71 (95% CI: 0.54, 0.95) for Quintile 3; 0.64 (95% CI: 0.47, 0.85) for Quintile 4; 0.62 (95% CI: 0.47, 0.82) for Quintile 5. At age 55, 65, 75 and 85, significant risk reduction of 16-44%, 19-55%, and 18-59%, respectively, across Quintile 3, 4, and 5. At age 95 and 100, there was no significant reduction in risk of death across the quintile categories. A sensitivity analysis showed modest attenuating effects towards the null when body mass index (BMI) was added to the multivariate adjusted model. Conclusion: Healthful diet quality and lifestyle practices over 12.8 years with higher VLI score were consistently associated with reduced risk of death.

Session II: Vegetarian Diets and Health Outcomes – II

[S201] The effect of almonds on vitamin E status and cardiovascular risk factors in Korean adults: A randomized trial

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Health benefits of certain plant foods in cardiometabolic diseases are well appreciated for their differential efficacy resulting from confounding impact of ethnicity and habitual diet. Almonds can improve some cardiovascular risk factors in diverse ethnic populations but this relationship has never been tested in Koreans who consume about 70% daily calories from carbohydrates. Thus, we tested the impact of almonds consumed as a snack within the context of a typical Korean diet on cardiovascular risk factors. We conducted a randomized, crossover trial with a two-week run-in period, two 4-week intervention phases, and a two-week washout period between interventions. Eighty four overweight/obese participants consumed either 56 g of almonds or isocaloric cookies daily. Mean daily energy intake at baseline was 64.8, 21.3, and 14.9% from carbohydrate, fat, and protein, respectively. The addition of 56 g of almonds decreased carbohydrate energy, increased fat, and maintained protein. Consuming the almonds increased intake of MUFA by 192.3%, PUFA by 84.5%, vitamin E by 102.7%, and dietary fiber by 11.8%. Total caloric intake was increased by the almonds, but body weight, waist circumference, and body composition were not affected. Almonds decreased TC, LDL-C, and non-HDL-C by 5.5, 4.6, and 6.4%, respectively, compared to the cookie control (P < 0.05). Almonds increased plasma tocopherol by 8.5% (P < 0.05) from the baseline and tended to increase its value as compared to cookies (P =
Almonds at 56 g/day consumed as a snack favorably modified the Korean diet by increasing MUFA, PUFA, vitamin E, and dietary fiber intake and decreasing % energy intake from carbohydrate. Almonds also enhanced plasma tocopherol status and serum TC and LDL-C in overweight and obese Koreans.

[S202] Vegetarian diets as protective to subclinical atherosclerosis evaluated by clinical imaging
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Background: Several studies have demonstrated the protective effect of vegetarian diets on the prevalence of CVD. Among them, the group of Seventh-day Adventists (ASD), already studied in the United States and Europe, stands out. Nonetheless, there is scarce clinical data on the effects of a vegetarian diet in the set of a South American country, and even so regarding the imaging patterns associated. Carotid intima-media thickness, pulse wave velocity, arterial length are some of the parameters associated with early subclinical atherosclerosis detection. Higher numbers in liver edge thickness have been associated with hepatic steatosis and metabolic syndrome.

Methods: We studied 1,404 individuals of both sexes, aged 35-74 years, living in the State of São Paulo, Brazil, from the ADVENTO Study (Analysis of diet and lifestyle for cardiovascular event prevention in Seventh-day Adventists), divided into three groups: 546 omnivores (OMN), 623 lacto-ovo vegetarians (LOV) and 235 strict vegetarians (VEG). Patients were submitted to a social and health history questionnaire and were assessed for anthropometric data, blood pressure and laboratory tests. Some of the imaging tests performed were carotid intima-media thickness (c-IMT) and distensibility were evaluated. There was an ultrasound evaluation of the liver for hepatic steatosis. Also, arterial stiffness determined by carotid-femoral pulse wave velocity (PWV) was performed. Continuous variables were expressed as means (SD) or medians (interquartile ranges, IQR), and compared using analysis of variance (ANOVA), the Mann-Whitney U test or the Kruskal-Wallis test, as deemed appropriate after assessing normality assumptions. The analyses were done using SPSS 23.0 software (IBM, Chicago, Ill., USA). p < 0.05 was regarded as significant and all tests were two sided.

Results: Image markers were favorable to vegetarian diets as follows: c-IMT: - VEG (540 ± 120um) and LOV (560 ± 130um) vs OMN (600 ±160) p<0.001; Arterial length: VEG (55.02 ± 4.49) and LOV (55.66 ± 3.99um) vs OMN (56.41 ±4.73), p=0.005; liver edge thickness: VEG (97.95 ± 13.02) and LOV (100.63 ± 12.0) when compared to OMN (105.16 ±12.27), p<0.001. PWV didn't show difference between the groups. In the multivariate analysis, VEG and LOV were independently associated with lower c-IMT, arterial length and liver edge thickness index.

Conclusion: In the present study, the strict vegetarian and lacto-ovo vegetarian diets were independent factors for reduced subclinical carotid vascular disease and hepatic steatosis in comparison with non-vegetarian diet.

[S203] Risk of ischemic heart disease and stroke in UK meat eaters, fish eaters, vegetarians and vegans
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Background: There is limited evidence on the association of vegetarianism with cardiovascular diseases subtypes. We aimed to examine this association in the EPIC-Oxford cohort in the United Kingdom, which has a high proportion of non-meat eaters. Methods: In EPIC-Oxford, dietary information and blood were collected at baseline, and participants were categorized into five diet groups (16,332 regular meat eaters: 50g of meat per day; 8,096 low meat eaters: <50g
of meat per day; 7,506 fish eaters; 14,422 vegetarians; and 1,832 vegans). Using multivariable-adjusted Cox regression, we estimated the risk of ischemic heart disease (IHD) and stroke (ischemic and hemorrhagic), with outcomes identified through record linkage. **Results:** Compared with regular meat eaters, all other diet groups had lower non-high density lipoprotein cholesterol (non-HDL-C) levels (measured in a subset, n=3,662), e.g. 0.5 mmol/L lower in vegetarians. Over 18.1 years of follow-up, all other diet groups had a lower risk of IHD (hazard ratio 0.75; 95% confidence interval 0.58-0.97 in vegans to 0.88; 0.80-0.98 in low meat eaters) and vegetarians had a lower risk of composite IHD or stroke (0.86; 0.78-0.95). Conversely, compared with regular meat eaters, all other diet groups had a higher risk of total stroke (1.44; 1.00-2.06 in vegans to 1.22; 1.03-1.43 in low meat eaters), and vegetarians had a higher risk of hemorrhagic stroke (1.55; 1.12-2.13). No statistically significant associations were observed for the risk of myocardial infarction or ischemic stroke. Results from sensitivity analyses, such as excluding the first five years of follow-up, were similar. **Conclusions:** The lower risk of IHD in low or non-meat eaters may be related to lower non-HDL-C levels in these diet groups, while mechanisms for the higher risk of stroke in low or non-meat eaters deserve further investigation.

**[S204] Fasting-mimicking diet and risk factors for aging, diabetes, cancer and cardiovascular disease**

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**Background:** Periodic fasting cycles lasting two or more days are emerging as a highly effective strategy to protect normal cells and organs from a variety of toxins and toxic conditions while increasing the death of many cancer cell types. Since prolonged fasting is difficult for most human subjects, we developed a vegetarian diet that mimics the effects of fasting (fasting mimicking diet, FMD) which is a low calorie, low protein, plant-based meal plan for five continuous days. Our objective was to investigate whether a dietary intervention more practical and safer than fasting could affect markers or risk factors for aging and cancer. **Methods:** 100 participants without a diagnosed medical condition in the preceding six months were enrolled based on inclusion criteria (generally healthy adult volunteers, 18 to 70 years of age, body mass index of 18.5 and up). This study is designed as a randomized cross-over trial, includes two arms: control and multi-cycle special five-day dietary regimen (diet, three cycles). We evaluated the effects of the FMD on risk factors and markers for aging, cancer, metabolic syndrome and cardiovascular diseases. **Results:** For all subjects who completed three FMD cycles (combining both FMD arms), body weight, BMI, total body fat, trunk fat, absolute lean body mass, waist circumference, IGF1, systolic and diastolic blood pressure, total cholesterol and LDL were significantly reduced (P<0.05) and relative lean body mass (p=0.0002) was increased. **Conclusions:** Fasting mimicking with plant-based diet cycles are effective in improving an array of metabolic markers/risk factors associated with poor health and aging and in contributing to the treatment and prevention of multiple age-related diseases including cancer.

**[S205] Impact of a one year plant-based diet intervention on diet and the dietary inflammatory index**

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**Purpose:** To examine three- and 12-month changes in dietary intake and dietary inflammatory index (DII®) scores in the Inflammation Management Intervention (IMAGINE) study: a 12-month plant-based diet (informed by the DII) intervention trial. **Study methods:** Adults were recruited to participate in a self-selection trial where participants could opt to receive the intervention (n=59; weekly classes for three months, monthly classes through 12 months) targeting systemic inflammation reduction or select a control condition (n=34; weekly email cancer screening newsletters for three months, monthly newsletters through 12 months). Intervention classes included participatory cooking and dietary recommendations focused on consuming a plant-based diet rich in foods identified as being highly anti-inflammatory (spices, vegetables, etc.). Changes in dietary intake (via 24-hr recalls) and DII were analyzed using linear regression modeling the change as the outcome. **Results:** There were no differences in attrition (15%) or baseline characteristics between groups with the exception of age (52.6 ±10.8 y intervention; 38.4 ±15.7 control; P<0.01), BMI (32.4 ±7.2 kg/m2 intervention; 29.2 ±6.6 control; P=0.03) and energy intake; therefore, models were adjusted for baseline age, BMI and energy. Participants (38% black; 62% white) were mostly female (81%). At three months, the intervention group saw greater increases in fiber, whole grains and vegetable intake than the control group. At both three and 12 months, the intervention group had greater reductions in energy intake, % energy from fat and saturated fat, cholesterol, red meat/poultry and dairy and greater increases in carbohydrate than the control group. DII scores decreased significantly in the intervention group at three months; however, differences were not significant (P=0.09) at 12 months. **Conclusions:** The IMAGINE study results demonstrate long-term improvements in several dietary outcomes associated with cardiovascular disease and hypertension. Use of plant-based diets guided by the DII may aid in improving chronic disease risk.

**[S206] Grain patterns are associated with dietary fiber intake, diet quality and weight-related measures**

_Yanni Papanikolaou¹, Victor L. Fulgoni, III²_


**Background:** Scientific research is lacking on how Americans consume grain foods and the associated nutrient and health outcomes. Our objective was to identify the most commonly consumed grain food patterns in US children (2-18 years-old) and adults (19 years-old) and compare nutrient intakes, diet quality and health parameters in the various grain patterns in comparison to individuals who consumed no main grain foods. **Methods:** The USDA food coding system was used to define main categories of grain foods. Cluster analyses using data from the National Health and Nutrition Examination Survey 2005-2010 identified patterns of grain consumption. **Results:** In children, consuming bread/rolls, pasta/cereals/rice and crackers/salty snacks patterns was associated with a higher diet quality (Healthy Eating Index-2010 score: 46.1±0.5, 50.6±1.0 and 46.0 ±0.4 vs. 42.7 ±0.9, respectively; p<0.001). In children, dietary fiber intake was higher in five grain patterns as compared to those consuming no grains. Body mass index Z-score was lower in children consuming bread/rolls, quick breads, pasta/cereals/rice, crackers/salty snacks and mixed grains patterns. Adults consuming cereals, pasta/cooked cereals/rice and mixed grains patterns had a higher diet quality than no grains (54.7 ±1.0, 54.4 ±0.6 and 49.5 ±0.03 vs. 46.8 ±0.9, respectively; p<0.002). Consuming pasta/cooked cereals/rice and quick breads was associated with lower added sugar intake relative to the no grain adults (12.4 ±0.4 vs. 20.1 ±0.8 tsp eq; 0.0001). Dietary fiber intake in adults was greater in three of the eight grain patterns identified when compared to no grains. Pasta/cereals/rice consumption in adults was linked to lower body weight (79.1 ±0.7 vs. 82.5 ±1.2 kg; p=0.009) and waist circumference...
(95.2 ±0.6 vs. 98.2 ±1.0 cm; p=0.004) as compared to no grains. **Conclusion:** Consuming a variety of grain food patterns in US children and adults was associated with improved dietary fiber intake and diet quality. Additionally, certain grain patterns were associated with lower added sugar intake and improved weight-related measures.

**Session III: Nutritional Status and Assessment of Vegetarians**

**[S301] Body composition of Brazilian Adventists exposed to different vegetarian dietary patterns.**

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**Background:** Members of the Seventh-day Adventist church long studied in longitudinal investigations represent a population of high longevity known to show reduced risk factors for obesity and various chronic diseases. **Study aim:** Our aim was to compare body composition data between Adventist subjects exposed to vegetarian and non-vegetarian dietary patterns. **Study method:** We conducted a cross-sectional study of 405 participants of a subsample of the ADVENTO Study, age between 34 and 75 years, living in the state of São Paulo. Seventy four participants were vegans, 98 were lacto-ovo vegetarians, 26 were pesco-vegetarians, 38 were semi-vegetarians who were grouped into a total of 236 vegetarians (VEG) and 169 non-vegetarians (NVEG). Participants completed a semi-quantitative food frequency questionnaire and body composition data were assessed by tetrapolar bioelectrical impedance. Comparisons between the two dietary patterns were done by T-test or Wilcoxon-Mann-Whitney test. **Results:** Our preliminary results showed that VEG individuals had lower body weight, body mass index (BMI), body fat percentage (in both genders), absolute total body fat and trunk body fat than NVEG. Also, the VEG group showed higher values of relative muscularity of lower limbs and trunk. **Conclusion:** These initial findings may represent a gain for cardiovascular health among vegetarians.

**[S302] Nutrient intake and growth indices of vegetarian, vegan and omnivorous children (1-3 y) in Germany**

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**Background:** Vegetarian (VG) and vegan (VN) diets are becoming increasingly popular in Germany. Many VG and VN parents raise their children without meat or foods of animal origin. Until now, only few studies have been conducted with VG and VN children worldwide. **Study Methods:** The Vegetarian and Vegan Children Study (VeChi Diet-Study) collected data of 272 German children (1-3 y). Dietary intake (including supplements and fortification) was assessed by a three-day-weighted dietary record; lifestyle and anthropometric data by an online questionnaire. Medians were compared by nonparametric analyses (Kruskal-Wallis test, Mann-Whitney test). **Results:** While the intake of carbohydrates (VG 53 % of energy (en%); OM 51 en%), iron (VG 7; OM 6 mg/1000 kcal), folate (VG 125; OM 108 µg/1000 kcal) and calcium (VG 426; OM 459 mg/1000 kcal) did not differ between VG and OM, VN had significant higher intakes of carbohydrates (56 en%), iron (9 mg/1000 kcal) and folate (156 µg/1000 kcal) and a significant lower calcium intake (320 mg/1000 kcal). Compared to OM, the intake of vitamin C (VN 62; OM 45 mg/1000 kcal) and protein (VN 11; OM 13 en%) was higher in VN. OM had highest
riboflavin intakes (646 µg/1000 kcal), followed by VG (517 µg/1000 kcal) and VN (437 µg/1000 kcal). Regarding cobalamin, 43 VG (53%), 12 OM (17%), and 12 VN (10%) did not meet the German dietary reference intakes. There were no significant differences in standard-deviation-scores for weight-for-height and height-for-age (WHO Growth Standards, 2011), energy intake/density, fat or zinc intake. **Conclusion:** Our initial analyses showed significant differences in the nutrient intake between the study groups while weight-for-height and height-for-age did not differ. The VeChi Diet-Study provides the opportunity to develop guidelines to improve the nutrient intake of VG, VN and OM children.

**[S303] Clinical significance of vitamin B12 status among vegan and vegetarian adults**

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**Background:** High prevalence of vitamin B12 (B12) deficiency among vegetarians, especially vegans, has been documented in a number of studies. **Objectives:** To critically analyze clinical significance of B12 status among vegetarians, including vegan, adults, specifically, 1) summarize the status and overview of the prevalence of B12 deficiency, 2) review the association between B12 status and selected health outcomes, 3) overview B12 assessment methods and 4) propose dietary strategies to ensure adequate B12 status. **Findings and conclusions:** Obersby et al. reported the mean serum B12 among vegans of 172 pmol/L, based on 9 studies, and 209 pmol/L among vegetarians, based on 15 studies. The incidence of B12 deficiency ranged from 20% in an American study to 92% in a study with German and Dutch adults. In vegetarians, inadequate B12 status is the main factor in developing hyperhomocysteinemia (HHcy), an independent risk factor for cardiovascular disease and osteoporotic fractures. HHcy has also been associated with brain atrophy, cognitive decline, depression and mortality. Interventions with B12 therapy in asymptomatic vegetarians resulted in reduced intima-media thickness and improved flow-mediated dilation. While not all vegans or vegetarians may develop B12 concentration below commonly utilized deficiency cutoffs, the best outcomes, in terms of prevention of common health conditions, are achieved when B12 level is considerably higher than these cutoffs. B12 status can be assessed via serum/plasma B12, MCV, Hcy, holotranscobalamin II and methylmalonic acid. Evidence based cutoffs, based on outcomes of chronic health conditions, will be suggested. While eggs, dairy products fortified with B12 plant foods may provide enough B12 to never develop traditional signs of deficiency (e.g. paresthesia, pancytopenia), achieving B12 concentrations associated with the best clinical outcomes can only be done by using appropriate doses of B12 supplements, which depend on diet, age and life cycle.

