

food and health  
science, industry and society

imdea food institute

annual report

2019

[www.food.imdea.org](http://www.food.imdea.org)



**Guillermo Reglero**

Director, IMDEA Food Institute  
July 2020

En el momento de escribir estas líneas, el mundo atraviesa la pandemia provocada por el coronavirus SARS-CoV-2 o COVID-19, con dramáticas consecuencias en muertes y sufrimiento, y con una caída de las economías que puede costar mucho recuperar.

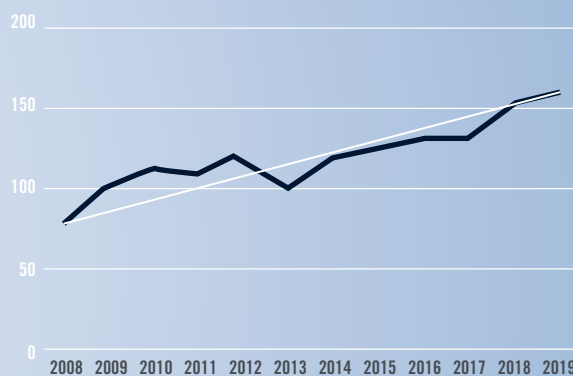
Esta crisis ha puesto de manifiesto que los sistemas de ciencia de los países no han podido cumplir la principal de sus misiones que es proteger y mejorar la vida de las personas mediante el avance del conocimiento. El coronavirus ha dado suficientes motivos al mundo para reflexionar sobre los actuales sistemas de ciencia. Es verdad que algunos países han mostrado una gran capacidad de reacción y en pocos meses han sido capaces de girar y dirigir importantes investigaciones hacia el SARS-CoV-2, aunque todavía son insuficientes.

Hay que reenfoque los sistemas de investigación e innovación públicos y privados, para aprovechar bien los recursos disponibles, especialmente si, como ocurre en nuestro país, éstos no son muy elevados. La gestión de la ciencia tanto básica, como orientada o aplicada, debe realizarse bajo criterios de excelencia, priorización y eficacia, para poder tener los resultados necesarios.

Desde el descubrimiento del *Tobacco Mosaic Virus* en 1898, se han publicado cerca de tres millones de artículos de investigación con alguna mención directa o indirecta a los virus, 600.000 de las cuales son trabajos específicos. En 2003 ya había publicaciones sobre SARS (*Severe Acute Respiratory Syndrome associated Coronavirus*), el tipo de virus al que pertenece el COVID-19. Pero incluso contando con tal volumen de conocimiento sobre los virus, cuando llegó la pandemia no teníamos ni vacuna, ni antivirales efectivos, ni siquiera un conocimiento suficiente de la fisiopatología de la infección por el SARS-CoV-2. Ingentes recursos empleados en el estudio de los virus durante décadas que no han servido para lo que necesitábamos cuando llegó la pandemia.

Sí que la crisis del coronavirus ha sensibilizado a la sociedad e impulsado el debate sobre la ciencia en España. Pero todo se centra en la escasez de recursos. Es verdad que la inversión española en I+D no se ha recuperado desde la crisis de 2008 y sigue muy por debajo de la media de la UE. Sin embargo, no solo es cuestión de financiación, sino que hay que reflexionar también sobre la organización.

En la siguiente gráfica les presento las publicaciones realizadas en España en las dos revistas científicas más importantes, Nature y Science, entre 2008 y 2019, donde puede verse una tendencia positiva.



Es decir, en este periodo sin incremento (o más bien de descenso) presupuestario público y privado para I+D+I, la ciencia española muestra señales de progreso, cuando lo que podría esperarse es lo contrario. Esto indica que tenemos un gran potencial, pero es preciso hacer cambios estructurales para mejorar el servicio que el sistema español de ciencia presta a la sociedad. Para ello hay que elegir con decisión las líneas en las que conviene trabajar y dotar al sistema de flexibilidad y agilidad.

IMDEA Alimentación ha tratado de aplicarse estos principios para luchar contra la pandemia. Nada más producirse la convocatoria extraordinaria de investigaciones sobre COVID-19

words from the director...



del Gobierno, a través del Instituto de Salud Carlos III, los grupos del Instituto orientaron sus líneas de investigación y generaron en pocos días 9 proyectos que presentaron a esta convocatoria. Con base en nuestra experiencia en genética, metabolismo, obesidad, diabetes o inflamación, factores que, como se ha visto, están muy relacionados con el pronóstico de los infectados por el COVID19, se plantearon proyectos sobre aspectos como la estimulación de la inmunidad innata como estrategia preventiva y coadyuvante frente al COVID-19, el pronóstico y supervivencia de los enfermos según ciertas características personales, la mejora de la función hepática durante la infección para mantener la homeostasis sistémica y la identificación de dianas terapéuticas y productos para combatir la enfermedad.

La disposición y capacidad de IMDEA Alimentación para atender problemas de salud graves e imprevistos revela, en primer lugar, su compromiso y el de sus investigadores, con la sociedad. También es un indicador de la madurez que se ha alcanzado y que queda reflejada en las actividades realizadas y los resultados obtenidos en 2019, que ahora les presentamos en este informe anual.

Los grupos del Instituto han producido en 2019 un total de 162 artículos científicos, con un factor de impacto medio de 5.42, la mayoría publicados en revistas de las primeras posiciones de los rankings de nutrición y biomedicina, entre las que pueden destacarse *Science*, *Journal of Clinical Oncology*, *Nature Communications*, *Advances in Nutrition* o *Jama Pediatrics*. En paralelo a la investigación básica y traslacional, IMDEA Alimentación ha estimulado la innovación, transfiriendo una patente a una empresa madrileña que pondrá productos en el mercado a lo largo de 2020. Además, ha impulsando el desarrollo de dos empresas de base tecnológica, una de ellas es licenciataria de una patente de la que IMDEA Alimentación es cotitular, que ha sido concedida en 2019 por la Oficina Europea de Patentes y registrada en los principales países del mundo. La otra spin off ha participado en el proyecto europeo *Genetic tests for precision nutritional and food supplement recommendations for a healthy aging* para integrarse en la plataforma Quisper (*Quality Information Services and Dietary Advice for Personalized Nutrition in Europe*).

En 2019 ha aumentado la implicación de IMDEA Alimentación, en asociación con la Universidad Autónoma de Madrid, en EIT Food. En su tercer año, esta plataforma despliega un formidable número de actividades en Europa en los ámbitos de la innovación, la comunicación y la educación. El grupo de IMDEA Alimentación que gestiona la participación del Instituto en EIT Food lidera importantes acciones como *Global Food Venture*, *WeLead* y *Master in Food Systems* en colaboración con socios académicos y empresariales de todo Europa y trata de extenderlas a la Comunidad de Madrid a través del programa de Entidades de Enlace de la convocatoria gestionada por la Consejería de Ciencia, Universidades e Innovación.

Hay que hacer una referencia especial a la atracción de talento, aspecto clave en los sistemas de ciencia más destacados. Además de la importancia de generar un marco de trabajo que pueda interesar a buenos investigadores extranjeros, debemos tener presente el extraordinario grupo de brillantes científicos españoles que trabajan en competitivos laboratorios del mundo. Su retorno masivo impulsaría definitivamente al sistema y se rentabiliza la inversión realizada en su formación. IMDEA Alimentación trata de contribuir a ello y en los últimos años ha conseguido la incorporación de cerca de una veintena científicos españoles que habían trabajado en laboratorios de los países más avanzados en ciencia.

Cuando se publica este Informe Anual 2019, IMDEA Alimentación se encuentra en un periodo especial de funcionamiento, aún dentro de la pandemia del COVID-19, tratando de combinar la seguridad de sus empleados y colaboradores con la continuación de sus actividades en torno a la salud de la población.

Esperamos que cuando se publique el Informe Anual 2020 de IMDEA Alimentación, la Comunidad de Madrid, España y el mundo hayan superado la pandemia y se estén realizando los cambios necesarios para que la población esté mejor protegida y con mayor impulso hacia el progreso y el bienestar.



At the time of writing these lines, the world found itself in the grip of the SARS-CoV-2 or COVID-19 pandemic, the cause of death, suffering, and an economic downturn from which recovery may be difficult.

This crisis also revealed that the systems underpinning science in many countries could not protect people through the advancement of knowledge. The SARS-CoV-2 virus has given the world much to think about in this regard. Some countries did respond well, and in a few months were able to get on top of the problem and undertake important research on the virus, but this was certainly not the case for most.

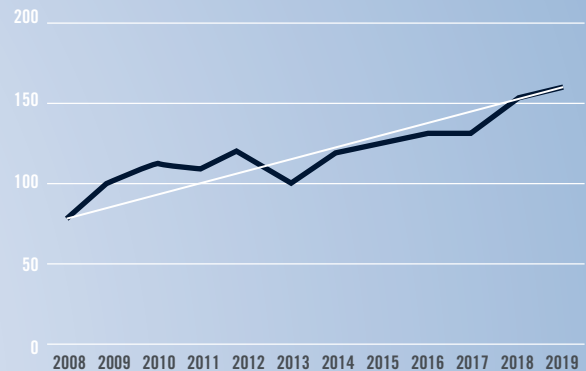
This has taught us the need to refocus both our public and private research systems so that we can make better use of the resources available, especially if they are not entirely abundant (as is the case in Spain). If we are to obtain needed results, the management of science - basic and applied - will have to revolve around excellence, prioritization and efficiency.

Since the discovery of the tobacco mosaic virus in 1898, some three million research papers have been published that mention viruses directly or indirectly, among which 600,000 are entirely focused on a virological subject. The year 2003 saw the first papers on the SARS virus (severe acute respiratory syndrome-associated coronavirus), which belongs to the same family as the virus behind COVID-19. And yet, even given everything we knew when the current pandemic began, we still have with no vaccine or any effective antiviral therapy. Neither is enough known about the pathophysiology of this infection. All the resources we have spent on virological research over the years simply failed to prepare us for this crisis.

The current pandemic has certainly served as a wake-up call, promoting debate about science in Spain. However, this has centred almost entirely on resources. Certainly, Spanish R+D has not fully recovered from the economic crisis that fell upon us 2008; indeed, R+D spending in Spain remains below the EU average. However, the current

problem is not just one of funding; we need to reflect on how science is organised.

The graph below shows the number of papers published in the most important international journals - Nature and Science - between 2008 and 2019; an increasing trend is easily seen.



Thus, during this period, when public and private funding for R+D+I did not rise (or actually fell), Spanish science unexpectedly continued to show signs of progress. This is doubtlessly a sign of the country's potential, but structural changes are needed if the service to society that the Spanish science system provides is to improve. There is a need to carefully select the lines of research that should be followed, and to build agility and flexibility into the system.

IMDEA Food has tried to apply these principles in the fight against COVID-19. When the Spanish Government (via the *Instituto de Salud Carlos III*) made a special call for research in this area, IMDEA Food orientated its research accordingly and in just a few days presented nine projects for consideration. Our experience in genetics, metabolism, obesity, diabetes and inflammation - all of which influence the outcome of SARS-CoV-2 infection - allowed us to propose projects on the stimulation of the innate immune system as a preventive and adjuvant defence strategy, on the prognosis and survival of patients

according to their personal characteristics, on improving liver function during infection in order to maintain systemic homeostasis, and on the identification of therapeutic targets and products to fight the disease.

The willingness and capacity of IMDEA Food to investigate unexpected and serious health problems highlights the commitment of its staff to the good of society, and underlines its maturity as a research institution, all of which is reflected in this 2019 Annual Report. A total of 162 papers were produced with a mean impact factor of 5.42, the majority being published in top-ranking journals such as *Science*, the *Journal of Clinical Oncology*, *Nature Communications*, *Advances in Nutrition* and *JAMA Pediatrics*. The basic and translational research undertaken at IMDEA Food also stimulated innovation, and a patent was transferred to a Madrid company that will bring products to market over 2020. In addition, the development of two technology-based firms was boosted. One of these companies is a licence-holder of a patent co-held with IMDEA Food, awarded in 2019 by the European Patent Office and registered internationally. Another spin-off company participated in the European project *Genetic tests for precision nutritional and food supplement recommendations for healthy aging*, becoming part of the Quisper (*Quality Information Services and Dietary Advice for Personalized Nutrition in Europe*) platform.

In association with the *Universidad Autónoma de Madrid*, the involvement of IMDEA Food in EIT Food increased in 2019 - its third year of existence. This platform has become involved in many activities across Europe in the fields of innovation, communication and education. IMDEA Food, which manages the partnership with the above University within EIT Food, is taking the lead in important activities such as the *Global Food Venture*, *WeLead*, and the *Master in Food Systems* programme, all in collaboration with academic and business partners across Europe. It is also extending these ventures within the Madrid Region through the programme entitled *Entidades de Enlace* (*Consejería de Ciencia, Universidades e Innovación*).

Special emphasis needs to be made with respect to the attraction of talent - a key aspect in the most successful science programmes. Not only is it important to construct a framework attractive to good foreign researchers, it should attract the many brilliant Spanish scientists now working in competitive laboratories around the world. Their return *en masse* would not only be a boost to the Spanish science system but allow the country to profit from the investment made in their training. In recent years IMDEA Food has attracted some two score Spanish researchers from the countries currently making the greatest advances in science.

As the 2019 Annual Report is published, IMDEA Food finds itself at a special moment in which we are still dealing with the COVID-19 pandemic. The institute is therefore trying to ensure the safety of its employees and collaborators while continuing with its health-orientated research activity. Hopefully, when the time for next year's report comes around, the pandemic will have been consigned to the past, and we will have made the changes needed to better protect ourselves and to ensure a future of progress and greater wellbeing.

**Guillermo Reglero**

Director, IMDEA Food Institute  
July 2020

A handwritten signature in black ink, appearing to read 'Guillermo', with a long horizontal stroke extending to the right.





instituto **IM**dea alimentación

CTRA. CANTOBLANCO 8



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# contents

	<b>about us</b>	<b>10</b>
<b>12</b>	<b>our structure</b>	
	<b>in figures</b>	<b>14</b>
<b>18</b>	<b>research</b>	
	<b>facilities</b>	<b>22</b>
<b>24</b>	<b>programmes</b>	
	<b>principal investigators</b>	<b>76</b>
<b>86</b>	<b>annex</b>	
	<b>R&amp;D projects and contracts</b>	<b>87</b>
	<b>fellowships</b>	<b>95</b>
	<b>scientific results</b>	<b>100</b>
	<b>technology offer</b>	<b>145</b>
	<b>training, communication and outreach</b>	<b>147</b>



## about us

The IMDEA Food Institute, one of the seven Madrid Institutes for Advanced Studies (IMDEA), is a public research centre founded in 2007 by Madrid's regional government. The goal of the Institute is to generate science of excellence in the field of food on which to support solutions to social problems and to contribute to a knowledge-based economic model capable of generating high added value.

### mission

The mission of the IMDEA Food Institute is to generate scientific knowledge of excellence in the field of food, to improve the quality of life of the population and to contribute to the development of an economic model based on the creation of value from knowledge-based innovation.

The Institute's hallmark is the study of the relationship between genes and nutrients with special emphasis on the prevention and treatment of chronic diseases through precision nutrition.

### vision

IMDEA Food advances its lines of research through the strategies and tools of nutritional genomics, in fields such as cancer, ageing, obesity and cardiometabolic diseases.

## IMDEA Food organizes its activities around three strategic axes:



### science

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



### business

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



### society

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

## RESEARCH PROGRAMMES



Precision Nutrition and Aging



Precision Nutrition and Cancer



Precision Nutrition and Obesity



Precision Nutrition and Cardiometabolic Health



Childhood Precision Nutrition

## RESEARCH PLATFORMS



Platform for Clinical Trials in Nutrition and Health. GENYAL + P4H



Innovation, Communication and Education Unit





# people



The core strength of the Institute is its international **research team**, consisting of **talented researchers from 12 different nationalities**, which carries out new scientific discoveries in Food Science, and foster the development of emerging technologies.

**78 researchers**  
48 PhD, 22 no PhD y 8 technicians

**12 different nationalities**  
United States, Peru, Argentina, Colombia, Venezuela, Greece, Italy, Portugal, Australia, Singapore and Spain

**15 research groups**

**9 people in management**

# laboratory



## The facilities of IMDEA Food Institute

The building and laboratories of IMDEA Food Institute are located at the Cantoblanco University Hospital, next to the Universidad Autónoma de Madrid campus, with which the Institute collaborates closely.

