



imdea food institute

[food and
health science
industry
and society]

institute
iMdea
food

r e p o r t

2013-14

p r o l o g u e

prologue



Guillermo Reglero

Director, IMDEA Food Institute

r e p o r t

2013-14

The 2013-2014 Report of the IMDEA Food Institute highlights the activity of the centre over these two important years in its development and consolidation.

The Institute was created by the *Comunidad de Madrid* (the Madrid Region) in November of 2006. Up until the end of 2013 it undertook its work in space provided by the *Universidad Autónoma de Madrid* (the Autonomous University of Madrid) and in rented facilities at the *Parque Científico de Madrid* (The Madrid Science Park). The Institute now, however, has its own premises. In July 2012 the *Consejería de Educación, Juventud y Deporte de la Comunidad de Madrid* (the Education, Youth and Sports Council of the Madrid Region) ceded the *Antiguo Pabellón Central del Hospital de Cantoblanco* (the Main Unit of the Cantoblanco Hospital) to the Institute, where it has established its headquarters. The building, which was inaugurated by King Alfonso XIII and Queen Victoria Eugenia in 1917, is of historic and architectural interest. At the beginning of 2014, once the building was equipped with the infrastructure needed to undertake scientific work in the area of life and food sciences, the Institute was able to move in. The building occupies some 4.595 m² and boasts laboratories equipped to perform work in molecular and cellular biology, genomics and instrumental analysis. It also has installations where clinical trial work can be performed.

The period 2013-2014 saw the Institute take up its place in the field of health and food science and the consolidation of its scientific programme. Over this period the Institute's staff grew by 50%. It now has 37 contracted staff, 31 of which are researchers from five countries, some associated with prestigious institutions such as the Pierre and Marie Curie University (Paris), New York University, Tufts University, reference institutions such as the CNIC, CNIO and CSIC, and hospitals such as the La Paz and Ramón y Cajal hospitals in Madrid. This has allowed the Institute to achieve a scientific production with an accumulated impact factor of 1.252. Several patents have also been filed. The Institute is involved in regional, state and European programmes that enrich its scientific activity while contributing to its funding alongside the stipend provided by the Madrid Region (its main funding source).

The general aim of the Institute for the next two years is to undertake research of international excellence standard that is of use to society, to contribute towards the advancement of the life and food sciences and to develop a model of efficient translation of information and transfer of technology.

The Institute specialises in the study of the molecular mechanisms and fundamental concepts underlying the relationship between food and health. It strives to provide the health system with the means to prevent problems such as cancer, cardiovascular disease, metabolic syndrome and obesity, as well as improve their diagnoses, and to provide the food industry with strategies that increase the added value of its products and improve its competitiveness and job creation capacity.

t a b l e o f
c o n t e n t s

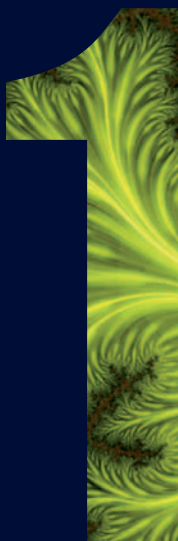
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The high incidence of chronic disease, such as cancer and cardiovascular disease, the appearance of which is strongly related to what we eat, requires the full attention of those involved in food science research. In Spain, we also need to remember that the country's food industry, the foremost in the industrial sector in terms of contribution to GDP, is well below average in terms of what it invests in research and development – and this in an international economic context in which innovation provides much impulse to competitiveness and the generation of added value and employment.

These two circumstances lie at the heart of the work performed by the IMDEA Food Institute, the mission of which is to undertake research into life and food sciences with a double focus: the generation of food-based clinical applications (translational focus), and the transfer of products and nutritional strategies to the food industry.

The Institute aims:

- to contribute towards the advancement of the life, food and nutrition sciences
- to contribute towards the wellbeing of the population, and to improving the efficacy, quality and cost of public services in the food and health field
- to contribute towards the competitiveness of Madrid's and Spain's economies, their capability of job creation, the productivity of their industry and the latter's possibilities of international expansion

The Institute is conscious of its duty and responsibility towards society with respect to the monitoring of the research it performs, as well as the ethics of that research. It has therefore established an ethics committee, the function of which is to guarantee the observance of bioethical principles and the honouring of commitments made by the scientific community, as well as those enshrined in the Institute's statutes.

The strategy adopted by the Institute for attaining its goals involves the organisation of its activities around three axes:

- **Axis 1. Science:** This involves contributing towards scientific knowledge on the relationship between food and health, especially the prevention of chronic disease, via the study of the interaction between genes and nutrients.
- **Axis 2. Industry:** This involves contributing towards the economic development, the job creation capacity and competitiveness of the food industry via the design and validation of strategies and healthy products of demonstrated efficacy.
- **Axis 3. Society:** This involves contributing towards reducing the cost of health care, and the wellbeing of the population, via studies on health and diet, communication programmes, and the giving of nutritional advice.



Five research units cover the lines of work followed by the Institute within the framework of systems biology. These focus on new areas of nutrition, with special emphasis on the relationship between genes and nutrients.

Line 1: Nutritional Genomics of Cardiovascular Disease and Obesity

The GENECO Unit

This line of research examines the effect of the diet on the expression of microRNAs important in energetic metabolism, with special interest in those related to cardiovascular disease and obesity. The work performed ranges from basic research to its application in human populations.

Line 2: Molecular Oncology and the Nutritional Genomics of Cancer

The OMYGEN Unit

This line examines the metabolic alterations associated with cancer, with special emphasis on the identification of molecular markers that might provide early diagnosis, aid in making clinical prognoses, and help predict the response of patients to treatment. The work, which is interdisciplinary in nature, aims to provide a better understanding of the molecular bases underlying the relationship between obesity, metabolic syndrome and cancer, and permit their therapeutic modulation via personalised nutritional strategies.





Line 3: The Functional Foods Laboratory

The LABFUN Unit

This line examines the aetiology of cardiovascular and cardiometabolic problems and how they might be prevented and treated via micronutrient therapy. Molecular studies are performed on their mechanisms of action and biological activity in animal models and via clinical trials. This work therefore helps validate functional foods and nutraceuticals with market potential.

Line 4: Diseases of Lipid Metabolism and Molecular Nutrition

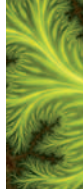
The DISLIPID Unit

Imbalances in microRNAs can play an important role in the development of cardiometabolic disease. This line of work tries to understand how different microRNAs regulate lipid metabolism in health and disease, and thus develop new dietetic and pharmacological strategies that might modulate their function.

Line 5: Production and Development of Food for Health

The PRODESALUD Unit

This line of research is complementary to the four above. Its main aim is to connect with the food industry and establish a bridge between mechanistic, molecular research and the market via the development of foods with specific health uses. Products are developed from the results generated by the Institute's more basic research lines, or from foods validated using the scientific tools employed by these lines.



The Institute also has three strategic platforms that provide services to its own research units as well as to other research groups and companies, both national and international. This aids in the transfer of scientific and technological knowledge.

Nutritional Genomics and Food

GENYAL. Nutrigenetic testing in human subjects

The activity of this platform focuses on nutrigenetic studies in human subjects. It has its own ethics committee as well as its own clinical trials, biostatistics and bio-informatics, nutritional genomics and training units; these increase its capacity to provide advanced scientific services in the food-health area.

Cooperative R+D+I Activity Laboratory

LACID. Open to cooperation

This platform provides a framework for cooperation in applied research, technological development and innovation in the field of nutrition, food and health. The Institute and other participating bodies share funding, human resources, spaces and infrastructure in their joint R+D+I ventures.

Interactive Nutrigenomics Centre

CIN. Dissemination of knowledge

Nutrition, food and health – from the laboratory to society. This multi-themed exhibition aims to provide visitors with the tools provided by research for maintaining health via responsible nutrition. The exhibition uses video, tactile, structural, mechanical, manipulable and scenographic exhibits to transmit its message.

g o v e r n i n g b o d i e s a n d f u n c t i o n a l s t r u c t u r e



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

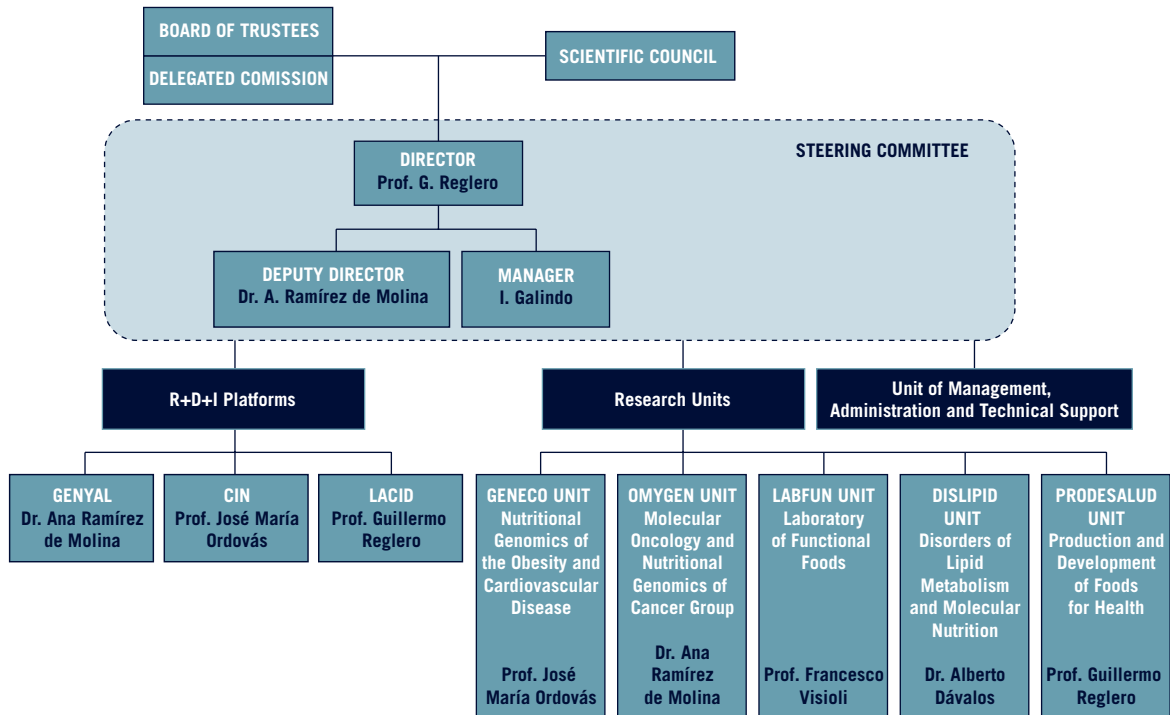


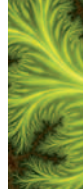
Fig 1. Management structure of IMDEA Food Institute.

The main governing body of the Institute is its Board of Trustees constituted by representatives of the Madrid Regional Government, 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.

2.1. 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.



PRESIDENT OF THE FOUNDATION

Manuela Juárez Iglesias

*Professor
Spanish National Research Council
Spain*

VICE-CHAIRMAN OF THE FOUNDATION

Lucía Figar de Lacalle

*Chairman of Board of Education, Youth and Sport
Education, Youth and Sport Counseling
Madrid Regional Government. Spain*

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*General Director of Universities and Research (Since December 2014)
Education, Youth and Sport Counseling
Madrid Regional Government. Spain*

Rocío Albert López-Ibor

*General Director of Universities and Research (August 2013-November 2014)
Education, Youth and Sport Counseling
Madrid Regional Government. Spain*

Jon Juaristi Linacero

*General Director of Universities and Research (Until July 2013)
Education, Youth and Sport Counseling
Madrid Regional Government. Spain*

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Treasury and Economic Policy Counseling
Madrid Regional Government. Spain*

Juan Ángel Botas Echevarría

*Assistant Director of Universities and Research
Education, Youth and Sport Counseling
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*Head of the Rector's Office
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Lucas Domínguez Rodríguez

*Professor of Animal Health
Universidad Complutense de Madrid
Spain*

Francisco A. Tomás Barberán

*Coordinator of Food Science and Technology Area
Spanish National Research Council
Spain*

SCIENTIFIC TRUSTEES

Jean- Louis Sebedio

*Research Director
UMR- INRA. Université d'Auvergne,
Institute de Nutrition Humaine,
Clermont-Ferrand. France*

Michael Heinrich

*Head of Centre for Pharmacognosy and Phytotherapy
The School of Pharmacy. University of London. UK*

Fabrizio Arigoni

*Director
Nestlé Research Tokio. Japan*

Ben van Ommen

*Biology Systems Program Director
TNO Quality of life, Zeist. Netherlands*

EXPERT TRUSTEES

Daniel de la Sota Rius

*Director of the Innovation and New Technologies Department
CEIM. Madrid Business Confederation-CEOE.
Spain*

Jorge Jordana Buttica de Pozas

*General Secretary FIAB-Spanish Federation of Food and Beverages Industry
Madrid. Spain*

COMPANY TRUSTEES

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Joao Paulo Andorinha

*Research and Development Director
Barcelona. Spain*

EMBUTIDOS FRIAL, S.A.

Paloma Frial Suárez

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Madrid. Spain*

BIOSEARCH LIFE, S.A.

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*Research and Development Director
Madrid. Spain*

COCA-COLA IBERIAN DIVISION

Rafael Urrialde de Andrés

*Responsible of Health and Nutrition
Coca-Cola Iberian Division
Madrid. Spain*

NATAN

José Carlos Quintela Fernández

*Scientific General Director
Madrid. Spain*

SECRETARY

Alejandro Blázquez Lidoy

Madrid. Spain



2.2. 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.

Scientific Council:

Dr. Manuela Juárez Iglesias

*Professor
Spanish National Research Council
Spain*

Dr. Michael Heinrich

*Head of Centre for Pharmacognosy and
Phytotherapy
The School of Pharmacy. University of London.
UK*

Dr. Jean Louis Sebedio

*Research Director
UMR- INRA. Université d'Auvergne
Clermont- Ferrand. France*

Dr. Francisco A. Tomás Barberán

*Coordinator of Food Science and Technology
Area
Spanish National Research Council
Murcia. Spain*

Dr. Antonio Vidal-Puig

*Scientific Director
Cambridge Phenomic Center. Institute of
Metabolic Science
Cambridge University. UK*

Dr. Carlos Fernández-Hernando

*Associate Professor of Comparative Medicine
and of Pathology
Yale University and New York University
New York. EE.UU.*

Dr. Fabrizio Arigoni

*Director
Nestlé Research Tokyo
Japan*

Dr. Carlos López-Otín

*Biochemistry Professor and Cancer Molecular
Biology Unit Director
Oviedo University
Spain*

Dr. Ben van Ommen

*Biology Systems Program Director
TNO Quality of Life
Zeist. Netherlands*

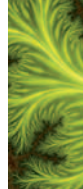
Dr. Francisco Pérez Jiménez

*Medicine Professor ,Córdoba University &
IMIBIC Director
Córdoba. Spain*

Dr. Rafael Urrialde de Andrés

*Responsible of Health and Nutrition
Coca-Cola Iberian Division
Madrid. Spain*





2.3. 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

Lorena Heras Sedano

Members

José M^a Rotellar García

Juan Ángel Botas Echevarría

Daniel de la Sota Rius

Secretary

Julián García Pareja

2.4. 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**

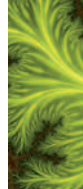
Dr. Ana Ramírez de Molina

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.



2.5. Research units and platforms

The Research Units are made up of researchers. They can be organized into one or more groups, each led by a Principal Researcher. They perform scientific research, fund-raising in order to carry out projects, publishing and transfer of results.

The Platforms are composed of researchers, technicians and support staff. They provide internal scientific services to the Investigation Units and other Platforms and external services to other research groups and companies at a national or international level. In addition, they perform functions of specialized training and provide support in the transfer of results, dissemination, communication and outreach.

2.6. Management units

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 Units of Research and the Platforms.



r e s e a r c h u n i t s



- 3.1. RESEARCH UNIT 1. Nutritional Genomics of Cardiovascular Disease and Obesity. GENECO [20]
- 3.2. RESEARCH UNIT 2. Molecular Oncology and Nutritional Genomics of Cancer. OMYGEN [26]
- 3.3. RESEARCH UNIT 3. Laboratory of Functional Foods. LABFUN [32]
- 3.4. RESEARCH UNIT 4. Disorders of Lipid Metabolism and Molecular Nutrition. DIS LIPID [36]
- 3.5. RESEARCH UNIT 5. Production and Development of Foods for Health. PRODESALUD [39]
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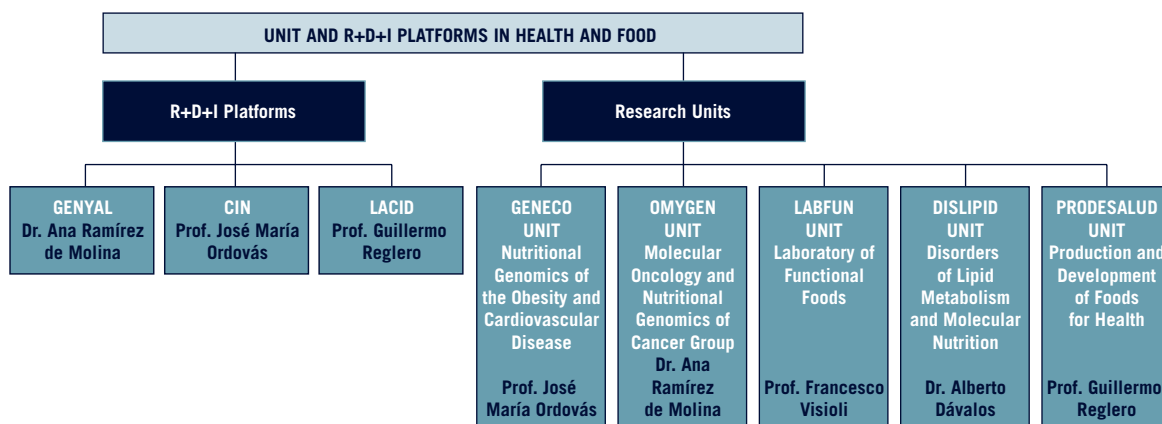
2013-14



The activity of the IMDEA Food is characterized by excellence in research that is multidisciplinary and produces results transferrable to society.

Five Research Units and three R+D+I Platforms develop the operational lines of the IMDEA Food Institute

- **Research Unit 1**
Nutritional Genomics of Cardiovascular Disease and Obesity. GENECO
- **Research Unit 2**
Molecular Oncology and Nutritional Genomics of Cancer. OMYGEN
- **Research Unit 3**
Laboratory of Functional Foods. LABFUN
- **Research Unit 4**
Disorders of Lipid Metabolism and Molecular Nutrition. DISLIPID
- **Research Unit 5**
Production and Development of Foods for Health. PRODESALUD
- **Research Platform 1**
The Food and Nutritional Genomics Platform. GENYAL.
- **Research Platform 2**
The Nutrigenomics Interactive Center. CIN
- **Research Platform 3**
The Cooperative R+D+I Activity Laboratory. LACID





3.1. Research Unit 1

Nutritional Genomics of Cardiovascular Disease and Obesity. GENECO

Research activity:

The group's work focuses on the study of the effect of diet on the expression of relevant microRNAs in energy metabolism with special emphasis on those related to cardiovascular (CVD) disease and obesity. MicroRNAs have recently emerged as important modulators of molecular pathways with direct association to CVD and obesity. It is therefore important to conduct studies directed at discovering the role of microRNAs in the modulation of these pathways. Moreover, diet is the principal modifiable factor with respect to cardiovascular risk. The group's work pays particular attention to the components of the Mediterranean Diet, (DM) the effect of which on microRNAs may explain part of the heart-healthy effects attributed to the diet. The DM is a tool with great potential for preventing CVD that, moreover, is within reach of the Spanish population. Within the context of microRNAs, this group studies aspects of CVD and obesity as chronobiology, the microbiota or the neurobiological and behavioral role of nutrition. The role of circulating microRNAs as biomarkers of CVD and healthy diet is also studied.

Research developed by this group is carried out from the aspects of basic research to the perspective of research applied to human populations. In this sense, the research group conducts studies on in vitro models that provide insight into molecular mechanisms of action and animal models for manipulating molecular pathways to discover their effect at the level of the whole organism. Finally, an important part of the research takes place in human populations based on both observational and intervention studies with DM in both healthy subjects and patients with CVD.



