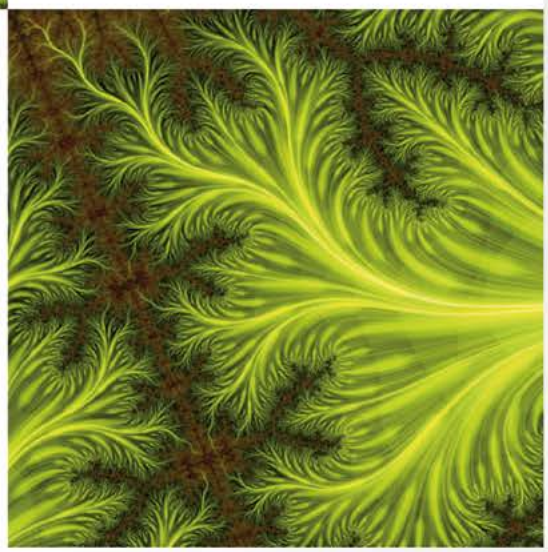
institute
imdea food

report 2016



www.food.imdea.org

food and health

science, industry and society

prologue

prologue

Guillermo Reglero
Director of the IMDEA Food Institute

report
2016

Ten years have passed since the launch of the IMDEA Food project, enough for us to confirm that the hypothesis upon which its research lines were based was solid: nutrition can be an effective tool in the prevention and treatment of chronic disease, and can maintain and improve people's quality of life.

When our project started, the human genome had only recently been sequenced, but the extraordinary advances it would allow lay in clear view. And indeed, expectations have been met and even surpassed. Today, progress continues to be made in the life sciences, and the discoveries being made could, in a few years, lead to paradigm shifts in the treatment of cancer, aging and cardiometabolic disease. These are goals towards which food and nutrition science is making an exceptional contribution: different nutrients and food products have been shown to play vital roles in the body's molecular mechanisms.

Knowledge of these processes, and the possibility of controlling them via what we eat, has opened up the field of personalised nutrition. This seeks to invest dietary strategies aimed at improving health with the greatest effectiveness. This, however, can only be achieved when the genetic profile of individual persons, and the context in which they live (together dictating their physiological status), are taken into account. With this knowledge, precision, individualised nutritional interventions can be prescribed, a concept that in the coming years will form part of our everyday lives.

In 2016, IMDEA Food took a major step forward in its organisational structure, creating 5 programmes in the area of Precision Nutrition, 4 dealing with chronic disease - cancer, aging, obesity, cardiometabolic disease - and the fifth with the design and validation of products. During the year, staff numbers increased by 24%, and the Institute now has 45 researchers and 7 people of management and administration. This report describes the work performed during 2016, guided by the Institute's consolidating axes: Science, Business, and Society.

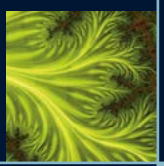
The Institute's researchers published 82 articles in 2016, 72% of these covered by the Q1 del Science Citation Index (the most important international citation index), achieving an average impact factor of 5.74. The publications produced by the Institute since its inauguration have now been cited by other researchers over 5.000 times.

Our work with businesses has been very fruitful. The personalised nutrition project, arising from the CDTI's CIEN calls for projects, has returned very satisfactory results of clear industrial importance. In the 2016 calls, 2 more CIEN projects were approved in which IMDEA Food is a participating member; both focus on nutrition and precision medicine. In addition, a patent was registered describing a novelty in the formulation of food products for the improvement of health. This has attracted the interest of several firms, and its industrial use is expected by 2017. The Institute has also been involved in setting up a spin-off business for translating to society the benefits of its scientific findings, and has made a contribution to the economy of the Madrid region.

As well as transferring research findings to businesses, the Institute undertakes translatable research that provides hospitals with nutritional strategies for the treatment of chronic diseases. In close collaboration with the La Paz and Infanta Sofía hospitals, precision nutritional therapies are designed for use in patients with cancer, and a clinical trial is now underway in patients with colon cancer.

The Institute's work focusing on Society includes research into rare diseases, such as multiple chemical sensitivity syndrome. A trial has also begun among schoolchildren in the Madrid region, run with the help of the Consejería de Educación, Juventud y Deporte, investigating educational strategies to combat genetic susceptibility to obesity. Finally, 42 bachelors and masters degree students from different universities undertook project work at the Institute during 2016, and 11 postgraduate students are currently performing doctoral work.

The Institute has enjoyed funding for R&D projects from the main national and EU financing programs. Currently, 12 projects receive public funding, 10 are privately funded, and funds from different sources have been awarded for contracting researchers and technicians. In 2016, self-financing was up from 19 to 28%, and a 'Nominative Subsidy' was awarded by the Madrid Regional Government on the basis of the results obtained. The latter is the major funding source for the Institute.



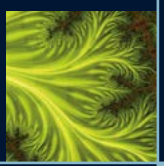

Instituto
idea alimentación

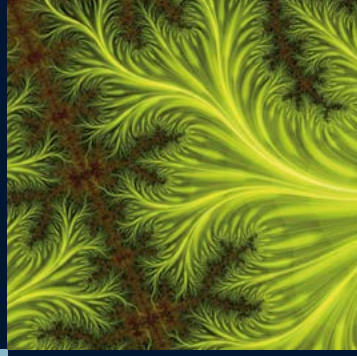
table of contents

table of contents

report

2016



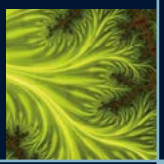


1

presentation

report

2016



presentation

Given the high rate of morbidity associated with chronic diseases - the onset and progress of which may be nutrition-associated - and faced with a food industry in Spain that shows little innovation despite facing strong international competition, Spanish society needs food R&D results.

The overall aim of IMDEA Food is to undertake high level research in the area of Precision Nutrition. Its founding mandate is to translate health and nutrition research into benefits for the economy of the Madrid Region and wider Spain, and into the wellbeing of the country's inhabitants. It aims to undertake world class research into food, nutrition and health, and to identify nutritional strategies of economic and social value.

The Institute's activities are orientated towards studying the molecular mechanisms of the human body, the physiological effects of chronic disease, and how these are related to the nutrients we consume. Nutritional strategies need to be designed and validated with Precision Nutrition in mind, and must therefore focus on individuals and their particular characteristics, i.e., their genetic profile and particular physiological status.

Strategics axes

IMDEA Food organises its activities around three strategic axes:

Axis 1. Science: Advancing scientific knowledge in the area of food and health, with a special focus on the prevention of chronic diseases.

Axis 2. Business: Contributing towards the economic development and competitiveness of the food industry via the design and validation of nutritional strategies and food products of proven effectiveness in the prevention and treatment of chronic diseases.

Axis 3. Society: Contributing towards the reduction of healthcare costs and improving the wellbeing of the population through the study of the relationship between diet and health, the execution of communication programmes, and via the dissemination of nutrition advice.

R&D Programmes

IMDEA Food has 5 R&D programmes:

Precision Nutrition and Obesity

The aim of this program is to gain knowledge about how different dietary patterns and specific nutrients modulate the cardiovascular disease risk and related pathologies with emphasis on obesity using two complementary approaches: epidemiological and molecular.

Precision Nutrition and Cancer

Precision Nutrition and Cancer Program addresses different areas of knowledge including the precise (molecular) mechanism of action of bioactive compounds present in foods, the genetic profile and its impact in the personal susceptibility to develop cancer and respond to specific treatments, as well as the development of specific strategies for current personal physiological conditions.

Precision Nutrition and Cardiometabolic Health

This PRECISION Program (Personalized Related Energomics and Cardiometabolomics: interactions Involving Inheritance Obesity and Nutrition) is focused on understanding genetic and epigenetic outcomes involved in obesity and cardiometabolic adverse traits and on implementing newer metabolic biomarkers to design Precision Nutrition guidelines.

Precision Nutrition and Aging

The recently created Precision Nutrition and Aging Program at IMDEA Food is focused on the molecular and physiological effects that nutrition exerts on the process of aging. Covering a wide range of biological topics, from the discovery and development of new bioactive products active against aging-related pathologies, to the dissection of different molecular pathways involved in degenerative pathologies, or the study of nutritional interventions with anti-aging properties.

Food Products for Precision Nutrition

The aim of this programme is to validate new food products and nutritional strategies based on discoveries made in the Institute's other programmes. The goal is to bring to society the benefits of research into Precision Nutrition by translating to industry the advances made.

Platforms

IMDEA Food has 3 'strategic platforms' that provide scientific services both internally and to other groups and businesses (national and international), thus contributing to the transfer of scientific and technological knowledge.

Platform for Clinical Trials in Nutrition and Health. GENYAL

This focuses on human nutrigenetic studies. It has its own ethics committee, plus it own nutrition, clinical trials, biostatistics, bioinformatics, genomics and training groups, potentiating its ability to provide scientific services in the area of food and nutrition.

Interactive Centre for Nutrigenomics. CIN

"Nutrition, food and health: from the laboratory to society". This is a multi-topic exhibition with a single aim: to provide visitors with research-derived tools for maintaining a healthy lifestyle through responsible nutrition. Information is made available via the use of video, tactile, structural, mechanical, hands-on and scenographic exhibits.

Cooperative Activity Laboratory for R+D+I. LACID

This provides a collaboration framework for applied research, the development of technology, and innovation, in the field of nutrition, food and health. IMDEA Food and other participating bodies share financial commitments, human resources, spaces and infrastructure in the development of R+D+I projects.

Ethical responsibility

IMDEA Food is conscious of its duty to society regarding the oversight of the research it conducts and its ethical component. The Institute guarantees its respect for the principles adhered to, and bioethical responsibilities recognised by, the scientific community, as outlined in its founding statutes.

2

research, programs, groups and platforms

2.1 Research Program.
Precision Nutrition and Obesity [14]

- Nutritional Genomics and Epigenomics Group
- Neuroendocrinology of Metabolism Group
- Cardiovascular and Nutritional Epidemiology Group

2.2 Research Program.
Precision Nutrition and Cancer [20]

- Molecular Oncology Group
- Clinical Oncology Group
- Molecular Immunonutrition Group

2.3 Research Program.
Precision Nutrition and Cardiometabolic Health [31]

- Cardiometabolic Nutrition Group
- Bioactive Ingredients Food Group
- Epigenetics of Lipid Metabolism Group

2.4 Research Program.
Precision Nutrition and Aging [39]

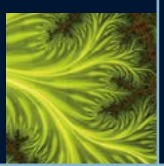
- Metabolic Syndrome Group
- Nutritional Interventions Group

2.5 Research Program.
Food Products for Precision Nutrition [44]

2.6 Research Platform.
Platform for Clinical Trials in Nutrition and Health. GENYAL [47]

2.7 Research Platform.
Nutrigenomics Interactive Center. CIN [56]

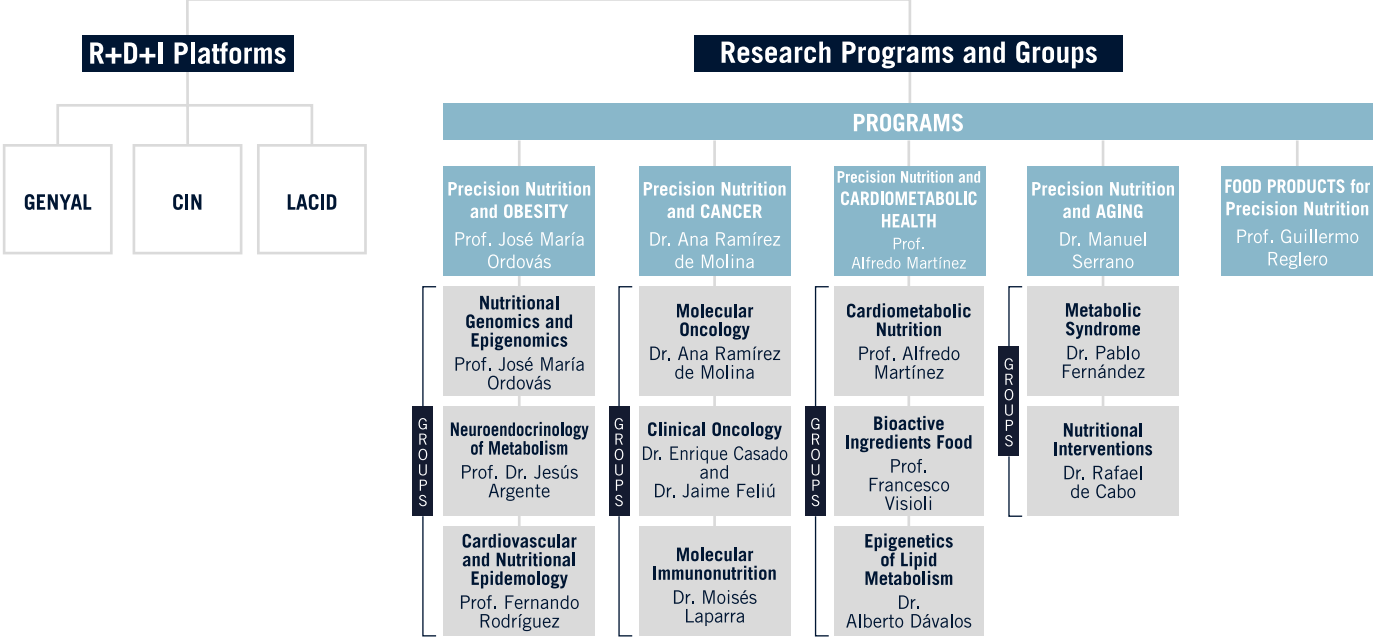
2.8 Research Platform.
Cooperative R + D + I Laboratory. LACID [59]



In 2016 a new organizational research structure based on thematic programs has been established, whose specific objectives are addressed by specialized research Groups and 3 scientific Platforms:

- **Research Program. Precision Nutrition and Obesity**
  - Nutritional Genomics and Epigenomics Group
  - Neuroendocrinology of Metabolism Group
  - Cardiovascular and Nutritional Epidemiology Group
- **Research Program. Precision Nutrition and Cancer**
  - Molecular Oncology Group
  - Clinical Oncology Group
  - Molecular Immunonutrition Group
- **Research Program. Precision Nutrition and Cardiometabolic Health**
  - Cardiometabolic Nutrition Group
  - Bioactive Ingredients Food Group
  - Epigenetics of Lipid Metabolism Group
- **Research Program. Precision Nutrition and Aging**
  - Metabolic Syndrome Group
  - Nutritional Interventions Group
- **Research Program. Food Products for Precision Nutrition**
- **Research Platform. Platform for Clinical Trials in Nutrition and Health. GENYAL**
- **Research Platform. Nutrigenomics Interactive Center. CIN**
- **Research Platform. Cooperative R + D + I Laboratory. LACID**

PROGRAMS, GROUPS AND R+D+I PLATFORMS IN HEALTH AND FOOD



2.1 Research Program. Precision Nutrition and Obesity

Director: Prof. José María Ordovás Muñoz

Objectives: diet and exercise play an important role in the development and treatment of obesity and its comorbidities; however, it is well known that there is a dramatic inter-individual variability in the response to any therapeutic diet or physical regime aimed to prevent obesity and/or return to a healthy body weight. In order to understand an individual's susceptibility to becoming obese and their responsiveness to weight loss interventions we need to generate new knowledge at the molecular level using the tools provided by genetics and epigenetics as well as other omics, such as metabolomics. Most important in the current obesity epidemics is the fact that obesity begins early in life; therefore is of paramount importance that we understand the neurobiological factors that drive childhood obesity in order to decrease the current rates both at early ages as in the aging population. It is precisely the later group that is being most seriously affected by the comorbidities of obesity (i.e., diabetes, cardiovascular diseases and cancer); therefore, until such time that the developments of Precision Nutrition, in particular, and precision medicine in general, provide the means to prevent those diseases we need to develop better measures to improve the quality of life of those already in the elderly category and this can be done with the information provided by longitudinal cohorts designed to provide solid information about the current risk factors and facilitate the pathway to a healthy aging.

precision,
nutrition
and obesity

Nutritional Genomics and Epigenomics Group

Group leader: Prof. José María Ordovás Muñoz

Objectives: our group aims to provide genomic tools and knowledge to manage obesity and related comorbidities at the individual level through:

1. The identification of genetic variants predisposing to obesity.
2. The definition of how these variants interact with the diet to modulate such predisposition.
3. The understanding of the dietary modulation of the how diet is able to modulate the obesogenic epigenome.

Members:

Dr. Lidia A. Daimiel Ruiz
Postdoctoral researcher

Silvia Berciano Benítez
Predoctoral researcher

Víctor Micó Moreno
Predoctoral researcher

Laura Berninches Pintado
Technician

Javier Tapia Belloso
Technician

Students:

Patricia Ortiz Leal
Paula Martínez Oca
Marta Bueno Tarodo
Elena Dueñas Martín
Joaquín García Cordero
Laura Antón Marcos
Laura Mariella Pietrantonio Milocco
María Aguirre Lozano
Raquel Aguado Puertas
Javier Tapia Belloso
Joaquina Gabella de Prado
Carmen Fernández Márquez
José Antonio Celada Guerrero

Prof. José María Ordovás Muñoz

Director of the Precision Nutrition and Obesity Program and Group leader of the Nutritional Genomics and Epigenomics Group

José M. Ordovás, PhD, is Professor of Nutrition and Genetics and a Senior Scientist at the USDA-HNRCA at Tufts in Boston, and Director of the Nutrition and Genomics Laboratory. Dr. Ordovás graduated from the University of Zaragoza and did postdoctoral work at the MIT, Harvard and Tufts. He has published over 700 scientific articles in peer review journals (h-index 92) and written numerous reviews and books. In this regard, he is considered one of the most distinguished world experts in gene-diet interactions related to cardiovascular traits. Throughout his career, Dr. Ordovás has received multiple honors for his scientific achievements. He has been awarded an honorary degree in Medicine from the University of Córdoba in Spain and he is Member of the Royal Academies of Sciences, Medicine, Nutrition and Pharmacy.

Dr. Lidia A. Daimiel Ruiz

Postdoctoral researcher

Dr. Lidia Daimiel Ruiz graduated in Biology at Universidad Autónoma de Madrid where she carried out postgraduate studies about the genetic and epigenetics alterations associate with colorectal cancer onset and progression, under the supervision of Prof. Juan José González Aguilera and Prof. Mª Antonia Fernández. The studies conducive to her PhD were developed at Hospital Ramón y Cajal and were focused in the study of cholesterol-mediated gene regulation, under the supervision of Dr. Javier Martínez-Botas. She joined IMDEA Food in 2011 to carry out her postdoctoral research under the supervision of Prof. Jose Mª Ordovás. Her research at IMDEA Food focuses on the dietary modulation of the epigenetic mechanisms associate with cardiovascular disease. Along her career, she has published her results in international peer-review journals of the first quartile and high impact. Additionally, she carries out teaching activities as Associate Professor at Universidad San Pablo CEU. In the last years, Dr. Lidia Daimiel has joined to the prestigious consortium PREDIMED-PLUS as Principal Investigator at IMDEA Food, is supervising PhD Thesis and has performed a postdoctoral stay as Visiting Professor of the Vascular Biology and Therapeutics program at Yale University.

Silvia Berciano Benítez

Predoctoral researcher

Silvia Berciano Benítez obtained her first class BSc (Hons) Molecular Biology and Genetics degree from the University of Westminster (2013) and a Master's degree in Agricultural Chemistry and Novel Foods from the Universidad Autónoma de Madrid (2014). During the final years of her undergraduate education, Silvia investigated the relationship between BMI and Differentially Methylated Regions (DMRs) within the HTR2C gene promoter, gaining a keen understanding of how epigenetic mechanisms can potentially modulate mood, behavior and health. Silvia also undertook volunteering laboratory roles during the summer months, designing novel genetic constructs to target Cancer Stem Cells. In November 2013, Silvia joined Prof. Ordovás' group at IMDEA Food as a predoctoral researcher, where she currently investigates genetic and epigenetic mechanisms associate with executive functions affecting dietary habits, with emphasis on inhibitory control.

Víctor Micó Moreno
Predoctoral researcher

Victor Micó Moreno studied at Complutense University of Madrid where he completed his degree in Human Nutrition and Dietetics (2010). Later, at Balearic Islands University, he completed the Nutrigenomics and Personalized Nutrition Master (2011) where he presented his final project: "Maternal caloric restriction during lactation can affect muscle metabolism in the offspring depending on gender and diet". Finally, at Autónoma University of Madrid, he completed his degree in Food Science and Technology (2013). In 2014, Víctor was awarded the XIV Manuel de Oya scholarship for the project: "Influence of beer consumption on circulating microRNAs related to cardiovascular health. "Exogenous beer microRNAs as health-promoting agents". In April 2014, Víctor joined IMDEA Food Insitute's in the Nutritional Genomics and Epigenomics Group as a predoctoral researcher where he currently studies the effect of Caloric restriction on epigenetic mechanism and their influence on cardiovascular health and healthy aging.

Laura Berninches Pintado
Technician

Bacherlor's Degree of Science in Physical Activity and Sports and bachelor's degree in Human Nutrition and Dietetics granted in the Universidad Autónoma de Madrid. Expert in diagnosis, treatment and management of obesity by the UNECertified ISAK (International Society for the Advancement of Kinanthropometry). Throughout his academic and professional career she has carried out various activities related to nutrition, physical activity, sport and health. She has collaborated with various public and private entities. As well she has participated as a member of the research team on the project "Evaluation of physical activity, fitness, anthropometry and body composition, and its relationship with diseases related to sedentary lifestyles" awarded by the Spanish institution Ministerio de Educación y Ciencia. She is the author with other professionals of the published guide economic and healthy food, the NGO. (Nutrición Sin Fronteras).In 2015 she joined IMDEA Food as a nutritionist in the Nutritional Genomics and Epigenomics Group. Her work focuses on the study PREDIMED-PLUS "Effect of study of life based on a traditional Mediterranean diet with energy restriction, physical activity and behavioral therapy for the prevention of cardiovascular disease".

Javier Tapia Belloso
Technician

Diploma in Human Nutrition and Dietetics from the University of Zaragoza. Currently Graduated in Physiotherapy from the Universidad Europea de Madrid.
Expert in Sports Nutrition and High Performance by the School of Sports Medicine of the Universidad Complutense de Madrid. Certified as Cineanthropometrist by ISAK (International Society for the Advancement of Kinanthropometry). Director and Coordinator of Leisure Time Educational Activities and Expert in School Dining, has participated in the planning of menus and nutrition education programs aimed at children.
He has collaborated in A.D. Alcorcón SAD, coordinating the Nutrition Area of the base football. Likewise, he has worked as Dietician-Nutritionist in the private clinic.
In 2016 he joined IMDEA Food as a nutritionist in the Nutritional Genomics and Epigenomics Group. His work focuses on the study PREDIMED-PLUS "Effect of an intensive lifestyle intervention based on a traditional Mediterranean diet with energy restriction, physical activity and behavioral treatment on the prevention of cardiovascular disease.

instituto imdea food

Neuroendocrinology of Metabolism Group

Group leader: Prof. Dr. Jesús Argente Oliver

Objectives: our strategic objectives are as follows:

1. To understand the causes of childhood obesities, including epigenetics, genetics, genomics and metabolomic influences.
2. To investigate the interaction between genetics and nutrition on metabolic and health outcomes.
3. To analyze comorbidities in children with severe early onset obesity.
4. We use animal models to try to understand the effects of early nutrition and hormonal changes on long-term metabolic health. At a cellular level, we are interested in how the brain, especially glial cells, respond to specific nutrients to affect metabolism and neuroinflammation.

Prof. Dr. Jesús Argente Oliver

Professor and Director of the Department of Pediatrics at the Universidad Autónoma de Madrid. Director of the Department of Pediatrics, Chairman of the Department of Pediatric Endocrinology and Director of the Laboratory of Research, Niño Jesús University Hospital

Associate researcher, IMDEA Food

Group leader of the Neuroendocrinology of Metabolism Group

He is Full Professor and Director of the Department of Pediatrics at the Universidad Autónoma de Madrid, Director of the Department of Pediatrics and Chairman of the Department of Pediatric Endocrinology and Director of the Laboratory of Research at the Niño Jesús University Hospital in Madrid, Spain and is IP in the CIBER of Obesity and Nutrition, being the leader of the childhood obesity program.
He obtained his medical degree at the University of Zaragoza and completed his pediatric residency at the Hospital Ramón y Cajal in Madrid and has worked at the Hospital Saint Vincent de Paul in Paris, France, the University of Virginia in Charlottesville, VA, USA and at the University of Washington in Seattle, WA, USA. His main research interests include childhood obesity, pathophysiology of human growth, puberty, eating disorders and diabetes.
He has published more than 300 original articles and has lectured in more than 30 countries. He is past president of the European Society for Pediatric Endocrinology (ESPE) and past president of the Spanish Society for Pediatric Endocrinology (SEEP). He has obtained multiple national and international awards for his research.

Cardiovascular and Nutritional Epidemiology Group

Group leader: Prof. Fernando Rodríguez Artalejo

Objectives: our strategic objective is to produce relevant information to support clinical and population-based policies aimed at controlling cardiovascular diseases and their functional adverse outcomes. Specifically we work on the following research areas:

1. Nutritional and omic determinants of frailty and functional status in the older adult.
2. Diet and physical activity as determinants of obesity and cardiovascular risk in the elderly.

The results of our studies have been incorporated into the National Strategy for Ischemic Heart Disease Control, the National Strategy for Obesity Prevention and Control, and the National Strategy on Disease Prevention and Health Promotion, elaborated by the Ministry of Health of Spain. Our group aims to provide genomic tools and knowledge to manage obesity and related co-morbidites at the individual level through:

1. The identification of genetic variants predisposing to obesity.
2. The definition of how these variants interact with the diet to modulate such predisposition.
3. The understanding of the dietary modulation of the how diet is able to modulate the obesogenic epigenome.

Prof. Fernando Rodríguez Artalejo

Professor of Preventive Medicine and Public Health, Medical School of the Universidad Autónoma de Madrid
Associate researcher, IMDEA Food
Group leader of the Cardiovascular and Nutritional Epidemiology Group

Fernando Rodríguez Artalejo, MD, PhD, is Professor of Preventive Medicine and Public Health at the Medical School of the Universidad Autónoma de Madrid. Dr. Rodríguez Artalejo graduated from the Universidad Autónoma de Madrid and received postgraduate training in the La Paz University Hospital, the Institute of Health Carlos III and the Spanish Ministry of Health in Madrid, as well as in the London School of Hygiene and Tropical Medicine and the Johns Hopkins Bloomberg of Public Health in Baltimore. He has published over 400 scientific articles in peer-reviewed journals (h-index 51) and contributed to many policy documents on health planning and evaluation and on prevention and control of obesity and cardiovascular disease. He has received the Carles Martí Henneberg award to a scientific career on Nutrition Research, the Ciril Rozman award of the Spanish Society of Internal Medicine, the Silver Medal of the National Plan on Drug Addiction, and the Encomienda de la Orden Civil de Sanidad. Dr. Rodríguez Artalejo has been a member of the Scientific Committee of the Spanish Agency of Foods Safety and Nutrition, and currently serves in the European Advisory Committee of Health Research of the World Health Organization and in the Expert Panel of the European Joint Action on Prevention of Frailty (ADVANTAGE).

2.2 Research Program. Precision Nutrition and Cancer

Director: Dr. Ana Ramírez de Molina

Objectives: according to the most recent data published by leading authorities, a high percentage of cancer cases may be preventable. Diet and life style are key factors in cancer prevention, but also exert essential function as coadjutants for cancer patients during and after therapy. Metabolic reprogramming is a hallmark of cancer in which nutritional strategies might play a key role. Thus, it is necessary to develop personalized treatments based in molecular and metabolic alterations, combining complementary precision medicine and nutrition. We understand Precision Nutrition for cancer as highly efficiency products and strategies personalized for specific physiological conditions and population groups. This new way of understand Nutritional Sciences addresses different areas of knowledge including the precise (molecular) mechanism of action of bioactive compounds present in foods, the genetic profile and its impact in the personal susceptibility to develop cancer and respond to specific treatments, as well as the development of specific strategies for current personal physiological conditions.

Molecular Oncology Group

Group leader: Dr. Ana Ramírez de Molina

Objectives: the group is currently focused on three research topics:

1. Lipid metabolism disorders in cancer: identification of new biomarkers and therapeutic targets in diet-related tumors.

In this subject, the work of our group mainly focuses on the analysis of lipid metabolism alterations in cancer. Most specifically, we aim at studying the special energetic and structural requirements of tumor cells as well as identifying novel biomarkers of progression and response to therapy, which may represent new therapeutic targets.

To this end, in close collaboration with the divisions of Medical Oncology from several hospitals, we analyze clinical samples from cancer patients using state-of-the-art genomic approaches. Gene expression analysis, identification of gene variants and epigenetic regulation by microRNAs of lipid metabolism pathways are then used to study their association with the clinical outcome of the disease. Furthermore, we perform functional studies both using conventional and three-dimensional cell culture such as organoids, and animal models to investigate the role of identified genes and microRNAs. We are especially interested in identifying metabolic profiles associated to the disease progression and analyzing their role from in-vitro cell systems to cancer patients. These analyses are mainly focused on the identification of metabolic pathways and distinctive oncometabolites that may constitute novel markers and targets for the development of future cancer therapies, as well as the genetic basis of the relationship between obesity, associated metabolic disorders and cancer.

2. Activity and mechanism of action of bioactive compounds as potential effective dietary supplements in cancer prevention and treatment.

We evaluate the activity and molecular mechanism of action of bioactive compounds that may have a therapeutic use in cancer, either alone or in combination with existing chemotherapy. The aim is to establish the scientific basis for the development of nutritional supplements that may exert a beneficial effect on the disease.