**[S304] Biomarkers of dietary intake differentiate vegetarian and non-vegetarian dietary patterns**

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**Background:** Differences in nutrient intake and various health outcomes have been reported for vegetarians and non-vegetarians in the Adventist Health Study-2 (AHS-2) cohort. We sought to determine if diet-related biomarkers also differed between individuals classified as vegetarian (vegan, lacto-ovo vegetarian, pesco-vegetarian, semi-vegetarian) or non-vegetarian based on patterns of consumption of meat, dairy and eggs. **Methods:** Fasting plasma, overnight urine and adipose tissue samples were collected from approximately 900 AHS-2 participants, who also completed repeated 24-hour dietary recalls and two food frequency questionnaires, as part of a calibration study. A total of 35 diet-related biomarkers were analyzed. Multiple linear regression was used to examine the association between diet pattern and biomarker abundance. Adjusted mean values for biomarker abundances were calculated for each diet group. Bonferroni correction
and Benjamini-Hochberg false discovery rate (FDR) were used to control for multiple testing.

**Results:** Vegetarian diets were associated with significantly increased levels of carotenoids, isoflavones, and enterolactone, decreased urinary 1-methyl-histidine, and alterations in fatty acid profiles, relative to a non-vegetarian diet. Associations were strongest among vegans (often P <0.0001).

**Conclusion:** These findings provide validation of the classification of vegetarian and non-vegetarian dietary groups within the AHS-2 cohort, and help to elucidate nutritional profiles that may have relevance to health outcomes. Vegetarian diets clearly induce significant changes in body chemistry.

**[S305] Protein and amino acid consumption and their associations with body composition in adolescents**

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**Background:** Despite the significant role of protein in growth and development of adolescents, protein intake patterns of this age group have hardly been studied. We investigated protein consumption and its potential associations with adiposity and body composition in a sample of 601 healthy Adventist adolescents aged 12-18 years participating in the Teen Food and Development study.

**Methods:** Protein intake was determined from the web-based questionnaire and protein foods were categorized as red meat, white meat, processed meat, fish, dairy, egg, grain, gluten, soy, non-soy legumes and nuts. Parametric comparison tests were used for descriptive analyses and multiple regression analysis was used to explore possible associations.

**Results:** Mean intakes of protein for all age-gender categories were greater than the EAR across all quartiles, yet about 7% of 12-13 year-old adolescents and 10% of 14-18 year-old boys and 8% of 14-18 year-old girls did not meet the recommendations. Protein intake averaged 86 g/d (55% derived from plant protein), 1.5 g/kgBW/d, and 16% of total energy intake. Dairy, red meat and poultry contributed the most to animal protein intake whereas grains, soy products and non-soy legumes contributed the most to plant protein intake. Overweight and obese adolescents consumed significantly higher amounts of white meat and lower amounts of soy and non-soy legumes, with the latter also being observed in adolescents with abdominal obesity. Higher intakes of total and animal protein and branched chain (BCAA) and sulfur containing (SCAA) amino acids were significantly associated with higher BMI-z scores and fat mass. Significant positive associations were observed between intake of animal protein and SCAAs with waist to height ratio.

**Conclusion:** We observed clear differences in protein intakes according to demographic characteristics and dietary status. Our findings suggest a potential harmful role of high total and animal protein intake and BCAAs and SCAAs in these adolescents.

**Session IV: Plant-based Diets and Health Education: Person and Planet**

**[S401] Sociodemographic and health behavior determinants of vegetarianism among Adventist youth in India**

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**Background:** Research has highlighted nutritional advantages to vegetarian diets and has indicated that vegetarianism can lead to lifelong healthy eating habits when adopted at a young age. This study aimed to identify sociodemographic and health behavior determinants of vegetarianism among Adventist youth in India.
age. Hence there is a need to investigate the health and lifestyle of young vegetarian and non-vegetarian. The present study aims to explore differences in sociodemographic characteristics and mental health status in a representative sample of Adventist adolescents and young adults who were defined as vegetarian and non-vegetarian. **Study Methods:** A sample of 226 Seventh-day Adventist youth in the age group of 15 to 25 years (113 males and 113 females) attending the Southern Asia Division Youth Congress were examined in the cross sectional survey. Participants were drawn from the representative sample of the Adventist Health Development Study (AHDS). The mean age of sample was 21.5 years; 45% were vegetarians and 55% were non-vegetarians. The sample comprised 62% late adolescents and 38% early adults. **Results:** According to sociodemographic factors more females (49%) are vegetarians than males (41%). Those with higher educational qualifications 44% (degree and above) than with lower educational qualifications 56% (below grade 12) very vegetarians. The analysis for socio economic status showed mixed response. On mental health conditions vegetarian adolescents and early adults were significantly more likely than non-vegetarians to experience high levels of depression (52%) and suicidal thoughts (60%). Vegetarians were less likely to consume alcohol 29% and illegal drug taking behavior (33%). **Conclusion:** Adolescent and young adult vegetarians experience the health benefits associated with lower consumption of alcohol and harmful drugs. They also experience the added benefit of decreased risk for smoking behavior, tobacco chewing and self-harm. However, vegetarian adolescents and early adults are vulnerable to higher levels of depression and suicidal thoughts. The overall picture of the health of vegetarians therefore appears to be mixed.

**[S402] Making traditional and popular soul food recipes more healthful while maintaining cultural relevance**

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**Purpose:** To examine energy, total fat, fiber and sodium differences in regional soul food restaurant menu items versus recipes revised using the dietary recommendations of the NEW Soul Study, a plant-based dietary intervention among African American adults targeting cardiovascular disease prevention. **Methodology:** Using an online search strategy (Google, Yelp), the top 15 local (Columbia, SC) soul food restaurants were identified. Menus of restaurants were compared to identify the top five most common main course, side dish and dessert items across all restaurants. Standard recipes were analyzed using the USDA nutrient database and compared to recipes employing the vegan, low/no oil and low sodium recommendations of the NEW Soul study (e.g., meat analogues vs. meat, vegetables seasoned with broth vs. fatback). **Results:** Comparing the nutrient values of the standard vs. revised menu items, energy content for main entrees, sides and desserts was reduced by 48%, 37%, and 29% respectively. Fat content for main entrees, sides and desserts was reduced by 73%, 70%, and 25% respectively. Fiber content for main entrees, sides and desserts was increased by 67%, 6%, and 31% respectively. Sodium content for main entrees, sides and desserts was reduced by 62%, 29%, and 22% respectively. **Conclusion:** Conventional soul food recipes are typically high in energy, fat and sodium, and low in fiber, all of which can contribute to cardiovascular disease. Using the NEW Soul recommendations, however, traditional soul food recipes can be prepared in a more healthful method, while maintaining the cultural relevance of the foods. Future iterations of the recipes will further transform the ingredients to rely more on whole foods versus meat analogues (e.g., BBQ lentils vs. BBQ mock chicken sandwich). The remainder of this study will examine the palatability of these recipes as well as other health outcomes.
[S403] Scientific publications on vegetarian nutrition in the past 109 years: A systematic review

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Background: The number of people switching to vegetarian diets continues to increase worldwide. This has sparked an interest in research on this group of people as well. Study aim: The purpose of this study was to evaluate the number of scientific publications on vegetarian nutrition.

Methods: To analyze the publication trends of vegetarian nutrition articles we used the keyword “vegetarian” in the National Institutes of Health Medline bibliographic database between 1907-2016. We quantified the total number of articles on vegetarian nutrition by five-year time periods, and we classified in which type of journal they were published (nutrition or non-nutrition journals). Other variables were analyzed: the affiliation of the first author, the origin of the study population, the type of articles and the main theme. Results: The total number of articles published was 4,103 and the number of articles increased steadily in all periods from 1937-1941. Non-nutrition journals published more articles on vegetarian nutrition, except in the periods 1952-1956 and 1957-1961. A strong correlation (r=0.9404) between the number of articles in relation to the total number of articles indexed by Medline annually was observed. It was also observed that after 1960 the articles on vegetarian nutrition were proportionately more than the total published, except in the years 1970, 2007, 2008, 2010, 2011, 2012, 2013, 2015. Regarding the other variables, the majority of authors were based in Europe (42.86%), followed by North America (27.92%), Asia (19.43%) and Latin America (1.41%). The origin of the study population is not identified in (38.97%), followed by Europe (24.32%) and Asia (17.61%). Original research and review articles represented 58.55% and 24.55% respectively. In 24.81% of all publications, the theme was the adequacy of vegetarian diets and nutritional status. Conclusion: We noticed a marked increase in the publication of papers on vegetarian nutrition over the years in absolute and relative terms indicating an increase of interest in the subject.

[S404] Effect of vegetarian diets on planetary and population health outcomes

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Background: Dietary choices may have effects not only in the health of populations but also in planetary health outcomes. More attention is being paid in recommendations about dietary patterns which differ in their content of plant and animal products. Our aim is to compare greenhouse gas emissions (GHGEs) of vegetarian dietary patterns with different proportion of plant and animal foods in the Adventist Health Study-2 (AHS-2) cohort, and to match these figures with mortality risk as a surrogate measure of population health.

Study methods: We calculated GHGEs for each of the 200+ food items in the AHS-2 food frequency questionnaire by SimaPro Life Cycle Assessment software, using primary data. We determined the GHGEs for five iso-energetic dietary patterns: vegan, lacto-ovo vegetarian, pesco-vegetarian, semi-vegetarian and non-vegetarian. Results: The mean (SD) GHGEs for the vegan, lacto-ovo vegetarian, pesco-vegetarian, semi-vegetarian and non-vegetarian were 1.73 (0.44), 2.14 (0.67), 2.26 (0.71), 2.38 (0.83) and 2.96 (1.00), respectively. Compared to non-vegetarian diet, the mean reductions in GHGEs for the vegan, lacto-ovo vegetarian and pesco-vegetarian were 42%, 28% and 24%, respectively. According to a previous report in the same cohort, the multiple-adjusted HR for all-cause mortality in vegans, lacto-ovo vegetarians, pesco-vegetarians and semi-vegetarians was 0.85 (95% CI, 0.73-1.01), 0.91 (95% CI, 0.82-1.00), 0.81 (95% CI, 0.69-0.94) and 0.92 (95% CI, 0.75-1.13) compared with non-vegetarians, respectively. Conclusions: Different vegetarian dietary
Short Oral Presentations

[S405] Sustainability of different dietary patterns according to health, environment and price: Results from the Sun project.

_Ujue Fresan_1,2, _Miguel-Angel Martinez-Gonzalez_1,3, _Joan Sabaté_2, _Maira Bes-Rastrollo_1

1University of Navarra, Pamplona, Spain, 2Loma Linda University, Loma Linda, California, 3Harvard University, Cambridge, Massachusetts

**Background:** A sustainable diet could be defined according to its environmental footprints, healthiness or affordability. Studies analyzing these different aspects at the same time are necessary. Our objective was to evaluate the overall sustainability of different dietary patterns that diverge in their content of plant and animal products (Provegetarian (pVD), Mediterranean (MeD) and Western (WDP) patterns), according to their effects on health and environment, and to their affordability in the Spanish SUN project cohort. **Study methods:** Subjects’ diets were assessed through a 136-item food frequency questionnaire. Participants’ diets were rated according to their conformity to each of the three dietary patterns. The healthiness of the patterns was assessed by the Rate Advancement Period (RAP), a measure of the time a specific outcome (for this study a composite end-point of all-cause mortality, cardiovascular disease, breast cancer or type 2 diabetes) is advanced or postponed; their environmental footprints by the use of natural resources and greenhouse gas emissions in the production of the food items; and their affordability by their market price. We designed an overall sustainability index that combined these three aspects. Means (95%CI) were adjusted for age, sex and total energy intake. **Results:** Comparing the highest quartile of adherence to the three dietary patterns, the MeD was the healthiest pattern, while the WDP was the unhealthiest diet. The environmentally friendliest pattern was the pVD whereas the WDP was the most environment-detrimental diet. Regarding their price, the WDP was the most affordable pattern while the MeD was the most expensive pattern. The MeD was the most overall sustainable option, closely followed by the pVD. The less overall sustainable diet was the WDP. **Conclusion:** Following a plant-based dietary pattern could be a good option in order to achieve an overall sustainable diet.

[S406] Protecting biodiversity with healthy soil, healthy seeds-and our plate

_Irana W. Hawkins_1

1Walden University, Minneapolis, Minnesota

**Background:** Food choices, agricultural methods and lifestyle characteristics play a critical role in biodiversity loss and environmental degradation. From the planetary boundaries framework we understand that the loss of biodiversity contributes to an earth system that will be increasingly inhospitable. The unprecedented rate of extinction combined with excessive resource consumption, degraded ecosystems and climate change diminish ecological resiliency. A substantial array of data implicates the food on our plate and the plate itself in biodiversity loss. While plant-based diets minimize the burden of chronic disease, resource consumption and environmental degradation, plant-foods should be grown to regenerate ecosystems. **Methods:** This presentation will review the evidenced-based data on protecting and rejuvenating biodiversity with regenerative agriculture; building healthy seed systems; institutionalizing organic whole food plant-based menus; and implementing zero waste policies including eliminating food waste and food-serving waste. These solutions offer a multitude of co-benefits not only for human health but for the living beings and the living systems of the natural environment that we depend upon.
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**Theme 3: Plant-based Nutrition: Programs and Dietary Tools**

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**Theme 5: Plant foods, plant-based diets and health outcomes**

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[P101] The polypharma study: Association between diet and amount of prescription drugs among seniors
Hildemar dos Santos¹, Josileide Gaio¹, Larry Beeson¹
¹Loma Linda University School of Public Health, Loma Linda, California

Background: The Polypharma Study is a cross-sectional design to investigate the association between the amount of pills or medication that people take and their lifestyle. There is a term called polypharmacy or multiple prescription that describes the current epidemic at least among seniors, who have multiple prescriptions due to their multiple morbidities. This is a matter of concern because many of those drugs have several side effects that can interact and sometimes be synergic in bringing other complications to their already fragile health conditions. We hypothesized that a healthy lifestyle will be associated with better health, less morbidity and therefore, less need for medication. The problem is a great concern to provide appropriate medical management for patients (Lindley et al, 1992, Hamano & Tukuda, 2014 Connor et al, 2012, ). Most approaches have been conducted on the part of the physician education and training to improve the situation (Rognstad et al, 2013, Onder et al, 2013). Our study focused on seniors living in the city of Loma Linda with the intent to see if lifestyle could decrease the need for multiple medications. Methods: For the study we recruited 300 participants in the city of Loma Linda that were 60 years or older. Participants read and agreed to the informed consent approved by the institutional review board (IRB). All analyses were conducted using SAS 9.4 software. The outcome variable was the number of pills and the distribution was positive skewed. We used a Poisson regression analysis to compare the number of pills in different types of diets, adjusting for exercise, BMI, age, gender and income. To account for over dispersion, we used the multiplicative over dispersion factor(f).

Results: Preliminary analyses of the Polypharma Study showed that people who followed a vegan diet take 64% less pills (Exp(β= .36), the ones who are pesco-vegetarians use 54% % less pills (Exp(β)=.46), when compared to those who were omnivores. Also, age was significantly associated (Exp(β)= 1.03). Women were more likely to use less prescription drugs (Exp(β)=.77. And finally, those who were less educated, high school or some high school, were more likely to use less drugs (Exp(β)=.44).

Conclusion: Our study in its preliminary analyses was able to determine an association between diet, age and education and the use of multiple prescription drugs.