Head of the Unit

Prof. José María Ordovás Muñoz

Members

Dr. Lidia A. Daimiel Ruiz
Postdoctoral researcher

Dr. Valentini Konstantinidou
Postdoctoral researcher

Britt Blokker
Predoctoral researcher

Silvia Berciano Benítez
Predoctoral researcher

Victor Micó Moreno
Predoctoral researcher

Visiting Researcher

Dr. Juan Francisco Alcalá Díaz
Universidad de Córdoba

Students

Mercedes Klett Mingo
Santander Bank's Fellowship

Luna Manuela Caicedo Gómez
Master student (UAM)

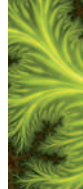
Raquel Fernández Dacosta
Santander Bank's Fellowship

Laura D^a Laura Díez Ricote
Master student (UAM)

Contributing Researchers

Dr. Arantxa Rodríguez Casado
Senior researcher

Marta González Castejón
Predoctoral researcher





Prof. José María Ordovás Muñoz

Head of the unit

Prof. José M. Ordovás, PhD, (born in Zaragoza, Spain in 1956) is Professor of Nutrition and a Senior Scientist at the USDA-Human Nutrition Research Center on Aging at Tufts University in Boston, Massachusetts where he also is the Director of the Nutrition and Genomics Laboratory. He is a Senior Collaborating Scientist at the CNIC, Madrid and he is Senior Researcher at IMDEA Food. Dr. Ordovas was educated in Spain at the University of Zaragoza where he completed his undergraduate work in chemistry (1978) and received his doctorate in the topic of Human Lipoprotein Metabolism (1982). He did postdoctoral work at the MIT, Harvard and Tufts.

Dr. Ordovas' major research interests focus on the genetic factors predisposing to cardiovascular disease and obesity and their interaction with the environment and behavioral factors with special emphasis on diet. He has published about 600 scientific articles in peer review journals and written numerous reviews and books

on these topics in this regard, he is considered one of the most renowned world experts in gene-diet interactions related to cardiovascular traits. Moreover, he has trained in his laboratory over 60 scientists and his current genetic studies involve populations and investigators from all Continents.

Throughout his career, Dr. Ordovas has received multiple honors for his scientific achievements including the USDA Secretary's Award, the Centrum American Nutrition Society Award; the Mary Swartz Award from the Dietetic Association; the Garry-Labbe Award from the American Association for Clinical Chemistry, the Francisco Grande Memorial Lecture all for Excellence in Nutrition; The Rafael del Pino Foundation Lecture, the Turkish Genetics Society Award; the Jaén Paraíso Interior and AEMO awards for his contributions to the diffusion of the Mediterranean diet and the Olive oil; the Good Cholesterol award from Aviles and the Danone Foundation Award for achievements in Nutrition Research and Gold Medal of the Spanish Society of Cardiology. He has been awarded an honorary degree in Medicine bestowed by the University of Cordoba in Spain and the title of Member of the Royal Academies of Sciences, Medicine, Nutrition and Pharmacy, all of them in Spain.

Dr. Ordovas serves on multiple editorial boards and is active with multiple international peer review and steering committees and advisory boards including the presidency or the Scientific Committee Centro de Investigación de Tecnología Agroalimentaria del Gobierno de Aragón.



Dr. Lidia Daimiel Ruiz

Postdoctoral researcher

Dr. Lidia Ángeles Daimiel Ruiz, obtained her degree in Biological Sciences at Universidad Autónoma de Madrid (2003). Then, she worked as a Third Cycle student in the Laboratory of Human Genetics in the Department of Biology at Universidad Autónoma de Madrid, under the supervision of Prof. Juan José González Aguilera, and Prof M^a Antonia Fernández Peralta (2003-2006). This work was focused on the study of genetic alterations of colorectal tumours and its relationship with the diagnosis and prognosis of the cancer. She specifically studied the methylation status of some tumour suppressor genes and the presence of SNPs associated to high risk of colorectal cancer development. Afterwards, she started working on her PhD as graduate student of CIBER Physiopathology of the Obesity and Nutrition in the Department of Biochemistry-Research at Hospital Ramón y Cajal in Madrid under the supervision of Dr. Javier Martínez-Botas and Dr. Diego Gómez-Coronado. The aim of her PhD was to study the effect of cholesterol availability alterations on gene expression and to identify new lipid-regulated genes. For this study, she used wide-genome expression analyses techniques such as microarrays and she participated in the design and development of the CholestchipTM, a focused microarray for the study of genes involved in lipid metabolism and cell cycle, which is currently commercialized by BlackBio S.L. She obtained her PhD in Genetics and Cell Biology at Universidad Autónoma de Madrid in 2010 and has joined to IMDEA Food for the study of the effects of bioactive components of food on the microRNA-mediated lipid metabolism regulation.



Dr. Valentini Konstantinidou

Postdoctoral researcher

Dr. Valentini Konstantinidou graduated from the Technological Educational Institution, Athens, Greece with a degree in Food Science and Technology (1997-2002). She obtained her Official Master (2006-2007) and doctorate (2007-2010) degrees in Biomedical Research and Biomedicine, respectively, from Pompeu Fabra University, Barcelona, Spain. She performed her doctoral studies in the Cardiovascular risk and Nutrition group, at the Municipal Institute for Medical Research (IMIM-Hospital del Mar) under the supervision of Dr. Maria Isabel Covas. Her expertise lies on the field of nutrigenomics. She investigates the human in vivo nutrigenomic mechanisms, which could explain the beneficial effect of Mediterranean diet, olive oil and its polyphenols on the risk of developing cardiovascular disease. During her doctoral thesis, her main contribution was the precise assessment of the molecular mechanisms involved in the protective effect of Mediterranean Diet and olive oil consumption in humans, which resulted in a publication chosen by editors for press release (Konstantinidou et al, FASEB J, 2010). She has participated in large scale human, nutritional, intervention studies (e.g. EUROLIVE, PREDIMED) and she has been able to standardize new laboratory techniques. After her doctoral studies, she collaborated with the Hellenic Health Foundation, Athens, Greece (P.I. Antonia Trichopoulou) and she continued her work at the Rovira i Virgili University, Tarragona, Spain (P.I. Rosa Sola). She has authored and published papers in international, peer reviewed journals and two book chapters. Her work has been presented in different national, international congresses and symposiums. She joined IMDEA Food in September 2012 as a postdoctoral researcher in Nutritional Genetics and Molecular Nutrition, under the supervision of Prof. José M Ordovás.

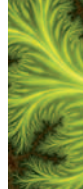
Britt Blokker

Predoctoral researcher

Britt Blokker, BS in Biology at Wageningen University (Netherlands).

During her career, her studies were focused on the interaction between genetics and nutrition, accomplishing a final career Project on Nutrigenomics. She continued her master focused on nutrition, metabolism and genomics. She has participated in several intervention human studies for researching the effect of diets with high protein levels on the genes expression of adipose tissue.

In November 2013, she joined Nutritional Genomics of Cardiovascular Disease and Obesity unit at IMDEA Food as a pre-doctoral researcher, in order to study the interaction between circular microRNAs and cardiovascular diseases





Silvia Berciano Benítez
Predoctoral researcher

Silvia Berciano Benítez obtained her first class BSc (Hons) Molecular Biology and Genetics degree at the University of Westminster (2013). 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 pre-doctoral researcher, where she currently studies microRNA-mediated effects of dietary fatty acids on insulin and lipid metabolism.



Víctor Micó Moreno
Predoctoral researcher

Victor Micó Moreno is a predoctoral researcher at IMDEA-Food. Victor Micó was educated in Spain at Universidad Complutense de Madrid where he completed his degree in Human Nutrition and Dietetics (2010). Later, at Universidad de las Islas Baleares, he completed the Nutrigenomics and Personalized Nutrition Master (2011). Finally, at Universidad Autónoma de Madrid, he completed his degree in Food Science and Technology (2013). Presently Victor Micó is developing a project about the detection of microRNAs in beer and their influence in cardiovascular health. His major research interest is focused about the influence of exogenous microRNAs in the development of cardiovascular disease and how the exercise and nutrition can modulate the endogenous expression of microRNAs.



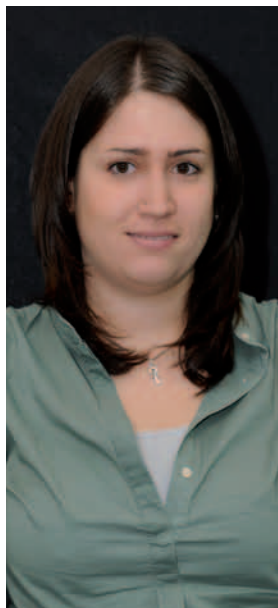


Dr. Arantxa Rodríguez Casado

Senior researcher

Dr. Arantxa Rogriguez Casado, after receiving her B.Sc. Degree in Chemistry (UCM, 1994), she started working on the PhD in the CSIC. Her scientific interest was focused on the structural characterization of nucleic acid by IR/Raman spectroscopies. The research included isotope labeling by organic and enzymatic synthesis, and purification of the biological samples. In 1998, after the defense of her doctoral thesis, she continued working as a postdoc in structural determinants of recognition nucleic acid-protein complexes by Raman/IR and CD spectroscopies. Crystallized salts for this study were prepared according to standard crystallization protocols. From 1999 to 2002, she worked as a Research Associate in a Raman spectroscopy laboratory in US focused on biophysics. The projects handled over there required the application of virology, molecular biology, and protein chemistry skills. They involved bacteriophages isolation and viral particles purification with the

objective of understanding the molecular basis of protein recognition that leads to the virus assembly. In addition, experience of electrophoresis and familiarity with other techniques for protein characterization, such as HPLC, FPLC (ion-exchange, affinity and size exclusion chromatography) with an emphasis on separation/purification but analytical procedures as well. H/D exchange studies on the proteins were used to supplement the structure characterization obtained by spectroscopic techniques. Then, she went to London to Birkbeck College (UK) until 2004. There, she was trained on electron microscopy since it is thought to be a good complement to the vibrational spectroscopy for studies oriented to structural characterization of biomolecules. Over there she worked on 3D reconstruction by single particles and image processing. Specifically the bacteriophage SPP1 was the object of study. Four year ago she came back to Spain by the I3P program to the CSIC to work on two main projects focused on Hepatitis C virus and fish proteins structure characterization. Results of all those years dedicated to the research work are reflected on 28 publications with important impact factor in their knowledge area, and she has been able to gain usefulness as the role involves responsibilities laboratory instrumentation, writing and as supervision of graduate students. She is currently a scientist research in IMDEA-food, and her research interest is focus in new technology in the nutrition domain and the interaction between nutrition and chronic diseases.



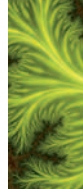
Marta González Castejón

Predoctoral researcher

Marta González Castejón graduated in Biology at the Universidad Autónoma de Madrid in 2007.

During his final year performed the Proyecto Fin de Carrera in the Department of Biology of UAM, working in the construction and analysis of mutant strains of bacteria. Completion of this project along with the subjects allow to be familiar with techniques of molecular biology and genomics.

In March 2009 she joined IMDEA Food, by obtaining a Contract Research Staff Support of Madrid for the completion of the doctoral thesis on the topic New functional ingredients that affect the expression of genes involved in development of obesity and metabolic syndrome, thesis directed by Dr. Arantxa Rodríguez-Casado.





3.2. Research Unit 2

Molecular Oncology and Nutritional Genomics of Cancer. OMYGEN

Research activity:

The scientific work of the group is currently focused on two research topics:

1.-Lipid metabolism alterations 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 also represent new therapeutic targets.

To this end, in close collaboration with the divisions of Medical Oncology of 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 determined and associated with the clinical outcome of the disease. Furthermore, functional studies both in cells and in animal models to investigate the role of identified genes and microRNAs are performed. 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 that may constitute novel targets for the development of future cancer therapies, as well as the genetic basis of the relationship between obesity and associated metabolic disorders and cancer.

2.- Study of the activity and mechanism of action of bioactive compounds as potential effective supplements in preventing and/or treating cancer.

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 Universidad Autónoma de Madrid, specifically with researches from the group of Bioactive Food Ingredients of the Institute of Food Science Research, we design and characterize different formulations of bioactive compounds, and combine genomics and functional studies in order to determine the effect and target populations for personalized therapeutic use of the mentioned formulations.

Recently, we have evaluated the effect on gastrointestinal tumor progression of a supercritical extract of rosemary (which has been shown to be 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 tumor cell lines. Furthermore, we have identified key players of its underlying molecular mechanism as well as the characteristics of potential patients more likely to benefit most from a nutritional supplement based on this extract.

Head of the Unit

Dr. Ana Ramírez de Molina
Deputy Director

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

Margarita González-Vallinas Garrachón
Predoctoral researcher

Jorge Martínez Romero
Predoctoral researcher

Silvia Cruz Gil
Predoctoral researcher

Dra. Susana Molina Arranz
Senior laboratory technician

Students

Jean Paul Cerna Vargas
Master student (UAM)

María Soledad García Álvarez
Student (UAM)

Rafael Martín Martínez
Student (UAM)

Almudena Álvarez Teno
Student (UAM)

Alba López Paredes
Student (UAM)

Elena Ortego Hernández
Student (UAM)

Olga López-Cediel Verdú
Santander Bank's Fellowship

Cristina Prieto Navarro
Santander Bank's Fellowship





Dr. Ana Ramírez de Molina
Deputy Director
and head of the unit

Dr. Ana Ramírez de Molina, has developed her scientific career in the field of lipid metabolism and oncogenes of the ras superfamily. In that area she successfully developed projects dealing with several aspects of the tumorigenic process both at the molecular mechanistic level as well as on an applied point of view. Her PhD was done at the "Instituto de Investigaciones Biomédicas (CSIC)" under the supervision of Prof. Juan Carlos Lacal and focused on the oncogenes ras mediated intracellular signalling and its relationship with the lipid metabolism. Thanks to these studies she published 6 articles (5 as first author) and was awarded as outstanding PhD thesis by the Autónoma University in 2002. She worked as an associated researcher in the Translational Oncology Unit CSIC-UAM-La Paz Hospital, and performed postdoctoral stays with Professor Paul Workman, Head of the Cancer Research UK Centre for Therapeutics, and Prof. Jesus Garcia Foncillas in

Clinica Universitaria de Navarra. In addition, she performed two postdoctoral stays with Prof. Carlos Cordon-Cardó which was director of the Molecular Pathology Division of the Sloan Kettering Cancer Center (New York) for the analysis of new molecular markers in cancer patients. In the last years she has published 20 articles in prestigious international journals of her research field, is co-inventor of 8 patents in different phases of exploitation by a biotechnology company and has supervised two PhD Thesis. Several of her patents help and promote the creation of a spin-off company from CSIC which focuses on the development of new tumour markers and therapies in Cancer: TCD Pharma, in which she was former Director of Research, Development and Innovation. She joined IMDEA Food Institute as a "Ramón y Cajal" researcher in 2009 and since then, she is head of Molecular Oncology and Nutritional Genomics of Cancer Group. From 2012 to 2013, she has been the Coordinator of Research, Development and Transfer and in 2014 has been appointed Deputy Director.



Dr. Teodoro Vargas Alonso
Postdoctoral researcher

Dr. Teodoro Vargas Alonso, has joined IMDEA Food (January 2011) in the research project "Identification of new biomarkers and bioactive compounds in human cancer", has developed his scientific career at the Research Center of the "12 de Octubre" Hospital (Madrid). He has worked in the field of human genetics, particularly, in molecular analysis and genetic screening of mutations and polymorphisms, and its relationship with different diseases. His PhD was done at the Neurosciences Department, and during this period, he published 8 articles (5 as first author) in international journals, dealing with several aspects of the neurodegenerative process in the Alzheimer Disease (AD). His thesis focused on the identification of different genetic polymorphisms associated with an increased risk for AD, identification of biomarkers in AD patients, and he successfully developed a lentivirus-mediated gene therapy focused on restore alterations that occur at neurological level in a murine model of amyloidosis. 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 and Nutritional Genomics of Cancer Group for the study of the effects of bioactive components of food on cancer prevention in the research project "Identification of bioactive compounds with antitumoral activity in human cancer". Furthermore, he has worked in the identification of genetic markers as predictive factors in the prognosis of patients with stage II colorectal cancer. In the last years he has published 17 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 stage II colorectal cancer patients.



Dr. Ruth Sánchez Martínez
Postdoctoral researcher

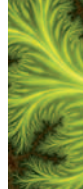
Dr. Ruth Sánchez Martínez, obtained her Biology Diploma (BSc) at the University of Oviedo in 2001. Her PhD training (2002-2007) was performed at the “Instituto de Investigaciones Biomédicas de Madrid” (IIBM) under the supervision of Prof. Ana Aranda. This work was mainly focused on the molecular mechanisms of action of vitamins and hormones, in particular in the transcriptional regulation mediated by nuclear receptors of thyroid hormone, vitamin D and retinoids. In 2008 she joined, as a postdoctoral fellow, Dr. Marcos Malumbres group at the Spanish National Cancer Research Centre (CNIO). During this period she studied the role of new molecules involved in mitotic exit regulation using genetically modified mice. The aim was to not only study mitosis from the molecular point of view, but also to validate these molecules as putative cancer targets. In addition to this, 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 Biology Diploma (BSc) at the University of the Basque Country (UPV-EHU). She performed her PhD training under the supervision of Dr. Juan Antonio García-Alvarez at the Spanish National Centre for Biotechnology (CNB-UAM-CSIC) in Madrid. During her PhD she analyzed the role of the CI RNA helicase in PPV infection (2004). In 2005 she moved to the National Research Council-Institute for Biological Sciences (NRC-IBS) in Ottawa (Canada) at Dr. Danica Stanimirovic’s lab (Postdoctoral Fellowship MEC-Fullbright). She was interested in the characterization of Grb7-D mutants to determine their contribution to tumorigenesis and angiogenesis. In 2006 she returned to Spain and joined to Dr. Marcos Malumbres’ group at the Spanish National Cancer Research Centre (CNIO). She analyzed the *in vivo* relevance of microRNA -203 in leukemias and microRNAs implicated in the regulation of the cell cycle and the control of Myc oncogenic pathways.

In 2013 she joined IMDEA where she is interested in the regulation of lipid metabolism pathways by microRNAs and their association with the clinical outcome in human cancer.





Dr. Cristina Aguirre Portolés
Postdoctoral researcher

Dr. Cristina Aguirre Portolés, BS in Biology at Autónoma University in Madrid, started her scientific career at the Spanish National Cancer Institute in 2006. She performed her PhD training under the supervision of Dr. Ignacio Pérez de Castro and Dr. Marcos Malumbres. Her studies were mainly focused in the role of the mitotic protein TPX2 both in mouse development and tumorigenesis 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.

In parallel with this project she worked in the function and regulation of the Aurora family and also in the implications of these kinases in cancer development. 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 used murine models overexpressing a mutant version of the Epidermal Growth Factor Receptor (EGFR-L858R) as a model for NSCLC and overexpression of Mad2 as source of chromosomal instability. 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 Autonomous 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 in the Spanish population, analyzing genes implicated in the pigmentation pathway and melanin synthesis.

Since 2010, she has conducted postdoctoral research at the Molecular and Cell Biology of the Thyroid group in the Biomedical Research Institute, a center of the Spanish National Research Council (CSIC) in Madrid. In December 2014 she joined IMDEA Molecular Oncology and Nutritional Genomics of Cancer Group.

She has a solid professional experience in the biology of cancer, molecular endocrinology, transcription factors and thyroid signaling 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.



Margarita González-Vallinas Garrachón

Predoctoral researcher

Margarita González-Vallinas Garrachón has a Degree in Pharmacy in year 2008 and a Degree in Biochemistry in 2010 both at the Salamanca University in Spain.

In summer 2007 made an internship at the CNB by means of a Research Grant, awarded by the Spanish Council for Scientific (CSIC). In 2007/2008 she obtained a Collaboration Fellowship, in the Department of Nutrition and Bromatology at University of Salamanca (Spain).

During 2008/2009 she won an Erasmus grant to accomplish a research project in the Laboratory for Food Technology at the Catholic University of Leuven (Belgium).

In 2010, she joined IMDEA Food to perform the thesis titled: "Evaluation of supercritical rosemary extract as antitumor agent: a genomic approach", directed by Dr. Ana Ramírez de Molina and defended in March 2014 (SUMA CUM LAUDE).



Jorge Martínez Romero

Predoctoral researcher

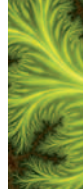
Jorge Martínez Romero. He is Pre-doctoral researcher at the IMDEA Food Institute's Molecular Oncology and Nutrition Genomics of Cancer group, after completing the Diploma in Human Nutrition, the Degree in Human Nutrition and Dietetics and a Masters in Agricultural Chemistry and Novel Foods from the Universidad 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 SL) 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 and Nutritional Genomics of Cancer Group (OMYGEN). Her research primarily focuses on the role of the lipid metabolism in tumor progression.





3.3. Research Unit 3

Laboratory of Functional Foods. LABFUN

Research Activity:

Nutritional profiles and claims offer great added value to food products and they are currently rarely constructed based on ACEs. Rather, they are based on epidemiological observations or in vitro experiments. While ACEs are in fact the standard of Pharmacology since they are the only way of providing reliable and evidence-based data, they are difficult to apply to nutrition-based environments.