In close collaboration with the Bioactive Food Ingredients Group from the Research Institute of Food Science (CIAL, CSIC-UAM), we design and characterize different formulations of bioactive compounds. We combine genomics and functional studies in cell lines and intestinal organoids to determine the effect and target populations for personalized therapeutic use of these formulations. These products are further evaluated in animal models and finally, in clinical trials in healthy volunteers or cancer patients. Recently, we have evaluated the antitumor effect of a supercritical extract of rosemary approved as safe for human use by EFSA. Such extract inhibits proliferation, induces cell death, and potentiates the effect of chemotherapy, both in sensitive and resistant colon cancer cells. Its formulation for human consumption shows an immunomodulatory effect in healthy volunteers and it is currently being used in a phase-I clinical trial in cancer patients.

instituto imdea food

Members:

Dr. Teodoro Vargas Alonso
Postdoctoral researcher

Dr. Ruth Sánchez Martínez
Postdoctoral researcher

Dr. Marta Gómez de Cedrón Cardeñosa
Postdoctoral researcher

Dr. Cristina Aguirre Portolés
Postdoctoral researcher

Dr. Lara P. Fernández Álvarez
Postdoctoral researcher

Dr. Juan Moreno Rubio
Postdoctoral researcher

Jorge Martínez Romero
Predoctoral researcher

Silvia Cruz Gil
Predoctoral researcher

Visiting researchers:

Dr. Elena María Arranz Gutiérrez
University of Guelph(Canada)
Food Science Department

Students:

Jesús del Barrio Morán
Marta Blanco López
Amanda Sousa
Diego Portillo Liso
Irene Marina Beltrán de Heredia Anguita

Dr. Ana Ramírez de Molina

Deputy Director, Director of the Precision Nutrition Program and Group leader of the Molecular Oncology Group

Dr. Ana Ramírez de Molina has developed her scientific career in the field of lipid metabolism, molecular oncology, nutrition and cancer. She has worked as an associated researcher in the Traslational Oncology Unit CSIC-UAM-La Paz Hospital (Madrid), and has performed long postdoctoral stays at Cancer Research UK Centre for Therapeutics (London) and the Molecular Pathology Division of the Sloan Kettering Cancer Center (New York). She has published more than 60 scientific articles in her research field, is co-inventor of 6 patents in different phases of exploitation by a biotechnology company and has supervised 6 PhD Thesis. Several of her patents promoted the creation of a spin-off company from CSIC focused on the development of new tumour markers and therapies in Cancer in which she was former Director of Research, Development and Innovation for more than 3 years. She joined IMDEA Food Institute in 2010, where she leads the Programe of Precision Nutrition and Cancer. From 2011 she has been the Coordinator of Research, Development and Transfer, and in 2014 was promoted to Deputy Director of the Institute. In 2002 she was awarded with the prize Young Researchers MSD, in 2003 the extraordinary doctorate recognition as the best Thesis of her promotion in Molecular Biology, and in 2016 the 8th March distinction from the Community of Madrid as an outstanding woman in Science.

Dr. Teodoro Vargas Alonso

Postdoctoral researcher

He obtained his PhD in Biochemistry and Molecular Biology at Universidad Complutense de Madrid in 2010 and has joined to IMDEA Food in 2011 in the Molecular Oncology Group for the study of the effects of bioactive components of food on cancer prevention in the research project "Identification of bioactive compounds with anti-tumoral activity in human cancer". Actually, he has working in the identification of genetic markers as predictive factors in the prognosis/ diagnosis of patients with cancer and in the identification of bioactive compound with anti-tumoral activity for therapeutic use. In the last years he has published 18 articles in prestigious international journals of his research field, and is co-inventor of 1 patent focused on the development of a genetic signature that was able to predict risk of relapse in colon cancer patients.

Dr. Ruth Sánchez Martínez

Postdoctoral researcher

Dr. Ruth Sánchez Martínez, obtained her BSc at the Oviedo University (2001). Her PhD training (2002-2007) was focused on the molecular mechanisms of action of nuclear receptors of thyroid hormone, vitamin D and retinoids under the supervision of Prof. Ana Aranda at the IIB Madrid (CSIC). In 2008 she joined, as a postdoctoral fellow, Dr. Marcos Malumbres group at the CNIO to study the role of new proteins involved in mitotic exit regulation of importance in cancer therapy using genetically modified mice. She also studied microRNA regulation of several important cell cycle regulators. In the last years she has published several articles in prestigious international journals and she took part in both national and international research grants and consortiums. In 2012 she joined IMDEA to study new biomarkers and bioactive compounds in human cancer.

Dr. Marta Gómez de Cedrón Cardeñosa

Postdoctoral researcher

Dr. Marta Gómez de Cedrón, obtained her Bachelor's degree in Biological Sciences (BSc) at the University of the Basque Country (UPV-EHU). Her PhD training was performed at the National Centre of Biotechonology (CNB-UAM-CSIC) under the supervision of Dr. Juan Antonio García Álvarez "Enzymatic characterization of cylindrical inclusion protein (CI) of Plum Pox Virus". In 2005 she moved as a postdoctoral researcher (Fullbright Grant) to the Institute for Biological Sciences (IBS-NRC) in Canada at Danica Stanimirovic's lab. Her research aimed to elucidate the role of mutants of Grb7 mutants in the stimulation of angiogenesis in glioblastomas. In 2006 she joined Dr. Marcos Malumbres' group at the Spanish National Cancer Research Centre (CNIO). During this period, she worked in mouse models for depletion (cKO) and overexpression (iKI) of microRNA-203 and its role in skin cancer and leukaemias. In 2013 she joined Ana Ramírez de Molina's lab at IMDEA Food Institute (Molecular Oncology Group). Her interests are the study of (1) Cell Metabolism alterations (specifically lipid metabolism) in Chronic Diseases related to Nutrition, and (2) the characterization of the Biological Activities of Bioactive Compounds and Plant derived Extracts to be used as supplements in the prevention/treatment in human cancer.

Dr. Cristina Aguirre Portolés
Postdoctoral researcher

Dr. Cristina Aguirre Portolés, BS in Biology at Autonoma University in Madrid, started her scientific career at the Spanish National Cancer Institute in 2006. Her studies were mainly focused in the role of the mitotic protein TPX2 both in mouse development and tumorogenisis in adults. Part of this research was performed at the Max Plank Institute of Molecular Cell Biology and Genetics under the supervision of Dr. Anthony Hyman.
After obtaining her PhD degree in Molecular Biology and Genetics she joined the European Molecular Biology Laboratory (EMBL) in 2012. She focused her work in the implication of chromosomal instability in the initiation, progression and regression of non-small-cell lung cancer (NSCLC). She joined IMDEA in 2014 as a postdoctoral researcher focusing her studies in the association between metabolic syndrome, obesity and cancer.

Dr. Lara P. Fernández Álvarez
Postdoctoral researcher

Lara P. Fernández Álvarez, obtained her PhD in Biochemistry, Molecular Biology and Biomedicine from the Autonoma University of Madrid (UAM) and the Spanish National Cancer Research Centre (CNIO), Spain, in 2009. Her thesis focused on the characterization of genetic susceptibility to malignant melanoma. Since 2010, she has conducted postdoctoral research at the Molecular and Cell Biology of the Thyroid group in the Biomedical Research Institute (IIBm-CSIC-UAM), in Madrid. In December 2014 she joined IMDEA Molecular Oncology Group.
She has a solid professional experience in the biology of cancer, molecular endocrinology, transcription factors and thyroid signalling pathways, as well as human genetics, cancer susceptibility and oncogenes. Additionally, she has published several research articles in the field of thyroid, melanoma, and breast cancer.

Dr. Juan Moreno Rubio
Postdoctoral researcher

Currently Juan Moreno Rubio combines his work as a collaborator in the group of Molecular Oncology of IMDEA Food with the coordination of the Precision Oncology Laboratory (POL) of the Infanta Sofia University Hospital. Previously, he coordinated the Laboratory of Translational Oncology of La Paz Hospital (IdiPAZ, Group 32) and performed his doctoral thesis (Excellent Cum Laude) in the Osteoarticular Pathology Laboratory (IISFJD). As a result of this activity has participated in 26 publications in international scientific journals, has taken part in 11 research projects, 7 of these projects financed in competitive public calls. He has been involved in the invention of 2 patents, has directed 2 doctoral theses and he has given numerous communications to international conferences.

molecular oncology group

Jorge Martínez Romero
Predoctoral researcher

Jorge Martínez Romero is currently working on his Doctoral Thesis at the IMDEA Food Institute's Molecular Oncology Group, after completing the Diploma in Human Nutrition, the Degree in Human Nutrition and Dietetics and a Masters in Agricultural Chemistry and Novel Foods from the Universidad Autónoma de Madrid (2014). He holds a Bachelor of Economics Science ICADE E-2 degree from Pontificia University of Comillas (1989), and has led several companies related to the manufacture and assembly of machinery for the food industry. He currently combines his work in the field of research with his business administration.

Silvia Cruz Gil
Predoctoral researcher

Silvia Cruz Gil obtained her Biochemistry Degree at Universidad Complutense de Madrid in 2013. During the last two years of her degree she collaborated with the Biochemistry II Department at Pharmacy School in Universidad Complutense de Madrid studying the molecular biology of hepatocellular carcinoma. Later, she continued her training by obtaining a Master in Molecular Biosciences at Universidad Autónoma de Madrid in 2014. Meanwhile, Silvia joined ALGENEX (Alternative Gene Expression S.L.) in association with I.N.I.A. (National Institute of Agricultural and Food Research and Technology) for an internship. During this period she worked in the development of vectored vaccines. In October 2014, she started studies conducive to her PhD Degree at IMDEA Food Institute in the Molecular Oncology Group. Her research primarily focuses on the role of the lipid metabolism in tumor progression. In April 2016 she obtained a Boehringer Ingelheim Travel Grant to perform a short research stage in the University Hospital Carl Gustav Carus (Dresden, Germany) to learn organoids technique under the supervision of Dr. Daniel Stange.

Clinical Oncology Group

Group leaders: Dr. Enrique Casado Sánz and Dr. Jaime Feliú Batle

Objectives: Cancer is a complex disease, whose characteristics, prognosis and response to different treatments depends on several factors, including the patient's genome, environmental causes such as exposure to contaminants, and microenvironmental causes such as nutritional status or immunological condition of the patient; This complexity makes it imperative that cancer research must be done in a multidisciplinary way and with the joint efforts of many researchers.

Under the premise that diet and lifestyle are key factors in both cancer prevention and treatment, and in close collaboration with the other groups that are part of the Precision Nutrition and Cancer Program, the Clinical Oncology Group focuses its work on research in patient groups that voluntarily accept to participate in the study of new methods of treating cancer. In general, it is accepted that in the last decades the continuous improvement of the results in the treatment of cancer is due to the realization of clinical trials with new drugs. Similarly, our line of research focused in cancer-oriented nutrigenomics aims to deepen in the knowledge of this pathology by studying highly efficiency products and personalized strategies focused on the implementation of a Precision Nutrition that complements individualized cancer treatments. To do this, we design and carry out clinical trials and nutritional studies that seek to find better ways to prevent, diagnose and treat cancer.

Members:

Dr. Ana María Jiménez Gordo
Oncologist Infanta Sofía University Hospital

Dr. César Gómez Raposo
Oncologist Infanta Sofía University Hospital

Dr. María Sereno Moyano
Oncologist Infanta Sofía University Hospital

clinical oncology group

Dr. Enrique Casado Sánz

Director of the Medical Oncology Department, Infanta Sofía University Hospital and Oncology Coordinating Professor of Oncology, European University of Madrid
Associate researcher, IMDEA Food
Group leader of the Clinical Oncology Group

Enrique Casado finished his undergraduate studies in Medicine and Surgery (1992) and Biohealth Sciences (1993) in Complutense University of Madrid (Universidad Complutense de Madrid) (UCM). He obtained the Degree of Doctor of Medicine (1994) with Extraordinary Prize granted by UCM. He did his medical residency in La Paz University Hospital (Hospital Universitario de la Paz) (1993-97) and Master's Degree in Palliative Care (1997) in Universidad Autónoma de Madrid (UAM), in combination with extended postdoctoral internships in University of Alabama (Birmingham) and University of California (San Francisco). He was the attending physician of Medical Oncology in gastrointestinal and thoracic cancer and laboratory coordinator for the Translational Oncology Group of Hospital Universitario de la Paz (Madrid), He is an associate professor of UAM and visiting professor of UCM. He is currently the Director of Medical Oncology Department at the Hospital Universitario Infanta Sofía de Madrid and a Coordinating Professor of Oncology in the Universidad Europea de Madrid. He has received 7 awards in recognition of his research work from institutions as prestigious as the American Society of Clinical Oncology.

Dr. Jaime Feliú Batlle

Director of the Medical Oncology Department, La Paz University Hospital and Professor of Oncology in the Medicine Faculty and Director of Master's Degree in Palliative Care and Treatments for Cancer Patient Support at Universidad Autónoma de Madrid
Associate researcher, IMDEA Food
Group leader of the Clinical Oncology Group

Dr. Jaime Feliú Batlle holds a Degree in Medicine and Surgery from Universidad Complutense de Madrid issued in 1982. He specialized in Medical Oncology in Hospital Universitario de la Paz, where he is currently the Director of Medical Oncology Department. He is a professor of Oncology in the Medicine Area of Universidad Autónoma de Madrid (UAM) and Director of Master's Degree in Palliative Care and Treatments for Cancer Patient Support of UAM. Furthermore, he is the current president of the Multidisciplinary Spanish Group of Digestive Cancer (GEMCAD).He has participated as a principal investigator or co-investigator in more than 70 phase I, II and III trials. He has written or co-written more than 200 articles for national and international journals, more than 60 book chapters and has presented a large number of communications in national and international congresses.

Dr. Ana María Jiménez Gordo

Oncologist Infanta Sofía University Hospital
Associate researcher, IMDEA Food

Dr. Ana M. Jiménez Gordo. Graduated in Surgery and Medicine at Universidad Autonoma Madrid (1994). Specialty in Medical Oncology at Hospital Universitario La Paz (1998). PhD in Medicine at Universidad Autonoma Madrid (2004). Master in Palliative Care of Neoplastic Patient at Hospital La Paz (1998). Master in Molecular Oncology at CNIO (2009). Associate Profesor in Oncology at Universidad Europea Madrid from 2013. She has worked as Medical Oncologist in Hospital La Paz (1990-2000). Hospital Alcorcon (2000-2005). Hospital Getafe (2005-2013). Hospital Infanta Sofía from 2013. Pfeizer Fundation Prize, Clinical Investigation 2012. She has more tan 80 national and international publications, congress communications and book chapters. She is member of Spanish Society of Clinical Oncology and has collaborated in several work groups of long cancer survivors, translational investigation, geriatric Oncology and doing some Clinical Guideliness. Recently she collaborates in clinical developmentof the IMDEA Project “Clinical Formulation por individualized nutrition of cáncer patients”.

Dr. María Sereno Moyano

Oncologist Infanta Sofía University Hospital
Associate researcher, IMDEA Food

María Sereno finished her undergraduate studies in Medicine and Surgery (1999) in Universidad Autónoma de Madrid (UAM). She did her medical residency in La Paz University Hospital (2000-2003) and a Master’s Degree in Palliative Care (1997) in Universidad Autonoma de Madrid (UAM). She obtained the Degree of Doctor of Medicine (2005). She did a postdoctoral internship in Thoracic Program with Prof. S. Antonia in Moffit Comprenhensive Cancer Center in South Florida University (Tampa, Florida). She did a Master’s Degree in Molecular Oncology in the Oncology Research National Cancer Institute (2007-2009) in Madrid and another Master’s Degree in Immuno-oncology in Medical Department in Alcalá University (2017). She was the attending physician of Medical Oncology in Gastrointestinal and Thoracic Cancer unit from 2004-2008 and then, she moved to Infanta Sofía University Hospital (San Sebastian de Los Reyes, Madrid), where she is working in Thoracic and Genitourinary Tumors section. She is associate professor in European University of Madrid (UEM) since 3 years ago. She had published several papers and has participated in different traslational oncology projects, some of them with public support, as FIS and Plan Nacional.

Dr. César Gómez Raposo

Oncologist Infanta Sofía University Hospital
Associate researcher, IMDEA Food

César Gómez Raposo obtained his Medicine Degree at Universidad Autónoma de Madrid in 2002 and later his Medical Oncology speciality at Hospital Universitario La Paz in 2007. He performed his doctoral thesis (Excellent Cum Laude) in 2012 focused on ovarian cancer. Since 2008 he worked as medical oncologist at Hospital Universitario Infanta Sofía in San Sebastián de los Reyes, mainly in breast and gynecological cancer. As a result of this activity has participated in more than 25 papers published in peer reviewed medical or scientific journals, and has taken part in international clinical trials in breast and gynecological cancer.

Molecular Immunonutrition Group

Group leader: Dr. Moisés Laparra Llopis

Objectives: immunonutritional-based precision intervention strategies to a selective and driven modulation of innate immune responses preventing/treating the risk for severity of liver-related diseases and antitumoral response (s).

Cereals, legumes and other grains have been shown to contain several different protease inhibitors, which have been assigned to different families on the basis of amino acid sequence similarities. These molecules play important roles as defensive agents against insects and pests, but also potentially deleterious/beneficial effects in human nutrition and immune function. The latter represent greatest stimulus for Dr. Laparra's research. Particularly, his research approaches the naturally powerful immunostimulatory property of toll-like receptors (TLRs) agonists for active immunotherapy against liver metabolic dysfunction and cancer promotion. Here, a better understanding and use of the immunonutritional-mediated TLR activation can greatly impact the functional differentiation and polarization of macrophages, as relevant prognostic biomarkers of tissue damage and tumor progression. Additionally, the selective and driven metabolic programming of antigen presenting cells have important roles in the regulation of CD4+T cells priming as well as immune checkpoint blockade. Thereby, preventing effector CD8+T cells exhaustion and longer anti-tumoral response(s).

A clear example is the activation of intestinal innate immune responses via TLR4 by defined non-gluten members of the α-amylase/trypsin inhibitors family, present in wheat endosperm and the source of flour. Besides, Dr. Laparra's research provided significant contributions demonstrating that defined prebiotic structures modulate TLR4 innate immune responses, but normalizes the plasmatic concentrations of phospholipids, central in the setting of therapeutic effects. Additionally, his research line contributed with effective immunonutritional interventions to promote an anti-inflammatory environment advantageous to CD8+ effector T cells development and reduce hepatic macrophages infiltration. These effects on macrophages, central in coordinating innate immune responses, were associated to changes in the expression of the fatty acid receptor, recently associated to regulation of metastasic penetrance and tumor growth. The extent to which immunonutritional-based modulation can be translated into physiological benefits for large groups of population affected by liver-related diseases is a central objective of this research line.

Members:

Belén García Carrasco
Laboratory technician

molecular immunonutrition group

Dr. Moisés Laparra Llopis

Group leader of the Molecular Immunonutrition Group

José Moisés Laparra Llopis holds a PhD in Pharmacy gained during his stay at the High Research Council of the Spanish Government. His scientific career is focused on the field of intestinal homeostasis and the cross-talk within gut-liver axis. The novelty and scientific and social impact of his studies was used by the European Food Safety Authority to establish recommendations concerning staple foods. A continuous contact and interaction with internationally renowned research groups constitutes a constant in Dr. Laparra's career. He held a leading position on prebiotic research awarded by The Fulbright Commission to conduct postdoctoral research in the Food Science Department at Cornell University. Additionally, he participated in teaching activities that end up in a renowned honor thesis awarded by the professional organization for food science and technology professionals in the U.S. This experience favored his incorporation to the Institute of Translational Immunology at the University Medical Center of Mainz University as independent researcher. Dr. Laparra has published over 70 scientific articles and book chapters. He has overseen several precompetitive public funded projects. As senior researcher at IMDEA Food he develops immunonutritional-based precision strategies to tumor suppressioner.

Belén García Carrasco

Laboratory technician

Belén García Carrasco is a laboratory technician of clinical diagnosis. From 2007 to 2009 she worked at the Polytechnic University of Agriculture of Madrid, in the Department of Biotechnology, in the group of Gabriel Salcedo and Araceli Díaz Perales, performing techniques such as ELISAs, HPLC, FPLC, PCR, affinity columns, filtration, activation of T lymphocytes and TH1 TH 2 later response and protein purification. In 2009 she joined the group of Prof. Jesús Cruces at the Faculty of Medicine of the UAM, Department of Biochemistry, where she developed the characterization of promoter regions, protein expression in different cell lines, and participated in the development of gene amplification for mutational screening programs. She also has experience in handling laboratory mice, both, maintenance and genotyping, different methods of phenotyping, nucleic acid extraction from tissue or cryopreservation samples. Since 2011 she works at IMDEA Food as a lab technician, implement efforts to support different research groups at both laboratory and administrative.

2.3 Research Program. Precision Nutrition and Cardiometabolic Health

Director: Prof. Alfredo Martínez Hernández

Objectives: this PRECISION Program (Personalized Related Energomics and Cardiometabolomics: interactions Involving Inheritance Obesity and Nutrition) is focused on:

1. Optimize and appraise available resources and databases from Diogenes; Nugenob, Predimed, Worldmethylepigenome and Preview cohorts to better understand genetic and epigenetic outcomes involved in obesity and cardiometabolic adverse traits.

2. Analyze and implement newer metabolic biomarkers with diagnostic, prognostic and therapeutical potential value including the design and definition of Precision Nutrition guidelines.

3. Investigate with global perspectives the interactions including shared mechanisms and triggering common physiopathological pathways among obesity with liver disease and cancer.

4. Integration of nutriomics and metagenomics approaches to understand the phenotipical interactions and responses to specific nutrients and diets involving nutrigenetic and nutrigenomic outcomes.

instituto imdea food

Cardiometabolic Nutrition Group

Group leader: Prof. Alfredo Martínez Hernández

Objectives: observational, cross-sectional and longitudinal studies have evidenced that obesity rates and associated complications such as type 2 diabetes, dyslipidemia, liver steatosis and cardiovascular events are continuously rising as a health burden with increasing costs. In this context, subjects elicit variable responses to the dietary intake depending on phenotypical and genotypical factors whose understanding is helping to provide Precision Nutrition management. Nutriomics offer a huge prospect to feature and assess the variety in the reactions to diverse nutritional therapies as well as for medical applications.

Research on candidate genes together with Genome Wide Association Studies (GWAS) and meta-analyses of GWAS have characterized a number of polymorphisms associated with cardiometabolic and liver related adverse features, while nutrigenetics is involved in the recognition of gene-diet interactions, putatively explaining phenotypical differences accompanying food and dietary consumption.

In addition to discover differences associated to the genetic make-up, transcriptomic strategies measuring mRNAs levels have found that the energy intake plus nutrient contents and quality could affect the expression of genes involved in fuel intermediate metabolism, insulin signalling, lipid turnover, and inflammation in different organs and cells such as liver and adipose tissue . Further studies have revealed the occurrence of epigenetic processes (mainly DNA methylation, covalent histone modifications and miRNAs) that may modulate gene functions and participate in nutrition-related diseases and personalized differences.

The investigation of newer metabolomic biomarkers is essential to progress in the evaluation of patient's metabolic dysfunctions and unhealthy conditions, which will enable to better define health and disease statuses and discriminate responders from non-responders to a given nutritional prescription. Also, metagenomics researches have demonstrated that lifestyle factors such as diet or physical activity can impact intestinal microbiota composition, with possible influence in body weight homeostasis/maintenance, type 2 diabetes, cardiovascular or liver diseases.

Integration in the near future of omics data into Precision Nutrition will allow the implementation of personalised nutritional treatments to prevent and manage chronic diseases and to monitor the individual's response to novel therapeutical interventions.

Prof. Alfredo Martínez Hernández

Director of the Nutrition Research Center, University of Navarra
Professor of Nutrition, Faculty of Pharmacy, University of Navarra
Associate researcher, IMDEA Food
Director of the Precision Nutrition and Cardiometabolic Health Program and Group leader of the Cardiometabolic Nutrition Group

Prof J. Alfredo Martínez holds a PhD Nutrition being also PharmD and MD. He is co-IP and has been involved in several landmark intervention trials such as DIOGENES, SEAFOODplus, NUGENOB, FOOD4ME, PREDIMED and PREVIEW, whose results have been published in the most relevant medical and nutritional journals including NEJM, Lancet, Nature, BMJ, AJCN, Obesity, IJO, JCEM, Diabetology, Trends in Immunology, TIPS, IJO, Cell Metabolism Circulation, etc producing so far more than 20.000 citations. Prof. Martínez has supervised more than seventy PhD students and published more than 600 peer review papers in the areas of Obesity and Nutrition, including precision nutritional omics (H Factor > 60); He has ben president of FESNAD and is currently president of ISNN as well as president elect of the International Union of Nutritional Sciences (IUNS) and has been recipient of several important awards including Hipocrates and Dupont prizes. During his scientific career, Prof. J. Alfredo Martínez has enjoyed training or invited stays at Nothingham, Berkeley, MIT, Harvard, Oxford and King College London as well as being reviewer for different EU Committees and Spanish Organizations such as AECOSAN.

Bioactive Ingredients Food Group

Group leader: Prof. Francesco Visioli

Objectives: the Bioactive Ingredients Food Group is being developing a Ministry of Innovation (MICINN) – funded study on the effects of selected phospholipids in models of aging and cognitive decline. In particular, the group is investigating the nutrigenomic effects of phospholipids isolated from buttermilk and krill oil, via innovative technologies developed in the CIAL (UAM + CSIC Madrid campus). Aging represents an important socio-economic issue, in that the European population is rapidly aging and the health care costs associated with this demographic phenomenon are becoming unbearable. Therefore, there is a strong need to find suitable and effective preventive measures, to lessen the burden of disease and decrease budgetary stress. In particular, aging is associated with cognitive decline, which can become severe and develop into dementia and/or Alzheimer's disease. Given than the brain is the organ richest in lipids (up to 40% in weight), the LabFun thinks it conceivable to supply appropriate phospholipids to maintain and/or restore proper membrane composition, fluidity, and signal transduction. The preliminary results do demonstrate the provision of food-derived phospholipids (formulated through original techniques) are able to ameliorate the synaptic machinery and restore adequate mitochondrial function.

The group employs in vitro and in vivo (including human) approaches to create strong and solid scientific data and foster the formulation of evidence-based nutraceuticals and functional foods.

In addition, the group keeps publishing the results of former projects along with reviews on specific topics, therefore enjoying a strong publication record.

bioactive ingredients food group

instituto imdea food

Members:

Dr. Emma Burgos Ramos
Postdoctoral researcher

Dr. João Tiago Estevao Tomé Carneiro
Postdoctoral researcher

Carmen Crespo Lorenzo
Predoctoral researcher

Students:

Laura Costoso León
Gema Bastante del Palacio
Jorge Llanos Garrido
María Trapero Ruiz
Beatriz Castro Meco
Sara Rollan Esteban

Prof. Francesco Visioli
Group leader of the Bioactive Ingredients Food Group

Francesco Visioli's current currently concerns essential fatty acids, namely those of the omega 3 series and polyphenols, as related to cardiometabolism and cognitive decline. His research ranges from in vitro studies of bioactivity (test tubes, cell cultures) to in vivo tests, performed on laboratory animals and/or humans. Dr. Visioli has a publication record of approximately 250 papers and book chapters, which have been cited over 9.000 times. He gave invited lectures in over 80 meetings. Dr. Visioli is the Editor-in-Chief of PharmaNutrition, the Leader of the Fats and Human Health division of Eurofed Lipid, and member of the EFSA GMO Panel.

Dr. Emma Burgos Ramos
Postdoctoral researcher

Dr. Emma Burgos Ramos got her degree and PhD in Biology from the UAH (2006). For five years, she worked as a postdoctoral researcher at the Laboratory of Endocrinology and Nutrition in HIUNJ. She enjoyed postdoctoral stays at the Universidad Clínica de Navarra and also at the Edison Biotechnology Institute in Ohio University. In 2013, she was incorporated to stem cells and cancer group at the CNIO. In late 2014, she joined IMDEA Food Institute as a postdoctoral researcher at the Bioactive Ingredients Food Group led by Prof. Francesco Visioli, where she is evaluating the effects of polyphenols from extra virgin extra olive oil and other micronutrients on cognitive decline and Alzheimer's disease. Since 2015, she is an associate professor at the Faculty of Environment Sciences and Biochemistry in UCLM. She has published 6 book chapters and 24 articles in international journals of high impact factor related to neurosciences, endocrinology, metabolism and nutrition.

Dr. João Tiago Estevao Tomé Carneiro
Postdoctoral researcher

The research carried out by Dr. Joao Tiago Estevao Tomé Carneiro has been focusing on the biological activity of food constituents in chronic pathologies. He has a degree in biochemistry and he obtained his PhD at the University of Murcia working at CEBAS-CSIC (2013). He is the co-author of 15 peer-reviewed papers in relevant international journals. In 2014, he joined the Bioactive Ingredients Food Group at IMDEA Food, where he contributes to the assessment of the potential health effects of bioactive food components in vitro, in vivo and through placebo-controlled randomized clinical trials. He is currently participating in a research project focused on evaluating if the consumption of bioactive phospholipids, as part of a nutritional supplement, contributes to the improvement or delaying of mild cognitive impairment and its correlation with different biological, clinical or neuropsychological biomarkers.