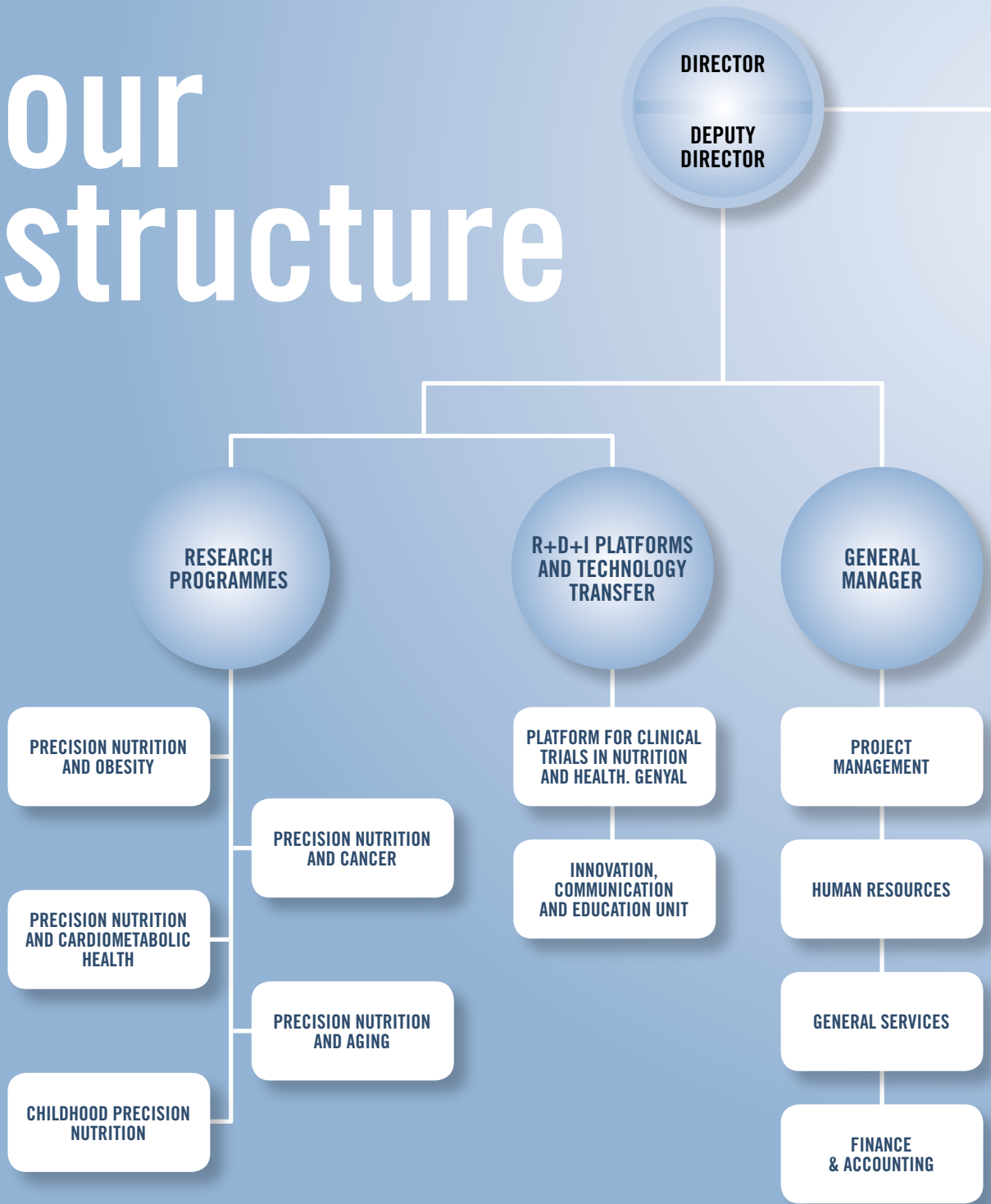
**4.595 m<sup>2</sup> area**

**2 symmetrical areas of 5 floors each**

**Maximum capacity of 100 researchers and has 6 research labs**



# our structure





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Health and Nutrition Director  
Coca-Cola Iberian Division. Spain

**NATAC BIOTECH S.L. Spain**  
D. José Carlos Quintela Fernández  
Scientific General Director

**ASEACAM-Asociación empresarial de Industrias Alimentarias de la Comunidad de Madrid**  
Spain

### SECRETARY

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Spain

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Department of Pharmaceutical and Health Sciences  
CEU San Pablo University. Spain

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Researcher Professor  
CEBAS-CSIC. Spain

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### VICE-PRESIDENT

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Researcher / Senior Nutritionist and Group Leader of the Food and Clinical Trials Unit.  
IMDEA Food. Spain

### SECRETARY

**D.ª Elena Aguilar Aguilar**  
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IMDEA Food. Spain

### MEMBERS

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Natac Biotech S.L. Spain

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**D. José Mª Carrascosa Baeza**  
Professor of Molecular Biology.  
CBM "Severo Ochoa". Spain

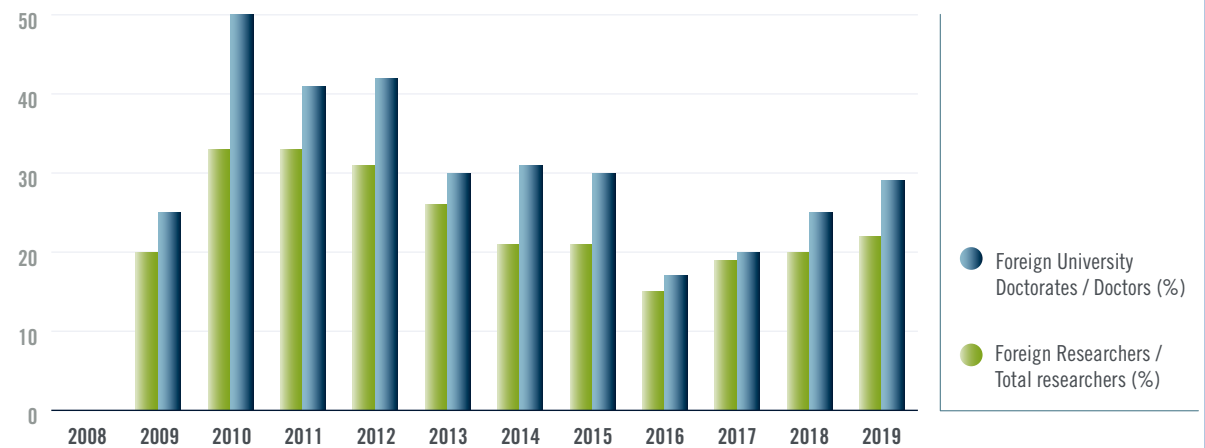
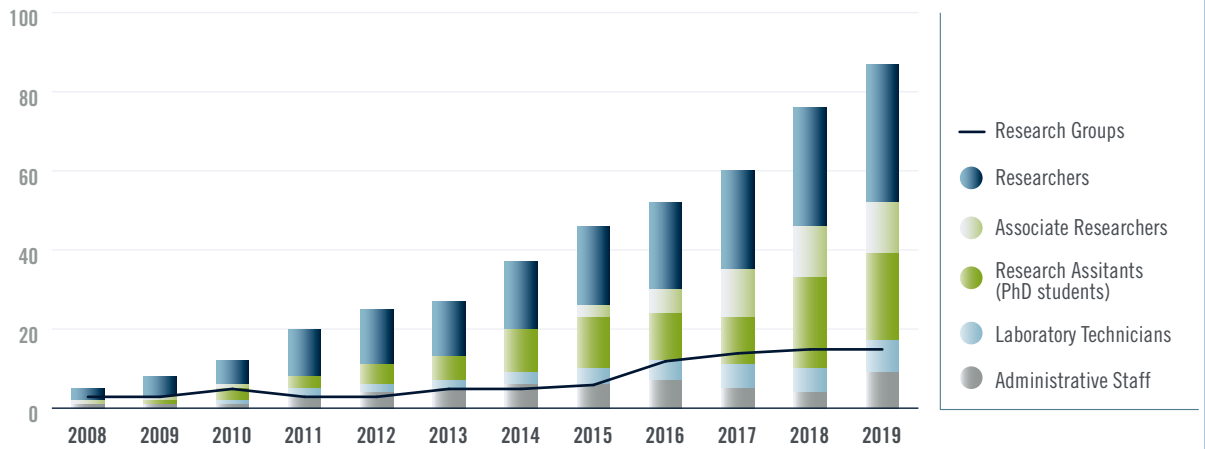
**D.ª María Victoria Moreno-Arribas**  
Scientific Researcher  
CSIC-CIAL. Spain





# in figures

## human resources



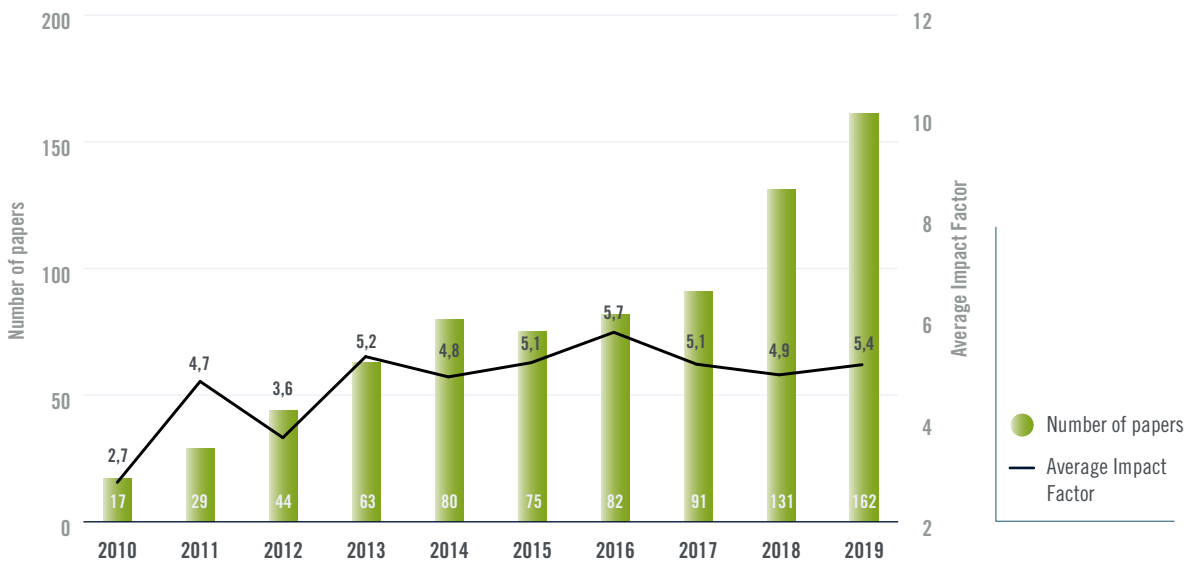
Technology and knowledge transfer to society through **talent transfer**

**16** defended PhD theses since 2008

**11** ongoing PhD theses



# scientific results



## 2019

**41**

keynote/  
invited talks

**162**

JCR papers

**5,104**

average  
impact factor

# technology transfer



As regards Agreements and other technology transfer actions, 10 projects have been developed in collaboration with companies and other bodies. The GENYAL Platform continues to grow and already has more than 2,500 volunteers in its cohort for clinical food trials.

In addition, the Institute has a portfolio of 5 patents, 3 of which have already been granted, 1 of them in 2019. Two patents have been transferred to the company CANAAN through the granting of an exclusive license with the right to sublicense, to develop, use and market the international patent PCT/ES2017/070263 and the Spanish priority patent number

P201131733, and two products derived from the invention P201830740 have been licensed to the company YNSADIET.

Also, IMDEA Alimentación, participates in 1 EBT (technology-based company) PRECISION FORHEALTH, SL (P4H) constituted in January 2018 from the research results obtained at the Institute.

Finally, the following shows the companies that have been collaborating with the centre during 2019, the agreements agreed with International Universities and Research Institutes, as well as the different scientific and technological international partnerships that IMDEA Alimentación has:

## Companies which had active collaboration with IMDEA Food during 2019



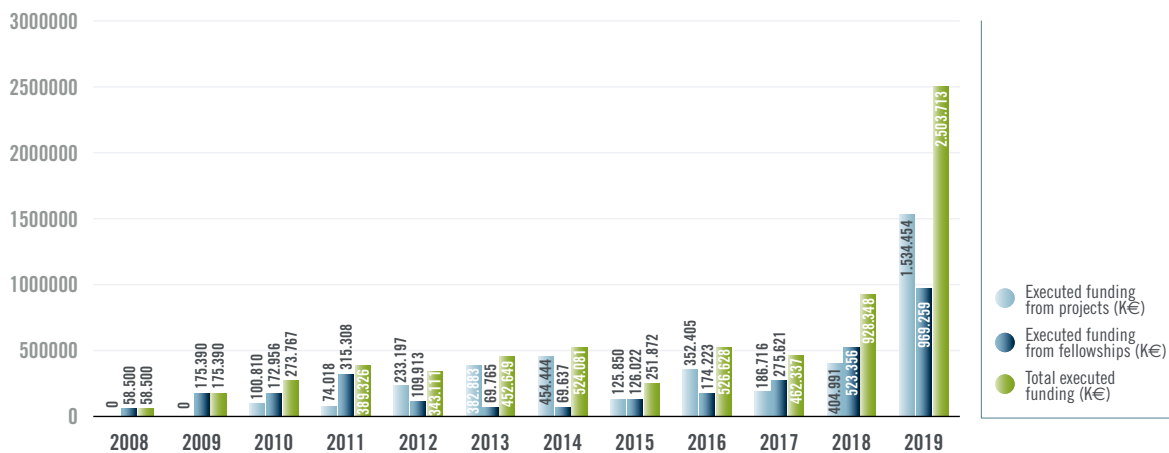
## Agreements with International Universities and Research Institutes



## Scientific/Technological international partnership







## 2019



● International projects  
14



● National Projects  
15



● Regional Projects  
3



R&D projects



Contracts with industry

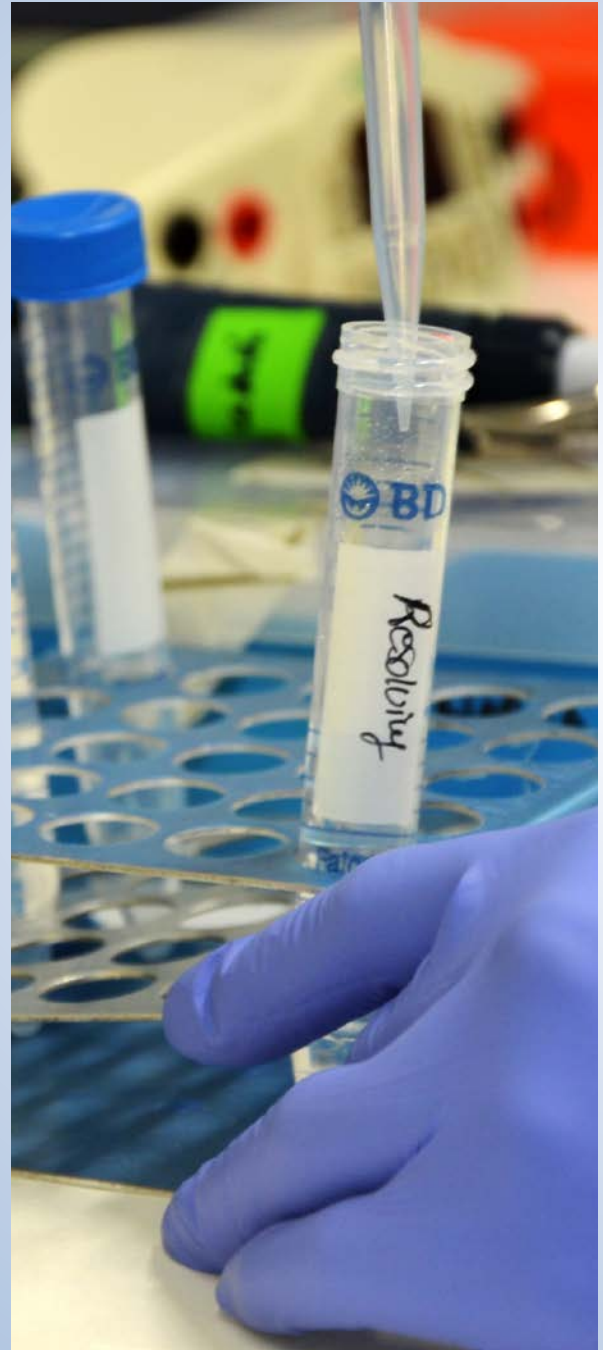
# research



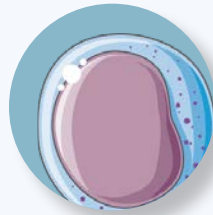
IMDEA Food focuses its scientific project on Precision Nutrition. The development of products and therapies for various chronic diseases is based on new scientific knowledge of the molecular mechanisms that give rise to different physiological processes. The identification of therapeutic targets that can be modulated by the nutrients is key for the food to reach the therapeutic character attributed to it in the current scientific context. IMDEA Food traces its lines of research through the strategies and tools of nutritional genomics, in fields such as cancer, ageing, obesity and cardiometabolic diseases.

The Institute's organizational structure is based on five thematic research programmes with the common denominator of precision nutrition. Each of the Programmes are divided into Groups, whose leaders are senior researchers. This structure is completed with three Technology and Technology Transfer Platforms.

The scientific staff is distributed in the five Research Programmes led by a principal researcher and focused on lines of strategic interest within the field of Nutrition, Food and Health. All of them carry out applied scientific research, fundraising for projects, scientific publications and transfer of results.