In LABFUN, basic research will be carried out to gain in-depth knowledge of the etiology of cardiovascular and cardiometabolic disorders; the preventive and therapeutic role of micronutrients selected in the modulation of such diseases will be addressed by obtaining solid mechanistic evidence of their actions; studies will be conducted on animals to discover any in vivo biological activity, and security issues will also be covered; studies will be carried out on selected humans (first on healthy volunteers and then on patients) to evaluate the physiomodulatory action of micronutrients and their metabolism; there will be collaboration in the development and validation of functional or nutraceutical food with a high potential for entering the market.

Head of the Unit

Prof. Francesco Visioli

Dr. João Tiago Esteveo Tomé Carneiro

Postdoctoral researcher

Members

Dr. Nathalie Nicod

Postdoctoral researcher

Dr. Emma Burgos Ramos

Postdoctoral researcher

Dr. Elena Giordano

Postdoctoral researcher

Carmen Crespo Lorenzo

Predoctoral researcher

Students

Silvia Baracchini

ERASMUS Programme

Pamela Ranzetti

Students (Padua University)

scientists





Prof. Francesco Visioli
Head of the unit

Prof. Francesco Visioli, earned a degree in Pharmacy and Pharmaceutical Chemistry from the University of Milan and a PhD in Biotechnology from the University of Brescia. Currently, he is head of the Labfun Unit at the Madrid Institute for Advanced Studies (IMDEA)-Food. From 1996 to 2010 he was full Professor of physiopathology at the Université Pierre et Marie Curie (Paris), where he directed the "Micronutrients and cardiovascular disease" unit. He is also Assistant Professor at the College of Pharmacy, Oregon State University. Dr. Visioli's research currently concerns essential fatty acids, namely those of the omega 3, and series natural antioxidants, as related to atherosclerosis and cardiovascular disease. In particular, Dr. Visioli's group discovered the biological and pharmacological properties of olive oil phenolics, including hydroxytyrosol. In addition, Dr. Visioli is being studying bioactive components of plant foods, including lycopene from tomato and biophenols from wild greens.

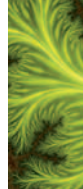
His research ranges from in vitro studies of bioactivity (test tubes, cell cultures) to in vivo tests, performed on laboratory animals and/or humans. Dr. Visioli has a publication record of over 160 papers and book chapters, which have been cited over 3.000 times. He gave invited lectures in over 60 meetings. As related to human health, Dr. Visioli created a method to evaluate the nutritional profile of foods (foodprofile.org), which was published in 2007 and field-tested in 2009.

Dr. Visioli is member of the Board of Directors of the International Society for the Study of Fatty Acids and Lipids (ISSFAL), member of EFSA's expert database, and member of several learned societies. Currently, Dr. Visioli is the Editor-in-Chief of Pharmacological Research, Associate Editor of Lipids and of PLEFA, and First Editor of the British Journal of Nutrition, in addition to being a member of the Editorial Board of several other journals.



Dr. Nathalie Nicod
Postdoctoral researcher

Dr. Nathalie Nicod obtained her Chemistry Diploma (BSc) at the University of Lausanne (CH) in 2000. Her diploma thesis was on biphenyl stereochemistry with Prof. Schlosser. However her interest lied in nutritional biochemistry and in order to gain a more human vision of nutrition she spent a year and a half as research assistant in the Physiology Institute of Lausanne with Dr. Luc Tappy (2000-2002). She supervised a in a clinical trial on the effects of dexamethasone-induced insulin resistance. Thereafter she wanted to tie her to backgrounds together (Chemistry and Physiology), thus she obtained her PhD in Molecular Nutrition (Nutritional Biochemistry) at Cornell University (NY) in (2002-2008) under the supervision of Dr. Robert Parker, where she investigated the role of ATP-binding cassette lipid transporters in vitamin E secretion and status. She was a Marie-Curie postdoctoral fellow in frame of the IAPP-ADIBET project (The role of adipose tissue in obesity: beta cell crosstalk) at IDIBAPS (Barcelona) with Dr. Ramon Gomis. She investigated the effect of the single nucleotide polymorphism rs7903146 on alternative splicing of TCF7L2. She is a postdoctoral fellow at IMDEA Food in Dr. Francesco Visioli's group looking at the effects of dietary lipids on reverse cholesterol transport.





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. In 2013, he finished his PhD in Integration and Modulation of Signals in Biomedicine at the University of Murcia. In his thesis, he had the opportunity to explore the beneficial cardiovascular health effects of the consumption of a grape extract providing physiological amounts of resveratrol. In addition, the potential molecular mechanisms responsible for the observed effects were investigated in peripheral blood mononuclear cells. The results obtained during his PhD work led to six first author publications (including two invited reviews) in important international journals. Moreover, he participated in a project focused on exploring the anti-inflammatory effects of resveratrol-derived compounds, which resulted in a patent. More recently, he participated in a European Union-funded project aiming at exploring the beneficial effects of dietary bioactive peptides and polyphenols on human cardiovascular health.

In August 2014 he joined the Laboratory of Functional Foods at IMDEA-Food, where he contributes to the assessment, in vitro, in vivo and through double-blind, placebo-controlled, randomized clinical trials, of the potential health effects of hydroxytyrosol (the main component of extra virgin olive oil).



Dr. Elena Giordano

Postdoctoral researcher

Dr. Elena Giordano, obtained a B.Sc. Hons. in Biological Sciences at the University of Cagliari, Italy (2003) and undertook her PhD studies under the guidance of Dr. Sebastiano Banni in the Department of Experimental Biology at University of Cagliari, Italy (2007). She obtained her PhD in Nutritional Biochemistry and Physiology in 2011. During her PhD training at University of Cagliari and at Rutgers University, she gained extensive knowledge in lipid and retinoid biochemistry and metabolism in animal model and in humans. She started to study the effect of dietary Conjugated Linoleic Acid (CLA) isomers on liver metabolism and in fat mass and bones turnover, in relationship with retinoid metabolism in mice. Furthermore, she was involved in investigating omega-3 PUFAs and endocannabinoid nutritional control in different animal models (rats and mice) and in humans, with a special interest in obesity and other metabolic diseases.

In her current position as Postdoctoral Researcher at IMDEA Food Institute, she is designing and taking the lead of two main research projects focussed on gene-nutrient interactions (nutrigenetics/nutrigenomics), with the aim of developing and applying advanced techniques and methodologies to produce novel effective functional foods. One of her projects involves an in vitro model of human hepatocarcinoma (HepG2) cells, to study the effects of the olive phenol hydroxytyrosol on endoplasmic reticulum (ER) stress. The other project concerns the effects of selected soy components and olive oil polyphenols on target genes involved in adipogenesis, osteogenesis and lipid pathways, in vitro (3T3-L1 cells) and in vivo (mouse).



Dr. Emma Burgos Ramos
Postdoctoral researcher

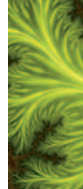
Dr. Emma Ramos Burgos obtained her degree in Biology from the Universidad de Alcalá in 2002 and subsequently began her doctoral studies in the Department of Biochemistry and Molecular Biology at the Universidad de Alcalá, in Neurobiochemistry group led by Professor Eduardo Arilla Ferreiro. For four years, she studied the effects of several drugs on the somatostatin receptor-effector system in an experimental model of Alzheimer's disease. This study allowed her to publish 6 articles in prestigious international journals about neuroendocrinology. In late 2006, she got her PhD in Biology from the University of Alcalá. In 2007 she joined to the Laboratory of Endocrinology and Nutrition from Hospital Infantil Universitario Niño Jesús as postdoctoral researcher, under the supervision of Vicente Barrios Sabador PhD. During that time she was also member of Obesity and Nutrition CIBER. The following year, Instituto de Salud Carlos III granted her a contract Postdoctoral Sara Borrell in order to study the regula-

tion of leptin and insulin intracellular signaling mechanisms both in central nervous system as in peripheral tissues, which regulate energy homeostasis, in the pathogenesis of obesity and type 2 diabetes. These findings enabled her to publish 12 articles in international journals of high impact factor related to endocrinology, metabolism, and neuroscience. She has also written several book chapters related to metabolic syndrome and neurological diseases. This contract also allowed her to enjoy of two stays at excellence centers, in the Metabolic Research Laboratory at the Universidad Clínica de Navarra and in Edison Biotechnology Institute at Ohio University, where she carried out microarray profiles and proteomic analysis, respectively. In 2013 she joined to CNIO at the cancer stem cells group directed by Professor Christopher Heeschen, participating in the metabolic characterization of stem cells from pancreatic tumors. In 2014 she joined to IMDEA Food Institute as a postdoctoral researcher at the Laboratory of Functional Foods led by Professor Francesco Visioli.



Carmen Crespo Lorenzo
Predoctoral researcher

Carmen Crespo Lorenzo has a degree in Molecular and Cellular Biology at the IE University of Segovia (2010). She then joined the INGEMM (Institute of Medical and Molecular Genetics) Hospital Universitario La Paz. During three years she studied the Gorham-Stout syndrome using different molecular techniques such as array CGH, SNP array & NGS (next generation sequencing). The aim of the research was to find novel genomic rearrangements in patients with this disease, which remains of unknown etiology. In 2013 she obtained a Master degree in pharmacological research conducted at the Universidad Autónoma de Madrid. She has the certificate for handling and design experimental animals protocols (Category "C"). Now Carmen is a predoctoral researcher at LABFUN research group (Laboratory of Functional Foods) at IMDEA Food Institute. She is conducting a nutrigenomic and epigenetic project on hydroxytyrosol. By performing in vitro and in vivo studies, she is searching for new molecular targets of this phenolic compound in order to find novel therapeutic targets.



3.4. Research Unit 4

Disorders of Lipid Metabolism and Molecular Nutrition. DISLIPID

Research Activity:

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.

This unit 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.

Head of the Unit

Dr. Alberto Dávalos

Visiting researcher

Dr. Eduardo Iglesias Gutiérrez
Universidad de Oviedo

Members

Dr. Patricia Casas Agustench
Postdoctoral researcher

Dr. Maria Jesús Latasa Sada
Postdoctoral researcher

Judith Gil Zamorano
Predoctoral researcher

Students

Iryna Tyshkovska
Student (URJC)

Sara Malaguti
Science without Frontiers Programme



scientists



Dr. Alberto Dávalos

Head of the unit

Dr. Alberto Dávalos studied Pharmacy and Biochemistry at the Universidad San Marcos (Lima). He did his PhD with Begoña Bartolomé at the CSIC (Madrid). There he studied the bioavailability and the antioxidant effects of dietary polyphenols. He worked in the laboratory of Prof. Miguel A. Lasunción as postdoc at the Hospital Ramón y Cajal (Madrid), studying the cholesterol and lipoprotein metabolism. He joined Prof. William C. Sessa lab at Yale University (New Haven), where he studied the role of caveolae proteins in endothelial cell function and atherosclerosis. He also joined Prof. Carlos Fernandez lab at New York University (New York) where his studies focused on the role of microRNAs in lipid metabolism.

Dr. Dávalos's research program focuses in identifying and characterizing new microRNAs that regulate lipid metabolism and the effects of minor dietary components (micronutrients) on their expression. microRNAs have been recognized as critical modulators of cardiovascular system in health and disease. He hopes to identify new therapeutic strategies through modulating microRNAs levels by the diet to treat dyslipidemia and to prevent atherosclerosis and cardiovascular diseases.



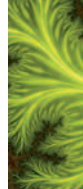
Dr. Patricia Casas Agustench

Postdoctoral researcher

Dr. Patricia Casas Agustench obtained her Degree in Human Nutrition and Dietetics (2003) and Food Science and Technology (2005) at University of Barcelona. In 2010 obtained her PhD in Nutrition and Metabolism under the supervision of Dr. Jordi Salas-Salvadó and Dr. Mònica Bulló at the Rovira i Virgili University in Reus.

From 2005 until 2010, she was part of the Human Nutrition Unit in Faculty of Medicine and Health Sciences at Rovira i Virgili University. During this period, she studied the effect of nut consumption on energy balance, metabolism and inflammatory response and oxidation in subjects with metabolic syndrome. In 2009, she obtained a mobility predoctoral grant from AGAUR-Generalitat de Catalunya to make a stay at the Nutritional Genomics Laboratory from Tufts University (Boston, MA) under the supervision of Dr. José M Ordovás. Afterwards she did a postdoctoral collaboration with Dr. Emilio Ros in the Lipid Unit from Endocrinology and Nutrition Service at Hospital Clinic (Barcelona). In October 2011 she is incorporated to IMDEA Food in the programme "Marie Curie international Outgoing Fellowships for Career Development" (IOF) to study possible interactions between genetic and health style factors in the obesity development.

She has published 15 original papers in national and international journals. She has also participated in writing two book chapters "Tratado de Nutrición" and "Nutrición y Dietética Clínica". She has presented 20 communications in different national and/or international conferences and has participated as a speaker in courses and national symposiums.





Dr. María Jesús Latasa Sada
 Postdoctoral researcher

Dr. Maria-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, the studies conducive to her Ph.D. degree, carried out in the Superior Council for Scientific Research (CSIC), were focused on the regulation by various hormones and growth factors of the b-amyloid protein precursor gene, implicated in Alzheimer's disease. Later on, in the Department of Nutritional Sciences & Toxicology at UC Berkeley (USA), her work versed on the effect of the nutritional state on the regulation of Fatty Acid Synthase, the central enzyme in lipid synthesis. Once returned to Spain, Dr. Latasa joined again the CSIC as a "Ramón y Cajal" appointee, working on gene expression studies during nervous system development, focusing on the epigenetic processes involved in such regulation. Thus, her most recent works have referred to the regulation of myelin genes expression by the active metabolite of vitamin A during peripheral nervous system development. In pursuing this investigation, microRNAs have emerged as fundamental players in such gene regulation. At this moment, after joining IMDEA Food, her scientific interests focus on the effect of diet on the regulation of microRNA and other non-coding RNAs expression.

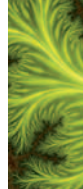


Judith Gil Zamorano
 Predoctoral researcher

Judit Gil Zamorano is a Superior Technician in Clinical Diagnostic Laboratory and has a degree in Biology from the Universidad Complutense de Madrid specializing in Biotechnology.

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. She also did the training course to work with experimental animals (Category B, Universidad Autónoma de Madrid).

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 regulate the metabolism of cholesterol and lipoproteins in the enterocyte, and the effect of minor components of the diet on its expression.



3.5 Research Unit 5

Production and Development of Foods for Health. PRODESALUD

Research Activity:

This line is complementary to the previous four and its main purpose is to connect with the food industry by establishing a bridge between molecular mechanistic research and the market by means of the development of food products for specific health use that either respond to the results generated by the basic lines of the Institute or are validated using the scientific tools of said lines.

PRODESALUD will be based mainly on human resources and infrastructures external to the IMDEA Food Institute coming from the environment of the Universidad Autónoma of Madrid, with which the Institute has signed a collaboration agreement and, more specifically, within the context of the Biocampus Norte de Madrid (BUC) developed by the Universidad Autónoma and in which the IMDEA Food Institute is integrated, along with other companies in the field of biomedicine and public research centers. Researchers from the Instituto Mixto de Investigación en Ciencias de la Alimentación (Joint Institute for Research in Food Science) (UAM-CSIC), specialists in new technologies for obtaining bioactive food ingredients, will participate in the activities of this line as partners of the IMDEA Food Institute. These researchers have access to the pilot plant Novalindus, located in the aforementioned joint institute, with which the tasks of development and pilot production of the products under investigation will be carried out.

Head of the Unit

Prof. Guillermo Reglero Rada
Director

Members

Dr. Marta Corzo Martínez
Postdoctoral researcher

Lamia Mouhid Al Achbili
Predoctoral researcher

Mónica Gómez Patiño
Laboratory Technician

scientists





Prof. Guillermo Reglero Rada

Director and head of the unit

Prof. Guillermo J. Reglero Rada is Doctor 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).

He works in a research group on food and health. He has directed 5 projects of the National Plan of R&D, 3 projects Innacto and 70 industrial 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 a project of the Strategic National Consortia Program Research (CIEN).

He is author over 200 publications of international impact and 2 licensed patents in exploitation. In 2001 he received the "Archer Daniels" Award from the American Oil Chemists Society and in 2008 the Prize of the Spanish Society of Gastronomía as Best Spanish Researcher in Food Science.

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.



Dr. Marta Corzo Martínez

Postdoctoral researcher

In 2006, Dr. Marta Corzo (Madrid, 1983) obtained her BSc degree in Food Science and Technology at the University Autonoma of Madrid (October 2001- June 2006) where she was awarded the Extraordinary Prize for BSc students. In January 2007, she started PhD studies in Food Science and Technology in the Department of Food Characterization at the Institute of Industrial Fermentations (IFI) (currently, Department of Bioactivity and Food Analysis at the Institute of Food Science Research, CIAL (CSIC-UAM)) under direction of Drs. Mar Villamiel and F. J. Moreno and sponsored by a pre-doctoral research fellowship of CSIC (January 2007- December 2010). Part of her PhD studies were conducted in other North American and Spanish research centers and universities during several short stays that have provided her with a broad range of skills and a considerable experience in different ways of planning, managing, executing and dissemination of scientific research. On January 21, 2011,

she presented the Doctoral Thesis titled "Characterization, technological functionality and bioactivity of dairy proteins glycosylated via the Maillard reaction" at the University Autonoma of Madrid, obtaining the maximum mark (Cum Laude). Since January 2011 until January 2012, she enjoyed a grant from the Danone Institute to develop new approaches to improve the production of potential bioactive oligosaccharides from cheese whey permeate. In January 2012, she got an aid of post-doctoral mobility from the Spanish Ministry of Education to work in the Laboratory of Food Chemistry of the Wageningen University (WU-FCH) (The Netherlands). This fellowship allowed her to gain knowledge and experience in the carbohydrate field as well as acquire new skills in handling mass spectrometers. In 2013, she started to work in The Department of Food Science & Technology at The University of Tennessee (Knoxville, USA) in the Research Project "Milk-based nano-delivery system for hydrophobic drugs in infants and children", during which she developed a new pediatric formulation of the antiretroviral drug Ritonavir. Since April to October 2014 she worked in the Institute of Food Science Research (CIAL, Department of Bioactivity and Food Analysis) as associate postdoctoral researcher. She joined PRODESALUD IMDEA Food group in november 2014 as postdoctoral researcher.



Lamia Mouhid Al Achbili

Predoctoral researcher

Lamia Mouhid Al Achbili 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 pre doctoral researcher, where she is currently developing customized nutritional products for patients with gastric cancer.



Mónica Gómez Patiño

Laboratory Technician

Mónica Gómez Patiño is both a Superior Technician in Microbiological and Chemical Control Analysis and a specialist Technician in Instrumental Methods of Analysis regarding scientific research assistance (i+D+I), co-organized by CIEMAT, IGME, INIA, INTA and INAP.

She is soon to obtain a Degree in Chemical Sciences.

She began her professional experience working at Qualicaps Europe and BioMérieux, both pharmaceutical companies. After that, she worked for 3 years at the Spanish Research Institute for food and agrarian technology (INIA), where she collaborated as a main technician in the analytical part of the research projects in progress at the Department of Environment and also in the preparation of scientific publications to be presented at international congresses. Between 2010 and 2012 she worked as a lab technician at the Gas Chromatography Service of the Centre of Biological Research belonging to the Spanish Scientific Research Superior Council (CIB-CSIC). By late 2012, she started working as a lab technician at the I+D Department of the pharmaceutical company ALK Spain, conducting several techniques related to the identification, quantification and detection of specific proteins and also immunoassays related to respiratory diseases research. Currently, she is working as a lab technician at IMDEA-Food, and assisting Scientific-Technological Infrastructures in Biosafety issues. Her contract was awarded by the Spanish Ministry of Economy and Competitiveness and is co-financed by the European Social Fund.



3.6. Research Platform 1

Food and Nutritional Genomics Platform. GENYAL



Knowledge of the human genome and of the variation in its key genes is of great importance in deciphering the molecular mechanisms that determine the responses of different individuals to diet, and in identifying biomarkers that allow the effects of different foods to be accurately known. Such information is vital to the promotion of health via healthy eating.

The “Cantoblanco” Food and Nutritional Genomics Platform (GENYAL) provides a high-level service for undertaking nutrigenomic and nutrigenetic studies designed to identify and understand the scientific basis of the effects of food on health. GENYAL was created to cater to 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 incorporation and validation of personalised molecular nutrition.

GENYAL provides its 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

GENYAL also provides a route for IMDEA Food Institute scientists to translate to society the advances made in their applied research projects. It 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. Phenotype characterisation includes the gathering of socio-health data, physical activity profiles, anthropometric information and the results of biochemical analyses; genotype characterisation involves the identification of variants (nucleotide polymorphisms and SNPs) of genes involved in nutrient metabolism and nutrition-linked disease. Volunteers are being permanently recruited; nearly 1000 persons interested in participating as volunteers have already been contacted.