[P102] Bowel habits referred by vegetarians and omnivorous
Luiza Antoniazzi¹², Maria Cristina A. Gaspar¹, Rodrigo E. Oliveira³, Julio César Acosta-Navarro², Carolina V. M. B. Pimentel¹, Luciana Saraiva³
¹Paulista University, São Paulo, Brazil ²Heart Institute, University of São Paulo, São Paulo, Brazil, ³School of Dentistry, University of São Paulo, São Paulo, Brazil

Background: Different types of diets can cause significant changes in bowel habits. The objective of this research is to verify the influence of fiber and liquid consumption of vegetarians and omnivores on intestinal functioning. We included 35 vegetarians and 32 omnivores in this analysis, who participated in the diet and periodontal health study that looked at how much diet influences the accumulation of dental calculus, approved by the ethics and research committee of the School of Dentistry of the University of São Paulo. Methods: A three-day food record was used to calculate the caloric value and nutrients ingested from Brazilian food composition tables, as well as questions about the frequency and quantity of water and other liquids consumed. For the evaluation of the bowel habits of the individuals, the Bristol scale was used for consistency of stools and questions of multiple choice to identify symptoms related to intestinal habit. Chi-square and T-Student tests were performed by SPSS Software 20.0. Results: The majority of vegetarians (n=23, 71.9%) and omnivores (n=23, 65.7%) were female (p=0.587). Regarding the evacuation schedule, 13 omnivores (40.6%) reported irregularity and seven (20.6%) of vegetarians (p=0.133), three omnivores (9.4%) and two vegetarians (5.7%) reported onset of symptoms (pain and / or excessive exertion and / or bleeding and / or incomplete emptying) (p=0.658). Three vegetarians (8.6%) and one omnivore (3.1%) were classified as constipated (p = 0.266). In relation
to the practice of physical activity, the majority of individuals evaluated were active (n=32, 47.8%). There was no association between physical activity and constipation, with two cases of constipated vegetarians classified as active (66.7%), one as insufficiently active (33.3%) and the only constipated omnivore individual was very active (100%) (p = 0.266). Most of the individuals evaluated had normal body mass index (BMI) (n=37, 55.2%), three cases of constipation had BMI indicative of eutrophic (75%) and one case indicative of overweight (25%) (p = 0.712). The fiber intake was higher for vegetarians 20.9g/1,000Kcal compared to omnivores 15.7g/1,000 Kcal (p=0.007). The mean daily water consumption of vegetarians was 1,312.9 l and the omnivores 1,281.3 l (p=0.813), total liquid was 1,910.6 l for vegetarians and 1,919.1 l for omnivores (p=0.963). In the present study, there was no difference in the bowel habits of vegetarians and omnivores despite the higher consumption of fiber by vegetarians, which may be due to similarity in water consumption, physical activity practice and nutritional status of both groups.

[P103] Nuts increase EEG power spectral density for delta and gamma frequency, beneficial for brain health

Lee Berk1,2, Jessica Bradburn1, Kristin Bruhjell1, Nikita Vijayan1, Sayali More1

1Department of Research Affairs, School of Allied Health Professions, Loma Linda University, Loma Linda, California, 2Department of Pathology and Anatomy, School of Medicine, Loma Linda University, Loma Linda, California, 3Department of Physical Therapy, School of Allied Health Professions, Loma Linda University, Loma Linda, California

Background: Nuts are a major source of flavonoids. They are potent antioxidants with known mechanisms that provide cardioprotective, anticarcinogenic, and anti-inflammatory properties. Studies have shown that absorbed flavonoids penetrate and accumulate in brain hippocampal regions involved in learning and memory. Neurobiological correlates of flavonoids cascade an expression of neuroprotective and neuromodulatory proteins that promote neurogenesis, blood-flow improvement, and angiogenesis supporting brain wellness. However, the correlates of neuroelectric activities that are associated with nut flavonoid effects on neurocognition, neuronal synchronization, memory, recall, mood and behavior are not well known. Study aim: To provide evidence of a relationship between antioxidant concentration in nuts and electroencephalography (EEG) brain state frequency modulation, specifically gamma wave band frequency 31-40 Hz (γBA). Study methods: A study was conducted using walnuts, pecans, pistachios, peanuts, cashews and almonds. EEG power spectral density (PSD) V2 was acquired during a sequence of enhancing sensory awareness tasks ranging from cognition of past experience, visualization, olfaction, taste and finally consumption of nuts. EEG wave band activity was recorded from nine cerebral cortical scalp regions F3, Fz, F4, C3, Cz, C4, P3, Pz and P4 using the FDA approved EEG B-Alert 10X System, Carlsbad, CA. Second by second, nine bandwidths (BW) were recorded through the study. The PSD BW data were referenced to eyes closed baseline task, and then Z-scored. Results: Z-scores were graphed and analyzed for each task along with BW across 0-40 Hz. The overall respective BW were collapsed across all nine EEG channels. With descriptive analysis, the most profound observation was Gamma and Delta wave band frequencies which showed the highest PSD response during the TASK of placement of the nuts in mouth (p<0.01). The lowest PSD response for all nuts studied was alpha slow frequency. It was observed that both δBA and γBA were highest for pecans with an antioxidant concentration of 1,743 moles; followed by walnuts, with an antioxidant concentration of 2,772 moles; and for cashews, with an antioxidant concentration 48 moles. Conclusion: This study provides objective evidence that PSD for different brain EEG wave bands are modulated differentially by different types of nuts. We propose this protocol as an assessment tool to determine the efficacy of various types of nuts effecting modulation of EEG frequency bands 0-40 Hz & subsequent neurochemical modulation.
[P104] The magic vegetable in pediatric anemia treatment

Joshua Ngwang¹, Njimogu Samuel²

¹Cameroon Laboratory & Medicine Foundation Health Centre Community Practice, Cameroon, Central Africa ²Saint Louis University of Medicine and Health Sciences

Background: Limited resources, limited access to medicines, poverty and lack of insurance are enormous health care challenges in developing nations, especially African countries. Although most killer diseases in Africa have proven to benefit from good nutrition, CALMEF Practice’s Community cross-sectional study on secondary anemia and pumpkin leaves are rewarding. Study methods: From January 2012 - December 2016, three hundred anemic children were divided into three equal groups; all were diagnosed with secondary anemia (from malaria, malnutrition, etc.). The first group was treated solely with iron syrup plus underlying illness treatment, while the second group received boiled pumpkin leaves ± juice three times daily, and the third group, other vegetable varieties. Daily hemoglobin (Hb) tests were done. Inclusion criteria: Age range from 2-12 years old on the general pediatric ward. Exclusion criteria: Critically ill patients and anemia in other chronic health conditions like HIV, cancer, etc. Results: Even though their disease diagnosis varied, the focus of the study was on managing the anemia comorbidity. The Hb in the second group increased daily and most Hb were normalized in seven days, while the third was normalized in two weeks and the first, in more than two weeks. Conclusion: High poverty, lack of insurance and irregular/lack of medical supplies triggered this study. Even though all vegetables contain iron, we have yet to determine the ingredient(s) in pumpkin leaves triggering the exceptional outcome. The study outcome is being incorporated in an outreach community project on the benefits.

[P105] Plant-based menu for hospitalized patients at nutritional risk - a sensory feasibility study

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Background: Danish national recommendations for hospitalized patients at nutritional risk (NRS-2002) emphasizes animal-based protein and energy dense food. However, more patients are now asking for plant-based alternatives. This study aimed to investigate if plant-based alternatives could be accepted also amongst omnivorous patients and thereby to higher extend, be integrated in the regular hospital diet. Study methods: 112 hospitalized, omnivorous patients (61 male/51 female, average 60.8 years (range 18-94)) at the Departments of Infectious Medicine and Department for Heart and Lung Surgery at Aalborg University Hospital, in Denmark, gave informed consent to participate in a sensory acceptance study with plant-based alternatives to the traditional animal-based food. A total of 48 different recipes were tested. Patients were given six small portions (25 g) at a time and were asked to rank each according to taste (hedonic nine-point scale) and if they would like to eat again (five-point scale). In addition, they were asked if they would prefer if the hospital food, to a higher extent (but not solely), were based on plant-based ingredients. Results: 55 % of the patients would prefer (most likely/definitely) to have hospital foods that to a higher extent, were based on plant-based ingredients. 45 (94 %) samples had a median point six for taste acceptance and 27 (56%) had a median point seven. To eat again 31 (65 %) samples had a median point four. Highest ranking (average seven) was given for desserts, ice-cream, cakes, milky drinks, bread rolls, soup, vegan omelets and a fried fish filet. Lowest ranking for taste (median four) was given for two meat products, respectively meat loaf and meat paste. Conclusion: Plant-based alternatives to traditional animal-based hospital diet are widely accepted for taste amongst Danish, omnivorous hospitalized patients and could be incorporated as an alternative in the present hospital diet.
[P106] Vegetarian inpatients nutritional profile in a public tertiary hospital
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Background: In this new millennium, vegetarianism has become a more frequent food habit around the world, even in countries, like Brazil, which does not have this type of food culture. This increase in the vegetarian population has also been observed in the hospital environment. Currently, there is no existing record for profiling the causes and types of vegetarian inpatients. The aim of this study was to map out and describe the nutritional profile of these inpatients and to evaluate the necessity of implementing a vegetarian menu. Methods: A cross-sectional study was conducted from July, 2015 to July, 2016, at Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo Brazil (HCFMUSP). A survey sheet was used as the evaluation instrument to collect information from all vegetarian patients hospitalized during this period. Results: Twenty-five patients were included, corresponding to 80% ovo-lacto-vegetarians, 8% lacto-vegetarians, 8% vegan and 4% ovo-vegetarians. The mean age was 43 ± 16.8 years, 56% were female and mean BMI was 24.6 ± 5.5kg/m². The average length of hospital stay was 23 ± 24.5 days. One patient died. Ethics, health, family and flavor were the main reasons cited for adherence to vegetarianism. The causes of hospitalizations were trauma (32%), gastrointestinal tract surgeries (28%), cancer (8%), pregnancy (8%), other causes (24%). At the time of data collection, 36% of the patients received general diet, 20% soft, 20% specialized diets, 12% pureed, 4% mechanically altered, 8% full liquid. Conclusion: The present study identified a higher prevalence of eutrophic patients, ovo-lacto-vegetarians, who made this food option mainly due to ethics and/or health. The major causes of hospitalization were trauma and gastrointestinal tract surgery. These characteristics led to the adaptation of diets in their different consistencies and restrictions according to the needs of the patients. This emphasizes the importance of developing and implementing a vegetarian menu.

[P107] Vitamin D supplementation with lifestyle changes improves depression
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Background: Vitamin D levels could be low in vegetarians. The effect of vitamin D levels on patients in a depression recovery program was studied. Methods: The 10-day medical residential depression program consisted of lifestyle interventions by physicians, psychologists, chaplains, dietitians, exercise physiologists and more. The program focused on identifying the causes of depression. Blood tests and psychological tests were utilized, including the Depression and Anxiety Assessment Test (DAAT) which was administered before and after the program. The DAAT depression was classified according to DSM-5 into four categories; none (0-6), mild (7-10), moderate (11-19) or severe (20 or more). Vitamin D levels between 20ng/mL to 50ng/mL were considered normal and less than 12ng/mL indicated vitamin D deficiency. Those deficient received 50,000 IUs of vitamin D3 three times a week. Results: Deficiency was found in n=33 (8.9%) of the n=367 patients. DAAT baseline depression of those with normal vitamin D levels was mean 18.9, SD 5, median 20 and mode 21. Baseline for those deficient was mean 19.5, SD 6, median 22 and mode 22. The end DAAT scores for those with baseline normal vitamin D levels were mean 5.7, SD 4.7, median 5 and mode 0. T-test for DAAT before and after for the normal vitamin D group was t(306)=43.6, the change was significant with a p<0.001. End DAAT values for those with baseline deficiency were mean 5.6, SD 5.2, median 3 and mode 0. T-test of DAAT before and after of those with deficiency was t(32)=11.7, the change was significant with a p>0.001. Conclusions: The synergetic effect of vitamin D supplementation with lifestyle interventions seems to have a positive effect in lowering depression levels.
[P108] The vegetarian diet and the periodontal condition: A possible connection?
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Background: Obesity, cardiac diseases and other systemic diseases have been studied for a long time, as well as relating them to dietary habits or the type of foods eaten daily. However, studies that evaluate the impact of different classes of vegetarian diets and the oral health of their consumers are extremely rare and occasionally contradictory. Objective: Evaluating the connection between the types of diet (vegetarian, lacto-ovo-vegetarian, semi-vegetarian, omnivorous) and the oral health (bleeding gums). Method: 74 individuals from both genders and different ages were selected and classified according to their diet: lacto-ovo-vegetarian; strict vegetarians or vegans; lacto-vegetarians; semi-vegetarians (consuming white meat up to two times a week); flexi-vegetarians (consume meats in general only two times a week); and omnivorous. In this study, only the bleeding gums were analyzed as an indicator of periodontal health. For the normality analysis of the variables, the Kolmogorov–Smirnov was used and Spearman's rank correlation coefficient was used in order to analyze the connection between both groups. The level of statistical significance was p< 0.05. Results: 35.1% (n=26) of individuals are vegetarian, 14.9% (n=11) are vegan, 2.7% (n=2) are lacto-ovo vegetarian and 47.3% (n=35) are omnivorous. Their average age is 34.4 years old (± 9.6 years). The type of diet presented a positive correlation to the evaluated periodontal condition (r= 0.230, p= 0.049), with a higher incidence of bleeding gums being observed in the group of omnivorous. Conclusion: The omnivorous individuals evaluated here presented a higher level of bleeding gums when compared to other groups, suggesting an inverse connection between the consumption of red meat and the periodontal health in our sample. However, the age of the volunteers and the time of vegetarianism can be responsible for the differences found, making it necessary to develop further samples and analysis.

[P109] Waist-hip ratio as an effect modifier in the ACEs and depression relationship: Vegan vs non-vegan
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Background: The adverse childhood experiences (ACEs) scale measures exposure to abuse, neglect, domestic violence, as well as parental substance abuse, mental illness and/or incarceration. ACEs are a major risk factor for depression and are associated with an increase in pro-inflammatory markers. The relationship between ACEs and inflammation has been shown to be mediated by waist circumference and adiposity. Diet is one of the most modifiable risk factors for inflammation levels and body fat accumulation. The waist-hip ratio (WHR) is used to predict central obesity, stored inflammation and the risk of developing serious health conditions such as depression. In addition, there is increasing evidence to support a relationship between diet and depressive disorders. Dietary patterns characterized by lower intakes of red and processed meats are associated with lower levels of inflammation and a decreased risk for depression. The relationship may also vary by dietary pattern such that vegans and lacto-ovo vegetarians have a higher likelihood of having a better WHR and therefore less depressive symptoms. Methods: Participants of this study were 507 Seventh-day Adventists from a substudy of the Adventist Health Study-2. Participants were categorized into five dietary pattern groups based on levels of animal protein consumption: omnivorous, semi-vegetarian, pescatarian, lacto-ovo vegetarian, and vegan. Results: A hierarchical multiple regression analysis by subgroup was conducted to test the hypothesis that WHR moderates the relationship between ACEs and depression within dietary pattern. ACEs and WHR accounted for a significant amount of variance in depression for vegans, R²=.167,F(7, 146)=4.192, p<.001. The interaction between ACEs and WHR was
found to account for a significant proportion of the variance in depression for vegans, R2=.027, F(1, 146)=4.783, p<.05. Conclusion: These results indicate that WHR moderates the relationship between ACEs and depression, such that having a low WHR buffers the effect of ACEs on depression, but only for vegans.

[P110] Hematological parameters in people of different diet groups in UK Biobank
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Background: There may be differences in hematological parameters between meat-eaters and low and non-meat eaters, but data on this topic are scarce. Study methods: A complete blood count was carried out in all UK Biobank participants at recruitment. We examined hemoglobin, white blood cell counts and platelet counts, in regular meat-eaters (> three times/week of red and processed meat consumption, n=90,742), low meat-eaters (> three times/week of red and processed meat consumption, n=97,124), poultry-eaters (n=2,259), fish-eaters (n=5,701), vegetarians (n=3,870), and vegans (n=248), of white ethnicity participating in UK Biobank.

Results: In men, compared with regular meat-eaters, mean hemoglobin concentrations were lower in all low and non-meat eaters. In premenopausal and postmenopausal women, compared with regular meat-eaters, mean hemoglobin concentrations were lower in low meat-eaters, poultry-eaters, fish-eaters and vegetarians. In all participants, compared with regular meat-eaters, mean white blood cell counts, neutrophil counts and lymphocyte counts were lower in all other diet groups. In all participants, mean platelet counts were highest in vegetarians and lowest in vegans. Conclusions: Hemoglobin concentrations were higher in red meat-eaters than in the other diet groups. The lower white cell counts observed in low and non-meat eaters, and the differences in platelet counts across diet groups in UK Biobank, warrant further investigation and may be related to risk of disease.

[P111] Prevalence of two components of metabolic syndrome in children and adolescents in Latin America
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Background: Metabolic syndrome (MS) is characterized by the presence of certain components: abdominal obesity, dyslipidemias (alterations in triglycerides and HDL cholesterol), impaired glucose tolerance and arterial hypertension. It is diagnosed when three or more of these components are present. However, excess weight plays a central role. When a child develops MS it is highly likely that he will maintain this condition until his adult life, increasing his risk for developing cardiovascular disease. Study aim: To determine the prevalence of two components of MS in children and adolescents in Latin America and the Caribbean. Study methods: To assess the components of abdominal obesity and arterial hypertension, the criteria and cut-points used to diagnose MS proposed by the NCEP-ATP III were used and adapted for children and adolescents. The waist circumference and blood pressure of 4,306 Seventh-day Adventist children and adolescents from seven to 19 years of age, from Mexico (41%), South America (35%), the Caribbean (19%) and Central America (5%) were evaluated. Results: The prevalence of abdominal obesity was 6.1%. The prevalence of hypertension was 6.4% systolic and 13.7% diastolic while 0.6% of the participants showed abdominal obesity and arterial hypertension, two of the MS components. Conclusions: No indicator of dyslipidemia or impaired glucose tolerance was evaluated. However, the evaluation of two components reflects a very low prevalence of MS in the population studied. Although the prevalence of abdominal obesity is low, by using a BMI indicator adjusted for age and sex, a prevalence of overweight of 29% and 1.8% of obesity was
identified. This could represent a slight increase in the prevalence of MS if another definition is considered for its diagnosis, which includes BMI as a criterion to define obesity.

