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report 2015

institute IMdea food

[food and health

science, industry and society]

prologue

prologue

Guillermo Reglero
Director of the IMDEA Food Institute

report 2015

“Science, Business and Society” is the motto of IMDEA Food as it represents the Institute’s objectives of obtaining new scientific knowledge for generating applications aimed at the creation of value in the industry and at social well-being within the food, nutrition and health sector.

At present, nutrition lies between food and health forming an inevitable link between them and playing a more far-reaching role than it had in the past. This is spurred by the spectacular progresses being made in life sciences research since the start of the 21st century.

The idea that food could possibility be a tool for actively improving health was suggested for the first time in Japan in the 1980s and it has not ceased to catch the interest of the entire world ever since. However, public administrations, particularly public European administrations, have established regulations making it difficult for the food industry to competitively exploit food for health. Precisely, the Spanish food industry needs, probably more than food industries in other European countries, to enhance their wealth creation ability because, given that food sector is the sector with the highest turnover in Spain, the added value it generates is well below the industry average. The case of Madrid is not an exception.

To turn foods for health into a reality in the new strategies for industrial progression, there is a need to demonstrate that said foods for health can provide solutions for population-related health problems. This is achieved through new nutrition, taking a closer look into the molecular mechanisms of physiological processes of the human body, seeking full understanding of the factors affecting main chronic diseases and of the ways to intervene their modulation. In that context, works performed in IMDEA Food in 2015 was centered on designing nutritional strategies for the prevention and improvement of diseases such as cancer, metabolic syndrome and obesity. These strategies are customized according to genetic profiles or targeted specific groups of the population.

In collaboration with clinical teams from public hospitals, IMDEA Food has conducted several nutrigenetic testing in humans. This testing will subsequently be conducted in patients treated for cancer and its protocols have already been approved by the Ethics Committee. The objective is to develop nutritional therapies for improving the prognosis and the quality of life of these patients. For 2016, IMDEA Food has prepared an ambitious project for nutrigenetic evaluation and design of nutritional strategies against obesity targeting adolescents in Madrid Regional Government (Comunidad de Madrid) which has also been approved by the Ethics Committee. Finally, as regards the social activity aspect of IMDEA Food in 2015, mention can be made of the clinical study conducted with patients having chronic fatigue syndrome and multiple chemical sensitivity in collaboration with the association of individuals affected by this disease in Madrid. The results have opened up new paths in the search for nutritional intervention-based therapies for these diseases.

IMDEA Food has carried out an intense R&D activity with the food industry. In the framework of CDTI’s CIEN project, IMDEA Food has conducted works with respect to product and cus-

tomized diet design and validation. The objective is to prevent chronic diseases throughout life by means of consuming modified traditional foods. In 2015, 6 clinical trials have been conducted with industrial food products from companies participating in the project. A pilot trial on the commercial implementation of personalized nutrition is prepared for 2016.

For IMDEA Food, scientific research is the driving force for competitive innovation in businesses and for solving population-related problems. In this sense, the research activity must focus on the highest levels of scientific excellence. Evidence proving the high level achieved by the Institute includes the more than 12,000 mentions already received by publications made by IMDEA Food. In 2015, the Institute has published 75 scientific articles in journals with high international impact and participated in 18 international congresses. Some of the scientific contributions made by the Institute are the discovery of connections between metabolism and cancer, which open up new paths for the treatment of colon cancer; the possibility of using products extracted from rosemary in cancer therapies; the identification of molecular keys influencing nutrition during pregnancy in the generation of metabolic disorders in adulthood; and the demonstration of dietary lipid modulating effect on circadian rhythm regulators.

Talent recruitment and researcher training continue to be one of the main objectives of the Institute. IMDEA Food has participated in research fellowship programs including the European Union Marie Skłodowska-Curie program and the Spanish Ramón y Cajal program, Juan de la Cierva program and Formacíon de Investigadores program. Forty master and undergraduate students from different universities have performed their internships in IMDEA Food.

IMDEA Food has participated in the main R&D project funding programs of the EU such as the programs launched by the European Research Council and H2020. There is a need to highlight the Institute's involvement, in close collaboration with the Autonomous University of Madrid (Universidad Autónoma de Madrid), in an international consortium working towards presenting a proposal in 2016 for a "knowledge innovation community" on food to the European Institute of Innovation.

IMDEA Food has continued to grow in 2015 as a result of the effort, involvement and enthusiasm of all its members and as a result of the support and funding received from the Comunidad de Madrid.


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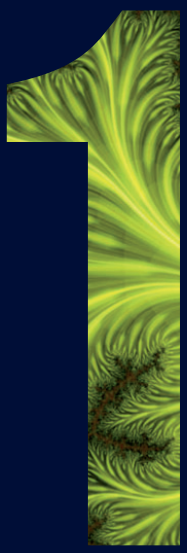


report

2015

Strategic objectives

Food is one of the factors with greater impact on health. In the last decades, life sciences research has clearly showed that it is possible to improve population health condition by means of regulating diet and incorporating in said diet bioactive ingredients capable of preventing and improving the most common chronic diseases. It is now the time to transfer the mentioned scientific progresses to the population. To that end, there is a need to design functional foods which, besides the conventional aspects of nutrition, are effective in preventing and improving various chronic diseases such as vascular diseases, tumor diseases, joint diseases and neuronal diseases, among others.

Objectives

The general objective of IMDEA Food is to conduct a high level food-health scientific research contributing to improving the economy of the Comunidad de Madrid and of Spain and to improving social well-being.

The development of foods and nutritional supplements for specific health use and the design of preventive or therapeutic nutritional programs for chronic diseases are the strategic objectives of IMDEA Food which can be achieved through conducting research in the food, nutrition and health sectors.

Mission

The society needs to receive the results of food R&D in view of the high morbidity rates caused by chronic diseases whereby food is a key factor determining their onset and progression and a Spanish food industry that lacks innovation in a highly competitive world. The founding purpose of IMDEA Food is to transfer to the Comunidad de Madrid and the Spanish society progresses made in nutrition, food and health research in order to contribute to economic progress and to the well-being of the population.

Therefore, the mission of IMDEA Food is to conduct transferable and translational original scientific research of excellence at the forefront of knowledge in the nutrition, food and health sector, and identify food products and nutritional strategies with economical and social value, in order to:

- Contribute to the well-being of the population and to the efficiency, quality and cost of public services in the health sector.
- Contribute to the competitiveness of Madrid's and Spain's economies, the productivity of businesses and their international expansion.
- Contribute to the progress of life sciences, food and nutrition and to the dissemination of scientific knowledge.

Vision

Stepping into a new century and the second millennium, food sciences have undergone a momentous change. Backed by the technological development of the 20th century and the great strides made in Biochemistry, Molecular Biology and Biomedicine, Nutrition has evolved from studying the essential needs of the human body to become the branch of science relating to knowledge concerning the molecular mechanisms of action of nutrients for preventing and improving diseases. Tools such as genomics, metabolomics, proteomics or microbiomics, which were unthinkable a decade ago, are available today to allow dealing with scientific challenges in the food-health sector.

The vision of IMDEA Food is to train its activities towards the study of scientific bases, molecular mechanisms of the human body and physiological effects associate with chronic diseases and related to nutrients, new bioactive food ingredients, food products for specific health use, healthy traditional foods and dietary strategies; all this within the framework of systems biology and applying the new approaches to nutrition, with emphasis on the gene-nutrient relationship.

This will allow achieving a better understanding of the causes of chronic diseases now on the rise as a result of an aging population and said understanding will translate into better diagnoses as well as prevention and therapeutic strategies.

Strategic pillars

IMDEA Food organizes its activities around three strategic pillars:

- **Pillar 1. Science:** Contribution to advanced aspects of scientific knowledge concerning the food-health relationship with special emphasis on chronic disease prevention.
- **Pillar 2. Business:** Contribution to the economic development and competitiveness of the food industry by means of the design and validation of nutritional strategies and food products as well as validation of efficacy demonstrated in the prevention and therapy of chronic diseases.
- **Pillar 3. Society:** Contribution to the reduction of healthcare expenditure and to the well-being of the population by means of diet-health studies, communication programs and nutrition counseling.

Research lines

The strategic activities of IMDEA Food are carried out through 6 research lines:

Line 1: Nutritional Genomics of Cardiovascular Disease and Obesity

The activity of this research line focuses on the study of the effect of diet on the expression of relevant microRNAs in energy metabolism with special emphasis on microRNAs related to cardiovascular diseases and obesity. The research conducted in this line ranges from basic research aspects to research perspective applied to human populations.

Line 2: Molecular Oncology and Nutritional Genomics of Cancer

The activity of this research line focuses on the study of metabolic alterations in cancer, specializing in the identification of molecular markers for early diagnosis, clinical prognosis or treatment response predictions in patients with this disease. The interdisciplinary work approach aims to provide a better understanding of the molecular bases of the relationship between obesity, metabolic syndrome and cancer, as well as of the therapeutic modulation thereof through personalized nutritional strategies to improve human health.

Line 3: Functional Foods Laboratory

The activity of this research line focuses on the study of the etiology of cardiovascular and cardiometabolic disorders, addressing the preventive and therapeutic role of micronutrients. This research line conducts molecular studies of the mechanism of action, studies of the biological activity in animal models and clinical trials in humans, collaborating in the development and validation of functional foods or nutraceutical products with high potential to enter the market.

Line 4: Lipid Metabolism Pathologies and Molecular Nutrition

Disequilibrium in non-protein encoding RNAs (microRNAs) play an important role in the development of cardiometabolic diseases. The objective of this line is to understand how the different microRNAs regulate lipid metabolism in healthy and disease states and to thereby develop new pharmacological and dietary strategies for modulating their function.

Line 5: Production and Development of Foods for Health

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

Line 6: Bioactive Products and Metabolic Syndrome

This line studies the mechanism of action of bioactive products, the molecular mechanism of which is unknown, with indications of metabolic effectiveness. This line also identifies compounds which are present in the diet with bioactive effects unknown up until now and are useful in the prevention and treatment of metabolic syndrome and associate diseases.

Platforms

IMDEA Food has three strategic platforms providing in-house scientific services to the research units, as well as to other research groups and businesses in a national and international level, contributing to scientific and technological transfer:

Food and Nutritional Genomics Platform. GENYAL

The activity of this platform focuses on conducting nutrigenetic studies in humans. This platform has its own Ethics Committee, nutrition and clinical trial unit, biostatistics and bioinformatics unit as well as genomic and training units for the purpose of enhancing their ability to provide advanced scientific services as regards food and health.

Laboratory of Cooperative Activity in R+D+I. LACID

LACID provides a framework for collaboration to perform applied research activities, technological development and innovation in the field of nutrition, food and health. IMDEA Food and the participating entities share the funding, human resources and spaces and infrastructures in the development of joint R+D+I projects.

Nutrigenomics Interactive Center. CIN

Nutrition, food and health: from laboratory to the society. The sole purpose of this multi-topic exhibition is to provide visitors with research-proven tools for maintaining a healthy lifestyle by means of responsible nutrition. This exhibition uses audiovisual elements, tactile elements, sculptural elements, mechanical elements, operable elements and props.

Ethical commitment

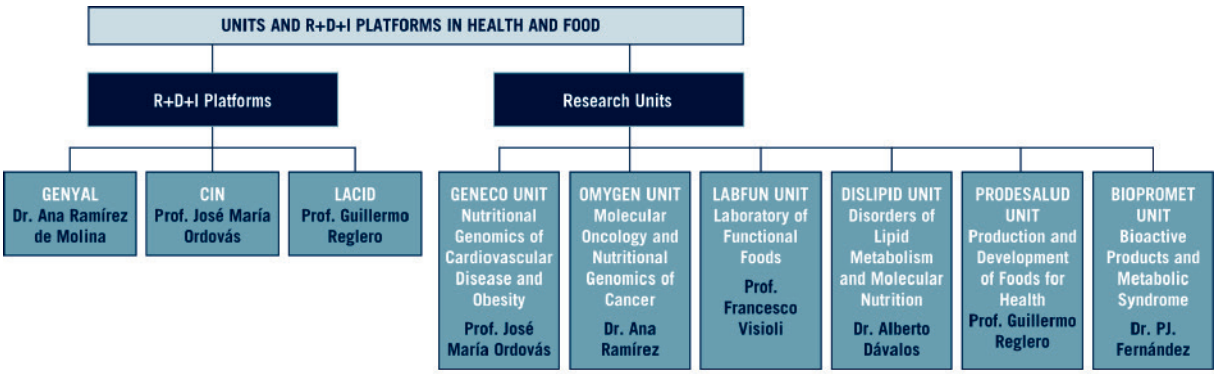
IMDEA Food is aware of its duty and responsibility to the society with respect to the follow-up and control of research conducted in its organization and of its ethical aspects. Therefore, IMDEA Food has set up its own Ethics Committee whereby it strives to assure compliance with the bioethical principles and commitments made by the scientific community and the Articles of the Foundation.

research units and platforms

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

Six research units and three R+D+I platforms will 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 Unit 6**
  Bioactive Products and Metabolic Syndrome. BIOPROMET
- **Research Platform 1**
  The Food and Nutritonal Genomics Platform. GENYAL
- **Research Platform 2**
  The Nutrigenomics Interactive Center. CIN
- **Research Platform 3**
  The Cooperative R + D + I Laboratory. LACID



2.1 Research Unit 1

Nutritional Genomics of Cardiovascular Disease and Obesity. GENECO

Research activity:

The Unit'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 Unit'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 Unit 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 Unit 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.