Carmen Crespo Lorenzo
Predoctoral researcher

Mª del Carmen Crespo Lorenzo has a degree in Molecular and Cellular Biology from the IE University of Segovia (2010). In 2013 she obtained a Master degree in pharmacological research from the UAM. As part of her research activity, she was part of the research project team "Genetic and genomic analysis in patients affected by Gorham-Stout Disease and General Lymphatic Anomalies" at the Hospital Universitario La Paz. In June 2014, she began her Ph.D. program at IMDEA's Bioactive Ingredients Food Group. She is playing a relevant part in nutrigenomic and epigenetic projects with different micronutrients (e.g. Hydroxytyrosol, bioactive phospholipids) performing in vitro, in vivo and placebo-controlled, randomized trials in healthy volunteers to evaluate the possible beneficial effect that these molecules play on chronic diseases and find their molecular targets, in order to find new therapeutic strategies. Her publication record shows 10 papers.

instituto imdeafood

Epigenetics of Lipid Metabolism Group

Group leader: Dr. Alberto Dávalos Herrera

Objectives: cardiometabolic diseases are the main causes of mortality in the world and excess in the diet is one of the main causes of these human diseases linked to our modern life-style. The objective is to understand how different non-coding RNAs regulate lipid metabolism during states of health and disease, developing new strategies, both pharmacological and dietetic, to modulate their function. Pharmacological or dietary modulation of the activity of non-coding RNAs that, ultimately, regulate the metabolism of lipids lead to the prevention or treatment of cardiometabolic diseases.

The increasing prevalence of chronic diseases has prompted a strategic focus on prevention strategies. While Precision (personalized) Medicine strives to provide 'the right therapeutic strategy for the right person at the right time' a distinct approach is needed for disease prevention. Epigenetics of Lipid Metabolism Group also focus on understanding lifestyle modification of the epigenome in order to try to personalize the health of individuals using epigenetics for the development of Precision Nutrition.

This group works to generate new basic knowledge of how non-coding RNAs regulate the metabolism of lipids under physiological and pathological conditions.

To find and evaluate minor dietary components for their ability to modulate the activity of non-coding RNAs associated with the metabolism of lipids. To carry out collaborative projects with the food and pharmaceutical industry to test and develop new dietary supplements or functional foods based on solid scientific knowledge to prevent or treat a variety of lipid metabolism disorders. And, to incorporate the use non-coding RNAs data to develop Precision Nutrition. In this endeavor, the group actively collaborate with many international research groups located at the following institutions: CINVESTAV (Mérida, Mexico), URFJ (Rio de Janeiro, Brasil), IMSERM UMR1011 (Lille, France) and many other national research groups.

epigenetics of lipid metabolism group

Members:

Dr. Maria Jesús Latasa Sada
Postdoctoral researcher

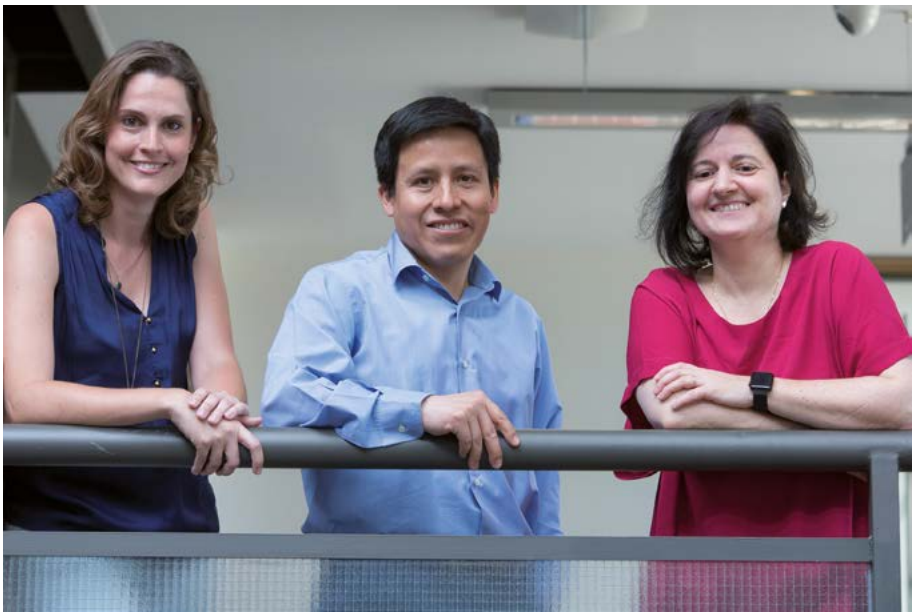
Judit Gil Zamorano
Predoctoral researcher

Visiting researches:

Flavia Brasil Spreafico
University of Rio de Janeiro

Students:

Yolanda Molero Miguel
Ainoa Gómez Díaz



Dr. Alberto Dávalos Herrera

Group leader of the Epigenetics of Lipid Metabolism Group

Dr. Alberto Dávalos holds a degree in Pharmacy and Biochemistry by San Marcos University (Lima) and a PhD in Pharmacy by Universidad Complutense de Madrid (Madrid). He has conducted postdoctoral research at the Hospital Ramón y Cajal (Madrid), at Yale University School of Medicine, (New Haven), and at New York University School of Medicine (New York). Dr. Dávalos's research program focuses in identifying and characterizing new noncoding RNAs (miRNAs, lncRNAs and other type of regulatory RNAs) that regulate lipid metabolism and the effects of minor dietary components (micronutrients) on their expression. Non-coding RNAs have been recognized as critical modulators of cardiovascular system in health and disease. He hopes to: (i) identify new therapeutic strategies through modulating noncoding RNAs levels by the diet or other lifestyle factors to treat dyslipidemia and to prevent atherosclerosis and cardiovascular diseases; and (ii) understand lifestyle modification of the epigenome and personalize the health of individuals using epigenetics (particularly noncoding RNAs) for the development of Precision Nutrition.

Dr. María Jesús Latasa Sada

Postdoctoral researcher

Dr. María Jesús Latasa holds a Pharmacy degree by the University of Navarra and a Ph.D. in Pharmacy, Biochemistry and Molecular Biology section, by the University of Alcalá. Throughout all her professional career, her research field has always been the regulation of gene expression on different tissues and systems, as well as in diverse physiopathological conditions. Thus, her work covers several topics, going from the regulation by various hormones and growth factors of the APP gene, implicated in Alzheimer's disease (IIBM-CSIC-Spain), to gene expression regulation during nervous system development by epigenetic factors (IC and IIBM-CSIC-Spain), and research on the effect of the nutritional state on the regulation of FAS, the central enzyme in lipid synthesis (UCBerkeley-USA). At this moment her scientific interests focus on the effect of diet on the regulation of microRNA and other non-coding RNAs expression. Recently, she has been as well involved in R&D Management activities within the EIT Food.

Judit Gil Zamorano

Predoctoral researcher

Judit Gil Zamorano has a degree in Biotechnology from the Universidad Complutense de Madrid (2011). In 2012 was fellow of the program Starts from IMDEA Food, taking part in the study of the mechanism by which the consumption of DHA reduces the risk of cardiovascular disease, and the analysis of miRNAs that modulate this effect. In 2014 she made a practical stay at the National Center for Microbiology (ISCIII) in Spirochetes and special Pathogens Laboratory, carrying out techniques of extraction, purification and sequencing of DNA, as well as PCR and Reverse Line Blotting for determination of pathogens in human blood samples. Now Judit forms part of the team of Dr. Alberto Dávalos as predoctoral researcher, where she is developing a project based on the screening and characterization of miRNAs that regulates the metabolism of cholesterol and lipoproteins in the enterocyte, and the effect of minor components of the diet on its expression.

2.4 Research Program. Precision Nutrition and Aging

Director: Dr. Manuel Serrano Marugán

Objectives: the recently created Precision Nutrition and Aging Program at IMDEA Food is focused on the molecular and physiological effects that nutrition exerts on the process of aging. Since aging is a complex, multi-organ degenerative process strongly influenced by the genetic background and the environment, our research covers a wide range of biological topics: from the discovery and development of new bioactive products active against aging-related pathologies, to the dissection of different molecular pathways involved in degenerative pathologies, or the study of nutritional interventions with anti-aging properties, such as fasting or calorie restriction.

Headed by Dr. Manuel Serrano, one of the most prestigious Spanish scientist in the fields of aging and cancer, the Precision Nutrition and Aging Department is intensely expanding at the moment. Recently, it has incorporated another of the worldwide best-known aging scientist, Dr. Rafael de Cabo, from the National Institute of Aging, a reference in the study of calorie restriction as a nutritional intervention to lengthen lifespan. Along with these two very important figures, the group of Dr. Pablo J. Fernandez Marcos, focused on nutritional interventions (bioactive products, fasting) to fight obesity, diabetes and aging, form the program.

instituto imdea food

Dr. Manuel Serrano Marugán
Director of the Tumour Suppression Group and Director of the Molecular Oncology Program, Spanish National Cancer Research Center
Associate researcher, IMDEA Food
Director of the Precision Nutrition and Aging Program

Manuel Serrano is a researcher at the Spanish National Cancer Research Centre (CNIO), in Madrid, and Director of the Molecular Oncology Program of the CNIO. After completing his studies and PhD in Madrid, M.S. joined the laboratory of David Beach, at Cold Spring Harbor Laboratory, NY, USA, as postdoctoral fellow from 1992 to 1996. During this time, Manuel Serrano made one of his most important contributions with the discovery of the tumour suppressor p16. Manuel Serrano established his research group, first at the National Center of Biotechnology, Madrid, and since 2003 at the CNIO. The main contributions of the Serrano's laboratory during these years are related to the concept of oncogene-induced senescence and the anti-aging activity of tumor suppressors. More recently, Serrano's group has reported on the relevance of tumor suppressors in metabolic Syndrome, the existence of senescence during embryonic development, and the feasibility of embryonic reprogramming within alive adult organisms (the latter was considered "Achievement of the Year 2013" in the stem cells field by Nature Medicine). The unifying theme of Manuel Serrano's research is to understand and manipulate cellular stress responses in relation to cancer and regeneration.

precision nutrition and aging

Metabolic Syndrome Group

Group leader: Dr. Pablo José Fernández Marcos

Objectives: metabolic syndrome (MS) is a group of pathologies caused by a prolonged imbalance between energy intake and expenditure, and is strongly related to the degenerative process of aging. The main MS-associated pathologies are obesity, diabetes, cardiovascular diseases and cancer, which makes MS one of the main health challenges of developed countries.

This research group is focused on the study and development of nutritional interventions to fight MS and aging. More precisely, we are focused on two main research lines: characterization and development of new bioactive products with evidences of metabolic activity, for which no molecular mechanism is yet known; and the study of the beneficial effects and applications of fasting as a powerful nutritional intervention.

For the first line, we will analyze a battery of pure compounds and extracts from different natural sources, and will measure their effects on essential metabolic processes in obesity and diabetes development, such as insulin signaling, mitochondrial activity, the pentose phosphate pathway or brown fat thermogenesis. Once safety and effectivity of these bioactive products are checked on mice, we can start designing nutritional assays on human volunteers, taking advantage of the nutrigenomic platform at IMDEA Food.

For the second research line, we are currently studying the ability of fasting to enhance anti-cancer chemotherapy treatment, in two ways: first, fasting protects from chemotherapy toxicity; second, fasting potentiates anti-tumor immune responses.

Members:

Dr. Marta Barradas Solas
Postdoctoral researcher

Luís Filipe Costa Machado
Predoctoral researcher

Students:

Patricia Agudo García
Sindy Stefany Paz Martínez
Daniel de la Nava Martín

Dr. Pablo José Fernández Marcos

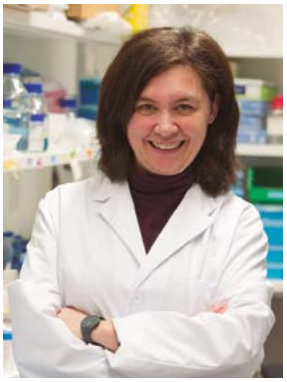
Group leader of the Metabolic Syndrome Group

Dr. Pablo José Fernández Marcos studied Biochemistry in the Universidad Autónoma de Madrid. He obtained his PhD in the laboratory of Dr. Manuel Serrano, at the CNIO, for which he obtained the Special PhD Award and published 8 research articles about mouse models of cancer, metabolism and aging in mice. He them moved to the laboratory of Prof. Johan Auwerx, at the EPFL, Switzerland, studying mouse models of metabolic alterations and achieving 5 publications. He returned to the CNIO after two years at the EPFL, where he combined studies on cancer with research on metabolism, publishing 9 new articles. In December 2015, he was appointed Group leader Metabolic Syndrome Group at IMDEA Food, focused on nutritional interventions against obesity, diabetes and cancer. From this standpoint, Dr. Fernández Marcos has participated in several publications about the potential of molecular drugs and fasting to improve metabolic status and to enhance chemotherapy safety and efficacy. In total, he counts with 29 publications in prestigious journals as Cell, Cancer Cell, Cell Metabolism, Journal of Clinical Investigations, Nature Communications, PNAS or EMBO Journal, 4 of them as co-corresponding author (already from IMDEA Food) and 9 as first author.

Dr. Marta Barradas Solas

Postdoctoral researcher

Marta Barradas joined Manuel Serrano's lab at Centro Nacional de Biotecnología (Madrid) in 1997, where she obtained her PhD in the characterization of Ras-induced senescence in primary cells. In 2003 she moved to UK, where she was working as a postdoctoral researcher in several laboratories. First, in Fiona Watt's labsa at London Research and Cambridge Research Institutes, studying the role of catenin signalling in skin cancer. Then in 2008, she moved to Jesús Gil's lab at the MRC-CSC (London), where she studied the interplay between epigenetics and cancer. In 2011 she moved back to Spain to work in the Cell Signalling Therapies lab of EliLilly at Centro Nacional de Investigaciones Oncológicas, CNIO (Madrid), where she focused on the validation of new metabolic targets for cancer therapy. After a brief stay in the Brain Metastasis Group at CNIO, in December 2015 she joined the Metabolic Syndrome Group at IMDEA Food Institute.



Luís Filipe Costa Machado

Predoctoral researcher

Luís Filipe Costa Machado has a bachelor degree in Pharmacy (2014) and a master's degree in Biomedical Research (2015) both from the University of Santiago de Compostela. In March 2013, he joined the group of neuropharmacology at the University of Bath (UK) where he worked in a research project focused on the study of the genetic bases of depression. During the last months of his undergrad, he also worked at the group of Oncology and Cell Cycle at the Center for Molecular Medicine and Chronic Diseases (CIMUS), to study the role of the transcription factor E2F in neuronal stem cells. During his master's research project, he joined the group of Stem Cells in Cancer and Aging at the Health Research Institute of Santiago de Compostela (IDIS) where he was responsible for the development of high-throughput methods to identify new senescence inducing compounds in tumor cells. In December 2015, he joined Dr. Pablo Fernández group, as a predoctoral researcher, in order to study new approaches to understand and treat metabolic disorders.

Nutritional Interventions Group

Group leader: Dr. Rafael de Cabo

Objectives: the Nutritional Interventions Group applies the knowledge gained in model organisms to translate nutritional interventions to improve or delay the decline of function that occurs with aging. We utilize whole body physiological and tissue-specific molecular approaches to investigate effects of nutritional interventions on basic mechanisms of aging and age-related diseases.

Dr. Rafael de Cabo

Chief of the Translational Gerontology Branch, National Institute on Aging (NIH) (USA)
Associate researcher, IMDEA Food
Group leader of the Nutritional Interventions Group

Rafael de Cabo, PhD is currently the chief of the Translational Gerontology Branch at the National Institute on Aging in Baltimore, Maryland. A native of Cordoba, Spain, he received his B.S. from the University of Cordoba, and his Ph.D. in 2000 from the Department of Foods and Nutrition at Purdue University. Upon completion of his graduate education, he trained as a postdoctoral fellow in the Laboratory of Neurosciences at the National Institute on Aging in Baltimore, Maryland. In 2004, he was appointed as a tenure track investigator in the Laboratory of Experimental Gerontology. His group applies both physiological and tissue-specific molecular approaches to investigate effects of nutritional interventions on basic mechanisms of aging and age-related diseases. Research within his unit strives to identify protective mechanisms invoked by caloric restriction and to evaluate the consequences of dietary interventions on lifespan, pathology, and behavioral function. Dr. de Cabo's research balances the exploration of in vivo rodent, as well as in vitro, paradigms of caloric restriction.

nutritional interventions group

instituto imdea food

2.5 Research Program. Food Products for Precision Nutrition

Director: Prof. Guillermo Reglero Rada

Objectives: the main purpose of this line is to connect with the food industry, building a bridge between molecular mechanistic research and the market through the development of food products for specific health use which either respond to the results generated by the most basic lines of the Institute or are validated using the scientific tools of said lines.

This group is based mainly on human resources and infrastructures outside IMDEA Food provided by Universidad Autónoma de Madrid. For this reason, the Institute has signed a collaboration agreement and, more specifically, within the context of Biocampus Norte de Madrid (BUC) developed by Universidad Autónoma and in which IMDEA Food is integrated, along with other public research centers and companies in the biomedicine sector.

Members:

Dr. Clara Ibáñez Ruiz
Postdoctoral researcher

Dr. María Tabernero Urbieta
Postdoctoral researcher

Lamia Mouhid Al Achbili
Predoctoral researcher

Mónica Gómez Patiño
Laboratory technician

Students:

Azucena Martín Olmos
Daniela Pingarrón Cárdenas

Prof. Guillermo Reglero Rada

IMDEA Food Director and Director of the Food Products for Precision Nutrition Program

Guillermo J. Reglero Rada, PhD in Chemistry (1985). Full Professor of Food Sciences at the University Autonoma de Madrid (1999) and Senior Researcher of Consejo Superior de Investigaciones Científicas, CSIC (on leave). Between 1993 and 1994 he worked as Technical of Industrial Projects for Centro para el Desarrollo Tecnológico Industrial (CDTI). Between 2002 and 2006 he was the Manager of the Food Science and Technology Program of the National Plan of R&D. Between 2005 and 2010 he was a member of the Steering Committee of the UAM-CSIC Instituto de Investigación en Ciencias de la Alimentación, CIAL. Currently he is the Director of IMDEA Food Institute. He works in a research group on food and health. He has directed 6 projects of the National Plan of R&D, 3 projects of industrial R&D Innpacto and 70 projects in collaboration with companies. Since 2005 he has coordinated a Program of Activities in Technology funded in three calls for the Comunidad de Madrid and composed of groups of 10 research centers and hospitals. He has participated in projects of the EU Framework Program, as well as Consolider and Cenit Ingenio 2010 Programs. Currently he is involved in 3 projects of the Strategic National Consortia Program Research (CIEN). He is author over 250 publications of international impact and 3 licensed patents in exploitation. In 2001 he received the Award of the American Oil Chemists Society and in 2008 the Prize of the Spanish Society of Gastrononía as Best Spanish Researcher in Food Science and in 2015 the Fundación García Cabrerizo Award to the Invention.

Dr. Clara Ibáñez Ruiz

Postdoctoral researcher

Clara Ibáñez Ruíz received her PhD in Chemistry with International Mention from the University of Alcala (UAH) in 2013. Her thesis was awarded with the special mention by the UAH and for the Best Doctoral Thesis in Analytical Methods in Biochemistry (Prize Juan Abelló Pascual II) by the Royal Academy of Doctors of Spain. Her scientific career has been primarily focused on the development and application of metabolomic strategies directed towards the search for metabolic biomarkers related to the onset and / or development of different diseases, diagnosis, and preventive effect of food ingredients. She currently works in the IMDEA Food Institute as a postdoctoral researcher with a Juan de la Cierva contract. Her scientific work is reflected in more than 30 publications and in the dissemination of results in more than 30 congresses.

Dr. María Tabernero Urbieta

Postdoctoral researcher

Dr. María Tabernero holds a Biology degree by the University of Salamanca and a PhD in Biochemistry and Molecular Biology by the Universidad Complutense of Madrid. Her professional career combines multidisciplinar research experience in some of the leading global Food Companies (Unilever Research –The Netherlands- and Kraft, currently Mondelèz–France) and public research centers (ICTAN-CSIC and the Hospital La Paz Institute for Health Research). She has been awarded with two Marie Curie Fellowships which have allow her develop her research in the topic of physiological validation of bioactive ingredients and functional foods. She is currently part of an ILSI-Europe taskforce group of experts and is actively involved in the European Project EIT-Food. She joined IMDEA Food in September 2016 as a postdoctoral researcher applying food technology and nutritional sciences for the promotion of health.

food products for precision nutrition

Lamia Mouhid Al Achbili

Predoctoral researcher

Lamia Mouhid obtained her Biotechnology degree at the University of Lleida in 2010, a Master in Administration and Innovation in the Food Industry at the same university, and a Master in Pharmacology at the University Autónoma de Madrid. During 2010 and 2011 she worked at the R&D department in a private company, where she developed a fermented beverage from fruit juice. In 2012, she worked in a pharmaceutical company and in 2013 at La Princesa Hospital and at the University of Montreal, where she studied molecular mechanisms associated with neurodegenerative diseases and the efficacy of neuroprotective drugs. In November 2014, Lamia joined IMDEA Food as a predoctoral researcher, where she is currently developing customized nutritional products for patients with gastric cancer.

Mónica Gómez Patiño

Laboratory Technician

Mónica Gómez Patiño is a senior technician in Analysis and Chemical and Microbiological Control as well as specialist in Instrumental Analysis Techniques. She is currently finishing the degree in Chemistry. She has professional experience in the field of pharmaceutics working in private companies such as Qualicaps Europe and BioMerieux. She also worked in Spain ALK performing various experimental procedures in the field of Biochemistry, using different techniques for the identification, quantification and detection of specific proteins as well as immunology related techniques for the investigation of respiratory diseases. She has five years of experience in Chromatographic Techniques, acquired in different research centers such as the Institute for Research and Agricultural and Food Technology (INIA) and the Center for Biological Research (Higher Council for Scientific Research (CIB-CSIC). She currently works in the IMDEA Food Institute, as a laboratory technician, supporting Food Products for Precision Nutrition Program and the Platform GENYAL and she is also the Director of Biosafety of the Institute. Her contract is funded by the European Social Foundation.State Program of Talent People Promotion from the State Plan of Scientific and Technical and Innovation Research.

2.6 Research Platform. Platform for Clinical Trials in Nutrition and Health. GENYAL

General Director: Prof. Guillermo Reglero Rada
Scientific Director: Dr. Ana Ramírez de Molina
Administrative Director: Inmaculada Galindo Fernández

The Platform for Clinical Trials in Nutrition and Health (GENYAL) constitutes a high-throughput genomic tool with high scientific level useful to investigate how individual human genomes interact with diet constituents and these in turn with the genome. The results of the research provide information about the benefits and harms of specific nutrients and food ingredients on the human health. The application includes both basic and applied research related to gene-diet interactions at the two fields, Nutrigenetic and Nutrigenomic.

GENYAL caters Spanish and foreign research groups working on nutritional genomics, as well as food industry companies, interested in:

- Nutritional intervention studies required for product development or for obtaining official approval of the nutritional and health claims made for products.
- The generation of the information needed to provide added value to new and existing products (e.g., the identification of new indications).
- The identification of (mainly) genetic or metabolic markers involved in the response to product consumption.

The Platform focus its activity on two areas:

1. Nutritional intervention studies to validate the effect of functional foods and food supplements on the general population and by genotypes.

To date more than twenty nutritional intervention studies have been performed to evaluate effectiveness of:

- Prepared dishes enriched with artichoke, olive and grape on overweight and obese people.
- Functional drink enriched with antioxidants on healthy people.
- Functional biscuits enriched with an olive extract on overweight and obese people.
- Olive, apple and grape extracts on people suffering the metabolic syndrome.
- Daily intake of a functional jam enriched with a pomegranate extract on postmenopausal healthy women.
- Daily intake of a functional Mediterranean drink on healthy subjects presenting risk factors for chronic diseases development.
- Formulation of products for personalized nutrition of patients with gastric cancer.
- Interactions between gut microbiota, genotype and dietary polyphenols, in normal-weight, overweight and obese healthy adults.
- Genotypic and phenotypic characterization of patients suffering multiple chemical sensitivity syndrome (MCS) and associated chronic fatigue syndrome (SFC).

2. Permanent recruitment of volunteers.

GENYAL also has a program for characterising the phenotypes and genotypes within populations, allowing a cohort Platform to be constructed for use in clinical trials on nutrition and health. The main objective is to identify and characterize gene variants associated with different responses to nutrients and studying the effects of foods and food constituents on gene expression. Phenotype characterisation includes the gathering of socio-health data, physical activity profiles, anthropometric information and the results of biochemical analyses; geno-type characterisation involves the identification of variants (nucleotide polymorphims and SNPs) of genes involved in nutrient metabolism and nutrition-linked disease. Volunteers are being permanently recruited and as of now more than 1.500 people have been genotypically and phenotphenotypically characterized.

The Platform has its own ethics committee and provides advanced scientific services to researchers and companies via three IMDEA research Units:

- The Nutrition and Clinical Trials Unit
- The Biostatistics and Bioinformatics Unit
- And the Genomics Laboratory

In addition, GENYAL performs functions of specialized training and provide support in the transfer of results, dissemination, communication and outreach.

2.6.1. Nutrition and Clinical Trials Unit

Group leader: Dr. Viviana Loria Kohen

The Nutritional and Clinical Trials Unit undertakes nutritional intervention studies designed to assess the biological activity and health properties of functional foods/bioactive compounds and diets in humans. Both observational and clinical intervention studies involving healthy subjects and those with pathologies can be performed.

The Unit has an intervention/extraction room, two nutritional consultation offices, a room for short-term monitoring, and a room for discussions and conferences on nutritional education.

An independent ethics committee ensures that the rights, safety and wellbeing of trial participants are upheld, by taking into account the methodology of proposed trials, their ethical and legal aspects, and the balance between risks and benefits. This committee is formed by professionals of recognized prestige and experience in research.

Members:

Dr. Rocío de la Iglesia González
Senior nutritionist

Elena Aguilar Aguilar
Senior nutritionist

Isabel Espinosa Salinas
Senior nutritionist

Helena Marcos Pasero
Nutritionist, predoctoral researcher

Students:

Virginia Murillo Guadalix
Beatriz Serrano Polo
Ana Espinosa Ruiz
Elena Borregón Rivilla
Fernando Aguilón Martín
Isabel Estévez Martínez
Amancay Ortega López
Helena Marcos Pasero
Alicia Zaragoza Córdoba

Dr. Viviana Loria Kohen

Nutritionist, senior researcher and Group leader of the Nutrition and Clinical Trials Unit

Dr. Viviana Loria Kohen obtained her Bachelor's degree in Nutrition at Universidad de Buenos Aires, UBA (1996) and completed a Postgraduate Program in Nutrition (1996-1999) (training program similar to MIR in Spain). While living in Spain, she earned a Master's degree in Clinical Nutrition at Universidad Autónoma de Madrid, UAM (2001). Thereafter, she obtained her PhD in Medicine at UAM in 2010. In 2004 she joined the Fundación Biomédica of the Hospital Universitario La Paz (FIHULP) staff, taking part of the Research Group in Nutrition and Functional Food, IDipaz. In March 2012, she joined IMDEA Food and currently, she is Group leader of the Nutrition and Clinical Trials Unit at IMDEA Food. She has authored nutrition education books and has co-authored 27 books. Moreover, she has published more than 50 papers in scientific journals and has presented 85 communications and papers in national and international conferences. She has been professor in Human Nutrition and Dietetics at Escuela de Nutricionistas UBA and participated in teaching activities for the Universidad Nacional de Educación a Distancia (UNED). She is nowadays tutor of practices in UAM and UCM.

Dr. Rocío de la Iglesia González

Senior nutritionist

Dr. Rocío de la Iglesia is BsC in Human Nutrition and Dietetics (UAM, 2008), MsC in Nutrition and Metabolism (UNAV, 2009) and PhD in Food Science, Physiology and Health (UNAV, 2014). She received the Final Master of Higher Scientific Quality Award for her work in the field of a new generation of food for weight management and obesity prevention (CENIT PRONAOS project). During the PhD studies, she specialized in the implementation of clinical trials examining the health effects of different dietary components. This PhD included a period in the HS Nutrition Unit at the University of Reading (U.K) which lead her to obtain the International Doctor Mention. Moreover, she has university teaching experience in the degrees of Pharmacy and Human Nutrition and Dietetics (positive evaluation from ANECA as assistant professor). She has worked on 13 R&D projects, she has co-authored 19 publications and she has presented different communications in national and international congresses.

Elena Aguilar Aguilar

Senior nutritionist

Elena Aguilar Aguilar has a degree in Human Nutrition and Dietetics and a Masters in Food Science and Technology obtained at Universidad Complutense de Madrid (UCM). Currently she's studying her PhD in Nutrition Project at Department of Nutrition and Food Science I of Pharmacology Faculty at UCM. Her work activity has been developed both in research and in the healthcare field and teaching. She was a member of the Research Group in Nutrition and Functional Foods (NUTRINVEST) of Research Institute of University Hospital La Paz (IdiPAZ) and she worked as a nutritionist at University Hospital Santa Cristina in Madrid. She had a placement as a teacher and a tutor in some courses and masters. Likewise, she has written some book chapters and contents for subjects of a degree and postgraduate courses. She has joined on September 2015 to the IMDEA Food Research Institute as a Senior Nutritionist.

nutrition and clinical trials unit

Isabel Espinosa Salinas

Senior nutritionist

Isabel Espinosa Salinas holds a Bachelor of Science degree in Food Science and Technology (2006) and a degree in Human Nutrition and Diet (2004) from Universidad Autónoma de Madrid. She has been involved in Endocrinology and Nutrition Department of "La Paz" and "Puerta de Hierro" Hospitals. She collaborated with Mahou-San Miguel Group for the development of a health and nutrition program in several cities around Spain. In 2010, she joined IMDEA Food and worked on the set up and development of the Platform for Clinical Trials in Nutrition and Health GENYAL. At present, she has more than seven years of experience as nutritionist in the development of more than 15 clinical trials funded by National Projects grantee and in nutritional intervention studies for companies as Biosearch Life or Capsa Food among others. She has teaching experience in nutrition courses and workshops. She has co-authored several publications, classroom books for Fundación Universitaria Iberoamericana and she has also presented different communications in national and international congresses.