[P112] Pomegranate ellagic acid decreases seizure-like activity in bang-sensitive drosophila
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Background: Epilepsy affects over 65 million people worldwide. Approximately 80% of individuals with epilepsy live in low- and middle-income areas with decreased access to medication. Current anti-seizure medications are often inaccessible, can have debilitating side effects, or render ineffective in individuals with pharmaco-resistant epilepsy. Ellagic acid, a polyphenol present in fruits and nuts, has been shown to reduce epilepsy and anxiety in animal models, possibly though GABAergic pathways. Bang-sensitive drosophila experience seizure-like activity through mechanical stimulation and provide a high-throughput, cost-effective alternative to rodent and animal models. The aims of this study were to (a) explore the dietary effects of ellagic acid on seizure-like activity in fruit fly model of epilepsy and (b) explore the mechanism of action through the addition of two GABAa receptor antagonists, flumazenil and picrotoxin.

Study methods: Adult male flies from two bang-sensitive strains (bang-senseless [Bss] and easily-shocked [Eas]) were pre-treated with ellagic acid, flumazenil and/or picrotoxin. Following treatment, seizure-like activity was induced via mechanical stimuli. Seizure distance, seizure duration and time spent in paralysis was recorded using a digital video camera. Results: Seizure duration was not significantly different between strains. Flumazenil and picrotoxin significantly increased seizure-like activity. Ellagic acid reduced seizure-like activity and blocked the convulsant effect of flumazenil.

Conclusion: Drosophila models of epilepsy may serve as an effective drug-screening tool for epilepsy in humans. Dietary changes and plant-based compounds may be prophylactic against seizure severity.

[P113] Therapeutic meal planning for a robust gut microbiota in diabetes
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Background: Nutrition plays a prominent role in maintaining the health of the microbiota. The microbiota has a symbiotic relationship with the host by promoting immune homeostasis, healthy metabolism and preventing colonization of pathogenic bacteria. The microbiota can improve nutritional status by aiding in digestion, extracting nutrients and synthesizing vitamins and certain amino acids. Dybiosis has been implicated in numerous metabolic diseases, including type 2 diabetes. The incidence of type 2 diabetes continues to grow dramatically affecting over 30 million Americans. A Western eating pattern, high in fat and processed foods can impair gut barrier function allowing components of bacteria and other molecules to enter the host, contributing to a low-grade inflammatory state, also referred to as endotoxemia. It has been observed that serum lipopolysaccharide (LPS) from gram-negative cell walls is elevated in type 2 diabetes. Elevated cytokines, in response to elevated LPS levels, can inactivate insulin receptors, contributing to insulin resistance in type 2 diabetes and damage beta cells, reducing glucose mediated insulin responses. Dybiosis has also been implicated in altered fatty acid metabolism, leading to obesity and a reduction in gut peptides involved in satiety and glucose metabolism. Observational studies have revealed that individuals following a plant-based eating pattern have a healthier gut microbiota. Dietary interventions have resulted in significant improvements in diabetes outcomes while promoting a microbiota robust in genetic diversity and health promoting species, while keeping populations of pathogens in check. Methods: This presentation will review the literature comparing a healthy microbiota with dysbiosis in diabetes, as well as key observational and interventional studies on eating patterns to improve diabetes outcomes and
the composition of the gut microbiota. Results: Specific dietary guidelines on improving glucose metabolism, reducing inflammation and improving gut microbiota health will be presented.

[P201] The effect of vitamin B12 supplementation on the plasma homocysteine and vitamin B12 levels

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Aim: To investigate the effect of VitB12 supplementation on reducing homocysteine among vegetarians. Background: Vegetarian diets in many parts of the world tend to be low in vitamin B12, and this leads to an increase in plasma homocysteine (Hcy), a known risk factor for ischemic heart diseases and stroke. Vegetarians, especially vegans, need vitamin B12 supplementation. The duration and dosages of the supplementations on the effect of plasma homocysteine and B12 need further study. Study method: 65 vegetarians with Hcy more than 12 mole/L were selected and randomly assigned to the experimental group (N=33) and the control group (N=32). Each group was respectively given 500g vitamin B12 and placebo. While double blinding procedure vitamin B12 was given for 6 months, then the supplementation was stopped. Lab tests of CBC, biochemistry, folic acid, CRP, vitamin B12, Hcy level at month zero, three, six, nine, 12. Result: Plasma vitamin B12 increased significantly in the experimental group compared to the placebo group during the six months of supplementation (506.2 pg/mL vs 377.1 pg/mL) but returned to baseline after the supplementation was stopped. Hcy remained low in the experimental group even at 12 months (11.86 mol/L vs 18.66 mol/L). Conclusion: 500g vitamin B12 taken daily for six months can improve the Hcy level at least for 12 months in vegetarians with hyperhomocysteinemia.

[P202] Analysis of serum and 12h urinary phosphorus levels in adults with different dietary patterns

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Objective: To analyze the differences in mean serum phosphorus and 12h urinary phosphorus in adults with different dietary patterns. Background: Higher serum phosphorus levels are associated with increased cardiovascular and mortality risk. High protein foods are rich in phosphorus and the bioavailability of this mineral is higher in animal products. On the other hand, data regarding phosphorus consumption and its correlation with different dietary patterns are scarce in the Brazilian literature. Study methods: We reviewed the findings of 576 participants of the ADVENTO Study, of both sexes, aged between 35 and 74 years-old, among members of the Seventh-Day Adventist Church, that underwent medical history, anthropometric measurements and blood and urine collection. Using a structured diet questionnaire, subjects were divided into three groups: strict vegetarians, lacto-ovo vegetarians and non-vegetarians. Results: Of the 576 subjects, 17% were strict vegetarian, 54% ovo-lacto vegetarian and 29% non-vegetarian. Mean age was 54.1 ± 10.3 years, 60,9% were women and 54.0% were white. Mean body mass index (BMI) was normal for strict vegetarians (23.7 Kg/m2) and elevated for lacto-ovo vegetarians (25.3 Kg/m2) and non-vegetarians (27.9 Kg/m2), with higher prevalence of obesity in non-vegetarians (p<0.001). There was no difference in serum phosphorus levels between subjects from the different dietary patterns. Adjusting to age, gender and BMI, mean urinary phosphorus was significantly lower in strict and lacto-ovo vegetarians (B= -5.7 , p<0.01 e B= -8.0 , p<0.01) when compared to non-vegetarians. Conclusion: There was no difference in serum phosphorus levels in adults with different dietary patterns, most likely due to renal compensation, as evidenced by higher 12h urinary phosphorus levels in non-vegetarians when compared to strict vegetarians and lacto-ovo vegetarians.
[P203] Anthropometric and physiological characteristics in British vegetarians and non-vegetarians
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Background: Detailed description of anthropometric and physiological characteristics of people in different diet groups is lacking. We aimed to study this by performing cross-sectional analyses in a large cohort in the United Kingdom (UK). Methods: The UK Biobank recruited about 500,000 middle-aged participants throughout the UK in 2006-2010. Anthropometric indices (height, weight, waist and hip circumference, body composition) and other physiological characteristics (heel bone mineral density, grip strength, blood pressure, pulse rate) were measured following standardized protocols. We estimated the age-adjusted means of each characteristic in six diet groups (198,166 regular meat eaters, 199,784 low meat eaters, 4,381 poultry eaters, 9,674 fish eaters, 6,366 vegetarians, 378 vegans) in white women and men, and in two diet groups (3,322 meat eaters and 1,186 vegetarians) in British Indian women and men. Results: In white women, compared with regular meat eaters, the other diet groups had lower adiposity (e.g. 4.5% lower body fat in vegan women). Comparing the extreme diet groups, white vegan women had lower heel bone mineral density t-score (-0.26), grip strength (-0.8 kg) and systolic and diastolic blood pressure (-4.2 and -3.3 mmHg) compared with regular meat eaters (p-heterogeneity<0.0001 for all); patterns of differences by diet group were similar in white men. In British Indians, compared with meat eaters, vegetarian women were shorter (-1.1 cm), and both vegetarian women and men had lower grip strength (-1.3 and -1.4 kg, respectively); no significant differences in the other characteristics were observed. Conclusions: Differences in anthropometric and physiological characteristics were observed across diet groups in white women and men, but fewer differences were observed in British Indian women and men. The observed differences may be important as intermediate markers of long-term health in different diet groups.

[P204] The status of folate, vitamin B12 and homocysteine among vegetarian and non-vegetarian teenagers.
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Background: Folate, vitamin B12 (B12) and homocysteine (Hcy) play an important role in human development and in disease prevention and development. Data on the status of folate, B12 and Hcy among teenagers are very scarce, and for vegetarian teenagers, almost non-existent. Methods: Cross-sectional analysis of plasma folate, B12, and Hcy among 49 vegetarians and 639 non-vegetarians, 14-17 year-old participants. Analyses: The two-sample t-test (variances not assumed equal) was used to compare the groups on the raw scales for each variable. As there were outliers and skewness the two-sample t-test was also used on the log transformed data. Findings: Geometric means for folate, B12, and Hcy were 25.07 vs. 29.44; 265.61 vs. 361.03; and 8.18 vs. 7.85 for vegetarians and non-vegetarians, respectively. The mean (range) of folate, B12 and Hcy were 33.4 (9.57-101) vs. 27.7 (2.7-86), p = 0.033; 287.81 (134-702) vs. 392.22 (119-1300), p < 0.001; and 8.82 (3.1-28.7) vs. 8.19 (2.9-30.8), p = 0.33, in vegetarians and non-vegetarians, respectively. In comparison to non-vegetarians, vegetarians had a higher percentage of participants in lower serum B12 categories, 8.2% vs. 0.9%, p = 0.003, for <148pmol/L; 22.4% vs. 9.4%, p < 0.001, for B12 between 148 and 222pmol/L; and 36.7% vs. 22.5%, p < 0.001, for B12 between 222 and 300pmol/L. No statistically significant difference was detected for incidence of folate deficiency or elevated Hcy. Conclusions: Vegetarians had a statistically significantly higher mean folate and lower B12, compared to non-vegetarians. No statistically significant difference in mean Hcy concentration was detected. With the exception of Hcy, these findings are consistent with those reported in previous studies with adults. Foods fortified with B12 and/or B12 supplements should be used by vegetarian teenagers to improve their B12 status.
[P205] Self reported vitamin B12 intake and vitamin B12 deficiency among vegetarians  
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Objective: Explore the relationship between self-perceived intake of vitamin B12 and laboratory proven deficiency among vegetarian patients participating in a depression program. Methods: A 75-question questionnaire, in which patients reported if they were eating twice a day food supplemented with vitamin B12 or a daily vitamin B12 supplement. Possible answers were “yes”, “sometimes” or “no” to that daily intake. B12 levels were determined by a blood sample. B12 deficiency was defined as less than 220 pg/mL. Beck Depression Inventory II (BDI) was applied at baseline and at the end. The therapy consisted in lifestyle interventions such as nutrition, exercise, rest as well as hydrotherapy, psychological, spiritual and medical interventions. Results: From 368 patients, 191 self-reported vegan patients participating in the residential recovery program, 64% females, 80% Caucasian, 70% Seventh-day Adventist. From those 191 patients n=53 (27%) reported twice a day B12 intake or daily supplement, from that group 6% of the patients were lab proven deficient in vitamin B12, their baseline group BDI level was 7.3 (minimum) SD 7.8. N=83 (43%) reported that “sometimes” took daily vitamin B12, 8% of them were deficient, baseline BDI was 28.6 (moderate) SD 9.8. N=55 (28.7%) reported no regular daily intake of vitamin B12, from them 5% were deficient, baseline BDI was 28.6 (moderate) SD 11.2. All patients with deficiency were given 1,000 mcg of hydroxycobalamin form of vitamin B12 qd. Conclusions: Vegans consciously taking vitamin B12 supplements compared with those not taking it on a daily basis had similar deficiency rates. The depression level of the three groups was similar at baseline.

[P206] Factors associated with iron status in vegetarians and non-vegetarians  
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Background: The reduced bioavailability of iron from plant sources may contribute to reduced iron stores in vegetarians. Objective: To examine the association between vegetarian dietary pattern, heme and non-heme iron intake and suboptimal iron status in an adult-to-elderly healthy population. Study Design: Cross-sectional analysis of calibration substudy participants (n=721, mean age = 57 y) from the Adventist Health Study-2 (AHS-2) cohort. Baseline dietary intakes of heme and non-heme iron were derived from six 24-hour dietary recalls and vegetarian status assessed from a FFQ. Multiple linear regression analysis was used to assess the association between vegetarian status, heme and non-heme iron intake and serum ferritin and transferrin receptor (sTfR) concentrations. Results: Compared to non-vegetarians, serum ferritin concentrations were inversely associated with dietary pattern in vegans (β = -0.43; 95% CI: -0.67, -0.18), lacto-ovo vegetarians (β = -0.29; 95% CI: -0.46, -0.11), pesco-vegetarians (β = -0.30; 95% CI: -0.51, -0.10) and semi-vegetarians (β = -0.19; 95% CI: -0.52, -0.14). Overall, dietary heme iron was positively associated with serum ferritin concentration (β = 0.008; 95% CI: 0.004, 0.013). There were no differences among the dietary groups in the prevalence of low iron status assessed by ferritin or serum transferrin receptor (sTfR) using the cutoffs 15 g/L and 1.5 g/L respectively. Conclusions: Non-vegetarians had higher ferritin levels than vegans or other vegetarians and this was determined by heme iron. However, iron stores assessed as serum ferritin were not significantly different between the vegetarian and non-vegetarian groups.
[P207] Breast milk fatty acid profile of vegan, vegetarian and non-vegetarian lactating women
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Background: Fatty acid content of breast milk is dependent on maternal diet and plays an important role in infants brain and nervous system development and as an energy source.

Objectives: To compare fatty acids content in the breast milk of vegan, vegetarian and non-vegetarian women. Methods: Lactating women (N=74, age 18-46 years) were recruited through social media to complete a diet survey and provide one expressed milk sample. Women with known health conditions that affect nutritional status were excluded. Participants were classified into three dietary groups: vegan (n = 31), vegetarian (n = 18) and non-vegetarian (n = 25). Fatty acid content was assessed using gas chromatography. Findings: There was a statistically significant difference in the mean (standard deviation) saturated (vegans = 35.3% [7.2%]; vegetarians = 41.4% [6.5%]; non-vegetarians = 42.6% [6.3%]; p < 0.001); unsaturated (vegans = 64.2% [7.1%]; vegetarian = 58.4% [6.4%]; non-vegetarian = 56.9% [6.2%]; p < 0.001); and trans fatty acid content (vegans = 0.6% [0.4%]; vegetarian = 0.8% [0.4%]; non-vegetarian = 1.1% [0.5%]; p < 0.001) by diet group. The distribution of EPA (median, IQR) approached significance (vegans = 0.0%, 0.1%; vegetarians = 0.0%, 0.1%; non-vegetarians = 0.0%, 0.2%; p = 0.088) but not DHA (vegans = 0.1%, 0.1%; vegetarians = 0.2%, 0.1%; non-vegetarians = 0.2%, 0.2%; p = 0.728) fatty acids. There was no detectable EPA in 52.7% of participants and no detectable DHA in 14.9% of participants, though prevalence was not different by diet group (p = 0.182 and p = 0.180, respectively). Discussion: Breast milk of women adhering to different dietary patterns have different profiles of saturated, unsaturated and trans fatty acids, which is likely reflective of their different dietary intake. The significance of this finding in terms of infant growth and development is unclear.

[P208] Diet evaluation in the ADVENTO study: Development of a food frequency questionnaire.
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Background: The aim of this study was to develop a food frequency questionnaire (FFQ) to evaluate the diet of the ADVENTO Study Adventist participants. Methods: The preliminary version was built from a validated short version of the Elsa-Brasil Study FFQ, plus food items obtained from fifty 24-hour recalls (half week day and half weekend) of a subsample (n=50) of the ADVENTO Study participants. The final version was obtained by comparing the preliminary food list with the list obtained by three food records (two week day and one weekend) from 152 participants of the ADVENTO Study through one year, with four month intervals. Participants of these two distinct samples were stratified according to vegetarian diet pattern, sex, age and school level. Trained interviewers administered 24-hour recalls and food records using specific protocols. The frequencies of consumption of food items were determined. Food items with frequency of consumption of 10% were added to the ADVENTO-FFQ list. None of the Elsa-Brasil FFQ short version items (n=76) were removed, except for two Brazilian regional foods. Portion sizes were confirmed or adjusted according to most frequently cited by the study participants. Nineteen new food/preparations were included to the Elsa-Brasil FFQ short version. The final version of the ADVENTO FFQ had 93 items. Some existing items gained sub-items due to certain peculiarities of the Adventist eating habits, identified through the 24-hour recalls and food records. Average interview time was 35 minutes and the frequency choice options were:
more than three times/day, two to three times/day, one time/day, five to six times/week, two to four times/week, one time/week, one to three time/month and never or rarely. Results: We have developed the first Brazilian FFQ for dietary data collection that seeks to meet eating habits of the Adventist population with varied vegetarian dietary patterns. This instrument can be used in future similar studies, if it shows good reliability and validity.