GENECO
unit

Head of the Unit:

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Members:

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Postdoctoral researcher

Silvia Berciano Benítez
Postdoctoral researcher

Víctor Micó Moreno
Postdoctoral researcher

Laura Berninches Pintado
Technician

Contributing researcher:

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Laura Díez Ricote
Paula Martínez Oca
Lidia Blanco Sánchez

Postdoctoral visitors:

Dr. Ana Peropadre López
UAM Science

2.2 Research Unit 2

Molecular Oncology and Nutritional Genomics of Cancer. OMYGEN

Research activity:

The Unit currently works on two research topics:

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

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

To this end, in close collaboration with the divisions of Medical Oncology from several hospitals, we analyze clinical samples from cancer patients using state-of-the-art genomic approaches. Gene expression analysis, identification of gene variants and epigenetic regulation by microRNAs of lipid metabolism pathways are then used to study their association with the clinical outcome of the disease. Furthermore, we perform functional studies both using conventional and three-dimensional cell culture and animal models to investigate the role of identified genes and microRNAs. We are especially interested in identifying metabolic profiles associate 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 new oncometabolites as distinctive metabolites of different tumor stages and metabolic pathways that may constitute novel targets for the development of future cancer therapies. On the other hand, we are particularly interested in the genetic basis of the relationship between obesity and cancer, paying special attention to cholesterol levels and the tumor microenviroment.

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

Here, we evaluate the effect 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. Based on the technology and genomics commonly used in the group, reaching evaluation in animal models and finally, evaluating their evaluation in clinical trials in healthy volunteers or patients.

In collaboration with the group of Bioactive Food Ingredients of the Institute of Food Science Research (CIAL), we combine genomics and functional studies in order to characterize natural extracts with a high content in phenolic compounds alone or in combination with bioactive lipid carriers such as alkylglycerols. These formulations are further evaluated in animal models and finally, in clinical trials in healthy volunteers or patients. This allows for the development of nutritional supplements and functional foods for personalized nutrition for cancer patients in order to reduce tumor progression rate and improve their general condition and prognosis.

In turn, we determine target populations for personalized therapeutic use of several compounds, mainly natural extracts and new structured lipids. This strategy also allows us to identify within nature new basic structures for the design of new anti-tumor drugs.

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

Dr. Juan Moreno Rubio
Postdoctoral researcher

Dr. Laura Nogués Vera
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Jorge Martínez Romero
Postdoctoral researcher

Silvia Cruz Gil
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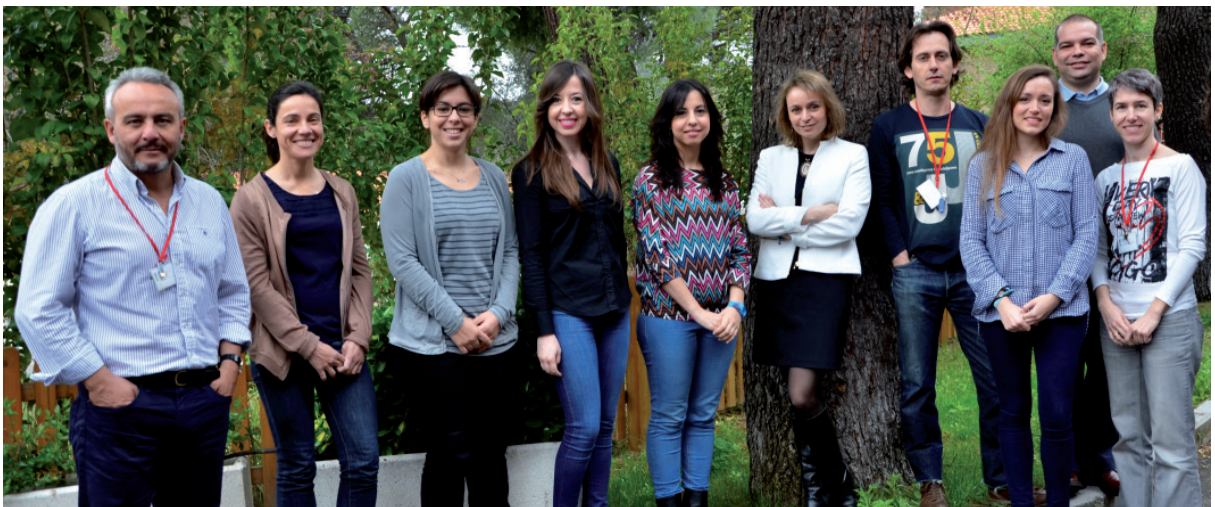
Marta Alonso Bernáldez
Juliana Campos Atherino
Miguel Rebollo Hernanz
Lethicia Galvao
María Soledad García Álvarez
Ana María Fernández Pérez
Jesús del Barrio Morán
Gloria Domínguez Rodríguez

Visiting researchers:

Dr. Elena María Arranz Gutiérrez
University of Guelph / Food Science Department



2.3 Research Unit 3
Laboratory of Functional Foods. LABFUN

Research activity:

Our Unit is being studying the cardio-metabolic effects of some polyphenols (namely, those derived from extra virgin olive oil) for many years. Indeed, an extensive publication record shows the contribution of our group to this important field.

However, due to the rapid aging of the population and to the ever-increasing prevalence of age-related diseases, e.g. neurodegeneration such as dementia and Alzheimer's disease we opened a new line of research devoted to the study of micronutrients and cognitive decline. Following the tradition of our laboratory, our studies span from cell cultures (to gain mechanistic insight and to investigate molecular pathways) to animal models to human trials. The overarching theme is the formulation of science-based nutraceuticals or functional foods with high added value to the food and pharmaceutical industries.

Head of the Unit:

Prof. Francesco Visioli

Members:

Dr. Emma Burgos Ramos
Postdoctoral researcher

Dr. João Tiago Estevao Tomé Carneiro
Postdoctoral researcher

Carmen Crespo Lorenzo
Postdoctoral researcher

Students:

Pablo Chico González
Lucía Patricia Fornieles Pérez
Laura Costoso León

2.4 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.

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

This 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 associate with the metabolism of lipids. To carry out collaborative projects with the food and / pharmaceutical industry to test and develop new dietary supplements or functional foods based on solid scientific knowledge to prevent or treat a variety of lipid metabolism disorders. And, to incorporate the use non-coding RNAs data to develop Precision Nutrition.

Head of the Unit:

Dr. Alberto Dávalos Herrera

Members:

Dr. Maria Jesús Latasa Sada
Postdoctoral researcher

Judit Gil Zamorano
Postdoctoral researcher

Students:

Tatiana García Blanco
Itziar Gutiérrez Ruiz
Sergio Márquez Rodríguez
Mónica Alejandra Martínez

PRODESALUD unit

2.5 Research Unit 5
Production and Development of Foods for Health. PRODESALUD

Research activity:

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

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

Head of the Unit:

Prof. Guillermo Reglero Rada
Director

Members:

Dr. Marta Corzo Martínez
Postdoctoral researcher

Lamia Mouhid Al Achbili
Postdoctoral researcher

Mónica Gómez Patiño
Laboratory technician

Students:

Elena Ortego Hernández
Celia Bañares Echevarría

2.6 Research Unit 6

Bioactive Products and Metabolic Syndrome. BIOPROMET

BIOPROMET unit

Research activity:

Metabolic syndrome (MS) is a group of pathologies caused by a prolonged imbalance between energy intake and expenditure. The main MS-associate pathologies are obesity, diabetes, cardiovascular diseases and cancer, which makes MS one of the main health challenges of developed countries.

Among micronutrients in human diets can be found a large variety of chemical compounds. Some of them present bioactive properties with great potential for the prevention or treatment of metabolic imbalances leading to MS. However, the exact properties of many of these diet compounds are unknown and, in those cases where the beneficial effects are clear, the molecular mechanisms of action are frequently a mystery.

The main goal of the BIOPROMET research Unit is to characterize the mechanism of bioactive products with sign of metabolic activity, for which no molecular mechanism is yet known; and to identify new compounds present in human diet with yet unknown bioactive effects. These two goals will constitute a valuable support to the prevention and treatment of MS and its associate pathologies. For this, we will analyze a battery of pure compounds and extracts from different foods, and will measure their effects on essential metabolic processes in obesity and diabetes development, such as insulin signaling, mitochondrial activity, the pentose phosphate pathway or brown fat thermogenesis. Once interesting bioactive products are identified, we look for their molecular mechanisms of action. First, we work at a molecular level, using a wide set of molecular biology techniques, and then we move on to study their physiological effects, sung mouse models of obesity and diabetes. Once safety and effectivity of these bioactive products are checked on mice, we can start designing nutritional assays on human volunteers, on whom we can tests adequate dosage and measure their effectivity against human obesity and diabetes, taking advantage of the nutrigenomic Platform at IMDEA Food.

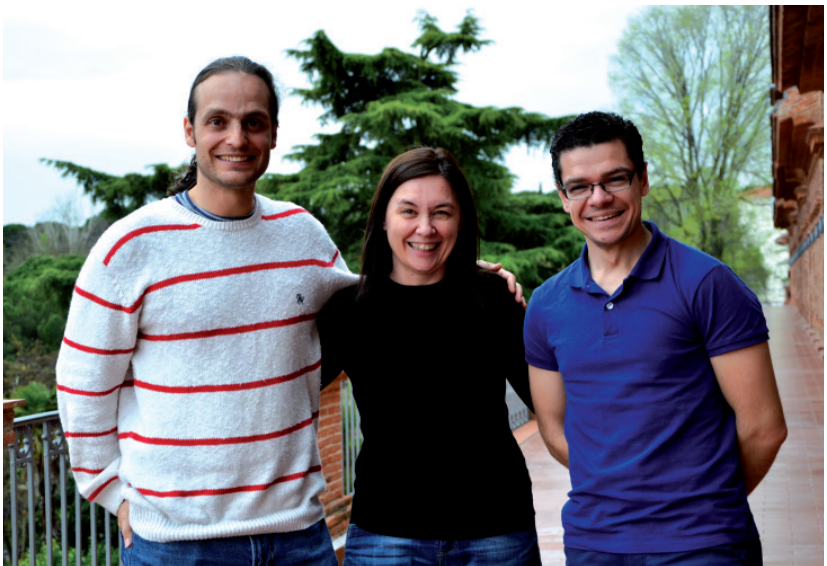
Head of the Unit:

Dr. Pablo José Fernández Marcos

Members:

Dr. Marta Barradas Solas
Postdoctoral researcher

Luís Filipe Costa Machado
Postdoctoral researcher



2.7 Research Platform 1
The Food and Nutritonal Genomics Platform. GENYAL

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 also has a program for characterising the phenotypes and genotypes within populations, allowing a cohort Platform to be constructed for use in clinical trials on nutrition and health. 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 polymorphims and SNPs) of genes involved in nutrient metabolism and nutrition-linked disease. Volunteers are being permanently recruited.

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 Platform (Genomics Laboratory)

GENYAL platform

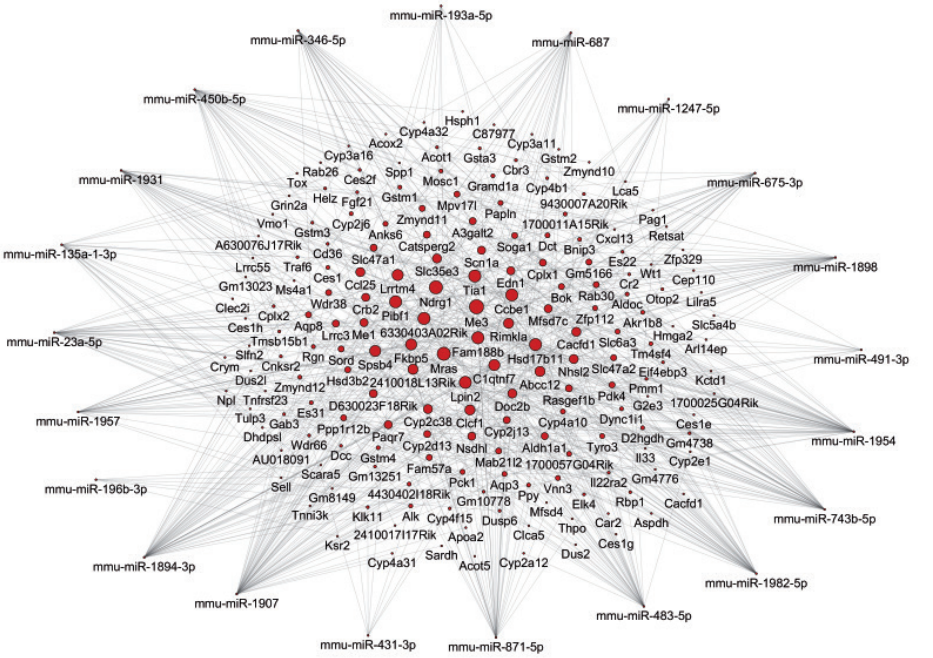
2.7.1. Nutrition and Clinical Trials Unit

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

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

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

In the last year, twelve dietary intervention studies have been carried out to investigate the effects of bioactive compounds related to individual genetics.