Helena Marcos Pasero

Nutritionist, predoctoral researcher

Helena Marcos Pasero has a degree in Human Nutrition and Dietetics from the Universidad Autónoma de Madrid (2010-2014). She completed the interuniversity Master's Degree "NUTRENVIGEN-G + D Factors" in Genetic, Nutritional and Environmental Conditions of Growth and Development from the Universidad de Granada (2015-2016). In 2014 she joined Platform for Clinical Trials in Nutrition and Health GENYAL at IMDEA Food Institute as a Nutritionist, where she collaborates on the development of several clinical trials related to nutrition and genetics. Currently she's studying her PhD in Food Sciences from Universidad Autónoma de Madrid, following the Nutrition Genomics line of research.

2.6.2. Biostatistics and Bioinformatics Unit

The Unit provides resources and personnel specialized in the analysis of phenotype-genotype associations, the identification of biomarkers, the analysis of gene expression microarray data, real time PCR analysis, the functional analysis of differential expression results, and those obtained by next generation sequencing, etc.

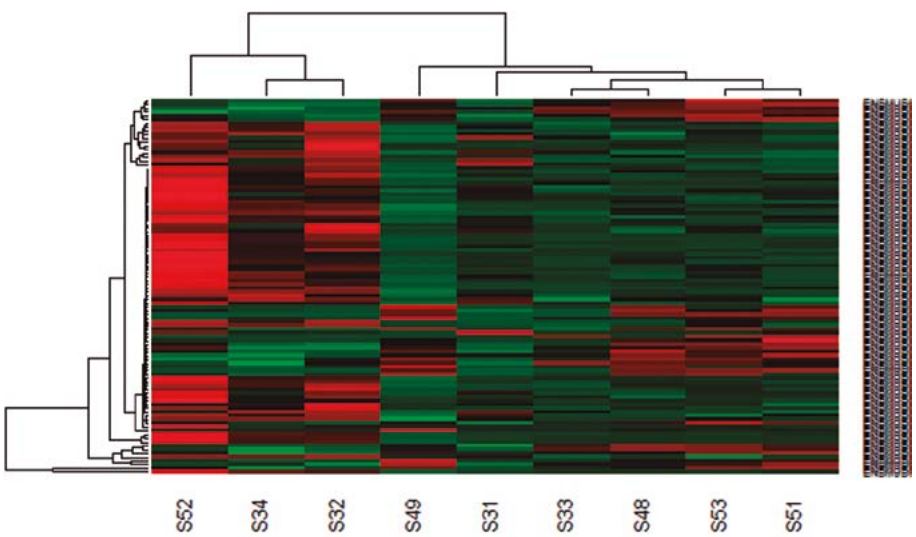
A project control web application has been developed for storing and processing data and monitoring samples pertaining to different nutrition research projects. This application, designed by the IMDEA Food Institute and which uses open source software, can store and manage a large volume of phenotype and genotype data. It also holds anthropometric, medical and biochemical data, as well as validated nutritional questionnaires that can be filled in on-line (greatly facilitating data entry). The recruitment process can also be managed using this application. The entire system dissociates/anonymises all data in keeping with Spanish privacy legislation (Ley Orgánica 15/1999 de 13 de diciembre de Protección de Datos de Carácter Personal).

The Unit organizes specialized training courses and collaborates with the postgraduate program of the Universidad Autónoma de Madrid.

Members:

Jesús Herranz Valera
Biostatistician, senior researcher

Roberto Martín Hernández
Bioinformatic, predoctoral researcher



Heatmap representing the level of expression of the most differentially expressed genes between two experimental conditions.

biostatistics and bioinformatics unit

Jesús Herranz Valera

Biostatistician, senior researcher

Jesús Herranz obtained his degree in Mathematical and Statistical Sciences at the University of Granada. He has worked as Biostatistician to the research Unit of the Clinic Hospital San Carlos in Madrid, in the Molecular Discovery Research GlaxoSmithKline's Basic Research Center in Tres Cantos, and the Molecular and Genetic Epidemiology Group of the Spanish National Cancer Research Center (CNIO). The main research interests of Jesús Herranz are focused on the gene-gene interactions analysis in the GWAS setting, the application of the data mining and statistical learning techniques to genetic data and the extension of these techniques to survival data. He has been Assistant Teacher in the Faculty of Mathematical of the Complutense University of Madrid. Now, he is teaching courses of statistics applied to the biomedical research with R software.

Roberto Martín Hernández

Bioinformatic, predoctoral researcher

Roberto Martín Hernández obtained his Master's Degree of Science in Biochemistry and Biotechnologies at the Université Paul Sabatier (Toulouse, France). He worked as a trainee scientist at Bayer CropScience division (Lyon, France) developing enzymatic assays for high throughput applications. In March 2008 he joined the Computers Architecture Department of the Universidad Complutense de Madrid (Spain) and started to work in the statistical analysis of biological data generated by high throughput technologies. Afterwards he joined the R&D Department of the bioinformatics startup Integromics (Madrid, Spain), where he continued working on massive data analysis generated by transcriptomics and genomics platforms, and he contributed to the development of professional software packages which are still commercialized. He joined the IMDEA Food research Institute on May 2012. With an 8 years' experience in bioinformatics and computational biology, he has co-authored 15 scientific research articles published in international journals. His scientific interests focus on data mining, data integration and deep learning. In addition he is completing the UAM (Madrid) PhD program in Nutrition science as a part-time student.

2.6.3. Genomics Laboratory

Lab manager: Dr. Susana Molina Arranz

The Genomics Laboratory has the necessary infrastructure for providing genetic and genomic services, as well as metabolomic analysis, providing technical and scientific support to researchers and private companies.

This Laboratory is equiped with appropriate devices for sample processing and nucleic acid extraction and quantification, as well as the latest hardware for gene expression and high performance genotyping analysis, such as the latest generation QuantStudio™ apparatus. These devices have different applications, such as digital PCR, DNA fragment analysis, expression/gene quantification analysis, allele discrimination using TaqMan probes, and the detection of SNPs and mutations, etc. In addition, the laboratory has specific equipment for analyzing metabolites (HPLC, Seahorse, Magpix), a high value added tool in nutrigenomic and nutrigenetic studies, to achieve effective Precision Nutrition".

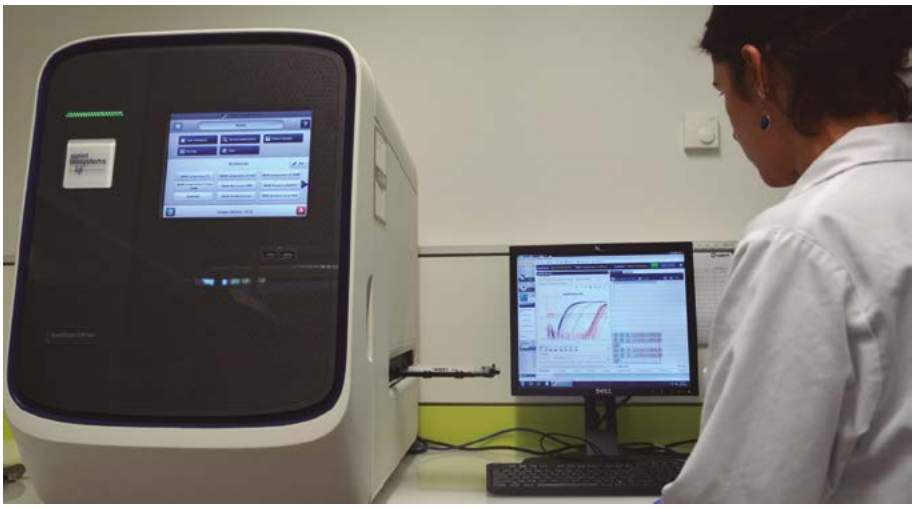
Members:

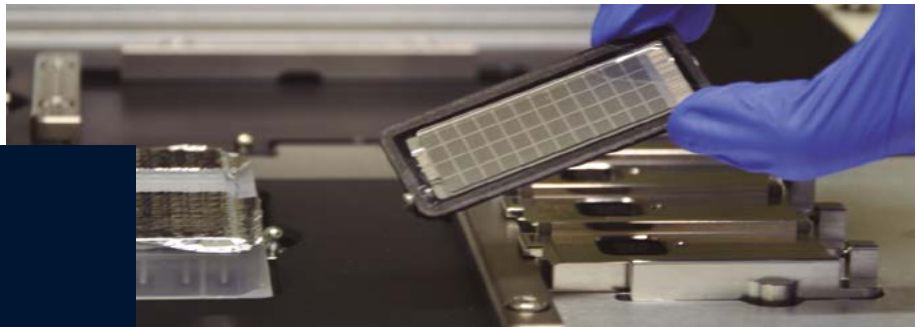
Elena García Carrascosa
Laboratory technician

Mónica Gómez Patiño
Laboratory technician

International Affairs:

Dr. Han Joosten
Senior researcher





Dr. Susana Molina Arranz
Technical responsible of the Genomic Laboratory

Susana Molina Arranz, performed her PhD studies in the group of Prof. Luis Carrasco at the "Centro de Biología Molecular Severo Ochoa" (CSIC-UAM). In 2007 she joined Dr. Juan M. Torres group at "Centro de Investigación en Sanidad Animal" (INIA), a research group about prion diseases and its strain barriers. Between 2008 and 2009 she joined the group of Fernando Valdivieso at the "Centro de Biología Molecular Severo Ochoa" (CSIC-UAM), working as a technician generating biological tools for the therapeutic investigation of Alzheimer Disease. During all these years she acquired experience in cell culture, as well as different techniques in molecular biology as western blotting, cloning, and nucleic acid and protein purifications. In 2009 started in IMDEA Food as the Technical responsible of the Genomic Laboratory, working both in the investigation line about nutritional genomics of cancer, as well as in GENYAL Nutrigenomic Laboratory. Her work in the GENYAL Platform includes processing and analyzing samples from the different intervention studies that are developing in IMDEA Food, but also from external companies and research centers interested in genotyping studies.

Elena García Carrascosa
Laboratory technician

Elena García Carrascosa obtained her Biology Degree in 2013 at Complutense University in Madrid specializing in Health Biology, in 2013 she made a practical stay at the Clinical Analysis Laboratory of Hospital General Mancha Centro. In 2015 she obtained a Master degree of Food Quality and Innovation at the University of Valladolid. Meanwhile, she joined Biosearch Life as a student in practice, she took part in the characterization of probiotic bacteria in breast milk samples.
In February 2016, she joined IMDEA Food Institute where she is working in GENYAL Platform as a research assistant.

International Affairs

Dr. Han Joosten
Senior researcher

Han Joosten studied Biology at the Radboud University of Nijmegen (the Netherlands) and obtained a PhD degree at Wageningen University in 1988 based on his research on the formation of biogenic amines in cheese that was carried out at the Netherlands Institute for Dairy Research (NIZO). After a post-doc at the Autonomous University of Madrid (1989-1991) in the group of Dr. Eladio Viñuela he joined the leading Dutch dairy company Coberco as Director of the microbiology laboratory in Deventer. From 1994 to 1996 he worked as a research scientist at the CIT-INIA in Madrid on the application of a bacteriocin producing starter culture in dairy products. From 1996 until early 2015 he was employed by Nestlé at the central research facility in Lausanne, Switzerland. During this period he has been active in the development of methods for microbiological analysis of foods and safety assessments of food products and processing methods. In 2012 Han Joosten was nominated as professor at Wageningen University where he holds the European Chair in Food Safety Microbiology. In October 2015 he joined GENYAL Platform at IMDEA Food Institute as a senior scientist.

2.7 Research Platform. Nutrigenomics Interactive Center. CIN

cin centro interactivo de nutrigenómica

The Nutrigenomics Interactive Centre (CIN) is an initiative of the IMDEA Food Institute, the aim of which is to disseminate the Institute's research results.

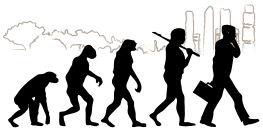
Currently the CIN presents its exhibition entitled 'SNP: Salud y Nutrición Personalizada', i.e., "Health and Personalised Nutrition" the aims of which are to:

- Familiarize society at the school, family and business level, of the aims of research into nutritional genomics.
- To transmit the idea of the importance of nutrition in human health and the relationship between genetics and the effects of food on health.
- To explain different traits of personalised nutrition: emotional, chronobiological and social.

Via scientifically validated interactive surveys, the exhibition allows visitors to understand their degree of adherence to the Mediterranean Diet, their chronotype, and the involvement of their emotions in their food choices. Visitors acquire knowledge about themselves, their biology, their emotions and their current habits, and how they can use this information to follow a more healthy lifestyle.

The exhibition is divided into 6 areas:

A1: Evolution and diet
A2: Diet and health
A3: Healthy living
A4: The Mediterranean Diet
A5: At the supermarket
A6: In the laboratory



A1: Evolution and diet

This area shows the visitor how our diet has changed since the time of Australopithecus until that of Homo sapiens, and how the evolution of the diet has been inexorably linked to that of our species.

A2: Diet and health

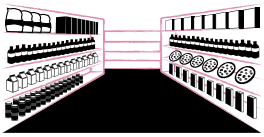
This area teaches the visitor about how diet influences health. Traditionally, foods have been thought of as sources of energy and construction materials required by our cells so that they can undertake their functions. However, we now know that the diet plays an essential role in the regulation of gene expression. When genes are appropriately expressed, they help us maintain our bodies in perfect equilibrium. A strong diversion from the optimum, however, could lead to disease.

A3: Healthy living

In this section, the visitor will learn about the key elements of a healthy lifestyle and will be able to experience some of them as part of the interactive experience. The role of physical activity on health is well known, but less is known about how our emotions influence our food choices and how our mood is in turn affected by our diet, or how our internal clock works and should be synchronized with our diet to prevent chronic diseases.

A4: The Mediterranean Diet

The Mediterranean Diet is a great Spanish heritage, which, in 2010, was declared a World Intangible Cultural Heritage by UNESCO. We therefore have one of the best ways of maintining health right before our eyes. But do people know what makes up the Mediterranean Diet? And is the diet we follow Mediterranean? The visitor can here learn the answers to these questions, as well as others on this diet.



A5: At the supermarket

Here visitors can use their newly acquired knowledge in a virtual food shopping scenario. The aim is to teach people responsible, personalised healthy food shopping.

A6: In the laboratory

This area recounts the history of research into nutrition, and describes the research work of the IMDEA Food Institute. A laboratory bench allows visitors to 'be' scientists, and to extract their own DNA. Audiovisual aids explain the make-up of the Institute and what some of our installation's equipment is for.

Temporary workshops and exhibitions

The CIN also sets up workshops directed towards:

- Schoolchildren - supporting teaching in schools.
- Families - encouraging responsible nutrition at home.
- Nutrition consultants – providing support in the form of training.

The CIN also has temporary exhibitions organized by companies working in nutrition and allied fields.

lacid
laboratorio de actividad cooperativa de I+D

2.8 Research Platform. The Cooperative R+D+I Laboratory. LACID

The Cooperative R+D+I Activity Laboratory (LACID, according to its Spanish initials) provides a framework for cooperation between the IMDEA Food Institute and the R+D departments of private companies and public research institutes (Spanish and foreign), in which funding, human resources, spaces and infrastructures can be shared for joint R+D+I projects in nutrition and health.

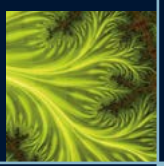
LACID has the objective of bringing together science and the agrifood industry in order to provide better opportunities for improving competitiveness and social wellbeing for the Region of Madrid and indeed the whole of Spain.

LACID platform

3

research projects

report 2016



3.1 Competitive research projects

FORCANCER

Developing products for personalized nutrition of gastric cancer patients

Principal investigator: Dr. Ana Ramírez de Molina
Funded by: Ministerio de Economía y Competitividad
Duration: 2014 - 2016

FORCANCER project aims to exploit the opportunities offered by the current state of knowledge to design and validate effective food products to improve some aspects of cancer. Its objectives are to obtain and characterize functional food ingredients of high bioavailability, combining natural extracts rich in phenolic compounds with alkylglycerols and glycerides as carrier lipids to formulate nutritional supplements and functional foods aimed at reducing the rate of tumor progression and to improve the general condition and response to treatment of colon and pancreatic cancer patients.

European Projects Bureau MADRIMASD - IMDEA Food

(EUC2013-C-50806)

Funded by: Ministerio de Economía y Competitividad
Duration: 2014 - 2016

The European Research Projects Office is an initiative to promote researchers' participation in European funding programs. The project is made up of the following institutions: IMDEA Water, IMDEA Food, IMDEA Energy, IMDEA Materials, IMDEA Nanoscience, IMDEA Networks, IMDEA Software and Madri+d Foundation, which coordinates the project.

The European Research Projects Office is responsible for giving support in the application, giving expert advice in project management and informing researchers about funding opportunities.

ALIBIRD-CM

Functional Foods and nutritional strategies for the prevention and treatment of chronic diseases. (ALIBIRD III S2013/ABI-2728)

Principal investigators: Dr. Ana Ramírez de Molina (ONCOGENOM) and Dr. Francesco Visioli (GENECO)
Funded by: Consejería de Educación, Juventud y Deporte. Comunidad de Madrid
Duration: 2014 - 2018

A total of 9 research groups of the Community of Madrid are involved in this consortium that aims to advance forward scientific aspects of knowledge needed for the development of high efficacy and security functional foods to contribute to the improvement of the health of populations, and reducing obesity and improving the life of cancer patients.

It also pretends to contribute to the competitiveness of European industry in the food and nutrition area.

PREDIMED+DM

Effect of a hypocaloric Mediterranean Diet and physical activity promotion on the prevention of type 2 diabetes mellitus in subjects with the Metabolic Syndrome

Instituto de Salud Carlos III

Principal investigator: Dr. Lidia Daimiel Ruiz
Funded by: Instituto de Salud de Carlos III
Duration: 2015 - 2017

The aim of this project is to evaluate the effect on the incidence of T2DM of an intensive weight loss intervention based on a traditional hypocaloric Mediterranean Diet, physical activity and behavioural therapy, as compared to dietary advice based on a Mediterranean Dietary in the context of usual health care.

The PREDIMED+DM study is impinged in the PREDIMED-PLUS study, a randomized clinical trial evaluating the effect of same therapeutic strategies used in our study but on primary prevention of cardiovascular disease in overweight/obese subjects with the metabolic syndrome.

PHOSPHOLIPIDS4COGNITION

Evaluation of a nutritional supplement enriched with bioactive phospholipids designed to prevent age-associate mild cognitive impairment

GOBIERNO DE ESPAÑA MINISTERIO DE ECONOMÍA Y COMPETITIVIDAD

Principal investigator: Dr. Javier Fontecha Alonso (CIAL, CSIC-UAM)
IMDEA Food participant investigator: Dr. Francesco Visioli
Funded by: Ministerio de Economía y Competitividad
Duration: 2015 - 2018

Cognitive impairment (IC) associate with age (Age-related cognitive decline -ARCD) is one of the great challenges of our society today due to the aging population, which is a serious social and family problem, as well as a great difficulty for national health systems. Since currently available pharmacological treatments are not effective in preventing IC, are been promoted multidisciplinary strategies related to the prevention of chronic diseases associate with aging. Both the R+D+I and the H2020 include multidisciplinary lines in order to improve the understanding, prevention, early diagnosis and treatment of mental condi- tions and disorders of the elderly. PHOSPHOLIPIDS4COGNITION raises the approach of a coordinated multidisciplinary project, whose overall objective is to investigate the effect of the intake of PLs bioactives (of dairy and marine origin) in the prevention and treatment of cognitive impairment associate with aging, using a preclinical study with aged rats and a clinical study in a cohort of older adults previously diagnosed with mild cognitive impairment.

FORCHRONIC

Formulation of food products for the prevention and targeted treatment of chronic diseases related to metabolism (AGL2016-76736-C3-3-R)

Principal investigator: Dr. Ana Ramírez de Molina
Funded by: Ministerio de Economía y Competitividad
Duration: 2016 - 2019

The objective of the project FORCHRONIC is to design, develop and validate the effect and safety of new formulas for humans, effective in regulating the molecular mechanisms of cellular cholesterol transport and the activation of fatty acid synthesis, fundamental routes in the development of colorectal cancer, obesity and metabolic syndrome, in order to achieve food products with high added value, highly effective as nutritional supplements aimed at preventing and improving the treatment of these diseases.

The project is based on two hypotheses resulting from the previous project carried out by the research team within the State Program of R+D+I, Challenging the Society; The regulation of ABCA1 metabolism genes and the ACSL / SCD pathway allows the control of cholesterol transport pathways and the activation of fatty acid synthesis, associated with the development of chronic diseases such as colon cancer and the metabolic syndrome; Formulas based on the combination of polar lipids and bioactive principles of natural origin can provide for efficient regulation of metabolism genes due to potentiation of bioavailability and synergistic biological activity.

Intesti-nAhRuNg

Therapeutic modulation of non-coding RNAs through bioactive components of the diet: impact on pathophysiological regulation of lipid metabolism (AGL2016-78922-R)

Principal investigator: Dr. Alberto Dávalos Herrera
Funded by: Ministerio de Economía y Competitividad
Duration: 2016 - 2019

Despite advances in the prevention and the success of many widely prescribed drugs for the management of dyslipidemia, cardiovascular disease remains a leading cause of mortality. This highlights the need for deeper insight into disease mechanism and innovative therapeutic strategies. A large amount of novel transcripts from our genome are transcribed into different types of noncoding RNAs (ncRNAs) including microRNAs (miRNAs) and long noncoding RNAs (lncRNAs). Several novel ncRNAs are being identified as regulators of different biological processes and associated with different complex human diseases. Moreover, recent evidence suggests that the expression of certain miRNAs and lncRNAs can be modulated by food bioactive components. The emerging function of ncRNAs in cholesterol and lipid metabolism and their possible modulation by diet, open up new therapeutic possibilities. “Intesti-NahRuNg” aims to characterize the role of novel miRNAs and lncRNAs in both the physiological and pathological processes of intestinal lipid metabolism and test their therapeutic modulation through dietary bioactive compounds.

NUPROBED

Fundación BBVA

Formulation of food products for the prevention and targeted treatment of chronic diseases related to metabolism (AGL2016-76736-C3-3-R)

Principal investigator: Dr. Pablo Fernández Marcos
Funded by: Fundación BBVA
Duration: 2016 - 2018

Obesity and the pathologies derived, encompassed under the term Metabolic Syndrome, are considered one of the main health challenges of the 21st century. Many naturally occurring extracts have been used against obesity and diabetes for centuries, in many cases with beneficial effects and few side effects, and almost always without a thorough knowledge of their mechanisms of action. The NUPROBED project, which is being carried out by IMDEA Food in collaboration with the Institute of Food Science Research (CIAL) and the National Cancer Research Center (CNIO), aims to find new bioactive products derived from foods with potential against Obesity, thanks to its effects on the main metabolic signaling pathways involved in this pathology. This project contemplates conducting a bioactive product search through high performance biological research platforms (HTS) testing four crucial metabolic pathways for obesity and diabetes: Insulin pathway, mitochondrial potential, pentoses phosphate pathway and adipogenesis.

GEPS - CM

Comunidad de Madrid
CONSEJERÍA DE EDUCACIÓN, JUVENTUD Y DEPORTE

Population, family and aging in the contemporary world: dimensions of an ongoing process (S2015/HUM-3321)

Principal investigator: Dr. David Sven Reher Sullivan (UCM)
IMDEA Food participant investigator: Dr. Lidia Daimiel Ruiz
Funded by: Consejería de Educación, Juventud y Deporte. Comunidad de Madrid
Duration: 2016 - 2018

The Project GEPS: "Population, family and aging in the contemporary world: different dimensions of an ongoing process" is root in the Social Sciences sphere but with the purpose of gathering professionals from the Health Sciences and the Social Sciences to study different aspects of the aging process. In the frame of this project, different studies will be carried out that focus on:

- Fertility and reproduction
- International migrations and demographic shift
- Family
- Economic challenges associated with the aging society
- Active life in elder people
- Nutrition and quality of live in the aging process

This project offers a multidisciplinary study of aging process from a historical, demographic, sociological, economical and biological point of view. As a result, this project will allow to gain a deeper understanding of the effect of aging on the society that will pave the way to the development of new programs and policies to face the challenge of the aging society.

3.2 International Consortia

NUTRITECH

Application of new technologies and methods in nutrition research the example of phenotypic flexibility (GA289511)

Principal investigator: Dr. José María Ordovás Muñoz
Funded by: Comisión Europea. VII programa Marco I+D
Duration: 2012 - 2016

A total of 23 research groups are involved in the Nutritech project. These groups from a variety of European and American leader institutions in the research field of Nutritional Genomics. Using technical and analytical methodologies, Nutritech will evaluate the gen-nutrient relationship. The included technologies are the most novel biological technologies. They refer to omics technologies such as genomic, transcriptomic, proteomic and metabolomics, among others. The application of all these technologies to the nutritional genomics research will allow revealing the dietary modulation of genes from different perspectives to define how the effect of the diet on genes expands to proteins and metabolites.

COST Action-POSITIVe

Interindividual variation in response to consumption of plant food bioactives and determinants involved (FA 1403)

Principal investigator: Dr. José María Ordovás Muñoz
Funded by: European Comission
Duration: 2014 - 2018

To combat the burden of cardiometabolic disease, which constitutes a major public health issue in Europe, it is of crucial importance to develop efficient strategies that target the dietary behaviours of European consumers and improve the food supply. Plant foods are rich sources of a large range of bioactive compounds that beneficially affect our health, particularly by decreasing the risk of cardiometabolic diseases.

POSITIVe specifically addresses inter-individual variation in bioavailability and physiological responses to consumption of plant food bioactives in relation to cardiometabolic endpoints.

Inflammarine

Anti-inflammatory and healing activity of sea cucumber (Isostichopus badionotus) in a murine model: characterization of pharmacological activity and cellular mechanisms involved (CB.2013-01 No. 22173)

CONACYT
Consejo Nacional de Ciencia y Tecnología

Principal investigator: Dr. Alberto Dávalos Herrera
Funded by: CONACYT Consejo Nacional de Ciencia y Tecnología (Mexico)
Duration: 2015 - 2018

Uncontrolled inflammatory response is a major driver of many modern human chronic diseases. The natural world has been the source of novel anti-inflammatory and other biologically-active agents. Plants, insects and marine organisms, including algae and invertebrate marine organisms, have been screened for the presence of anti-inflammatory agents. Sea cucumbers are marine invertebrates, considered by the traditional Chinese medicine as tonic foods, attributing them with a wide range of biological effects, including anti-inflammatory. However, their mechanism of action is poorly described. Isostichopus badionotus, is a sea cucumber from the Peninsula of Yucatan (Mexico) whose many biological activities are not well characterized.

“inflammarine” aims to contribute to a better understanding of the anti-inflammatory activity and mechanisms of action of the bioactive components of sea cucumber I. badionotus. Our results will allow the development of possible therapies from this marine invertebrate and support the search for therapeutic alternatives to combat the devastating consequences of the chronic inflammatory processes that today afflict our modern society.

3.3 Research grants

Programme: "Marie Curie" AMAROUT II Europe Programme (Grant Agreement nº 291803)

- **Dr. Cristina Aguirre Portolés**

Type: Incoming Fellow
Category: Experienced researcher

Duration: 2015 - 2017

- **Dr. Han Joosten**

Type: Incoming Fellow
Category: Experienced researcher

Duration: 2015 - 2016
Funded by: Comisión Europea. VII Programa Marco I+D

Contract for technical support personnel (PTA2013-8144-I)

- **Mónica Gómez Patiño**

Principal investigator: Dr. Ana Ramírez de Molina
Funded by: Ministerio de Economía y Competitividad
Duration: 2014 - 2017

Contracts Juan de la Cierva - (FJCI-2014-19601)

- **Dr. Clara Ibañez Ruiz**

Funded by: Ministerio de Economía y Competitividad
Duration: 2016 - 2018

Contracts Ramón y Cajal (RYC-2015-18083)

- **Dr. Moisés Laparra Llopis**

Funded by: Ministerio de Economía y Competitividad
Title: Influence of bioactive components on the enterohepatic axis
Duration: 2016 - 2021

Contracts for Research Assistants (PEJ15/BIO/AI-0355)

- **Elena García Carrascosa**

Funded by: Consejería de Educación, Juventud y Deporte. Comunidad de Madrid
Duration: 2016 - 2017

Program "José Castillejo" Mobility stays abroad for young doctors (CAS15/00081)

- **Dr. Lidia Daimiel Ruiz**

Funded by: Ministerio de Educación, Cultura y Deporte
Duration: 2016 - 2017

Program "José Castillejo" Mobility stays abroad for young doctors (CAS16/00232)

- **Dr. Alberto Dávalos Herrera**

Funded by: Ministerio de Educación, Cultura y Deporte
Duration: 2016 - 2017

Laboratory Practice Program

- **Daniel de la Nava**

Funded by: AECC-Asociación Española contra el Cáncer
Duration: 2016

Grants for training university teachers. (FPU014/06386) (FPU014/06386)

- **Silvia Berciano**

Principal investigator: Dr. José María Ordovás Muñoz
Funded by: Ministerio de Educación, Cultura y Deporte
Duration: 2015 - 2016

Grant for research in oncology.