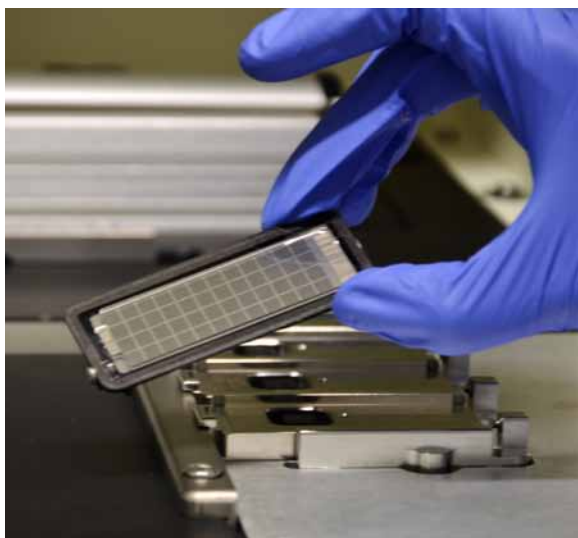


3.6.1. Nutrition and Clinical Trials Unit

GENYAL has all the necessary infrastructure for undertaking clinical trials that may or may not include a genetic component. 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 recognised prestige and experience in research.

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.

In recent months, three dietary intervention studies have begun to investigate the effects of bioactive compounds. In two trials, these compounds are given as nutritional supplements, and in one a functional food is provided. Responses are being examined taking into account the subjects' genetic backgrounds.



3.6.2. Biostatistics and Bioinformatics Unit

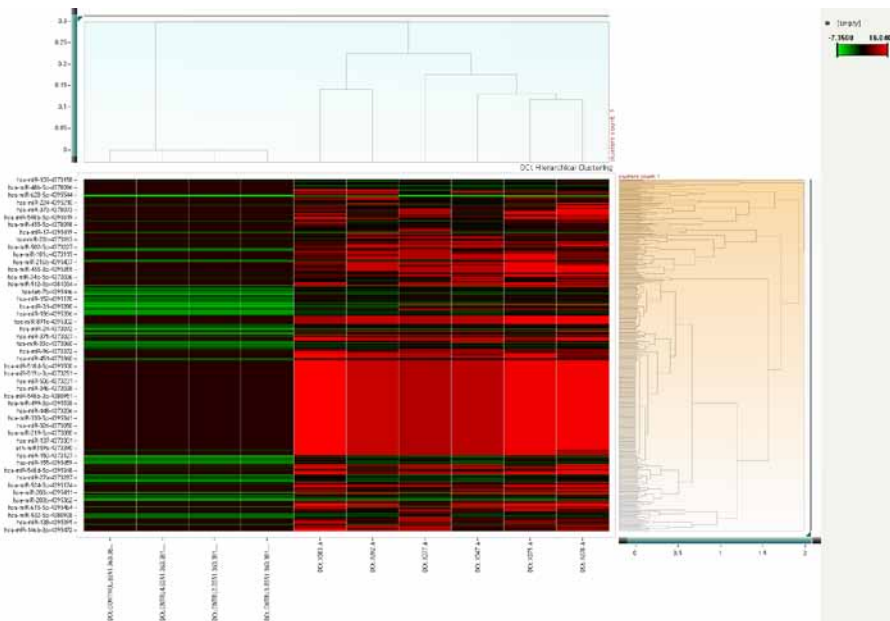
A project control web application has been developed for storing and processing data and monitoring samples pertaining to different nutrition research projects. This application, designed by the IMDEA Food Institute and which uses open source software, can store and manage a large volume of phenotype 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 provides resources and personnel specialised 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.

The Unit organises specialised training courses and collaborates with the postgraduate program of the *Universidad Autónoma de Madrid*.



3.6.3. Genomics Platform

The Genomic Laboratory has the necessary infrastructure for providing genetic and genomic services, and provides technical and scientific support to researchers and private companies. The Laboratory has the latest hardware for performing gene expression and genotyping analyses - such as a QuantStudio™ apparatus etc. - for use in nutrigenetic and nutrigenomic studios designed to provide the scientific background for effective, personalised “medical nutrition”.

the GENYAL team

Management

President:

Prof. José María Ordovás Muñoz

General Director:

Prof. Guillermo Reglero Rada

Scientific Director:

Dr. Ana Ramírez de Molina

Administrative Director:

Inmaculada Galindo Fernández

Nutrition and Clinical Trials Unit

Dr. Viviana Loria Kohen

Nutritionist, senior researcher

Isabel Espinosa Salinas

Nutritionist, predoctoral researcher

Helena Marcos Pasero

Nutritionist, predoctoral researcher

Biostatistics and Bioinformatics Unit

Jesús Herranz Valera

Biostatistician, senior researcher

Roberto Martín Hernández

Bioinformatics scientist, predoctoral researcher

Nutritional Genomic Laboratory

Dr. Susana Molina Arranz

Senior laboratory technician

Belén García Carrasco

Laboratory technician

Students:

Marta García Huidobro

Student (UAM)

Marina Almela Moore

Student (UAM)



researchers

nutricional and clinical trial

Dr. Viviana Loria Kohen

Nutritionist, senior researcher



Dr. Viviana Loria Kohen, received her Bachelor's degree in Nutrition at Universidad de Buenos Aires, UBA (1996), and obtained the Master's degree in nutrition at Hospital Ramos Mejía, Argentina (1996-1999). In Spain, she earned a Master's degree in Clinical Nutrition at Universidad Autónoma de Madrid (2001). Thereafter, she worked at the Department of Endocrinology and Nutrition in Hospital del Niño Jesús, Hospital Ramón y Cajal and Hospital La Paz. She obtained her PhD in Medicine at Universidad Autónoma de Madrid in 2010, under the supervision and direction of Prof. Juan García Puig and Dr. Carmen Gómez Candela. In 2004 she joined the Fundación Biomédica del Hospital Universitario La Paz (FIHULP) staff, taking part of the Research Group in Nutrition and Functional Food, IDipaz as researcher and dietician at Unidad de Nutrición Clínica y Dietética, Hospital La Paz. She participated in many research projects about functional foods and different nutrition-related diseases: obesity, eating disorders, cancer, and kidney disease. In March 2012 she joined IMDEA Food for work on the design and development of different clinical trials related to nutrition and genetics: study of efficacy and safety of different foods, functional foods and bioactive compounds in human trials. She has authored many nutrition education books like: "Visual guide to food and feed", "Manual theoretical practical nutrition education Food Disorders", and

"Health to the letter for the patient with osteoarthritis"; and has also co-authored 18 books. Moreover, she has published 33 papers in scientific journals (Loria-Kohen et al. Nutrition. 2014 Oct; 30(10):1144-50; Loria-Kohen et al. Clin Nutr. 2012 Nov 6. doi:pii: S0261-5614(12)00230-0. 10.1016/j.clnu.2012.10.015; Loria-Kohen et al. Clin Nutr. 2012 Aug;31(4):455-61) and has presented 56 communications and papers in national and international conferences. She held teaching positions in Human Nutrition and Dietetics at the Escuela de Nutricionistas de la Universidad de Buenos Aires and, Universidad Autónoma de Madrid. She also participated in teaching activities for the Universidad Nacional de Educación a Distancia (UNED) and some courses of Continuing Medical Education and Master in Food, Nutrition and Community Health.



Mª Isabel Espinosa Salinas
Nutritionist, predoctoral
researcher

Mª Isabel Espinosa, holds a Bachelor of Science degree in Food Science and Technology and a degree in Human Nutrition and Diet from Universidad Autónoma de Madrid. She has been involved in Endocrinology and Nutrition Department of “La Paz” and “Puerta de Hierro” University (Community of Madrid). In 2008, she collaborated with Mahou-San Miguel Group for the development of a health and nutrition program in Madrid, Barcelona, Lleida, Tenerife, Malaga, Burgos and Guadalajara. She has experience in anthropometric assessments, nutritional management, capillary samples collection as well as developing menus for catering and dietary consultation and monitoring. She is currently doing her PhD in Biology and Food Sciences at the Universidad Autónoma de Madrid.

In January 2010, she joined IMDEA Food Institute and she is working on the Platform of Nutritional Genomics and Food in recruitment around 1,000 volunteers, design of

nutritional questionnaires. She has worked in recruitment and nutritional assessments of the “New bioactive food ingredients derived from mushrooms: Effectiveness according to genetic profiles”. Moreover, she has worked in the selection of genetics polymorphisms for CENIT-PRONAOS Nutrition intervention study for the analyses of diet-gene interactions.

Over the last year she has participated in two human clinical trials: evaluation of the effect of high bioavailability supercritical rosemary extracts on markers associated with cardiovascular risk in women with elevated waist circumference, and nutritional intervention study on the effectiveness of the daily intake of a functional milk drink in healthy overweight and obese volunteers. She is currently performing the recruitment of volunteers to conduct nutritional intervention to evaluate the effect of hydroxytyrosol on phase II enzymes in healthy subjects study.



Helena Marcos Pasero
Nutritionist, predoctoral
researcher

Helena Marcos Pasero, has a degree in Human Nutrition and Dietetics by the Autonomous University of Madrid (2010-2014). She completed the first year of the bachelor of Human Nutrition and Dietetics by the Autonomous University (2009-2010).

In February 2014 she joined IMDEA Food as a student in practice and then as a member staff at Platform of Food and Nutritional Genomics GENYAL for the development of different clinical trials related to nutrition and genetics.

She has completed the course of “Nutritional Genomics and Personalized Nutrition” taught in IMDEA Food (2014). She participated in the “Days of Psychoterapeutic Group-Guidance in Eating Disorders Behavior” at the University Hospital Santa Cristina (Madrid, 2013).



Jesús Herranz Valera
Biostatistician, senior
researcher

Jesús Herranz obtained his degree in Mathematical and Statistical Sciences at the University of Granada. He started his professional career in software application development, and he joined on 1999 as Biostatistician to the research unit of the Clinic Hospital San Carlos in Madrid, analyzing clinical and epidemiological data. In 2002 he joined to the Molecular Discovery Research GlaxoSmithKline's Basic Research Center in Tres Cantos, analyzing biochemical assays data. He developed new statistical techniques of hit identification, clustering

researcher

biostatistics

of pharmacokinetic curves, pattern recognition and systematic errors detection in the High Throughput Screening (HTS) process. In 2010 he joined as Biostatistician to the Molecular and Genetic Epidemiology Group of the Spanish National Cancer Research Center (CNIO) managed by Dra. Nuria Malats. He has participated in several international projects analyzing biomarkers and SNPs involved in bladder and breast cancer risk and prognosis. The main research interests of Jesús Herranz are focused on the gene*gene interactions analysis in the genome-wide association studies (GWAS) setting, the development of new statistical techniques to analyze interactions based in nonparametric and model-free models, the assessment of the

prediction ability of the regression models, the application of the new 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, and he has collaborated with the UNED, teaching advanced and specialized statistical courses in health sciences. Now, he is teaching courses of statistics applied to the biomedical research with R software. He has joined on September 2012 to the IMDEA Food research institute as Senior Biostatistician.



Roberto Martín Hernández
Bioinformatics scientist,
predoctoral researcher

Roberto Martín Hernández, obtained his Bachelor's of Science degree in Biochemistry and Biotechnologies at the University Paul Sabatier of Toulouse (France) in 2006. Immediately after he obtained his Master's Degree at the same University, specializing in Gene Expression and Recombinant Proteins, completing it with a ten month training in the Biochemistry Department at Bayer CropScience in Lyon (France).

researcher

bioinformatics

During this period, he acquired scientific and technical experience with recombinant DNA for the production of recombinant proteins of agronomic interest within a variety of cellular systems. In March 2008 he joined the Computer Architecture Department of the Universidad Complutense de Madrid (Spain), working as a research fellow on bioinformatics and genomic projects, under the supervision of Dr. Alberto Pascual-Montano. Afterwards, he joined the R&D Department of the bioinformatics company Integromics (Madrid, Spain). At this position he continued working on massive

data analysis generated by transcriptomic and genomic platforms, and on the implementation and development of professional software for bioinformatics. He also was involved in the management of a few European projects from the FP7 Health framework (Resolve, ProActive and LipidomicNet), writing the technical reports addressed to the European Commission, and representing Integromics in the periodic international and national follow-up meetings. He joined the IMDEA Food research institute on 1st May 2012 as a Bioinformatics scientist.

personnel

of the laboratory of nutritional genomics



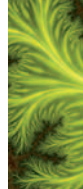
Dr. Susana Molina Arranz
Senior laboratory technician

Susana Molina Arranz, is PhD in Molecular Biology by the Autonomia University in Madrid. She performed her PhD studies in the group of Prof. Luis Carrasco at the “Centro de Biología Molecular Severo Ochoa” (CSIC-UAM). During these years she worked viral RNA translation, specializing in techniques such as viral infections, radioactive labellings, Western blotting, cloning or protein purifications. In the same group she worked in the analysis of the etiology of several diseases that afflict humans, studying the implication of fungi. In this work she took part in the development of methods to determine the presence of yeasts in human samples, including antibodies recognizing different yeast antigens or detection of fungal DNA by RT-PCR. In 2007 she joined Dr. Juan M. Torres group at “Centro de Investigación en Sanidad Animal” (INIA), where she collaborated in different projects 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), where she started to work as a technician generating biological tools for the therapeutic investigation of Alzheimer Disease. In 2009 started in IMDEA Food as a Laboratory Technician, working both in the investigation line about nutritional genomics of cancer, as well as in GENIAL Nutrigenomic platform.



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 Diaz Perales, performing techniques such as ELISAs, HPLC, FPLC, PCR, affinity columns, filtration, activation of T lymphocytes and TH1 TH2 later response and protein purification. In 2009 she joined the group of Prof. Jesus 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 programmes. 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.



3.7. Research Platform 2

Interactive Centre For Nutrigenomics. CIN



Research dissemination

The Nutrigenomics Interactive Center (Centro Interactivo de Nutrigenómica, CIN) is a key initiative of the IMDEA Food Institute to engage and transfer its research findings to society.

The results of our research help us define how a balanced, personalized diet can promote health at all stages of life. The CIN is the perfect environment to transmit this message, offering a didactic, creative and interactive space to bring research in Nutritional Genomics closer to society; becoming a regional referent in terms of nutritional education, Nutrigenetics and human health.

The SNP exhibition is an important component of the CIN, aimed at showing the visitors how to make health-promoting, personalized dietary choices everyday and to maintain a healthy lifestyle. For this purpose, CIN is designed to reach a large number of audiences, including ludic, didactic, interactive, audiovisual and graphical content that puts the visitors in charge of their own learning journey.

However, the CIN is far from being just an exhibition, and includes the following aims:

- Offering a privileged environment for scientists and nutrition professionals to communicate and interact with society.
- Promoting healthy eating among all ages with an emphasis on personalized nutrition.
- Developing a platform for public engagement and massive diffusion of nutritional information aimed to promote healthy lifestyles and dietary choices in order to prevent chronic illnesses.
- Attracting the interest of society, media and institutions to help educate in healthy nutrition and life habits.
- Creating the ideal space for launching communication and marketing campaigns on novel functional foods.
- Offering companies in the food, catering and hospitality industries a meeting point for the development and implantation of nutrition-related innovations based on the latest scientific advances.
- Offering scientific services to companies that wish to carry out their R&D initiatives at IMDEA Food.

The CIN comes to life with the inauguration of the SNP exhibition, whose aims can be defined as follows

- Familiarizing different societal groups (families, schools, businesses) with the objectives of IMDEA's research in Nutritional Genomics.

- Conveying the message of the importance of Nutrition for human health, and the relationship between one's genetic background and the beneficial or harmful effect of their diet.
- Showing different aspects – including emotional, social and chronobiological elements - of personalized Nutrition.
- Educating the public on the basics and the benefits of Mediterranean diet, and showing they can increase their adherence to it.
- Teaching visitors how to personalize their lifestyle according to their individual needs.

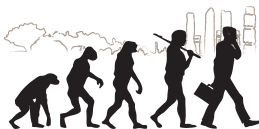
“SNP: Personalized Health and Nutrition”. A tour of the exhibition

The CIN's exhibition SNP guides the visitors through the evolution of our diet, demonstrating how it has shaped us as a species and how it now shapes our health. By allowing them to play and explore some of the most complex aspects of nutrition and health unveiled by scientific research, they will get to know themselves better, finding out whether or not they're still sticking to their grandparents diet, how being a morning lark or a night owl affects their health and how important their emotions are when it comes to deciding what to eat. All the information acquired will help visitors lead a healthy, personalized lifestyle.

The visitor is the protagonist of an interactive tour that combines audiovisual, tactile, sculptural and mechanic exhibits using the most innovative technologies to create the most enjoyable, hands-on learning experience for visitors of all ages and social condition.

The SNP exhibition is composed of six different sections:

- S1: Evolution and Diet
- S2: Diet and health
- S3: Healthy Living
- S4: Mediterranean Diet
- S5: At the supermarket
- S6: In the lab



S1: Evolution and diet

This section will show the visitor how our diet has changed as we evolved from our primate ancestors -Australopithecus- to Homo sapiens; and how the evolution of diet has been inextricably linked to the evolution of the species through a continuous dialog between our environment and our genome. However, today's fast-paced, changing environment overwhelms the capacity of our genes





to adapt to these changes. This dysregulation has been proposed to be the main reason for the current epidemic of chronic diseases.

S2: Diet and health

In this section, the visitor will learn how diet affects human health. Food has traditionally been considered a simple source of the energy and building blocks that our cells need to perform their specific biological functions. We now know that in addition to this, our diet plays an essential role in the regulation of the expression of our genes, so that our body can function well when they stay tuned, but a significant deviation can be the origin of disease.



S3: 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.



S4: Mediterranean Diet

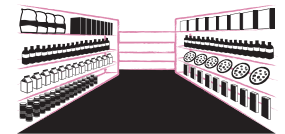
The Mediterranean diet, declared Intangible Heritage of Humanity by UNESCO in 2010, is a valuable legacy of our country. Therefore, we have in our hands one of the best tools to keep us healthy, but do we know what the Mediterranean diet actually is? And most importantly, is it our dietary pattern really Mediterranean?



In this section, the visitor will be able to answer these and other questions related to the Mediterranean Diet.

S5: At the supermarket

This section will allow visitors to test and apply what they learned in the exhibition by taking a virtual shopping trip, and filling their basket with food items to compose a personalized healthy diet.





S6: In the lab

This section is a journey into the history of Nutrition research and the work of the IMDEA Food Institute in this field.

Visitors will feel like scientists at the laboratory bench, where they will have the chance to extract and visualize their own DNA. The audiovisual and interactive elements will explain what the mission of IMDEA Food is, and what some pieces of equipment used in our facilities are for.

Target audiences

- Families
- Schools
- University students
- Health professionals
- Educators, researchers and nutrition experts
- Food-industry-related companies.

Workshops and temporary exhibitions

The CIN will host a variety of workshops for specific audiences.

- Workshops for groups of students, to provide schools with specialized educational support
- Workshops for families, to promote healthy eating at home
- Workshops for nutrition professionals, to support their work with the most up-to-date knowledge in Nutrition research and Nutritional Genomics

The CIN may host temporary exhibitions, sponsored by food industry partners and related sectors.

Meetings and social events

The CIN is a bridge between society, industry and the scientific community. Therefore, the CIN is the context in which public and private institutions can meet, communicate or present books, dossiers and food products to the community.

the CIN team

Management

Prof. José María Ordovás Muñoz

Members

Dr. Lidia A. Daimiel Ruiz
Postdoctoral researcher

Dr. Valentini Konstantinidou
Postdoctoral researcher

Silvia Berciano
Predoctoral researcher



3.8. Research platform 3

Cooperative R+D+I Activity Laboratory. LACID

Open to Cooperation

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 I+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.

For the last 30 years, the international scientific community has known that the mechanisms causing a range of chronic diseases can be influenced by diet. Disease can be delayed, and in many cases general health can be improved. According to the Medline™ (U.S. National Library of Medicine) database, between 1980 and 2013 some 79,782 papers have been written on ‘food and health’, with an annual increase of 15% over the last five years. A huge and rapidly growing body of scientific knowledge on nutrition therefore exists, which can be used to improve human health. However, there has been only limited success in translating this into food products and nutritional strategies capable of bringing this about. In fact, according to Patentscope™ (the World Intellectual Property Organization) data, for every 30 scientific articles published in this field, only one patent is drawn up. This is a clear indication that stakeholders in the field need to work more closely together if society is to gain from the scientific knowledge available.

The culmination of the Human Genome Project in the early 2000s was a watershed in the Life Sciences. Since then there has been an enormous improvement in genetic analysis and sequencing tools which has opened up new horizons in the understanding of vital processes. New genomic, metabolomic and proteomic technologies are now supporting the drive of biomedicine and nutrition to efficiently improve health.

In addition to the priority goal of improving health and wellbeing, the new context of research into nutrition offers opportunities for improving competitiveness in the food industry and the generation of wealth, contributing towards an economic model based on science, technology and innovation. The food and allied industries form the most important manufacturing sector in Spain in terms of production value, and are responsible for some 8% of the country’s GDP. However, the high degree of automation and the socio-cultural characteristics of its business fabric mean its generation of added value is below the industrial average – the consequence of scant innovative activity. Further, some 80% of new health products currently fail on the open market. The lack of scientific consistency of many of these products weakens their chances of solving problems for the population, leading to a lack of interest on the part of consumers.