2.7.2. Biostatistics and Bioinformatics Unit

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

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

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

2.7.3. Genomics Platform

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

Management:

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

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Nutritionist, senior researcher and head of the Unit

Dr. Rocío de la Iglesia González
Senior nutritionist

Elena Aguilar Aguilar
Senior nutritionist

Isabel Espinosa Salinas
Nutritionist, predoctoral researcher

Helena Marcos Pasero
Nutritionist, predoctoral researcher

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Enrique José García Tenorio Díaz
Jonatan Caballero Morales
Beatriz Belver Miguel
Esther Baeza Labrador
Xingyi Lin
Elena Madalina Robciuc
Andrea Nuria Andrei
Isabel Estévez Martínez
Amancay Ortega López
María Belén Rodríguez Lauandos
Lara Seoane Villar
Nicola Jayne Moro Greasley

Biostatistics and Bioinformatics Unit

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Biostatistician, senior researcher

Roberto Martín Hernández
Bioinformatic, predoctoral researcher

Nutricional Genomic Laboratory

Dr. Susana Molina Arranz
Senior laboratory technician

Belén García Carrasco
Laboratory technician

International Affairs

Dr. Han Joosten
Senior researcher

2.8 Research Platform 2
The Nutrigenomics Interactive Center. CIN

cin centro interactivo de nutrigenómica

CIN platform

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

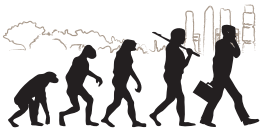
Currently the CIN presents its exhibition entitled 'SNP: Salud y Nutrición Personalizada', i.e., "Health and Personalised Nutrition" the aims of which are to:

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

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

The exhibition is divided into six areas:

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



A1: Evolution and diet

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

A2: Diet and health

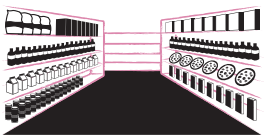
This area teaches the visitor about how diet influences health. Traditionally, foods have been thought of as sources of energy and construction materials required by our cells so that they can undertake their functions. However, we now know that the diet plays an essential role in the regulation of gene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

A3: Healthy living

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

A4: The Mediterranean Diet

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



A5: At the supermarket

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

A6: In the laboratory

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

Temporary workshops and exhibitions

The CIN also sets up workshops directed towards:

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

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

Management:

General Director:
Prof. Guillermo Reglero Rada

Scientific Director:
Prof. José María Ordovás Muñoz

Administrative Director:
Inmaculada Galindo Fernández

Members:

Dr. Lidia A. Daimiel Ruiz
Postdoctoral researcher

Silvia Berciano
Postdoctoral researcher

lacid
laboratorio de actividad cooperativa de I+D

2.9 Research Platform 3
The Cooperative R + D +I Laboratory. LACID

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

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

LACID platform

Management:

General Director:
Prof. Guillermo Reglero Rada

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

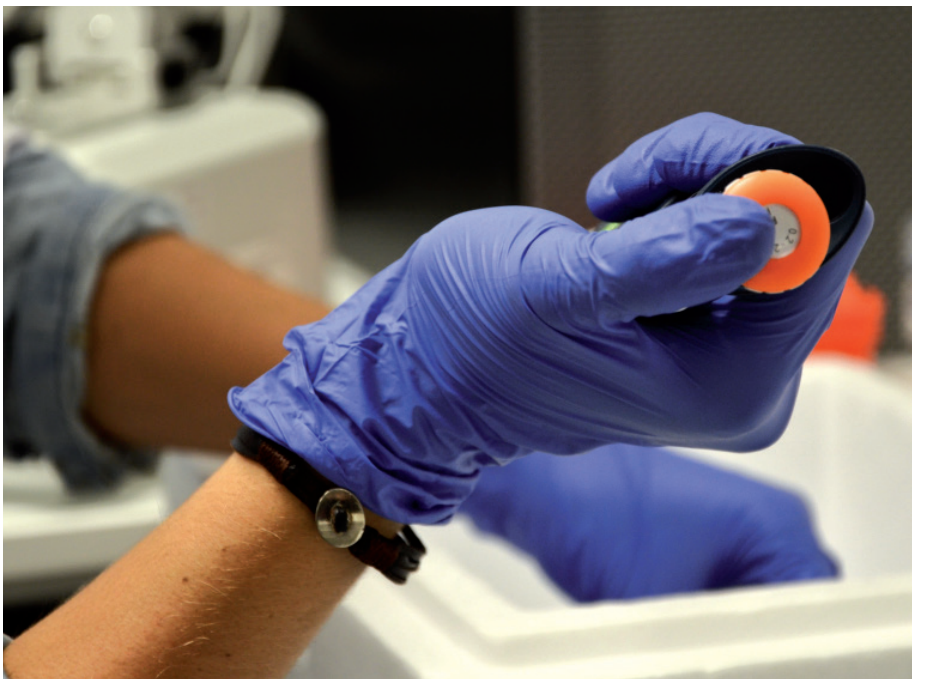
Administrative Director:
Inmaculada Galindo Fernández

Associate researchers:

Dr. Manuel Serrano Marugán
Head of the Tumour Suppression Group and Director of the Molecular Oncology Program, Spanish National Cancer Research Center

Dr. Enrique Casado Sáenz
Head of the Medical Oncology Department, Infanta Sofía University Hospital and Coordinating Professor of Oncology, European University of Madrid

Dr. Jaime Feliú Batlle
Head of the Medical Oncology Department, La Paz University Hospital



research projects

report 2015

3.1 Competitive research projects

miROVEE

Effect of extra virgin olive oil on plasma miRNA levels in healthy subjects: a pospandrial study. Association with the cardiovascular benefits associate 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.

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. Subprograma INNPACTO
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 commercialized 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
- Fundación IMDEA Alimentación
- Seprox Biotech S.L.
- Miguel Gallego S.A.

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 - 2017

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.

European Projects Bureau MADRIMASD - IMDEA Food

Acciones de Dinamización "Europa Redes y Gestores" (EUC2013-C-50806)

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 programs. The project is made up of the following institutions: IMDEA Water, IMDEA Food, IMDEA Energy, IMDEA Materials, IMDEA Nanoscience, IMDEA Networks, IMDEA Software and Madri+d Foundation, which coordinates the project.

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

ALIBIRD-CM

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

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

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

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

Instituto de Salud Carlos III

PREDIMED+DM

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

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

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

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

GOBIERNO DE ESPAÑA MINISTERIO DE ECONOMÍA Y COMPETITIVIDAD

PHOSPHOLIPIDS4COGNITION

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

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

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

NUTRITECH

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

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

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

COST Action-POSITIVe

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

Principal investigator: Dr. José María Ordovás Muñoz
Funded by: Comisión Europea
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.

3.2 Research grants

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

- **Dr. Cristina Aguirre Portolés**

Type: Incoming Fellow
Category: Experienced researcher

- **Dr. Han Joosten**

Type: Incoming Fellow
Category: Experienced researcher

Funded by: Comisión Europea. VII Programa Marco I+D
Duration: 2012 - 2016

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

- **Dr. Cristina Aguirre**

Principal investigator: Dr. Ana Ramírez de Molina
Funded by: Ministerio de Economía y Competitividad
Duration: 2014 - 2015

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

- **Mónica Gómez Patiño**

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

XIV Manuel de Oya grants call: Beer, health and nutrition

- **Victor Micó Moreno**

Principal investigator: Dr. José María Ordovás Muñoz
Funded by: Asociación Cerveceros España
Duration: 2014 - 2015

Grants for training university teachers. (FPU014/06386)

- **Silvia Berciano**

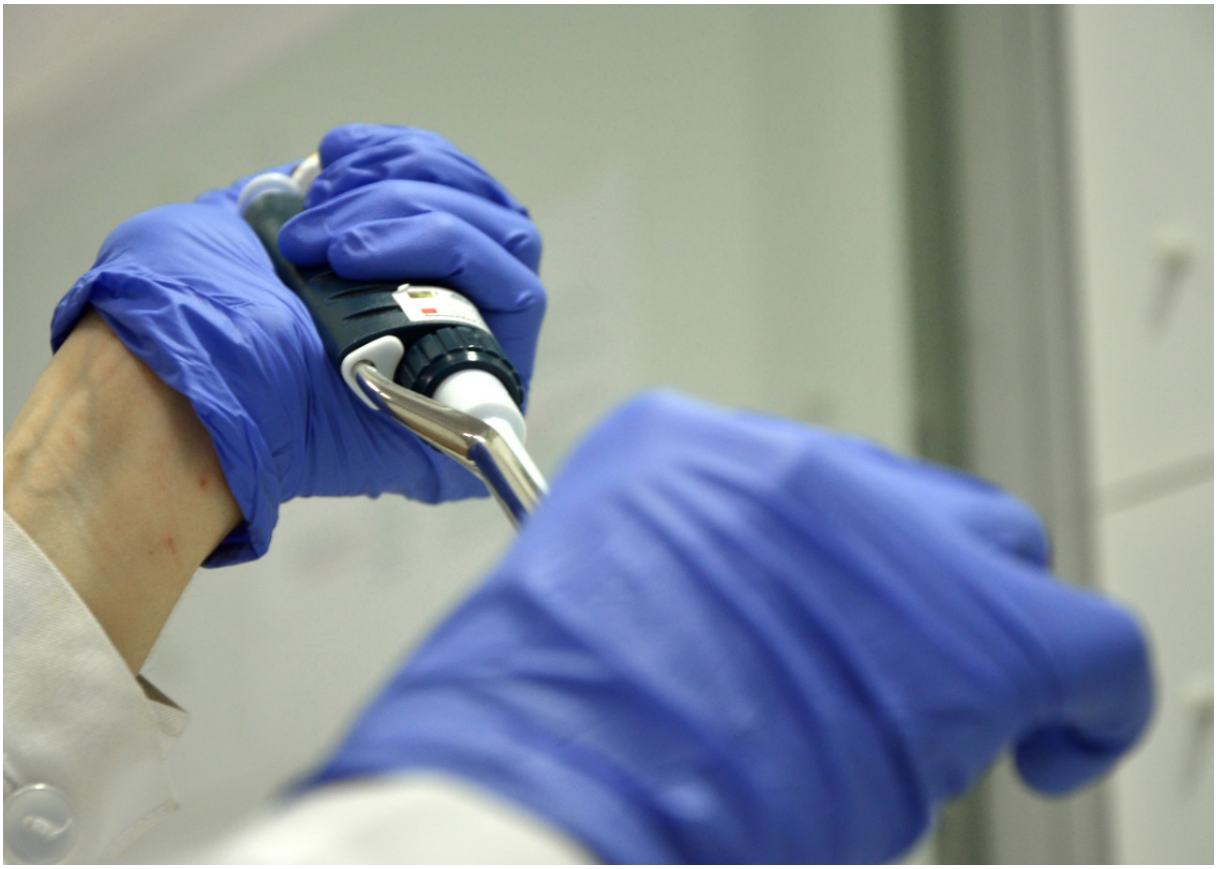
Principal investigator: Dr. José María Ordovás Muñoz
Funded by: Ministerio de Educación, Cultura y Deporte
Duration: 2015 - 2016

Grant for research in oncology

- **Dr. Pablo José Fernández Marcos**

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

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



3.3 R+I contracts with companies

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 PhytoMedTM complement

Principal investigator: Dr. Francesco Visioli
Funded by: Phytogen Medical Foods S.L.
Duration: 2013 - 2015

CHIP OPEN ARRAY

Open Array chip 16 SNPs. Loading and initial analysis of results for genetic association study with Alzheimer's disease

Principal investigator: Dr. Ana Ramírez de Molina
Funded by: Centro de Biología Molecular. Universidad Autónoma de Madrid
Duration: 2015

PRIMICIA

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

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

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

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

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

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

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

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

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

scientific results

report 2015

4.1 Publications

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3. Jaime L, Vázquez E, Fornari T, López-Hazas MD, García-Risco MR, Santoyo S, Reglero G. Extraction of functional ingredients from spinach (Spinacia oleracea L.) using liquid solvent and supercritical CO2 extraction. *Journal of the Science of Food and Agriculture* (2015) 95 (4), 722-729. doi: 10.1002/jsfa.6788

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8. Ramírez de Molina A, Vargas T, Molina S, Sánchez J, Martínez-Romero J, González-Vallinas M, Martín-Hernández RM, Sánchez-Martínez R, Gómez de Cedrón M, Dávalos A, Calani L, Del Rio D, González-Sarrías A, Espín JC, Tomás-Barberán FA, Reglero G. The Ellagic Acid Derivative 4,4'-Di-O-Methylellagic Acid Efficiently Inhibits Colon Cancer Cell Growth through

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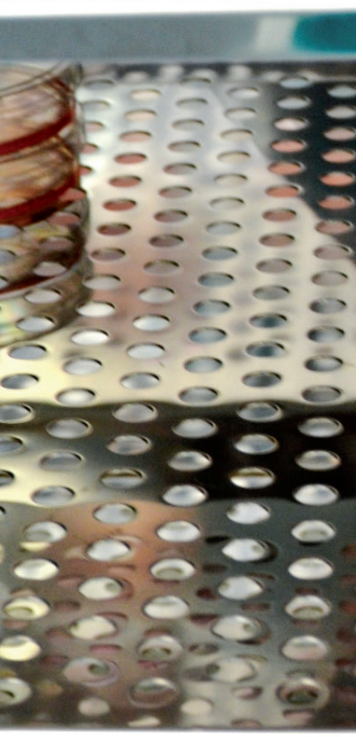

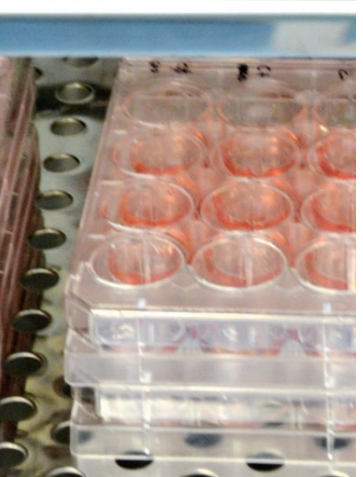

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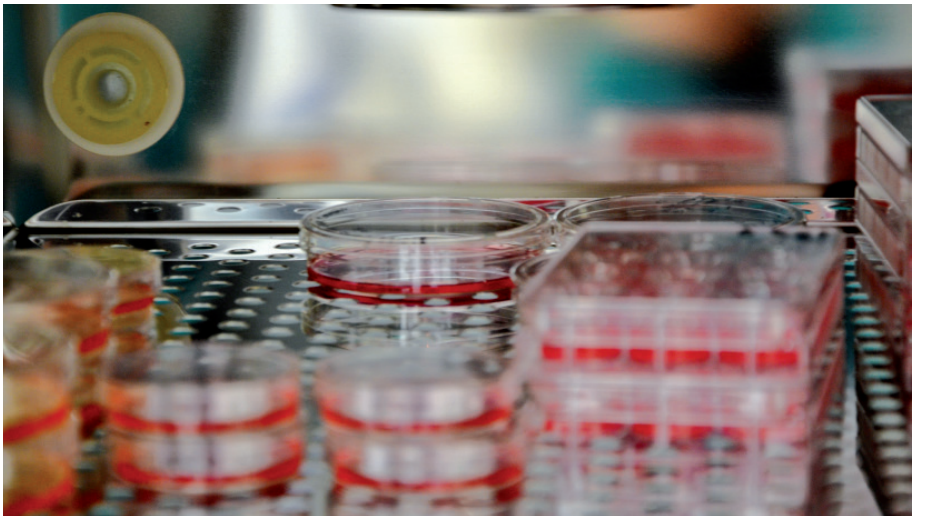

