

The benefits of olive oil consumption on health and disease prevention

A workshop at the University California Davis next Jan 17, 2018 will gather worldwide experts to present updated scientific findings on the benefits for health of olive oil consumption and the role of olive oil in the prevention of chronic disease.

Olive oil consumption has long been associated with better health outcomes.

Prof. Francesco Visioli, Professor of Human Nutrition at the University of Padua, Italy and Senior Investigator at the Madrid Institute for Advanced Studies (IMDEA) (Madrid, Spain) will be the first speaker in the UC Davis workshop. He has been working during several decades in the elucidation of different mechanisms of action of olive oil and its components.

It is known that the main driver of heart attacks and strokes is not only blood cholesterol, but the “bad” cholesterol (known as “low-density-lipoprotein”-cholesterol or LDL-cholesterol), especially when it is oxidized. The first piece of evidence relating olive oil to lower risk of cardiovascular disease concerned inhibition of the oxidation of this bad cholesterol molecules by two polyphenol molecules contained in olive oil (oleuropein and hydroxytyrosol). Subsequently, researchers obtained proof of dose-dependent absorption of olive oil polyphenols and of their manifold healthy potential activities. Thanks to technological advancements new evidence of the beneficial cardiovascular effects of olive oil polyphenols has come from techniques of nutrigenomics and proteomics. Moreover, toxicological tests that allow for the status of Novel Food and the incorporation of such molecules into functional foods are now available. By the merging of the results of large epidemiological studies with human trials and basic mechanistic studies, new light has been shed on the diverse beneficial actions of the foremost source of fat in the Mediterranean area.

Dr. Manuel Franco is Associate Professor of Preventive Medicine at the University of Alcalá (Spain) and Adjunct Associate Professor at the Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, Baltimore (USA). Dr. Franco’s work focuses on the epidemiology and prevention of heart disease and its major risk factors. His research assesses how different social characteristics relate to heart disease and its risk factors including dietary patterns, hypertension, diabetes and obesity. He is particularly interested on food environment and cardiovascular risk.

Mediterranean food environments present unique characteristics in terms of diversity of small food stores and public markets. In this context, the consumption of olive oil represents a hallmark of the Mediterranean food pattern consistently related to lower cardiovascular risk. Mediterranean food environments may help improving population diets. Within the Heart Healthy Hoods (HHH) project, funded by the European Research Council, Dr. Franco’s team studies the association between the Mediterranean food environment and adherence to the Mediterranean diet, and related chronic diseases. An important gap in the literature is the study of healthy food affordability (in terms of Mediterranean diet costs) and its influence on diet quality.

Dr. Estefanía Toledo is Associate Professor of Preventive Medicine at the University of Navarra, in Pamplona (Spain). She was the leader of the 2014 paper published in *JAMA Internal Medicine* showing a dramatic reduction by an intervention with the Mediterranean diet with extra-virgin olive oil in the risk of developing breast cancer among more than 4,000 Spanish women included in the PREDIMED trial.

Moreover, olive oil consumption has been suggested to have potential beneficial effects on several other types of cancer. Evidence is strongest for the beneficial effects of extra-virgin olive oil consumption on breast cancer prevention and, more specifically, on postmenopausal breast cancer prevention. Also, potential beneficial effects of olive oil consumption on colorectal cancer, bladder cancer, upper aero-digestive tract cancer and ovarian cancer have been described in large epidemiological studies. Much of the potential beneficial effects of olive oil have been attributed to minor components that present a higher concentration especially in extra-virgin olive oil varieties. Such effects have been observed in both in vivo and in vitro studies.

José A. Luchsinger is Associate Professor of Epidemiology and Medicine at the Presbyterian Hospital & at the Columbia University Medical Center in New York (USA) where he is the director of the Center on Aging and Health Disparities in the Division of General Medicine. His research has focused on the relation of vascular, metabolic, and dietary factors on aging outcomes, primarily cognition, in diverse populations.

In addition to the well-known association between better conformity to the Mediterranean Diet and reduced risk of heart disease, cancer and total mortality, a growing accrual of new data from large epidemiological studies are supporting that better adherence to the Mediterranean Diet is associated with a lower risk of cognitive decline and dementia. Importantly, in the PREDIMED-NAVARRA trial, after a 6.5-year intervention with a Mediterranean diet supplemented with extra-virgin olive oil, a better cognitive function was found in comparison with a control diet. Better post-trial cognitive performance versus control in all cognitive domains and significantly better performance across fluency and memory tasks were observed for participants allocated to the Mediterranean diet supplemented with extra-virgin olive oil as compared to the control group. After adjustment for sex, age, education, apolipoprotein E genotype, family history of cognitive impairment/dementia, smoking, physical activity, body mass index, hypertension, dyslipidaemia, diabetes, alcohol and total energy intake, this group also showed significantly lower risk of mild cognitive impairment compared with the control group.

A dietary pattern defined by a high consumption of olive oil, fruit, vegetables, whole grain, fish, low-fat dairy and antioxidants but low consumption of animal foods has been associated with a decreased risk of depression in recent systematic reviews of the available scientific evidence on dietary habits and depression risk. In an assessment of the role of dietary fat on the risk of depression conducted in the SUN cohort, a detrimental relationship was found for trans-fat intake, whereas weak inverse associations were found for mono-unsaturated, poly-unsaturated fat and olive oil consumption with respect to the future risk of developing depression.