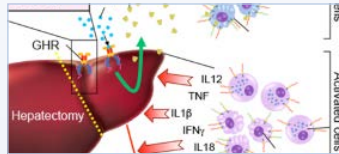


# research programmes



## Precision Nutrition and Aging Programme

**Dr. Manuel Serrano**



- Metabolic Syndrome Research Group

**Pablo Fernández**

- Nutritional Interventions Research Group

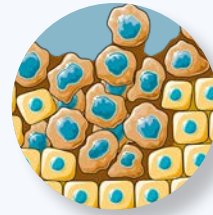
**Rafael de Cabo**

- Hepatic Regenerative Medicine Research Group

**Manuel Fernández Rojo**

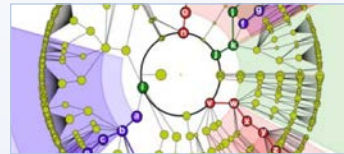
- Posttranscriptional regulation of metabolic diseases Research Group

**Cristina Ramírez**



## Precision Nutrition and Cancer Programme

**Dr. Ana Ramírez de Molina**



- Molecular Oncology Research Group

**Ana Ramírez de Molina**

- Clinical Oncology Research Group

**Enrique Casado and Jaime Feliú**

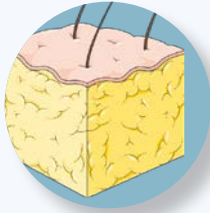
- Molecular Immunonutrition Research Group

**Moisés LaParra**

- Computational Biology Research Group

**Enrique Carrillo**





## Precision Nutrition and Obesity Programme

**Dr. Jose María Ordovás**



- Nutritional Genomics and Epigenomics Research Group  
**Jose María Ordovás**
- Cardiovascular Nutritional Epidemiology Research Group  
**Fernando Rodríguez Artalejo**
- Nutritional Control of the Epigenome Research Group  
**Lidia Daimiel**



## Precision Nutrition and Cardiometabolic Health Programme

**Dr. Alfredo Martínez**

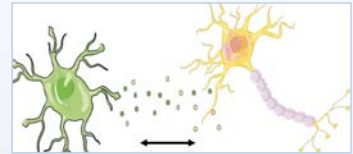


- Cardiometabolic Nutrition Research Group  
**Alfredo Martínez**
- Bioactive Ingredients Food Research Group  
**Francesco Visioli**
- Epigenetics of Lipid Metabolism Research Group  
**Alberto Dávalos**

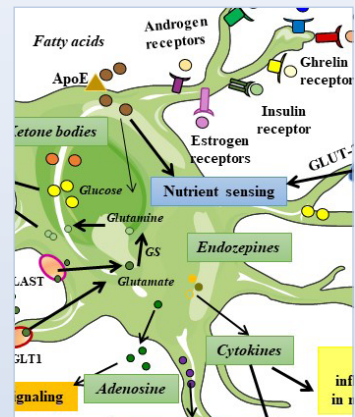


## Precision Nutrition and Childhood Obesity Programme

**Dr. Jesús Argente /  
Dr. Julie Chowen**



- Childhood Obesity Research Group  
**Jesús Argente / Julie Chowen**





# research platforms



## Innovation, Communication and Education Unit



- Education  
**María Jesus Latasa**
- Communication  
**Sara Castillo**



## Platform for Clinical Trials in Nutrition and Health. GENIAL

**Dr. Guillermo Reglero /  
Dr. Ana Ramírez de Molina**



- Food and Clinical Trials Unit  
**Viviana Loria**
- Nutritional Genomics and  
Health  
**Maria Isabel Espinosa**
- Computational Biology /  
Biostatistics Unit  
**Enrique Carrillo and Gonzalo  
Colmenarejo**
- GENIAL Lab  
**Susana Molina**



# facilities



science



business



society

IMDEA Food headquarters are located in the old main building of the Cantoblanco Hospital since beginning of 2014. The building, ceded to the Institute by the Department of Education and Employment from the Region of Madrid (the Education, Youth and Sport Council of the Madrid Region), is an excellent space in which to undertake scientific research.

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

The building occupies an area of 4.595 m<sup>2</sup> and is divided into two symmetrical main sections of five stories each

that can house up to 100 researchers. It is equipped with laboratories of molecular and cellular biology P2, genomics and instrumental analysis, as well as facilities for clinical trials in humans.

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

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 nucleofactor, a pressure reducer, an apparatus with micro-electric biosensors for cellular assays with real-time results and an analyzer with Luminex technology.

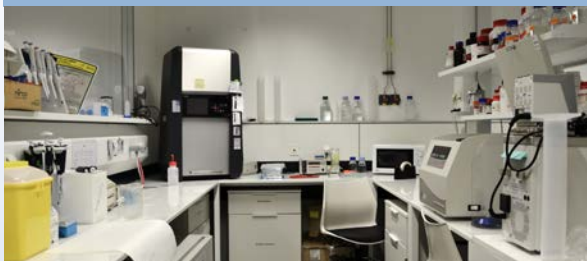


## Laboratory 2. Genomics Laboratory



- 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 la- test generation QuantStudio™ apparatus. The versatility of these systems allows analyses to be performed in different formats depending on the number of samples to be tested, from the use of 96-well plates through to chips capable of performing 3.072 genotyping reactions. These devices have different applications, such as digital PCR, DNA fragment analysis, expression/gene quantification analysis, allele discrimination using TaqMan probes, and the detection of SNPs and mutations, etc.
- The laboratory has a designated clean area for processing and extracting nucleic acids from samples originating from clinical trials.

## Laboratory 3. Biochemical Instrumental Techniques Laboratory



- This multifunctional laboratory is fitted with a range of small apparatuses for the preparation of reagents and solutions, plus more specific equipment for use in biochemical and molecular biological investigations, such as plate readers, a luminometer, a NanoDrop 2000 spectrophotometer, a SpeedVac sample concentrator, and an HPLC apparatus.
- It is divided into different areas where different techniques, such as Western blotting and agarose gel separations, and microbiological techniques for the cultivation and handling of bacteria, can be followed.

## Laboratory 4. General Biochemistry and Molecular Biology Laboratory



- This is where the different research Groups undertake their normal laboratory work. Each Group has its own space equipped with benches and all the reagents and materials required for its research line. Predoctoral students and those undertaking laboratory experience also work in these areas. Fume cupboards are available for handling volatile compounds, there are cupboards for the storage of flammable products and acids etc., and freezers for preserving samples and reagents.
- The IMDEA Food installations also have a cold room, a freezing room, a dark room, a cooling and ultrafreezing room, and a cryopreservation tank.

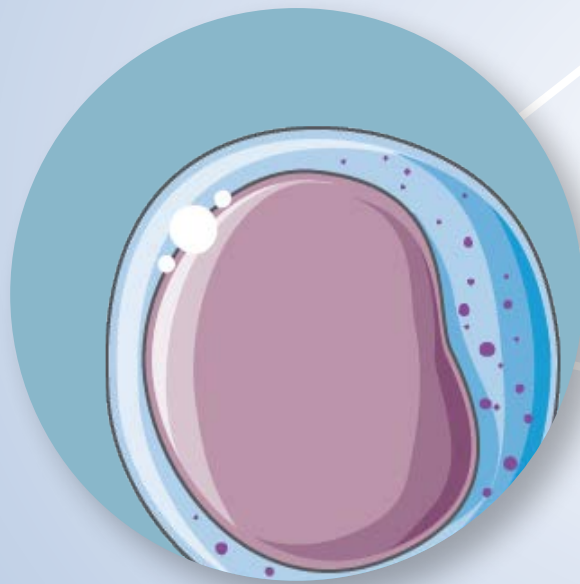


## programme

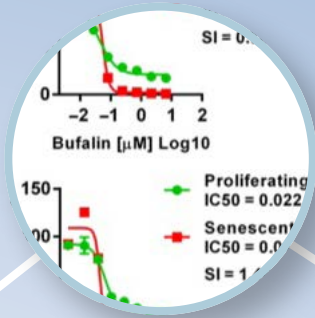
# Precision Nutrition and Aging

### Goal and vision

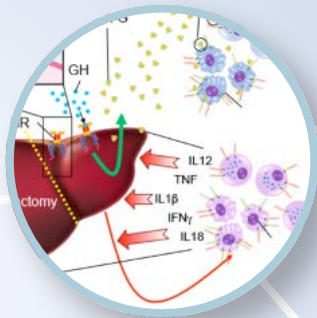
The Precision Nutrition and Aging Programme at IMDEA Food strives to study the multifaceted connections between nutrition and the aging process. Our programme utilizes multiple models of age-related metabolic diseases, including cardiovascular disease, non-alcoholic fatty liver disease, obesity, neurodegenerative diseases, hepatic regeneration or diabetes. We are also studying how different nutritional interventions slow down aging and delay age-related diseases, such as calorie restriction, intermittent fasting or different fasting-mimicking bioactive products. Finally, our research is focused on the molecular mechanisms that regulate metabolic pathologies and aging-delaying interventions, ranging from mitochondrial function, miRNA expression, insulin signaling, senescence or exosome production and function. Together, we cover a wide range of molecular approaches to fight aging through nutrition.







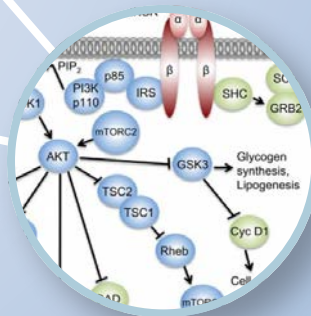
### Metabolic Syndrome Research Group



### Hepatic Regenerative Medicine Laboratory



### Research Group on Nutritional Interventions



### Research Group on Post-transcriptional Regulation of Metabolic Diseases



## Main research lines

### Metabolic Syndrome Research Group

Dr. Pablo Fernández

#### Intermittent fasting and fasting mimetics against age-associated diseases.

- Molecular and physiological mechanisms of intermittent fasting in mice and humans.
- Fasting-mimicking bioactive compounds against age-related diseases: PI3K-inhibitors, mitohormetics, senolytics, NAD<sup>+</sup> and NADPH boosters.
- Short-term fasting during chemotherapy administration: reduction of toxicity and enhancement of anti-tumor immune responses.
- Sirtuins in cancer: roles of Sirt3 and Sirt1 in liver and lung carcinogenesis.

#### Bioactive compounds against NAFLD *(see in Heads of Research Line)*

Dr. Ildefonso Rodríguez

### Research Group on Nutritional Interventions

Dr. Rafael de Cabo

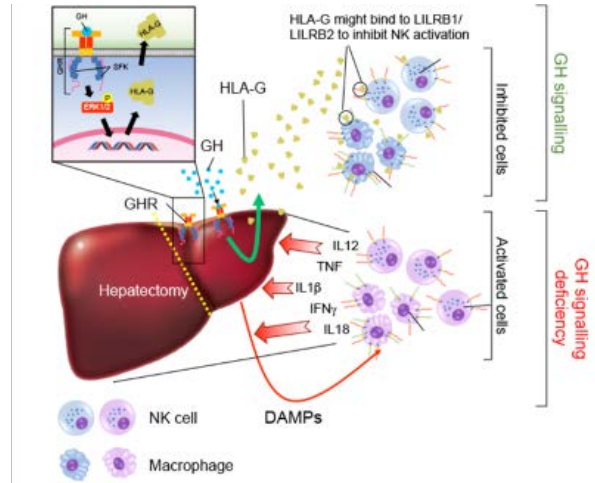
- Development of Viable Interventions to preserve function until late in life.
- Study of Daily Eating Patterns to modulate energy demand and cellular energetic metabolism.
- Characterization of circulating factors in the aging process.

### Hepatic Regenerative Medicine Laboratory

Dr. Manuel Fernandez Rojo

- Development of novel strategies to promote the regeneration of damaged liver linked to chronic liver diseases, metabolic disorders and infection).
- Restoring the regenerative capacity of the aged liver.

- Molecular mechanisms driving the inhibition of liver cancer.
- Characterizing signaling axis regulating mitochondrial function in health and disease.



#### Translational Venomics *(see in Heads of Research Line)*

Dr. Maria Ikonomopoulou

### Research Group on Post-transcriptional Regulation of Metabolic Diseases

Dr. Cristina Ramirez

- Posttranscriptional Regulators as molecular links between diabetes, obesity and Alzheimer's disease. Targets of insulin resistance, mitochondrial dysfunction, autophagy.
- Role of non-coding RNAs and RNA binding proteins in the regulation of glucose homeostasis and their implication in diabetes, metabolic syndrome and obesity.
- Non-coding RNAs and RNA binding proteins in aging.
- Potential effect of aging on endothelial dysfunction and atherosclerosis. Role of Caveolin-1.



## Projects in focus

### Metabolic Syndrome Research Group

#### **Sirtuins as biomarkers and targets in cancer: Sirt1 and Sirt3 in lung and liver carcinogenesis – SIRTBIO**

**Funding:** Asociación Española Contra el Cáncer - AECC

**Project Period:** 2018 - 2021

**Principal Investigator at IMDEA Food:** Dr. Pablo J. Fernandez-Marcos

#### **Ramón y Cajal Programme. RYC-2017-22335.**

**Funding:** Spanish Ministry of Science, Innovation and Universities.

**Project Period:** 2018 - 2022

**Principal Investigator at IMDEA Food:** Dr. Pablo J. Fernandez-Marcos

#### **Characterization of the molecular mechanisms of short-term fasting as an enhancer of chemotherapy. SAF2017-85766-R**

**Funding:** Spanish Ministry of Economy, Industry and Competitiveness.

**Project Period:** 2018 - 2021

**Principal Investigator at IMDEA Food:** Dr. Pablo J. Fernandez-Marcos

#### **New food-derived bioactive products against obesity and diabetes. CIVP18A3891**

**Funding:** Ramón Areces Foundation.

**Project Period:** 2017 - 2020

**Principal Investigator at IMDEA Food:** Dr. Pablo J. Fernandez-Marcos

#### **Marie Curie Horizon 2020 Framework Programme, 832741**

**Funding:** European Commission

**Project Period:** 2019 - 2021

**Principal Investigator at IMDEA Food:** Dr. Pablo J. Fernandez-Marcos

### Research Group on Nutritional Interventions:

#### **Alternative strategies to extend longevity and improve quality of life: Fasting cycles**

**Funding:** Talento Project Grant, Community of Madrid

**Project Period:** 2019-2022

**Principal Investigator at IMDEA Food:** Dr. Alberto Díaz-Ruiz

#### **Unraveling the role of several plant extracts as potential treatment against obesity, type 2 diabetes and aging.**

**Funding:** Biosabor

**Project Period:** 2019-2021

**Principal Investigator at IMDEA Food:** Dr. Alberto Díaz-Ruiz

### Hepatic Regenerative Medicine Laboratory

#### **Consequence of inflammation, elevated tissue-derived ferritin (from damaged liver cells) plays a role in mediating processes associated with hepatic injury by acting as a damage-associated molecular pattern (DAMP), via the inflammasome in HSCs .**

**Funding:** NHMRC Grant

**Project Period:** 2018-2020

**Principal Investigator at IMDEA Food:** Dr. Manuel Fernández Rojo

#### **HLA-G/H2BI is Critical for Regulating Inflammation in the Liver.**

**Funding:** NHMRC Grant

**Project Period:** 2018-2020

**Principal Investigator at IMDEA Food:** Dr. Manuel Fernández Rojo

#### **Diet modifications to improve liver regeneration and reduce liver cancer**

**Funding:** Talento Project Grant, Community of Madrid

**Project Period:** 2017-2021

**Principal Investigator at IMDEA Food:** Dr. Manuel Fernández Rojo

### Research Group of Post-transcriptional Regulation of Metabolic Diseases:

#### **New post-transcriptional regulators as a molecular link between Diabetes, Obesity and Alzheimer's**

**Funding:** Spanish Ministry of Science, Innovation and Universities.

**Project Period:** 2018-2020

**Principal Investigator at IMDEA Food:** Dr. Cristina Ramírez



## Scientific highlights

This year, the different Groups of the Precision Nutrition and Aging Programme have been working successfully in the following contributions:

The **Translational Venomics Laboratory**, led by Dr. Maria Ikonomopoulou, and the **Metabolic Syndrome Group**, led by Dr. Pablo J. Fernandez-Marcos, have participated in a multidisciplinary work that identified a new family of senolytic compounds, with the ability to selectively kill senescent cells. The IMDEA Food researchers screened libraries of venoms from animals, pure compounds from natural sources or plant extracts. They tested their bioactive products on proliferating or senescent human melanoma cells SK-MEL, and quantified the survival

after these treatments. They identified several senolytic compounds, all of which belonged to the cardiac glycosides family, sharing a common chemical scaffold (Figure 1). Our discovery opens the use of these chemical entities against senescence-driven diseases, such as cancer, lung fibrosis, cardiovascular disease or neurodegeneration.

### Reference:

Identification and characterization of Cardiac Glycosides as senolytic compounds. Triana-Martínez F, Picallos-Rabina P, Da Silva-Álvarez S, Pietrocola F, Llanos S, Rodilla V, Soprano E, Pedrosa P, Ferreirós A, Barradas M, Hernández-González F, Lalinde M, Prats N, Bernadó C, González P, Gómez M, Ikonomopoulou MP, Fernández-Marcos PJ, García-Caballero T, Del Pino P, Arribas J, Vidal A, González-Barcía M, Serrano M, Loza MI, Domínguez E, Collado M. *Nature Communications* (2019).

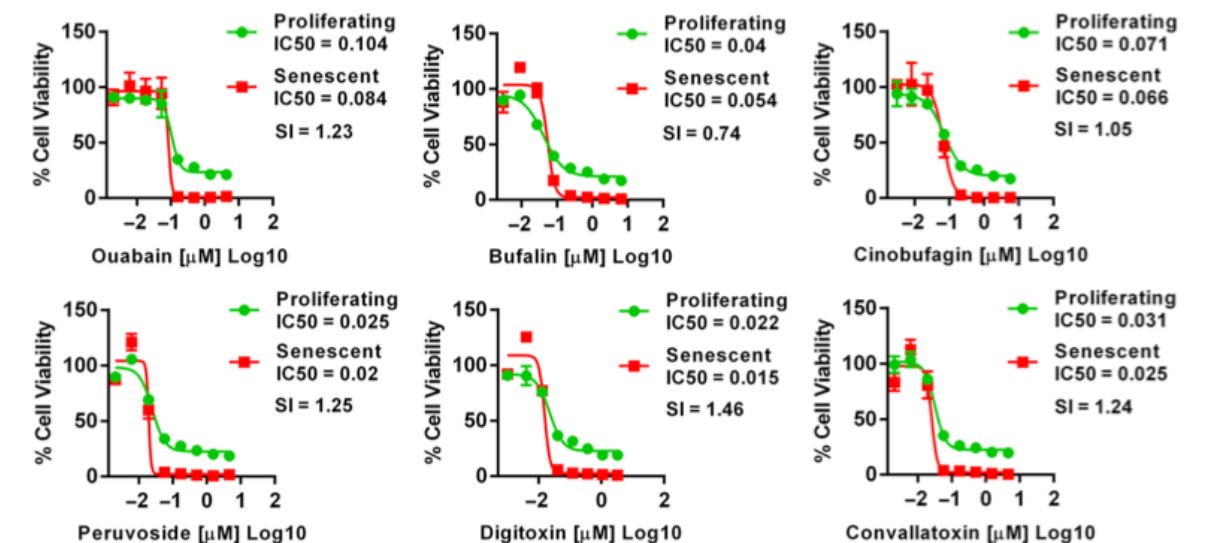


Figure 1. Identification of several cardiac glycosides as a new family of senolytics. Human melanoma SK-MEL-103 cells proliferating (green) or induced into senescence by palbociclib-treatment (red) were treated with the indicated compounds and concentrations, and cell viability was measured and normalized to the vehicle-treated controls.