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4.2 Books and chapters of books

1. Dávalos A, Chroni A. Antisense oligonucleotides, microRNAs, and antibodies. *Handbook of Experimental Pharmacology.* 2015, 224:649-89 doi: 10.1007/978-3-319-09665-0_22

2. Kardassis D, Gafencu A, Zannis VI, Dávalos A. Regulation of HDL genes: transcriptional, posttranscriptional, and posttranslational. *Handbook of Experimental Pharmacology.* 2015, 224:113-79 doi: 10.1007/978-3-319-09665-0_3

3. Ricardo Ramos Ruiz y Ana Ramírez de Molina. Chapter: El desarrollo de la genómica en el sector agroalimentario. In: *El sector agro-mar-alimentario español: una visión renovada. Estudios Mediterráneo Económico vol. 28. Monografías Cajamar,* November 2015

4. Guillermo Reglero Rada. Chapter: Alimentación y Salud Ciencia e Innovación para el Impulso del Sector Alimentario. *In: El sector agro-mar-alimentario español: una visión renovada. Estudios Mediterráneo Económico vol. 28. Monografías Cajamar,* November 2015

5. José María Ordovás Muñoz. Coordination. Introduction chapter. In: *Nutrición y Salud. Estudios Mediterráneo Económico vol. 27. Monografías Cajamar,* July 2015

4.3 Thesis directed or in progress

Title: Identification of SNPs involved in the response to different dietary components and association with food-related diseases: Nutrigenetic studies
PhD student: Isabel Espinosa Salinas
Directors: Dr. Ana Ramírez de Molina and Dr. Viviana Loria Kohen
University: Autónoma, Madrid
Date: 2016

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

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

Title: Effect of caloric restriction based on Mediterranean Diet about regulatory microRNAs of molecular processes associate to aging
PhD student: Victor Micó Moreno
Director: Prof. José María Ordovás Muñoz
University: Autónoma, Madrid
Date: 2018

Title: Studying the role of micronutrients in cardiovascular and neurodegenerative diseases
PhD student: Carmen Crespo Lorenzo
Director: Prof. Francesco Visioli
University: Autónoma, Madrid
Date: 2017

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

Title: Plant extracts for personalized nutrition for cancer patients
PhD student: Lamia Mouhid Al Achbili
Directors: Dr. Ana Ramírez de Molina and Prof. Tiziana Fornari Reale
University: Autónoma, Madrid
Date: 2017

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

Title: New biomarkers of clinical prognosis in non-small cell lung cancer
PhD student: María Merino Salvador
Directors: Dr. Ana Ramírez de Molina and Dr. María Sereno Moyano
University: Autónoma, Madrid
Date: 2017

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

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

4.4 Awards

1. Dr. Ana Ramírez de Molina
Best Paper Presented Award
Institution: Sociedad Española de Oncología Médica
Date: October 2015

2. Dr. Alberto Dávalos Herrera
XVII National Award for Research in Sports Medicine
Entidad: Universidad de Oviedo
Date: November 2015

3. Prof. Guillermo Reglero Rada
2015 Medal Promotion of Invention
Institution: Fundación García Cabrerizo
Date: November 2015

4. Prof. Jose María Ordovás Muñoz
V Maimónides Commemorative Lecture
Institution: Instituto Maimónides de Investigación Biomédica de Córdoba
Date: December 2015

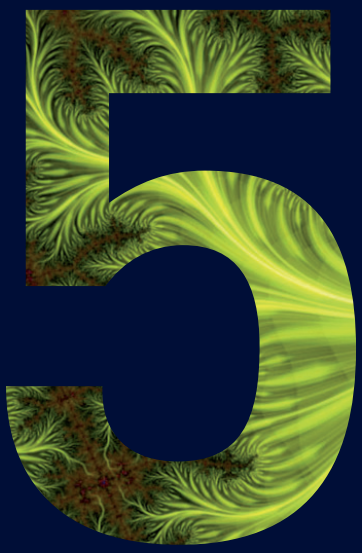
4.5 Patents

Publication number: ES2 408 7301B1
Title: Supercritical Rosemary extract for cancer treatment
Owners: IMDEA Food, Universidad Autónoma de Madrid
Inventors: Ana Ramírez de Molina, Susana Molina Arranz, Margarita González-Vallinas Garrachón, Tiziana Fornari Reale, Mónica Rodríguez García-Risco y Guillermo Reglero Rada

Publication number: ES2475366B1
Title: Methods and kits for prognosis of colorectal cancer
Owners: IMDEA Food, Hospital La Paz Institute dor Health Research
Inventors: Ana Ramírez de Molina, Guillermo Reglero Rada, Teodoro Vargas Alonso, Susana Molina Arranz, Margarita González-Vallinas Garrachón, Juan Moreno Rubio, Paloma Cejas Guerrero and Jaime Feliú Batlle

awards y patents

dissemination activities



report 2015

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

5.1 Organization of conferences and seminars

Author /s: Dr. Paloma Cejas Guerrero
Title: CNOT3 modulates transcriptional mechanisms characteristic of embryonic stem cells in colorectal carcinogenesis
Event: IMDEA Food seminar
Date: February 17, 2015

Author /s: Dr. Mª Jesús Latasa Sada
Title: Gene expression makes the difference: SREBP, vitamin A and microRNAs
Event: IMDEA Food seminar
Date: February 25, 2015

Author /s: Dr. David Olmeda Casadomé
Title: Modeling lymphangiogenesis and metastasis in melanoma
Event: IMDEA Food seminar
Date: March 17, 2015

Author /s: Dr. Lidia Daimiel Ruiz
Title: Dietary lipids modulate the expression of miR-107, a miRNA that regulates the circadian system
Event: IMDEA Food seminar
Date: April 22, 2015

Author /s: Dr. Javier Muñoz Peralta
Title: Next-generation proteomics: towards an integrative view of proteome dynamics
Event: IMDEA Food seminar
Date: May 12, 2015

Author /s: Dr. Sonia Ramos Rivero
Title: Potential Anti-Diabetic Effect of Cacao Polyphenols
Event: IMDEA Food seminar
Date: May 26, 2015

Author /s: Prof. Emilio Herrera and Dr. Alberto Dávalos Herrera
Title: Nutrition and Epigenetics in pregnancy and breastfeeding
Event: 2015 National Nutrition Day. Conference and visit to the IMDEA Food Interactive Nutrigenomics Center CIN
Date: May 28, 2015

Author /s: Dr. Ruth Sánchez Martínez
Title: Role of lipid metabolism in epithelial-mesenquimal transition: new therapeutic approaches in colon cancer
Event: IMDEA Food seminar
Date: June 23, 2015

Author /s: Dr. Alberto Dávalos Herrera
Title: Activity: The “scientific interlude”: scientists and the science on cinema, does it reality out perform the fiction?
Event: European Researchers’ Night. Co-organized by all IMDEA Institutes
Date: September 25, 2015

Author /s: The Food and Nutritonal Genomics Platform GENYAL
Title: TecnoUAM
Event: European Researchers’ Night. Co-organized by IMDEA Food, Universidad Autónoma de Madrid and the Instituto de Investigación en Ciencias de la Alimentación (CIAL, CSIC-UAM)
Date: September 25, 2015

Author /s: Prof. Tiziana Fornari Reale
Title: Carbon Dioxide: a key solvent for promoting functional food development
Event: IMDEA Food seminar
Date: September 28, 2015

Author /s: Dr. João Estevao Tiago Carneiro
Title: One year intake of a resveratrol-enriched grape extract: effects in patients with high CVD risk
Event: IMDEA Food seminar
Date: October 13, 2015

Title: "Biomeeting" with media. 2015 Europen Biotech Week
Event: Visit to the IMDEA Food Interactive Nutrigenomics Center CIN. Co-organized by IMDEA Food and the Asociación Española de Bioempresas
Date: October 13, 2015

Author /s: Dr. Rocío de la Iglesia González
Title: Effects of a new dietary strategy in the treatment of the metabolic syndrome: the resmena diet
Event: IMDEA Food seminar
Date: October 27, 2015

Title: III Entrepreneurs Scientific Congress
Event: Visit to the IMDEA Food Interactive Nutrigenomics Center CIN
Date: November 5, 2015

Author /s: Dr. Lidia Daimiel Ruiz
Title: Nutrition and Chronobiology. Light significance in nutrition
Event: 2015 Science Week. Conference and visit to the IMDEA Food Interactive Nutrigenomics Center CIN
Date: November 12 – 13, 2015

Author /s: Dr. Marta Corzo Martínez
Title: Production of a bioactive lipid-based delivery system from ratfish liver oil by enzymatic glycerolysis
Event: IMDEA Food seminar
Date: November 24, 2015

Author /s: Prof. Guillermo Reglero Rada
Title: Personalized nutrition to bring to market high efficiency food.
Event: Dissemination session: Food Challenges for the Distribution sector in s. XXI Organized by IMDEA Food
Date: November 25, 2015

Author /s: Prof. Javier Fontecha Alonso
Title: Phospholipids in Human Health
Event: IMDEA Food seminar
Date: December 15, 2015

5.2 Congress, invited conferences, seminars and courses

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

5.2.1 Congress coordination and communications

Author/s: Helena Marcos Pasero, Viviana Loria Kohen, Isabel Espinosa Salinas, Susana Molina Arranz, Jesús Herranz Valera, Ana Ramírez de Molina, Guillermo Reglero Rada
Title: Interaction of SELE genotypes with oxidized low density lipoprotein (ox-LDL) levels in a weight loss treatment
Communication: Poster
Event: XIX Practice Nutrition International Conference
Date: February 18 - 19, 2015

Author/s: Viviana Loria Kohen, Isabel Espinosa Salinas, Helena Marcos Pasero, Jesús Herranz Valera, Susana Molina Arranz, Guillermo Reglero Rada, Ana Ramírez de Molina
Title: La Interacción entre el polimorfismo CLOCK rs3749474 y la ingesta de grasa modulan la pérdida de peso en personas obesas
Communication: Oral
Event: 3rd FESNAD Congress. Food and Nutrition: Global need
Date: March 5 - 7, 2015

Author/s: José María Ordovás Muñoz
Title: Regulación de la expresión génica por mRNA procedente de los alimentos
Communication: Oral
Event: 3rd FESNAD Congress. Food and Nutrition: Global need
Date: March 5 - 7, 2015

Author/s: María Isabel Espinosa Salinas, Viviana Loria Kohen, Helena Marcos Pasero, Susana Molina Arranz, Jesús Herranz Valera, Ana Ramírez de Molina, Guillermo Reglero Rada
Title: Influencia de la variante genética APOE Arg176Cys sobre los niveles de Apolipoproteína B-100, LDL colesterol y marcadores de riesgo cardiovascular
Communication: Oral
Event: 3rd FESNAD Congress. Food and Nutrition: Global need
Date: March 5 - 7, 2015

Author/s: Ruth Sánchez-Martínez, Marta Gómez de Cedrón, Teodoro Vargas Alonso, Susana Molina Arranz, Belén García Carrasco, Jesús Herranz Valera, Mónica Álvarez Fernández, Juan Moreno Rubio, Guillermo Reglero Rada, Mirna Pérez Moreno, Jaime Feliú Batlle, Marcos Malumbres, Ana Ramírez de Molina
Title: A link between lipid metabolism and epithelial-mesenchymal transition generates cells with cancer stem cells characteristics and provides a target for combined drug therapy in colon cancer
Communication: Poster
Event: EMBO - EMBL Symposium Frontiers in Stem Cells and Cancer
Date: March 29 - 31, 2015

Author/s: José María Ordovás Muñoz
Title: Circadian Disruptions in Humans – Impact on Metabolism, Energy Balance and Obesity
Communication: Oral
Event: 2015 Experimental Biology Congress
Date: March 31, 2015

Author/s: José María Ordovás Muñoz
Title: Phenotypic flexibility. ASN Satellite
Communication: Oral
Event: 2015 Experimental Biology Congress
Date: April 1, 2015

Author/s: Lidia Daimiel Ruiz
Title: miR-107, un microRNA modulado por los lípidos de la dieta, en la regulación del ritmo circadiano de las células a través de su control sobre la expresión del gen CLOCK
Communication: Oral
Event: National Congress of the Spanish Society of Arteriosclerosis
Date: May 27 - 29, 2015

Author/s: Lamia Mouhid, Lilia Salas Pérez, Mónica R. García Risco, Tiziana Fornari Reale, Ana Ramírez de Molina, Guillermo Reglero Rada
Title: Antiproliferative Activity of Supercritical Plant Extracts on Pancreatic Cancer Cell Line
Communication: Poster
Event: 2015 EQUIFASE
Date: June 28 - July 1, 2015

Author/s: Calder PC, Bosco N, Bourdet-Sicard R, Capuron L, Delzenne N, Doré J, Franceschi C, Lehtinen M, Visioli F
Title: Health relevance of the modification of low-grade inflammation in ageing: Could nutrition play a role?
Communication: Poster
Event: 2015 FASEB
Date: July 26 - 31, 2015

Author/s: Mónica Rodríguez García Risco, Lilia Salas Pérez, Lamia Mouhid, Ana Ramírez de Molina, Guillermo Reglero Rada, Tiziana Fornari Reale
Title: Antioxidant activity of Asteraceae (Achillea millefolium and Calendula Officinalis) and Lamiaceae (Melissa officinalis and Origanum Majorana) plant extracts
Communication: Poster
Event: 2015 FLUCOMP
Date: September 16 - 18, 2015

Author/s: Francesco Visioli
Communication: Scientific Committee
Event: 13th Euro Fed Lipid Congress
Date: September 27 - 30, 2015