- **Dr. Pablo José Fernández Marcos**

Characterization of sirtuins involvement in the development of hematopoietic neoplasm and other tumor types

Funded by: Asociación Española Contra el Cáncer – AECC. Ayudas para Investigación en Oncología
Duration: 2015 - 2017

3.4 Contracts with companies

Determination of genetic variants associated with genetic studies

Principal investigator: Dr. Ana Ramírez de Molina
Funded by: PEACHES, S.L.
Duration: 2016 - 2017

CEBAS-CSIC
Centro de Edafología y Biología Aplicada del Segura

PolyMicroBio

Ellagitannins as a tool to study the interindividual viability in the polyphenol metabolism: Relationship with the genotype and intestinal microbiota postpartum-lactation, children, adolescents and adults (normal weight, obesity and metabolic syndrome). Collaboration agreement for the project AGL2015-64124-R

Principal investigator: Dr. Ana Ramírez de Molina
Funded by: Centro de Edafología y Biología Aplicada del segura (CEBAS - CSIC)
Duration: 2016 – 2019

cnio Centro Nacional de Investigaciones Oncológicas

Evaluation of p21 induction and associated molecular pathways in response to short-term fasting

Principal investigator: Dr. Pablo José Fernández Marcos
Funded by: Centro Nacional de Investigaciones Oncológicas (CNIO)
Duration: 2016

Risk&RNAs

Literature review of baseline information on non-coding RNA (ncRNA) that could support the food/feed risk assessment of ncRNA-based GM plants

Principal investigator: Dr. Alberto Dávalos Herrera
Funded by: European Food Safety (EFSA)
Duration: 2016 – 2017

PRIMICIA

Personalized Nutrition to bring to market high efficiency food (Strategic Program National Business Research Consortia - CIEN)

IMDEA Food leads the scientific program of the consortium of food companies that carry out the PRIMICIA project, under which six new scientific studies have been developed for the companies:

Alvinesa Alcoholera Vinícola S.A.U.
Principal investigator: Prof. Guillermo Reglero Rada
Duration: 2015 - 2017

Grupo Natac S.L.
Principal investigator: Prof. Guillermo Reglero Rada
Duration: 2015 - 2017

Tutti Pasta S.A.
Principal investigator: Prof. Guillermo Reglero Rada
Duration: 2015 - 2017

AMC Innova S.L.
Principal investigator: Prof. Guillermo Reglero Rada
Duration: 2015 - 2017

Dulces y Conservas Helios S.A.
Principal investigator: Prof. Guillermo Reglero Rada
Duration: 2015 - 2017

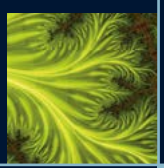
Galletas Gullón S.A.
Principal investigator: Prof. Guillermo Reglero Rada
Duration: 2015 - 2017

Funded by: Centro para el Desarrollo Tecnológico Industrial. Ministerio de Economía y Competitividad

4

scientific results

report 2016



4.1 Publications

During 2016, the institute has published 82 articles in magazines of high international impact. 72% of the published articles are in the first quartile of the SCI (Science Citation Index), which is indicative of the scientific excellence of the Institute.

1. Irvin MR, Rotroff DM, Aslibekyan S, Zhi D, Hidalgo B, Motsinger-Reif A, Marvel S, Srinivasasainagendra V, Claas SA, Buse JB, Straka RJ, Ordovas JM, Borecki IB, Guo X, Chen IY, Rotter JI, Wagner MJ, Arnett DK. A genome-wide study of lipid response to fenofibrate in Caucasians: a combined analysis of the GOLDN and ACCORD studies. ***Pharmacogenet Genomics.*** 2016 Jul;26(7):324-33. doi: 10.1097/FPC.0000000000000219

2. Bigornia SJ, Harris WS, Falcón LM, Ordovás JM, Lai CQ, Tucker KL. The Omega-3 Index Is Inversely Associated with Depressive Symptoms among Individuals with Elevated Oxidative Stress Biomarkers. ***Journal of Nutrition*** 2016 Apr;146(4):758-66. doi: 10.3945/jn.115.222562

3. Talavera-Garcia E, Delgado-Lista J, Garcia-Rios A, Delgado-Casado N, Gomez-Luna P, Gomez-Garduño A, Gomez-Delgado F, Alcala-Diaz JF, Yubero-Serrano E, Marin C, Perez-Caballero AI, Fuentes-Jimenez FJ, Camargo A, Rodriguez-Cantalejo F, Tinahones FJ, Ordovas JM, Perez-Jimenez F, Perez-Martinez P, Lopez-Miranda J.Influence of Obesity and Metabolic Disease on Carotid Atherosclerosis in Patients with Coronary Artery Disease (CordioPrev Study). ***PLoS One.*** 2016 Apr 11;11(4):e0153096. doi: 10.1371/journal.pone.0153096. eCollection 2016. Erratum in: PLoS One. 2016, 11(6):e0157213

4. Corella D, Asensio EM, Coltell O, Sorlí JV, Estruch R, Martínez-González MÁ, Salas-Salvadó J, Castañer O, Arós F, Lapetra J, Serra-Majem L, Gómez-Gracia E, Ortega-Azorín C, Fiol M, Espino JD, Díaz-López A, Fitó M, Ros E, Ordovás JM. CLOCK gene variation is associated with incidence of type-2 diabetes and cardiovascular diseases in type-2 diabetic subjects: dietary modulation in the PREDIMED randomized trial. ***Cardiovascular Diabetology.*** 2016 Jan;15(4). doi: 10.1186/s12933-015-0327-8

5. Ma Y, Follis JL, Smith CE, Tanaka T, Manichaikul AW, Chu AY, Samieri C, Zhou X, Guan W, Wang L, Biggs ML, Chen YD, Hernandez DG, Borecki I, Chasman DI, Rich SS, Ferrucci L, Irvin MR, Aslibekyan S, Zhi D, Tiwari HK, Claas SA, Sha J, Kabagambe EK, Lai CQ, Parnell LD, Lee YC, Amouyel P, Lambert JC, Psaty BM, King IB, Mozaffarian D, McKnight B, Bandinelli S, Tsai MY, Ridker PM, Ding J, Mstat KL, Liu Y, Sotoodehnia N, Barberger-Gateau P, Steffen LM, Siscovick DS, Absher D, Arnett DK, Ordovás JM, Lemaitre RN. Interaction of methylation-related genetic variants with circulating fatty acids on plasma lipids: a meta-analysis of 7 studies and methylation analysis of 3 studies in the Cohorts for Heart and Aging Research in Genomic Epidemiology consortium. ***American Journal of Clinical Nutrition.*** 2016 Feb;103(2):567-78. doi: 10.3945/ajcn.115.112987

6. Das M, Sha J, Hidalgo B, Aslibekyan S, Do AN, Zhi D, Sun D, Zhang T, Li S, Chen W, Srinivasan SR, Tiwari HK, Absher D, Ordovas JM, Berenson GS, Arnett DK, Irvin MR. Association of DNA Methylation at CPT1A Locus with Metabolic Syndrome in the Genetics of Lipid Lowering Drugs and Diet Network (GOLDN) Study. ***PLoS One.*** 2016 Jan 25;11(1):e0145789. doi: 10.1371/journal.pone.014578910.3305/nh.2015.31.sup3.8765

7. Ferguson JF, Allayee H, Gerszten RE, Ideraabdullah F, Kris-Etherton PM, Ordovás JM, Rimm EB, Wang TJ, Bennett BJ. Nutrigenomics, the Microbiome, and Gene-Environment Interactions: New Directions in Cardiovascular Disease Research, Prevention, and Treatment: A Scientific Statement From the American Heart Association. ***Circulation Cardiovascular Genetics Journal.*** 2016 Jun;9(3):291-313. doi: 10.1161/HCG.0000000000000030

8. Delgado-Lista J, Perez-Martinez P, Garcia-Rios A, Alcala-Diaz JF, Perez-Caballero AI, Gomez-Delgado F, Fuentes F, Quintana-Navarro G, Lopez-Segura F, Ortiz-Morales AM, Delgado-Casado N, Yubero-Serrano EM, Camargo A, Marin C, Rodriguez-Cantalejo F, Gomez-Luna P, Ordovas JM, Lopez-Miranda J, Perez-Jimenez F. CORonary Diet Intervention with Olive oil and cardiovascular PREVention study (the CORDIOPREV study): Rationale, methods, and baseline characteristics: A clinical trial comparing the efficacy of a Mediterranean diet rich in olive oil versus a low-fat diet on cardiovascular disease in coronary patients. ***American Heart Journal.*** 2016 Jul;177:42-50. doi: 10.1016/j.ahj.2016.04.011

9. Dashti HS, Zuurbier LA, de Jonge E, Voortman T, Jacques PF, Lamon-Fava S, Scheer FA, Kiefte-De Jong JC, Hofman A, Ordovás JM, Franco OH, Tiemeier H. Actigraphic sleep fragmentation, efficiency and duration associate with dietary intake in the Rotterdam Study. ***Journal of Sleep Research.*** 2016 Aug;25(4):404-11. doi: 10.1111/jsr.12397

10. Laclaustra M, Casasnovas JA, Fernandez-Ortiz A, Fuster V, Leon-Latre M, Jimenez-Borreguero LJ, Pocovi M, Hurtado-Roca Y, Ordovas JM, Jarauta E, Guallar E, Ibanez B, Civeira, F. Femoral and Carotid Subclinical Atherosclerosis Association With Risk Factors and Coronary Calcium The AWHS Study. ***Journal of the American College of Cardiology.*** 2016 Mar;67(11):1263-1274. doi: 10.1016/j.jacc.2015.12.056

11. Mico V, Martin R, Lasuncion MA, Ordovas JM, Daimiel L. Unsuccessful Detection of Plant MicroRNAs in Beer, Extra Virgin Olive Oil and Human Plasma After an Acute Ingestion of Extra Virgin Olive Oil. ***Plant Foods for Human Nutrition.*** 2016 Mar;71(1):102-108. doi: 10.1007/s11130-016-0534-9

12. Johnston JD, Ordovas JM, Scheer Frank A, Turek FW. Circadian Rhythms, Metabolism, and Chrononutrition in Rodents and Humans. ***Advances in Nutrition.*** 2016 Mar 15;7(2):399-406. doi:10.3945/an.115.010777

13. Micó V, Díez-Ricote L, Daimiel L. Nutrigenetics and Nutrimiromics of the Circadian System: The Time for Human Health. ***International Journal of Molecular Sciences.*** 2016 Feb;17(3):299. doi: 10.3390/ijms17030299

14. Nobrega-Pereira S, Fernandez-Marcos PJ, Brioche T, Gomez-Cabrera MC, Salvador-Pascual A, Flores JM, Vina J, Serrano M. G6PD protects from oxidative damage and improves healthspan in mice. ***Nature Communications.*** 2016 Mar 15;7:10894. doi: 10.1038/ncomms10894

15. Ambrogio C, Gomez-Lopez G, Falcone M, Vidal A, Nadal E, Crosetto N, Blasco RB, Fernandez-Marcos PJ, Sanchez-Cespedes M, Ren XM, Wang Z, Ding K, Hidalgo M, Serrano M, Villanueva A, Santamaria D, Barbacid M. Combined inhibition of DDR1 and Notch signaling is a therapeutic strategy for KRAS-driven lung adenocarcinoma. ***Nature Medicine.*** 2016 March;22(3):270-277. doi: 10.1038/nm.4041

16. Fernandez-Marcos PJ, Serrano M. Mitochondrial Damage Induces Senescence with a Twisted Arm. ***Cell Metabolism.*** 2016 Feb;23(2):229-30. doi:10.1016/j.cmet.2016.01.012

17. Gil-Ramirez A, Caz V, Smiderle FR, Martin-Hernandez R, Largo C, Tabernero M, Marin FR, Iacomin M, Reglero G, Soler-Rivas C. Water-Soluble Compounds from Lentinula edodes Influencing the HMG-CoA Reductase Activity and the Expression of Genes Involved in the Cholesterol Metabolism. ***Journal of Agricultural and Food Chemistry.*** 2016 Feb;64(9):1910-1920. doi: 10.1021/acs.jafc.5b05571

18. Caz V, Gil-Ramirez A, Santamaria M, Tabernero M, Soler-Rivas C, Martin-Hernandez R, Marin FR, Reglero G, Largo, C. Plasma Cholesterol-Lowering Activity of Lard Functionalized with Mushroom Extracts Is Independent of Niemann-Pick C1-like 1 Protein and ABC Sterol Transporter Gene Expression in Hypercholesterolemic Mice. ***Journal of Agricultural and Food Chemistry.*** 2016 Feb;64(8):1686-1694. doi: 10.1021/acs.jafc.5b05490

19. Lopez-Padilla A, Ruiz-Rodriguez A, Reglero G, Fornari T. Study of the diffusion coefficient of solute-type extracts in supercritical carbon dioxide: Volatile oils, fatty acids and fixed oils. ***Journal of Supercritical Fluids.*** 2016 Mar;109:148-156. doi: 10.1016/j.supflu.2015.11.017

20. Vázquez L, Jordán A, Reglero G, Torres CF. A First Attempt into the Production of Acylglycerol Mixtures from Echium Oil. ***Frontiers in Bioengineering and Biotechnology.*** 2016 Jan 19; 3:208. doi: 10.3389/fbioe.2015.00208

21. Bermejo, DV , Ibanez, E , Reglero, G , Fornari, T. Effect of cosolvents (ethyl lactate, ethyl acetate and ethanol) on the supercritical CO2 extraction of caffeine from green tea. ***Journal of Supercritical Fluids,*** 2016 Jan;107:507-512. doi: 10.1016/j.supflu.2015.07.008

22. Zanoni P, Khetarpal SA, Larach DB, Hancock-Cerutti WF, Millar JS, Cuchel M, DerOhannessian S, Kontush A, Surendran P, Saleheen D, Trompet S, Jukema JW, De Craen A, Deloukas P, Sattar N, Ford I, Packard C, Majumder Aa, Alam DS, Di Angelantonio E, Abecasis G, Chowdhury R, Erdmann J, Nordestgaard BG, Nielsen SF, Tybjærg-Hansen

A, Schmidt RF, Kuulasmaa K, Liu DJ, Perola M, Blankenberg S, Salomaa V, Männistö S, Amouyel P, Arveiler D, Ferrieres J, Müller-Nurasyid M, Ferrario M, Kee F, Willer CJ, Samani N, Schunkert H, Butterworth AS, Howson JM, Peloso GM, Stitziel NO, Danesh J, Kathiresan S, Rader DJ, CHD Exome+ Consortium, CARDIoGRAM Exome Consortium, Global Lipids Genetics Consortium. Rare variant in scavenger receptor BI raises HDL cholesterol and increases risk of coronary heart disease. ***Science.*** 2016 Mar;351(6278):1166-71. doi: 10.1126/science.aad3517

23. Baena M, Sangüesa G, Dávalos A, Latasa MJ, Sala-Vila A, Sánchez RM, Roglans N, Laguna JC, Alegret M. Fructose, but not glucose, impairs insulin signaling in the three major insulin-sensitive tissues. ***Scientific Reports - Nature.*** 2016 May;6:26149. doi: 10.1038/srep26149

24. Díez-Planelles C, Sánchez-Lozano P, Crespo MC, Gil-Zamorano J, Ribacoba R, González N, Suárez E, Martínez-Descals A, Martínez-Camblor P, Álvarez V, Martín-Hernández R, Huerta-Ruíz I, González-García I, Cosgaya JM, Visioli F, Dávalos A, Iglesias-Gutiérrez E, Tomás-Zapico C. Circulating microRNAs in Huntington's disease: Emerging mediators in metabolic impairment. ***Pharmacological Research.*** 2016 May;108:102-110. doi: 10.1016/j.phrs.2016.05.005

25. Parri A, Fitó M, Torres CF, Muñoz-Aguayo D, Schröder H, Cano JF, Vázquez L, Reglero G, Covas MI. Alkylglycerols reduce serum complement and plasma vascular endothelial growth factor in obese individuals. ***Inflammopharmacology.*** 2016 Jun; 24(2-3):127-31. doi: 10.1007/s10787-016-0265-4

26. Ferguson LR, De Caterina R, Görman U, Allayee H, Kohlmeier M, Prasad C, Choi MS, Curi R, de Luis DA, Gil Á, Kang JX, Martin RL, Milagro FI, Nicoletti CF, Nonino CB, Ordovas JM, Parslow VR, Portillo MP, Santos JL, Serhan CN, Simopoulos AP, Velázquez-Arellano A, Zulet MA, Martinez JA. Guide and Position of the International Society of Nutrigenetics/Nutrigenomics on Personalised Nutrition: Part 1 - Fields of Precision Nutrition. ***Journal of Nutrigenetics and Nutrigenomics.*** 2016 May;9(1):12-27. doi: 10.1159/000445350

27. Burgos-Ramos E, Canelles S, Frago LM, Chowen JA, Arilla-Ferreiro E, Argente J, Barrios V. Improvement in glycemia after glucose or insulin overload in leptin-infused rats is associated with insulin-related activation of hepatic glucose metabolism. ***Nutrition and Metabolism*** (Lond). 2016 Mar 1;13:19. doi: 10.1186/s12986-016-0079-9. eCollection 2016

28. Bacchetta L, Visioli F, Cappelli G, Caruso E, Martin G, Nemeth E, Bacchetta G, Bedini G, Wezel A, van Asseldonk T, van Raamsdonk L, Mariani F, On Behalf Of The Eatwild Consortium. A manifesto for the valorization of wild edible plants. ***Journal of Ethnopharmacology.*** 2016 Sep 15;191:180-7. doi: 10.1016/j.jep.2016.05.061

29. Tomé-Carneiro J, Crespo MC, Iglesias-Gutierrez E, Martín R, Gil-Zamorano J, Tomas-Zapico C, Burgos-Ramos E, Correa C, Gómez-Coronado D, Lasunción MA, Herrera E, Visioli F, Dávalos A. Hydroxytyrosol supplementation modulates the expression of miRNAs in rodents and in humans. ***The Journal of Nutritional Biochemistry.*** 2016 May;31,34:146-155. doi: 10.1016/j.jnutbio.2016.05.009

30. Mendiola M, Martínez-Marin V, Herranz J, Heredia V, Yébenes L, Zamora P, Castelo B, Pinto Á, Miguel M, Díaz E, Gámez A, Fresno JÁ, Ramirez de Molina A, Hardisson D, Espinosa E, Redondo A. Predictive value of angiogenesis-related gene profiling in patients with HER2-negative metastatic breast cancer treated with bevacizumab and weekly paclitaxel. ***Oncotarget.*** 2016 Apr;7(17):24217-27. doi: 10.18632/oncotarget.8128

31. Baquedano E, Burgos-Ramos E, Canelles S, González-Rodríguez A, Chowen JA , Argente J, Barrios V, Valverde AM and Frago LM. Increased oxidative stress and apoptosis in the hypothalamus ofdiabetic male mice in the insulin receptor substrate-2 knockout model. ***Disease Models & Mechanism.*** 2016 May;9(5):573-83. doi: 10.1242/dmm.023515

32. Sayols-Baixeras S, Subirana I, Lluis-Ganella C, Civeira F, Roquer J, Do AN, Absher D, Cenarro A, Muñoz D, Soriano-Tárraga C, Jiménez-Conde J, Ordovas JM, Senti M, Aslibekyan S, Marrugat J, Arnett DK, Elosua R. Identification and validation of seven new loci showing differential DNA methylation related to serum lipid profile: an epigenome-wide approach. The REGICOR study. ***Human Molecular Genetics.*** 2016 Sep. pii: ddw285. [Epub ahead of print]

33. Garaulet M, Vera B, Bonnet-Rubio G, Gómez-Abellán P, Lee YC, Ordovás JM. Lunch eating predicts weight-loss effectiveness in carriers of the common allele at PERILIPIN1: the ONTIME (Obesity, Nutrigenetics, Timing, Mediterranean) study. ***American Journal of Clinical Nutrition.*** 2016 Oct;104(4):1160-1166. Epub 2016 Sep 14

34. Noel SE, Arevalo S, Smith CE, Lai CQ, Dawson-Hughes B, Ordovas JM, Tucker KL. Genetic admixture and body composition in Puerto Rican adults from the Boston Puerto Rican Osteoporosis Study. ***Journal of Bone and Mineral Metabolism.*** 2016 Sep. [Epub ahead of print]

35. Smith CE, Coltell O, Sorlí JV, Estruch R, Martínez-González MÁ, Salas-Salvadó J, Fitó M, Arós F, Dashti HS, Lai CQ, Miró L, Serra-Majem L, Gómez-Gracia E, Fiol M, Ros E, Aslibekyan S, Hidalgo B, Neuhouser ML, Di C, Tucker KL, Arnett DK, Ordovás JM, Corella D. Associations of the MCM6-rs3754686 proxy for milk intake in Mediterranean and American populations with cardiovascular biomarkers, disease and mortality: Mendelian randomization. ***Scientific Reports - Nature.*** 2016 Sep;6:33188. doi: 10.1038/srep33188

36. Peñalvo JL, Fernández-Friera L, López-Melgar B, Uzhova I, Oliva B, Fernández-Alvira JM, Laclaustra M, Pocock S, Mocoroa A, Mendiguren JM, Sanz G, Guallar E, Bansilal S, Vedanthan R, Jiménez-Borreguero LJ, Ibañez B, Ordovás JM, Fernández-Ortiz A, Bueno H, Fuster V. Association Between a Social-Business Eating Pattern and Early Asymptomatic Atherosclerosis. ***Journal of the American College of Cardiology.*** 2016 Aug;68(8):805-14. doi: 10.1016/j.jacc.2016.05.080

37. Barragán R, Coltell O, Asensio EM, Francés F, Sorlí JV, Estruch R, Salas-Huetos A, Ordovas JM, Corella D. MicroRNAs and Drinking: Association between the Pre-miR-27a rs895819 Polymorphism and Alcohol Consumption in a Mediterranean Population. ***International Journal of Molecular Sciences.*** 2016;17(8). pii: E1338. doi: 10.3390/ijms17081338

38. Smith CE, Fullerton SM, Dookeran KA, Hampel H, Tin A, Maruthur NM, Schisler JC, Henderson JA, Tucker KL, Ordovás JM. Using Genetic Technologies To Reduce, Rather Than Widen, Health Disparities. ***Health Affairs.*** (Millwood). 2016;35(8):1367-73. doi: 10.1377/hlthaff.2015.1476

39. Rangel-Zúñiga OA, Corina A, Lucena-Porras B, Cruz-Teno C, Gómez-Delgado F, Jiménez-Lucena R, Alcalá-Díaz JF, Haro-Mariscal C, Yubero-Serrano EM, Delgado-Lista J, López-Moreno J, Rodríguez-Cantalejo F, Camargo A, Tinahones FJ, Ordovás JM, López-Miranda J, Pérez-Martínez P. TNFA gene variants related to the inflammatory status and its association with cellular aging: From the CORDIOPREV study. ***Experimental Gerontology.*** 2016;83: 56-62. doi: 10.1016/j.exger.2016.07.015

40. Yubero-Serrano EM, Delgado-Lista J, Alcala-Diaz JF, Garcia-Rios A, Perez-Caballero AI, Blanco-Rojo R, Gomez-Delgado F, Marin C, Tinahones FJ, Caballero J, Ordovas JM, van Ommen B, Perez-Jimenez F, Perez-Martinez P, Lopez-Miranda J. A dysregulation of glucose metabolism control is associated with carotid atherosclerosis in patients with coronary heart disease (CORDIOPREV-DIAB study). ***Atherosclerosis.*** 2016;253:178-185 .pii: S0021-9150(16)31204-7. doi: 10.1016/j.atherosclerosis.2016.07.903

41. Blanco-Rojo R, Delgado-Lista J, Lee YC, Lai CQ, Perez-Martinez P, Rangel-Zuñiga O, Smith CE, Hidalgo B, Alcala-Diaz JF, Gomez-Delgado F, Parnell LD, Arnett DK, Tucker KL, Lopez-Miranda J, Ordovas JM. Interaction of an S100A9 gene variant with saturated fat and carbohydrates to modulate insulin resistance in 3 populations of different ancestries. ***The American Journal of Clinical Nutrition.*** 2016;104(2):508-17. doi: 10.3945/ajcn.116.130898

42. Xin XX, Chen Y, Chen D, Xiao F, Parnell LD, Zhao J, Liu L, Ordovas JM, Lai CQ, Shen LR. Supplementation with Major Royal-Jelly Proteins Increases Lifespan, Feeding, and Fecundity in Drosophila. ***Journal of Agricultural and Food Chemistry.*** 2016; 64(29):5803-12. doi: 10.1021/acs.jafc.6b00514

43. Fernandez-Marcos PJ, Nóbrega-Pereira S. NADPH: new oxygen for the ROS theory of aging. ***Oncotarget.*** 2016 Aug;7(32):50814-50815. doi: 10.18632/oncotarget.10744

44. Margot H, Zwietering MH, Joosten H, Stephan R. Determination of single cell lag times of Cronobacter spp. strains exposed to different stress conditions: Impact on detection. ***International Journal of Food Microbiology.*** 2016 Nov;236:161-6. doi: 10.1016/j.ijfoodmicro.2016.08.002

45. Margot H, Tasara T, Zwietering MH, Joosten H, Stephan R. Effects of different media on the enrichment of low numbers of Shiga toxin-producing Escherichia coli in mung bean sprouts and on the development of the sprout microbiome. ***International Journal of Food Microbiology.*** 2016 Sep;232:26-34. doi: 10.1016/j.ijfoodmicro.2016.05.005

46. Hernando B, Ibarrola-Villava M, Fernandez LP, Peña-Chilet M, Llorca-Cardeñosa M, Oltra SS, Alonso S, Boyano MD, Martinez-Cadenas C, Ribas G. Sex-specific genetic effects associated with pigmentation, sensitivity to sunlight, and melanoma in a population of Spanish origin. ***Biology of Sex Differences.*** 2016 Mar;7:17. doi: 10.1186/s13293-016-0070-1. eCollection 2016

47. Fernández-Suárez ME, Escolà-Gil JC, Pastor O, Dávalos A, Blanco-Vaca F, Lasunción MA, Martínez-Botas J, Gómez-Coronado D. Clinically used selective estrogen receptor modulators affect different steps of macrophage-specific reverse cholesterol transport. ***Scientific Reports - Nature.*** 2016 Sep; 6:32105. doi: 10.1038/srep32105

48. Lopez-Padilla A, Ruiz-Rodriguez A, Florez CER, Barrios DMR, Reglero G, Fornari T. Vaccinium meridionale Swartz Supercritical CO2 Extraction: Effect of Process Conditions and Scaling Up. ***Materials.*** 2016 Jul;(7) 519. doi:10.3390/ma9070519

49. Tome-Carneiro J, Visioli F. Polyphenol-based nutraceuticals for the prevention and treatment of cardiovascular disease: Review of human evidence. ***Phytomedicine.*** 2016 Oct;(23)11:1145-1174. doi: 10.1016/j.phymed.2015.10.018

50. Corzo-Martínez M, Vázquez L, Arranz-Martínez P, Menéndez N, Reglero G, Torres C. Production of a Bioactive Lipid-based Delivery System from Ratfish Liver Oil by Enzymatic Glycerolysis. ***Food and Bioproducts Processing.*** In Press, Accepted Manuscript; 2016 Aug;100:311-322. Subdivisión: A. doi: 10.1016/j.fbp.2016.08.003

51. de la Iglesia R, Loria-Kohen V, Zulet MA, Martinez JA, Reglero G, Ramirez-de Molina A. Dietary strategies implicated in the prevention and treatment of metabolic síndrome. ***International Journal of Molecular Sciences.*** 2016 Nov;17(11). pii: E1877. doi: 10.3390/ijms17111877

52. Perez-Martinez P, Alcala-Diaz JF, Kabagambe EK, Garcia-Rios A, Tsai MY, Delgado-Lista J, Kolovou G, Straka RJ, Gomez-Delgado F, Hopkins PN, Marin C, Borecki I, Yubero-Serrano EM, Hixson JE, Camargo A, Province MA, Lopez Moreno J, Rodriguez-Cantalejo F, Tinahones FJ, Mikhailidis DP, Perez-Jimenez F, Arnett DK, Ordovas JM, Lopez-Miranda J. Assessment of postprandial triglycerides in clinical practice: Validation in a general population and coronary heart disease patients. ***Journal of Clinical Lipidology.*** 2016 Sep-Oct;10(5): 1163-1171. doi: 10.1016/j.jacl.2016.05.009

53. Correia NC, Melão A, Póvoa V, Sarmento L, Gómez de Cedrón M, Malumbres M, Enguita FJ, Barata JT. MicroRNAs regulate TAL1 expression in T-cell acute lymphoblastic leukemia. ***Oncotarget.*** 2016 Feb;7(7):8268-8281. doi: 10.18632/oncotarget.6987

54. Day, K ; Waite, LL ; Alonso, A ; Irvin, MR ; Zhi, D ; Thibeault, KS ; Aslibekyan, S ; Hidalgo, B ; Borecki, IB ; Ordovas, JM ; Arnett, DK ; Tiwari, HK ; Absher, DM. Heritable DNA Methylation in CD4(+) Cells among Complex Families Displays Genetic and Non-Genetic Effects. ***Plos One.*** 2016 Oct;11(10). doi: 10.1371/journal.pone.0165488