[P209] Consumption of unprocessed or minimally processed foods, processed foods and ultra-processed foods among Brazilian Adventists

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Background: Evidence has shown that dietary displacement of freshly prepared unprocessed and minimally processed foods by ultra-processed products is associated with chronic diseases. Adventists have a wide variety of eating habits ranging from strictly vegetarian to non-vegetarian diets. Study aim: The aim of this study was to evaluate differences in the consumption of foods classified by the NOVA system, based on the nature, extent and purpose of food processing, among Adventists. Study method: A cross-sectional study was performed using data from a sub-sample of 149 participants of the ADVENTO study. Three food records (two week day and one weekend) were collected during one year, with four month intervals. Consumption was evaluated in frequency/day of the following food groups: unprocessed and minimally processed foods, processed foods and ultra-processed foods. Individuals were classified as vegetarians (if they followed criteria established for either vegan, lacto-ovo vegetarian, pesco-vegetarian or semi-vegetarian dietary patterns) or non-vegetarians. The sample was composed of 64.4% (n=97) vegetarians, 52.3% (n=79) female, and 54.4% (n=82) participants with college or higher education level. The average age was 53.9 ±11 years. Results: Vegetarians showed higher daily consumption of unprocessed and minimally processed foods and lower consumption of processed and ultra-processed foods than non-vegetarians. These differences remained when daily frequency was adjusted by gender, age and education. Bananas, tomatoes, beans, lettuce and brown rice were the most consumed unprocessed/minimally processed foods among vegetarians, while whole wheat bread was the most consumed ultra-processed food in both groups. Adventists eat a variety of processed foods, natural fruit juice with sugar being the most consumed among non-vegetarians. Conclusion: These results show that Brazilian Adventists tend to choose high quality processed and ultra-processed foods and are also prone to acquire healthier eating habits when adopting vegetarian patterns.

[P210] Survey of dietary patterns in Loma Linda

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Background: Dan Buettner’s book ‘The Blue Zones’ mentions the city of Loma Linda as one of the five blue zones in the world where people have high longevity. Seventh-day Adventism (SDA) is the major faith group in this city that promotes vegetarianism. Vegetarian diets are associated with lower BMI values, lower prevalence of hypertension, lower prevalence of the metabolic syndrome, lower prevalence of diabetes mellitus and lower all-cause mortality. The objective of this study is to observe whether the younger populations of SDAs living in and around Loma Linda are following the traditional vegetarian dietary patterns versus the older population. Study methods: A convenience sampling method was used to recruit participants. They were given an anonymous one-page survey. We looked at four dietary patterns viz vegan, lacto-ovo vegetarian, pesco-vegetarian and non-vegetarian. A one-way analysis of variance (ANOVA) was calculated on participants’ age per diet type. We looked specifically at the SDA population. Results: The average age was lower among non-vegetarian participants, with statistically significant difference between group means as determined by one-way ANOVA (F (3,139) =3.96, p< 0.0096). As for
the Tukey’s post hoc test, group diet vegan (mean age = 64.933 (58.137; 71.730) and group diet lacto-ovo (mean age = 63.9 (58.014; 69.786) were confirmed to be different from non-vegetarian diet group (mean age = 52.558 (47.395; 57.720). Conclusion: Younger population of SDA in and around Loma Linda tend to follow non-vegetarian dietary pattern as compared to older generation, which could be due to the influence of fast food culture. It could also be due to passing down of traditions without understanding the meanings.

[P211] Assessment of vitamin B12 milk concentration among vegan, vegetarian and non-vegetarian lactating women

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Background: Vitamin B12 (B12), which plays a profound role in infant development, is considered a nutrient of concern for vegetarians, especially vegans. Inadequate intake may lead to developmental, neurological and hematological complications. Objectives: To compare B12 milk concentration among vegan, vegetarian and non-vegetarian lactating women. Methods: Lactating women (N = 74, age 18-46 years) were recruited through social media to complete a diet survey and provide one expressed milk sample. Women with known health conditions that affect B12 status were excluded. Participants were classified into three dietary groups: vegan, vegetarian and non-vegetarian. B12 was measured using a competitive chemiluminescent enzyme immunoassay. Findings: There was no observed difference in the median (quartile 1, quartile 3) B12 milk concentrations by diet group (p = 0.717): vegan (n = 31) 551.9 pmol/L (375.1, 758.6); non-vegetarians (n = 25) 476.1 pmol/L (363.9, 777.3); and vegetarians (n = 18) 402.2 pmol/L (326.4, 791.3). There was no observed difference in the prevalence of low-B12 levels, defined as < 362 pmol/L, between groups (vegan (22.6%), non-vegetarians (24.0%) and vegetarians (33.3%) (p = 0.705). Almost half of vegan women (48.4%) used individual B12 supplements, compared to 16.7% among vegetarian, and 4.0% among non-vegetarian participants (P < 0.001). Use of a B12 supplement was not significantly associated with B12 milk concentration (p = 0.391) even when limiting the analysis to vegans and vegetarians (p = 0.456). Prevalence of use of any vitamin supplement (B12, B-complex, multivitamin, prenatal vitamin) was significantly different by group (vegan 93.6%, vegetarian 55.6%, non-vegetarian 64.0%, p = 0.005). Discussion: Inadequate B12 milk concentration (< 362 pmol/L) appears to be a problem among a significant proportion of breastfeeding women (26%), though, surprisingly, no difference was detected by dietary preference or B12 supplement use. This finding is contrary to previous reports. It is unclear what factors may explain this finding, which warrants further investigation.

[P212] Relation between vitamin D and B12 according to dietary profile in adults in a Brazilian cohort

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Background: Unbalanced vegetarian diets may pose a risk of possible deficiencies in nutrients that are poorly represented in plant foods or with low bioavailability (e.g. vitamin D, iron, zinc, n-3 polyunsaturated fatty acids). However, only cobalamin (vitamin B12) appears to be virtually absent in vegetables and its lack can have serious implications. Vitamin D deficiency and insufficiency is a global health problem afflicting over one billion children and adults worldwide. Although vitamin D is rare as a source in vegetarian diets, it does not appear that lacto-ovo vegetarian or strict vegetarians are more likely to be deficient than omnivores. Thus, we found it
important to verify the suitability of the presence of 25-OH vitamin D and vitamin B12 among the strict vegetarian, ovo-lacto vegetarian, and non-vegetarian diet groups in a group of Brazilian Adventists. **Methods:** We studied 1,222 individuals of both sexes, aged 35-74 years, living in the state of São Paulo, from the ADVENTO Study (analysis of diet and lifestyle for cardiovascular event prevention in Seventh-day Adventists) in São Paulo, Brazil, divided into three groups: 434 omnivores (OMN), 580 lacto-ovo vegetarians (LOV) and 208 strict vegetarians (VEG). Vitamin D and B12 were determined by competitive immunoassay using direct chemiluminescence performed on the automated Advia Centaur® XP equipment from Siemens®. Continuous variables were expressed as means (SD) or medians (interquartile ranges, IQR) and compared using analysis of variance (ANOVA), the Mann-Whitney U test or the Kruskal-Wallis test, as deemed appropriate after assessing normality assumptions. The analyses were done using SPSS 23.0 software (IBM, Chicago, Ill., USA). *p* < 0.05 was regarded as significant, and all tests were two sided. **Results:** The profile for vitamin D in the VEG and LOV groups were significant better than the OMN group: (27.37 ± 11.9 and 27.76 ± 10.1 vs 25.42 ± 7.29), *p*<0.001. For vitamin B12, OMN group had higher levels than VEG and LOV groups (345.98 ±169.91 vs 261.67 ±199.77 and 277.93 ± 153.61), *p*<0.001. All groups had mean vitamin levels above the cutoff point established for the method (Normal: > 20 ng/mL for vitamin D). **Conclusion:** In the present study, the strict vegetarian and lacto-ovo vegetarian groups presented a better vitamin D status than the non-vegetarian group analyzed. Strict vegetarians and lacto-ovo vegetarian groups presented a lower vitamin B12 medium status, but above the clinical threshold for this study.

**[P213] Amino acid intake profile of vegetarian and non-vegetarian diets**  
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**Background:** The amino acid composition of plant proteins differs from that of animals proteins. Whether the amino acid patterns of the overall diet consumed by customary vegetarians diverges from that of non-vegetarians has not been ascertained. **Objective:** To determine differences in the amino acid intake of vegetarians compared to non-vegetarians of an adult-to-elderly healthy population. **Study Design:** Cross-sectional analysis of calibration sub-study participants from the Adventist Health Study-2 (AHS-2) cohort. Dietary intakes of amino acids were derived from six 24-hour dietary recalls and vegetarian status assessed from a FFQ. **Results:** Table compares daily intakes of selected amino acids according to vegetarian dietary pattern. **Conclusion:** As plant protein as % of energy increased, the amount (% protein) of leucine, methionine and lysine decreased whereas that of glutamate and arginine increased. These differences may contribute to risk of chronic disease.

**[P214] Association between vegetarian and non-vegetarian dietary patterns and inflammatory biomarkers**  
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**Background:** Dietary approaches have a definitive impact in immune function and its components are known to play an important factor on inflammatory process. Vegetarian diets have been associated with low-grade chronic inflammation compared with non-vegetarian diets. The benefits of plant-based diets are mainly related to reduced levels of inflammatory markers. **Study aim:** To evaluate the association between vegetarian dietary patterns on inflammatory biomarkers when compared with non-vegetarians. **Methods:** This cross-sectional study included 1,404 individuals from both sexes stratified into groups of dietary patterns (strict vegetarians, ovo-lacto-vegetarians, and omnivores) from the ADVENTO Study (analysis of diet and lifestyle for cardiovascular...
event prevention in Seventh-day Adventists). Biochemical and circulating inflammatory markers were compared by ANOVA or Kruskal-Wallis. Results: The preliminary results (table 1) demonstrated that fasting plasma glucose and insulin was lowest in vegans (94.95 mg/dL ± 19.69) and (7.8 mU/L ± 4.45) respectively and highest among non-vegetarians (104.02 mg/dL ± 36.09) and (12.51 mU/L ± 7.61) (P<0.001) respectively. Total white cells count was lowest among vegans (5226/mm³ ± 1541) and highest in non-vegetarians (6165/mm³ ± 1606) (P<0.001). CRP Plasma hs-CRP was lowest among lacto-ovo vegetarians (1.75 ± 2.39) and highest in non-vegetarians (2.59 ± 3.71) (P<0.001). Among diet patterns, there was no difference in lymphocytes and monocytes cells. Conclusion: In the present study, between the diet patterns, vegetarians presented better blood glucose profile and lower levels of inflammatory biomarkers compared with non-vegetarians.

[P301] A community-based lifestyle education program addressing chronic diseases in the South Pacific
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Background: Chronic diseases have reached epidemic proportions in Pacific Island countries. Unhealthy lifestyle is one of the major risk factors and lifestyle interventions have been shown to be efficacious for primary, secondary and early tertiary prevention. One such intervention is the Complete Health Improvement Program (CHIP). However, there is a paucity of evidence regarding effective community-based lifestyle interventions in the Pacific Islands. This pilot study examined the effectiveness of a contextualized version of the evidence-based CHIP intervention in Fiji, utilizing the REFLECT delivery approach, which is widely used in low-literacy communities.

Methods: A 30-day cluster randomized controlled trial of 48 adults with elevated risk for NCD, in two rural villages of Fiji, who reside permanently in their village and are able to prepare their own meals. Intervention participants (n=24) from one village met three times a week to receive the modified CHIP program. Participants from the control village (n=24) received country specific Ministry of Health literature only. Outcome assessments at baseline, 30 and 90 days included body mass index, waist circumference, blood lipids, blood pressure and blood glucose, determined by analysis of variance, significant at p<0.05.

Results: In the intervention group, significant reductions were recorded at 30 days and 90 days respectively, for the participants' body mass (2%, p=0.001; 3%, p=0.001), systolic blood pressure (11%, p<0.001; 14.5%, p<0.001), diastolic blood pressure (8%, p=0.012; 14.4% p<0.001), T-cholesterol (5%, p=0.051; 9%, p=0.011), LDL-cholesterol (12%, p=0.003; 12%, p=0.034) and HDL-cholesterol (14%, p=0.004; 19%, p<0.001). Conversely, triglycerides increased (35%, p=0.005) at 30 days only. For the control group, the only decreases were for DBP (7%, p=0.042) and T-cholesterol (8%, p=0.048) at 30 days.

Conclusions: This is the first lifestyle intervention using the REFLECT approach to target NCDs in Fiji. The results of this pilot study indicate the feasibility of enrolling at-risk participants across Pacific Island settings and sets the stage to guide broader delivery of a lifestyle intervention to reduce the burden of chronic disease and improve health and wellbeing across the South Pacific.

[P302] Dietary inflammatory index scores in a walnut supplemented diet are lower than a control diet
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Background: The dietary inflammatory Index (DII) is a validated literature-based tool used to determine the dietary inflammatory potential of a diet. While predominately used in
observational studies, there is limited evidence of DII application in randomized-control trials in
an elderly population. **Study aim:** To assess whether there is a difference in DII score among free-
living elderly individuals that add walnuts to their daily diet compared to a usual diet abstaining
from walnuts over two years, and to determine significant contributors to differences in DII score.
**Study method:** The Walnuts and Healthy Aging (WAHA) Study is a randomized clinical trial
assessing the daily ingestion of walnuts on age-related health outcomes among 365 free-living
healthy elderly subjects (247 women, 199 men), ages 63-79 years from one center at Loma Linda
University. The walnut group (n = 120) consumed their habitual diet (HD) + 30-60 grams of
walnuts (representing 15% of their energy intake). The control group (n = 137) consumed their
habitual diet without any walnuts. Over the 2 years, each subject provided 5-unannounced dietary
recalls via telephone interviews. DII scores were calculated based on food and nutrient values
from the dietary recalls. **Results:** The mean DII score for the walnut group (DII=0.16) was
significantly lower than the control group (DII = 0.53) (p = .0037) after controlling for gender,
education, physical activity and BMI. Of these, only gender (p= 0.0006) and education (p=0.002)
were significant. **Conclusions:** In application of the DII, a lower DII score equates to a more
anti-inflammatory diet. In this elderly population, the significantly lower DII score in the walnut-
consuming group compared to the walnut abstaining group demonstrate the anti-inflammatory
properties of walnuts. Gender may be important to control for in future studies applying the DII
in a dietary intervention.

**[P303] Design, development and evaluation of the Vegetarian Lifestyle Index**
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Linda University, School of Public Health, Loma Linda, California
**Background:** Previous design and development of quality indices have been directed at examining
single nutrients, foods and combination of foods based primarily on dietary recommendations.
No epidemiologic studies have attempted to conceptualize a global index based on vegetarian
food pyramid guidelines as a systematic approach to evaluating overall diet and lifestyle quality.
**Objective:** Our objective is to develop and evaluate the Vegetarian Lifestyle Index (VLI) on
vegetarian and non-vegetarian Adventists, a population with unique and wide range of dietary
patterns. **Method:** The score is based on the operationalization of 14 dietary and lifestyle
components recommended by vegetarian food pyramid, using data from Adventist Health
Study-2 (AHS-2) comprehensive questionnaires. All components were equally weighted. Higher
scores reflect greater adherence. **Results:** Among an analytic sample of 90,057 participants,
47.7% were non-vegetarians, 5.6% were semi-vegetarians, 10.1% were pesco-vegetarians, 29.0%
were lacto-ovo vegetarians and 7.7% were vegans. The mean score for our population was 7.43
(SD=1.75) ranging from 1 to 12.5. When adjusted for non-modifiable, lifestyles and socio-
economic factors, non-vegetarians (6.13; 95% CI, 6.06-6.21) had significantly lower mean
compared to the vegetarian groups including semi-vegetarians (7.31; 95% CI, 7.22-7.40), pesco-
vegetarians (7.41; 95% CI, 7.32-7.49), lacto-ovo vegetarians (8.16; 95% CI, 8.06-8.24), vegan (8.87;
95% CI, 8.78-8.96). Vegetarians had a greater adherence to the LLU vegetarian food pyramid,
and scored on average 1.18 to 2.73 points higher than non-vegetarians. **Conclusion:** The results of
our study demonstrate that the VLI has strong discriminant ability across distinct categories of
dietary pattern.