Author/s: Custodio A, Vagas T, Mendiola M, Aparicio A, Yaya R, Maurel J, Fernández-Martos C, Rodríguez-Salas N, Ramírez de Molina A, Feliú J
Title: Sesión Plenaria COLOLIPIDGENE: firma génica del metabolismo lipídico (ML) como factor pronóstico en cáncer colorrectal (CCR) estadio II
Communication: Oral. Plenary Session
Event: XV Spanish Society of Medical Oncology Congress
Date: October 28 - 30, 2015

Author/s: Andrés Redondo, Marta Mendiola, Virginia Martínez-Marín, Jesús Herranz, Laura Yébenes, Beatriz Castelo, Pilar Zamora, Álvaro Pinto, Patricia Cruz, Victoria Heredia, Esther Díaz, Ángelo Gámez-Pozo, Juan Angel Fresno-Vara, Ana Ramírez de Molina, 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)
Communication: Oral
Event: XV Spanish Society of Medical Oncology Congress
Date: 28 - 30 de octubre de 2015

Author/s: José María Ordovás Muñoz
Title: Human Health
Communication: Oral
Event: Keystone Symposium Human Nutrition, Environment and Health
Date: October 15, 2015

Author/s: José María Ordovás Muñoz
Title: What have GWAS contributed to nutrition knowledge
Communication: Oral
Event: 12th European Congress of Nutrition, FENS
Date: October 20, 2015

Author/s: José María Ordovás Muñoz
Title: Obesidad: obeso metabólicamente sano y peso normal metabólicamente obeso
Communication: Oral
Event: 25 Medical Congress SAHTA
Date: November 5 - 7, 2015

Author/s: José María Ordovás Muñoz
Title: Biomarcadores omic en epidemiología nutricional. Tendencias presentes y futuras
Communication: Oral. Coordination and closing ceremony
Event: Ramon Areces Foundation International Symposium: The latest in obesity
Date: December 1 - 2, 2015

Author/s: José María Ordovás Muñoz
Title: V Maimonides Commemorative Lecture
Communication: Oral.
Event: V Maimónides lecture. Instituto Maimónides de Investigación Biomédica de Córdoba
Date: December 15, 2015

5.2.2 Invited conferences

Author/s: José María Ordovás Muñoz
Title: Guías alimentarias, equilibrio nutricional y balance energético
Event: Special Scientific Session. Real Academia de Medicina
Date: January 15, 2015

Author/s: Alberto Dávalos Herrera
Title: Micro RNAs rol en metabolismo lipídico y su regulación por componentes de la dieta
Event: 1st Congress Healthy Living: Food, nutrition and health. Universidad de Concepcion de Chile
Date: January 22 - 23, 2015

Author/s: José María Ordovás Muñoz
Title: Tuft Talks Obesity: from cell to society
Event: Scientific Session of Tufts University, Boston
Date: April 28, 2015

Author/s: Francesco Visioli
Title: Nutritional deficiencies: from macro to micro
Event: 2015 Meet the Global Challenge. Valagro Global Conference
Date: May 12, 2015

Author/s: José María Ordovás Muñoz
Title: Personalized nutrition is about what we eat and what we drink
Event: Special Scientific Session. Pharmacy School. Universidad Complutense de Madrid
Date: June 2, 2015

Author/s: Francesco Visioli
Title: Oltre gli antiossidanti: i componenti minori ed i loro variegati effetti fisiologici
Event: XIV Congress of the Italian Society of Photochemistry
Date: June 10 - 11, 2015

Author/s: Ana Ramírez de Molina
Title: Alteraciones del metabolismo lipídico en la progresión del cáncer colorectal
Event: IDIPAZ Scientific Seminar, Hospital Universitario La Paz de Madrid
Date: June 12, 2015

Author/s: José María Ordovás Muñoz
Title: Our future can change our past
Event: Scientific Extraordinary Session. ILSI North America FNSP mid-year meeting
Date: June 30, 2015

Author/s: José María Ordovás Muñoz
Title: Nutrigenómica y componentes genéticos de la obesidad
Event: I Conference on Lifestyle and Health. Universidad Europea de Madrid
Date: July 9, 2015

Author/s: Silvia Berciano Benítez
Title: Regulación epigenética a lo largo de la vida y su interacción con variantes genéticas: El caso del gen APOE
Event: I Conference on Lifestyle and Health. Universidad Europea de Madrid
Date: July 9, 2015

Author/s: José María Ordovás Muñoz
Title: Long-life health: an integrated effort of science and people
Event: Opening sesión. NuGO week 2015. Universidad de Barcelona
Date: September 7, 2015

Author/s: Ana Ramírez de Molina
Title: La mujer en la ciencia
Event: Entrepreneurs Scientists Congress
Date: November 5, 2015

Author/s: Lidia Daimiel Ruiz
Title: Nutrigenética y Dieta Mediterránea
Event: Curricular scientific seminar. Universidad Autónoma de Madrid
Date: November 18, 2015

Author/s: José María Ordovás Muñoz
Title: Aceite de oliva y envejecimiento saludable
Event: Olive oils and lifestyle (International Olive Oil). Abanca
Date: November 18, 2015

Author/s: José María Ordovás Muñoz
Title: "¿Cómo nos alimentaremos en el futuro?"
Event: Colloquium: The Future is coming. Espacio Fundación Telefónica
Date: November 30, 2015

Author/s: José María Ordovás Muñoz
Title: GATTACA: ficción de ayer, realidad de mañana?
Event: Nutrigenomics seminar with S.M. Leticia Ortiz. Consejo Superior de Investigaciones Científicas
Date: November 30, 2015

Author/s: Lidia Daimiel Ruiz
Title: Nutrigenética y Dieta Mediterránea
Event: Curricular scientific seminar. Universidad Autónoma de Madrid
Date: December 2, 2015

Author/s: Francesco Visioli
Title: Oli vegetali: i componenti minori
Evento: XXXVI National Congress SINU
Date: December 4, 2015

5.2.3 Courses

Título: Estadística aplicada a la investigación biomédica con R

Coordinating researcher: Jesús Herranz Valera

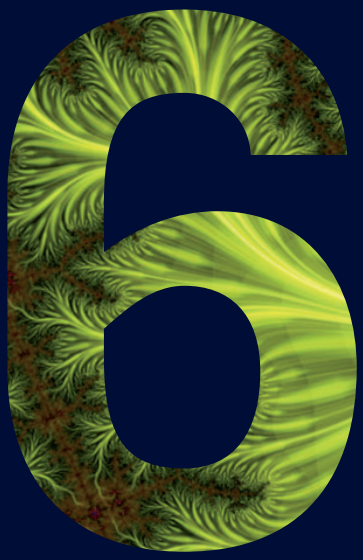
Date: November 11 - 13, 2015

Title: Técnicas estadísticas de Data Mining con R

Coordinating researcher: Jesús Herranz Valera

Date: December 14 - 17, 2015

personnel



report 2015

6.1 Executive Board

Prof. Guillermo Reglero Rada
General Director

Dr. Ana Ramírez de Molina
Deputy Director

Inmaculada Galindo Fernández
General Manager

executive board

Management

Prof. Guillermo Reglero Rada
Director and head of the PRODESALUD Unit

Guillermo J. Reglero Rada holds a PhD in Chemical Sciences (1985). He is a Professor of Food Sciences at the Autonomous University of Madrid (Universidad Autonoma de Madrid) (1999) and a scientific researcher of the Spanish National Research Council (Consejo Superior de Investigaciones Científicas) (on leave). He worked as an Industrial Project Technician in the Centre for the Development of Industrial Technology (Centro para el Desarrollo Tecnológico Industrial) (1993-1994) and was the Manager of the Food Science and Technology Area for the National R&D Plan (2002-2006). He has overseen many publicly and privately funded projects. He has coordinated since 2005 a Technology Activity Program funded in 3 calls for proposal of the Madrid Regional Government (Comunidad de Madrid), the program consists of groups from 10 research centers and hospitals. He is the author of more than 240 publications with international impact and 2 patents currently being enforced. He was the recipient of the Archer Daniels award bestowed by the American Oil Chemists Society in 2001. In 2008, the Spanish Gastronomy Association (Sociedad Española de Gastronomía) gave him the Best Food Science Researcher award. In 2015, he received the Medal of Honor for Encouraging Invention from the García Cabrerizo Foundation (Fundación García Cabrerizo).

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

Dr. Ana Ramírez de Molina (PhD in Molecular Biology, 2002) has developed her scientific career in the field of lipid metabolism alterations in cancer, working as an associate researcher in the Traslational Oncology Unit CSIC-UAM-La Paz Hospital, with long postdoctoral periods at The Royal Marsden Hospital (Cancer Research UK Centre for Therapeutics, London) and Memorial Sloan Kettering Cancer Center (New York). She has published more than 60 articles in prestigious international journals of her research field and is co-inventor of 5 patents in different phases of exploitation by a biotechnology. She was the former Director of Research and Innovation of TCD Pharma, spin-off company from CSIC focused on the development of new tumour markers and therapies in Cancer, where she participated to drive a new "first in class" drug to Phase I Clinical Trials for cancer patients. She joined IMDEA Food Institute in 2010, where she currently leads the Molecular Oncology and Nutritional Genomics of Cancer Unit, conducts the scientific direction of the GENYAL Platform for Personalized Nutrition for Health, and participates in the management of the Institute as the Deputy Director. She has been awarded with the mention of best PhD Thesis on Molecular Biology of her promotion by Universidad Autónoma de Madrid, outstanding young researcher (EACR-Merck Sharpp Dome award to Young Researchers), and recently as an outstanding woman in Science by Comunidad de Madrid.

6.2 Research Units and Platforms

Research Unit 1. Nutritional Genomics of Cardiovascular Disease and Obesity. GENECO

GENECO unit

Prof. José María Ordovás Muñoz
Head of the Unit

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

Dr. Lidia A. Daimiel Ruiz
Postdoctoral researcher

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

Silvia Berciano Benítez
Predoctoral researcher

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

Víctor Micó Moreno
Predoctoral researcher

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

Laura Berninches Pintado
Technician

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

Dr. Arantxa Rodríguez Casado
Senior researcher

Arantxa Rodríguez 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. From 1999 to 2002, she worked as a Research Associate in a Raman spectroscopy laboratory in US focused on biophysics. Then, she went to London to Birkbeck College (UK) until 2004 when 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. In 2008 she joined to the IMDEA Food Institute. 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.

Research Unit 2. Molecular Oncology and Nutritional Genomics of Cancer. OMYGEN

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

Dr. Teodoro Vargas Alonso
Postdoctoral researcher

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

Dr. Ruth Sánchez Martínez
Postdoctoral researcher

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

Dr. Marta Gómez de Cedrón Cardeñosa
Postdoctoral researcher

Dr. Marta Gómez de Cedrón, got her BSc degree in Chemistry (Biochemistry) from the Universidad del País Vasco (UPV-EHU) in 1993. She moved to Madrid in 1996 to start her scientific career in Jose Antonio García Álvarez's lab at Centro Nacional de Biotecnología (CNB-UAM). There she studied the RNA helicase (CI) of plum pox virus (PPV) describing mutation that inhibited the systemic spread of the virus on herbaceous hosts. In 2005 she got a postdoctoral grant (Fullbright) to join Danica Stanimirovic's lab in the Institute for Biological Sciences (IBS-NRC) in Ottawa (Canada), where she studied the role of Grb7 Delta mutants in angiogenesis related to glioblastomes. In 2006 she moved back to Spain to join Marcos Malumbres' lab at Centro Nacional de Investigaciones Oncológicas (CNIO) where she worked in the generation and characterization of two mouse models (cKO and iKi) for microRNA-203 related to leukaemias and skin cancer. In 2013 she joined to Ana Ramírez de Molina's lab at IMDEA FOOD where she started to work in the characterization of microRNAs deregulated in colorectal cancer. Her research actually is focused on the identification and characterization of bioactive compounds from plant extracts as potential supplements against 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. Her studies were mainly focused in the role of the mitotic protein TPX2 both in mouse development and tumorogenisis in adults. Part of this research was performed at the Max Plank Institute of Molecular Cell Biology and Genetics under the supervision of Dr. Anthony Hyman. After obtaining her PhD degree in Molecular Biology and Genetics she joined the European Molecular Biology Laboratory (EMBL) in 2012. She focused her work in the implication of chromosomal instability in the initiation, progression and regression of non-small-cell lung cancer (NSCLC). She joined IMDEA in 2014 as a postdoctoral researcher focusing her studies in the association between metabolic syndrome, obesity and cancer.

Dr. Lara P. Fernández Álvarez
Postdoctoral researcher

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

Dr. Juan Moreno Rubio
Postdoctoral researcher

Currently Juan Moreno Rubio combines his work as a collaborator in the group of Molecular Oncology and Nutritional Genomics of Cancer of IMDEA Food with the coordination of the Precision Oncology Laboratory (POL) of the Infanta Sofia University Hospital. Previously, he coordinated the Laboratory of Translational Oncology of Hospital La Paz (IdiPAZ, Group 32) and performed his doctoral thesis (Excellent Cum Laude) in the Osteoarticular Pathology Laboratory (IISFJD). As a result of this activity has participated in 25 publications in international scientific journals, has taken part in 11 research projects, 7 of these projects financed in competitive public calls. He has been involved in the invention of 2 patents, has directed 2 doctoral theses and he has given numerous communications to international conferences.

OMYGEN unit

Dr. Laura Nogués Vera
Postdoctoral researcher

After obtaining the BSc Hons in Biochemistry (2008) in Zaragoza with special distinction (Premio extraordinario de licenciatura), Laura moved to the Universidad Autónoma de Madrid to study a Master Degree in Molecular and Cell Biology. Afterwards, she joined Dr. Petronila Penela and Dr. Federico Mayor Group at the Centro de Biología Molecular "Severo Ochoa" (CBMSO) for doing her PhD work. As a result, several research papers have been published in high qualified journals. In December 2014, she presented her thesis with the maximum qualification (Sobresaliente Cum Laude) and with European Doctorate Mention due to a stay in the laboratory of Dr. Philippe Chavrier (Institute Curie, Paris) where she performed new approaches of 3D models of cell invasion and metastasis. She has also been awarded with different grants which include the EMBO short term fellowship. In 2015 he joined IMDEA as postdoctoral researcher to perform translational research focused on the study of functional relationships between once-modulators and bioactive compounds and their influence on signalling and metabolic transformation and/or tumor progression.