55. Corella, D; Coltell, O; Sorli, JV; Estruch, R; Quiles, L; Martinez-Gonzalez, MA; Salas-Salvado, J; Castaner, O; Aros, F; Ortega-Calvo, M; Serra-Majem, L; Gomez-Gracia, E; Portoles, O; Fiol, M; Espino, JD; Basora, J; Fito, M; Ros, E; Ordovas, JM. Polymorphism of the Transcription Factor 7-Like 2 Gene (TCF7L2) Interacts with Obesity on Type-2 Diabetes in the PREDIMED Study Emphasizing the Heterogeneity of Genetic Variants in Type-2 Diabetes Risk Prediction: Time for Obesity-Specific Genetic Risk Scores. ***Nutrients.*** 2016 Dec;8(12):793. doi: 10.3390/nu8120793

56. Martin, D; del Hierro, JN; Bermejo, D; Fernandez-Ruiz, R; Fornari, T; Reglero, G. Bioaccessibility and Antioxidant Activity of Calendula officinalis Supercritical Extract as Affected by in Vitro Codigestion with Olive Oil. ***Journal Of Agricultural and Food Chemistry.*** 2016 Nov;64(46):8828-8837. doi: 10.1021/acs.jafc.6b04313

57. Lopez-Guadamillas, E; Fernandez-Marcos, PJ; Pantoja, C; Munoz-Martin, M; Martinez, D; Gomez-Lopez, G; Campos-Olivas, R; Valverde, AM; Serrano, M. p21(Cip1) plays a critical role in the physiological adaptation to fasting through activation of PPAR alpha. ***Scientific Reports - Nature.*** 2016 Oct;6:34542. doi: 10.1038/srep34542

58. Mosteiro, L; Pantoja, C; Alcazar, N; Marion, RM; Chondronasiou, D; Rovira, M; Fernandez-Marcos, PJ; Munoz-Martin, M; Blanco-Aparicio, C; Pastor, J; Gomez-Lopez, G; De Martino, A; Blasco, MA; Abad, M; Serrano, M. Tissue damage and senescence provide critical signals for cellular reprogramming in vivo. ***Science.*** 2016 Nov;354(6315). pii: aaf4445. doi: 10.1126/science.aaf4445

59. Lopez-Guadamillas, E; Munoz-Martin, M; Martinez, S; Pastor, J; Fernandez-Marcos, PJ; Serrano, M. PI3K alpha inhibition reduces obesity in mice. ***Aging-US.*** 2016 Nov;8(11):2747-2753. doi: 10.18632/aging.101075

60. Cejas, Paloma; Cavazza, Alessia; Yandava, Chandri; Moreno, Victor; Horst, David; Moreno-Rubio, Juan; Burgos, Emilio; Mendiola, Marta; Taing, Len; Goel, Ajay; Feliu, Jaime; Shivdasani, Ramesh A. Transcriptional regulator CNOT3 defines an aggressive colorectal cancer subtype. ***Cancer Research.*** Epub 2016 Nov 29. doi: 10.1158/0008-5472.CAN-16-1346

61. Lopez-Gomez, M; Casado, E; Munoz, M; Alcala, S; Moreno-Rubio, J; D'Errico, G; Jimenez-Gordo, AM; Salinas, S; Sainz, B. Current evidence for cancer stem cells in gastrointestinal tumors and future research perspectives. ***Critical Reviews in Oncology Hematology.*** 2016 Nov;107:54-71. doi: 10.1016/j.critrevonc.2016.08.006

62. Vargas T, Moreno-Rubio J, Herranz J, Cejas P, Molina S, Mendiola M, Burgos E, Custodio AB, De Miguel M, Martín-Hernández R, Reglero G, Feliu J, Ramírez de Molina A. 3'UTR Polymorphism in ACSL1 Gene Correlates with Expression Levels and Poor Clinical Outcome in Colon Cancer Patients. ***PLoS One.*** 2016 Dec 19;11(12):E0168423. doi: 10.1371/journal.pone.0168423. eCollection 2016

63. Gomez-Delgado F, Delgado-Lista J, Lopez-Moreno J, Rangel-Zuñiga OA, Alcala-Diaz JF, Leon-Acuña A, Corina A, Yubero-Serrano E, Torres-Peña JD, Camargo A, Garcia-Rios A, Caballero J, Castaño J, Ordovas JM, Lopez-Miranda J, Perez-Martinez P. Telomerase RNA Component Genetic Variants Interact With the Mediterranean Diet Modifying the Inflammatory Status and its Relationship With Aging: CORDIOPREV Study; ***The Journals of Gerontology. Series A, Biological Sciences and Medical Sciences.*** 2016 Oct; pii: glw194; doi: 10.1093/gerona/glw194

64. Visioli F, Artaria C. Astaxanthin in cardiovascular health and disease: mechanisms of action, therapeutic merits, and knowledge gaps. ***Food & Function.*** 2016 Dec Epub ahead of print. doi: 10.1039/c6fo01721e

65. García-Blanco T, Dávalos A, Visioli F. Tea, cocoa, coffee, and affective disorders: vicious or virtuous cycle?. ***Journal of Affective Disorders.*** 2016 Nov Epub ahead of print. pii: S0165-0327(16)30783-2. doi: 10.1016/j.jad.2016.11.033

66. Cejas, P; Li, L; O'Neill, NK; Duarte, M; Rao, P; Bowden, M; Zhou, CSW; Mendiola, M; Burgos, E; Feliu, J; Moreno-Rubio, J; Guadalajara, H; Moreno, V; Garcia-Olmo, D; Bellmunt, J; Mullane, S; Hirsch, M; Sweeney, CJ; Richardson, A; Liu, XS; Brown, M; Shivdasani, RA; Long, HW. Chromatin immunoprecipitation from fixed clinical tissues reveals tumor-specific enhancer profiles. ***Nature Medicine.*** 2016 Jun;22(6):685-91. doi: 10.1038/nm.4085

67. de la Iglesia R, Espinosa-Salinas I, Aguilar-Aguilar E, Marcos-Pasero H, Reglero G, Ramírez De Molina A, Loria-Kohen V. Consumo de complementos dietéticos y cambios alimentarios en la menopausia. ***Revista Española de Nutrición Comunitaria.*** 2016 Oct Vol 22. Sup 1.

68. Loria-Kohen, V; Espinosa-Salinas, I; Marcos-Pasero, H; Lourenco-Nogueira, T; Herranz, J; Molina, S; Reglero, G; de Molina, AR. Polymorphism in the CLOCK gene may influence the effect of fat intake reduction on weight loss. ***Nutrition.*** 2016 Apr;32(4):453-460. doi: 10.1016/j.nut.2015.10.013

69. Gil-Ramirez, A; Caz, V; Martin-Hernandez, R; Marin, FR; Largo, C; Rodriguez-Casado, A; Tabernero, M; Ruiz-Rodriguez, A; Reglero, G; Soler-Rivas, C. Modulation of cholesterol-related gene expression by ergosterol and ergosterol-enriched extracts obtained from Agaricus bisporus. ***European Journal of Nutrition.*** 2016 Apr;55(3):1041-1057. doi: 10.1007/s00394-015-0918-x

70. Crespo, M Carmen; Visioli, Francesco. A brief review of blue- and bilberries' potential to curb cardio-metabolic perturbations: Focus on diabetes. ***Current Pharmaceutical Design.*** 2016 Oct Epub ahead of print

71. Visioli, F; Burgos-Ramos, E. Selected Micronutrients in Cognitive Decline Prevention and Therapy. ***Molecular Neurobiology.*** 2016 Aug;53 (6):4083-4093. doi: 10.1007/s12035-015-9349-1

72. Khymenets, O; Crespo, MC; Dangles, O; Rakotomanomana, N; Andres-Lacueva, C; Visioli, F. Human hydroxytyrosol's absorption and excretion from a nutraceutical. ***Journal of Functional Foods.*** 2016 May;23:278-282. doi: 10.1016/j.jff.2016.02.046

73. Pela, G; Crocamo, A; Li Calzi, M; Gianfreda, M; Gioia, MI; Visioli, F; Pattoneri, P; Corradi, D; Goldoni, M; Montanari, A. Sex-related differences in left ventricular structure in early adolescent non-professional athletes. ***European Journal of Preventive Cardiology.*** 2016 May;23(7): 777-784. doi: 10.1177/2047487315608826

74. Coltell, O; Corella, D; Barragan-Arnal, R; Asensio, EM; Fernandez-Carrion, R; Portoles, O; Ferriz, E; Gonzalez, JI; Ordovas, JM; Sorli, JV. Association between the rs11614913 polymorphism in the hsa-mir-196a2 and obesity-related parameters. ***Cardiology.*** 2016;134:447-447. Suplement: 1. Abstract of meeting: 434

75. Corella, D; Sorli, JV; Frances, FG; Fernandez-Carrion, R; Estruch, R; Parnell, L; Aros, F; Saiz, C; Ordovas, JM; Coltell, O. A genetic variant in the circadian gene bmal1 is associated with higher incidence of cardiovascular diseases. ***Cardiology.*** 2016;134:245-245. Suplement: 1. Abstract of meeting: 232

76. Coltell, O; Sorli, JV; Asensio, EM; Fernandez-Carrion, R; Ortega-Azorin, C; Barragan-Arnal, R; Gonzalez-Monje, I; Aros, F; Ordovas, JM; Corella, D. A genome-wide methylation analysis shows differentially methylated regions between future cvd cases and controls. ***Cardiology.*** 2016;134: 243-243. Suplement: 1. Abstract of meeting: 230

77. Lai, CQ; Wojczynski, MK; Parnell, LD; Hidalgo, BA; Irvin, MR; Aslibekyan, S; Province, MA; Absher, DM; Arnett, DK; Ordovas, JM. Epigenome-wide association study of triglyceride postprandial responses to a high-fat dietary challenge. ***Journal of Lipid Research.*** 2016 Dec;57(12):2200-2207. doi: 10.1194/jlr.M069948

78. Love-Gregory, L; Kraja, AT; Allum, F; Aslibekyan, S; Hedman, AK; Duan, Y; Borecki, IB; Arnett, DK; McCarthy, MI; Deloukas, P; Ordovas, JM; Hopkins, PN; Grundberg, E; Abumrad, NA. Higher chylomicron remnants and LDL particle numbers associate with CD36 SNPs and DNA methylation sites that reduce CD36. ***Journal of Lipid Research.*** 2016 Dec;57(12):2176-2184. doi: 10.1194/jlr.P065250

79. Malo, JE; de la Morena, ELG; Hervas, I; Mata, C; Herranz, J. Uncapped tubular poles along high-speed railway lines act as pitfall traps for cavity nesting birds. ***European Journal of Wildlife Research.*** 2016 Aug;62(4):483-489. doi: 10.1007/s10344-016-1025-x

80. Vazquez L, Gonzalez N, Reglero G, Torres C. Solvent-Free Lipase-Catalyzed Synthesis of Diacylgycerols as Low-Calorie Food Ingredients. ***Frontiers in Bioengineering and Biotechnology.*** 2016 Feb;4:6. doi:10.3389/fbioe.2016.00006

81. Hmimed S., Belarbi M., and Visioli F. Hydroxytyrosol augments the redox status of high fat diet-fed rats. ***PharmaNutrition.*** 2016 Dec;4(4):139-142. doi: 10.1016/j.phanu.2016.09.001

82. Herrera Acosta E., Alonso Suárez Pérez J.A., Aguilera Arjona, J., and Visioli F. An olive polyphenol-based nutraceutical improves cutaneous manifestations of psoriasis in humans. ***PharmaNutrition.*** 2016 Dec;4(4):151–153. doi: 10.1016/j.phanu.2016.10.002

4.2 Books and chapters of books

1. Jose Mª Ordovás, Silvia Berciano, Victor Micó, Lidia Daimiel-Ruiz. "Gene-Diet interactions in the development of Diabetes". ***Molecular Nutrition and Diabetes.*** 2016; chapter 4: 41-50. Ed. Elsevier, EE.UU. ISBN: 978-0-12-801585-8

2. Viviana Loria Kohen, Chapter in participation. "Alcanzando el balance energético: ni sobrepeso ni desnutrición". ***Manual de alimentación: Planificación alimentaria.*** 2016; chapter 22: 455-475.Ed. UNED, 2016. ISBN: 978-84-362-6975-8

3. T. Acunha, C. Ibáñez, V. García-Cañas, C. Simó, A. Cifuentes. "CE-MS in food analysis and Foodomics". ***Capillary Electrophoresis–Mass Spectrometry (CE-MS): Principles and Applications.*** 2016 ; chapter 8: 193-215. Ed: Wiley, EE.UU. ISBN: 9783527339242

4. Waddah A. Alrefai, Jaime Amaya-Farfan, Giovanni Annuzzi, Julie C. Antvorskov, Anna Ardévol, Knud Erik Bach Knudsen, Silvia Berciano, Piers R. Blackett, Mayte Blay, Lutgarda Bozzetto, Karsten Buschard, Lu Cai, Younan Chen, Fausto Chiazza, Carla Beatriz Collares-Buzato, Massimo Collino, Giuseppina Costabile, Vinicius F. Cruzat, Leticia Cuéllar, Lidia Daimiel-Ruiz, Louise T. Dalgaard, et al. (J.M. Ordovás). ***Molecular Nutrition and Diabetes.*** 2016, Pages 13-15. ISBN: 978-0-12-801761-6

4.3 Thesis directed or in progres

Title: Identification of SNPs involved in the response to different dietary components and association with food-related diseases: Nutrigenetic studies
PhD student: Isabel Espinosa Salinas
Directors: Dr. Ana Ramírez de Molina and Dr. Viviana Loria Kohen
University: Autónoma, Madrid
Date: 2017

Title: Gut-Brain axis and microRNAs as modulators of obesity and CVD
PhD student: Silvia Berciano Benítez
Director: Prof. José María Ordovás Muñoz
University: Autónoma, Madrid
Date: 2018

Title: Effect of bioactive compounds as new additional agents as therapeutic agents in cancer
PhD student: Jorge Martínez Romero
Directors: Dr. Ana Ramírez de Molina and Prof. Guillermo Reglero Rada
University: Autónoma, Madrid
Date: 2018

Title: Effect of caloric restriction based on Mediterranean Diet about regulatory microRNAs of molecular processes associate to aging
PhD student: Victor Micó Moreno
Director: Dr. Lidia Daimiel
University: Autónoma, Madrid
Date: 2018

Title: Studying the role of micronutrients in cardiovascular and neurodegenerative diseases
PhD student: Carmen Crespo Lorenzo
Director: Prof. Francesco Visioli
University: Autónoma, Madrid
Date: 2018

Title: Involvement of lipid metabolism in colorectal cancer tumor progression and prognosis of the disease
PhD student: Silvia Cruz Gil
Directors: Dr. Ana Ramírez de Molina and Dr. Ruth Sánchez Martínez
University: Autónoma, Madrid
Date: 2018

Title: Plant extracts for personalized nutrition for cancer patients
PhD student: Lamia Mouhid Al Achbili
Directors: Dr. Ana Ramírez de Molina and Prof. Tiziana Fornari Reale
University: Autónoma, Madrid Date: 2018

Title: Development of a Nutrigenomics data mining Platform
PhD student: Roberto Martín Hernández
Directors: Dr. Alberto Dávalos Herrera and Prof. Guillermo Reglero Rada
University: Autónoma, Madrid
Date: 2019

Title: New biomarkers of clinical prognosis in non-small cell lung cancer
PhD student: María Merino Salvador
Directors: Dr. Ana Ramírez de Molina and Dr. María Sereno Moyano
University: Autónoma, Madrid
Date: 2018

Title: The role of non-coding RNAs in lipid metabolism
PhD student: Judit Gil Zamorano
Director: Dr. Alberto Dávalos Herrera
University: Complutense, Madrid
Date: 2018

Title: Identification, characterization and development of natural compounds active against Metabolic Syndrome
PhD student: Luís Filipe Costa Machado
Director: Dr. Pablo José Fernández Marcos
University: Complutense, Madrid
Date: 2019

4.4 Awards

1. Dr. Ana Ramírez de Molina

8 March Distintion, in the area of Science and Technology on the occasion of International Women's Day
Institution: Comunidad de Madrid
Date: March 2016

2. Prof. José María Ordovás Muñoz

NAOS Strategy Award, of special recognition for relating genes, the environment and obesity
Institution: Agencia Española de Consumo, Seguridad Alimentaria y Nutrición
Date: November 2016

4.5 Patents

Publication number: ES24087301B1

Title: Supercritical Rosemary extract for cancer treatment
Owners: IMDEA Food, Universidad Autónoma de Madrid
Inventors: Ana Ramírez de Molina, Susana Molina Arranz, Margarita González-Vallinas Garrachón, Tiziana Fornari Reale, Mónica Rodríguez García-Risco, Guillermo Reglero Rada

Publication number: ES2475366B1

Title: Methods and kits for prognosis of colorectal cancer
Owners: IMDEA Food, Hospital La Paz Institute dor Health Research
Inventors: Ana Ramírez de Molina, Guillermo Reglero Rada, Teodoro Vargas Alonso, Susana Molina Arranz, Margarita González-Vallinas Garrachón, Juan Moreno Rubio, Paloma Cejas Guerrero, Jaime Feliú Batlle

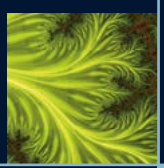
Application number: P201630560

Title: Uso de combinaciones sinérgicas de lípidos portadores bioactivos y otros principios bioactivos para el desarrollo de fórmulas destinadas a la nutrición dirigida a pacientes oncológicos
Owners: IMDEA Food, Universidad Autónoma de Madrid
Inventors: Carlos Torres, Luis Vázquez, Pablo Arranz, Marta Corzo, Guillermo Reglero, Ana Ramírez de Molina

5

dissemination activities

report 2016



The IMDEA Food Institute has participated in the organization of seminars and events for the dissemination of international and national science as well as specialization courses, invited presentations, communications to congresses to disseminate the research results obtained and in the organizing committee of two international congresses.

5.1 Organization of conferences and seminars

Author/s: Francesco Visioli
Title: "How to write your best paper"
Place: Madrid
Date: January 19, 2016

Author/s: Moisés Laparra
Title: "Exploring the role of cancer-related proteins in the physiological control of metabolism"
Place: Madrid
Date: January 25, 2016

Author/s: Pilar Santisteban Sanz
Title: "Role of TGFbeta/Smad pathway and microRNAs in molecular pathogenesis of thyroid cancer"
Place: Madrid
Date: February 9, 2016

Author/s: Guillermo Reglero Rada
Title: "Innovar para crecer. Ciencia y Tecnología para responder al mercado alimentario"
Place: Madrid
Date: March 3, 2016

Title: "Con Ciencia en la Escuela"
Place: Madrid
Date: March 9 – 10, 2016

Author/s: Aleix Sala-Vila
Title: "Fatty acid composition of cellular membranes and cardiovascular risk"
Place: Madrid
Date: March 15, 2016

Author/s: Bricia López Plaza
Title: "The Intestinal Microbiota as a modulator of the genesis of obesity. Use of probiotics and prebiotics"
Place: Madrid
Date: March 29, 2016

Author/s: GENYAL Platform
Title: "Alimentación en la menopausia"
Place: Madrid
Date: April 8 – 13, 2016

Author/s: Carlos F. Torres Olivares
Title: "Structure-activity relationship of bioactive lipids"
Place: Madrid
Date: April 19, 2016

Author/s: Organized by Francesco Visioli
Title: EFSA GMO Panel Meeting
Place: Madrid
Date: May 3 – 4, 2016

Author/s: Pablo José Fernández-Marcos
Title: "From cancer to metabolic syndrome and bioactive products"
Place: Madrid
Date: May 10, 2016

Title: Visit of DIRCOM (Association of Communication Directors) to IMDEA Food
Place: Madrid
Date: May 23, 2016

Author/s: Alejo Efeyan
Title: "Cellular nutrients and mTOR - from neonatal metabolism to adult physiology"
Place: Madrid
Date: May 24, 2016

Title: Visit of ASEACAM (Association of Food Industries of the Community of Madrid) to IMDEA Food
Place: Madrid
Date: May 25, 2016

Author/s: Marta Gómez de Cedrón Cardeñosa
Title: "MicroRNA-661 modulates redox and metabolic homeostasis in colon cancer"
Place: Madrid
Date: May 31, 2016

Author/s: Jara Pérez Jiménez
Title: "Macromolecular antioxidants, bioactive compounds of the diet: concept, metabolism, intake and potential effects on health"
Place: Madrid
Date: June 14, 2016

Author/s: Manuel Fernández-Rojo
Title: "Hepatic stellate cells: Tunning inflammation during chronic liver diseases"
Place: Madrid
Date: July 13, 2016

Author/s: Francesco Visioli
Title: "How to evaluate the quality of scientific research"
Place: Madrid
Date: September 27, 2016

Title: "Alimenta tus genes de manera saludable". European Researchers' Night 2016
Place: Madrid
Date: September 30, 2016

Author/s: Ana Ramírez de Molina
Title: "Una Ciencia muy deportiva o un deporte muy científico". European Researchers' Night 2016
Place: Madrid
Date: September 30, 2016

Author/s: José Antonio Enríquez Domínguez
Title: "Mitochondrial and nuclear DNA matching shapes metabolism and healthy ageing"
Place: Madrid
Date: October 11, 2016

Author/s: Guillermo Reglero Rada
Title: "Nutrición Personalizada: ¿reto científico o realidad social?"
Place: Madrid
Date: November 16, 2016

Author/s: Alfredo Martínez Hernández
Title: "Nutrición Personalizada: ¿reto científico o realidad social?"
Place: Madrid
Date: November 16, 2016

Author/s: Diego Moreno Fernández
Title: "Research on food and health: benefits of consumption of Broccoli"
Place: Madrid
Date: November 22, 2016

Author/s: Clara Ibáñez Ruiz
Title: "Metabolomics in clinical research and nutrition"
Place: Madrid
Date: November 30, 2016

Author/s: Ángela Martínez Valverde
Title: "Differential effects of double versus single glp-1/glucagon receptor agonists in diet-induced obesity and nash"
Place: Madrid
Date: December 16, 2016

Author/s: Agustín Rodríguez González
Title: "Mechanistic multiscale modelling enables personalized treatment in cancer induced anemia"
Place: Madrid
Date: December 20, 2016

5.2 Congress, invited conferences and courses

The section includes invited lectures and participation in scientific congress and courses by researchers of the IMDEA Food Institute.

5.2.1 Congress coordination and communications

Author/s: Helena Marcos-Pasero, Isabel Espinosa-Salinas, Elena Aguilar Aguilar, Rocío de la Iglesia González, Jesús Herranz Valera, Susana Molina Arranz, Guillermo Reglero Rada, Ana Ramírez de Molina, Viviana Loria-Kohen
Title: "Estado nutricional y calidad de vida en pacientes con Síndrome Químico Múltiple"
Communication: Oral communication
Event: V Conference Addinma
Place: Madrid
Date: March 11 - 12, 2016.

Author/s: Cristina Aguirre Portolés
Title:"Obesity and colon cancer: relevance of cholesterol metabolism in tumorogenesis and tumor microenvironment"
Communication: Poster
Event: Tumour Microenvironment and Signalling Symposia (EMBL)
Place: Heidelberg, Germany
Date: April 2 – 4, 2016

Author/s: José María Ordovás Muñoz
Title: "Applying Big Data Approaches to Study Food and Diet Patterns on Health Markers"
Communication: Oral communication
Event: Experimental Biology Congress
Place: San Diego (USA)
Date: April 2, 2016

Author/s: José María Ordovás Muñoz
Title: "Polyphenols, flavonoids & Genomic-based precision Medicine"
Communication: Oral communication
Event: Experimental Biology Congress
Place: San Diego (USA)
Date: April 2, 2016

Author/s: Helena Marcos-Pasero, Isabel Espinosa-Salinas, Elena Aguilar Aguilar, Rocío de la Iglesia González, Ana Ramírez de Molina, Guillermo Reglero Rada, Viviana Loria-Kohen
Title: "Caracterización genotípica y estado nutricional en pacientes con Síndrome Químico Múltiple"
Communication: Poster
Event: XX Conference of Practical Nutrition and X International Congress of Nutrition, Food and Dietetics
Place: Madrid
Date: April 13 – 15, 2016

Author/s: José María Ordovás Muñoz
Title: "Decreased insulin sensitivity in evening-types who are carriers of the risk allele at MTNR1B rs10830963 relative to non-carriers in two independent populations: Mediterranean and North American"
Communication: Poster
Event: Sleep 2016
Place: Denver (USA)
Date: June 11 – 15, 2016

Author/s: Silvia Berciano Benítez
Title: "NutriTech ExCom Meeting" and "Junior Meeting"
Communication: Oral Communication
Event: NutriTECH final symposium
Place: Lisbon, Portugal
Date: June 12 – 15, 2016

Author/s: Emma Burgos Ramos, M. Carmen Crespo Lorenzo, Joao Tomé Carneiro, Francesco Visioli
Title: "El hidroxitirosol previene la resistencia a insulina asociada a la enfermedad de Alzheimer en los astrocitos"
Communication: Poster
Event: V Conference on Biomedicine. Science
Place: Ciudad Real
Date: June 15, 2016

Author/s: Pablo Fernández Marcos
Title: "G6PD increases NADPH levels, protects from oxidative damage and improves healthspan in mice"
Communication: Poster
Event: Ageing and Metabolism Cell Symposia
Place: Sitges, Barcelona
Date: July 8 – 12, 2016

Author/s: C. Ibañez, V. Loria-Kohen, M. Gómez de Cedrón, G. Reglero, A. Ramírez de Molina
Title: "Comprehensive profiling or redox related metabolites in plasma: Evaluation of the antiageing effects of a natural extract as a case study Ageing and Metabolism"
Communication: Poster
Event: Ageing and Metabolism Cell Symposia
Place: Sitges, Barcelona
Date: July 8 – 12, 2016

Author/s: B. Soldevilla, C. Cuevas-Martín, C. Ibáñez, M. A. Alberti, C. Simó, F. Santacatterina, C. Casasnovas, C. Márquez-Infante, T. Sevilla, S. I. Pascual, M. Sánchez-Aragó, C. Espinós, F. Palau, J. M. Cuezva
Title: "Plasma-metabolite and skin-protein signatures of Charcot-Marie-Tooth 1A provide molecular markers of disease and suggest future therapeutic interventions"
Communication: Poster
Event: VI International Charcot-Marie-Tooth and related neuropathy Consortium (CMTR) Meeting
Place: Venice, Italy
Date: September 8 – 10, 2016

Author/s: Francesco Visioli. Organizing Committee
Event: Euro Fed Lipid Congress
Place: Ghent, Belgium
Date: September 18 – 21, 2016

Author/s: de la Iglesia R, Espinosa-Salinas I, Aguilar-Aguilar E, Marcos-Pasero H, Reglero G, Ramírez De Molina A, Loria-Kohen V
Title: "Consumo de complementos dietéticos y cambios alimentarios en la menopausia"
Communication: Poster
Event: XI Congress of the Spanish Society of Community Nutrition
Place: Zaragoza
Date: September 28 – 30, 2016

Author/s: Alberto Canfrán-Duque, Noemi Rotlan, Elisa Araldi, Xinbo Zhang, Lidia Daimiel, Carlos Fernández-Hernando, Yajaira Suarez
Title: "Hematopoietic miR-21 deficiency promotes apoptosis and plaque necrosis in advanced atherosclerotic lesions"
Communication: Oral Communication
Event: American Heart Association
Place: New Orleans (USA)
Date: November 12-16, 2016

5.2.2 Invited conferences

Author/s: Viviana Loria Kohen
Title: "Alcanzando el balance energético: ni sobrepeso ni desnutrición"
Communication: Oral Communication
Event: Nutrición y dietética: planificación alimentaria Course.Universidad Nacional de Educación a distancia
Place: Madrid
Date: February 20, 2016

Author/s: Emma Burgos Ramos
Title: "El aceite de oliva, un gran tesoro para el cerebro"
Communication: Oral Communication
Event: World Brain Week 2016
Place: Toledo
Date: March 15, 2016

Author/s: Francesco Visioli
Title: "Biochemistry and pharmacology of nutraceuticals: the example of antioxidants"
Communication: Oral Communication
Event: NUCE Health World Expo
Place: Bologna; Italy
Date: March 18, 2016

Author/s: José María Ordovás Muñoz
Title: "Nutrigenómica, precisión para las recomendaciones nutricionales"
Communication: Oral Communication
Event: Impact of the omic sciences in medicine, nutrition and biotechnology. Fundación Ramón Areces International Symposium
Place: Madrid
Date: March 29, 2016

Author/s: Ana Ramírez de Molina
Title: "Terapias del cáncer: aproximaciones más precisas y personalizadas"
Communication: Oral Communication
Event: Impact of the omic sciences in medicine, nutrition and biotechnology. Fundación Ramón Areces International Symposium
Place: Madrid
Date: March 29, 2016

Author/s: José María Ordovás Muñoz
Title: "The importance of gene-environment interactions in Genetic Predictive Medicine"
Communication: Oral communication
Event: Mind the Gap: NIH Seminar Series
Place: Washington DC, USA
Date: April 19 – 20, 2016

Author/s: José María Ordovás Muñoz
Title: "Yo soy yo y mi alimentación"
Communication: Oral communication
Event: Alimentaria 2016 Trade Fair
Place: Barcelona
Date: April 25, 2016

Author/s: José María Ordovás Muñoz
Title: "La genómica como vertebrador de la investigación biomédica"
Communication: Oral communication
Event: I Congress of Biomedical and Health Research of the Canary Islands
Place: Las Palmas de Gran Canaria
Date: May 1, 2016

Author/s: José María Ordovás Muñoz
Title: "Importancia de la correcta identificación del riesgo cardiovascular del paciente"
Communication: Oral communication
Event: Iberican Investigators Meeting
Place: Boston, USA
Date: May 6, 2016