**[P304] Lifestyle educational intervention increases intake of folate rich plant-based
foods and improves depression**
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**Background:** Folate is essential for mental health. Many patients with depression are reported
to have low folate levels. Folate supplements can supply the required amount we report on how
a community-based education program can improve plant-based folate intake. **Methods:** A community educational program was organized by certified facilitators which ran the program once a week for eight weeks. The first hour, a DVD is watched followed by a facilitated small group discussion about improving various lifestyle factors including nutrition, exercise, rest, control of thoughts, cooking classes among others. The Depression and Anxiety Assessments Test (DAAT) was used at baseline and at the end of the eight weeks. It assesses depression, demographics and folate intake, among other questions. Good folate intake was defined as two servings of folate rich foods at least three times a week. **Results:** A total of 5,221 participants (30% males) finished the program from 2007 to 2015 in 4 continents. At baseline, 40% (n=2,119) reported poor folate intake and 11.6% (n=592) occasional folate intake. Regarding depression, at baseline the poor folate intake group had an average DAAT score of 14 (moderate) SD 7.3, compared to the good folate intake group score of 11 (moderate) SD 7.4. By the end of the eight weeks those with poor folate intake had a score of eight (mild) SD 6.4, while those with good folate intake had a score of six (none) SD 5.5. By the end of the eight weeks 40% (n=851) of those with poor folate intake at baseline had increased to good intake while 10% (n=218) increased to occasional intake. **Conclusions:** Low folate intake was associated with worse depression, even at baseline. Increasing plant-based folate intake appears to help depression, 50% of the participants with low folate increased their intake without supplements.

**[P305] Vegan Food Management “The first vegan Bachelor of Arts (BA) program worldwide”**
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**Background:** Vegan diets are becoming more and more popular in Germany. This is reflected not only by a growing number of vegans but also by an increasing market share of vegan food products. Sales of meat alternatives and vegan spreads show annual growth rates of about 20-30% in the last few years; the same applies for plant-based dairy alternatives. However, this rising importance of the vegan food market is not accompanied by an in-depth knowledge of the relevant market players, e.g. in retail trade. Questions concerning health aspects of plant-based diets, the quality of meat alternatives or the motives of the consumers buying these products often remain unanswered. **Description and purpose of the BA program vegan food management:** In consideration of this development the world’s first vegan BA program was established in October 2016 by the Fachhochschule des Mittelstands (FHM) (University of Applied Sciences) Bielefeld, supported by the Erna Graff Foundation for Animal Protection. Of the eight university campuses the program started at Cologne and Bamberg. In 2018, the program will be offered at two more campuses in Berlin and Bielefeld. The degree program combines business administration and other economic competences with expertise in diet, nutritional medicine, consumer behavior, sustainability, corporate social responsibility, food and consumer law, vegan food and product management and animal ethics. Possible careers of vegan food managers include management positions in the food industry, retail trade, catering, tourism and NGOs like animal rights organizations and foundations. **Conclusion:** The BA program on vegan food management is the first academic program on veganism worldwide is a promising way of training experts for a growing market of healthy vegan food products. These experts will contribute to a further shift of non-sustainable western diets towards sustainable plant-based diets.

**[P306] The Giessen vegan food pyramid (Germany)**
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**Background:** Vegan diets are becoming more and more popular in Germany. Although there is a growing number of vegans, there are no science-based guidelines of food intake for vegans
in Germany. Therefore, we developed the Giessen vegan food pyramid for consumers and nutrition counselors. **Study methods:** The Giessen vegan food pyramid has been derived from the calculated nutrient intakes of a 14-day wholesome vegan diet (2,050 kcal/d). The aim was to ensure a sufficient intake of the critical nutrients in vegan diets (e.g. protein, cobalamin, calcium, iron, zinc, riboflavin, long-chain n-3 polyunsaturated fatty acids [LCPUFA] and iodine). Food was combined in food groups and the daily intake recommendations for each food group were derived from the mean food intakes. **Results:** Based on a 14-day wholesome vegan diet the reference intakes for almost all nutrients were reached or exceeded, except for vitamin D and cobalamin (as expected). In addition to a broad variety of plant foods (vegetables, fruits, whole grain and potatoes, legumes, nuts and seeds and plant oils), daily consumption of nori algae (Ulva sp.) is recommended to meet the reference intake of iodine. Also, mineral waters rich in calcium (>400 mg Ca/L) and fortified milk alternatives based on soy, cereals or nuts (e.g. soy milk) are helpful to meet the reference intake for calcium. The Giessen vegan food pyramid includes DHA-fortified oils, cobalamin supplementation and the recommendation of exposure to sunlight to ensure vitamin D synthesis. **Conclusion:** The Giessen vegan food pyramid is the first science-based vegan pyramid in German speaking countries. It shows that a wholesome vegan diet can meet the German reference nutrient intakes, at least theoretically. The next step is to test and evaluate the practicability of the Giessen Vegan food pyramid.

**[P307] Plant-based dietary intervention using a skills-based health education methodology**

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**Background:** Puente de Picos is a rural community located in the northwestern region of Mexico, where marginalization and vulnerability compromise the health status of its inhabitants, especially children and adolescents in whom there is an elevated nutritional risk. A proposed intervention includes an effective strategy to overcome these conditions by designing a skills-based health education intervention for improving the nutritional status and overall health in this community. **Study methods:** A qualitative, skills-based health education, methodology was used. The situation analysis, measuring the health and vulnerability risk of the child and adolescent populations, was implemented through participant observation and consent from the community was considered for the plant-based nutritional intervention. Social participation, as well as community values (human rights), are part of the learning methods (teaching and learning methods) selected for the increase and improvement of knowledge, attitudes, communication and interpersonal skills of decision making and critical thinking; as well as coping and self-management for the consumption of plant-based foods. **Results:** The initiative had a duration of six months and included sessions for the development of skills in the knowledge of local edible plants, development of a community garden, harvest and preparation of the food for self-consumption. **Conclusion:** The development of a skills-based health education, through specific methodologies during the formative years of life, contributes to the formation of conduct and behaviour that tend to persist until adulthood with positive health outcomes.
[P308] Validation of a questionnaire to evaluate eating patterns of children in Latin America
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Background: Eating patterns are associated with health status. These involve the consumption of food, but also eating behaviors. Study aim: To validate a questionnaire to evaluate the eating patterns of children and adolescents in Latin America and the Caribbean. Methods: A four-level Likert scale was used to qualitatively assess the weekly frequency of consumption of 17 food groups and seven eating behaviors. Five factors were determined; two related to a healthy eating pattern, and three with an unhealthy pattern. The scale was administered to 4,688 Seventh-day Adventist children and adolescents from seven to 19 years of age, from Mexico (40%), South America (34%), the Caribbean (21%) and Central America (5%). Results: The exploratory factor analysis resulted in an acceptable sample adjustment (KMO = .854) and a significant Bartlett’sphericity. Both the criterion of own value and the drop contrast, identify five factors (Table 1), which after being rotated orthogonally explain 44.15% of the total variance. All items report a factorial load greater than .3. The general scale shows a reliability of .681 according to Cronbach’s alpha. The stability of the factorial structure is acceptable, showing little exchange of items among the factors of unhealthy eating. The grouping of some items is discussed, mainly the behavior of ingesting pure water, since it was located as unhealthy behavior, but with a negative load. Conclusions: It is considered that the instrument shows coherence with the theory and its indicators of validity and reliability are acceptable, although more research is required. It is a useful, self-administered, low-cost and quick tool to evaluate, in a general way, the eating patterns of children and adolescents.

[P309] The impact of a 12-week nutrition intervention on health and wellness in the workplace
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Purpose: Community Chronic Disease Prevention (CCDP) intervention focused on adopting a micro-nutrient dense, plant-rich (mNDPR) diet style, to assess the effects on overall cardiometabolic risk and wellness for the participants. The participants were recruited from adult employees or spouses from two employer groups. This intervention resulted in convincing improvements in several measures of cardiometabolic risk reduction and wellness measures.

Background: The average person devotes over 90,000 hours in a lifetime to their employment. The workplace can, therefore, be an effective environment in which to incorporate healthy interventions to achieve and maintain a healthy lifestyle. Methods: This study focused on how cardiometabolic risk factors and wellness measures of participants were affected by 12 weeks of nutrition education, which included six hours of introductory education and one-hour weekly meetings. The educational sessions informed participants how to implement an mNDPR diet style. Pre- and post-intervention biometric screening tests and anthropometric measurements were completed. Wellness factors were measured by the following assessment tools: Quality of Life Index (QLI), Patient Health Questionnaire-9 (PHQ-9), Pittsburgh Sleep Quality Index (PSQI), and Work Productivity and Activity Impairment (WPAI). Summary of Results: Post-intervention assessment of participants resulted in significant improvements in several measurements. Average reductions were as follows: weight, 12.27 lbs; waist, 2.64”; hip, 1.50”; blood pressure, 6.79 mm Hg (systolic) and 9.81 mm Hg (diastolic); total cholesterol, 18.10 mg/
dl (8.61% reduction); LDL, 12.81 mg/dl (10.11% reduction); GERD scores, 2.63 points (70.8% reduction); PSQI (5.4%); QLI (17.7%); WPAI (38.5%); PHQ-9 (58%). Conclusion: Participants reduced their cardiometabolic risk factor and improved their overall well-being by adhering to the mNDPR diet style. Widespread workplace implementation of an mNDPR diet style should be considered for increasing work productivity and the overall wellness of employees.

[P310] The role of superfoods in academic performance - A preliminary study in elementary students
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Background: A balanced diet with the right type of nutrients is absolutely essential for the development of the brain and its normal cognitive function, as well influencing behavior. This is even more important in school-aged children. To date, there are very few studies on the extent to which certain superfoods affect the academic performance. Study aim: The aim of this study was to confirm not only the benefits of superfoods in academic performance but also to contribute towards healthy food choices of both students and their parents. Methods: Attention/concentration was evaluated through a simple test given individually to students (age 7-9) over a period of 10 days. The academic performance translated in the time for completing the task was evaluated daily in order to compare the effect of a single-dose morning snack of different types of superfoods (including nuts, seeds and berries) categories which potentially could be used to replace their usual unhealthy choices. Results: The increase in the speed of completing a new task was observed in all the groups. A significant increase of 2.16 min was observed particularly for walnuts, compared with the group which didn't receive any superfoods which was only 0.43 min. Conclusion: Although the evaluation was done in only a small number of elementary school students, these preliminary results encourage us to extend the study to a larger number of students, including teens. Aside from the confirmation of the important role superfoods supplementation has on academic performance, this study proved to be an excellent educational tool towards healthy lifestyle and nutrition.

[P401] Comparing plant-based education agendas with student outcomes at four Adventist universities
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Background: Nutrition education and related health information are crucial to the agenda setting and formulation of food-related policies at the institutional, community and systems levels. Academic institutions with campus-wide policies, such as plant-based only food service items, typically also provide various curricula courses and activities to support the dietary lifestyle and health agenda of the campus organization. These enabling plant-based environments and objectives are not always fully effective however, unless the vegetarianism-related knowledge, attitudes and behaviors of matriculating students, are sufficiently inclined. Methods: This study used a simple, non-invasive, non-offensive 14-item survey to determine whether diet-related knowledge, attitudes and behaviors of consenting students (> 18 years) attending two Caribbean and two American Seventh-day Adventist universities, mirror the institutions' plant-based nutrition education agenda. Probability proportional sampling was used based on the student population of each university at the time of the study. Statistical methods included descriptive analyses, cross-tabulations and chi square Cramer tests. Results: Of the 384 student sample, almost 50% believed vegetarian nutrient intake is adequate; yet 77% reported non-vegetarian lifestyles. The majority indicated meat-based or dairy-based diets contained the most saturated fat and cholesterol; and 74% identified legumes as the healthiest vegetarian protein source. Yet most students ate little or no beans; while real eggs and cheese were more frequently used.
Additionally, students from the southern American university reported use of the most milk substitutes; while dairy milk was used more by southern Caribbean university students. Northern American university students reported the most dairy versus imitation cheese; while northwest Caribbean university students reported more real egg use versus substitutes than the other campuses. Overall, the Caribbean university students reported greater fish consumption and more non-vegetarians than the American universities. **Conclusions:** Students' knowledge, attitudes and beliefs were generally consistent with the health philosophies of Adventist institutions, but reported diet behaviors were not.

**[P402] Vegetarianism in Costa Rica: A new food experience**

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**Background:** Nowadays, in Costa Rica there are more food options available for vegetarians such as restaurants, processed products, organic foods, mindful eating programs and sustainable and ecological eating. As a result, more people are seeking nutritional counseling to switch to vegetarian diets. The objective is to present the results of an intervention designed specifically for vegetarians in Costa Rica to improve their eating habits and overall health. **Methods:** The Nutritional Education and Care University Program at the School of Nutrition of the University of Costa Rica, is an academic space that proposes and executes various educational methodologies and nutritional counseling on priority issues for the country and the region. The nutritional and educational intervention designed for vegetarians is developed within the University Program over a period of seven weeks, with two-hourly sessions each week. The sessions include menu planning and portion sizes, quality and best food sources of proteins and carbohydrates, key nutrients and how to fulfill nutritional requirements, selection of vegetarian food options and a cooking workshop. At the workshop they learn skills for food selection and preparation, nutrient content as well as new and varied forms of cooking the variety of foods found in this tropical country. **Conclusion:** Even though traditional Costa Rican cuisine has vegetarian selections, vegetarians precise nutrition assessment according to their specific eating habits, not only as an omission or substitution of animal products, but as an educational process to learn how to obtain the nutrients they need from the vast diversity of plant foods available in Costa Rica. The value of the interventions addressed specifically to them, is shown through the improvement of the nutrition status and their claim.

**[P403] Influence of a vegetarian emphasis on enrollment of Loma Linda University graduate nutrition students**

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**Background:** Although vegetarian diets have only become more socially acceptable and scientifically recognized in recent decades, Loma Linda University (LLU), a Seventh-day Adventist health sciences institution has espoused vegetarian diet patterns for over a century. The university's graduate nutrition program's curricula emphasize in vegetarian nutrition and require a course in vegetarian nutrition that discusses contemporary issues and controversies related to vegetarian diets. The purpose of this report is to assess the influence of the vegetarian emphasis on recent LLU graduate nutrition students' decision to enroll. **Methods:** From 2009 to 2017, data was collected from 326 LLU students in eight different course sections, one section each year. Students in the course were asked to anonymously self-report on the first and last days of class, respectively, if their decision to come to LLU was "because of", "indifferent to" or "despite" the vegetarian emphasis of the nutrition program at LLU. **Results:** Of the 299 LLU nutrition students that responded (91.7% of students enrolled), more reported "indifferent" (46%) attitudes to the vegetarian emphasis of the program compared with "because" (30%) or "despite" (24%). While the proportion of indifferent response increased over time, the despite attitude tended to decrease during the period studied. Eighty-three percent of students maintained their
response after completion of the course, and of those whose responses changed, no considerable
direction was observed. **Conclusion:** Over recent years, the majority of graduate nutrition
students enrolled at LLU had an indifferent attitude toward the program's emphasis in vegetarian
nutrition. It appears that the proportion of students enrolling despite the vegetarian emphasis is
trending downward.

**[P404] A comparative study of dietary types relating to social responsibility in
the Philippines**

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**Background:** Diet may influence social responsibility measured through health, animal welfare
and environment impact. However, there is no study conducted among Filipinos comparing
social responsibility among three different dietary types. **Objective:** To determine which dietary
type is more socially responsible in terms of health, animal welfare and environmental impact.

**Methods:** This study was a comparative research design. The respondents were 148 adults (39
vegans [V], 22 lacto-ovo vegetarians [LOV], and 87 omnivores [O]) from Cavite and Metro Manila. Respondents self-reported their dietary type. Social responsibility was measured using
a self-constructed questionnaire. Descriptive statistics and ANOVA was used to describe and
compare social responsibility in terms of health, animal welfare and environmental impact among
the dietary groups. **Results:** There were significant differences on social responsibility in terms of health (F(2,145)=139.233; p<.001), animal welfare (F(2,145)=32.116; p<.001) and environmental
impact (F(2,145)=4.389; p=.014) among the dietary groups. On health, V (M=1.68, SD=0.14)
have greater social responsibility than LOV (M=1.31, SD=0.24) and O (M=1.03, SD=0.22)
groups. Moreover, on animal welfare, V have greater social responsibility (M=1.86, SD=0.16)
than LOV (M=1.46, SD=0.21) and O groups (M=1.47, SD=0.31). However, on environmental
impact, V (M=1.27, SD=0.24) and LOV (M=1.28, SD=0.21) have the same social responsibility
but both are greater than the O group (M=1.17, SD=0.22). **Conclusion:** The vegan dietary group
has greater social responsibility in terms of health, animal welfare and environmental impact than
lacto-ovo vegetarian and omnivorous dietary groups.