Jorge Martínez Romero
Predoctoral researcher

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

Silvia Cruz Gil
Predoctoral researcher

Silvia Cruz Gil obtained her Biochemistry Degree at Universidad Complutense de Madrid in 2013. During the last two years of her degree she collaborated with the Biochemistry II Department at Pharmacy School in Universidad Complutense de Madrid studying the molecular biology of hepatocellular carcinoma. Later, she continued her training by obtaining a Master in Molecular Biosciences at Universidad Autónoma de Madrid in 2014. Meanwhile, Silvia joined ALGENEX (Alternative Gene Expression S.L.) in association with I.N.I.A (National Institute of Agricultural and Food Research and Technology) for an internship. During this period she worked in the development of vectored vaccines. In October 2014, she started studies conducive to her PhD Degree at IMDEA Food Institute in the Molecular Oncology and Nutritional Genomics of Cancer Group (OMYGEN). Her research primarily focuses on the role of the lipid metabolism in tumor progression.

Research Unit 3. Laboratory of Functional Foods. LABFUN

Prof. Francesco Visioli
Head of the Unit

Francesco Visioli is senior investigator at the Madrid Institute for Advanced Studies (IMDEA Food) 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. Dr. Visioli has a publication record of more 240 papers and book chapters, which have been cited over 8.400 times.

Dr. Emma Burgos Ramos
Postdoctoral researcher

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

Dr. João Tiago Estevao Tomé Carneiro
Postdoctoral researcher

The research carried out by Dr. Joao Tiago Estevao Tomé Carneiro has been focusing on the biological activity of food constituents in chronic pathologies. With a degree in Biochemistry, he obtained his PhD at the University of Murcia (2013). He is the co-author of 12 peer-reviewed papers in relevant international journals. In 2014, he joined the Laboratory of Functional Foods at IMDEA Food , where he contributes to the assessment of the potential health effects of bioactive food components, such as hydroxytyrosol, in vitro, in vivo and through placebo-controlled, randomized clinical trials. He is currently participating in a research project aimed at evaluating if the consumption of bioactive phospholipids, as part of a nutritional supplement, contributes to the improvement or delaying of mild cognitive impairment and its correlation with different biological, clinical or neuropsychological biomarkers.

Carmen Crespo Lorenzo
Predoctoral researcher

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

LABFUN unit

Research Unit 4. Disorders of Lipid Metabolism and Molecular Nutrition. DISLIPID

DISLIPID unit

Dr. Alberto Dávalos Herrera
Head of the Unit

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

Dr. Maria Jesús Latasa Sada
Postdoctoral researcher

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

Judit Gil Zamorano
Predoctoral researcher

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

Research Unit 5. Production and Development of Foods for Health. PRODESALUD

Prof. Guillermo Reglero Rada: Director and head of the Unit

PRODESALUD unit

Dr. Marta Corzo Martínez
Postdoctoral researcher

Dr. Marta Corzo (Madrid, 1983) obtained her BSc degree (2006) and Doctorate (2011) in Food Science and Technology at the University Autónoma of Madrid. During 2012, she continued with her research activity in the Laboratory of Food Chemistry of the Wageningen University (WU-FCH) (The Netherlands) thanks to an aid of postdoctoral mobility from the Spanish Ministry of Education, and in 2013, she started to work in The Department of Food Science & Technology at The University of Tennessee (Knoxville, USA). In April 2014, she came back to Spain to the Institute of Food Science Research (CIAL, group of Prebiotic Carbohydrates) as associate postdoctoral researcher, and in November 2014, she joined PRODESALUD IMDEA Food group. Since November 2015, she works in the Department of Characterization and Production of Novel Foods at CIAL (CSIC-UAM) with a Juan de la Cierva postdoctoral contract.

Lamia Mouhid Al Achbili
Predoctoral researcher

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

Research Unit 6. Bioactive Products and Metabolic Syndrome. BIOPROMET

BIOPROMET unit

Dr. Pablo José Fernández Marcos

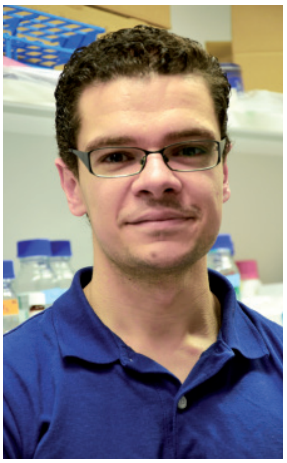
Head of the Unit

Dr. Pablo Jose Fernández-Marcos studied biochemistry in the Universidad Autónoma de Madrid. He obtained his PhD in the laboratory of Dr. Manuel Serrano, at the CNIO, for which he obtained the Special PhD Award and published 8 research articles about mouse models of cancer, metabolism and aging in mice. He them moved to the laboratory of Prof. Johan Auwerx, at the EPFL, Switzerland, studying mouse models of metabolic alterations and achieving 5 publications. He returned to the CNIO after two years at the EPFL, where he combines studies on cancer with research on metabolism, publishing 9 new articles. In total, he counts with 23 publications, 2 of them as co-corresponding author (already from IMDEA Food) and 9 as first author, in journals as Journal of Clinical Investigations, Nature Communications, PNAS or EMBO J; and second authorships in journals as Cell or Cancer Cell. At present he is Group Leader of the BIOPROMET unit at IMDEA Food.

Dr. Marta Barradas Solas

Postdoctoral researcher

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



Luís Filipe Costa Machado

Predoctoral researcher

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

Research Platform 1. The Food and Nutritonal Genomics Platform. GENYAL

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

Nutrition and Clinical Trials Unit

GENYAL platform

Dr. Viviana Loria Kohen
Nutritionist, senior researcher and head of the Unit

Degree in Nutrition at Universidad de Buenos Aires, UBA (1996), and obtained the Master's degree in nutrition Argentina (1996-1999). In Spain, she earned a Master's degree in in Clinical Nutrition at Universidad Autónoma de Madrid (2001). She obtained her PhD in Medicine at Universidad Autónoma de Madrid in 2010. 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. In March 2012 she joined IMDEA Food and currently, she is head of The Unidad de Nutrición y Ensayos Clínicos at IMDEA Food. She has authored many nutrition education books and has co-authored 27 books. Moreover, she has published 49 papers in scientific journals and has presented 84 communications and papers in national and international conferences. She was professor in Human Nutrition and Dietetics at Escuela de Nutricionistas, Universidad de Buenos Aires and participated in teaching activities for the Universidad Nacional de Educación a Distancia (UNED). She is tutor of practices in UAM and UCM.

Dr. Rocío de la Iglesia González
Senior nutritionist

Dr. Rocío de la Iglesia González, graduated with a BSc degree in Human Nutrition and Dietetics from Universidad Autónoma de Madrid and with a European Master's degree in Nutrition and Metabolism from Universidad de Navarra (UNAV), where she received the Final Master of Higher Scientific Quality Award. Thereafter, she obtained a PhD studentship from the Institute of Health Carlos III and she joined the UNAV as a predoctoral researcher. Her PhD involved a clinical trial examining a new dietary treatment for the metabolic syndrome and associate comorbidities. This PhD included two periods of secondment, one at the Universidad Complutense de Madrid and one at the University of Reading (UK). She has co-authored 15 publications and 2 book chapters. She has university teaching experience in the degrees of Pharmacy and Human Nutrition and Dietetics. She has also presented different communications in national and international congresses. In September 2015 she joined IMDEA Food Institute as a senior nutritionist.

Elena Aguilar Aguilar
Senior nutritionist

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

GENYAL platform

Isabel Espinosa Salinas
Nutritionist, predoctoral researcher

Isabel Espinosa Salinas holds a Bachelor of Science degree in Food Science and Technology (2006) and a degree in Human Nutrition and Diet (2004) from Universidad Autónoma de Madrid. She trained in "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, Lérida, Tenerife, Malaga, Burgos and Guadalajara. In 2010, she joined IMDEA Food and began working on the development of the Food and Nutritional Genomics Platform GENYAL. At present, she has more than six years of experience as nutritionist in the development of clinical trials funded by the Ministry of Economy and Competitiveness as REDUCOL, FOODOMICS, INSAOLI and FORCANCER, ALIBIRD consortium as NUTRIGEN, and in projects with companies as Biosearch Life (CENIT-PRONAOS), Migasa-FUAM, Capsa Food and Cetiver.

Helena Marcos Pasero
Nutritionist, predoctoral researcher

Graduated with a Bachelor of Science degree in Human Nutrition and Dietetics from 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). She is currently enrolled in the Master's degree in Genetics, Nutritional and Environmental Conditions on Growth and Development from Granada University. In February 2014 she joined IMDEA Food as a trainee, and thereafter she became a member of the contracted staff of the Platform of Food and Nutritional Genomics GENYAL, to work in the development of different clinical trials related to nutrition and genetics.

Biostatistics and Bioinformatics Unit

Jesús Herranz Valera
Biostatistician, senior researcher

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

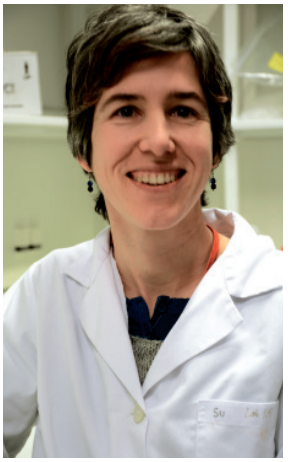
Roberto Martín Hernández
Bioinformatic, predoctoral researcher

Roberto Martín Hernández obtained his Bachelor's Degree of Science in Biochemistry and Biotechnologies at the University Paul Sabatier of Toulouse (France). Immediately after he obtained his Master's Degree at the same University, completed with a training period at Bayer CropScience (Lyon, France). After that he joined the Computers Architecture Department of the UCM (Madrid, Spain), and he started working as a research fellow in bioinformatics. Afterwards, he joined the R&D Department of the company Integromics (Madrid, Spain), where he continued working on "omics" data analysis and he collaborated on the development of professional software for bioinformatics. He joined the IMDEA Food institute on May 2012 as a Bioinformatic Scientist. Until the date he has co-authored 12 scientific research articles published in international journals.

Nutricional Genomics Laboratory

Dr. Susana Molina Arranz
Senior laboratory technician

Susana Molina Arranz, is PhD in Molecular Biology by the Autónoma University in Madrid. She has worked with different research groups at the "Centro de Biología Molecular Severo Ochoa" (CSIC-UAM), as well as "Centro de Investigación en Sanidad Animal" (INIA). During these years she has collaborated in different projects about virology, ethiology of diseases that afflict humans, prion diseases and its strain barriers, and development of biological tools for the therapeutic investigation of Alzheimer Disease, specializing in several molecular biology techniques. 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 GENYAL Nutrigenomics 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 Díaz Perales, performing techniques such as ELISAs, HPLC, FPLC, PCR, affinity columns, filtration, activation of T lymphocytes and TH1 TH 2 later response and protein purification. In 2009 she joined the group of prof. Jesús Cruces at the Faculty of Medicine of the UAM, Department of Biochemistry, where she developed the characterization of promoter regions, protein expression in different cell lines, and participated in the development of gene amplification for mutational screening programs. She also has experience in handling laboratory mice, both, maintenance and genotyping, different methods of phenotyping, nucleic acid extraction from tissue or cryopreservation samples. Since 2011 she works at IMDEA Food as a lab technician, implement efforts to support different research groups at both laboratory and administrative.

International Affairs

Dr. Han Joosten
Senior researcher

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

CIN platform

Research Platform 2. The Nutrigenomics Interactive Center. CIN

Management

Prof. Guillermo Reglero Rada
General Director

Prof. Jose María Ordovás Muñoz
Scientific Director

Inmaculada Galindo Fernández
Administrative Director

Members

Dr. Lidia A Daimiel Ruiz
Postdoctoral researcher

Silvia Berciano
Predoctoral researcher

Research Platform 3. The Cooperative R + D + I Laboratory. LACID

Management

Prof. Guillermo Reglero Rada
General Director

Prof. Guillermo Reglero Rada
Dr. Ana Ramírez de Molina
Scientific Directors

Inmaculada Galindo Fernández
Administrative Director

LACID platform

Associate researchers

Dr. Manuel Serrano Marugán

Head of the Tumour Suppression Group and Director of the Molecular Oncology Program, Spanish National Cancer Research Center

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

Dr. Enrique Casado Sáenz

Head of the Medical Oncology Department, Infanta Sofía University Hospital and Oncology Coordinating Professor of Oncology, European University of Madrid

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

Dr. Jaime Feliú Batlle

Head of the Medical Oncology Department, La Paz University Hospital

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

6.3 Management Unit

Members

Inmaculada Galindo Fernández
General Manager

Patricia Lodín Velázquez
Technician

Gema Alegre Pulido
Technician

Carlos Zarapuz Agüero
Technician

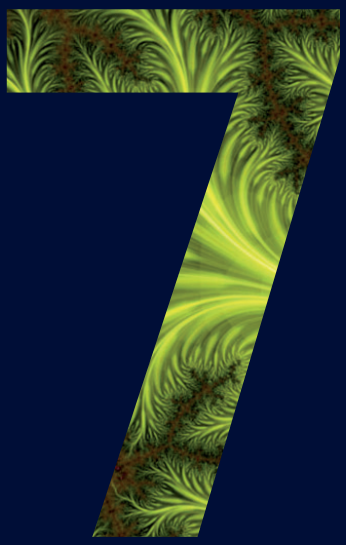
Cristina Merino Fernández
Técnico de gestión

Mª Pilar Diarte Pérez
Técnico de gestión

Sara Castillo Alonso
Técnico de gestión

IMDEA Food personnel

Infrastructure



report 2015

7.1 Headquarters

Since beginning 2014 IMDEA Food is stablished in its definitive headquarters, the old Main Building of the Cantoblanco Hospital (Carretera de Canto Blanco 8. 28049 Madrid), ceded to the Institute by the Consejería de Educación y Empleo de la Comunidad de Madrid (the Education, Youth and Sport Council of the Madrid Region).