The slogan of the Horizon 2020 framework program for EU R+D+I for the period 2013-2020 is “Research & Innovation”. The idea is to more directly connect science and innovation in order to make products that better solve society’s problems. Within this context, 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.

the LACID team

Management

Prof. Guillermo Reglero

Members

Dr. Ana Ramírez de Molina
Senior researcher

Prof. José M. Ordovás
Senior researcher

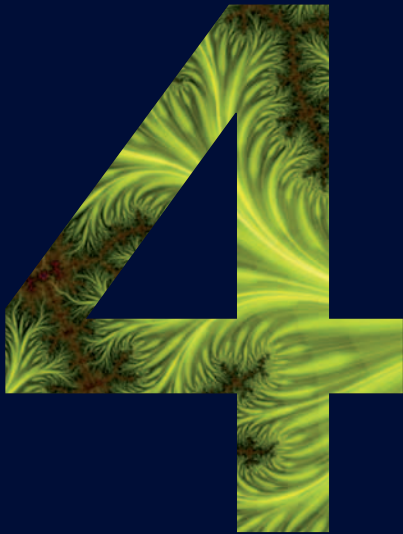
Prof. Francesco Visioli
Senior researcher

Dr. Alberto Dávalos
Senior researcher

Mónica Gómez Patiño
Laboratory technician



scientific infrastructures



4.1. The Institute's headquarters [58]

4.2. Scientific infrastructure [58]

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4.1. The Institute's headquarters

One of the highlights of 2013 was the completion of refurbishment work on the Institute's headquarters building ceded to the Institute by the *Consejería de Educación, Juventud y Deporte de la Comunidad de Madrid* (the Education, Youth and Sport Council of the Madrid Region) (Orden 9141/2012) on the 30th July 2012.

This building, situated in the *Antiguo Pabellón Central del Hospital de Cantoblanco* (the old Main Unit of the Cantoblanco Hospital), occupies an area of 4.595 m² and is divided into two symmetrical main sections of five stories each. It is located next to the Cantoblanco Campus of the *Universidad Autónoma de Madrid* (the Autonomous University of Madrid) –with which the Institute has strong cooperative ties– within the grounds of the *Hospital Universitario Cantoblanco* (the Cantoblanco University Hospital).

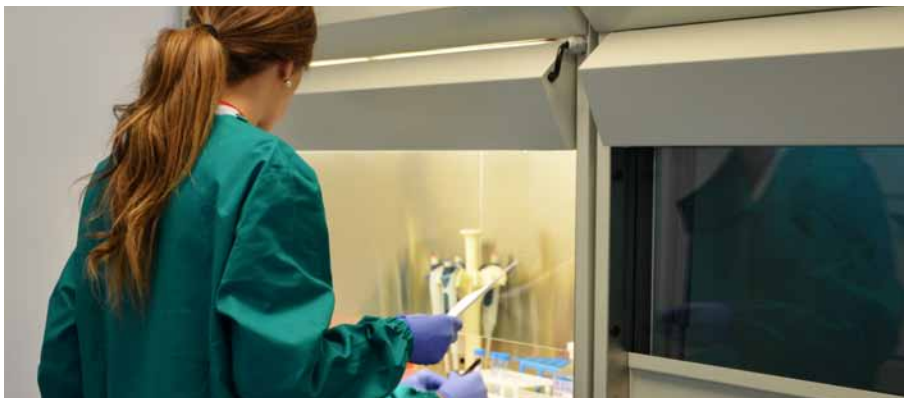
The new building is an excellent space in which to undertake scientific research. Currently it can house up to 100 researchers, has 6 research laboratories and an animal house, all with the most advanced equipment.

4.2. Scientific infrastructure

In 2011 and 2012, the building was equipped with research laboratories, all of which were 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 etc. It also has a fluorescence microscope and a nucleoflector system, which are required in certain experiments.





Laboratory 2. Genomics Laboratory

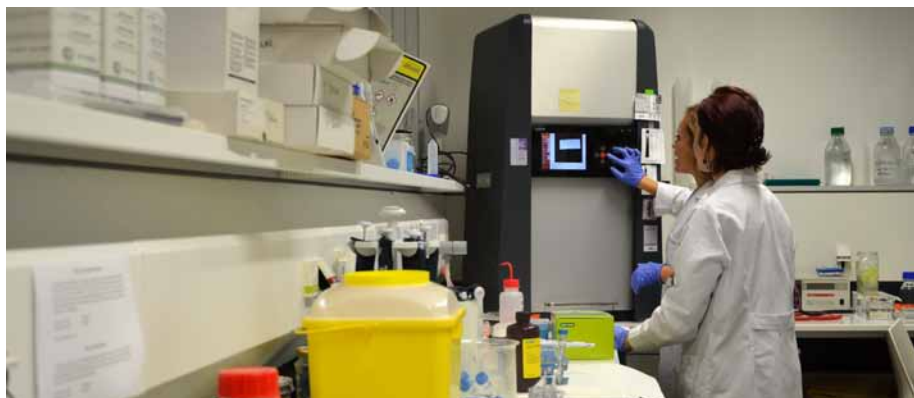
The Genomics Laboratory contains equipment required for genetic, genomic, transcriptomic and epigenetic analyses, etc. It is fitted with all the basic equipment required, such as thermocyclers for performing conventional PCR work, an ABI PRISM HT 7900 apparatus for real-time PCR, plus equipment for gene 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.





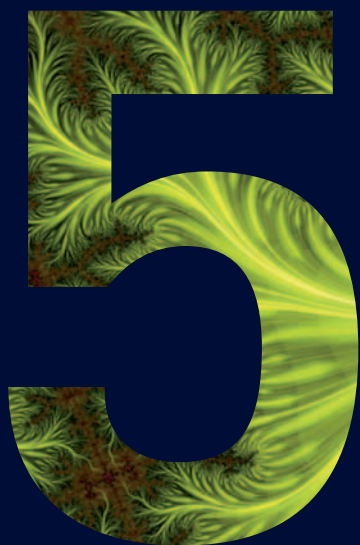
Laboratory 4. General Biochemistry and Molecular Biology Laboratory

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.

research projects



5.1. Competitive research projects [62]

5.2. Contracts with companies [70]

5.3. Research grants [71]

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2013-14



5.1. Competitive research projects

NUTRITECH

Application of new technologies and methods in nutrition research – the example of phenotypic flexibility

Principal researcher: Dr. José María Ordovás Muñoz

Funded by: European Commission. VII RTD Framework Program

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

HDL- from biological understanding to clinical exploitation

Principal investigator: Dr. Alberto Dávalos

Funded by: European Commission. Biomedicine and Molecular Bioscience COST

Duration: 2010-2013

Cardiovascular disease (CVD) remains the leading cause of mortality worldwide. Due to their multiple beneficial anti-atherogenic properties, high-density lipoprotein (HDL) remains an attractive target for preventing CVD. Probably due to their large heterogeneity in both composition and function, no effective therapy targeting HDL is available; which really increases the necessity to enhance our research effort to better understand the multiple biological function of HDL. The aim of this COST Action is to create a scientific network of leading European investigators working on structure, function, genetic regulation, physiology, epidemiological and clinical validation of biomarkers and therapies of HDL in order to enhance multidisciplinary and collaborative HDL research. To obtain and share novel scientific information on different aspects of HDL biology could be translated into an effective therapy toward CVD related to HDL dysfunction.



COST- POSITIVE

Interindividual variation in response to consumption of plant food bioactives and determinants involved

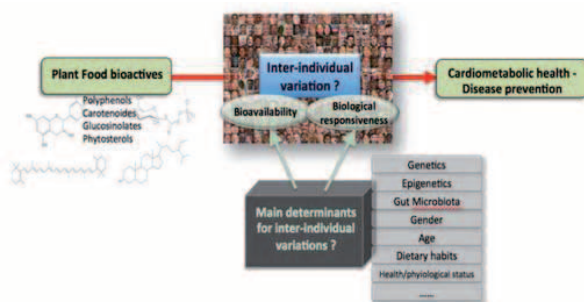
Principal investigator: Dr. José María Ordovás Muñoz

Funded by: European Commission. Biomedicine and Molecular Bioscience COST.

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.



*COST-POSITIVE Project:
Variation in response to
consumption of plant food
bioactives and determi-
nants involved*

FOODOMICS

Foodomics of hydroxytyrosol: insights into its molecular effects and search of new markers and targets. (AGL2011-28995)

Principal investigator: Dr. Francesco Visioli

Funded by: Ministerio de Economía y Competitividad

Duration: 2012-2014

The main aim of this multidisciplinary project is to combine and apply the most recent technologies in “Foodomics” (genomics, proteomics, and non-coding RNAs array) and other cellular and molecular biology techniques to determine the molecular mechanisms by which hydroxytyrosol exerts its beneficial effects. Based on in vitro and animal studies, it also explores new targets and biomarkers to develop in a human pilot study.



INNSAOLI

Development of bioactive food ingredients and health products from the olive grove. (IPT-2011-1248-060000)

Principal investigator: Dr. Ana Ramírez de Molina

Funded by: Ministerio de Economía y Competitividad

Duration: 2011-2015

The main objective of the INNSAOLI project is to obtain new meat products based on the replacement of animal fats traditionally used for healthy fats generated from new bioactive ingredients from olive oil and antioxidants generation. Finally, the products developed will be commercialize at both European and international level.

A consortium of 5 institutions, two of which are SMEs and two public research organizations, has been formed to undertake this Project. All of them are directly involved in the various activities of the Project that meet the needs of research and development objectives at the beginning:

- EMBUTIDOS FRIAL S.A.
- UNIVERSIDAD AUTÓNOMA DE MADRID
- IMDEA-FOOD INSTITUTE
- SEPROX BIOTECH S.L.
- MIGUEL GALLEGO S.A. (MIGASA)

ENTEROMIR

Screening and characterization of miRNAs that regulate cholesterol and lipoprotein metabolism in the enterocytes and effects of minor dietary components on their expression. Targeting enterocytic miRNAs that regulate HDL metabolism. (PI11/00315)

Principal investigator: Dr. Alberto Dávalos

Funded by: Instituto de Salud Carlos III

Duration: 2012-2014

The aim of this project is to search and characterize the miRNAs that regulate lipid metabolism in the enterocyte and the effects of some minor dietary components on their expression that regulate enterocyte cholesterol metabolism and lipoprotein. An additional objective to be achieved in this project is to characterize those miRNAs that regulate the metabolism of HDL in the intestine.



DIETGEN

Gene-nutrient interactions: Study of the potential beneficial effect of dietary incorporation of rosemary extracts on the development of colon cancer (AGL2010-21565)

Principal investigator: Dr. Ana Ramírez de Molina

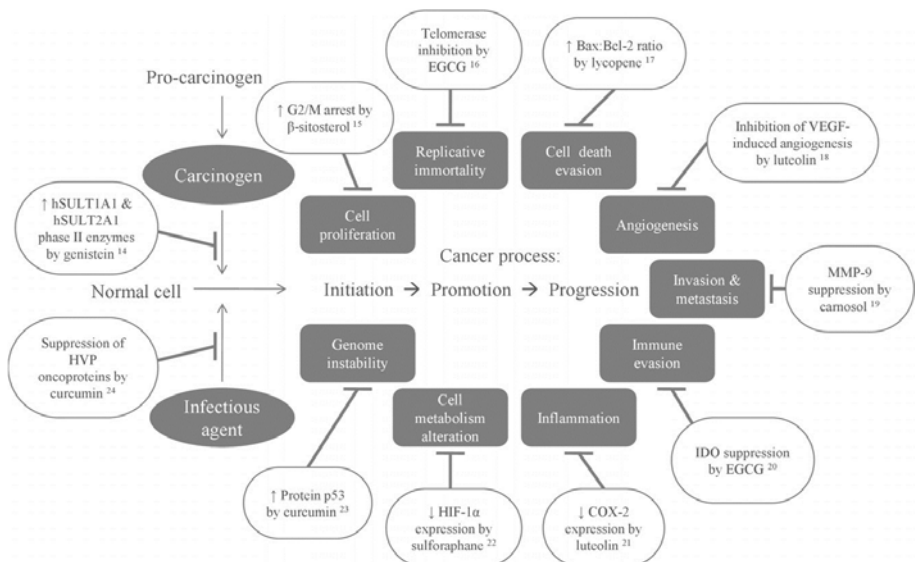
Funded by: Ministerio de Economía y Competitividad

Duration: 2011-2013

Carnosic acid extracted from rosemary is a powerful natural antioxidant, recognized as safe by the EFSA. Its capacity to alleviate cell damage caused by oxidative stress and additional evidence such as its regulatory action on lipid metabolism, or detoxifying enzymes like GST, suggests that this component of rosemary has a beneficial effect on human carcinogenesis. Promising results have recently been reported in leukemia cells, indicating that as a dietary component this ingredient could have beneficial effects on cancer. However, additional studies are needed to confirm and analyse the clinical importance of these preliminary findings and look more closely into the mechanics of this effect.

This project proposes separation and isolation of carnosic acid by supercritical chromatography as a potential functional ingredient of rosemary for future foods if the EFSA regulations are further developed, or as nutraceuticals and/or nutritional supplements affecting the development, course and treatment of colon cancer. It is proposed to elucidate the mechanics of this effect by means of various gene expression studies in human tumor cells treated with this ingredient, and also in samples from patients with colon cancer, in whom it is proposed to study the expression of carnosic acid-target genes, as well as other related genes bearing on the response to nutritional components. This study should lead to the identification of new genes associated with the development of colon cancer which could be readily modulated by diet and which might play a fundamental role in the onset, incidence, progress, severity and/or treatment of this disease.

Dietary phytochemicals in cancer prevention and therapy: a complementary approach with promising perspectives



REDUCOL

New bioactive food ingredients derived from mushrooms. Effectiveness according to genetic profiles (AGL2010-21537)

Principal investigator: Dr. Guillermo Reglero Rada

Funded by: Ministerio de Economía y Competitividad

Duration: 2011-2013

This project is oriented towards the development of functional foods capable of effectively reducing serum cholesterol levels by acting simultaneously on three levels:

1. reducing endogenous cholesterol synthesis by inhibiting hydroxymethylglutaryl-CoA reductase (the key enzyme of cholesterol metabolism),
2. increasing the activity of other regulatory molecules is dependent (enzymes, receptors, etc. LDL.) Involved in maintaining cholesterol homeostasis and
3. Hindering cholesterol absorption by displacement of mixed micelles, sequestration of biliary acids during intestinal digestion to prevent re-absorption, inhibition of pancreatic lipase and modulation of the enterocyte proteins responsible for cholesterol absorption

Extracts of edible mushrooms (common and fortified with selenium) will be obtained using supercritical fluid extraction (SFE) and water under subcritical conditions (SWE) polysaccharides enriched (beta-glucan type), statin-type or similar metabolites, ergosterol derivatives concentrated and compounds of Percyquinnin type and determine their capabilities to reduce cholesterol levels. All samples will be subjected to processes of digestion and absorption test (in vitro and in vivo) to assess their bioavailability and their mechanism of action at molecular level. The responsible compounds will be identified and quantified using ordinary analytical techniques (HPLC, GC - MS). The effect of the extracts will be evaluated on gene expression of the major genes involved in the absorption and homeostasis of serum cholesterol in vitro and in vivo models. Nutrigenetic studies in humans will also be made to correlate the target population of food, design to different haplotypes, and evaluate the effectiveness of the products, taking into account the genetic polymorphisms of the most important enzymes involved in the metabolism cholesterol.



NUTRIGEN

Design and Validation of Active Ingredients for the Development of Functional Foods (ALIBIRD S2009/AGR1469)

Coordinator: Dr. Guillermo Reglero Rada

Principal investigator: Dr. Ana Ramírez de Molina

Funded by: Consejería de Educación, Juventud y Deporte. Comunidad de Madrid

Duration: 2010-2014

The role of IMDEA Food Institute is to study the heart-healthy effect of target functional foods (antioxidants, microbial enzymes, structured and functional lipids, bioactive peptides, prebiotics and probiotics) in humans, taking into account the variations in individual genomes. This activity will consist fundamentally in studies of cohorts with particular genetic traits. According to the strategy laid down in the Consortium's Work Plan, coordinated by Prof. Guillermo Reglero Rada, the groups will study procedures for producing one or two products of each type—i.e. ten in all. These will be evaluated in terms of industrial feasibility and will be subjected chemical and biological characterization. Following this process it is hoped that at least three of the ingredients will be sufficiently viable for getting into the next step of the project, in which they will be assessed for safety and put through pre-clinical (toxicology and efficacy) and nutrigenetic clinical studies.



ONCOGENOM - GENECO

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

Coordinator: Dr. Guillermo Reglero Rada

Principal investigators: Dr. Ana Ramírez de Molina (ONCOGENOM) y 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 and improving the life of cancer patients.

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





ENTEROMIRAR

Screening and characterization of miRNAs that regulate cholesterol and lipoprotein metabolism in the enterocytes and effects of minor dietary components on their expression. Targeting enterocytic miRNAs that regulate HDL metabolism.

Principal investigator: Dr. Alberto Dávalos

Funded by: Fundación Española de Arterioesclerosis

Duration: 2011-2013

The aim of this project is to search and characterize the miRNAs that regulate lipid metabolism in the enterocyte and the effects of some minor dietary components on their expression that regulate enterocyte cholesterol metabolism and lipoprotein. An additional objective to be achieved in this project is to characterize those miRNAs that regulate the metabolism of HDL in the intestine.

miROVEE

Effect of extra virgin olive oil on plasma miRNA levels in healthy subjects: a postprandial study. Association with the cardiovascular benefits associated to olive oil intake. Detection of exogenous miRNAs

Principal investigator: Dr. José María Ordovás Muñoz

Funded by: Fundación Salud 2000

Duration: 2013-2015

miRNAs are important modulators of a plethora of physiological processes and play a key role in the maintenance of the tissue homeostasis. Recent findings suggest that the levels of several miRNAs may be modulated by the diet. Thus, miRNAs emerge as putative targets for therapeutic approaches. Moreover, this opens a new field in the prevention and treatment of cardiovascular disease and related risk factors through the dietary-mediated modulation of miRNAs. The aim of this study is to detect and quantify cardiovascular-related miRNAs in the plasma of healthy volunteers after the consumption of phenolic-enriched extra virgin olive oil.



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 opportunity 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.

OPE MADRIMASD – IMDEA

Principal investigator: Dr. Ana Ramírez de Molina

Funded by: Ministerio de Economía y Competitividad

Duration: 2014-2015

The European Research Projects Office is an initiative to promote researchers' participation in European funding programmes. 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.



madri+d | imdea

Merck Serono Research Grant, 2013 Ceremony Award. Fundación Salud 2000





5.2. Contracts with Companies

SARA

Analysis of the effect of supercritical fluid rosemary extracts on cardiovascular disease parameters in large waist circumference women

Principal investigators: Dr. Ana Ramírez de Molina and Dra. Viviana Loria Kohen

Funded by: MIGASA-FUAM.

Duration: 2013-2014



BLAF

Development and clinical evaluation of a milk drink with bioactive and effective ingredients towards the metabolic syndrome, diabetes and obesity

Principal investigator: Dr. Guillermo Reglero Rada

Investigators: Dr. Ana Ramírez de Molina, Dr. Viviana Loria Kohen, Jesús Herranz Valera, Roberto Martín Hernández and D^a Isabel Espinosa Salinas.

Funded by: CAPSA

Duration: 2013-2014



NUTRIGENO

Development of a telematic platform of nutrigenetic counselling

Principal investigator: Dr. Guillermo Reglero Rada

Investigators: Dr. Ana Ramírez de Molina, Dr. Viviana Loria Kohen, Jesús Herranz Valera, Roberto Martín Hernández, Dr. Susana Molina Arranz and Isabel Espinosa Salinas.

Funded by: CETIVER. Vértice Sistemas, S. L.

Duration: 2013-2014



PHYTOMED

Pilot Clinical Trial to Assess Changes in Biomarkers of Cancer Related to Inflammation in Women With Stage 0-IIIa Breast Cancer and Without Evidence of Disease Who Were Given the PhytoMed™ Complement

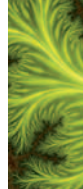
Principal investigator: Dr. Francesco Visioli

Investigators: Dr. Elena Giordano, D. Jesús Herranz Valera, D^a Belén García Carrasco.

Funded by: PHYTOGEN Medical Foods S.L.