**[P405] Savings of greenhouse gas emissions through dietary choices among
college students**

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**Background:** University cafeterias offer vegetarian alternatives to college students who choose
plant-based menu items for health reasons and to save environmental resources. Bon Appetit
is a food service company committed to a sustainable future that serves vegetarian meals at the
Andrews University dining services. This food service provides a unique opportunity to quantify
the greenhouse gas emissions (GHGEs) in real life settings at personal and group levels. **Study
aim:** To compare the carbon footprint of vegetarian meals served at Bon Appetit with foods
commonly consumed in the United States. **Methods:** We estimated the GHGEs as carbon
dioxide equivalents (CO2-eq) of plant-based and animal-based menu items through partial
life cycle analysis with SimaPro 8.1. Our functional unit was a serving for each food item. All
comparison foods had similar ingredients, except the main protein source. GHGEs in mile
equivalent was based on the CO2 emissions of an average midsize car (411 g/mile). **Results:**
The kilograms of CO2-eq emissions from one serving of plant-based menu items are as follows:
hamburger, 0.52; soy-based sandwich, 0.47; tofu sandwich, 0.38; almond-cashew cheese pizza,
0.86; and soy-gluten roast, 0.27. The kilograms of CO2-eq emissions from one serving of animal-based menu items are as follows: beef hamburger, 2.44; chicken sandwich, 1.05; cheese pizza, 1.41; and beef roast, 2.17. GHGEs savings (kilograms of CO2-eq) by choosing plant based menu items: hamburger, -1.92; chicken sandwich, -0.58; tofu sandwich, -0.67; pizza, -0.56; and roast, -1.91. Savings of GHGEs from 500 servings as mile equivalents are as follows: hamburger, -2331; chicken sandwich, -704; tofu sandwich, -815; pizza, -675; and roast, -2318.

Conclusion: Plant-based food choices are effective in lowering carbon emissions and saving planetary resources among college students on university campuses. Those savings translate into significant mitigation strategy for planetary health at the university level.

[P406] Vegetarian diet is associated with lower medical expenditure in Taiwan
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Background: Vegetarian diets have been associated with lower chronic non-communicable diseases that are responsible for the largest disease burden today. Previous studies have made estimations on medical expenditures attributable to meat consumption, but no study thus far has directly compared the medical expenditure of vegetarians and non-vegetarians. Taiwan has a universal health care system which covers nearly 100% of the population, making direct medical expenses comparison possible. Methods: Tzu Chi Vegetarian Study recruited 12,062 Buddhists from the Tzu Chi Foundation in 2005. Demographics, medical history, diet, and lifestyles were assessed through a self-administered questionnaire. Due to the discrepancy in age and gender between vegetarians and non-vegetarians, 2,127 vegetarians were matched with 4,254 non-vegetarians from the study based on age and gender. Individual data were linked to the National Health Insurance claim at the Health and Welfare Data Science Center and followed-up until December 2014. Results: Vegetarian diet is associated with approximately 10 to 15% lower total and outpatient medical expenditure. Vegetarians had lower medical expenditure incurred by diabetes and metabolic diseases, mental diseases, and genitourinary diseases. We found no difference in dental expenditure between vegetarian and non-vegetarians. Conclusion: Vegetarian diets are associated with lower medical expenditure and may be a promising preventive strategy to alleviate the current medical-economic burden.

[P407] Incorporation of legumes in child nutrition programs: Perceptions of directors and staff
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Background: Legumes offer a low-fat, high-fiber, plant-based protein source for inclusion in Child Nutrition Program (CNP) menus. To help CNPs improve compliance of serving a weekly vegetable legume subgroup option and to increase legume offerings, directors and staff were surveyed regarding current use and perceptions of using legumes. Study Methods: An on-line survey was distributed to all CNP directors in Idaho. Directors were asked to respond to the survey and distribute it to foodservice staff. A total of 78 directors and 57 foodservice staff (N=135) responded. Participants were asked to describe ways they currently meet the vegetable legume subgroup, and to provide suggestions for developing recipes using legumes. Qualitative responses were reviewed by three independent raters and coded into categories and themes. Additionally, participants ranked legumes in order of preference and rated comfort level using different legumes. Means were calculated to determine group rankings and ratings. Results: The most common categories stated for meeting the vegetable legume subgroup included refried beans, chili, baked beans and salad bar. One common theme was adding legumes to meat dishes including chili, pork and beans, meatloaf and taco meat. Themes for recipe suggestions included focusing on flavor and appearance. Another common theme was the request for help and new recipes to increase legume offerings. Rankings for legumes in preference for cooking and ratings of
comfort level using legumes were similar with pinto, kidney, black and red beans being the highest and split pea, pink and cranberry being the lowest. **Conclusion:** Results indicate the legume vegetable subgroup is being met with traditional bean dishes that may not always be vegetarian. Participants indicated a need for new legume recipes. Incorporating legumes in CNP menus may require training for directors and staff to increase knowledge and comfort level with a variety of legume options.

**[P408] Associations between vegetarian dietary patterns and initial reasons for choosing plant-based diets in Japan**

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**Introduction:** Previous studies suggested that plant-based diets were effective to prevent various diseases such as metabolic diseases, and related with longevity. However, the number of people who follow plant-based diet is small in Japan and their initial reasons for the diet is not known. The purpose of this study is to clarify initial reasons for choosing plant-based diets. **Methods:** An online survey was conducted among members and officials of the Japanese Vegetarian Societies: Japan Vegetarian Society, Veg Culture Network, Seventh-day Adventist Church members and Japan CI between 2012 and 2013. A total of 408 responses were classified into five dietary patterns (non-vegetarian, semi-vegetarian, pesco-vegetarian, lacto-ovo vegetarian and vegan) according to inclusion/exclusion of corresponding animal-source foods. Associations between initial reasons and dietary patterns were analyzed by residual analysis. **Results:** Participants were mainly female (N=310, 76.0%) and age groups were 10-19 y (1.5%), 20-29 y (15.4%), 30-39 y (29.7%), 40-49 y (31.9%), 50-59 y (10.3%), 60-69 y (6.6%), 70-79 y (3.9%), and 80 y or older (0.5%). Two hundred sixty-seven (65.4%) were living with someone and 141 (34.6%) were living alone. Health was the most selected initial reason in five dietary patterns (72.8%). Of them, the proportion of semi-vegetarian who selected health as an initial reason was significantly higher (89.1%) and that of lacto-ovo vegetarian was significantly lower (63.3%) than other dietary patterns. Animal rights was higher in vegan (69.0%) and lower in semi-vegetarian (14.5%) and non-vegetarians (14.3%). Environment was higher in vegan (54.8%) and lower in pesco-vegetarians (26.6%). Food safety was not different among dietary patterns and selected 28.6 to 38.3%. **Discussion:** Health was the main initial reason for choosing a plant-based diet in Japan. Further studies are needed to clarify factors promoting longer adherence to plant-based diet.

**[P409] Coconut oil: The miracle health food**

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**Background:** Coconut oil, which some describe as the healthiest oil on earth, has become a superfood in the diet of many vegetarians and others. Many claims have been made for the oil, such as reversing the effects of cognitive impairment and slowing the progression of Alzheimer’s disease. Proponents of coconut oil claim it provides help for arthritis, is useful for treating depression and protective against heart disease, while lauric acid (the major component of coconut oil) exhibits anti-microbial properties. It is claimed that coconut oil helps stabilize your blood sugar, lowers insulin resistance and lowers the risk of type 2 diabetes. Much of the claims about the health benefits of coconut oil originate from the fact that coconut oil contains medium chain triglycerides (MCT) which behave differently from other fats. MCT (containing C6- C10 fatty acids) are more readily absorbed and metabolized differently than other fatty acids. Proponents claim that coconut oil can decrease visceral fat and waist size, increase energy expenditure and supports weight loss. **Methods:** These claims will be examined in light of the fact that coconut oil contains less than 15% medium-chain fatty acids. In addition, the nutritional content of coconut oil will be compared with that of coconut milk and coconut cream. **Results:** A review
of 21 studies reported that coconut oil (which contains about 85% saturated fat) raised total and LDL cholesterol relative to other plant oils. Studies with primates revealed that coconut oil also increases the risk of blood clots. Indigenous populations in Asia and the Pacific that include fresh coconut in their traditional cuisine and have low rates of heart disease, typically consume a lot of vegetables, tubers, fruit and fish, and are more active than Westerners, while using little coconut oil. Coconut oil does not appear to live up to all the hype.

**[P501] Efficacy of whole food plant-based diets and treatment of lesser-researched chronic disease-a review**

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**Background:** Current evidence suggests that more whole food, plant-based diets (WFPBD), rich in whole plant foods with minimal animal products and heavily processed foods, protect against chronic disease, and may also effectively treat cardiovascular disease, type II diabetes and obesity. Additionally, WFPBD have been tested on other conditions, but no review has captured their effects on these diseases. The purpose of this review is to evaluate the efficacy of WFPBD in the treatment and management of lesser-studied conditions. **Methods:** A review of intervention studies was performed using PubMed, including studies through December 2017. A snowball search was conducted from the retrieved articles. Trials were included if they assessed effects of WFPBD on chronic conditions other than cardiovascular disease, type II diabetes and obesity. **Results:** Prostate cancer patients (three studies) experienced slowed progression of PSA levels and reduced need for conventional prostate cancer treatment. Two studies on Crohn's disease patients showed high rates of induction and maintenance of remission. Subjects with moderate to severe depression or anxiety benefitted dramatically (one study). Asthmatic lung function and symptoms improved (one study) in 92% of subjects. One study demonstrated substantially alleviated atopic dermatitis symptoms. Multiple sclerosis (MS) patients experienced no improvements on a low-fat WFPBD, but a moderate-fat WFPBD resulted in significantly reduced relapse rates and three times lower risk of MS mortality. Parkinson's disease patients (one study) experienced significantly improved motor functioning and rheumatoid arthritis (four studies), fibromyalgia (two studies), and osteoarthritis (one study) subjects found significant improvements in quality of life, pain and/or functional status measures. **Conclusion:** WFPBD appear to demonstrate effectiveness in a wide variety of diseases, although research is severely limited. Additional, higher quality studies are needed to establish efficacy of WFPBD diets on the conditions examined in this review, as well as other diseases not yet tested.

**[P502] Could a plant-based diet affect cognition? Findings from a systematic review of randomized controlled trials on the Mediterranean diet**

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**Background:** Dementia is a leading cause of death and disability without treatment to prevent, slow or reverse its course. Observational studies suggest plant-based diets may benefit cognition and reduce dementia risk. We aimed to conduct the first review of randomized controlled trials (RCTs) on the Mediterranean diet. **Methods:** We searched nine databases (inception to July 2017) to identify RCTs comparing a Mediterranean to an alternate diet for cognitive or brain morphology/function outcomes, with additional focus on diet quality and adherence to the traditional Mediterranean dietary pattern and cuisine. **Results:** Analyses were based on 66 cognitive tests and one brain function outcome from five included studies (n=1,888). Intervention diets varied considerably between studies, and in important ways from the elements
and quantities defining a traditional, predominantly plant-based, Mediterranean dietary pattern. Only 12.1% of individual outcomes (eight out of 66) at trial level significantly favored a Mediterranean intervention for cognitive performance, with effect sizes (ESs) ranging from small (0.32) to large (1.66); whereas two outcomes favored control. Data limitations precluded a meta-analysis. However, three out of eight domain composite cognitive scores (memory, frontal and global function) were significant, with ESs ranging from 0.39 to 1.29. The likelihood of having low plasma brain-derived neurotrophic factor (BDNF) was reduced (OR=0.22; 0.05, 0.90) in those on a Mediterranean diet after three years of follow-up in PREDIMED (Prevención con Dieta Mediterránea). Other post-test analyses of diet interactions with genotypes associated with dementia risk within this trial at 6 ½ years found mixed and inconclusive evidence for diet-genotype interactions altering cognitive adaptations to the Mediterranean diet. There was no effect of the Mediterranean diet on incident cognitive impairment or dementia. **Conclusion:** Current empirical data are limited, with mostly non-significant or small ESs. However, some significant improvements in cognitive domain composites in PREDIMED, the most robustly designed study, suggest clinical importance and warrant further research.

**[P503] Protective effect of plasma from vegetarian subjects in endothelial cells against oxidative stress**  
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**Background:** Several studies report that a vegetarian diet lowers the probability of developing cardiovascular diseases (CVDs). The endothelial dysfunction is one of the main mechanisms that leads to CVDs. Endothelial cells form a barrier that maintains internal homeostasis of blood vessels and releases molecules that modulate vascular structure, vasodilation and vasoconstriction. Decreased nitric oxide (NO) bioavailability and excessive production of reactive oxygen species (ROS) are involved in endothelial dysfunction. Therefore, vegetarian diet may act as protective factor against endothelial dysfunction, by modulating NO and ROS production. **Study aim:** To evaluate NO and ROS levels in human umbilical vein endothelial cells (HUVECs) preincubated with plasma from vegetarian and omnivorous subjects and exposed to oxidative damage. **Study methods:** HUVECs were preincubated with pool of plasma at 10% (v/v) from vegetarian and omnivorous subjects (n=12/group). After 24h, HUVECs were incubated with or without tert-Butyl hydroperoxide solution (tBHP, 25 µM) for 2 h to induce oxidative stress. Cells incubated with plasma OMN/VEG without tBHP was used as control. DAF-2 diacetate and 2,7-Dichlorodihydrofluorescein diacetate (DCFH) (Cayman Chemical) fluorescent dyes were used to assess endothelial NO and ROS production, respectively. The fluorescence was measured using a fluorescent microplate reader. The study protocol was approved by the research committee and the institutional review board of the Heart Institute (3751/12/007). **Results:** After tBHP-induced stress, ROS level was 2.6 times higher in cells incubated with OMN plasma compared to VEG group (4.42 vs. 1.67 respectively, data expressed as delta of fluorescence intensity). Regarding NO levels, there was no difference in the production after tBHP-induced stress between the groups (1.11 vs. 1.06 respectively, data expressed as delta of fluorescence intensity). **Conclusion:** Vegetarian diet could exhibit a beneficial effect on the endothelial cells against oxidative damage, which might be related to a healthier profile of cardiovascular biomarkers compared to omnivorous diet.
[P504] Habitual avocado intake reduces the likelihood of adult weight gain and overweight and/or obesity

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Background: Nutrient-dense food choices may help to abate increasing trends in overweight and obesity. Avocado, a nutrient-dense and medium-calorie food, is rich in various nutrients and bioactive compounds that may help to reduce the risk of overweight and obesity. The objective of this study is to examine the effect of habitual avocado intake on changes in weight and body mass index (BMI). Study Methods: Prospective analyses were conducted relating changes in weight and BMI (calculated for self-reported baseline and follow-up data), to avocado intake that was measured using a food frequency questionnaire (FFQ) in the Adventist Health Study-2 (AHS-2) cohort. The generalized least squares method was used to analyze the effect of avocado intake on repeated measures data (baseline and follow-up weights). Odds ratios for becoming overweight and/or obese were calculated using logistic regression analysis, with the exposure being no intake (reference), low (>0 to <32 g/day), and high (≥32 g/day) avocado intake. Results: Among normal weight subjects, those who consumed avocado had lower odds of becoming overweight and/or obese over time compared to nonconsumers: OR (95% CI) by follow-up questionnaire #1 = 0.91 (0.83, 1.00), and 0.65 (0.45, 0.94); by follow-up questionnaire #2: 0.87 (0.79, 0.95), and 0.62 (0.42, 0.93) for low and high consumers respectively. Adult weight gain was significantly abated in avocado consumers compared to nonconsumers. Conclusion: Individuals who consume avocado are less likely to become overweight or obese compared to individuals who avoid consuming avocados.