This building, occupies an area of 4.595 m^2 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 and has 6 research laboratories, all with the most advanced equipment.

7.2. Scientific infrastructures

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

Laboratory 1. Cell Culture Laboratory (Biosafety Level 2)

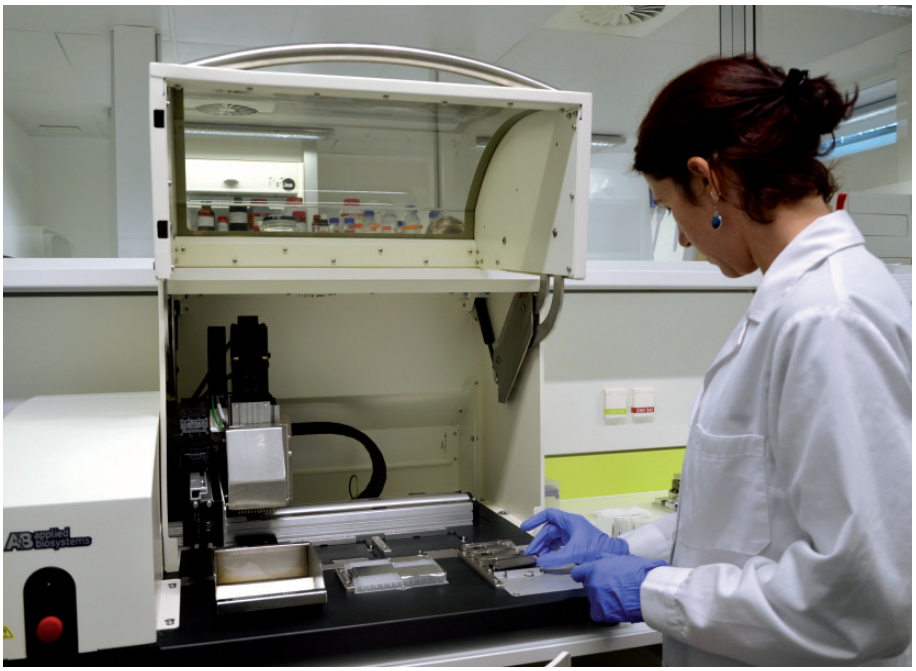
This Biosafety Level 2 laboratory allows research to be undertaken on a wide range of moderate risk agents. It is routinely used in experimentation on, and the maintenance of, cell cultures.

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

Laboratory 2: Genomics Laboratory

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

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



Laboratory 3. Biochemical Instrumental Techniques Laboratory

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

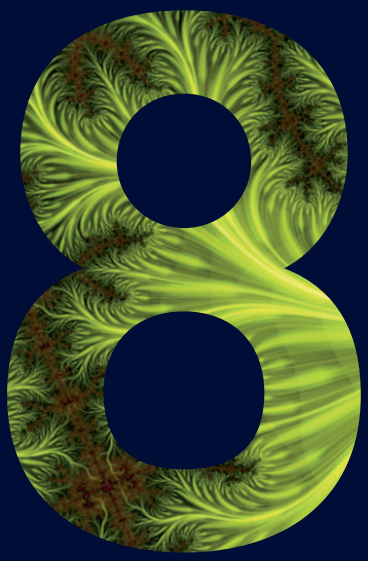
It is divided into different areas where different techniques, such as Western blotting and agarose gel separations, and microbiological techniques for the cultivation and handling of bacteria, can be followed.

Laboratory 4. General Biochemistry and Molecular Biology Laboratory

This is where the different research Units undertake their normal laboratory work. Each Unit 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.

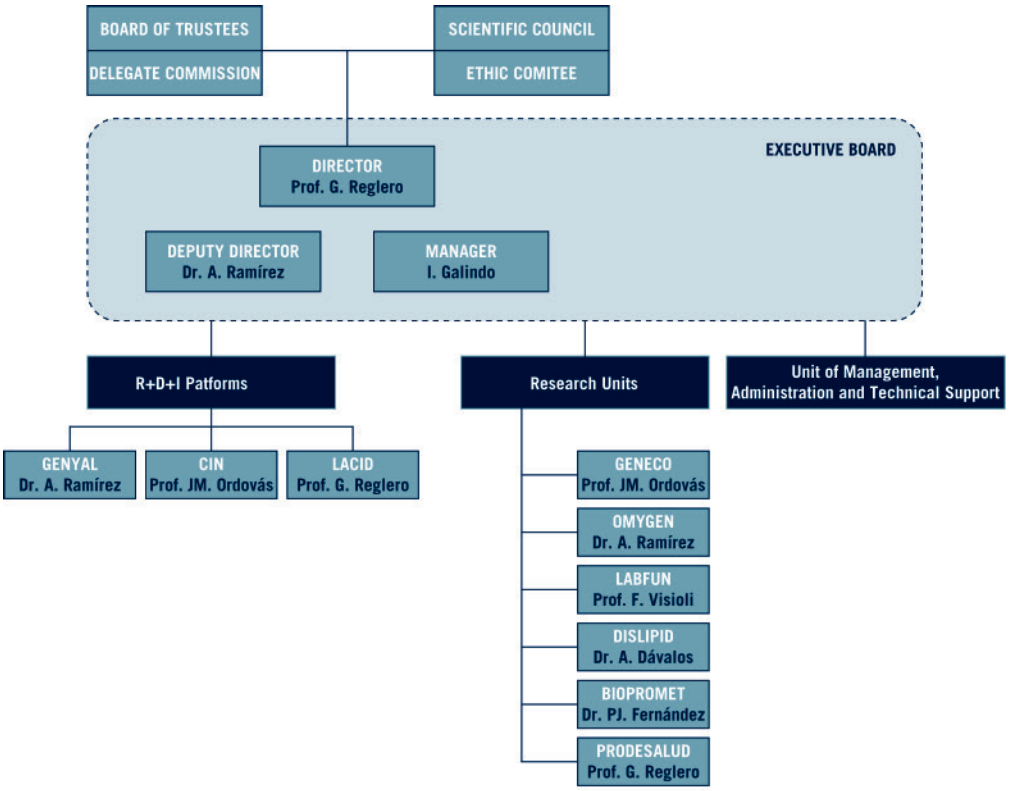
organization



report 2015

8.1 Organizational structure

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



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

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

8.2 Board of Trustees

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

PRESIDENT OF THE FOUNDATION

Manuela Juárez Iglesias
Professor
Spanish National Research Council. Spain

VICE-CHAIRMAN OF THE FOUNDATION

Rafael van Grieken Salvador
Chairman of Board of Education, Youth and Sport
(since June 2015)
Education, Youth and Sport Counseling
Madrid Regional Government. Spain

Lucía Figar de Lacalle
Chairman of Board of Education, Youth and Sport
(January – May 2015)
Education, Youth and Sport Counseling
Madrid Regional Government. Spain

REGIONAL ADMINISTRATION REPRESENTATIVES

José Manuel Torralba Castelló
General Director of Universities and Research
(since june 2015)
Education, Youth and Sport Counseling
Madrid Regional Government. Spain

Lorena Heras Sedano
General Director of Universities and Research
(January – May 2015)
Education, Youth and Sport Counseling
Madrid Regional Government. Spain

José Mª Rotellar García
Vice-Counselor of the Treasury and Economic Policy
(January – May 2015)
Treasury and Economic Policy Counseling
Madrid Regional Government. Spain

Rafael A. García Muñoz
Assistant Director of Universities and Research
(since June 2015)
Education, Youth and Sport Counseling
Madrid Regional Government. Spain

Juan Ángel Botas Echevarría
Assistant Director of Universities and Research
(January – May 2015)
Education, Youth and Sport Counseling
Madrid Regional Government. Spain

José de la Sota Ríus
Deputy Director
madri+d Foundation for Knowledge. Spain

INSTITUTIONAL TRUSTEES

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

Jesús Vázquez Minguela
Head of the Office of the Rector
Universidad Politécnica de Madrid. Spain

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

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

Fabrizio Arigoni
Director
Nestlé Research Center. Tokio. Japan

Ben van Ommen
Biology Systems Program Director
TNO Quality of life. Zeist. Netherlands

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

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

EXPERT TRUSTEES

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

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During 2015 some Trustees have been renewed for revocation of mandates and new Company Trustees have incorporated, although some of them have yet to appoint their representatives on the board of trustees or accept the position.

8.3 Scientific Council

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

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8.4 Ethics Committee

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

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

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8.5 Delegate Commission

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

President

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8.6 Executive Board

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

Director

Prof. Guillermo Reglero Rada

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

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

Deputy Director
Dr. Ana Ramírez de Molina

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

General Manager
Inmaculada Galindo Fernández

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


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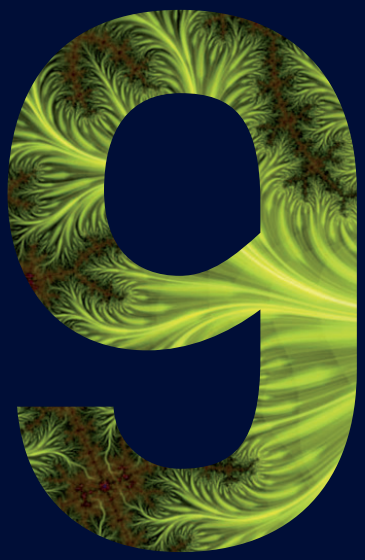


report

2015

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

Cooperation Agreement with the "Centro Nacional de Investigaciones Oncológicas"

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

Cooperation Agreement with the "Consejo Superior de Investigaciones Científicas"

In August 2014, a Framework Cooperation Agrement was signed between IMDEA Food Foundation and "el Consejo Superior de Investigaciones Científicas" to facilitate cooperation in scientific and technological activities, exchange of staff that will promotes scientific progress of both institutions and the implementation of programs and research projects.

Cooperation Agreement with the "Universidad Autónoma de Madrid"

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

Cooperation Agreement with the "Hospital Universitario Infanta Sofía"

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

Cooperation Agreement with Metabolon Inc.

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

Cooperation Agreement with the "Fundación Española de la Nutrición"

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

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

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

Cooperation Agreement with the "Universidad de Murcia"

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

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

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

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

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

Cooperation Agreement betwen the "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 Universitary Campus from where most of the voluntiers of the studies are selecteMoreover, the "Universidad Autónoma de Madrid" provides facilities to IMDEA Food Institute and support to medical staff.

Collaboration with the "Hospital Universitario La Paz"

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

Collaboration with the "Hospial Universitario Ramón y Cajal"

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

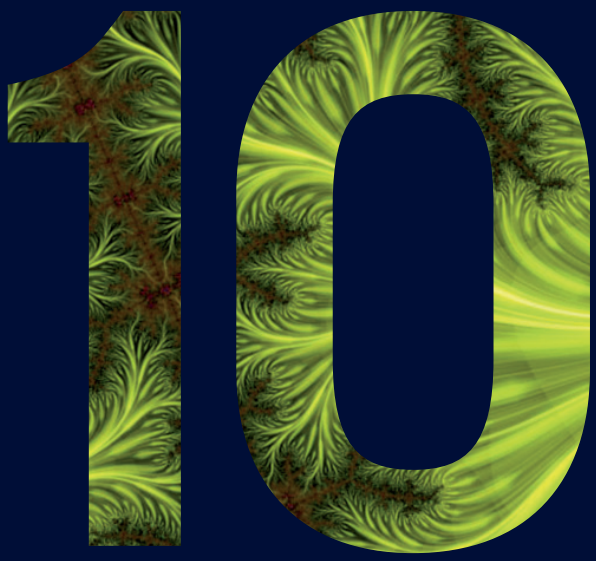
International Campus of Excellence UAM+CSIC

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

Association Agreement with Madrid Science Park

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

scientific highlights



report

2015

Lipid metabolism: New fuels for cancer, new targets for therapy

Molecular Oncology and Nutritional Genomics of Cancer. OMYGEN

Colorectal cancer (CRC) is one of the most deadly and prevalent cancers in the developed world[1]. Among the risk factors for developing the disease, factors related to lifestyle such as lack of physical activity, smoking and westernized diets -high in red or processed meats and poor in vegetables- are included[2]. In fact, according to WHO, one-third of all cancers are preventable with lifestyle factors as diet.

There is increasing evidence of the decisive contribution of these factors determining the amount and the nature of the energy supply for cancer cells and metabolic reprogramming is now one of the emerging hallmarks of cancer. In addition to well-known carbohydrate metabolism alterations, such as Warburg effect by which cancer cells preferentially drive glucose metabolism to lactate production under aerobic conditions[3], other metabolic pathways alterations demand further attention. Lipid metabolism represents a relevant source of energy and structural and biosynthetic resources and has been demonstrated to be key to invasion and cancer pathogenesis[4,5].

In the Molecular Oncology and Nutrition Cancer Genetics group, we have recently discovered a new connection between lipid metabolism and CRC that helps to understand the role of diet and metabolism in these tumors. We have described a link between high levels of lipid metabolism key enzymes in patients with CRC and increased aggressiveness of the disease[6]. These enzymes act as a collaborative network, the acyl-CoA synthetase/stearoyl-CoA desaturase (ACSL/SCD) network, composed by the members of the fatty acid activating enzymes ACSL1 and ACSL4 and the SCD fatty acid desaturase. This metabolic network activates cellular pathways such as Erk, β-Cat and Akt that confer tumor cells increased ability to migrate and invade other tissues, key to the development of metastasis, through a process known as epithelial-mesenchymal transition (EMT)[7]. This effect relies on an energetic advantage that can be reverted through reactivation of the master regulator of cell energy balance, the AMPK kinase.

Therefore, this ACSL/SCD metabolic switch is an example of how different types of metabolic reprogramming can be used by tumors to increase their malignity depending on the needs and the environment (Figure 1). Very importantly, the treatment with specific inhibitors for these enzymes is able to cause the cell death of CRC cells without affecting normal cells. Therefore, the use of these drugs in clinical practice as a new way of addressing tumor metabolism might represent a promising therapeutic strategy for the treatment of CRC.