Prof. Miguel A. Martínez-González is Professor and Chair of Preventive Medicine at the University of Navarra, in Pamplona (Spain) and Adjunct Professor at the Department of Nutrition, Harvard TH Chan School of Public Health (Boston, USA). He is the Principal Investigator of the SUN Mediterranean cohort, and he was the coordinator of the PREDIMED Research Network. PREDIMED (published in 2013) was the first primary prevention trial of heart disease through a dietary intervention based on the Mediterranean dietary pattern supplemented with either extra-virgin olive oil or tree nuts versus a control (low-fat) group. Prof. Martinez-Gonzalez is also the Principal Investigator of the European Research Council Advanced Research Grant to fund the PREDIMEDPLUS trial, another on-going cardiovascular primary prevention trial with 6,874 randomized participants aiming to assess the cardiovascular effects of an energy-restricted Mediterranean diet with physical activity and weight loss now on-going in 23 centers.

The primary end-point of PREDIMED was a composite of hard cardiovascular events (heart attacks, strokes, or cardiovascular deaths) assessed in 7,447 participants after almost 5 years of average follow-up. The two intervention diets were supplemented with either extra-virgin olive oil or tree nuts and showed similar relative reductions versus the control (low-fat) diet of 30% in this composite primary cardiovascular end-point. Newer methods of analyzing these data using causal inference approaches showed even stronger reductions in this risk. The risk of developing diabetes among 3541 PREDIMED participants who were free from diabetes at baseline was 40% lower with the Mediterranean dietary pattern supplemented with extra-virgin olive oil as compared to the control group. A similar reduction was observed in the risk of developing the main arrhythmia, atrial fibrillation, with extra-virgin olive oil as compared with the control group. Differences in 5 year changes in bodyweight were significantly advantageous for the Mediterranean dietary pattern supplemented with extra-virgin olive oil as compared with the control group, though the difference was small (-0.43 kg). Preliminary data from the PREDIMED-PLUS trial support the long-term sustainability of weight losses obtained with a Mediterranean diet rich in olive oil.

Prof. Walter C. Willett is Professor of Epidemiology and Nutrition at Harvard T.H. Chan School of Public Health and Professor of Medicine at Harvard Medical School, Boston (USA). He has published over 1,700 research papers, primarily on dietary and lifestyle risk factors for heart disease, cancer, and other conditions. Many of these papers are based on several long-term studies that include nearly 300,000 men and women with repeated dietary assessments. They are providing the most detailed information on the long-term health consequences of food choices. Prof. Willett has written the textbook, *Nutritional Epidemiology*, published by Oxford University Press, now in its third edition. He is the most cited nutrition scientist internationally.

Dietary fat has been at the center of efforts to prevent cardiovascular disease for over 50 years. Notably, intake of total fat was similar in areas with both the highest and lowest rates of heart disease. In Finland, where dairy fat (rich in saturated fatty acids) predominated, the rates of heart disease were the highest and in Greece, where olive oil, (rich in monounsaturated fat predominated), the lowest rates were found.

More recently, these relationships have been examined in large prospective studies in which confounding factors can be better controlled. Importantly, trans fatty acids have been found to be most strongly predictive of heart disease, saturated fat and typical forms of carbohydrate are similarly related to risk, and both monounsaturated and polyunsaturated fatty acids are related to lower risk of heart disease. These findings are consistent with effects on blood lipid fractions, and similar associations are also seen with total mortality. This large body of evidence strongly supports elimination of partially hydrogenated fats, and replacement of animal fats and highly saturated plant oils with primarily unsaturated plant oils that include omega-3 (present in walnuts) omega-6 polyunsaturated fatty acids (seed oils) and monounsaturated fatty acids present in olive oil.

Prof. Frank Hu is Fredrick J. Stare Professor of Nutrition and Epidemiology, and Chair, of the Department of Nutrition at the Harvard TH Chan School of Public Health, Boston (USA). He is also Professor of Medicine at Harvard Medical School and served on the Advisory Committee for the Dietary Guidelines for Americans 2015-2020. Prof. Hu's research has focused on diet/lifestyle, metabolic, and genetic determinants of obesity, type 2 diabetes, and heart disease.

Diabetes is a pandemic which currently represents a global health crisis. However, the scientific evidence shows that type 2 diabetes is highly preventable. Diet and lifestyle modifications can prevent or delay onset of type 2 diabetes. There is substantial evidence that dietary patterns high in olive oil improve cardiometabolic risk factors and reduce type 2 diabetes risk, potentially due to its monounsaturated fatty acid content and high amounts of polyphenols. In an intervention study, those assigned to a Mediterranean diet supplemented with extra virgin olive oil had a significantly reduced risk of type 2 diabetes compared with a control diet. In US women, total olive oil consumption, as well as substituting olive oil for other types of fats, was inversely associated with type 2 diabetes risk after adjustment for other dietary and lifestyle factors. While further research is needed, olive oil consumption as part of a healthy dietary pattern may be able to reduce type 2 diabetes risk.

In 2018, taking into account the health problems that currently account for a greater part of the global burden of disease (heart attacks, strokes, diabetes, cancer, obesity, dementia, depression), a Mediterranean diet rich in olive oil seems to be the healthiest option. The good news is that it is also highly palatable and it has a strong potential for long-term sustainability.