[P505] The Nutritarian women’s health study: A longitudinal study assessing dietary intake and health

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Background: Prior research supported that individual components of this micronutrient-dense, plant-rich (mNDPR) diet are effective individually. The intent of this investigation is to assess the benefits of combining an assortment of these protective plant foods in a dietary portfolio called the Nutritarian diet. Methods: The Nutritarian women’s health study (NWHS) is a longitudinal hybrid effectiveness-implementation study that seeks to track females 18 years and older over years to determine the role of a nutrient-dense plant-rich (NDPR) diet on the incidence and progression of chronic diseases. Enrollees complete intensive online questionnaires regarding health and current dietary practices. We intend to assess the differences between and among the study participants with varying degrees of compliance and adoption of the recommended protocols/lifestyle. Summary of Results: For this baseline assessment, there were 1,271 women enrolled in the study, representing all 50 U.S. states. The targeted total sample size is 5-10,000 women. Mean participant age is 50.69 years (SD=11.56). Mean participant waist-to-hip ratio is 0.86 (SD=0.13) while mean participant BMI is 27.03 kg/m² (SD=6.83). 88.9% of participants self-reported race as white. Pregnancy during the lifetime was reported by 71.8% of participants. 6.8% of all participants received a diagnosis of breast cancer, with treatment as follows: 93.0% underwent surgery, 51.9% lumpectomy, 56.5% radiation and 45.3% chemotherapy, within this subset. Conclusions: This mNDPR dietary longitudinal investigation seeks to combine the elements of clinical effectiveness and implementation which can provide for more effective strategies and rapid translational gains for clinical and public health practice.
Comparing risks of depression in different dietary patterns
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Background: Vegetarian diets have been associated with reduction in obesity, diabetes and
hypertension but the impact of a vegetarian diet on depressive disorders remains uncertain.
Depression affects more than 322 million people worldwide, especially South-East Asia and the
Western Pacific region. Retarding the occurrence of depression is urgent. This study aims to
estimate the relative risk of depression between vegetarians and non-vegetarians. Study methods:
More than twelve thousand participants from the Tzu Chi Foundation participated in the Tzu
Chi Vegetarian Study in 2005. All of them were assessed for demographics, medical history,
diet and lifestyle through self-administered questionnaire, and these baseline data were linked
to the National Health Insurance claim data to ascertain for disease incidence. Participants
who reported consumption of meat and fish less than once per month in the food frequency
questionnaire were classified as vegetarians. Incident cases were ascertained if a participant
is diagnosed with depressive disorder after 2006, in at least two outpatients or one inpatient
psychiatric admission based on ICD-9-CM criteria (code: 296.2, 296.3, 300.4, and 311). After
excluding those with missing data on gender and education level, a total of 10,577 participants
were included in the analysis. We assessed risk of depression in vegetarians versus non-vegetarians
using Cox proportional hazard regression. Results: Vegetarians had a decreased risk of depression
(hazard ratio: 0.70, 95% confidence interval: 0.52-0.93), after adjusting for demographics and
lifetime comorbidities. This finding is particularly significant in those with age 50 (HR: 0.58,
95% CI: 0.37-0.90). Participants with a lower education level or female were at high risk. Chronic
diseases such as hypertension, diabetes and hyperlipidemia were also risk factors that significantly
increased the risk of depression. Conclusion: Vegetarian diet was associated with a significant
decrease in incidence of depressive disorder, especially in the younger group (age 50). Our study
implies that a vegetarian dietary pattern may prevent depressive disorders.

Circulating levels of brain derived neurotrophic factor and glycemia in
vegetarian adults
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Background: Data from the literature have repeatedly demonstrated the beneficial role of the
vegetarian diet in reducing risk factors for cardiovascular diseases, mainly because they positively
modulate biochemical parameters, particularly those related to glycemic control and lipemia.
Recently, animal studies have demonstrated the relationship of the Brain Derived Neurotrophic
Factor (BDNF) and its relationship with increased insulin sensitivity and consequent lowering of
blood glucose levels. Objective: To evaluate the glycemic profile (fasting glycemia) and circulating
levels of BDNF in adult vegetarian individuals compared to omnivores. Methods: A cross-
sectional study was carried out with 96 subjects (56 vegetarians and 40 omnivores) adults. The
biochemical parameters were obtained by means of blood collection, glycemia by the Automated
Enzymatic Colorimetric method and the BDNF levels by BDNF Emax® ImmunoAssay System
(Promega®, Madison, WI, USA), according to the manufacturer’s specifications. For analysis,
biochemical variables were classified as normal and altered using the following reference ranges
for altered fasting glycemia (> 110mg/dL) and for BDNF (median [626.0 pg/mL]). The analyzes
were performed in Statistical Package for Social Sciences (SPSS) version 20.0 and for all a level
of significance of 5% was considered. Results: Vegetarians had lower fasting blood glucose levels
when compared to omnivores (82.13 ± 9.11 mg/dL vs 85.8 ± 10.87 mg/dL, p=0.004). Regarding
the BDNF variable, there was no difference between vegetarians and omnivores (662.8 ± 276.5pg/
ml vs 698.1 ± 314.9 pg/ml, p=0.563). **Conclusions:** The results indicate that the vegetarian diet has a beneficial role in relation to the glycemic control of these individuals, research with a greater number of subjects is necessary to understand its relationship with BDNF levels.

**[P508] Consumption of sugar-rich foods, metabolic and inflammatory markers profile in vegetarian and non-vegetarian Brazilian Adventists**

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**Background:** High intakes of dietary sugars of different sources have been associated with glycaemia and inflammatory markers. Vegetarian diets contain various anti-inflammatory components and have been considered a useful approach to manage inflammation in the long term. **Study aim:** To investigate the consumption of sugar-rich foods, metabolic and inflammatory markers profile among vegetarian and non-vegetarian Brazilian Adventists. **Methods:** A cross-sectional study was performed using data from a sub-sample of 140 participants of the ADVENTO study. Three food records were collected during one year, with four month intervals. Consumption of sugar-rich foods was estimated as frequency/day of all foods that carry sugar as first or second ingredient, by weight. Individuals were classified as vegetarians (if followed established criteria for either vegan, lacto-ovo vegetarian, pesco-vegetarian or semi-vegetarian patterns) or non-vegetarians. Fasting glucose, insulin, C-Reactive Protein (CRP) and white blood cells were measured. Comparisons between vegetarians and non-vegetarians were made by chi-square and Fisher exact tests. Means of daily frequency of consumption of sugar-rich foods and of biochemical exams were compared by t-test or Mann-Whitney. Correlations between sugar-rich foods consumption and biochemical exams were tested by Pearson or Spearman tests. **Results:** The results showed that vegetarians have higher education levels, and less diabetes, as a result of fasting blood glucose level (Table 1). Non-vegetarians showed higher average levels of leukocyte, glucose and frequency of consumption of sugar-rich foods. There was no difference in CRP, lymphocyte, monocyte, segmented cells and insulin among diet patterns (Table 2). Also, there was no correlation between the consumption of sugar-rich foods and biochemical exams according to dietary patterns. **Conclusion:** These initial results show healthier patterns of consumption of sugar-rich foods, better blood glucose profile and discreetly better inflammatory profile among vegetarians compared to non-vegetarians.

**[P509] Cardiovascular disease risk factors profile among Australian vegetarian and non-vegetarian teenagers**

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**Background:** Cardiovascular disease (CVD) is the leading cause of mortality in Australia. Diet plays an important role in CVD risk. The goal was to compare profiles of CVD risk factors among Australian vegetarian and non-vegetarian teenagers. **Methods:** Cross-sectional analysis to estimate difference in CVD risk factors among 49 vegetarian and 639 non-vegetarian 14-17 year-old participants. **Results:** Vegetarians had statistically significantly lower mean total (4.05 vs. 4.4 mmol/L; p < 0.001), and LDL cholesterol (2.18 vs. 2.55 mmol/L; p < 0.001); and diastolic blood pressure (69.6 vs. 72 mmHg; p = 0.038). No statistically significant difference was found in other risk factors including HDL cholesterol (p = 0.83), triglycerides (p = 0.601), systolic blood pressure (p = 0.727), BMI (p = 0.159), plasma glucose (p = 0.09), C-reactive protein (p = 0.527) or homocysteine (p = 0.45). There was a statistically significantly difference in the percentage of participants with abnormal total and LDL cholesterol level between vegetarians and non-vegetarians (2% vs. 16.5%, p = 0.003, having total cholesterol ≥ 5.1 mmol/L and 20.4%...
vs. 43.9%, \(p=0.001\), having LDL cholesterol \(\geq 2.59\) mmol/L. Statistically significantly higher percentage of vegetarians, compared to non-vegetarians had elevated diastolic blood pressure \((\geq 80\) mmHg; 12.2\% vs. 6.8\%, \(p=0.038\)). There was no statistically significant difference in the mean values for other risk factors. **Discussion:** Blood lipid profile constitutes a key risk factor for CVD. Vegetarians had statistically significantly lower total and LDL cholesterol compared to non-vegetarians, and virtually identical mean HDL cholesterol (1.45 vs. 1.44). Hcy concentration among vegetarians was higher, compared to non-vegetarians. However, the mean Hcy concentration in both groups was relatively low and the mean difference was not statistically significantly different. Contrary to findings in adults, CRP concentration was non-statistically significantly higher among vegetarian participants. The findings suggest vegetarians having lower future risk of CVD.

**[P510] The effects of chronic walnut supplementation on metabolic syndrome in an elderly cohort**


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**Objective:** To examine the effects of incorporating a daily dose of walnuts on metabolic syndrome (MetS) in an elderly cohort. **Methods:** In this two-year study, 708 healthy participants from Loma Linda, California and Barcelona, Spain were randomly assigned to either a walnut or a control group. Participants in the walnut group were provided with packaged walnuts (1, 1.5, or 2 oz.) and asked to incorporate into their daily habitual diet. Participants in the control group were asked to continue with their habitual diet and to refrain from eating walnuts or excessive intake of other nuts and omega-3 supplements. Blood samples, blood pressure (BP) and anthropometric measurements were collected at baseline and after two years. Data were analyzed using logistic regression models and t-test. **Results:** 636 (66.8% female, mean age =69.1) participants completed the study. Triglycerides decreased in both the walnut (-0.94 mg/dl, \(P<0.001\)) and control (-0.96 mg/dl, \(P<0.020\)) groups with no significant differences between groups (\(P = 0.506\)). There was a slight decrease in systolic BP in the walnut (-1.31, \(P=0.111\)) group and nearly no change in the control (0.01, \(P=0.999\)). Similarly, diastolic BP decreased more in the walnut group (-0.71, \(P=0.469\)) than in the control group (-0.08, \(P=0.999\)) with no significance between-groups in both systolic and diastolic BP. Fasting blood glucose decreased by approximately one point in both the walnut and control groups with no significant differences between groups. There was no significant difference between the walnut and control groups in the development or reversion of MetS. **Conclusion:** Supplementing the diet of older adults with a daily dose of walnuts and no other dietary advice results in neither adverse effect on MetS or in reversing MetS. A trend towards a beneficial effect in systolic and diastolic BP and triglycerides was observed with walnuts.

**[P511] Mental health status and dietary intake among California adults: A population-based survey**

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**Objectives:** To determine dietary intake frequencies among adults in the State of California, stratified by mental health status, and examine factors associated with mental illness and diet. **Method:** Data were pooled from the adult California Health Interview Survey for years 2005 to 2015. Dietary measures consisted of intake frequencies during the previous day, week or month for fruits, vegetables, sweetened fruit drinks, soda, fast food fruit, French fries, coffee, non-fat milk, water, cake and ice cream. Mental health status was assessed using the Kessler 6 survey, with respondents categorized as having low distress, moderate psychological distress (MPD), or serious psychological distress (SPD). Survey-specific routines were used to calculate mean
dietary intake frequencies by psychological distress, perform bivariate significance testing and determine additional factors (age, gender, race, education, poverty, marital status, BMI and geography) associated with dietary measures, primarily using ordinal logistic regression. **Results:** The 245,891 completed surveys represent an annual estimated population of 27.7 million adults, of whom 13.2% had MPD and 3.7% had SPD. Increasing levels of psychological distress were associated with lower levels of fruit and vegetable consumption and increased consumption of sweetened fruit drinks, French fries, fast food and soda, e.g., soda consumption in past 30 days was 6.2 (95% CI: 6.1 to 6.4) among those with low psychological distress, 9.8 (9.0 to 10.7) among MPD, and 12.3 (10.7 to 13.8) among those with SPD. Significant associations of MPD and SPD remained after adjusting for all other factors, e.g., soda odds ratios for MPD and SPD were 1.23 and 1.25, p <0.001, respectively. Higher education, lower poverty, being married and normal weight were generally associated with better diet, though no variable was consistent across all analyses. **Conclusion:** Our findings suggest that worsening mental health status is still associated with less healthy diet at the population level.

**[P512] Dose-dependent effects of dietary supplementation with polyphenols on lifespan and fecundity**

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**Background:** Scientific research on nutritional intake can provide innovative insights on the aging process and offer simple solutions for optimizing and extending lifespan. **Study aim:** To quantify the detailed relationship between diet, lifespan and reproduction in drosophila melanogaster. **Methods:** The effects of pomegranate juice (PJ) at various dilution ratios were tested on the D. melanogaster (fruit fly) model. Two to three day old flies were randomly assigned to one of four conditions. An equal sex-ratio of male-to-female subjects were placed into vials containing standard Carolina 4-24® medium supplemented with 10%, 50%, 100% PJ (v/v) or control. Flies were transferred into new medium every third day. Dead flies were counted and removed from vials daily throughout the experiment until no subjects remained. Newly eclosed flies were counted daily for ten days from the day the first fly emerged in each group. These data were recorded to measure longevity and fecundity, respectively. **Results:** The mean lifespan of flies raised on standard Carolina 4-24 medium supplemented with 10%, 50%, 100% PJ (v/v) or control was 29, 16, 28 and 27 days, respectively. The mean number of eggs deposited by flies raised on standard Carolina 4-24 medium supplemented with 10%, 50%, 100% PJ (v/v) or control was 18, 37, 12 or 32, respectively. **Conclusion:** Our data quantified the detailed relationship between diet, lifespan and reproduction in D. melanogaster. These data will be expanded upon in future scientific research to better understand the relationship between nutrition and healthy aging.

**[P513] Flax oil or fish oil for n-3 fatty acid supplementation of a vegan diet?**

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**Background:** Cardiovascular and mental health benefits have been associated with elevated blood levels of long chain polyunsaturated fatty acids (LC-PUFA). The evidence is stronger in epidemiological studies than in interventions. People following a pure vegetarian diet prefer to use plant-based foods and oils for their PUFA needs. Evidence points to the need for preformed LC-PUFAs as the conversion of alpha-linolenic acid into eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) are low in non-vegetarian individuals. However, this evidence has not been extended to people, especially women, following a vegan diet with low intake of n-6 PUFAs as well. **Methods:** A dietary intervention was undertaken in which each person took two tablespoons of flax oil (30 g) per day for eight weeks, followed by one teaspoon (5 g) of fish oil per day for eight weeks. Finger stick blood samples were analyzed for fatty acids before flax, after
flax oil and after the fish oil interventions were completed. No other dietary changes were made. Repeated measures analysis of variance was used to test for significance between interventions. **Results:** Six women completed the study. The baseline omega-3 index was 4.20 ± 0.76 (mean ± SD), below the recommended level. The flax oil intervention significantly raised the concentration of ALA, EPA and docosapentaenoic acid (DPA), but not DHA. The omega-3 index was not significantly changed by the use of flax seed oil (4.71 ± 0.86). The fish oil intervention significantly raised the omega-3 index to 8.12 ± 1.27. DHA, DPA and EPA were all significantly elevated after fish oil compared to baseline. **Conclusion:** In women following a pure vegetarian diet, the use of preformed LC-PUFAs in the form of fish oil raised the omega-3 index to the recommended levels.

**[P514] Gut bacteria composition were linked to distinct cardiometabolic profile in vegetarians and omnivore**

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**Background:** Gut microbiota is mainly composed of phyla Firmicutes and Bacteroidetes, which are followed by Actinobacteria, Proteobacteria and Verrucomicrobia. Its composition affects the physiology and metabolism, may generate inflammation and exert a role in the pathogenesis of obesity. This phenotype is influenced by diet, which could also alter the microbiota. **Study aims:** The objectives were to describe the abundance of major phyla and some genera in the gut microbiota of individuals according to dietary patterns and examine their associations with inflammatory markers, insulin resistance and cardiovascular risk profile. **Study methods:** This cross-sectional study included 268 non-diabetic individuals from the ADVENTO Study (analysis of diet and lifestyle for cardiovascular event prevention in Seventh-day Adventists) in Brazil who were stratified into groups of dietary patterns (strict vegetarians, lacto-ovo vegetarians, and omnivores). Clinical, biochemical and circulating inflammatory markers were compared by ANOVA or Kruskal-Wallis. Phylogenetic profile of bacterial communities in fecal samples was analyzed using 16SrDNA sequencing (Illumina MiSeq). **Results:** From 268 individuals (54.2% women; 49.4 ± 8.4 years), 66 were strict vegetarians, 102 lacto-ovo vegetarians and 100 omnivorous. Stratifying according to BMI, 71 had normal (21.7 ± 2.1 kg/m²) and 61 had increased BMI (29.1 ± 3.7 kg/m²). Inflammatory and cardiometabolic markers exhibited a gradual and significant increase from the strict vegetarians and lacto-ovo vegetarians to the omnivorous group. The strict vegetarians showed lower values of anthropometry and better metabolic profile. The abundance of major phyla differed according to dietary patterns, being the proportion of Firmicutes lower and Bacteroidetes higher in the strict vegetarian group when compared to lacto-ovo-vegetarians and omnivores. No differences were found between subsets of participants with normal and weight excess, considering the whole sample as well as the stratification according to dietary pattern. At the genus level, strict vegetarians had a higher Prevotella rate and Prevotella/Bacteroides ratio than the other groups. They also had a lower proportion of Faecalibacterium than lacto-ovo vegetarians, and both vegetarian groups had higher proportions than did omnivores. Succinivibrio and Halomonas from the Proteobacteria phylum were overrepresented in omnivores. **Conclusion:** Our data support the fact that there are differences in gut microbiota composition of individuals consuming distinct dietary patterns, which in turn are associated with inflammatory and metabolic profiles of the hosts. Based on recognized actions of commensal bacteria in the metabolism, we suggest that exposure to animal foods has an unfavorable impact on their proportions.
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