On the other hand, continuous energy restriction (CER) slows the progression of age-associated diseases and extends lifespan in most animal models. To achieve metabolic benefits of CER and reduce its negative-side effects, unconventional strategies are emerging wherein daily eating patterns (i.e. meal size, frequency of feeding, and/or the length of fasting time) are adjusted. The Group of Nutritional Interventions, led by Drs. Rafael de Cabo and Alberto Díaz-Ruiz, have implemented a feeding regime consisting of cycles of very low calorie (VLC) intake followed by ad libitum feeding. They found that mice undergoing VLC cycles exhibit a variety of health improvements (i.e. reduced body weight, fat mass, and improved metabolic flexibility) in the context of standard, but not obesogenic diet. This study provides new insights on the interactions of feeding regime and diet composition, paving the way to develop novel and translatable interventions to postpone functional decline that occurs with age.

In collaboration with researchers and clinicians in Australia, the **Hepatic Regenerative Medicine Laboratory** has characterized new technologies for the detection of

liver diseases in children. For this, they examined 125 children showing Cystic fibrosis (CF)-associated liver disease (CFLD), no evidence of liver disease (CFnoLD) and controls using Supersonic shear-wave elastography (SSWE) to non-invasively detect CFLD and assess hepatic fibrosis severity. The diagnostic performance for CFLD detection was evaluated alone or combined with aspartate aminotransferase-to-platelet ratio index (APRI). They concluded that SSWE-determined LSM exhibits great diagnostic accuracy in detecting CFLD in children. This was significantly improved when combined with APRI. Moreover, SSWE alone was able to discriminate advanced CFLD.

#### References:

Calvopina DA, Noble C, Weis A, Hartel GF, Ramm LE, Balouch F, Fernandez-Rojo MA, Coleman MA, Lewindon PJ, Ramm GA. Supersonic shear-wave elastography and APRI for the detection and staging of liver disease in pediatric cystic fibrosis. *J. of Cystic Fibrosis*. 2019 Jul 11.

Patent Cooperation Treaty (PCT), PCT/AU2018/050427: 'Anti-inflammatory agents and methods of treatment'. Authors: Manuel Alejandro Fernandez-Rojo and Grant A Ramm.

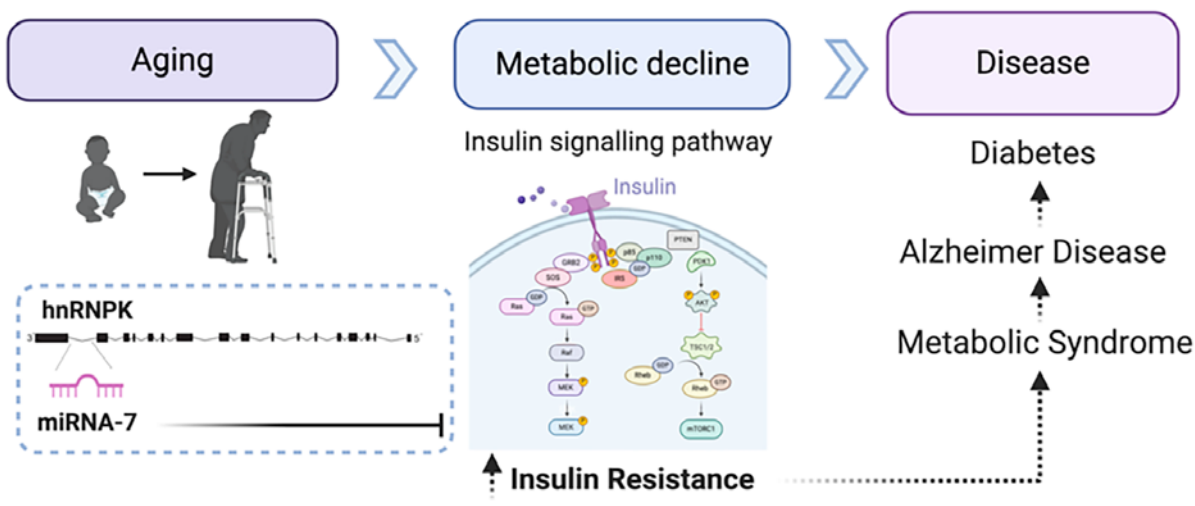


Figure 2. Study of the role HNRNPK-miR-7 axis on insulin resistance and aging related-metabolic diseases

In addition, the **Post-transcriptional Regulation of Metabolic Diseases Group** has been working on the study of brain insulin resistance as one of the most characteristic metabolic dysfunctions that accompanies the aging process, and it represents a key common pathological feature contributing together to Diabetes and Alzheimer’s disease (AD). In this study, they uncover the novel role of a posttranscriptional pair composed by the brain-enriched microRNA-7 and its host gene, the RNA binding protein HNRNPK in the regulation of important genes of the insulin signaling pathway, including the insulin receptor (INSR), insulin receptor substrate 2 (IRS-2), and insulin-degrading enzyme (IDE), as well as genes involved in the production of Ab peptide implicated in the pathology of AD. Interestingly, they found that the levels of miR-7 are abnormally elevated in brains from human

AD patients and in obese mice, providing a plausible molecular mechanism underlying the insulin resistance that characterizes of these two diseases. The research group efforts are now focused on decipher additional metabolic functions of HNRNPK-miR-7, their regulation in a variety of tissues and under different types of dietetic strategies, etc.

**References:**

Fernández-de Frutos M, Galán-Chilet I, Goedeke L, Kim B, Pardo-Marqués V, Pérez-García A, Herrero JI, Fernández-Hernando C, Kim J, Ramírez CM\*. “MiR-7 impairs insulin signaling and regulates Aβ levels through posttranscriptional regulation of the IRS-2, INSR, IDE and LXR pathway”. *Mol Cell Biol.* 2019 Oct 28;39(22). pii: e00170-19. (\*Corresponding author). [Colaboration Yale-IMDEA].





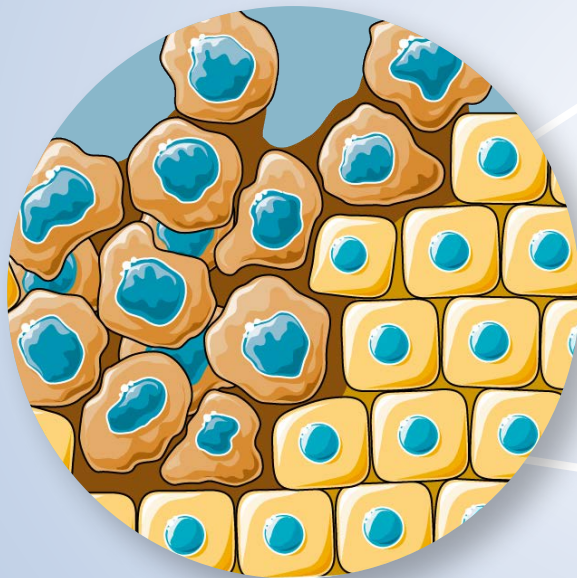
## programme

# Precision Nutrition and Cancer

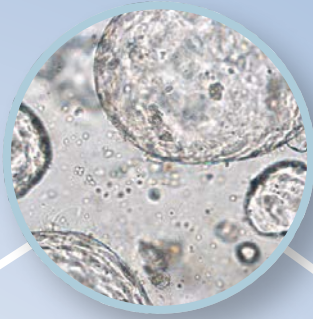
### Goal and vision

The programme of Precision Nutrition and Cancer aims to better understand the interplay of nutrients, metabolism, immunity and cancer, providing the scientific bases to develop precision nutritional strategies with therapeutic effects on cancer patients.

In the era of Personalized Medicine, and taking into account the strong relationship between nutrition and cancer, precision nutrition has to be part of the integral management of cancer patients. Essential events in cancer development and progression such as genetics, metabolism and immunity are strongly influenced by environmental factors, affecting signaling pathways controlling cell function and treatment response. In this programme, we combine molecular and cellular oncology techniques, computational biology approaches and clinical trials to further understand how metabolism and immunity are affected by genetic and life-style factors, aiming to develop therapeutic interventions and precision nutritional products focused on improving the response to treatments and quality of life of cancer patients.



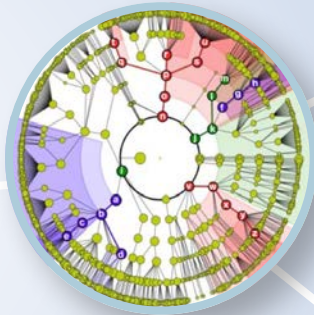




**Molecular  
Oncology Group**



**Clinical Oncology  
Group**



**Computational  
Biology Group**



**Molecular  
Immunonutrition Group**



## Main research lines

### Molecular Oncology Group

Dr. Ana Ramírez de Molina

- **Analysis of metabolic alterations in cancer. Identification of new biomarkers and therapeutic targets in diet-related tumors such as colon, breast and pancreatic cancer.**

Identification of metabolic profiles associated to cancer progression and treatment response. Metabolic reprogramming analysis in cancer and its relationship with a differential patterns of cancer metastasis. Funding: AGL2016-76736-C3-3-R. State Program of Research, Development and Innovation Oriented to the Challenges of Society. TRANSCOLONCAN CA17118 “Translational research to identify colorectal cancer biomarkers for personalized medicine”.

- **\* Nutri-metabolic score biomarker of cancer development and progression**

Analysis of the relationship between lifestyle factors (nutrition, physical activity), genetics (individual susceptibility), the consequent global metabolic state (healthy/unhealthy), and relationship with chronic inflammation and the immune response, as well as the development, progression, and response to treatment of patients with cancer. Development of a Nutri-metabolic score related to metabolic health as a new integrative biomarker of cancer development and progression of diet-related tumors. Funding: CM Regional Government, ALIBIRD2020.

- **Analysis of the activity and mechanism of action of specific nutritional strategies and bioactive compounds as coadjuvants in cancer treatment and associated metabolic disorders.**

Screening to identify natural compounds and nutritional strategies with potential therapeutic effect in cancer, and analysis of their personalized application through an organoids platform from gastric cancer patients. Design of precision nutritional

formulations and analysis of their potential synergism with current antitumoral treatments. Development of clinical trials in healthy volunteers and cancer patients with personalized nutritional strategies based on their molecular mechanisms and specific needs of the patients. Funding: Ramón Areces Foundation. Research projects in Life sciences and matter 2019. Title: Nutritional strategies and bioactive compounds to target lipid metabolism alterations in cancer: Platform of Patient derived Paired Organoids for Precision Nutrition.

### Clinical Oncology Group

Dr. Enrique Casado / Dr. Jaime Feliú

- **Enhancing the immune system in the prevention of infections during the COVID-19 pandemic in cancer patients with anti-tumour treatment.**

Cancer patients undergoing anti-tumour treatment are, due to their immunosuppression, comorbidity, toxicities and hospital exposure, at high risk of developing infections, and in the current situation, of contagion and complications from COVID19. It is of great interest to find strategies that can prevent infections and with the least possible toxicity. In collaboration with the Molecular Oncology group and the Universidad Autónoma de Madrid, clinical trials are being carried out to evaluate the effect of nutritional strategies to reduce the number of infections, including COVID-19, in cancer patients receiving oncological treatment.

- **Application of targeted dietary measures on the risk of developing metabolic syndrome in women diagnosed with early breast cancer undergoing chemotherapy.**

Breast cancer is the most common tumour in women worldwide. Despite the improved prognosis of this disease, women diagnosed with breast cancer have an increased risk of developing diseases such as diabetes,



osteoporosis or cardiovascular disease, which can have a negative impact on their prognosis. Current evidence suggests that adjuvant breast cancer chemotherapy causes weight and fat tissue gain, negatively affecting the components of the metabolic syndrome (SMet). Weight gain after a diagnosis of breast cancer negatively influences disease-free survival, local recurrence and survival. There is a need to develop and apply in the clinic strategies to inhibit the development of SMet in patients with breast cancer in treatment, and thus increase their response to treatment and quality of life.

- **Determination of metabolic status and epidemiological evaluation in Pancreatic cancer patients, and association with clinical outcome**

A large number of studies have established that the presence of obesity, type 2 diabetes and exposure to tobacco are the main modifiable risk factors for developing pancreatic cancer. Individuals who are overweight or obese have greater risk of developing these tumors than those whose body mass index is between within the ranges of normality. Herein we analyze the molecular mechanisms involved, including inflammation, insulin resistance, the presence of circulating lipids, as well as cytokines and changes in the microbiome. Specific biomarkers and targets of potential strategies related to life-style modifications are investigated.

### Computational Biology Group

#### Dr. Enrique Carrillo

- **Integrative bioinformatic analyses to study the nutrition-disease interaction through molecular variability responses.**

Understanding epigenomic and transcriptomic variability in metabolic genes and pathways of tumors from large datasets for the development of precision nutrition strategies in complex diseases. Two main areas are addressed:

- Development of computational tools to aggregate information about food/diet – drug interactions from structured and unstructured resources to study the complex molecular relationships of these interactions for negative (decreasing drug bioavailability or blocking the mechanism of action) or positive (maximize drug effect or reduce side effects) effects. Participation in Food Nutrition Security Cloud (FNS-Cloud): Cloud solution facilitates access to food and nutrition information (H2020-EU.3.2.2.3, Grant agreement ID: 863059. Funded under: (2019-2023)).
- Characterization of microbiome disruption in complex diseases like colorectal cancer or celiac disease and study the effects of bioactive compounds in microbiome modulation for a healthy gut. Participation in FOODTECH4MICROBES (National Plan of Research and Innovation, EIN2019-103470 (2019-2020), Applications of food technology to modulate the microbiome and its interference on tumour cells for the treatment of colorectal cancer) and COST Action CA18131 (“Statistical and machine learning techniques in human microbiome studies”) (2018-2022).
- Development and validation of a predictive model of a fatal and non-fatal cardiovascular event after 10 years of follow-up of the Type 2 Diabetes Mellitus cohort from Madrid (MADIA-BETES). Fondo de Investigación Sanitaria. Instituto de Salud Carlos III (PI18/01025) (2018-2021).



## Molecular Immunonutrition Group

Dr. Moisés Laparra

- **Immunonutritional intervention strategies on the myeloid-lymphoid relationship to establish adequate metabolic conditions within the gut-liver axis.**

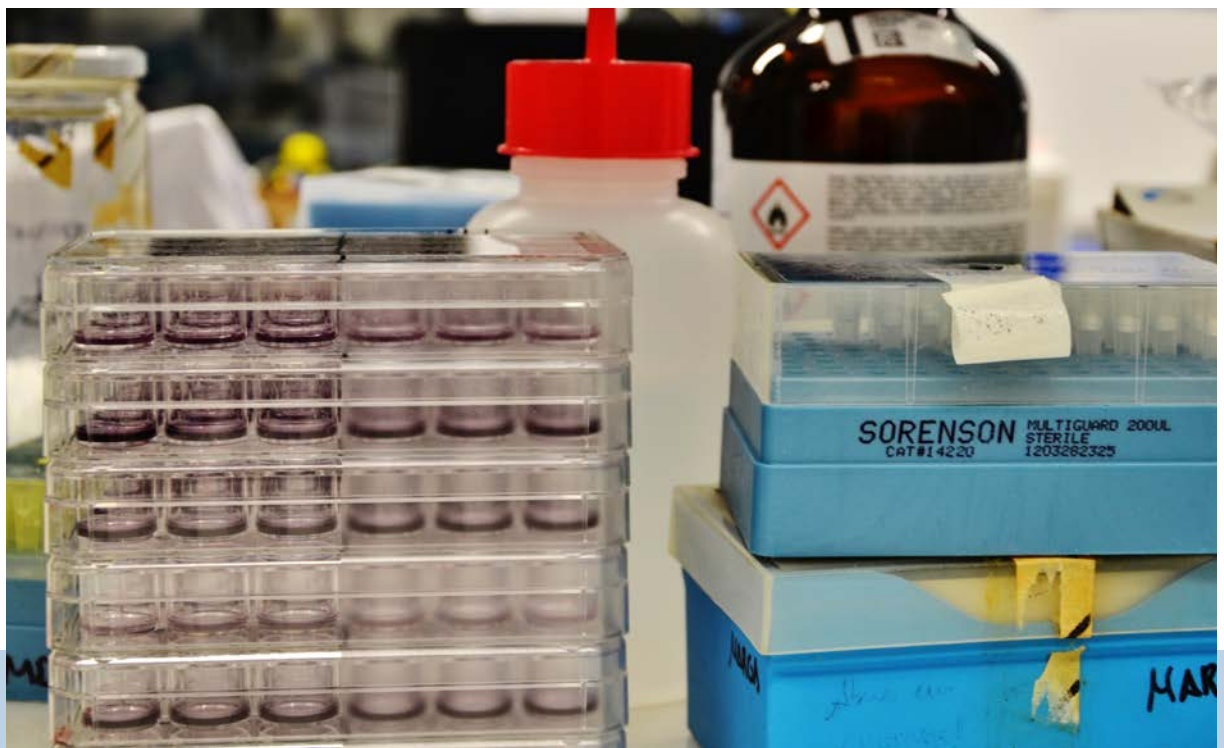
The role of immunonutritional agonists in the control of intestinal players such as macrophages and gut microbiota influencing the IL-23/IL-22 pathway has important effects on the control of metabolic alterations. Our research established a role for the F4/80+ population in the innate signaling that stem at intestinal level in the regulation of immunometabolic events within the gut-liver axis health.