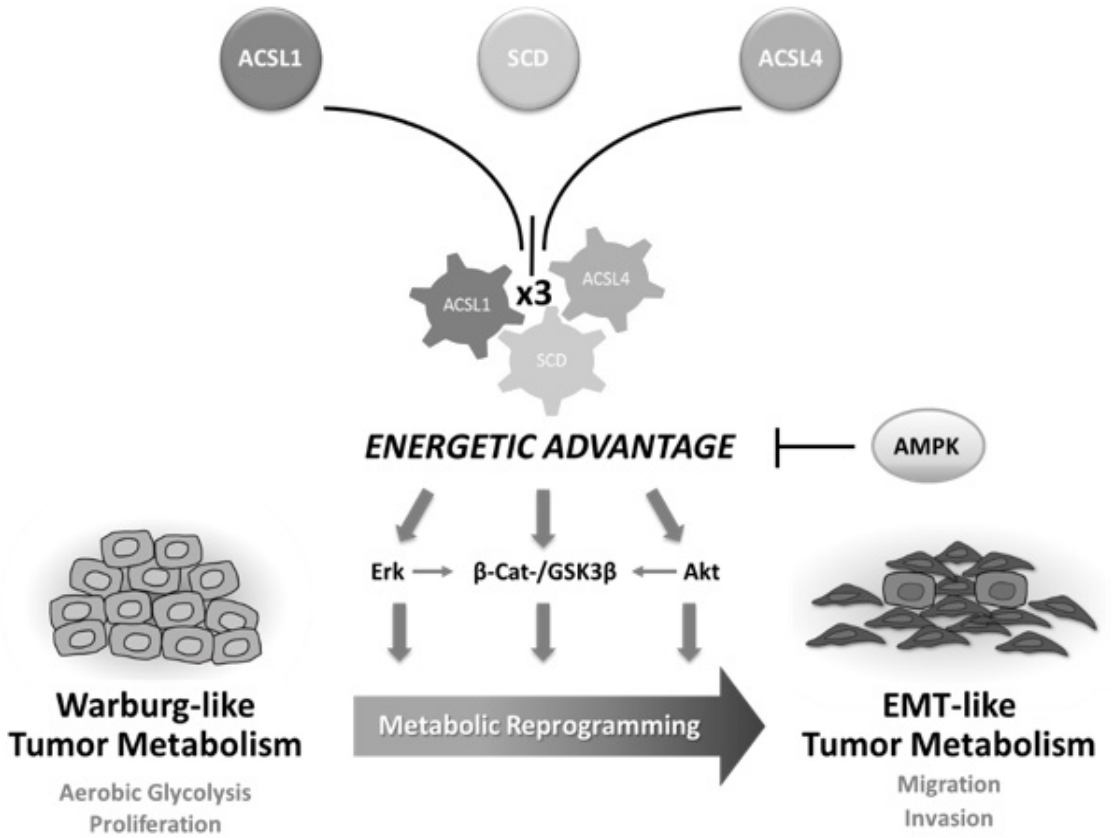


Figure 1: The combined action of ACSL1, ACSL4 and SCD (ACSL/SCD network) confers an energetic advantage to tumor cells that stimulates several EMT-promoting and survival pathways. Lipid metabolism switches Warburg-like tumor metabolism into EMT-like tumor metabolism leading to a gain of migratory and invasive capabilities. This process can be reversed upon re-activation of AMPK signaling.

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Micronutrients, nutraceuticals, and functional foods from cells to humans

Laboratory of Functional Foods. LABFUN

Cardiovascular disease (CVD) is the major cause of mortality and morbidity in the Western world (Micha et al., 2012). Preventive, i.e. public health measures are being implemented worldwide and include campaigns aimed at smoking cessation, reduction of salt consumption, increased physical activity, and, in general, education to proper lifestyle (Micha et al., 2012). Pharmacological treatment of CVD has also improved greatly over the past decades and several effective drugs, e.g. statins, beta-blockers, ACE inhibitors/AIIRAs, anti-platelets are now available. However, side effects and limited adherence to treatment often limit pharmacological effectiveness.

In addition to prescription drugs, nutraceuticals/functional foods/medical foods are being increasingly added as adjunct treatment of CVD or to prevent it is high-risk (real or perceived) subjects, even though there are no published high-quality human trials comparing drug vs. drug + nutraceuticals (Dutta et al., 2014; Mahabir, 2014). Notable examples include phytosterols, soluble fiber, or soy protein to lower blood cholesterol concentrations and fish oil for hypertriglyceridemia, for which clinical evidence is solid enough to recommend their use. Because of the strong epidemiological correlation between plant-based diets and lower CVD incidence (Visioli et al., 2005), much research is being devoted to clarify the biological activities of phytochemicals, namely of (poly)phenols. Indeed, (poly)phenols are endowed with very interesting healthful properties, most of which – alas – have only been demonstrated in vitro (Visioli and Dávalos, 2011). Yet, the nutraceutical industry is rapidly cashing in on basic research and many (poly)phenol-based products are now available on the market to target CVOf note, several (poly) phenol-based products are currently being labeled as antioxidants (in a quixotic search for the most potent one), even though - due to bioavailability and kinetic constraints issues - modern research is disproving direct antioxidant activities (Chiva-Blanch and Visioli, 2012; Visioli, 2015).

In recent years, many human dietary interventions aimed at investigating the potential cardiovascular health effects of (poly)phenol-derived preparations on cardiovascular risk markers have been carried out to back their often unrealistic health claims. We carry out studies that range from cell culture mechanistic investigations (Visioli and Dávalos, 2011) to human trials (Crespo et al., 2015), in order to validate (or not) health claims associate with nutraceuticals and functional foods (Tome-Carneiro and Visioli, 2015).

Population aging is a worldwide demographic trend. Consequently, the prevalence of chronic age-related conditions such as clinically diagnosed neurological diseases, cognitive decline, and dementia will significantly increase in the near future. The important role of diets and healthy lifestyle as preventative of neurodegenerative diseases is widely accepted nowadays, and it may provide preventive strategies in very early, non-symptomatic phases of dementia well, especially because there are still no effective treatments for it.

Another area of investigation we are actively exploring is that of effects of selected micronutrients on the aging brain, to propose evidence-based strategies for dietary improvements of cognitive decline (Visioli and Burgos-Ramos, 2015).

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Parents' nutritional miRNA legacy: the sins of our parents

Disorders of Lipid Metabolism and Molecular Nutrition. DISLIPID

Prenatal and postnatal nutritional status may influence adult susceptibility to the development of cardiometabolic risk factors such as impaired glucose tolerance, type 2 diabetes, dyslipidemia or obesity. Moreover, increasing evidence suggests an important biological role of fathers in obesity and metabolic programming of their offspring[1]. Though little is known about the mechanisms that cause these phenomena. Epigenetics, which is the study of heritable alterations in phenotypes and gene expression that occur without changes in the DNA sequence, is one of the most promising areas to understand these phenomena. DNA methylation, histone modification, chromatin folding, and small regulatory RNAs alterations, which collectively enable the cell to respond quickly to environmental changes, are epigenetic mechanisms. These different mechanisms may explain in part the way by which dietary factors in early critical developmental steps[2], or even parental eating habits[3] might be able to affect the susceptibility to develop metabolic diseases in adulthood.

microRNAs (miRNAs) are small regulatory non-coding RNAs that regulate gene expression by targeting complex biological pathways. miRNAs act as 'fine-tuners' of gene expression under physiologic conditions, but it is under conditions of stress where their function becomes specially decisive, underscoring their role in health and disease[4]. The role of miRNAs in fetal programming remains largely under-studied[5]. In this context, IMDEA researchers at the laboratory of disorders of lipid metabolism and molecular nutrition (DISLIPID lab) are evaluating the influence of the consumption of different types of fatty acids, at critical developmental stages, and their susceptibility to develop cardiometabolic disease later in life[6] through mechanism mediated by miRNA action[7]. But miRNAs might not be the only small RNAs involved, as sperm transfered RNA-derived small RNAs might also contribute to intergenerational inheritance of diet-induced metabolic disorders[8]. However, other epigenetic changes, such as changes in DNA methylation, histone modifications and others should be considered as potential carriers of epigenetic information that passes from one generation to another. In this aspect, nutrition and lifestyle factors may play a role. Indeed, dietary excess of our parents (sins) may underline the current obesity and diabetes pandemic. But this needs to be experimentally tested in our specie.

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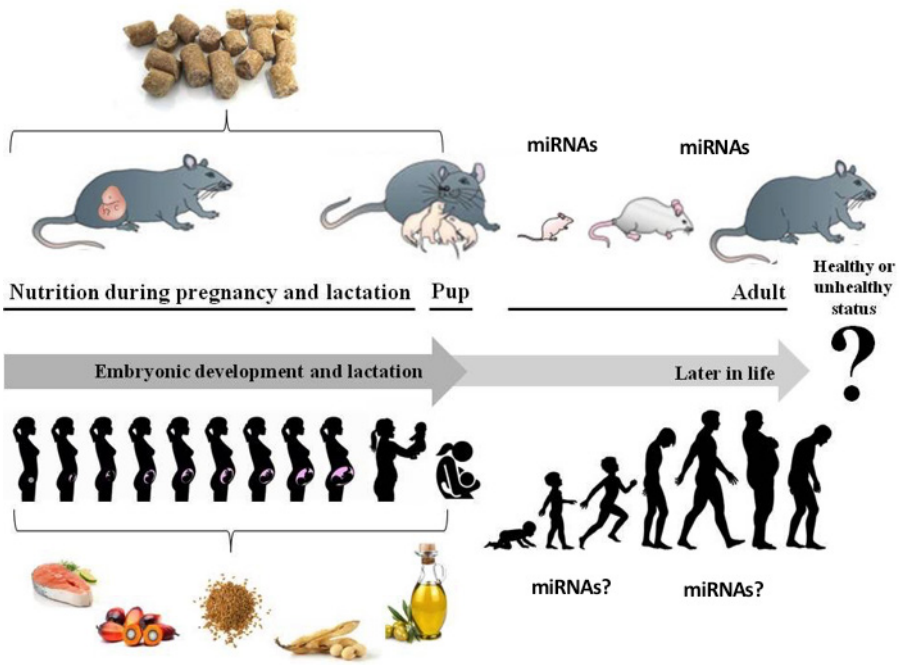

Figure 1. Mother's nutritional miRNA legacy. Nutrition during critical time of development influence susceptibility to develop cardiometabolic disease later in life.

Bioactive products against obesity: inhibitors of insulin signaling

Bioactive Products and Metabolic Syndrome. BIOPROMET

Insulin signaling is essential in the control of blood glucose. Obese people are prone to develop abnormalities in this pathway, giving rise to insulin resistance and, ultimately, diabetes[1]. The study of insulin signaling pathway is, therefore, of special interest for our groups. Besides, some recent studies show that moderate inhibition of the main kinase in charge of transmitting insulin signals (the so-called PI3K) have surprising beneficial effects in obesity development[2,3]. Thus, finding new bioactive products which moderately inhibit PI3K or its pathway constitute a very attractive goal.

Our group has set up at IMDEA Food a screening platform already used before for monitoring insulin pathway activity[4], insulin binding triggers PI3K activation and a chain of reactions ending in the exclusion of the transcription factor FOXO from the nucleus. We have generated a cell line expressing FOXO fused with a green fluorescent protein called GFP. This way, we can monitor FOXO subcellular localization by confocal microscopy in 384 well plates, so that compunds inhibiting the insulin pathway will present more FOXO-GFP in their nucleus.

At present, there is a compound with PI3K inhibitory activity approved for its use on humans: miltefosine, used for the treatment of leishmaniosis due to its ability to affect the binding of the parasite to the plasma membrane of its target cells[5]. Besides, ellagic acid, enriched in the pomegranate and some other red fruits, has also been described before as a PI3K inhibitor[6]. These compounds serve as controls for our first tests of the insulin platform, and both are good candidates for anti-obesity agents on humans, since thay are already approved for other uses.

With our system, we have been able to check that, in effect, miltefosine and ellagic acid induce nuclear translocation of FOXO-GFP that is: they inhibit insulin signaling. At present, we are validating these effects using different cellular approaches, and designing diets enriched in these compounds to treat obese mice and check their anti-obesity effects.

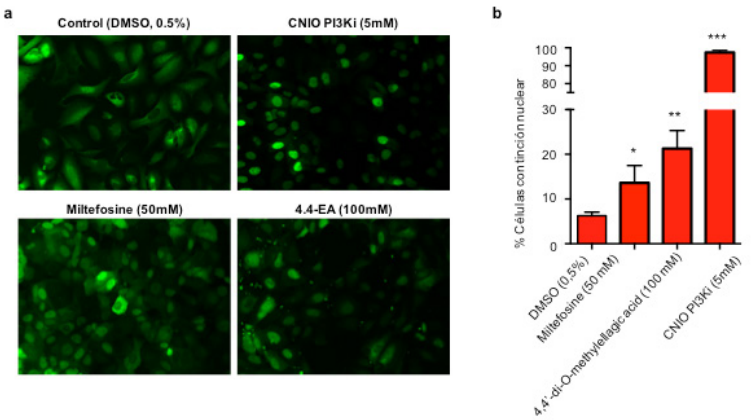

Figure 1. **Insulin pathway inhibitors.** (a) Human osteosarcoma cells stably expressing the fusion protein FOXO3-GFP were treated for 1h. with the indicated compounds, and nuclear translocation of FOXO-GFP was assessed using the Opera confocal system. (b) Insulin pathway inhibition by the indicated compounds, represented as the % of cells with nuclear FOXO-GFP, using DMSO 0.5% as solvent background. Data are represented as the mean of 4 biological replicates. Error bars represent standard deviation. Statistical significance was assessed using the Student t test. >, $p<0.05$; **, $p<0.01$; ***, $p<0.001$.

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