Duration: 2013-2015





5.3. Research Grants

Programme: Ramón y Cajal (RYC2008-03734)

- **Dr. Ana Ramírez de Molina**

Title: Alterations of lipid metabolism in cancer: towards a personalized diagnosis and therapy

Funded by: Ministerio de Economía y Competitividad

Duration: 2009-2014

“Marie Curie” AMAROUT Europe Programme. (Grant Agreement nº 229599)

Funded by: Comisión Europea. VII Programa Marco I+D

Duration: 2009-2013

- **Dr. Francesco Visioli**

Type: Incoming Fellow

Category: Very experienced researcher

- **Dr. Alberto Dávalos**

Type: Incoming Fellow

Category: Experienced researcher

- **Dr. Elena Giordano**

Type: Incoming Fellow

Category: Experienced researcher

“Marie Curie” AMAROUT II Europe Programme. (Grant Agreement nº 291803)

Funded by: Comisión Europea. VII Programa Marco I+D

Duration: 2012-2016

- **Dr. Cristina Aguirre**

Type: Incoming Fellow

Category: Experienced researcher

AMAROUT II: AMAROUT-SP (COFUND2014-51539-04)

Principal investigator: Dr. Ana Ramírez de Molina

Funded by: Ministerio de Economía y Competitividad

Duration: 2014-2015

“Marie Curie” International Outgoing Fellowship for Career Development (PIOF) (Grant Agreement nº 272581)

- **Dr. Patricia Casas Agustrench**

Title: Genes, Mediterranean Dietary pattern and metabolic syndrome risk

Funded by: Comisión Europea. VII Programa Marco I+D

Duration: 2011-2014

Contrato para personal investigador de apoyo .(CPI/0631/2008)

- **Dr. Marta González Castejón**

Funded by: Comunidad de Madrid

Duration: 2009-2013

Contrato para Personal Técnico de Apoyo. (PTA2013-8244-I)

- **Mónica Gómez Patiño**

Funded by: Ministerio de Economía y Competitividad

Duration: 2014-2017

XIV Convocatorias de Becas Manuel de Oya: Cerveza, Salud y Nutrición

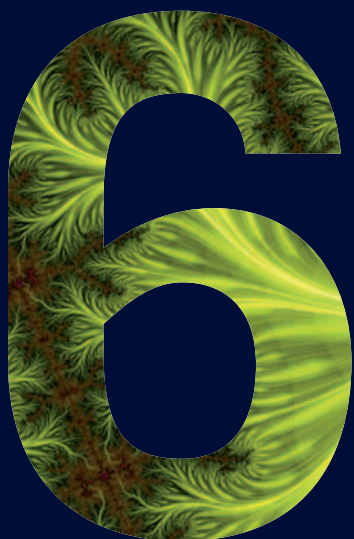
- **Victor Micó Moreno**

Funded by: Asociación Cerveceros España

Duration: 2014-2015



s c i e n t i f i c
r e s u l t s



- 6.1. Publications [75]
- 6.2. Books and chapters of books [89]
- 6.3. Thesis directed or in progress [90]
- 6.4. Patents [91]
- 6.5. Awards [92]

report
2013-14

6.1. Publications

Listed below are the scientific contributions published in international media by IMDEA Food Institute researchers from 2013 to 2014:

2013

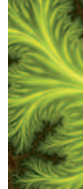
1. A.C. Frazier-Wood, E.K. Kabagambe, M.K. Wojczynski, I.B. Borecki, H.K. Tiwari, C.E. Smith, **J.M. Ordovás**, D.K. Arnett. The association between LRP-1 variants and chylomicron uptake after a high fat meal. *Nutr Metab Cardiovasc Dis*. 2013 Nov;23(11):1154-8. doi: 10.1016/j.numecd.2012.12.007.
2. Kris Richardson, Jennifer A. Nettleton, Noemi Rotllan, Toshiko Tanaka, Caren E. Smith, Chao-Qiang Lai, Laurence D. Parnell, Yu-Chi Lee, Jari Lahti, Rozenn N. Lemaitre, Ani Manichaikul, Margaux Keller, Vera Mikkilä, Julius Ngwa, Frank J.A. van Rooij, Christie M. Ballentyne, Ingrid B. Borecki, L. Adrienne Cupples, Melissa Garcia, Albert Hofman, **Ordovás JM**. Gain-of-Function Lipoprotein Lipase Variant rs13702 Modulates Lipid Traits through Disruption of a MicroRNA-410 Seed. *The American Journal of Human Genetics*, Volume 92, Issue 1, 10 January 2013, Pages 5-14. <http://dx.doi.org/10.1016/j.ajhg.2012.10.020>
3. M Garaulet, P Gómez-Abellán, J J Alburquerque-Béjar, Y-C Lee, **J M Ordovás** and F A J L Scheer. Timing of food intake predicts weight loss effectiveness. *International Journal of Obesity*. 2013. 37, 604-611. doi: 10.1038/ijo.2012.229
4. Zanon-Moreno V, Asensio-Marquez EM, Ciancotti-Oliver L, Garcia-Medina JJ, Sanz P, Ortega-Azarin C, Pinazo-Duran MD, **Ordovás JM**, Corella D. Effects of polymorphisms in vitamin E-, vitamin C-, and glutathione peroxidase-related genes on serum biomarkers and associations with glaucoma. *Mol Vis*. 2013;19:231-42.
5. Smith CE, Ngwa J, Tanaka T, Qi Q, Wojczynski MK, Lemaitre RN, Anderson JS, Manichaikul A, Mikkilä V, van Rooij FJ, Ye Z, Bandinelli S, Frazier-Wood AC, Houston DK, Hu F, Langenberg C, McKeown NM, Mozaffarian D, North KE, Viikari J, Zillikens MC, Djoussé L, Hofman A, Kähönen M, Kabagambe EK, Loos RJ, Saylor GB, Frouhi NG, Liu Y, Mukamal KJ, Chen YD, Tsai MY, Uitterlinden AG, Raitakari O, van Duijn CM, Arnett DK, Borecki IB, Cupples LA, Ferrucci L, Kritchevsky SB, Lehtimäki T, Qi L, Rotter JI, Siscovick DS, Wareham NJ, Witteman JC, **Ordovás JM**, Nettleton JA. Lipoprotein receptor-related protein 1 variants and dietary fatty acids: meta-analysis of European origin and African American studies. *Int J Obes (Lond)*. 2013 Sep;37(9):1211-20. doi: 10.1038/ijo.2012.215.
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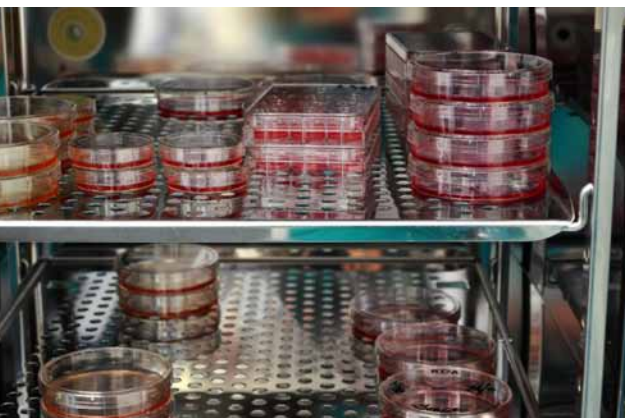
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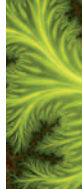
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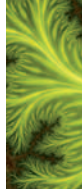
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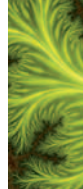
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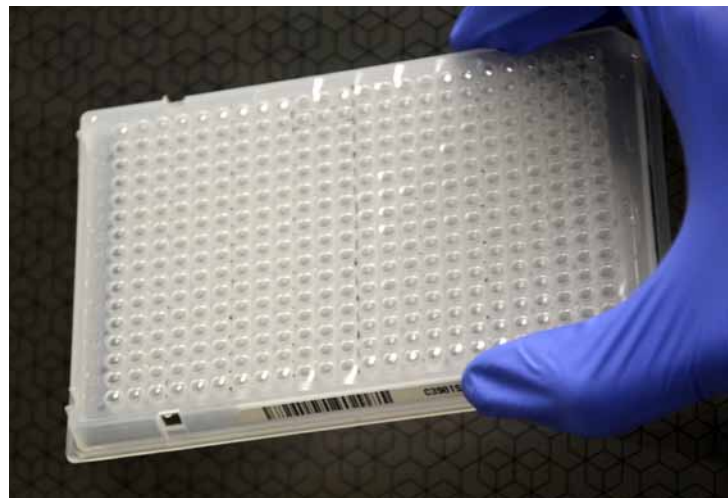
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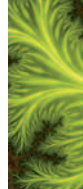
6.2. Books and chapters of books

2013

1. Garaulet, Marta, and **José M. Ordovás Muñoz**, eds. Chronobiology and obesity. Springer, 2013. ISBN: 978-1-4614-5081-8 (Print) 978-1-4614-5082-5 (Online)
2. **José María Ordovás Muñoz**. Nutrigenómica, la nueva ciencia del bienestar. Planeta, Colección: Drakontos. ISBN: 978-84-9892-597-5
3. **Ordovás José M.**, Guevara-Cruz Martha. Capítulo 28 - Genetic Influences on Blood Lipids and Cardiovascular Disease Risk. En: " Nutrition in the Prevention and Treatment of Disease (Third Edition)", 2013, Pages 519-540 ISBN: 978-1-4614-5081-8 (Print) 978-1-4614-5082-5 (Online) <http://dx.doi.org/10.1016/B978-0-12-391884-0.00028-7>,
4. Marta Garaulet , **José M. Ordovás Muñoz**. Capítulo 8 - Genetics in Chronobiology and Obesity. En: "Chronobiology and Obesity", 2013, pp 133-160
5. Elena Giordano, **Francesco Visioli**. "Interacciones dieta y xenobióticos en el siglo XXI". In: Nutraceuticals and Health: Review of Human Evidence (Eds: Mahabir S., and Pathak Y.), CRC Press, 2013, pp.191-197
6. **Visioli F**. Nutraceuticals in the treatment of metabolic syndrome. En: Nutraceuticals and Health: Review of Human Evidence (Eds: Mahabir S., and Pathak Y.), CRC Press, 2013, pp.191-197
7. Tiziana Fornari, **Ana Ramírez de Molina**, Guillermo Reglero. Phenolic diterpenes from rosemary as enhancement agents of usual chemotherapeutic drugs for colorectal cancer therapy. En: New Developments in Terpenes Research. Capítulo 3, pag. 47-79, 2013.

2014

1. Ramos R, Moreno-Rubio J, Casado E, **Ramírez de Molina A**. Title:"Application of novel genotyping microarray technologies in cancer research" en "Applications of Advanced Omics Technologies: From Genes to Metabolites". Comprehensive Analytical Chemistry, de Wilson&Wilson, Elsevier, 2014, pp. 47-74.
2. **Visioli F**. "Polyphenols in sport: facts or fads? En: Antioxidants and Sport Nutrition (Ed. Lamprecht M.), Taylor and Francis Press, 2014, pp. 97-103.
3. Tiziana Fornari, **Ana Ramírez de Molina**, **Guillermo Reglero**. Phenolic diterpenes from rosemary as enhancement agents of usual chemotherapeutic drugs for colorectal cancer therapy. Ed. Nova Publishers New York. En: Chemistry Research and Applications: New Developments in Terpenes Research, 2014, pag. 47-79.



6.3. Thesis directed or in progress

Title: Efecto de extractos de *Taraxacum officinale* sobre la adipogénesis y el metabolismo lipídico de células 3T3-L1

PhD student: Marta González Castejón

Director: Dr. Arantxa Rodríguez Casado

University: Autónoma de Madrid

Date: March 21st, 2013

Title: Efecto beneficioso de agentes fitoquímicos en la prevención, desarrollo o tratamiento de tumores relacionados con la alimentación

PhD student: Margarita González-Vallinas Garra-chón

Director: Dr. Ana Ramírez de Molina

University: Autónoma de Madrid

Date: March 18th, 2014

Title: Desarrollo de una plataforma de Genómica Nutricional para el estudio de la interacción genes-nutrientes

PhD student: Isabel Espinosa Salinas

Directors: Dr. Ana Ramírez de Molina y Prof. Guillermo Reglero Rada

University: Autónoma de Madrid

Date: 2015

Title: Evaluación del papel marcador de pronóstico del perfil de expresión de genes implicados en el metabolismo lipídico ColoLipidGene en pacientes con cáncer colorectal

PhD student: Cristina Aguado

Directors: Dr. Ana Ramírez de Molina y Dr. Jaime Feliu Batlle

University: Autónoma de Madrid

Date: 2015

Title: Roles of functional genetic variants and dietary fat on microRNA-mediated gene regulation of lipid metabolism

PhD student: Yu-Chi Lee

Director: Prof. José María Ordovás Muñoz

University: Tufts University

Date: 2015

Title: Epigenetic Modification and Genetic Interaction by/with Diet in early atherosclerosis

PhD student: Yiyi Ma

Director: Prof. José María Ordovás Muñoz

University: Tufts University

Date: 2015

Title: Chronobiology and CVD

PhD student: Hassan Dashti

Director: Prof. José María Ordovás Muñoz

University: Tufts University

Date: 2015

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 de Madrid

Date: 2016

Title: TMAO, food composition and atherosclerosis; the role of microRNAs

PhD student: Britt Blokker

Director: Prof. José María Ordovás Muñoz

University: Autónoma de Madrid

Date: 2016

Title: Efecto de compuestos bioactivos como nuevos agentes complementarios como agentes terapéuticos en cáncer

PhD student: Jorge Martínez

Director: Dr. Ana Ramírez de Molina

University: Autónoma de Madrid

Date: 2016

Title: microRNAs regulated by beer consumption: effect on healthy aging

PhD student: Victor Micó Moreno

Director: Prof. José María Ordovás Muñoz

University: Autónoma de Madrid

Date: 2016

thesis directed
or in progress

Title: Estudio de los polifenoles en el aceite de oliva
PhD student: Carmen Crespo Lorenzo
Director: Prof. Francesco Visioli
University: Autónoma de Madrid
Date: 2016

Title: Alteraciones metabólicas en cáncer y su efecto en la transición epitelio-mesénquima
PhD student: Silvia Cruz Gil
Directors: Dr. Ana Ramírez de Molina y Prof. Guillermo Reglero
University: Autónoma de Madrid
Date: 2016

Title: Formulaciones para la nutrición personalizada de pacientes con cáncer.
PhD student: Lamia Mouhid Al Achbili
Director: Dr. Ana Ramírez de Molina
University: Autónoma de Madrid
Date: 2016

6.4. Patents

Publication No.: ES2408730

Title: Supercritical rosemary extract for cancer treatment

Authors: IMDEA Alimentación, UAM

Inventors: Ana Ramírez de Molina, Susana Molina Arranz, Margarita González-Vallinas Garrachón, Tiziana Fornari, Mónica Rodríguez García-Risco, Guillermo Reglero Rada

Application No. (Spain): P201231918

Application No. (international): PCT/ES2013/070864

Title: Methods and kits for the prognosis of colorectal cancer

Authors: IMDEA Alimentación, Hospital La Paz Institute for Health Research

Inventors: Ana Ramírez de Molina, Teodoro Vargas Alonso, Susana Molina Arranz, Juan Moreno Rubio, Paloma Cejas Casado, Jaime Feliu Batlle, Guillermo Reglero Rada

Margarita González-Vallinas Garrachón

Defended thesis: "Efecto beneficioso de agentes fitoquímicos en la prevención, desarrollo o tratamiento de tumores relacionados con la alimentación"



patents

6.5. Awards



1. **Prof. José María Ordovás Muñoz.** Premio de Honor Doctor Benaprès
 Institution: La Sociedad Española de Medicina y Cirugía Cosmética (SEMCC)
 Date: May 2013



2. **Prof. José María Ordovás Muñoz.** Placa de Honor AEC-2013
 Institution: La Asociación Española de Científicos
 Date: September 2013



3. **Dr. Ana Ramírez de Molina.** Meeting Bursary Award
 Institution: EMBO/EMBL Symposium Frontiers in Metabolism: From Molecular Physiology to Systems Medicine
 Date: November 2014

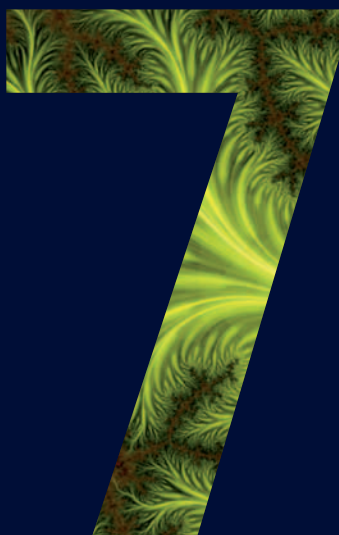
awards



PREMIOS DR. BENAPRES 2013

Miembros de la Junta Directiva de la SEMCC presentes en el acto, con el premiado, Prof. José M^o Ordovás, el Alcalde de Sitges, Sr. Miquel Fornés, y el Sr. Frederic Malagelada i Benaprès.

dissemination activities



7.1. Organization of conferences and seminars [94]

7.2. Invited conferences, courses and seminars [95]

report
2013-14

IMDEA Food Institute has taken part in national and international science fairs and dissemination events, including the following:

7.1. Organization of conferences and seminars

The IMDEA Food Institute has been involved in the organization of the following lectures and technical seminars in the field of food and health:

2013

Scientific seminar: Nutrición y actividad física: Dos comensales en la misma mesa

Speaker: Dr. Eduardo Iglesias

Date: May 20th, 2013

Organizer: IMDEA Food Institute

European Research's night 2013

Title: La ciencia del salón de tu casa

Date: September 27th, 2013

Venue: Espacio Fundación Telefónica. Madrid

European Research's night 2013

Title: La senda UAM de la alimentación: de los nutrientes a las tapas

Date: September 27th, 2013

Venue: Medicine University (UAM)

Science Week 2013

Visit of students to the headquarters and nutrigenetic laboratories of IMDEA Food Institute

Date: November 11-14th, 2013

Venue: IMDEA Food Institute

Monographic Course: Estadística aplicada a la investigación Biomédica con R

Director: Jesús Herranz Valera

Date: September 25th – 27th, 2013

Organizer: IMDEA Food Institute

2014

European Research's night 2014

Title: Tu coche y un F1: ciencia y tecnología del siglo XXI

Date: September 26th, 2014

Venue: Espacio Fundación Telefónica. Madrid

VI Jornadas de Usuarios de R

Title: "Modelos predictivos con el paquete caret"

Speaker: Jesús Herranz

Date: October 23 – 24th, 2014

Venue: Santiago de Compostela

Science Week 2014

Exhibition "La alimentación de los nuevos años 20: Alimentos funcionales y estrategias nutricionales para la prevención de enfermedades"

Date: November 3rd, 2014 to January 10th, 2015

Venue: Science Library (UAM). Madrid.

Science Week 2014

Visit of students to the headquarters and nutrigenetic laboratories of IMDEA Food Institute

Date: November 12 -14th, 2014

Venue: IMDEA Food Institute

Science Week 2014

Workshop: Descubriendo los Alimentos Funcionales.

Date: November 13th, 2014

Venue: Madrid.

Science Week 2014

Workshop: Nutrigenómica y Nutrición Personalizada

Date: November 6th, 2014

Venue: Science Library (UAM). Madrid.



7.2. Invited conferences, courses and seminars

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

2013

Author/s: Prof. José María Ordovás Muñoz
Title: Conferencia magistral
Event: Master de Nutrición y Metabolismo. Universidad de Barcelona
Date: January, 2013

Author/s: Dr. Lidia Daimiel Ruiz
Title: Módulo docente de master oficial
Event: Master oficial de Biomedicina Molecular. Universidad Autónoma de Madrid
Date: January, 2013

Author/s: Prof. José María Ordovás Muñoz
Title: Consequences of impaired phenotypic flexibility
Event: International Phenotypic Flexibility Symposium. El Escorial, Madrid.
Date: February 4-6th, 2013

Author/s: Prof. José María Ordovás Muñoz
Title: From human observational studies to evidence-based interventions and self-management of health
Event: International Congress Adding Healthy Years to the Human Lifespan. Bel Air Hotel in The Hague, Netherlands
Date: February 7-8th, 2013

Author/s: Prof. José María Ordovás Muñoz
Title: Lecture
Event: II Reunión Internacional Cátedra Danone. Barcelona
Date: 19th February, 2013

Author/s: Prof. José María Ordovás Muñoz
Title: Lecture

Event: XXVIII Congreso Nacional de la Sociedad Española de Medicina Estética (SEME). Barcelona
Date: 23rd February, 2013

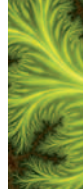
Author/s: Dr. Viviana Loria-Kohen
Title: Conceptos esenciales de Nutrición
Event: Máster universitario en Química Agrícola y nuevos alimentos. Universidad Autónoma de Madrid
Date: February 22nd, 2013

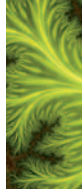
Author/s: Daimiel-Ruiz, L; Klett, M; Konstantinidou, V; García, B; Ordovás, JM
Title: PUFAs, specifically DHA, modify the microRNA pattern of the enterocytes: a screening of diet-modified microRNAs. Poster
Event: NuGO: Nutrigenomics Organization. Phenotypic Flexibility Symposium 2013. El Escorial.
Date: February 4-6th, 2013

Author/s: Margarita González-Vallinas, Susana Molina, Gonzalo Vicente, Ana de la Cueva, Teodoro Vargas, Mónica R. García-Risco, Tiziana Fornari, Guillermo Reglero and Ana Ramírez de Molina
Title: Rosemary extract as an adjuvant agent to overcome chemoresistance of cancer cells. Oral communication
Event: 5th International Conference on Drug Discovery and Therapy. Dubai
Date: February, 2013.