- **Nutritional approaches to innate immune regulation response.**

Definition of early innate immune regulatory response(s) against the initial tissue damage accompanied by the transition and activation of macrophages in tumor control. Elucidation of innate cell biology as a path forward to develop durable and long-lasting immune response(s). RYC-2015-18083, Molecular immunonutrition of the metabolic dysfunction and antitumoral response.

- **Analysis of the dynamic interplay of improved food formulations with immunonutritional benefits in the prevention and onset of liver dysfunction.**

Knowledge about the impact of food on citizens' health and well-being has become a major factor for the consumers' concern and food industry's competitiveness. Nowa-days, nutrition is demanded as a way to reduce the risk of suffering immunometabolic diseases, and can even offer a therapeutic potential on these. In these context, our goal, in collaboration with IATA and Valencian International University, is the meta-bolic reprogramming of innate lymphoid and myeloid components of the immune system, which is key to establish an adequate tissue metabolism to prevent/correct the distinctive stamp in alterations to the homeostasis of nutrients in which nutritional strategies can play a key role. Immun4Nut PRP\_PID\_2019, Understanding the dynamic interplay of improved food formulations with immunonutritional benefits in the prevention and onset of liver dysfunction.







## Project in focus

### Precision nutrition strategies for cancer patients: paired-organoids platform



FUNDACIÓN  
RAMÓN ARECES

**Principal Investigator:** Ana Ramírez de Molina.

**Period:** 2019 –2021

**Funding:** Ramón Areces Foundation: Life Science and Matter Call 2019

**Partner:** Infanta Sofía University Hospital

This project aims to study of the effects at the molecular level of bioactive compounds and molecular strategies for targeted interventions as co-adjuvants against metabolic disorders including cancer, taking into consideration risk factors in cancer such as the nutritional and metabolic status (obesity, T2DM, inflammation) and intestinal dysbiosis.

As an essential part of the research, the constitution of a Platform of Patient derived Paired Organoids in collaboration with the Medical Oncology Service of Infanta

Sofía Hospital is under construction for the analysis of lipid metabolism alterations in cancer and identification of the most appropriate approach for its specific metabolic alteration. This platform of organoids derived from patients with intestinal cancer, constitutes a more physiological and personalized tool, to further assess different drugs, bioactive compounds or specific nutritional strategies for the modulation of metabolic targets and their association with the progression of the disease. This methodology will have a major impact in the personalized management of cancer patients, focused on the introduction of precision nutritional strategies to restore proper metabolic function.

#### References:

A more physiological approach to lipid metabolism alterations in cancer: CRC-like organoids assessment. Cruz-Gil S, Sánchez-Martínez R, Wagner-Reguero S, Stange D, Schölch S, Pape K, Ramírez de Molina A. PLoS One. 2019 Jul 24;14(7):e0219944. doi: 10.1371/journal.pone.0219944. eCollection 2019.

Yarrow Supercritical Extract Ameliorates the Metabolic Stress in a Model of Obesity Induced by High-Fat Diet. Mouhid L, Gómez de Cedrón M, Quijada-Freire A, Fernández-Marcos PJ, Reglero G, Fornari T, Ramírez de Molina A. Nutrients. 2019 Dec 26;12(1):72. doi: 10.3390/nu12010072.

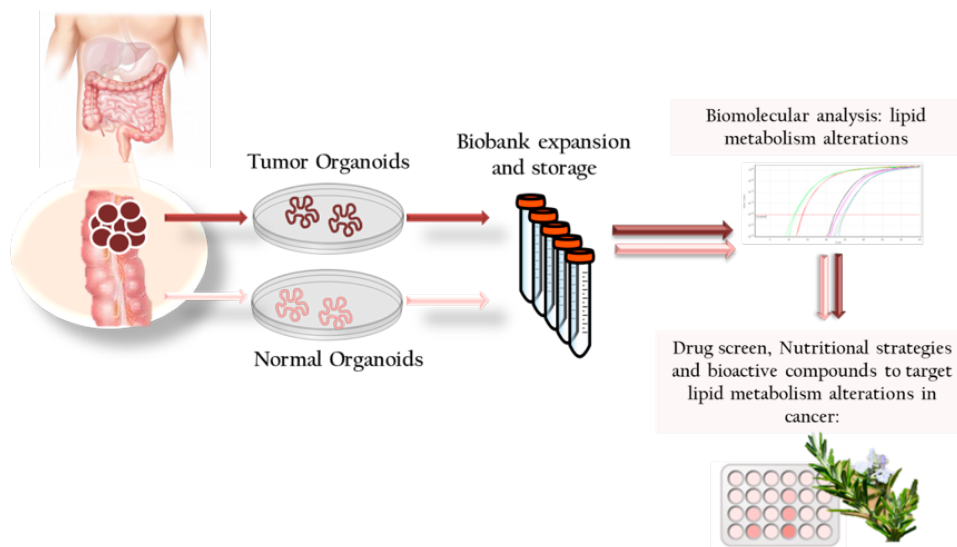


Fig. Platform of paired organoids for molecular nutritional approaches in gastric cancer patients



## FNS-Cloud: Cloud solution to facilitate access to food and nutrition information



**Principal Investigator:** Enrique Carrillo.

**Period:** 2019 –2023

**Funding:** H2020

FNS-Cloud will overcome fragmentation problems by integrating existing FNS data, which is essential for high-end, pan-European FNS research, addressing FNS, diet, health, and consumer behaviours as well as on sustainable agriculture and the bio-economy. Current fragmented FNS resources not only result in knowledge gaps that inhibit public health and agricultural policy, and the food industry from developing effective solutions, making production sustainable and consumption healthier, but also do not enable exploitation of FNS knowledge for the benefit of European citizens. FNS-Cloud will, through three Demonstrators; Agri-Food, Nutrition & Lifestyle and NCDs & the Microbiome to facilitate:

(1) Analyses of regional and country-specific differences in diet including nutrition, (epi)genetics, microbiota, consumer behaviours, culture and lifestyle and their effects on health (obesity, NCDs, ethnic and traditional foods), which are essential for public health and agri-food and health policies;

(2) Improved understanding agricultural differences within Europe and what these means in terms of creating a sustainable, resilient food systems for healthy diets;

(3) Clear definitions of boundaries and how these affect the compositions of foods and consumer choices and, ultimately, personal and public health in the future.

Long-term sustainability of the FNS-Cloud will be based on Services that have the capacity to link with new resources and enable cross-talk amongst them; access to FNS-Cloud data will be open access, underpinned by FAIR principles (findable, accessible, interoperable and re-useable). FNS-Cloud will work closely with the proposed Food, Nutrition and Health Research Infrastructure (FNHRI) as well as METROFOOD-RI and other existing ESFRI RIs (e.g. ELIXIR, ECRIN) in which several FNS-Cloud Beneficiaries are involved directly.

IMDEA Food Institute participates leading the development of an alert classification system for food/diet – drug interactions to catalogue and prioritize them based on scientific evidence included in structured and unstructured databases with the aim to provide a centralized information platform to prevent side effects and improve management of Non-Communicable Diseases by physicians and nutritionists.



*Figure- Diagram about food-drug interactions across their actions in membrane transporters and enzymes*



# Scientific highlights

## Nutrimetabolic score

**Dr. Ana Ramírez de Molina**

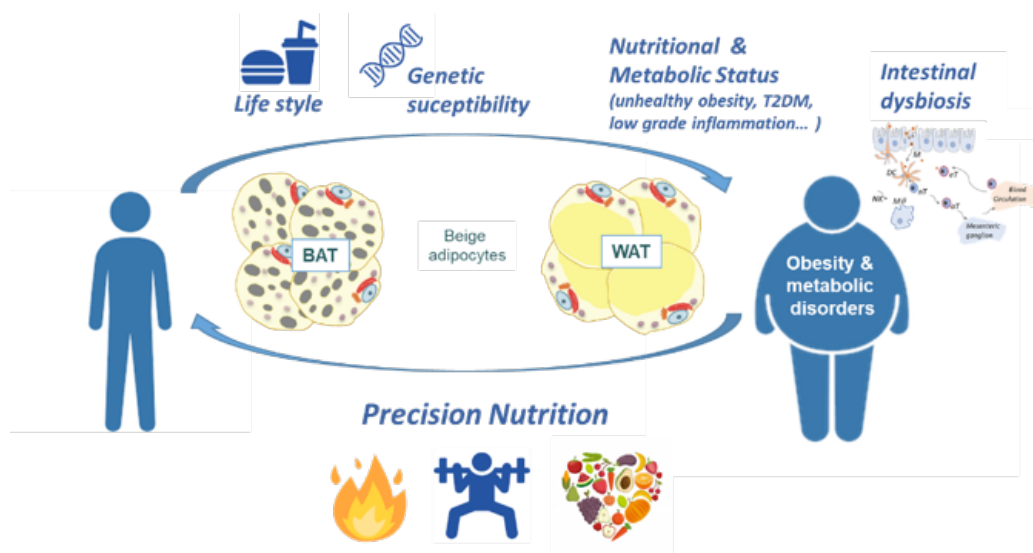
Molecular Oncology Group

Metabolic reprogramming is considered one of the “hallmarks” in cancer. Along with the increase in aerobic glycolysis (Warburg effect) and glutaminolysis, reprogramming of lipid metabolism has become a key factor in cancer initiation and progression. Thus, different oncogenic pathways activate de novo synthesis of fatty acids and cholesterol and / or increase lipid uptake from the extracellular medium; lipids participate in different signaling pathways, being important mediators of inflammation associated with tumor progression, and they model the tumor microenvironment facilitating tumor dissemination by reprogramming adipocytes and fibroblasts (CAAs, CAFs), as well as cells of the immune system (polarization Protumoral Th2), and stimulation of angiogenesis, among other processes.

Closely related to nutrition and life style, **overweight and obesity** have grown alarmingly, increasing the risk of

developing other pathologies such as T2DM, cardiovascular disease, metabolic syndrome and cancer. Obesity is associated with a higher incidence and progression of cancer in multiple types of tumors, contributing to up of 20% of cancer-related deaths. At the base of this association, there are the metabolic and inflammatory changes derived from excess of adipose tissue that interrupt the metabolic physiological homeostasis, both locally and systemically. In this sense, it is essential to define the degree of metabolically dysfunctional obesity (metabolically unhealthy individuals-MUI) associated with adipocyte hypertrophy (with the consequent increase in lipolysis, and the release of fatty acids into the bloodstream), systemic inflammation and lipotoxicity (mainly hepatic steatosis, and muscle and pancreatic dysfunction associated with insulin resistance) rather than the body mass index (BMI) itself.

An integrative biomarker of metabolic status including different factors such as genetic susceptibility, lipid profile, anthropometry and life style and nutritional data is being developed as a complex biomarker of tumor risk and progression.



## Immunonutrition

**Dr. Moisés Laparra**

Molecular Immunonutrition Group

Immunonutritional agonists have contributed to selectively modulate the underlying signaling of the 'Toll-like' receptor (TLR)-4 towards the interferon pathways. Thus, acting as nutritional tools to preserve adequate immunometabolic response(s) controlling hepatocarcinoma development.

Research line: Immunomolecular nutriology of the gut-liver axis. Immunonutritional factors help enhancing recovery, and reducing the incidence of immunometabolic complications by improving nutrition and innate biology, and thereby reducing the risk of disease. This approach allows to favour a more selective and positive impact of lifestyle on the immune system ameliorating the severity and progression of hepatocarcinoma.

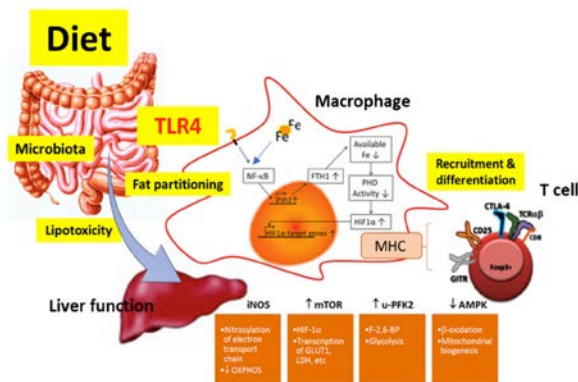
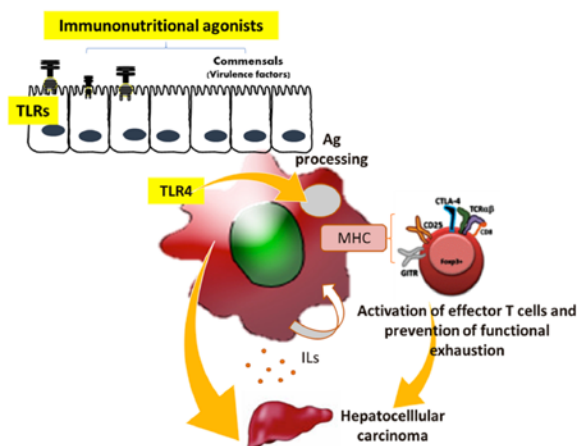


Figure legend: Schematic relationship of the role for immunonutritional agonists helping to develop antitumoral response(s) (Oncotarget. 2019, 10(7):760-772)





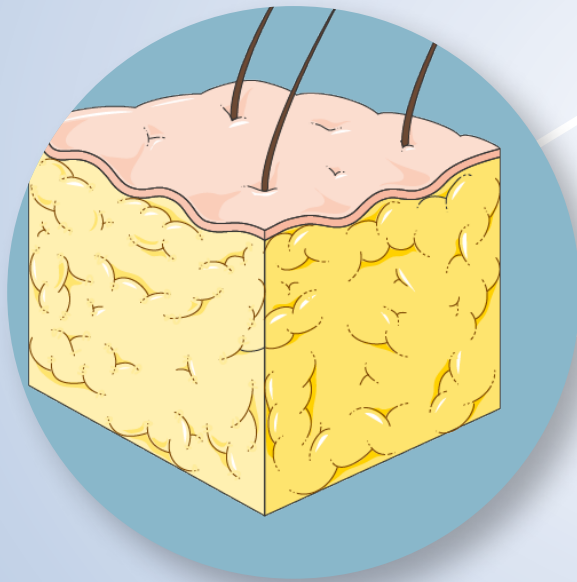


## programme

# Precision Nutrition and Obesity

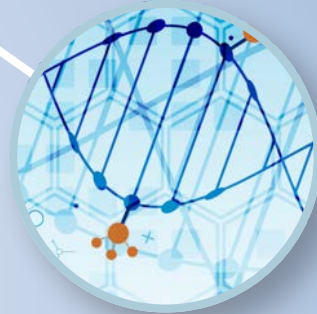
### Goal and vision

The Precision Nutrition and Obesity Programme aims to understand the inter-individual variability in the response to any therapeutic diet or physical regime with the aim to prevent obesity and/or return to a healthy body weight. The individual's susceptibility to becoming obese and the individual responsiveness to weight loss interventions are the result of an intricate network of linked biological mechanisms that, together, compose the biology of the system. We base on the n-equal-to-one approach to evaluate the individual response to diet and physical activity intervention by gathering genetic, epigenetic and metabolomic knowledge at individual level following systems biology approaches in large populations.





**Nutritional  
and Epigenomic  
Genomics Research  
Group**



**Nutritional Control  
of the Epigenome  
Research Group**



**Cardiovascular  
Research Group  
Nutritional  
Epidemiology**





## Main research lines

### Nutritional and Epigenomic Genomics Research Group

**Dr. José María Ordovás**

The group aims to provide genomic tools and knowledge to manage obesity and related co-morbidities at the individual level through:

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

### Nutritional Control of the Epigenome Research Group

**Dr. Lidia Daimiel**

The group aims to gain knowledge of the epigenetic mechanism that control the individual's response to diet to promote a healthy aging. Our executive objectives are:

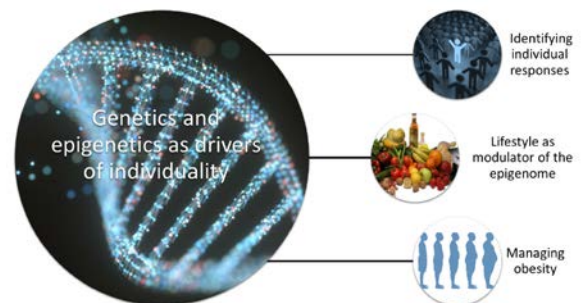
- The identification of microRNAs modulated by diet that regulate nutrient sensing pathways.
- The description of how interventions to prevent obesity based on diet and physical exercise modulate molecular hallmarks of aging, including telomerase activity, epigenetic regulation of gene expression and immunosenescence.
- The understanding of the relationship between obesity, diet and physical activity and neurocognitive decline in the elderly.

### Cardiovascular Research Group Nutritional Epidemiology

**Dr. Fernando Rodríguez-Artalejo**

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

- Characterization of the natural history of unhealthy aging in older people, by identification of its main determinants, which range from socioeconomic and psychosocial factors to environmental variables (e.g., heavy metals), health behaviors (diet, physical activity), as well as biological (e.g. blood pressure) and molecular (inflammation markers, metabolomics) variables”.
- Nutritional and omic determinants of frailty and functional status in the older adult.
- Diet and physical activity as determinants of obesity and cardiovascular risk in the elderly.