Author/s: José María Ordovás Muñoz
Title: "Nutrigenetics and Nutrigenomics. Omics: Advances, Applications, and Translation in Nutrition"
Communication: Oral communication
Event: Harvard University Conference
Place: Cambridge, USA
Date: May 9, 2016

Author/s: José María Ordovás Muñoz
Title: "Nutrición Precisa: el Genoma es quien mejor la conoce"
Communication: Oral communication
Event: Initiative for a Right Diet: Effects of Yoghurt on Health. II Symposia
Place: Mexico City, Mexico
Date: May 12, 2016

Author/s: José María Ordovás Muñoz
Title: "Trastornos circadianos: impacto en metabolismo, balance energético y obesidad"
Communication: Oral communication
Event: Initiative for a Right Diet: Effects of Yoghurt on Health. II Symposia
Place: Mexico City, Mexico
Date: May 12, 2016

Author/s: Ana Ramirez de Molina
Title: "Alimentación para la prevención y terapia de enfermedades crónicas: Bienestar social y competitividad industrial"
Communication: Oral communication
Event: I Conference of Innovation in the Madrid Food Industry
Place: Madrid
Date: May 18, 2016

Author/s: José María Ordovás Muñoz
Title: "When We Eat is Also Important: Chrononutrition"
Communication: Oral communication
Event: The Personalized Nutrition Congress
Place: Boston, USA
Date: May 19, 2016

Author/s: José María Ordovás Muñoz
Title: "Nutrición de precisión: el genoma sabe lo que le conviene"
Communication: Oral communication
Event: XXIX National Congress of Arteriosclerosis
Place: Granada
Date: May 20, 2016

Author/s: Francesco Visioli
Title: "Disease prevalence and dietary habits – the epidemiological basis for the health interest in Mediterranean diets"
Communication: Oral communication
Event: X Congress of the International Society of Nutrigenetics & Nutrigenomics
Place: Tel Aviv, Israel
Date: May 23, 2016

Author/s: José María Ordovás Muñoz
Title: "¿Son los genes y los alimentos quienes determinan nuestra salud?"
Communication: Oral communication
Event: Health and Wellness Forum
Place: Tenerife
Date: June 2, 2016

Author/s: Francesco Visioli
Title: "Laboratory of Functional Foods"
Communication: Oral Communication
Event: Éxitos en el Mercado Internacional. II Congress of Cuatrecasas Goncalves Pereira and Revista Alimentaria
Place: Madrid
Date: June 7, 2016

Author/s: José María Ordovás Muñoz
Title: "Integrating genome and phenome in phenotypic flexibility"
Communication: Oral communication
Event: NutriTECH final Symposium
Place: Lisbon, Portugal
Date: June 14, 2016

Author/s: José María Ordovás Muñoz
Title: "New technology in nutrition research and practice"
Communication: Oral communication
Event: Nutrition Society Meeting
Place: Dublin, Ireland
Date: July 13, 2016

Author/s: José María Ordovás Muñoz
Title: "Nutrición: la herramienta que esculpe el genoma humano"
Communication: Oral communication
Event: From Nutritional Genomics to Personalized Nutrition. XVII School of Nutrition «Francisco Grande Covián», Internacional Menéndez Pelayo University
Place: Santander
Date: July 14, 2016

Author/s: Ana Ramírez de Molina
Title: "Genómica nutricional y cáncer"
Communication: Oral communication
Event: Infanta Sofia University Hospital
Place: Madrid
Date: October 21, 2016

Author/s: María Tabernero Urbieta
Title: "Presentación de la Plataforma Europea para el Liderazgo en Nutrición (ENLP): objetivos y actividades"
Communication: Oral communication
Event: XVII Congress of of the Spanish Society of Nutrition
Place: Santiago de Compostela
Date: November 3, 2016

Author/s: Ana Ramírez de Molina
Title: "Alteraciones del metabolismo lipídico en cáncer: genómica nutricional"
Communication: Oral communication
Event: Alberto Sols Institute of Biomedical Research (UAM - CSIC)
Place: Madrid
Date: November 4, 2016

Author/s: José María Ordovás Muñoz
Title: "Predicción y prevención de la obesidad: un reto para las "Omicas""
Event: NAOS Strategy Conference
Place: Madrid
Date: November 7, 2016

Author/s: Guillermo Reglero Rada
Title: "Mejora en la composición de los alimentos"
Event: NAOS Strategy Conference
Place: Madrid
Date: November 7, 2016

Author/s: Viviana Loria Kohen
Title: "Investigación: no todo lo que brilla es oro. Diseño de estudios científicos"
Communication: Oral communication
Event: CiNut Course. Association of Dietitians-Nutritionists of the Community of Madrid
Place: Madrid
Date: November 11, 2016

Author/s: José María Ordovás Muñoz
Title: "Nutrigenetica: hacia una nutrición personalizada basada en el genoma"
Communication: Oral communication
Event: Fundación Jiménez Díaz
Place: Madrid
Date: December 1, 2016

5.2.3 Courses

Título: Estadística aplicada a la investigación biomédica con R
Coordinating researcher: Jesús Herranz Valera
Date: October 24 – 26, 2016

Title: "Técnicas analíticas aplicadas en las ciencias ómicas: técnicas de separación" and "Técnicas analíticas aplicadas en las ciencias ómicas: espectrometría de masas". Taught within the master "Gestión y Desarrollo de Tecnologías Biomédicas" at Universidad Carlos III
Researcher: Clara Ibáñez Ruiz
Date: November 2016.

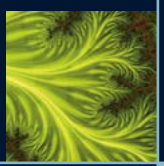
Title: "Nutrigenética del tiempo: alimentando al reloj molecular". Taught within the degree of Human Nutrition and Dietetics at Universidad Autónoma de Madrid
Researcher: Lidia Daimiel Ruiz
Date: November 14, 2016

Title: Técnicas estadísticas de Data Mining con R
Coordinating researcher: Jesús Herranz Valera
Date: December 12 - 15, 2016

6

infrastructures

report 2016



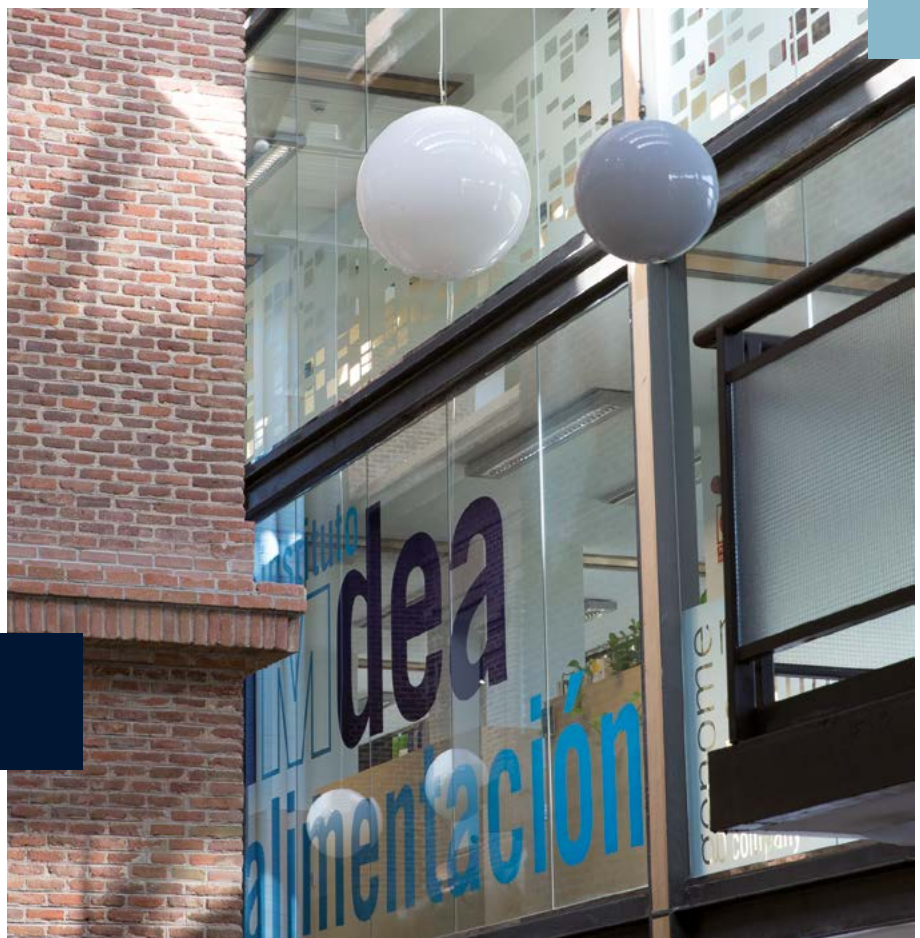
6.1 Headquarters

IMDEA Food headquarters are located in the old Main Building of the Cantoblanco Hospital since beginning of 2014. The building, ceded to the Institute by the Consejería de Educación y Empleo de la Comunidad de Madrid (the Education, Youth and Sport Council of the Madrid Region), is an excellent space in which to undertake scientific research.

It is located next to the Cantoblanco Campus of the Universidad Autónoma de Madrid with which the Institute has strong cooperative ties – within the grounds of the Cantoblanco University Hospital.

The building occupies an area of 4.595 m^2 and is divided into two symmetrical main sections of five stories each that can house up to 100 researchers. It is equipped with laboratories of molecular and cellular biology P2, genomics and instrumental analysis, as well as facilities for clinical trials in humans.

In 2016, has started the project for completing the Institute's Insfraestructures in the west wing of the building. This project includes the construction of new research areas (including new laboratories and experimental animal facilities) provided with advanced technical and scientific equipment.



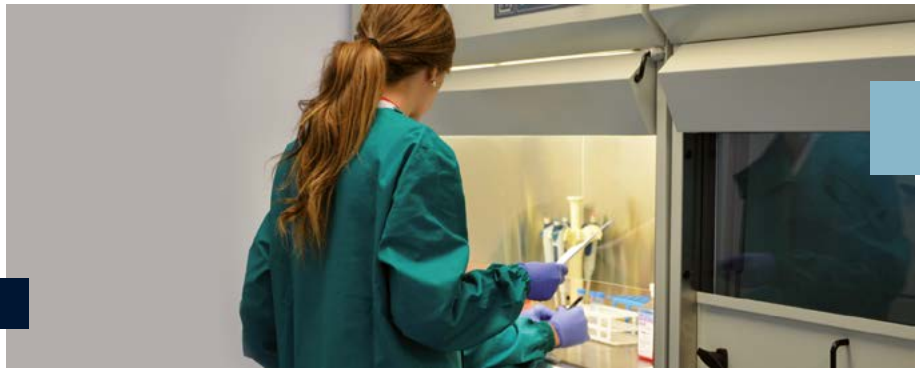
6.2. Scientific infrastructures

Currently the building is equipped with research laboratories, all of which are fitted with advanced scientific-technical hardware.

Laboratory 1. Cell Culture Laboratory (Biosafety Level 2)

This Biosafety Level 2 laboratory allows research to be undertaken on a wide range of moderate risk agents. It is routinely used in experimentation on, and the maintenance of, cell cultures.

It is equipped with incubators for maintaining cells under optimum growth conditions, laminar flow cabinets for working in sterile conditions, plus all the basic equipment needed for work on cell cultures, such as microscopes, water baths, centrifuges and cell counters. It also has a fluorescence microscope and a nucleoflector system, which are required in certain experiments. It has the latest equipment for analysis of metabolic activity (SeaHorse) apparatus, along with a fluorescence microscope and a nucleofector, a pressure reducer, an apparatus with micro-electric biosensors for cellular assays with real-time results and an analyzer with Luminex technology.



Laboratory 2. Genomics Laboratory

The Genomics Laboratory contains equipment required for genetic, genomic, transcriptomic and epigenetic analyses, etc. It is fitted with all the basic equipment required, such as thermocyclers for performing conventional PCR work, an ABI PRISM HT 7900 apparatus for real-time PCR, plus equipment for gene expression and high performance genotyping analysis, such as the latest generation QuantStudio™ apparatus. The versatility of these systems allows analyses to be performed in different formats depending on the number of samples to be tested, from the use of 96-well plates through to chips capable of performing 3.072 genotyping reactions. These devices have different applications, such as digital PCR, DNA fragment analysis, expression/gene quantification analysis, allele discrimination using TaqMan probes, and the detection of SNPs and mutations, etc.

The laboratory has a designated clean area for processing and extracting nucleic acids from samples originating from clinical trials.

Laboratory 3. Biochemical Instrumental Techniques Laboratory

This multifunctional laboratory is fitted with a range of small apparatuses for the preparation of reagents and solutions, plus more specific equipment for use in biochemical and molecular biological investigations, such as plate readers, a luminometer, a NanoDrop 2000 spectrophotometer, a SpeedVac sample concentrator, and an HPLC apparatus.

It is divided into different areas where different techniques, such as Western blotting and agarose gel separations, and microbiological techniques for the cultivation and handling of bacteria, can be followed.

Laboratory 4. General Biochemistry and Molecular Biology Laboratory

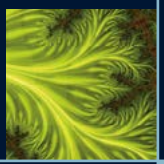
This is where the different research Groups undertake their normal laboratory work. Each Group has its own space equipped with benches and all the reagents and materials required for its research line. Predoctoral students and those undertaking laboratory experience also work in these areas. Fume cupboards are available for handling volatile compounds, there are cupboards for the storage of flammable products and acids etc., and freezers for preserving samples and reagents.

The IMDEA Food installations also have a cold room, a freezing room, a dark room, a cooling and ultrafreezing room, and a cryopreservation tank.

7

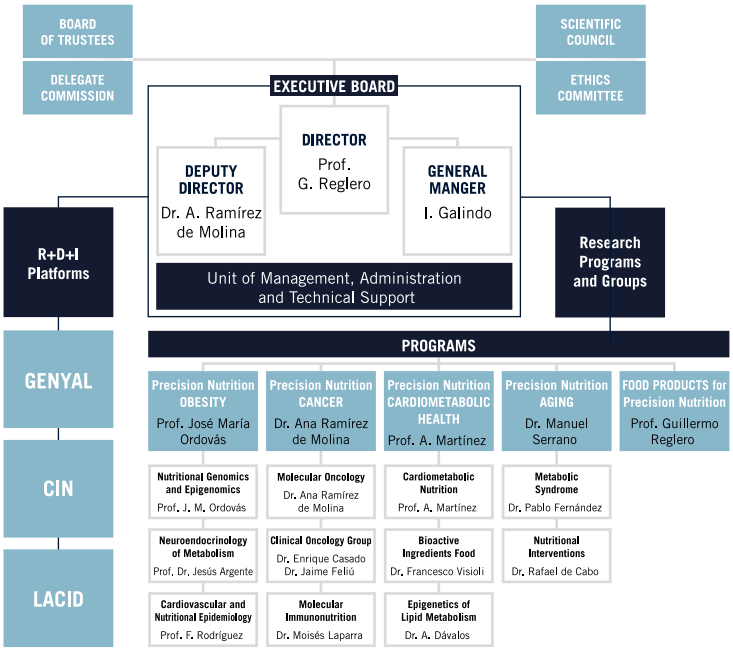
organization

report 2016



7.1 Organizational structure

The organizational and functional structure of the IMDEA Food Institute is summarized in the diagram below with indication of its main bodies and Groups.



The main governing body of the Institute is its Board of Trustees constituted by representatives of the Madrid Regional Government, 3 Madrid public universities, the Spanish National Research Council (CSIC), internationally renowned food and nutrition scientists, industrial partners and independent experts.

The Institute carries out its scientific research activity directed by its own management team and advised by a Scientific Committee composed of members of recognized international prestige, the Scientific Council and a Research Ethics Committee.

7.2 Board of Trustees

The Board is the highest body of government, representation and administration of the Foundation. The authority of the Board encompasses all matters concerning the government and administration of the Foundation, without exception, and the resolution of all legal and circumstantial incidents that occur. The Board is responsible for complying with the foundational purposes and for administering the assets and rights that constitute the patrimony of the Foundation, assuring their correct performance and effectiveness.

instituto imdea food

PRESIDENT OF THE FOUNDATION

Manuela Juárez Iglesias
Professor "Ad Honorem"
Spanish National Research Council.
Madrid. Spain

VICE-CHAIRMAN OF THE FOUNDATION

Rafael van Grieken Salvador
Chairman of Board of Education, Youth and Sport
Education, Youth and Sport Counseling
Madrid Regional Government.
Madrid. Spain

REGIONAL ADMINISTRATION REPRESENTATIVES

José Manuel Torralba Castelló
General Director of Universities and Research
Education, Youth and Sport Counseling
Madrid Regional Government.
Madrid. Spain

Rafael A. García Muñoz
Assistant Director of Universities and Research
Education, Youth and Sport Counseling
Madrid Regional Government.
Madrid. Spain

José de la Sota Ríus
Scientific-Technical Coordinator
madri+d Foundation for Knowledge.
Madrid. Spain

INSTITUTIONAL TRUSTEES

Rafael Garesse Alarcón
Vice-rector of Research and Innovation
Universidad Autónoma de Madrid.
Madrid. Spain

Alberto Garrido Colmenero
Vice-rector of Quality and Efficiency
Universidad Politécnica de Madrid.
Madrid. Spain

Juan Miguel Rodríguez Gómez
Professor of Nutrition and Bromatology
Universidad Complutense de Madrid.
Madrid. Spain

Mª Isabel Medina Méndez
Coordinator of the Science and Technology Department
Spanish National Research Council.
Madrid. Spain

SCIENTIFIC TRUSTEES

Jean Louis Sebedio
Research Director
Human Nutrition Department. INRA (French National Institute for Agricultural Research) / University of Auvergne 1.
Clermont-Ferrand-Theix. France

Michael Heinrich
Director of Center for Pharmacognosy and Phytotherapy
The School of Pharmacy. University of London.
London. UK

Daniel Ramón Vidal
Scientific Director and Chief Executive Officer
Biopolis S.L.
Valencia. Spain

Gregorio Varela Moreiras
Professor of Nutrition and Bromatology
Universidad CEU San Pablo.
Madrid. Spain

EXPERT TRUSTEES

Daniel de la Sota Rius
Innovation and New Technologies Expert
Madrid. Spain

Jorge Jordana Butticaz de Pozas
Trustee Director
Fundación LAFER.
Madrid. Spain

COMPANY TRUSTEES

DANONE, S.A.
Gregorio Alegre Muñoz
Health Affairs Director
Barcelona. España

FRIAL TECHNOLOGIES S.L.
Paloma Frial Suárez
President
Madrid. Spain

COCA-COLA IBERIAN DIVISION
Rafael Urrialde de Andrés
Responsible of Health and Nutrition
Madrid. Spain

NATAC
José Carlos Quintela Fernández
Scientific General Director
Madrid. Spain

ASEACAM - Food Industry Business Association of the Community of Madrid
Ricardo Oteros Sánchez - Pozuelo
President
Madrid. Spain

SECRETARIO

Alejandro Blázquez Lidoy
Madrid. Spain

scientific council

7.3 Scientific Council

The IMDEA Food Institute Scientific Council is composed of researchers of recognized international prestige in areas relevant to the Institute with the task of advising on and analyzing research programs that the Institute may take on, and evaluating the achievements and scientific results of the Institute research lines.

President

Dr. Manuela Juárez Iglesias
Professor "Ad Honorem"
Spanish National Research Council
Madrid.Spain

Members

Dr. Michael Heinrich
Director of Centre for Pharmacognosy and Phytotherapy
The School of Pharmacy, University of London
London. UK

Dr. Jean Louis Sebedio
Research Director
Human Nutrition Department. INRA (French National Institute for Agricultural Research)/ University of Auvergne 1
Clermont-Ferrand-Theix. France

Dr. Carlos Fernández Hernando
Associate Professor
Yale University and New York University
New York. USA

Daniel Ramón Vidal
Scientific Director and Chief Executive Officer
Biopolis S.L.
Valencia. Spain

Dr. Francisco Pérez Jiménez
Medicine Professor at the Universidad de Córdoba and Director of the Maimónides Biomedical Research Institute of Córdoba
Córdoba. Spain

Dr. Fabrizio Arigoni
Director
Nestlé Research Center of Tokio
Tokio. Japon

Dr. Carlos López Otín
Professor of Biochemistry and Molecular Biology
Universidad de Oviedo
Oviedo. Spain

Dr. Rafael Urrialde de Andrés
Responsible of Health and Nutrition
Coca-Cola Iberian Division
Madrid. Spain

Dr. Gregorio Varela Moreiras
Professor of Nutrition and Bromatology
Universidad CEU San Pablo
Madrid. Spain

Member and Secretary

Dr. Francisco A. Tomás Barberán
Research Professor
Spanish National Research Council (CEBAS–CSIC)
Murcia. Spain

7.4 Ethics Committee

The IMDEA Food Foundation, is a public institution of the Madrid Regional Government, aware of its duty and responsibility to society in terms of monitoring and control of the research and its ethical aspects.

In order to do it in an effective manner has established a Research Ethics Committee (according to the Article 12 of Law 14/2007, July 3, of biomedical research, and Article 22 of Royal Decree 1201/2005) to provide a quick and effective response to the needs of scientific research carried out in the field, in order to protect fundamental rights of people, animal welfare and the environment, and to respect bioethical principles and commitments made by the scientific community and by the Statutes of the Foundation.

President

Dr. José Carlos Quintela Fernández
Scientific General Director
Natac Biotech S.L.
Madrid. Spain

Vice President

Dr. Ana Ramírez de Molina
Deputy Director and senior researcher
IMDEA Food
Madrid. Spain

Secretary

Dr. Marta Corzo Martínez
Researcher
Institute of Food Science Research (UAM - CSIC)
Madrid. Spain

Members

Prof. Daniel Ramón Vidal
Scientific Director and Chief Executive Officer
Bipolis S.L.
Valencia. Spain

Prof. José Mª Carrascosa Baeza
Professor of Biochemistry and Molecular Biology Center for Molecular Biology "Severo Ochoa" (UAM-CSIC)
Madrid. Spain

Prof. Enrique Peñaranda Ramos
Professor of Administrative Law Department of Public Law and Legal Philosophy, Faculty of Law Universidad Autónoma de Madrid
Madrid. Spain

Prof. Rafael Garesse Alarcón
Professor of Biochemistry and Molecular Biology Biomedical Research Institute "Alberto Sols" (UAM-CSIC)
Madrid. Spain

Prof. José Mª Ordovás Muñoz
IMDEA Food senior researcher and and Full Professor of the Tufts University Boston
Madrid. Spain

Dr. Viviana Loria - Kohen
Nutricionist, senior researcher IMDEA Food
Madrid. Spain

delegate commission

7.5 Delegate Commission

All the powers of the Board of Trustees are delegated to the Foundation's Delegate Commission, with the exception of approval of the action plan, budgets, annual accounts amendment of statutes, mergers, liquidation, extinction and any acts requiring the authorization of the Protectorate. Also, they may not elect or dismiss any trustee or appoint officers of the Board, elect or dismiss the Director, or take any decision having to do with the Scientific Council, or grant powers of attorney or general delegations.

President

José Manuel Torralba Castelló

Members

Rafael A. García Muñoz
Daniel de la Sota Rius
José de la Sota Rius

Secretary

Julián García Pareja

7.6 Executive Board

The Executive Board is composed of the Director, the Deputy Director and the General Manager. The Executive Board is responsible for managing and dealing with the main business administration and scientific activities of the whole Institute, except those decisions taken by or shared with the Board of Trustees.

Director

Prof. Guillermo Reglero Rada

It is the Director's responsibility, pursuant to the powers and guidelines granted by the Board, to represent the Foundation and sign on its behalf; to direct, promote and oversee all the activities of the Foundation.

The Director of the Foundation to draw up the annual performance plan and the four-year target plan, as well as the general plan of activity of the Foundation, determining its needs and resources, as well as the necessary means to achieve the Foundation's objectives; to formulate budgets and annual accounts; to establish the distribution and application of the funds available to meet the purposes of the Foundation.

Deputy Director

Dr. Ana Ramírez de Molina

The Deputy Director is appointed by the Board or by the Executive Committee at the proposal of the Director. She reports directly to the latter and assists him in his tasks, representing him in case of his absence or inability to act.

General Manager

Inmaculada Galindo Fernández

The General Manager is appointed by the Board or by the Executive Committee at the proposal of the Director, to whom he reports. Her functions are to manage and coordinate the general services of the Foundation, in particular, the administrative, financial, economic and legal aspects. She is responsible for the financial and economic control of the Foundation. She draws up the draft budgets and annual accounts. She is responsible for the management of human resources and the implementation and management of policies of social responsibility, health and safety and hygiene at work, gender equality and work-life balance.

7.7 Management Unit

The Unit of Management, Administration and Technical Support is composed of technicians and administrative staff. It performs the technical, administrative and economic management of the research projects and the activities of the Institute, all the infrastructure of the centre and provides technical support to the Research Groups and the Platforms.

Members

Inmaculada Galindo Fernández
General Manager

Patricia Lodín Velázquez
Technician

Gema Alegre Pulido
Technician

Carlos Zarapuz Agüero
Technician

Cristina Merino Fernández
Technician

Sara Castillo Alonso
Technician

Astrid Valencia Quiñónez
Technician

Marta Gómez de Dios
Technician

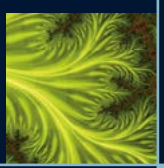
IMDEA Food personnel

8

strategics alliances

report

2016



IMDEA Food Institute has reinforced its strategic alliances with public and private entities and has come to new agreements with relevants research institutions.

Cooperation Agreement with the "Centro Nacional de Investigaciones Oncológicas"

In 2015 a framework cooperation agreement between the IMDEA Food Foundation and the "Centro Nacional de Investigaciones Oncológicas" was signed to carry out activities related to scientific research and technological development in the field of life sciences.

Cooperation Agreement with the "Consejo Superior de Investigaciones Científicas"

In August 2015, a Framework Cooperation Agrement was signed between IMDEA Food Foundation and "el Consejo Superior de Investigaciones Científicas" to facilitate cooperation in scientific and technological activities, exchange of staff that will promotes scientific progress of both institutions and the implementation of programs and research projects.

Cooperation Agreement with the "Universidad Autónoma de Madrid"

In 2014 a framework cooperation agreement between the IMDEA Food Foundation and the Universidad Autónoma de Madrid was signed to carry out activities related scientific research and technological development and university undergraduate and graduate students, in the field of nutrition, food and health.

Cooperation Agreement with the "Hospital Universitario Infanta Sofía"

In December 2013, a Framework Cooperation Agrement was signed between IMDEA Food Foundation and the "Hospital Universitario Infanta Sofía". This agreement tries to encourage the development of the scientific and technological activities in the areas of health, nutrition and biomedicine.

Cooperation Agreement with Metabolon Inc.

In April 2013, a Framework Cooperation Agrement was signed between IMDEA Food Foundation and Metabolon Inc. for which facilitates and encourages the development of research and technological activities.

Cooperation Agreement with the "Fundación Española de la Nutrición"

In April 2013, a Framework Cooperation Agrement was signed between IMDEA Food Foundation and the "Fundación Española de la Nutrición", for which facilitates and encourages the development of research and technological activities to contribute to the advancement of Nutrition Science and the improvement of the population health throught the correct nutrition.

Cooperation Agreement with the "Universidad de la Concepción de Chile"

In July 2013 a Framework Cooperation Agrement was signed between IMDEA Food Foundation and the Pharmacology Faculty of the "Universidad de la Concepción de Chile". This agreement tries to encourage the development of research activities and cooperation between the research staff of both institutions in order to prevent the high rate of obesity in Chile.

Cooperation Agreement with the "Universidad de Murcia"

In May 2012, a Framework Cooperation Agreement was signed between the IMDEA Food Foundation and the University of Murcia for which facilitates and encourages the development of research activities through participation in consortia or networks, participation at calls, research training and exchange of staff between the two institutions.

Cooperation Agreement with the "Centro Regional de Estudios en Alimentos Saludables"

In October 2011 a Framework Cooperation Agreement was concluded between "Centro Regional de Estudios en Alimentos Saludables" and IMDEA Food Institute to facilitate cooperation in scientific and technological activities, exchange of staff that will promotes scientific progress of both institutions and the implementation of programs and research projects.

Cooperation Agreement with the "Instituto Maimónides de investigación Biomédica de Córdoba"

In October 2011 a Bilateral Agreement was signed between the "Instituto Maimónides de investigación Biomédica de Córdoba" and IMDEA Food to stablish cooperation for its commitment of genuinely fostering sustainable development in the scientific activities and projects.

Cooperation Agreement between the "Universidad Autónoma de Madrid" and the Platform for Clinical Trials for Nutrition and Health "GENYAL"

The cooperation between the "Universidad Autónoma de Madrid" and the platform is reflected at the Cantoblanco Universitary Campus from where most of the voluntiers of the studies are selected. Moreover, the "Universidad Autónoma de Madrid" provides facilities to IMDEA Food Institute and support to medical staff.

Collaboration with the "Hospital Universitario La Paz"

IMDEA Food collaborates with the Department of Nutrition and Dietetics and the Department of Clinical Oncology and Research Group of IdiPaz Institute at La Paz University Hospital (Madrid), in the field nutritional genomics.

Collaboration with the "Hospial Universitario Ramón y Cajal"

IMDEA Food collaborates with the Department of Biochemistry and Research of the Hospital "Ramón y Cajal" (Madrid), in the field of lipid metabolism.

International Campus of Excellence UAM+CSIC

IMDEA Food Institute has joined the International Campus of Excellence UAM+CSIC, which was awarded International Campus of Excellence status by the Spanish Ministries of Education and Science and Innovation on the 26th of November 2009.