Author/s: M.I. Moran-Valero, S. Molina, D. Martin, T. Vargas, C.F. Torres, A. Ramírez de Molina, G. Reglero
Title: In Vitro Bioaccessibility and Bioactivity of Alkylglycerols as Vehicles of Butyric Acid
Event: 2nd International Conference on Food Digestion. Madrid
Date: March, 2013

Author/s: Viviana Loria-Kohen, Isabel Espinosa-Salinas, Jesús Herranz, Susana Molina, Juristo Fonollá, Mónica Olivares, Guillermo Reglero, José María Ordovás, Ana Ramírez de Molina
Title: Genetic variant of PPAR α modulates cardiovascular risk biomarkers after consumption of skimmed milk. Poster





Event: NuGO: Nutrigenomics Organization. Phenotypic Flexibility Symposium 2013. El Escorial. Madrid. Spain

Date: February 4-6th, 2013

Author/s: Prof. José María Ordovás Muñoz

Title: Lecture

Event: 2nd International Congress of Translational Research in Human Nutrition organized by the CRNH Auvergne. Clermont-Ferrand. Francia

Date: March 8-9th, 2013

Author/s: Prof. José María Ordovás Muñoz

Title: Lecture

Event: BIOCENTER OULU DAY 2013 Brain's Digest: Healthy Diet Drives a Sharp Mind. Oulu, Finlandia

Date: March 12th, 2013

Author/s: Dr. Ana Ramírez de Molina

Title: Eficacia de alimentos funcionales: componente genético. Opening conference

Event: V Edición del Máster en Gestión de la Calidad Alimentaria de la Universidad Politécnica de Madrid

Date: March, 2013

Author/s: Prof. José María Ordovás Muñoz

Title: Nutrición personalizada: hoy un reto científico, mañana una herramienta práctica necesaria. Opening conference

Event: XVII Jornadas de Nutrición Práctica y el VIII Congreso Internacional. Nutrición, Alimentación y Dietética. Facultad de Medicina de la Universidad Complutense de Madrid

Date: April 17-19th, de 2013

Author/s: Dr. Ana Ramírez de Molina

Title: Genómica Nutricional: aplicaciones en el estudio de la relación alimentación-salud

Event: Seminario Científico. Centro de Investigación en Alimentación CIAL (UAM-CSIC)

Date: April, 2013

Author/s: Patricia Casas-Agustench, Susana Molina, Isabel Espinosa-Salinas, Mónica Olivares, Guillermo Reglero, José M Ordovás, Ana Ramírez de Molina

Title: SELP Variant Modulates Plasma HDL-C Responses in Subjects with Moderate Cardiovascular Risk after Skimmed Milk Consumption

Event: Experimental Biology. Boston, MA.EE.UU.

Date: April 20-24th, 2013

Author/s: Giordano E, Dávalos A, Nicod N, Visioli F.

Title: Physiological concentrations of hydroxytyrosol modulates hepatic endoplasmic reticulum stress in HepG2 cells

Event: EB meeting, Boston, MA.EE.UU.

Date: April 20-24th, 2013

Author/s: Álvarez-Fernández M, Sánchez-Martínez R, Sanz B, Cañamero M and Malumbres M.

Title: Physiological role of mammalian Greatwall (Mstl). Tipo de presentación: Poster

Event: 3rd Cell Cycle and Cancer Meeting. French Society of Cell Biology. Montpellier (Francia).

Date: April 2-5th, 2013

Author/s: Dr. José María Ordovás Muñoz

Title: Opening conference

Event: I Expo Congreso Nutrición desde la Farmacia. Recinto ferial Juan Carlos I – IFEMA. Madrid

Date: Mayo 9-11th, 2013

Author/s: Daimiel-Ruiz, L; Klett, M; Konstantinidou, V; García, B; Dávalos A., Ordovás, JM.

Title: Los ácidos grasos poli-insaturados, especialmente el DHA, modifican el patrón de expresión de microRNAs principalmente implicados en funciones neurológicas en un modelo de enterocito. Oral communication

Event: XXVI Congreso Nacional SEA. Zaragoza

Date: May 22nd-24th, 2013





Author/s: Álvarez-Fernández M, Sánchez-Martínez R, Sanz B, Cañamero M and Malumbres M.
Title: Physiological role of mammalian Greatwall (Mastl) Tipo de presentación: Póster
Event: Chromosome Instability and Aneuploidy in Cancer: From Mechanisms to Therapeutics. CNIO Frontiers Meetings. Madrid
Date: May 27-29th, 2013.

Author/s: Prof. José María Ordovás Muñoz
Title: Opening conference
Event: 3ª edición del Salón de Productos y Servicios para las Alergias e Intolerancias Alimentarias
Date: May 31st – June 2nd, 2013

Author/s: Prof. Francesco Visioli
Title: Molecular targets of omega 3 fatty acids an update
Event: 11th Fatty Acids Cell Signalling (FACS) meeting “PUFA for a lifetime”
Date: June 15 – 17th, 2013

Author/s: Prof. Francesco Visioli
Title: Moderator and coordinator
Event: 11th Fatty Acids Cell Signalling (FACS) meeting “PUFA for a lifetime”
Date: June 15 – 17th, 2013

Author/s: Loria-Kohen V, Espinosa-Salinas I, Molina S, Herranz J, Reglero G, Ordovás JM, Ramírez de Molina A.
Title: Genetic variants in lipid metabolism and association with Cardiovascular Risk in The Canto-

blanco Platform of Food and Nutritional Genomics (GENYAL). Poster
Event: Congreso: IUNS-20th International Congress of Nutrition 2013. Granada
Date: September 15-20th, 2013

Author/s: Espinosa-Salinas I, Loria-Kohen V, Herranz J, Molina S, Fonollá J, Olivares M, Reglero G, Ramírez de Molina A, Ordovás JM
Title: PPAR α genetic variant modifies the response after consumption of skimmed or semi-skimmed milk on cardiovascular risk biomarkers. Poster
Event: Congreso IUNS-20th International Congress of Nutrition 2013. Granada.
Date: September 15-20th, 2013

Author/s: P. Casas Agustenich, D. Arnett, C. Smith, C. Lai, L. Parnell, I. Borecki, Y. Lee, J. Ordovás
Title: Total energy and saturated fat intake modulate the association between an obesity genetic risk score and bmi”. Oral communication
Event: Congreso IUNS-20th International Congress of Nutrition 2013. Granada.
Date: September 15-20th, 2013

Author/s: Daimiel-Ruiz, L; Klett, M; Konstantinidou, V; García, B; Dávalos A., Ordovás, JM.
Title: miR-107: a metabolically relevant microRNA regulated by lipids, Atorvastatin and Fenofibrate. Poster
Event: Congreso NuGO week 2013, a joint symposium of NuGO and the German Nutrition Society. Freising. Germany
Date: September 9-12th, 2013

Author/s: Dr. Ana Ramírez de Molina
Title: Mejorar la salud mediante una nutrición personalizada: la Nutrigenómica
Event: Máster en Gestión de la Calidad Alimentaria
Date: September, 2013

Author/s: Prof. Francesco Visioli
Title: Biological activities of polyphenols in oils
Event: IUNS 20th International Congress of Nutrition
Date: September 19th, 2013



Author/s: Margarita González-Vallinas, Susana Molina, Gonzalo Vicente, Ana de la Cueva, Teodoro Vargas, Mónica R. García-Risco, Tiziana Fornari, Guillermo Reglero and Ana Ramírez de Molina
Title: Rosemary extract enhances 5-fluoracil antitumor effect and overcomes resistance to the drug: new complementary approach for colon cancer therapy. Oral communication
Event: 3rd World Congress on Cancer Science and Therapy. San Francisco, CA.EE.UU.
Date: October, 2013

Author/s: Loria-Kohen V, Espinosa-Salinas I, Molina S, Herranz J, Reglero G, Ramírez de Molina A
Title: Beverage consumption habits in the Cantoblanco platform of food and nutritional genomics (GENYAL). Poster
Event: I Congreso Internacional de Hidratación y III Congreso Nacional de Hidratación. Madrid
Date: December 3rd – 4th, 2013

2014

Author/s: Dr. Ana Ramírez de Molina
Title: Ponencia acto inaugural
Event: Participación en la VI Edición del Máster en Gestión de la Calidad Alimentaria. Universidad Politécnica de Madrid
Date: February 24th, 2014

Author/s: Dr. Viviana Loria-Kohen
Title: Conceptos esenciales de Nutrición.
Event: Máster Universitario en Química Agrícola y Nuevos Alimentos. Universidad Autónoma de Madrid
Date: February 8th, 2014

Author/s: Dr. José M^o Ordovás Muñoz
Title: Papel de las mutaciones en el gen LDLr en la respuesta a la dieta y fármacos en la hipercolesterolemia familiar
Event: Congreso Sociedad Española de Arteriosclerosis. Organizado por la Sociedad Española de Arteriosclerosis. Barcelona
Date: February 20th – 21st, 2014

Author/s: Dr. José M^o Ordovás Muñoz
Title: Omega- 3 Fatty Acids and Genetics. Workshop on Omega-3 Fatty Acids in Health and Disease
Event: Workshop on Omega-3 Fatty Acids in Health and Disease. Rome.Italy
Date: February 13 – 14th, 2014



Author/s: Dr. José M^a Ordovás Muñoz
Title: La genómica Nutricional: ¿un vaso medio lleno o medio vacío?
Event: IX congreso internacional de Nutrición-Alimentación-Dietética. Universidad Complutense de Madrid. Organizing by SPRIM and la Sociedad Española de Dietética y Ciencias de la Alimentación (SEDCA). Closing ceremony
Date: March 19th – 21st, 2014

Author/s: Alberto Dávalos, Belen Garcia-Carrasco, Judith Gil-Zamorano, Roberto Martin, Lidia Daimiel, Sara Malaguti, Eduardo Iglesias-Gutiérrez, Francesco Visioli.
Title: Docosahexaenoic acid modulates the expression of intestinal microRNAs involved in lipid metabolism
Event: 7th International Atherosclerosis Society workshop on HDL. Rome, Italy.
Date: March 24th-26th, 2014

Author/s: Dávalos A, Gil-Zamorano J, Garcia-Carrasco B, Martin R, Daimiel L, Soares SMA, Iglesias-Gutierrez E, Visioli F.
Title: “Micro-managing” enterocyte lipid metabolism by DHA. Poster
Event: 21st Annual Meeting of the Austrian Atherosclerosis Society. St. Gilgen, Austria
Date: May 9th – 10th, 2014

Author/s: Casas-Agustench P, Arnett DK, Smith CE, Lai C-Q, Parnell LD, Borecki IB, Lee Y-C, Ordovás JM.
Title: Saturated fat intake modulates the association between and obesity genetic risk score and BMI in two US populations. Poster
Event: 21st European Congress on Obesity. Sofia, Bulgaria.
Date: May 28th – 31st, 2014.

Author/s: Casas-Agustench P, Sloan S, Jacques P, Willinger C, Yin X, Courchesne P, Ramachandran V, Robin SJ, Larson M, Chen B, Mendelson M, Levy D, Ordovás JM.
Title: Connections between dark fish intake, lipids and plasma triglycerides in the Framingham Heart Study.
Event: 82nd Congress European Atherosclerosis Society. Madrid
Date: May 31st - June 3rd, 2014.

Author/s: Andrés Redondo, Marta Mendiola, Virginia Martínez, Jesús Herranz, Laura Yébenes, PhD, Beatriz Castelo, Pilar Zamora, Alvaro Pinto, Patricia Cruz, Victoria Heredia, Angelo Gámez, Juan Angel Fresno, Ana Ramírez, David Hardisson, Enrique Espinosa.
Title: Predictive value of angiogenesis related gene profiling in patients with Her2-negative metastatic breast cancer (MBC) treated with bevacizumab and weekly paclitaxel (Bev-Pac)
Event: ASCO 2014. Chicago. USA
Date: May 30th – June 3rd, 2014

Author/s: Dr. Francesco Visioli
Title: Personalized Nutrition” and “The Secrets of Healthy Aging
Event: Nutrition Integrates 2014. London, UK.
Date: June 5th, 2014

Author/s: Dr. Francesco Visioli
Title: Adherence to diet
Event: ADAMS (Adherence@Multiple Sclerosis) II. London. UK.
Date: June 5th, 2014

Author/s: Casas-Agustench P, Fernandes FS, Tavares do Carmo MG, Herrera E, Dávalos A.
Title: Dietary lipids modulate the expression of microRNAs. Poster
Event: 11th Congress of the International Society for the Study of fatty acids and lipids. Stockholm, Sweden
Date: June 28th – July 2nd, 2014.

Author/s: Dávalos A, Gil-Zamorano J, Martín R, Daimiel L, Iglesias-Gutiérrez E, Visioli F.

Title: Docosahexaenoic acid modulates the expression of microRNAs involved in lipid metabolism. Poster

Event: 11th Congress of the International Society for the Study of fatty acids and lipids. Stockholm, Sweden.

Date: June 28th –July 2nd 2014.

Author/s: Dr. José M^a Ordovás Muñoz

Title: Nutrición y genómica. El papel de la Nutrigenómica en el desarrollo de la alimentación saludable del futuro.

Event: II Simposio científico internacional para la innovación en la industria marina y alimentaria. Vigo, Pontevedra.

Date: September 16th, 2014.

Author/s: Casas-Agustench P, Fernandes FS, Tavares do Carmo MG, Herrera E, Dávalos A.

Title: Consumption of different dietary lipids modulates the expression of miRNAs. Poster

Event: 3rd International Conference and Exhibition on Nutrition & Food Sciences. 2014. Valencia, Spain.

Date: September 23rd – 25th, 2014.

Author/s: Dr. Alberto Dávalos

Title: Pharmacologic therapy targeting endogenous miRNAs by dietary components. Oral communication

Event: 3rd International Conference and Exhibition on Nutrition & Food Sciences. 2014. Valencia, Spain.

Date: September 23rd – 25th, 2014.

Author/s: V Martínez-Martaín et al.

Title: Valor predictivo de un perfil génico relacionado con la angiogénesis en pacientes con cáncer de mama her2 negativo diseminado tratadas con bevacizumab y paclitaxel semanal. Oral communication

Event: 3rd Simposio de la Sociedad Española de Oncología Médica (SEOM). Madrid.

Date: October 22nd-24th, 2014.

Author/s: A Custodio Carretero et al.

Title: Firma génica asociada con el síndrome metabólico (SM) como factor pronóstico en cáncer colorrectal (CCR) estadio II. (Oral communication)

Event: 3rd Simposio de la Sociedad Española de Oncología Médica (SEOM). Madrid.

Date: October 22nd-24th, 2014.

Author/s: Dr. Ana Ramírez de Molina

Title: Participación en la actividad docente de la asignatura “Calidad y funcionalidad de compuestos o ingredientes bioactivos”

Event: Master de Química Agrícola y Nuevos Alimentos de la Universidad Autónoma de Madrid

Date: September, 2014.

Author/s: Dr. Ana Ramírez de Molina

Title: El Papel de la Nutrigenómica para Mejorar la Salud mediante una Nutrición Personalizada.

Event: Máster en Gestión de la Calidad Alimentaria de la Universidad Politécnica de Madrid

Date: October 14th, 2014.

Author/s: Dr. Francesco Visioli

Title: Hydroxytyrosol

Event: The 2nd International Conference on Pharma and Food. Shizuoka, Japan.

Date: November 6th, 2014

Author/s: Dr. Francesco Visioli

Title: Essential Fatty Acids: an update on their putative health effects

Event: The 19th Shizuoka Forum on Health and Longevity. Numazu, Japan.

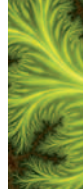
Date: 7th November, 2014

Author/s: Dr. José M^a Ordovás Muñoz

Title: Foods are us! On eating & becoming

Event: 15th EMBLIEMBO Science and Society Conference. Heildenberg. Germany

Date: November 6th, 2014



Author/s: Teodoro Vargas, Jesús Herranz, Juan Moreno-Rubio, Susana Molina, Guillermo Reglero, Ricardo Yaya, Jorge Aparicio, Joan Aurel, Jaime Feliu, Ana Ramírez de Molina

Title: Lipid metabolism-related gene signature as a biomarker of prognosis in stage-II colorectal cancer patients. Poster

Event: 15th EMBLIEMBO Science and Society Conference. Heildenberg. Germany

Date: November 6th, 2014

Author/s: Dr. Ana Ramírez de Molina

Title: Lipid metabolism-related gene signature as a biomarker of prognosis in stage-II colorectal cancer patients. Oral communication

Event: 15th EMBLIEMBO Science and Society Conference. Heildenberg. Germany

Date: November 6th, 2014

Author/s: Dr. Ana Ramírez de Molina

Title: Nutrición y cancer

Event: Semana de la Ciencia: “ La alimentación del los Nuevos “Años 20”: Alimentos funcionales y estrategias nutricionales para la prevención de enfermedades. Madrid. Oral communication

Date: November 6th, 2014

Author/s: Dr. Guillermo Reglero

Title: La alimentación en la era 2.0: De la opulencia a la alimentación inteligente

Event: Semana de la Ciencia: “ La alimentación del los Nuevos “Años 20”: Alimentos funcionales y estrategias nutricionales para la prevención de enfermedades. Madrid. Oral communication

Date: November 13th, 2014

Author/s: Dr. José M^o Ordovás Muñoz

Title: Sesión Plenaria. “Conócete a ti mismo y actúa en consecuencia. La Nutrigenética en la Medicina Personalizada”.

Event: XV Congreso Nacional de la Federación Española de Medicina del Deporte. La Coruña.

Date: November 26th-29th, 2014

Author/s: Dr. Lidia Daimiel Ruiz

Title: Nutrigenética y Dieta Mediterránea

Event: Grado de Nutrición Humana y Dietética. Universidad Autónoma de Madrid. Seminary

Date: December 3rd, 2014.

Author/s: Alberto Dávalos, Patricia Casas-Agustench, Flavia S. Fernandes, María G. Tavares do Carmo, Emilio Herrera

Title: Mother Nutritional miRNAs Legacy. Poster

Event: The 3rd international EGID Symposium. Lille, Francia

Date: December 2nd – 3rd, 2014.

Author/s: Dr. Francesco Visioli

Title: Growing older fast with healthy new ingredients – Opportunities for innovation

Event: 3rd Healthy Aging Conference Amsterdam, Netherlands

Date: December 4th-5th, 2014

Author/s: Victor Micó Moreno

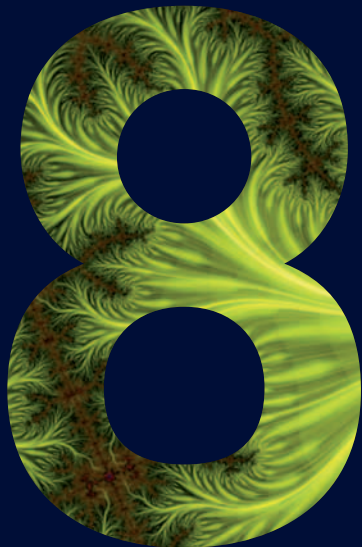
Title: Bebidas fermentadas ¿debe ser incluidas o excluidas del consejo nutricional?

Event: Seminary. Grado de Nutrición Humana y Dietética. Universidad Autónoma de Madrid

Date: December 11th, 2014.



s t r a t e g i c
a l l i a n c e s



report
2013-14

IMDEA Food Institute is strongly committed with and actively participating in national and international forums, networking, panel discussions in science and innovation, through the establishing of strategic alliances with public and private entities.



Cooperation Agreement with the Consejo Superior de Investigaciones Científicas

In August 2014, a Framework Cooperation Agreement 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 Hospital Universitario “Infanta Sofía”

In December 2013, a Framework Cooperation Agreement was signed between IMDEA Food Foundation and “el 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 Agreement 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 Agreement 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 through the correct nutrition.



Cooperation Agreement with the “Universidad de la Concepción de Chile”

In July 2013 a Framework Cooperation Agreement 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 University of 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 “Centro Regional de Estudios en Alimentos Saludables” (CREAS)

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



Cooperation Agreement with “Instituto Maimónides de investigación Biomédica de Córdoba” (IMIBIC)

In October 2011 a Bilateral Agreement was signed between IMIBIC and IMDEA Food Institute to establish cooperation for its commitment of genuinely fostering sustainable development in the scientific activities and projects.



Cooperation Agreement between Universidad Autónoma de Madrid and the Cantoblanco Platform of Nutritional Genomics and Food “GENYAL”

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



Cooperation Agreement with Tufts University. Boston (USA)

On 1st Feb, 2010 was concluded a Cooperation Agreement between Tufts University, Boston (USA) and IMDEA Food Institute to promote areas of interest in teaching and research at both institutions, and to promote greater understanding in either institution of the related economic, cultural and social issues.