# Projects in focus

## DIMENSION / Dietary induced methylome and transcriptome dynamics assessing nutrition impacts on cardiovascular and metabolic health



**Funding:** ERA-HDHL Nutrition & the Epigenome / Proyectos de I+D+D “Programación conjunta Internacional”, Ministerio de Ciencia, Innovación y Universidades

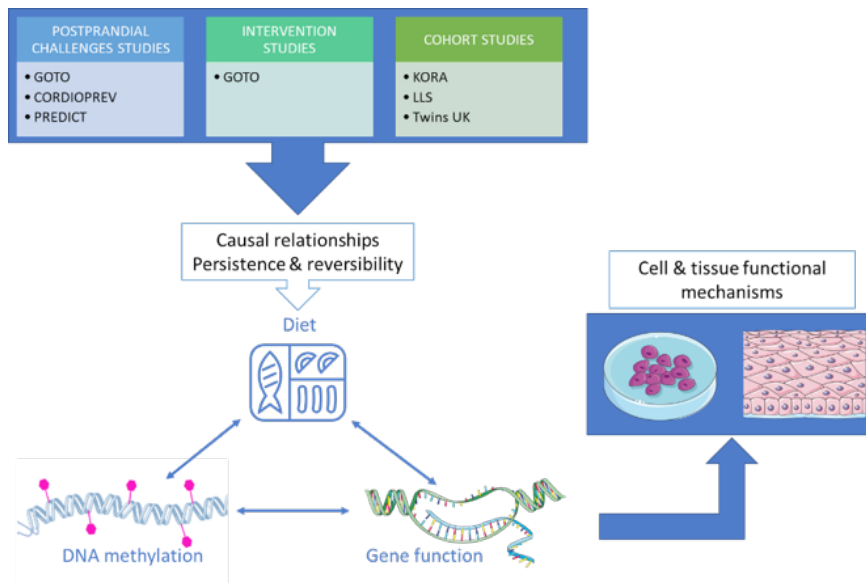
**Partners:** King’s College London, Department of Twin Research and Genetic Epidemiology (Co), IMDEA Food - Nutritional Genomics and Epigenomics Group and Nutritional Control of the Epigenome Group, Helmholtz Zentrum München, Leiden University Medical Center, INSERM U974 Center of Research in Myology, Ludwig-Maximilians-Universität (LMU) München

**Project Period:** 01/01/2019 – 31/12/2021

**Principal Investigator at IMDEA Food:** Jordana Bell (CO) / José M<sup>a</sup> Ordovás (PI)

individual variability in metabolic response to diet and its downstream effects on health. The DIMENSION consortium tests this hypothesis by investigating dynamically the causal impacts of dietary intake on epigenetic regulation of gene function across tissues, and their impact on subsequent cardio-metabolic health outcomes. The proposal will explore the gene regulatory and functional pathways that occur immediately following food intake in the postprandial state, as well as with habitual dietary intakes. The work programme is based on: i) targeted postprandial and nutritional intervention studies to tackle the causal relationships between diet, epigenetic modifications and gene function; (II) state-of-the-art analyses to characterize the links between diet, epigenetics, and cardio-metabolic health using novel diet measures including metabolomics in extensively studied cohorts; (III) functional follow-up experiments assessing the impact of diet-induced epigenetic and transcriptomic signals at the level of cells, within and across tissues.

Project hypothesis is that the identification of dietary induced epigenetic marks together with epigenetic signatures of cardio-metabolic traits explain inter-



## PREDIMED-Plus / Effect of an Energy-restricted Mediterranean Diet, Physical Activity and Behavioral Treatment on the Primary Prevention of Cardiovascular Disease



**Funding:** Instituto de Salud Carlos III a través de fondos FEDER con su programa de las Fondos de Investigación Sanitaria, Programa de Investigación en Salud

**Partners:** Facultat de Medicina i Ciències de la Salut de la Universitat Rovira i Virgili (Co) Universidad de Málaga, Centro Salud San Pablo de Sevilla, Departamento de Nutrición y Farmacia de la Universidad de Navarra, Hospital Son Espases de Mallorca, Hospital Clínic de Barcelona – IDIBAPS, Institut Hospital del Mar d’Investigacions Mèdiques de Barcelona – IMIM, Universidad de Granada, Fundación Jiménez Díaz, Facultad de Medicina de la Universidad de Navarra, Hospital Txagorritxu de Vitoria, Facultad de Medicina de la Universitat de València, Universidad de Las Palmas de Gran Canaria, Hospital Universitari de Bellvitge, Universidad de Córdoba, IMDEA Alimentación, Hospital Clínico de Madrid, Hospital de Málaga, Universitat de les Illes Balears, Servicio de Endocrinología del Hospital Clínic de Barcelona, Facultad de Medicina de la Universidad Miguel Hernández de Alicante, Universidad de Jaén, Universidad de León

**Project Period:** 01/01/2015 – 31/12/2020

**Principal Investigator at IMDEA Food:** Jordi Salas (CO) / Lidia Daimiel (PI)

In the 21st century we are witnessing an alarming increase in overweight and obesity. In Spain, over 60% of adults are overweight or obese and the prevalence of adult abdominal obesity is similarly high. Observational studies have shown that all-cause mortality increases progressively in parallel with adiposity and that the risk of cardiovascular mortality is especially high. However, how much the risk of cardiovascular disease is reduced by reducing body weight and adiposity is still controversial. In the PREDIMED-PLUS trial we are evaluating the safety and effectiveness of a multifaceted intervention program for alleviating excessive cardiovascular morbidity and mortality in overweight and obese individuals with metabolic syndrome. The study’s aim is to determine the effect on CVD morbidity and mortality of an intensive weight loss intervention program based on an energy-restricted traditional Mediterranean diet, increased physical activity and behavioral therapy in comparison with an intervention based on standard dietary advice and traditional health care for CVD prevention. PREDIMED-Plus is an ongoing multicentre intervention trial in 6874 individuals (55-75 years old men and 60-75 years old women) with overweight/obesity and metabolic syndrome. This trial will follow participants over 6 years and has completed its 3rd year of follow-up.





# Scientific highlights

## Effect of a Nutritional and Behavioral Intervention on Energy-Reduced Mediterranean Diet Adherence Among Patients With Metabolic Syndrome: Interim Analysis of the PREDIMED-Plus Randomized Clinical Trial [1]

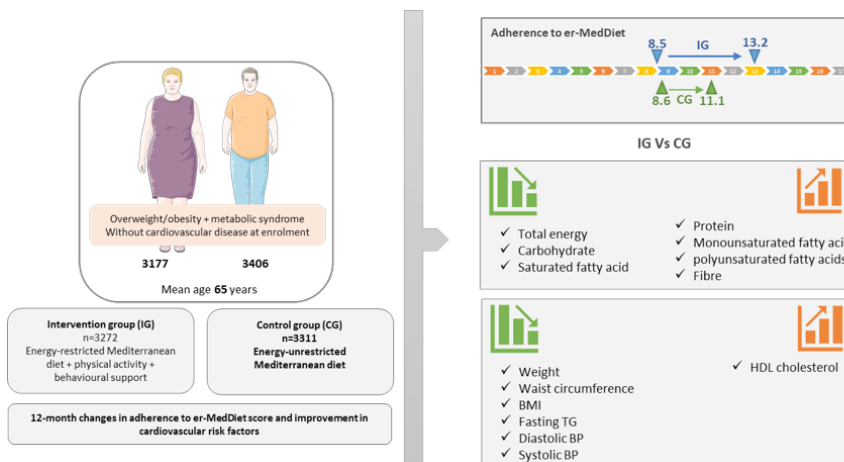
Interim analyses of the PREDIMED-Plus trial were published last October in JAMA (doi:10.1001/jama.2019.14630). We have assessed the effectiveness of the nutritional intervention and the physical activity program to reduced body weight and cardiovascular risk factors after 12 months of intervention. The analyses based on 6853 participants who had completed 12 months of follow-up showed a higher increase in the adherence to the energy-restricted Mediterranean Diet in the intervention group comparing with the control group.

After 12 months of follow-up, participants in the control group reduced more their energy intake. They reduced more the carbohydrate and saturated fatty acid intake, whereas they increased more protein, monounsaturated

and polyunsaturated fatty acids intake. It is worth mentioning the high increase in fiber intake in participants allocated to the intervention group.

According to this better improvement in dietary pattern, participants of the intervention group reduced more weight, waist circumference and body mass index. Participants of the intervention group also reduced more fasting triglyceride levels and diastolic and systolic blood pressure. Although we did not find a higher decrease in cholesterol, we found a higher increase in HDL cholesterol in participants of the intervention group.

Our preliminary analysis of the ongoing PREDIMED-Plus study, we show that the intervention based on an energy-restricted Mediterranean Diet resulted in a greater adherence to a Mediterranean dietary patter, a higher body weight loss and a clinically significant improvement of the cardiovascular risk factors.



[1] Sayón-Orea C, Razquin C, Bulló M, et al. Effect of a Nutritional and Behavioral Intervention on Energy-Reduced Mediterranean Diet Adherence Among Patients With Metabolic Syndrome: Interim Analysis of the PREDIMED-Plus Randomized Clinical Trial. JAMA. 2019;322(15):1486-1499. doi:10.1001/jama.2019.14630

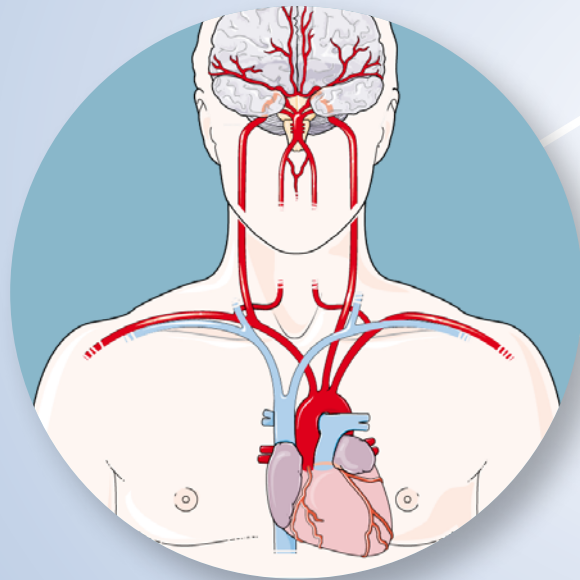


## programme

# Precision Nutrition and Cardiometabolic Health

### Goal and vision

This programme is focused on the study of personalized energetics and metabolomics involved in cardiometabolic adverse traits. Integration of nutriomics and metagenomics approaches is essential to understand the phenotypical responses of specific nutrients and diets triggering common physiopathological pathways among obesity, cardiovascular, metabolic, liver disease or cancer. The programme is also addressed to analyze and implement newer biomarkers with diagnostic, prognostic and therapeutical potential value, including the design and definition of Precision Nutrition guidelines.



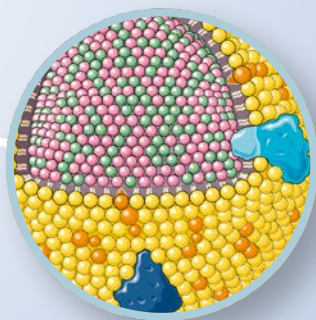




**Cardiometabolic  
Nutrition Research  
Group**



**Bioactive  
Ingredients  
Research Group**



**Epigenetic Research  
Group of Lipidic  
Metabolism**



## Main research lines

### Cardiometabolic Nutrition Research Group

Dr. Alfredo Martínez

- Elicit interindividual variable responses to the dietary intake depending on phenotypical and genotypic factors to provide Precision Nutrition management. Integration in the near future of omics data into Precision Nutrition will allow the implementation of personalised nutritional treatments to prevent and manage chronic diseases and to monitor the individual's response to novel therapeutical interventions.
- Determine new markers for the integration of dietary, nutritional, phenotypic and genetic data based on the analysis of large cohort databases through advanced statistical tools, such as multivariate analysis and machine learning techniques, to facilitate the evaluation of patient's metabolic dysfunctions and unhealthy conditions involved in the development of obesity and associated cardiometabolic complications.

- The definition of these markers will help the translation and transmission of information from scientific evidence in progress for its application in clinical practice of precision nutrition and to discriminate responders to a given nutritional prescription, that allows an action directed to each person through individual characterization.
- Define the role of chrononutrition on the individualized nutritional advice is another focus of the group and how lifestyle factors such as diet or physical activity impact on intestinal microbiota composition, with possible influence in body weight homeostasis/maintenance, type 2 diabetes, cardiovascular or liver diseases.

*(See in Heads of Research Line)*

### +Pec Proteomics

Dr. Aida Serra

### smORFs- lipidic metabolism and human-microbiotic miRNA

Dr. Almudena García Ruiz





## Bioactive Ingredients Research Group

Dr. Francesco Visioli

- Milk fat globule membranes and their role in slowing cognitive decline and in infant nutrition.
- Milk fat globule membranes and their role in the immune system (“immunefitness”). The group is developing a functional food composed of such membranes and carotenoids, with particular focus in the gastrointestinal tract, where immunity is largely regulated.
- Olive (poly)phenols and their actions on the cardiovascular system. In particular, the group is studying Non-Alcoholic Fatty Liver Disease (NAFLD), whose prevalence is rapidly increasing worldwide. Its modulation by olive phenols and the search for microRNAs to be employed diagnostically are now at the forefront of the group’s research.



## Epigenetic Research Group of Lipid Metabolism

Dr. Alberto Dávalos

- 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.
- Understand lifestyle modification of the epigenome in order to try to personalize the health of individuals using epigenetics for the development of Precision Nutrition.
- 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.
- Understand the possible regulatory role of dietary miRNAs on genoma modulation via cross kingdom communication.
- Exploit the use of extracellular vesicles, from different fruits and vegetables, as drug delivery vehicle for miRNA-based therapy determining their biological impact in the consumer and evaluate their potential application in the transport of other bioactive compounds.
- Understand the role of endogenous and exogenous sORFs (micropeptides) in the gut-liver axis in the context of lipid metabolism and evaluate the impact of dietary components in their modulation.
- Understanding the molecular mechanism by which consumption of micro and nanoplastics via the food chain impact our genome affecting to metabolic diseases development.



## Projects in focus

### NutrIMDEA study

**Funding:** IMDEA and Finut

**Partners:** -

**Project Period:** 2020-2013

**Principal Investigator at IMDEA Food:** J. Alfredo Martínez

This study aims to analyze the information on nutritional status aimed at personalizing individualized nutritional advice, with which an improvement in life and eating habits that improve the health of participants can be achieved by reducing the risk to develop future cardiometabolic diseases. In addition, potential low-cost, easy-to-use markers can be obtained from the study results that can be applied in clinical practice for screening patients. The results of this study may be integrated into clinical services and future studies, allowing to determine the type of complementary information needed (from biochemical, metabolomic or genetic analysis) to achieve greater precision and personalization in nutritional counseling.

The aim of the present study is to determine the main characteristics for the development of a nutritional status assessment tool focused on precision nutrition. To achieve this, the objectives are:

- Implementation of questionnaires that include the main markers (dietary, phenotypic and genetic) associated with nutritional status (Predictors).
- Integration of markers for the development of qualitative categorization (Nutrindex) through an index for the assessment of nutritional status and dietary patterns (Dietotype).
- Design of decision algorithms for the personalization of the nutritional advice based on the assessment of the nutritional status according to the predictors.

In this study have been performed a rationale approach based on clinical literature and evidence in scientific literature, and for weighting and prioritising tailored nutritional advice assessment required for each Nutritype cluster previously defined. The review of the current bibliography in order to select self-reported questionnaires that allow to collect sociodemographic information, anthropometric measurements, clinical and family history, lifestyle and dietary habits and the perception of healthy feeding and personal health. The information collected has been integrated into an electronic format that can be easily sent by email to be filled in on computers or electronic devices (as tablets). Simultaneously, we have designed the reports which inform the participants about the nutritional status assessment based on the information reported by the participants through the questionnaires.

A total of 6000 participants have accessed to the questionnaire available in an on line platform where the volunteers can send the survey data. All those individuals who show interest to be part of the study will be provided with an informed consent in which will be described all the procedures performed in the study. The data collected have been coded for preprocessing and subsequent analysis to determine the most important variables associated with nutritional status. First, all those questionnaires will be coded for which it is possible to obtain a score according to the indications. From these scores, association studies with phenotypic variables will be carried out to study the strength of association with the different indicators of nutritional status. Complementarily, sensitivity studies will be carried out with the different components of the indices to determine those elements that are capable of collecting the greatest range of variability of nutritional status (Predictors) so that they can be integrated into a new tool that covers a wider range of aspects related to cardiometabolic diseases (Nutriscore). In addition, exploratory multivariate analysis (analysis of factor or

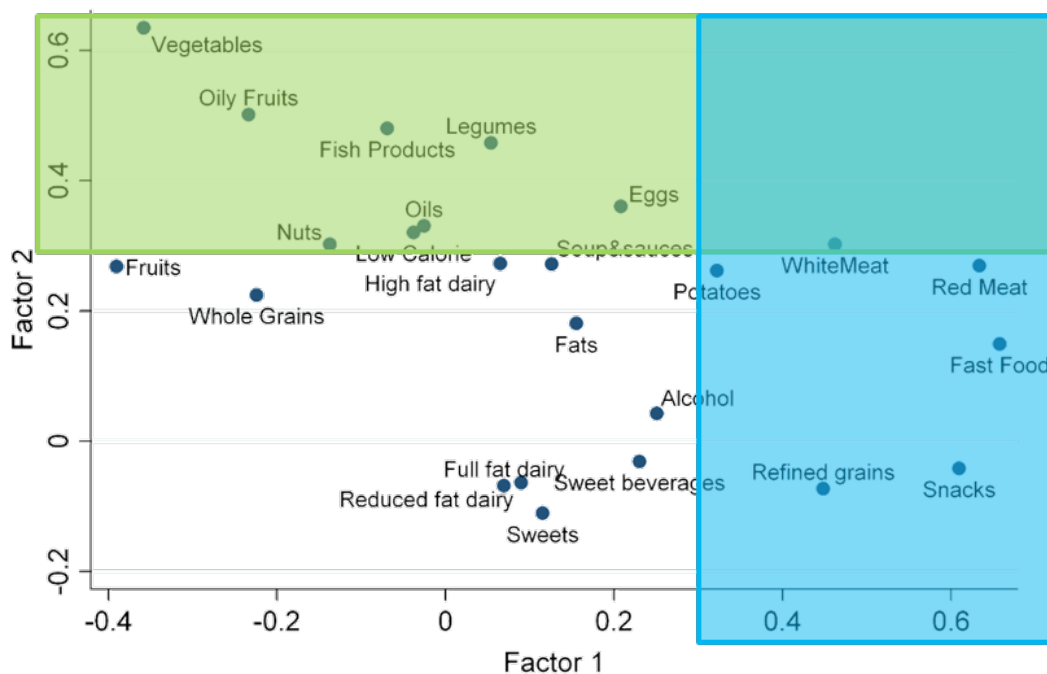




principal components) will be carried out in order to analyze the dietary patterns and profiles present in our population sample and determine the characteristics that define them (Dietotypes). These characteristics can be used to determine the decision algorithms that help classify people according to their nutritional status (Nutritype) through confirmatory analysis (through structural equation modeling «SEM»). Based on the joint integration of the Nutriscore and the Nutritype, the nutritional status of the participants can be determined and the risk of each of them can be predicted to develop some of the cardiometabolic diseases through logistic regression models that integrate all the selected variables and help to weigh the importance of each item.