Association Agreement with Madrid Science Park

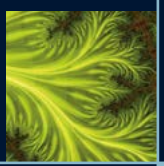
In June 2008 a General Association Agreement was concluded with Madrid Science Park for cooperation between the Park and IMDEA Food Institute, with the aim of making the most of the advantages that such an association offers in terms of R+D+I activities, and more specifically in the activities and services that characterize it as a site and agent of innovation, in addition to providing cooperative access to the network of parks in Madrid and Spain and allied agents.

9

scientific highlights

report

2016



scientific highlights

In The Spotlight…

Nutritional Genomics and Epigenomics Group

Nutritional Genomics and Epigenomics Group is currently carrying out the PREDIMED-PLUS project. PREDIMED-PLUS is a multidisciplinary multicenter study involving 23 research groups from Spain. The PREDIMED-PLUS consortium has recruited more than 6.800 participants with obesity and metabolic syndrome between 55 and 65 years without previous Cardiovascular Disease (CVD). Participants have been randomly distributed in one of two groups: control and intervention group. Participants in the control group receive educational individual and group sessions twice a year to encourage them to adhere to a Mediterranean Diet. Participants in the intervention group are visited every month by a team of nutritionists and specialists in physical activity and follow a hypocaloric Mediterranean Diet and a physical exercise program. Along the 6 years of follow-up we will record the incidence of CVD and other co-morbidities in the 2 groups.

Our group has recruited 170 participants in 6 different primary care centers of Madrid and one hospital:

- C.S. Aquitania
- C.S. Buenos Aires
- C.S. Bustarviejo
- C.S. Colmenar Viejo
- C.S Fuencarral
- C.S. Ibiza
- Hospital La Paz

For this purpose, the Nutritional Genomics and Epigenomics Group has created a network of more than 40 physicians and nurses that have collaborated in the participant's recruitment and are currently involved in the clinical management of the participants.

At present, this project is in the early intervention phase. Results are coming soon.

References

1. Daimiel, L., T. Vargas, and A. Ramirez de Molina, Nutritional genomics for the characterization of the effect of bioactive molecules in lipid metabolism and related pathways. Electrophoresis, 2012. 33(15): p. 2266-89
2. Konstantinidou, V., L. Daimiel, and J.M. Ordovas, Personalized nutrition and cardiovascular disease prevention: From Framingham to PREDIMED. Adv Nutr, 2014. 5(3): p. 368S-71S
3. Mico, V., L. Diez-Ricote, and L. Daimiel, Nutrigenetics and Nutrimiromics of the Circadian System: The Time for Human Health. Int J Mol Sci, 2016. 17(3): p. 299
4. Mico, V., et al., Unsuccessful Detection of Plant MicroRNAs in Beer, Extra Virgin Olive Oil and Human Plasma After an Acute Ingestion of Extra Virgin Olive Oil. Plant Foods Hum Nutr, 2016. 71(1): p. 102-8
5. Rosique-Esteban, N., et al., Leisure-time physical activity, sedentary behaviors, sleep, and cardiometabolic risk factors at baseline in the PREDIMED-PLUS intervention trial: A cross-sectional analysis. PLoS One, 2017. 12(3): p. e0172253
6. Daimiel-Ruiz, L., et al., Dietary lipids modulate the expression of miR-107, a miRNA that regulates the circadian system. Mol Nutr Food Res, 2015. 59(9): p. 1865-78
7. Corella, D., et al., Polymorphism of the Transcription Factor 7-Like 2 Gene (TCF7L2) Interacts with Obesity on Type-2 Diabetes in the PREDIMED Study Emphasizing the Heterogeneity of Genetic Variants in Type-2 Diabetes Risk Prediction: Time for Obesity-Specific Genetic Risk Scores. Nutrients, 2016. 8(12)
8. Garaulet, M., et al., Lunch eating predicts weight-loss effectiveness in carriers of the common allele at PERILIPIN1: the ONTIME (Obesity, Nutrigenetics, Timing, Mediterranean) study. Am J Clin Nutr, 2016. 104(4): p. 1160-1166
9. Smith, C.E., et al., Associations of the MCM6-rs3754686 proxy for milk intake in Mediterranean and American populations with cardiovascular biomarkers, disease and mortality: Mendelian randomization. Sci Rep, 2016. 6: p. 33188
10. Barragan, R., et al., MicroRNAs and Drinking: Association between the Pre-miR-27a rs895819 Polymorphism and Alcohol Consumption in a Mediterranean Population. Int J Mol Sci, 2016. 17(8)

Highlighted Projects

1. "Application of new technologies and methods in nutrition research – the example of phenotypic flexibility". 289511. NutriTech. BBE.2011.2.2-02. FP7.European Comission. 2012 – 2016

2. "PREDIMED+DM: Effect of an intervention based in a hipocaloric Mediterranean Diet and physical activity on the prevention of Type 2 Diabetes Mellitus in subjects with Metabolic Syndrome". Instituto de Salud Carlos III – Proyectos de Investigación en Salud 2014 PI14/01374. 2015 - 2017

3. "Population, family and ageing in the contemporary world: dimensions of and ongoing process". GEPS-CM. comunidad de Madrid H2015/HUM-3321. 2016-2019

scientific highlights

Obesity and cancer: from molecular mechanisms to disease prevention

Molecular Oncology Group

One of our main lines of investigation is the association between obesity and cancer prognosis with special focus in the direct implication of excessive adipose tissue in tumor microenvironment.

The dietary patterns have changed during the last decades: the physical activity has decreased in parallel with a significant increase in caloric intake. This energetic imbalance gives rise to a metabolic shift that generates hypertrophy and hyperplasia of adipose tissue leading to overweight and eventually to obesity. According to The World Health Organization (WHO), nowadays 13% of the overall adult population worldwide are obese. An unquestionable cause of concern is that in 2014, 41 million children under the age of 5 years were overweight or obese (WHO). Obesity has been implicated in the development of cardiovascular diseases and type-2 diabetes[1] as well as in the initiation and dissemination of several types of cancer[2]. In fact, overall risk of death from cancer is 1.5-1.6-fold higher in men and women with a BMI>40Kg/m^3. There are not enough data supporting the reversibility of obesity effects when the patients are already diagnosed for cancer. Thus, we should fight against obesity earlier in age and raise awareness about the importance of keeping healthy habits in the youngest population. Social education for health promotion, the individual responsibility as well as the food industry together with basic and translational research need to team up to face this urgent global health challenge.

The main types of cancer whose increased risk has been associated with obesity are: prostate cancer[4], postmenstrual endometrial[5] and breast cancer[2], ovary[6], bladder[7], liver[8], colon[9], pancreas[2], esophageal[10], gallbladder[11], kidney[12] and thyroid cancer[13] (Table 1). The excess of visceral adiposity provokes alterations in cellular composition of adipose tissue which is crucial for growth and dissemination of tumors that grow in a microenvironment rich in adipocytes like breast, ovary or colon tumors[14]. Although the epidemiological data are strong, the molecular mechanisms associating obesity and cancer are still poorly understood.

So far, three hypotheses have been defined to link obesity and tumor progression: alteration in the rates of androgenic precursors to oestradiol conversion leading to a hormonal imbalance; insulin resistance and the excess of bioactive IGF1 and systemic inflammation due to and excessive adipokine signaling activation[15, 16] (Figure 1). Our main goal is to shed light in new mechanisms linking both pathologies. We focus our research in understanding how lipid metabolism and specially cholesterol imbalance due to excessive adipose tissue in the tumour vicinity could influence cancer progression and dissemination.

Sex-specific risk estimates of different cancers in obesity				
Cancer Type	Risk estimate (95% CI)			Reference
	Men	Women	Overall	
Prostate cancer (high grade)	1.14 (1.04-1.25)	NA		4
Postmenopausal endometrial cancer	NA	2.54 (1.16-3.06)		5
Ovarian	NA	1.28 (1.16-1.41)		6
Postmenopausal breast	NA	1.25 (1.07-1.46)		2
Bladder	1.10 (1.05-1.16)	1.15 (1.02-1.29)		7
Liver (hepatocellular carcinoma)			1.89 (1.51-2.36)	8
Primary liver cancer	1.91 (1.51-2.41)	1.55 (1.30-1.85)		9
Colon (adenocarinoma)	1.46 (1.36-1.56)	1.15 (1.06-1.24)	1.44 (1.28-1.63)	10
Pancreatic (adenocarinoma)	1.36 (1.07-1.73)	1.34 (1.22-1.46)		2
Esophageal (adenocarinoma)	2.17 (1.56-3.01)	2.28 (1.64-3.18)	2.34 (1.95-2.81)	11
Gallbladder (adenocarinoma)	1.35 (1.09-1.68)	1.88 (1.66-2.10)	1.66 (1.47-1.88)	8
Kidney	1.63 (1.50-1.77)	1.95 (1.81-2.10)	1.28 (1.00-1.63)	12
Thyroid	1.26 (1.13-1.40)	1.43 (1.25-1.64)	1.33 (1.24-1.42)	13

Table 1. Sex specific and overall risk of cancer in patients with body mass index (BMI) equal or higher than 30kg/m^2. CI: confidence interval.

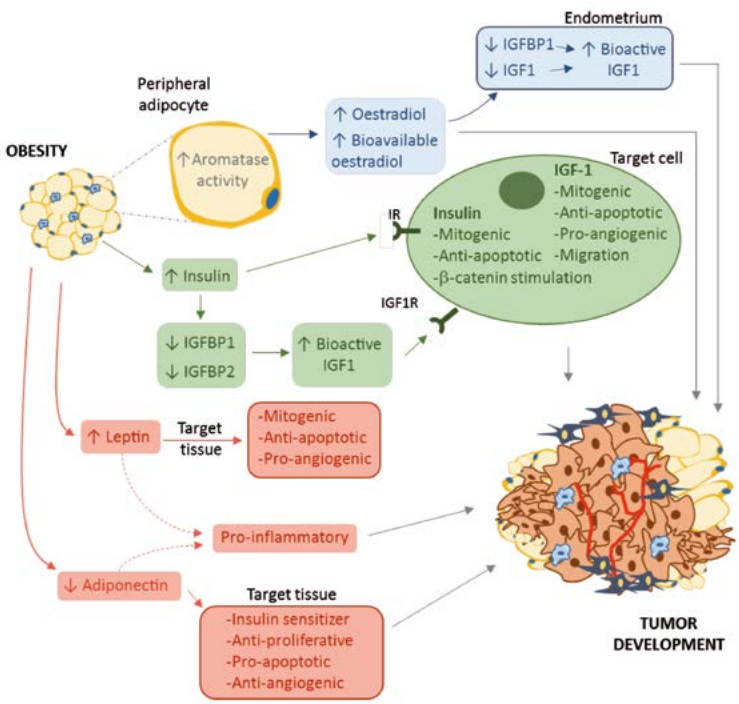


Figure 1. Three hypothesis connecting adipose tissue and tumorogenesis. The main molecular mechanisms under each hypothesis is shown in the scheme. PA: peripheral adipocyte; IGF: insulin-like growth factor; IGFP1: IGF-binding protein; IR: insulin receptor; IGF1R: IGF-1 receptor; TNF: tumor necrosis factor; NF-*κB*: nuclear factor-*κB*; IL: interleukin.

scientific highlights

References

1. Martín-Timón, I., Sevillano-Collantes, C., Segura-Galindo, A. & del Cañizo-Gómez, F. J. Type 2 diabetes and cardiovascular disease: Have all risk factors the same strength? World J. Diabetes 5, 444–470 (2014)
2. Dobbins, M., Decorby, K. & Choi, B. C. K. The Association between Obesity and Cancer Risk: A Meta-Analysis of Observational Studies from 1985 to 2011. Int. Sch. Res. Not. 2013, e680536 (2013)
3. Calle, E. E., Rodriguez, C., Walker-Thurmond, K. & Thun, M. J. Overweight, obesity, and mortality from cancer in a prospectively studied cohort of U.S. adults. N. Engl. J. Med. 348, 1625–1638 (2003)
4. ZHANG, X. et al. Impact of obesity upon prostate cancer-associated mortality: A meta-analysis of 17 cohort studies. Oncol. Lett. 9, 1307–1312 (2015)
5. Zhang, Y. et al. Overweight, obesity and endometrial cancer risk: results from a systematic review and meta-analysis. Int. J. Biol. Markers 29, e21-29 (2014)
6. Liu, Z. et al. The association between overweight, obesity and ovarian cancer: a meta-analysis. Jpn. J. Clin. Oncol. 45, 1107–1115 (2015)
7. Qin, Q., Xu, X., Wang, X. & Zheng, X.-Y. Obesity and risk of bladder cancer: a meta-analysis of cohort studies. Asian Pac. J. Cancer Prev. APJCP 14, 3117–3121 (2013)
8. Chen, Y., Wang, X., Wang, J., Yan, Z. & Luo, J. Excess body weight and the risk of primary liver cancer: An updated meta-analysis of prospective studies. Eur. J. Cancer 48, 2137–2145 (2012)
9. Moghaddam, A. A., Woodward, M. & Huxley, R. Obesity and Risk of Colorectal Cancer: A Meta-analysis of 31 Studies with 70,000 Events. Cancer Epidemiol. Prev. Biomark. 16, 2533–2547 (2007)
10. Turati, F., Tramacere, I., La Vecchia, C. & Negri, E. A meta-analysis of body mass index and esophageal and gastric cardia adenocarcinoma. Ann. Oncol. 24, 609–617 (2013)
11. Larsson, S. C. & Wolk, A. Overweight, obesity and risk of liver cancer: a meta-analysis of cohort studies. Br. J. Cancer 97, 1005–1008 (2007).
12. Wang, F. & Xu, Y. Body mass index and risk of renal cell cancer: A dose-response meta-analysis of published cohort studies. Int. J. Cancer 135, 1673–1686 (2014).
13. Ma, J. et al. Obesity and Risk of Thyroid Cancer: Evidence from a Meta-Analysis of 21 Observational Studies. Med. Sci. Monit. Int. Med. J. Exp. Clin. Res. 21, 283–291 (2015)
14. Nieman, K. M., Romero, I. L., Van Houten, B. & Lengyel, E. Adipose tissue and adipocytes support tumorigenesis and metastasis. Biochim. Biophys. Acta 1831, 1533–1541 (2013)
15. Renehan, A. G., Zwahlen, M. & Egger, M. Adiposity and cancer risk: new mechanistic insights from epidemiology. Nat. Rev. Cancer 15, 484–498 (2015)
16. Font-Burgada, J., Sun, B. & Karin, M. Obesity and Cancer: The Oil that Feeds the Flame. Cell Metab. 23, 48–62 (2016)

Immunonutrition: novel modulators of effectiveness and quality of anti-tumoral responses

Molecular Immunonutrition

The unprecedented non-alcoholic fatty liver disease (NAFLD) pandemic is going to have a strong impact on future morbidity rates and a reduction in life expectancy by 5-20 years. NAFLD has become the most common liver pathology worldwide affecting an estimated 15-30% of most populations due to a dramatic increase of risk factors such as obesity, sedentary life style and altered food supply and preferences. Thus, 10-20% of subjects with NAFLD will have the severe variant of non-alcoholic steatohepatitis (NASH), hepatic inflammation and the development of liver fibrosis with high liver related morbidity and mortality, part of which is due to the development of hepatocellular carcinoma. Innate immune Toll-like receptor (TLR)-4 and gut microbiota has been identified as determinants for hepatocellular carcinoma promotion.

While the host's endogenous factors are difficult to influence, the environmental factors are predominant and addressable in a preventive or therapeutic intention. A clear example is the activation of intestinal innate immune responses via toll-like receptor (TLR)-4 by defined protease inhibitors present in cereals. TLR4 activation in macrophages, central in coordinating innate immune responses, is associated to metabolic changes influencing functional differentiation and antigen presentation and, thereby, effector T cells function and activity. In this context, lipid mediator profiles change with macrophages phenotype.

In the group of Molecular Immunonutrition in the Metabolic Dysfunction and anti-Tumoral Response, we have recently defined significant a different cytotoxic and immunogenic potential of protease inhibitors from wheat and ancient-Latin American grains. This contribution helps to understand the role of immunonutritional food components to enforce the development of immune-based precision intervention tools and strategies as well as innovative scientific, translational and transferable, relevant aspects to improve the production of innovative healthier products.

Therefore, this immunonutritional-based precision imprinting is an example of how to overcome the usually fragmented and compartmentalized approach to address the impact of innate immune responses in NAFLD. Here, a better understanding and the use of immunonutritional compounds will help to reduce the socioeconomic burden and risk factors for NAFLD i.e., diabetes, obesity, and hyperlipidemia as well as the metabolic syndrome. Effective immunonutritional-based precision prevention/therapeutic strategies could also help to promote a healthier intrauterine immunity. Thus, the use of immunonutritional-based precision tools that ameliorate/prevent NAFLD represents a new hope to help arming the clinical/scientific community with effective translational and transferable strategies targeting not only liver-related diseases, but also progress to fibrosis and hepatocellular carcinoma.

scientific highlights

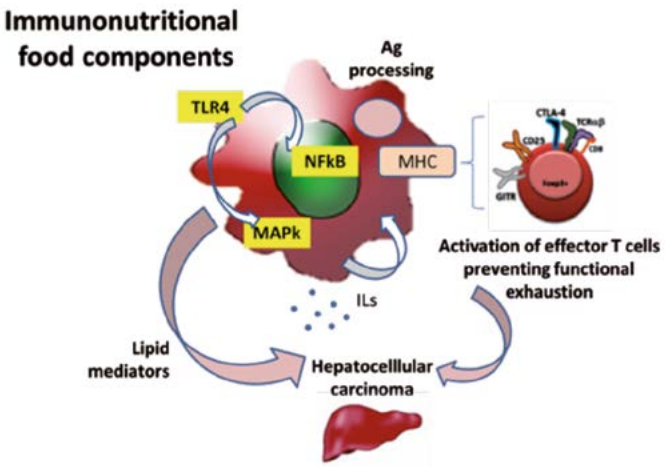


Figure 1. The influence of innate immune signaling promotes a metabolic switch in macrophages and tumoral cells that affects antigen processing and priming of adaptive T cell responses. These processes can be modulated by immunonutritional factors to selectively define the quality and quantity of T cell response(s).

References

1. Schuppan D, Schattenberg JM. Non-alcoholic steatohepatitis: pathogenesis and novel therapeutic approaches. J Gastroenterol Hepatol. 2013, 28 S1:68-76
2. Dapito DH, Mencin A, Gwak GY, et al. Promotion of Hepatocellular carcinoma by intestinal microbiota and TLR4. Cancer Cell 2012, 21(4), 504-516
3. Kaliszewska A, Martinez V, Laparra M. Proinflammatory responses driven by non-gluten factors are masked when they appear associated to gliadins. Food Chem Toxicol. 2016, 95, 89-95
4. Laparra M, Díez M, Moreno FJ et al. Kojibiose ameliorates arachidic acid-mediated liver alterations in hyperglucemic rats. Br J Nutr. 2015, 114(9), 1395-402
5. Laparra M, Olivares M, Gallina O, et al. Bifidobacterium longum CECT 7347 modulates immune responses in a gliadin-induced enteropathy animal model. PLoS One. 2012;7(2):e30744
6. Olivares M, Laparra M, Sanz Y. Oral administration of Bifidobacterium longum CECT 7347 modulates jejunal proteome in an in vivo gliadin-induced enteropathy animal model. J Proteomics. 2012, 77:310-20

instituto imdea food

Hydroxytyrosol fights cognitive declines

Bioactive Ingredients Food Group

The Bioactive Ingredients Food Group published the first evidence that hydroxytyrosol and – therefore – consumption of high-quality olive oil might prevent cognitive decline and Alzheimer's disease via restoration of proper cerebral insulin signaling. Alzheimer's disease (AD) is an irreversible neurodegenerative disorder, characterized by progressive memory deficit and neuronal loss, whose prevalence is increasing due to population aging. Recent prospective studies showed that the Mediterranean diet is associated with lower incidence of AD and can improve cognition. In this study, we demonstrate that HT protects Aβ(25-35)-treated astrocytes by improving insulin sensitivity. These data provide some mechanistic insight on the observed inverse association between Mediterranean diet score (and olive oil consumption) and prevalence of cognitive impairment. Future, ad-hoc human studies will eventually verify whether the use of HT as nutritional supplement could reduce IR associated with AD and, in turn, improve AD symptoms and clinical manifestations.

Reference

MC Crespo et al., Biofactors. 2017 Mar 20. doi: 10.1002/biof.1356. [Epub ahead of print]

scientific highlights

Targeting cardiometabolic disorders by sea-derived organisms and metabolites

Epigenetics of Lipid Metabolism Group

The increasing interest in natural sources of bioactive substances, with not only essential compounds for nutrition, but also with pharmaceuticals potentials has lead researchers to study different marine organisms[1, 2] Sea cucumbers are marine invertebrates, belonging to the class Holothuroidea, habitually found in the benthic areas and deep seas across the world. They have been considered by the traditional medicine as tonic foods in Asia and Middle East. Moreover, they have been attributed with a wide range of biological effects, including antioxidant, antimicrobial, antithrombotic, anticoagulant, healing, antioxidant, anti-hypertension, cytostatic and anti-inflammatory[3].

The therapeutic properties have been attributed to chemical compounds extracted from the sea cucumber´s body wall. Among molecules described in different sea cucumber species include: triterpene glycosides (saponins), chondroitin sulfates, glycosaminoglycan (GAGs), sulfated polysaccharides, sterols (glycosides and sulfates), phenolics, cerebrosides, lectins, peptides, glycoproteins, glycosphingolipids and essential fatty acids[3, 4].

There are several species from the genera Apostichopus, Holothuria, and Cucumaria that have been widely studied for their components and biological action. However, others species from the genera Actinopyga, Bohadschia, Parastichopus and Isostichopus remain poorly characterized, despite their high commercial value and potential in production systems.

In this context, IMDEA Food Institute researchers in collaboration with researchers from the Department of Recursos del Mar from the "Centro de Investigación y Estudios Avanzado" (Cinvestav) "Unidad de Mérida" (Mérida, Yucatán, Mexico) have studied the beneficial effects –on growth and body lipid profile in young rats– of different meals containing Isostichopus badionotus from Yucatan Peninsula. Their results reported that sea cucumber consumption modulate gene expression of key genes involved in cholesterol and lipid metabolism in the liver. Indeed, diets containing I. badionotus repressed the induction of key genes associated with dyslipidemia exerted by cholesterol supplementation. Their findings suggested that consumption of I. badionotus from the Yucatán Peninsula is beneficial for dyslipidemia, and showed that the biological effect is clearly dependent on the preparation method[5].

Dyslipidemia is only part of the story, as other biological functions are currently being evaluated by the researchers. As uncontrolled inflammatory response is a major driver of many modern human chronic diseases, the research team is now focusing on possible anti-inflammatory effects of molecules found in this type of marine organism[6]. Some previous studies have reported the anti-inflammatory effects of other species of this genera including *Apostichopus*[7], *Stichopus*[8], *Holothuria*[9, 10], *Cucumaria*[11], or *Parastichopus*[9]. However, there is scarce information for Isostichopus badionotus. Their preliminary results testing different components from body wall extracts suggest that fucosylated chondroitin sulphates from *Isostichopues badionotus* of Yucatán peninsula (unpublished data) exert strong *in vivo* anti-inflammatory properties by modulating key pathways related to inflammation. Understanding the molecular mechanisms exerted by fucosylated chondroitin sulphates isolated from sea cucumber from the Yucatan Peninsula will open up novel opportunities to combat our modern human disease related to inflammation.

Photo courtesy of Dr. Nuvia Kantún

Figure 1. Sea cucumber (Isostichopus badionotus) from Yucatán Península (Mexico). Adult sea cucumber "choco-chip" variety.

References

1. Jungbauer, A. and S. Medjakovic, Anti-inflammatory properties of culinary herbs and spices that ameliorate the effects of metabolic syndrome. Maturitas, 2012. 71(3): p. 227-39.
2. Mayer, A.M., et al., Marine pharmacology in 2009-2011: marine compounds with antibacterial, antidiabetic, antifungal, anti-inflammatory, antiprotozoal, antituberculosis, and antiviral activities; affecting the immune and nervous systems, and other miscellaneous mechanisms of action. Mar Drugs, 2013. 11(7): p. 2510-73.
3. Bordbar, S., F. Anwar, and N. Saari, High-value components and bioactives from sea cucumbers for functional foods--a review. Mar Drugs, 2011. 9(10): p. 1761-805.
4. Bahrami, Y. and C.M. Franco, Acetylated Triterpene Glycosides and Their Biological Activity from Holothuroidea Reported in the Past Six Decades. Mar Drugs, 2016. 14(8).
5. Olivera-Castillo, L., et al., Diets containing sea cucumber (Isostichopus badionotus) meals are hypocholesterolemic in young rats. PLoS One, 2013. 8(11): p. e79446.
6. Wang, J., et al., Fucoidan from sea cucumber may improve hepatic inflammatory response and insulin resistance in mice. Int Immunopharmacol, 2016. 31: p. 15-23.
7. Himaya, S.W., et al., Sea cucumber, Stichopus japonicus ethyl acetate fraction modulates the lipopolysaccharide induced iNOS and COX-2 via MAPK signaling pathway in murine macrophages. Environ Toxicol Pharmacol, 2010. 30(1): p. 68-75.
8. Zohdi, R.M., et al., Sea cucumber (Stichopus hermanii) based hydrogel to treat burn wounds in rats. J Biomed Mater Res B Appl Biomater, 2011. 98(1): p. 30-7.
9. Mena-Bueno, S., et al., Sea cucumbers with an anti-inflammatory effect on endothelial cells and subcutaneous but not on epicardial adipose tissue. Food Funct, 2016. 7(2): p. 953-63.
10. Panagos, C.G., et al., Fucosylated chondroitin sulfates from the body wall of the sea cucumber Holothuria forskali: conformation, selectin binding, and biological activity. J Biol Chem, 2014. 289(41): p. 28284-98.

scientific highlights

p21 as a molecular driver of fasting

Metabolic Syndrome Group

The exact molecular mechanisms driving the fasting-mediated protection from chemotherapy toxicity and fasting-mediated enhanced and anti-tumor immune response have not yet been described. Recently, our laboratory has participated in a project uncovering a possible mechanism for this protection: we described a strongly increased transcription of the cell cycle inhibitor p21 (also known as Cip1 or CDKN1a) upon short-term fasting in different mouse tissues [1]. Importantly, we have later verified that this mechanism is conserved in humans: our laboratory has carried out a clinical trial at IMDEA Food subjecting 20 healthy human volunteers to 36 hours of fasting, and obtaining blood samples to measure p21 mRNA levels in peripheral blood mononuclear cells (PBMCs) before and after fasting, and 24 hours after refeeding. As shown, we could observe a significant increase in p21 mRNA levels after the fasting period, that were recovered back to normal after 24 hours of refeeding. Importantly, this behavior was parallel to several target genes of the fasting-responsive nuclear receptor PPARa (PDK4 and CPT1a) [2], indicating that p21 is also a fasting-regulated gene in humans.

References

1. Lopez-Guadamillas, E., Fernandez-Marcos, P. J., Pantoja, C., Muñoz-Martin, M., Martínez, D., Gómez-López, G., Campos-Olivas, R., Valverde, A. M. & Serrano, M. p21Cip1 plays a critical role in the physiological adaptation to fasting through activation of PPAR***α***. Sci. Rep. 6, 34542 (2016).
2. Bouwens, M., Afman, L. A. & Müller, M. Fasting induces changes in peripheral blood mononuclear cell gene expression profiles related to increases in fatty acid beta-oxidation: functional role of peroxisome proliferator activated receptor alpha in human peripheral blood mononuclear cells. Am. J. Clin. Nutr. 86, 1515–23 (2007).

The Products Program highlight

Food Products for Precision Nutrition Program

The last 10 years have seen public and private resources pumped into the development of functional foods in Spain and Europe. Functional foods with anticarcinogenic properties have been of particular interest. In most cases, however, the expected effectiveness was never obtained, and these products have been of limited clinical use. After their incorporation into functional foods, bioactive ingredients that seemed promising in vitro commonly failed to return the hoped-for results in clinical studies. The problem often lay in the low solubility of these ingredients in water, which limits their solution in the intestinal lumen. This in turn leads to their poor stability during digestion and the promotion of their precipitation and degradation. They thus suffer from poor bioaccessibility (the quantity soluble in, and therefore absorbable from, the intestinal lumen) in the gastrointestinal tract, and low bioavailability (the capacity to be absorbed by the intestinal cells and eventually passed into the bloodstream). New formulations are therefore needed that can overcome these problems and help these bioactive compounds become more active in vivo.

In 2016, in collaboration with the Universidad Autónoma de Madrid, IMDEA Food patented a lipid-based system that not only stabilises many such bioactive compounds during digestion as well as improve their oral bioavailability, but in many cases potentiates their effects. Along with natural bile salts and phospholipids, this 'self-emulsion-forming' system produces microemulsions during digestion that stabilise bioactive components, preventing their precipitation or interaction with inhibitors of their absorption. Their bioaccessibility and bioavailability - and in turn their bioactivity - is therefore much improved. The system also allows the lipophilization of molecules that are little soluble in water, facilitating their incorporation into foods. Our researchers have reported a formulation developed by them to have an antiproliferative effect on human colon cancer cells; indeed, a synergistic effect was seen between the vehicle and carried compound was observed.

editor

IMDEA Food Institute

graphic design

Arts Creativos de Publicidad S.L.U.

L.D.

M-15793-2017

Contact

contacto.alimentacion@imdea.org
tel.+34 91 727 81 00
fax +34 91 727 81 01

Ctra. Canto Blanco, 8
E-28049 Madrid (Spain)