Collaboration with the Hospital Universitario “La Paz”

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



Collaboration with the Hospital 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

On 9th 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.

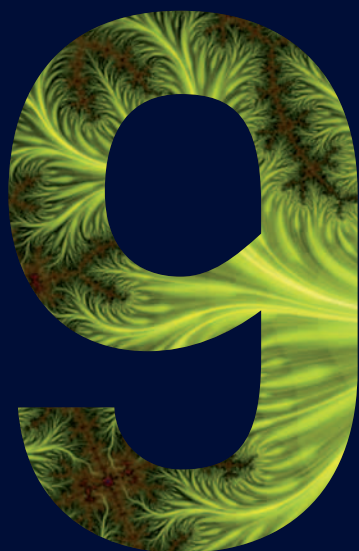


Salud
Genetics
Nutrition
Genes
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Genomics
Alimentos

eat
genome
metabolism



scientific highlights



- 9.1. Microtargeting cancer metabolism: Opening new therapeutic windows based on lipid metabolism [108]
- 9.2. Circulating microRNAs for inter-cellular communication modulated by diet [114]

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microtargeting ca

Microtargeting cancer metabolism: Opening new therapeutic windows based on lipid metabolism

A hallmark of cancer is the metabolic reprogramming to sustain cell proliferation and metastasis (Hanahan and Weinberg 2011). Regardless the oncogenic or tumor suppressor event implicated, cancer cells rely in a positive balance of energy and biosynthetic requirements. Moreover, cancer metabolism is the result of a combination of cell autonomous genetic alterations and microenvironment adaptation (oxygen, pH and nutrient availability) (Parks, Chiche et al. 2011; Chen and Russo 2012; Le, Lane et al. 2012).

The most prominent metabolic alterations in cancer are the increased glucose uptake and the use of aerobic glycolysis regardless the abundance of oxygen. In spite of the lower efficiency of energy generated by this compared to the mitochondrial respiration, aerobic glycolysis sustains precursors for anabolic processes (ribose, glycerol and serine). In addition, many tumors rely on glutaminolysis for tricarboxylic acid cycle (TCA) anaplerosis (to get energy and precursors for lipid, cholesterol and aa biosynthesis) (Deberardinis, Sayed et al. 2008; Dang 2010; DeBerardinis and Cheng 2010; Daye and Wellen 2012; Baenke, Peck et al. 2013). Moreover, glutamine contributes to maintain redox homeostasis (via glutation) (Weinberg, Hamanaka et al. 2010; Le, Lane et al. 2012).

Cancer cells show specific alterations in lipid metabolism (Baenke, Peck et al. 2013) that can affect numerous cellular processes, including cell growth, proliferation, differentiation, malignancy and motility (Mashima, Sato et al. 2009; Santos and Schulze 2012). The majority of adult mammalian tissues satisfy their lipid requirements through the uptake of free fatty acids (FFA) and lipoproteins. Fatty acid and cholesterol biosynthesis are mainly restricted to liver and adipose tissues. However, neoplastic tissues show aberrant activation of de novo lipogenesis (Menendez and Lupu 2007). In fact, overexpression of lipogenic enzymes is reported as a common characteristic of many cancers (Ramirez de Molina, Sarmentero-Estrada et al. 2007; Mashima, Sato et al. 2009; Roongta, Pabalan et al. 2011) and inhibi-

opening new
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based on lipid metabolism

Cancer metabolism

tion of different enzymes within the FA biosynthetic pathway can block cancer cell growth (Abramson 2011; Santos and Schulze 2012; Zaidi, Swinnen et al. 2012).

Regardless the relevance of de novo lipogenesis and cholesterogenesis in cancer, the mobilization of intracellular fatty acids (FA) from lipid droplets (LD) through lipophagy and subsequent fatty acid oxidation (FAO) contribute to specific adaptation to energy and redox stress (Singh, Kaushik et al. 2009; Pike, Smift et al. 2011). Figure 1: Summary of metabolic pathways altered in cancer.

MicroRNAs are small (~22nt), single-stranded, non-coding RNAs that regulate the expression of targets implicated in nearly all cellular processes such as cell cycle, apoptosis, autophagy, stemness, differentiation, angiogenesis, inflammation, drug resistance, stress response, transformation, and migration. MicroRNAs are frequently deregulated in cancer and so they are important biomarkers for diagnosis and prognosis of the cellular outcome (Kosaka, Iguchi et al. 2010; Peng, Yu et al. 2014)

Importantly, both, individual and combination of microRNAs can affect entire biological pathways (Bartel 2009) and this makes them good candidates for therapeutic intervention compare to classical single target approaches.

Herein we want to highlight the relevance of microRNAs as modulators of metabolic pathways and more specifically their role in the lipid dependent adaptation in cancer. We remark three aspects for microRNA-mediated therapeutic intervention:

First, microRNAs regulate the expression of multiple targets, often members of the same pathway, both in normal and cancer cells. Due to the diversity of mechanisms that trigger the metabolic reprogramming in cancer, a combination of microRNAs may be directed to specifically modulate the altered pathway. MicroRNAs can be reconsidered as modulators of pathways rather than absolute effectors. But importantly, this regulation will not dramatically compromise the homeostasis in normal cells. Specific combinations of microRNAs will contribute to target and modulate pathways in cancer cells without strong toxic effects in normal cells. Moreover, artificial microRNAs with seed matches to multiple target genes can be design to modulate specific pathways.



Second, cancer metabolism is the result of a combination of cell autonomous genetic alterations and microenvironment adaptation. It is under stress conditions (oncogenic events, hypoxia, oxidative stress) where microRNAs may become more relevant in the fine tuning regulation of adaptation to modifying situations.

Third, glucose and glutamine reprogrammed metabolism in cancer ends up with an increased fatty acid biosynthesis to sustain cell proliferation and survival. MicroRNA-mediated targeting of de novo lipogenesis will restrain tumor growth. Moreover, cancer cells are more efficient in FAO activation in response to nutrient depletion compared to normal cells. It should be expected that cancer cells may be more sensitive to FAO inhibition. We propose microRNA mediated targeting of lipogenesis as the ending point of the metabolic reprogramming in cancer as well as FA mobilization through lipolysis and lipophagy and subsequent FAO (fatty acid catabolism) as new therapeutic windows to face cancer metabolism.

Most of the work done to target cancer metabolism has been focus on the identification of oncogenes and tumor suppressors that mediate the metabolic reprogramming.

Although aerobic glycolysis is considered the major source of biosynthetic intermediates to support rapid cell proliferation, cancer cells present an increased glutamine metabolism which is highly important for energy and biosynthesis. Importantly, anaplerotic pathways to replenish TCA may be crucial to support tumor survival. The two main anaplerotic sources are pyruvate carboxylase and glutaminase. Pyruvate carboxylase catalyzes the conversion of pyruvate to oxaloacetate (OAA). Glutaminase deaminates glutamine producing glutamate which can further be converted into α -ketoglutarate. In addition, cancer cells can use fatty acids as fuels in vivo. FAO pathway relies in a process highly dependent on a functional oxidative phosphorylation. Lipid metabolism may sustain proliferation (structural membranes, lipid rafts for signaling), steroidogenesis, energy (FAO, lipophagy) and redox homeostasis (NADPH for ROS scavenging).

The specific oncogenic and tumor suppressor event that drives the metabolic reprogramming must be accompanied by flexibility and capacity to adapt to substrate and oxygen availability. A nice example of the incredible plasticity of cancer cells to support proliferation and survival has been recently described. Cancer cells with mitochondrial defects rely on glutamine reductive carboxylation that requires simultaneous oxidation of α -ketoglutarate to provide reducing equivalents. Importantly, in this context, α -ketoglutarate is sustained by pyruvate carboxylation from glycolysis (Mullen, Hu et al. 2014).

In this scenario microRNAs are good candidates for therapeutic approaches to face cancer. MicroRNAs affect nearly all cellular processes based on their mechanism of action. The very same microRNA may target oncogenes, may target tumor suppressors and so contributes to regulate energy, biosynthesis and the redox status of the cell (Gao, Tchernyshyov et al. 2009). In addition, microRNAs modulate cancer cell plasticity to microenvironment adaptation. It is

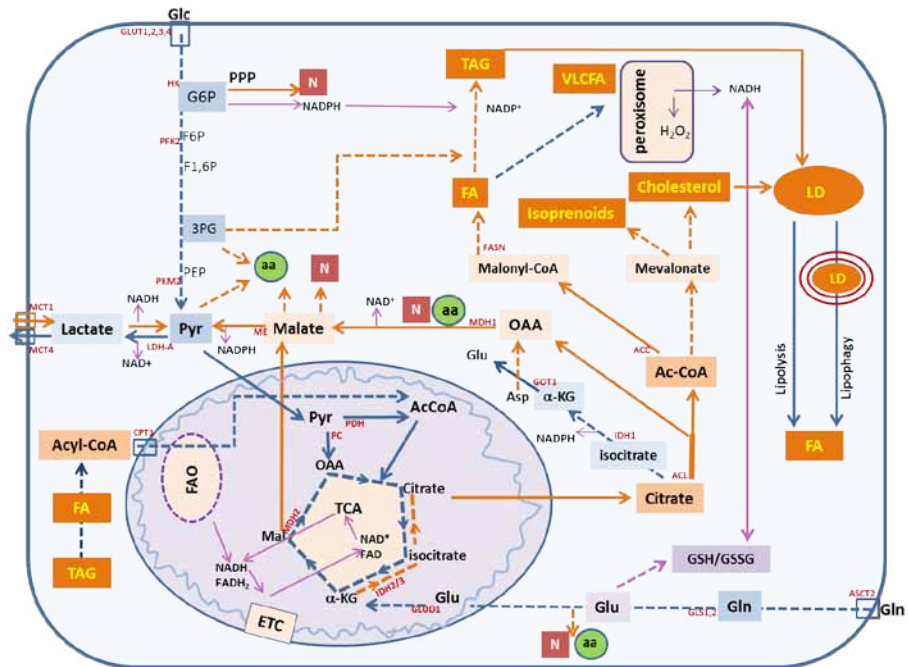
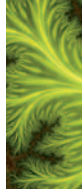


Figure 1: Summary of metabolic pathways altered in cancer: aerobic glycolysis, glutaminolysis, anaplerosis of TCA, mitochondrial oxidative phosphorylation, lipogenesis, cholesterogenesis, lipolysis, lipophagy, fatty acid oxidation, redox homeostasis. (Blue lines: catabolic pathways; orange lines: anabolic pathways, purple lines: redox homeostasis) ACC: acetyl-CoA carboxylase; ACL: ATP citrate lyase; FASN: fatty acid synthase; GLS: glutaminase; GLUT1: glutamate dehydrogenase; GOT1: aspartate aminotransferase; GSH/GSSG: reduced/oxidized glutathione; HK: hexokinase; IDH: isocitrate dehydrogenase; LDH-A: lactate dehydrogenase A; MDH1/MDH2: malate dehydrogenase; ME: malic enzyme; PDH: pyruvate dehydrogenase; PC: pyruvate carboxylase; PFK: phosphofructokinase; PKM2, pyruvate kinase isoform M2; α-KG: alpha-ketoglutarate; Asp: aspartate; AcCoA: acetyl-coA, Gluc: glucose, Glu: glutamate; Gln: glutamine; G6P: glucose-6-phosphate; F6P: fructose-6-phosphate; F1,6P: fructose-1,6-bisphosphate; Mal: malate; 3PG: 3-phosphoglycerate; PEP: phosphoenolpyruvate; Pyr: pyruvate; OAA: oxaloacetate; ETC: electron transporter chain; PPP: pentose phosphate pathway; FAO: fatty acids oxidation; ASCT: neutral amino acid transporter; CPT: carnitine palmitoyltransferase; GLUT: glucose transporter; MCT: monocarboxylate transporter; aa: aminoacids; FA: fatty acids; LD: lipid droplets; N: nucleotides; VLCFA: very long chain fatty acids; TAG: triacylglycerols

under stress conditions (nutrient deprivation, oxidative stress) where microRNAs may become more relevant in the fine tuning adaptation of cancer cells.

Combination of microRNAs can modulate complete pathways depending on the specific genetic alteration driving the tumor. Great amount of papers describing microRNAs modulating expression of oncogenic, tumor suppressors and transcription factors implicated in the metabolic reprogramming have been described.



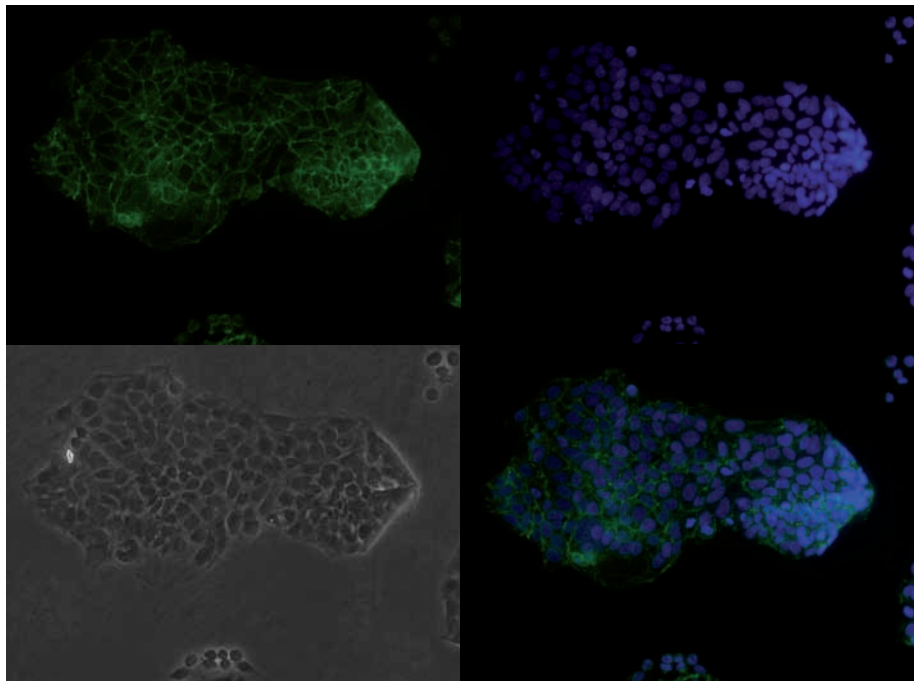
Special interest has been done in targeting aerobic glycolysis by microRNAs. But, in an attempt to explore new therapeutic opportunities, an integrative knowledge of both, the ending biosynthetic metabolites as well as the fueling ones is required. MicroRNAs may cover the complete and different scenarios to be targeted. So, they can be directed to target the ending biosynthetic pathways, such as lipogenesis and cholesterogenesis. But on the other hand, there are specific scenarios where it should be desirable to target for example lipid mobilization (lipolysis and lipophagy) and FAO as the fueling source.

MicroRNA-based therapeutic strategies have been successfully applied in pre-clinical models for several human malignancies, thus emphasizing the enormous potential of miRNAs as therapeutic mediators as well as targets for neoplastic diseases. Future clinical trials should provide new insights into the safety and efficacy of the developed microRNA-based anti-cancer therapies (Costa and Pedrosa de Lima 2013).

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circulating

Circulating microRNAs for inter-cellular communication modulated by diet

The formation of complex multicellular organisms such as humans implies the generation of specialized and distinct organs and tissues. This is accomplished even when all the cells in an organism carry exactly identical genomic information. In order to achieve the correct degree of specialization, the different cells express diverse sets of genes, therefore producing different proteins, and conferring the cells their identity and function. To this end, the cell must regulate the expression of its genes in a very precise timely manner, as well as in regard to the amount of the synthesized proteins. In order to ensure a correct development, various levels of gene expression regulation exist and, among these, the microRNAs (miRNAs) play a pivotal role. miRNAs are small, single stranded noncoding RNA molecules implicated in posttranscriptional gene regulation by binding to the target messenger RNA (mRNA), causing its degradation and inhibition of translation. Usually, this results in a modest change in gene expression, also known as a “fine-tuning effect”. The great potential of miRNAs relies on their capability of establishing regulatory networks. Due to the fact that a miRNA sequence does not perfectly match its target, one single miRNA is able to bind many different mRNAs, hence affecting several pathways. An mRNA can, as well, be targeted by many miRNAs. Although only approximately 2000 miRNAs exist in humans, they regulate ≈50% of all genes. miRNAs have been shown to be coordinately regulated during development (1) and their expression changes with adult age. Some of them are tissue specific and their concentrations may reflect the physiological status of the cell, including disease (2).

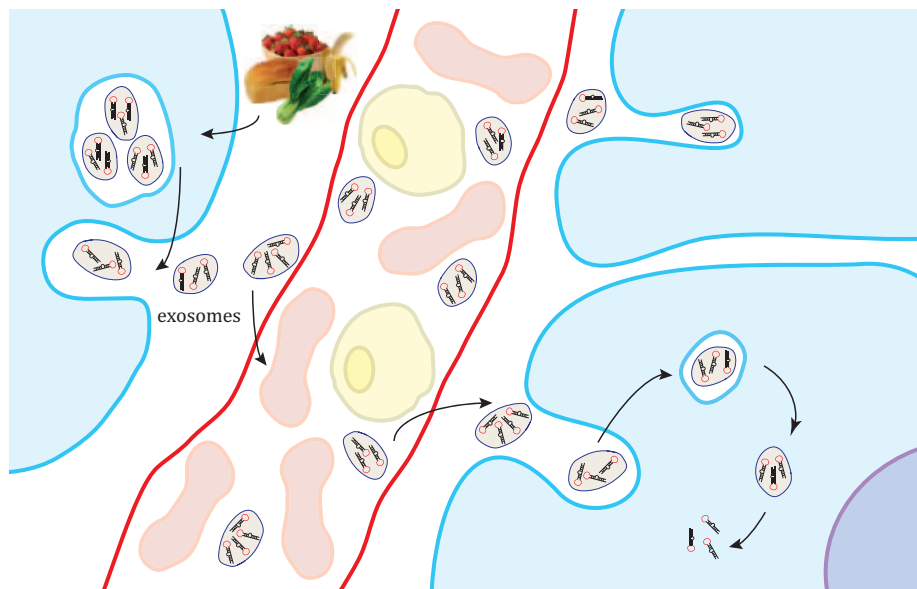
In the last few years, miRNAs have been found in most biological fluids, including blood, urine, milk, saliva, and cerebrospinal fluid, which has raised the notion that they can also participate in inter- and extra-cellular communication (3). For instance, immune-related miRNAs have been detected in human breast milk exosomes (4). It has been hypothesized that miRNA-enriched exosomes from mother’s milk may target cellular mRNA translation in the infant through extracellular communication. Thus, these circulating miRNAs, similar to other factors such as hormones, may mediate communication between different cell types

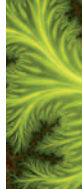
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miRNAs

or tissues, and participate in diverse biological processes and pathways. Consequently, the levels of circulating miRNAs vary widely among humans according to age or physiologic events, and are influenced by various extrinsic factors.

Recently, various reports have described the presence of exogenous plant miRNAs in the serum and tissues of mice and human, where the origin of these exogenous plant miRNAs would be from dietary sources. Moreover, it has been described that MIR168a, a specific miRNA abundant in rice, regulated the expression of low-density lipoprotein receptor-associated protein-I in mouse liver (5). These observations would imply the notion that genetic material from food could survive the digestive tract, enter the bloodstream, and regulate a gene in mammalian tissue. Furthermore, if circulating dietary miRNAs are found to exist in human plasma, it could be considered that the benefits of consuming a plant-based diet might be explained in part by the ingestion of plant miRNAs. Even though these preliminary results (5) might open a new field of study, appropriate confirmation of these hypothesis need to be validated.





On the other hand, miRNAs may be useful as nutritional biomarkers, functioning as early predictors of nutrient status. In this regard, there are some descriptions associating circulating miRNA levels to dietary zinc depletion/repletion (6), or vitamin D intake or status (7, 8). Related to this, distinct circulating patterns of miRNAs appear to be altered in many diseases and conditions (3). For instance, it has been reported the identification and validation of circulating patterns of miRNAs in subjects with varying degree of obesity and in response to weight loss by surgery (9), showing the potential utility of circulating miRNAs as disease biomarkers and perhaps as novel therapeutic targets.

In this context, IMDEA researchers at the Laboratory of disorders of lipid metabolism and molecular nutrition (DISLIPID lab) are evaluating the incidence of the diet on the expression patterns of circulating miRNAs -both as putative disease biomarkers and as therapeutic targets-, either by altering the diet or by affecting the levels of the circulating miRNAs. The variation of circulating miRNAs expression levels, even though at a very small scale, could have a magnification effect due to the regulatory networks these miRNAs are able to activate. Minimal changes at miRNA expression levels are amplified and diversified affecting the various biological processes and pathways where miRNAs are implicated, such as proliferation, cell cycle progression, apoptosis, differentiation or maintenance of stem cells.

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L.D.

M-5.778-2015

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