From the analysis of the results of the questionnaires, a series of values associated with the presence of healthy dietary habits will be obtained. These values obtained from the nutritional screening questionnaires will present an inverse association with people's fat markers, while the association with diet quality markers will have a positive association. Subsequently, the grouping of these factors in relation to the adherence of the different dietary patterns previously described for the Spanish population will be studied. The subsequent multivariate study of the factors that present a high discriminant value will be used to categorize our population sample according to the risk of presenting an imbalance in nutritional status. Finally, the effectiveness of the personalized nutritional advice provided will be evaluated by repeating the measures taken at the beginning of the study.

## Factor loadings



**“Regulation of gut microbiota through the transfer of host and dietary miRNAs: dietary exosomes and exosome mimetics (miRBiota)” RTI2018-093873-A100**

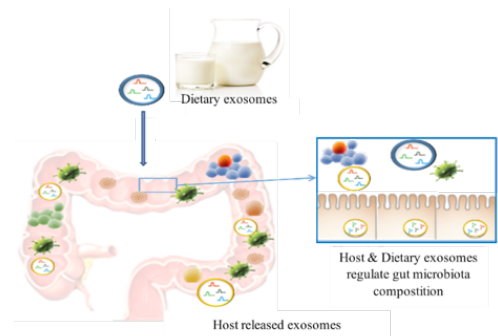
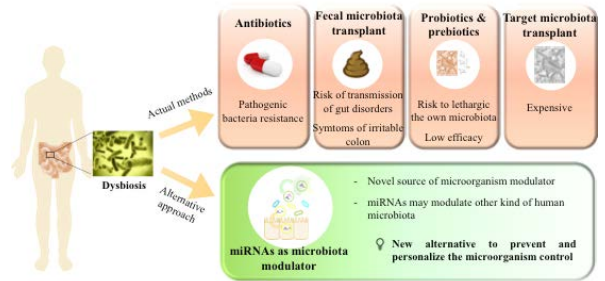
**Funding:** Agencia Estatal de Investigación  
**Partners:** IMDEA Alimentación – Universidad Autónoma de Madrid  
**Project Period:** 2019-2021  
**Principal Investigator at IMDEA Food:** Almudena García Ruiz

The close relationship between intestinal epithelium, gut microbiome, diet, and host health suggest a cross-kingdom communication. An imbalance in the gut microbiota composition (dysbiosis) is considered a major risk factor for human diseases. As the available methods to modulate the composition of gut microbiota (i.e. antibiotics, prebiotics, probiotics, fecal transplants, etc) possess many limitations, the search of novel therapies to control the gut microbiota is relevant to prevent or treat human diseases.

Cells communicate with each other using common signaling molecules including noncoding RNAs (ncRNAs). The composition of gut microbiota is also influenced by external elements being diet one of the key factors. Diet-derived miRNAs can be implicated in microbiota profile. Although rapidly degraded by RNases, some miRNAs are transported in extracellular vesicles (i.e. exosomes) and other complexes (i.e. Ago2, HDL, etc), which confer them high resistance to degradation. Plants also produce extracellular vesicles named exosome-like nanoparticles (ELNPs) that could transport different type of molecules including ncRNAs. Whether plant-derived miRNAs could directly modulate the gut microbiota is poorly described. Moreover, food-derived extracellular vesicles can be the ideal platform for the therapeutic application of miRNAs.

miRNAs could act as active signaling molecules to transport information across distinct species or even kingdoms. Although the mechanism of how exogenous miRNAs are shuttled between different organisms is still undetermined and is somehow controversial, their presence in mammalian biological fluids have been

described. However, it is still unclear whether these exogenous miRNAs (exomiRNAs) reach enough quantity to induce genomic modifications. In overall, our project aims to search and provide novel therapies to modulate the gut microbiota composition by dietary miRNAs transported within bovine milk exosomes in order to prevent or treat human diseases associated with dysbiosis.



**Scientific highlights**

The Cardiometabolic Nutrition Group of IMDEA Food have contributed to the update of the reference nutritional recommendations for the Spanish population. Prof. Dr. Alfredo Martínez, director of the IMDEA Food Precision Nutrition and Cardiometabolic Health Programme and the postdoctoral researcher of the same group Rodrigo San Cristobal, have participated in the desing of the Report of the Agency’s Scientific Committee Spanish Food Safety and Nutrition (AESAN) to update the Reference Nutritional Intakes.



The reference nutritional intake levels (INR) for a population allow the elaboration of dietary recommendations that ensure a balanced nutritional contribution for the maintenance of the good state of health of the population, as well as for the development of nutritional policies that allow preventing chronic diseases.

In the case of Spain, the last available update was carried out in 2010 by the Spanish Federation of Nutrition, Food and Dietetic Societies (FESNAD). However, in recent years, various international organizations with competencies in nutrition and health in various countries have updated their nutritional recommendations based on new scientific evidence.

At European level, the European Food Safety Authority (EFSA) has published between 2010 and 2017 dietary reference values and other countries have also updated their nutritional references in the last 10 years. So this new update is a milestone to maintain the health and well-being of the population.

A balanced diet is one that provides adequate amounts of various nutrients to maintain health and well-being. Proteins, carbohydrates, fats, vitamins, minerals and water are nutrients that have a particular function in the human body.

The amount of each nutrient necessary to maintain an individual's health is called the nutrient requirement and these vary from individual to individual depending on age, gender, level of physical activity, physiological status (such as pregnancy), eating habits and genetic background are also important factors.

The average requirement (AR) and the population reference intake (PRI) describe the distribution of the requirements in a population. These provide the intake of a nutrient that meets the daily needs of, respectively, half or most (97.5%) of the people in the population.

The estimation of new nutritional reference intakes for the Spanish population has followed a methodology, which includes the search for reference intakes published by official international organizations, the compilation of updated data after 2010 and the harmonization of recommendations by intervals of age and sex.

Finally, for each nutrient, vitamin or mineral, the reference nutritional intake values for the healthy population have been determined, applying a decision-making algorithm based on that of FESNAD. In the case of macronutrients and energy, those established by EFSA are assumed.

The document also establishes nutritional reference intakes for 15 minerals: calcium, chlorine, chromium, copper, fluorine, phosphorus, iron, iodine, magnesium, manganese, molybdenum, potassium, selenium, sodium and zinc and 13 vitamins: vitamin A, vitamin B1 (thiamine), vitamin B2 (riboflavin), vitamin B3 (niacin), vitamin B5 (pantothenic acid), vitamin B6 (pyridoxine), vitamin B9 (dietary equivalents of folate), vitamin B12 (cobalamin), biotin, vitamin C, vitamin D, vitamin E ( $\alpha$ -tocopherol) and vitamin K.

#### Reference:

Carlos Alonso Calleja, María Montaña Cámara Hurtado, Álvaro Daschner, Pablo Salvador Fernández Escámez, Carlos Manuel Franco Abuín, Rosa María Giner Pons, María Elena González Fandos, M. José González Muñoz, Esther López-García, Jordi Mañes Vinuesa, Sonia Marín Sillué, José Alfredo Martínez Hernández, Francisco Jose Morales Navas, M. Victoria Moreno-Arribas, María del Puy Portillo Baquedano, Magda Rafecas, David Rodríguez Lázaro, Carmen Rubio Armendáriz, María José Ruiz Leal, Pau Talens Oliag. Revista del Comité Científico de la AESAN, ISSN 1885-6586, N.º. 29, 2019, págs. 43-68.

Available at: [http://www.aecosan.msssi.gob.es/AECOSAN/docs/documentos/seguridad\\_alimentaria/evaluacion\\_riesgos/informes\\_cc\\_ingles/NUTRITIONAL\\_REFERENCE\\_INTAKES.pdf](http://www.aecosan.msssi.gob.es/AECOSAN/docs/documentos/seguridad_alimentaria/evaluacion_riesgos/informes_cc_ingles/NUTRITIONAL_REFERENCE_INTAKES.pdf)

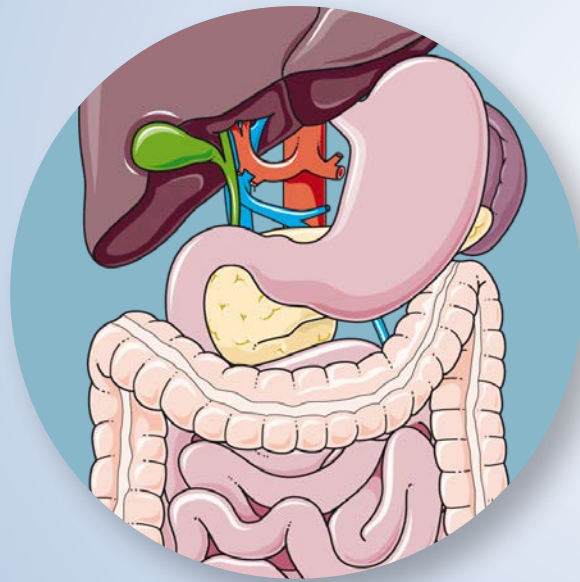


## programme

# Childhood Precision Nutrition

### Goal and vision

Childhood obesity is an important problem in developed countries, as not only will many of these children be obese adults, but the comorbidities associated with this disease can develop at an earlier age and thus be a more chronic burden not only on the person's health but also on the healthcare system. Understanding all aspects of obesity and the acceptance that obese children are not small obese adults, is of utmost importance in order to curtail this epidemic; however, it is now clear that the underlying cause is heterogeneous and that we should speak of "obesities" instead of "obesity" and that effective treatment will also differ depending on etiology. This research programme focuses on the integral understanding of children with obesity on a clinical, genetic, epigenetic, biochemical, metabolomic, and inflammatory basis in order to focus treatment protocols and to reduce the risk of future comorbidities.







**Childhood Obesity  
Research Group**



## Main research lines

### Childhood Obesity Research Group

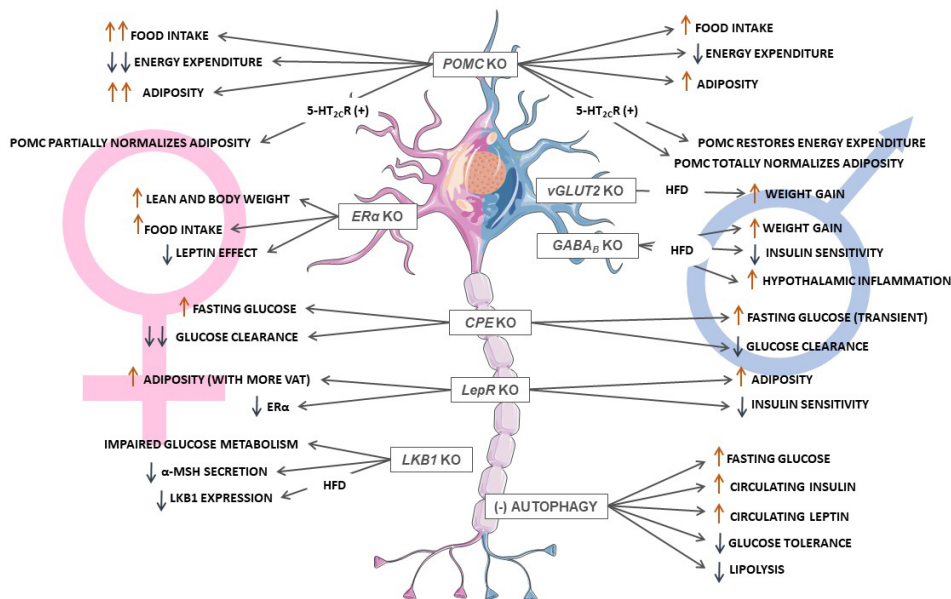
Dr. Jesús Argente and Dr. Julie Chowen

#### 1) Pediatric obesity

- Analysis and follow-up of the Madrid Cohort of 1300 pediatric subjects with severe early onset obesity.
- Clinical trials in children with specific genetic causes of severe obesity.
- Identification of predictive biomarkers for the development of insulin resistance in children with obesity.
- Understanding the response of the growth hormone (GH)/ insulin-like growth factor (IGF) system in clinical conditions of over- and under-nutrition and its role in growth and metabolic problems.

#### 2) Neuroendocrine control of metabolism

- Determination of the systemic and central metabolic response to diets composed of specific types of fatty acids.
- Early nutritional and hormonal effects on long-term metabolism.
- Analysis of the role of glial cells in central metabolism.
- Intercellular communication by exosomes and miRNAs in hypothalamic circuits.
- Sex differences in the neuroendocrine control of metabolism.





# Projects in focus

## Study of new regulatory factors identified in the GH/IGF system: Implications in human pathology, analysis of the development of potential new therapies

**Funding:** Fondo de Investigación Sanitario (FIS), Instituto Carlos III  
**Partners:** Dr. Jan Frystyk (University of Southern Denmark, Odense, Denmark) and Dr. Claus Oxvig, Denmark (Aarhus University, Aarhus, Denmark)  
**Project Period:** 2019-2022  
**Principal Investigator at IMDEA Food:** Jesús Argente.

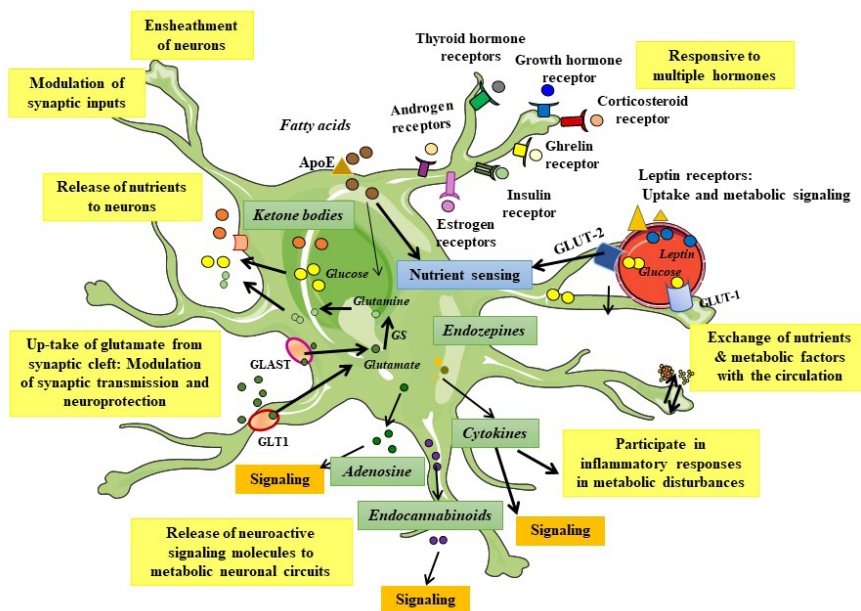
This project focuses on understanding the role of the GH/IGF system, with a special emphasis on stanniocalcins and pappalysins, in aberrant growth and metabolism in various pathologies including obesity, anorexia nervosa, bulimia nervosa, celiac disease, Crohn's disease, and children small for gestational age, as well as genetic causes of short stature.

## Cross-talk between hypothalamic astrocytes and perivascular adipose tissue on energy metabolism and cardiovascular function: impact of dietary modifications

**Funding:** MINECO  
**Partners:** Serge Luquet, Diderot University, Paris, France  
**Project Period:** 2018-2021  
**Principal Investigator at IMDEA Food:** Julie Ann Chowen King (coordinator)

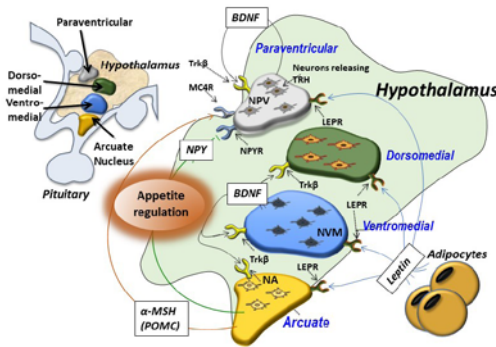
Project coordinated with María Soledad Fernández Alfonso, Universidad Complutense de Madrid.

This project addresses the effect of diets enriched in specific fatty acids on metabolic function and secondary health complications, especially cardiac function. One of the main objectives of this project is to understand the inter-cell communication at the hypothalamic levels, particularly between neurons and astrocytes, and how this is modified in response to specific fatty acids. In particular, the composition of exosomes (e.g., miRNAs) secreted by astrocytes subjected to different nutritional environments is being addressed, as well as how these changes affect metabolic neuronal populations.



## Scientific highlights

The underlying causes of obesity are multiple and personalized treatments are becoming available, at least for some forms of this disease. Clinical trials have begun in children with specific forms of genetic obesity with very promising results. As most genetic forms of obesity involve genes expressed in the hypothalamus, many of the drugs under development target this brain area.

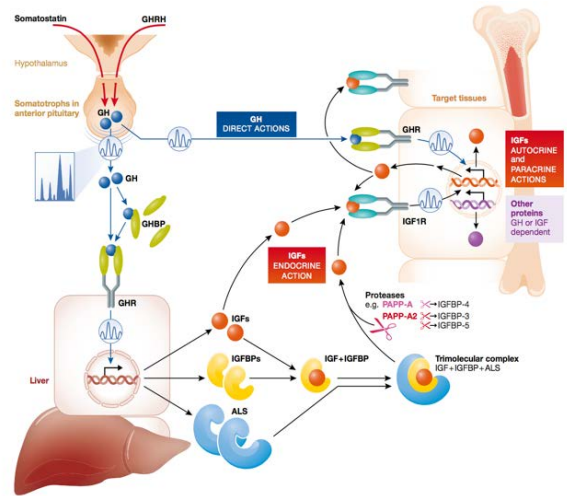


### Importance of the hypothalamus

The majority of the monogenic causes of obesity are related to genes expressed in the hypothalamus..

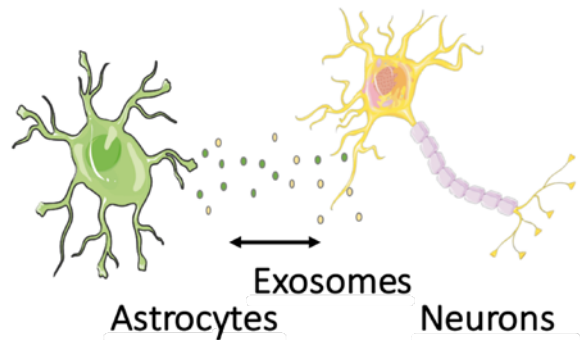
*Hypothalamic genes known to be involved in different forms of monogenic obesity.*

The complexity of the control of the GH/IGF system has become more apparent in recent years, and we demonstrated that mutations in a specific protease, pappalysin 2 or PAPP-A2, decrease the circulating levels of free IGFs causing a deceleration in growth velocity and modifications in bone morphology. Study of the pappalysins, as well as the proteins that control their activity, the stanniocalcins, in various pathologies is proving to be an exciting area of investigation to understand cell metabolism.



*The growth hormone (GH) insulin-like growth factor (IGF) system.*

The clear modification of hypothalamic astrocyte exosome content induced by specific fatty acids has resulted in numerous lines of investigation and proves to be an exciting area of investigation in the upcoming years. Moreover, these modifications are sex-dependent, suggesting that this level of control could be involved in sex differences in metabolism.



*Do dietary factors modify the cross-talk between hypothalamic astrocytes and neurons resulting in modifications in systemic metabolism?*









# Innovation, Communication and Education Unit

## Goal and vision

This unit is focused on fostering and boosting Innovation in the Food arena, where Communication is the springboard to engage the general public to participate in the changes driving this innovation under the 2030 Agenda objectives. Currently, there is a low flow of information among scientists, industry and end-users which delays knowledge transfer, and prevents citizens from partaking of the creative process driving innovation. This novel unit has been implemented in IMDEA Food to catalyze the interaction between the IMDEA Food research community and relevant stakeholders. On the other hand, we aim to search and facilitate the transfer of knowledge generated through applied and basic research into applications for Precision Nutrition, and from whose use Society and Industry can equally profit. This unit brings Science to both Industry and Society through four strategic pillars:

- Innovation
- Education
- Communication
- Business creation





**Innovation**



**Education**



**Communication**





## Main research lines

IMDEA Food in association with the Universidad Autónoma de Madrid, has increased its participation in EIT Food Activities during 2019. EIT Food is a Knowledge and Innovation Community (KIC) established by the European Institute for Innovation & Technology (EIT), an independent EU body set up in 2008 to drive innovation and entrepreneurship across Europe. EIT Food is Europe's leading food innovation initiative made up a unique network of diverse partners that provide a holistic view of food value chain, including key industry players, agri-food start-ups, research centres and universities from across Europe, all working together to deliver an innovative and entrepreneurial food system. Following EIT Food functional structure, the EIT Food Innovation, Education and Communication Groups address and connect three of the EIT Food's pillars, to develop world-class solutions to make the food system more sustainable, healthy and trusted by consumers, and to catalyse food entrepreneurship and innovation.

**EIT Food Innovation:** IMDEA Food role within EIT Food is to guide and accelerate the innovation process that will transform the food system. We are committed to overcoming low consumer trust, creating consumer-valued food for healthier nutrition, building a consumer-centric connected food system and enhancing sustainability through promoting a circular Bioeconomy.

We collaborate in building an inclusive and innovative community where the consumer is actively involved, by empowering consumers to take an active part in the transformation of the food system, as well as building and shaping the innovators of tomorrow.

EIT Food approach puts the needs and concerns of consumers at the heart of the food value chain, co-creating ideas to drive a more resource-efficient, secure, trusted and transparent food system. IMDEA Food is specially involved with projects focused on healthier nutrition through Precision Nutrition.

**EIT Food Education:** IMDEA Food collaborates with leading higher education institutions and food companies to develop and offer exciting programmes to help individuals with their career in the food system.

EIT Food programmes are aimed at current and future students as well as professionals either wanting to work or already working in the sector. They are designed together with industry professionals and entrepreneurs and are tailored to fit around busy schedules.

**EIT Food Communication:** IMDEA Food aims to disseminate the Institute research results, leading to changes in society's behavior and attitudes towards a healthier and more sustainable food system.

IMDEA Food, along with EIT Food vision, is building an inclusive and innovative community where you can be actively involved, so together we can deliver an innovative agrifood sector that produces both healthy and sustainable food and is trusted by society. Their public engagement activities can be grouped into the following areas:

- Dialogue and engagement via events & digital platforms
- Offering guidance by providing targeted information
- School programmes: The EIT Food School Network



## Project in focus

### Global Food Venture Programme

The Global Food Venture Programme enables highly qualified Ph.D. students from across Europe to turn their innovative ideas into successful business propositions. The programme strives to raise awareness of the issues and challenges in the Agri-Food sector, cultivate an entrepreneurial mindset and educate in the area of entrepreneurship and business creation. Young innovators gain essential business creation skills and knowledge through a bespoke 6-Month Curriculum of Training Bootcamps, Mentoring, Corporate Site Visits, Global Networking Events and Pitch Competitions. In this period, they are supported by top coaches and technology experts from EIT Food partners and have the unique chance to explore key innovation ecosystems in Europe.

The programme is divided in two stages:

#### Stage I – Idea Development

The Global Food Venture Programme - Stage I supports PhD students eager to create solutions for the challenges in our food system. Participants from across Europe get together for a life-changing, immersive entrepreneurial experience to gain the fundamentals skills & knowledge in ideation and venture creation, receive coaching over 6 months, and develop successful business ideas in the food & agritech space.

The participants benefit from the following activities:

- Private Online Course in Food Systems
- 10 day Summer School (Madrid)
- 6 months Mentoring from an EIT Food core partner
- Mobility Grants for Industry visits

#### Stage II – Business Incubation

The Global Food Venture Programme - Stage II is designed to support 25 talented PhD students with solid business ideas in food & agriculture. Early stage entrepreneurs join the Pre-Incubation bootcamp and a 6-month mentoring programme to bring their ventures to the next level. Stage II participants learn all about viable business creation, receive tailored mentoring support, access a network of experts, and have the possibility to win an innovation prize from EIT Food as they participate in a final pitch competition event in Europe.

The participants of this stage benefit from the following activities:

- Private Online Course in Food Systems
- Pre-Incubation Bootcamp (Lausanne)
- Visit to key international entrepreneurship ecosystems and innovation cultures
- 6 months Mentoring from an EIT Food core partner
- Mobility Grants for Industry visits
- Final event with pitch competition and innovation prizes





## GFVP – Stage I Summer School

IMDEA Food, along with UAM, is in charge of organizing the Summer School which takes place at the beginning of June in Madrid.

Specifically, the students participate in an intense programme on entrepreneurship developed by IMDEA Food in collaboration with Mashauri, a company specialising in training for entrepreneurs. The programme is designed to encourage the dynamic and active involvement of students by integrating the knowledge acquired during the programme with the development of business ideas through co-creation activities. The initiative, apart from having activities for the generation of business ideas and lectures on business models, and their design and execution through the CANVAS business model run by Simon Gifford and Apoorv Bamba (co-founders of Mashauri), involves various experts in different areas, such as Daniel Soriano (Director of the Center for Entrepreneurship and Innovation at IE Business School) or Carla Tanas (founder of Future Agro Challenge).

During the implementation of the programme, the participants had to develop their own business idea by teams, which they defended at the end of the course by means of an “elevator pitch” before a jury formed by innovation and entrepreneurship experts Ana Ramírez de Molina (assistant director of IMDEA Food Institute) and Annick Verween (head of the EIT Food Rising Food Stars programme), among others. The winning team was able to participate in the GFVP-Stage II pre-incubation Bootcamp in Lausanne, and the final pitch event winner was a participant who started her entrepreneurial journey in our Summer School in Madrid.



## InnoLink

012018-5352

This initiative is part of the framework of Linking Entities in Innovation promoted by Comunidad de Madrid, and which goal is to potentiate and energize the Food ecosystem within Madrid region by facilitating the necessary networking capabilities that IMDEA Food holds through its participation in EIT Food consortium. The project allows the participation of the food sector from the Madrid region in different activities developed under the umbrella of EIT Food in order to push the internalization of this ecosystem and, at the same time, attract innovative talent to generate new businesses based on technological innovation.

Our vision is the development of a transversal technology platform of precision nutrition innovation risen from sound scientific research. This platform will promote the collaboration among the various stakeholders from the food, precision nutrition and health sectors, as well as constituting a node to collate the knowledge, stakeholders and technology implicated in the advancement of translational research in the precision nutrition arena. This node will function as a tractor for innovation within a consolidated food ecosystem, will give support to technology-based newly generated businesses on Precision Nutrition, and will attract genetics and health related industries interested in partaking the nutrition field.





## Highlight

The programme managed multiple activities embedded within two projects: EIT Food and InnoLink.

EIT Food project for 2019 encompassed a total of 9 sub-projects within the different pillars:

- **Education:** Master's in food systems, Global Food Venture Programme, IValueFood, WE Lead, How to effectively change food habits and Human Capital.

- **Communication:** #AnnualFoodAgenda and FutureKitchen.



- **Business Creation:** MAKE It!



IMDEA Food participated as a partner in the different international consortia for all these projects but for #AnnualFoodAgenda, where IMDEA Food was the leading partner, coordinating the various events that took place during the implementation of this Communication activity. In fact, this activity was developed in 3 countries simultaneously, designing, planning and implementing 8 events each quarter. Every quarter the events shared a common general topic, such as Healthier Nutrition, Food Sustainability, Food Trends and Future Consumers and Trusting in Food , amounting to a total of 33 events developed during 2019.

The Master in Food Systems was able to kick off with its first cohort of international students, who will have the chance to pursue their scholar interests in two European host universities besides UAM. Researchers from IMDEA

Food are responsible for the implementation of one subject: Personal Nutrition and Chronic Diseases.

As it has been mentioned previously, IMDEA Food and UAM organized the first Summer School within the Global Food Venture Programme at La Nave in Madrid. Forty PhD students from all over Europe gathered at Madrid to have their first contact with the entrepreneurial world and the agrifood ecosystem.

IMDEA Food was able to show the achievements obtained in the XKIC project Human Capital with EIT Health and InnoEnergy at the First WeValueFood Conference that took place in Warsaw. Within this activity, we developed a didactic unit related to Healthier Nutrition to be implemented to primary school students in RIS regions in Italy and Spain. This unit includes novel tools to engage children and their families into adopting healthier food habits.

On the other hand, InnoLink project has allowed the integration of Madrid region stakeholders into certain EIT Food projects. For instance, our Comunidad de Madrid supported industrial PhD students were able to participate in the GFVP Summer School. WE Lead enabled the exposure of women leaders from Comunidad de Madrid to share their experience in the entrepreneurial world, as well as young women from Madrid were able to benefit from their knowledge and experience on leadership.





# GENYAL Platform of Clinical Trials in Nutrition and Health

## Goal and vision

The Platform for Clinical Trials in Nutrition and Health (GENYAL) constitutes a high-level scientific tool to assess the biological activity and health properties of food, supplements, targeted nutritional strategies and functional foods, taking into account the specific characteristics of population subgroups. Thus, GENYAL is a specialized platform for clinical trials in Precision Nutrition.

Both observational and clinical intervention studies involving healthy subjects and those with pathologies can be performed (celiac disease, obesity, diabetes, dyslipidemias, multiple chemical sensitivity, etc.), both in adults and childhood. We investigate how individual characteristics (genetics, microbiome, physiology, etc.) interact with nutrients and food components, in order to provide specific recommendations and products to promote health.

GENYAL caters Spanish and foreign research groups and companies working on nutritional genomics and targeted nutrition, interested in:

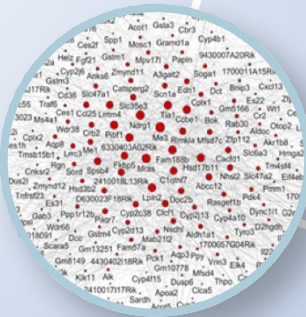
- Nutritional intervention studies required for product development or for obtaining official approval of the nutritional and health claims made for products.
- The generation of the information needed to provide added value to new and existing products (e.g., the identification of new indications). Main activities include postprandial response to different functional food and bioavailability components studies in humans, or the determination of the effectiveness of nutritional products in health promotion.
- The identification of (mainly) genetic or metabolic markers involved in the response to product consumption. Analysis of the interaction among genotype-microbiota and food components.
- Targeted nutrition for specific populations, including both, health (childhood, post-menopausal period, sport performance, etc..) and disease (obesity, metabolic syndrome, dyslipidemias, etc..). Nutrigenetic clinical trials.



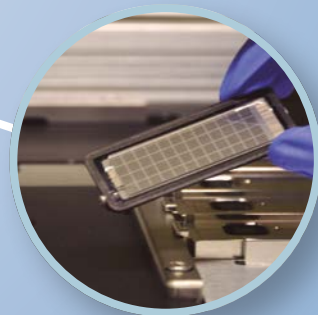
**Food and Clinical  
Trials Unit**



**Nutritional Genomics  
and Health Unit**



**Biostatistics and  
Bioinformatics Unit**



**GENYAL Lab**





## Main research lines

### Food and Clinical Trials Unit

Dr. Viviana Loria Kohen

- **Childhood obesity prevention. GENYAL Study.**

The main objective of this study is to design and validate a machine learning-based predictive model that identifies children who would benefit most from actions aimed at reducing the risk of obesity and its complications, considering both environmental and genetic factors, and applicable at the beginning of the school stage. The nutrition education developed in the intervention's schools will be also evaluated as part of the predictive model. The study is a cluster randomized clinical trial with 5-year follow-up.

- **Precision nutrition for healthy aging. NUTRIPRECISION Study.**

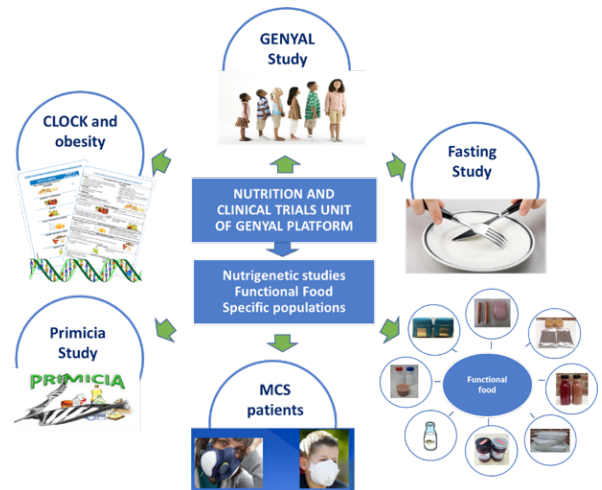
This project aims to develop new food products and technology platforms to design precise nutritional strategies with the aim of effectively preventing ailments associated with ageing, and of improving the quality and lifestyle of older demographics. AMC Innova Juice and Drinks, Iberfruta Muerza, Hijo de José Martínez Somalo, Grupo ICA, Congelados de Navarra, Galletas Gullón and Europastry comprise the consortium of companies that unite six research centres and lead the new NUTRIPRECISION project  
*Funding: Programa Estratégico de Consorcios de Investigación Empresarial Nacional (CIEN), Centro para el Desarrollo Tecnológico e Industrial (CDTI).*  
*Reference number: IDI-20160734.*

- **Targeting diet-related diseases through OMICS-based personalized nutrition.**

Development of clinical trials analyzing the role of microbiome changes in health and disease related to diet, physical activity and specific biochemical and molecular biomarkers. Within this research line the unit collaborates with different research groups within the National Plan of R&D and participates in H2020 PREVENTOMICS project "Empowering consumers to PREVENT diet-related diseases through OMICS-based personalized nutrition" (*Funding: Acondicionamento Tarrasense "LEITAT"*).

- **Development and evaluation of a new functional products.**

Evaluation of the effectiveness of different products and nutritional strategies to promote health. Different clinical trials are performed to evaluate the functional effect of different new bioactive products. As a main trial in this area in this year is reflected in the collaboration within the National Plan of R&D with The Center of Research in Food CIAL (UAM-CSIC) for the evaluation of the effect bioactive phospholipids in cognitive function.







## Nutritional Genomics and Health Unit

Dr. M<sup>a</sup> Isabel Espinosa Salinas

- **Precision nutrition strategies for patients with chronic diseases**

Application of nutrigenetic interventions in patients with chronic diseases including obesity, metabolic syndrome and cancer, in order to improve their nutritional and health status. This is carried out through the design and analysis of specific genotyping panels, as is the case of a nutrigenetic panel for oncological patients that has been developed within ALIBIRD2020 project, which association to clinical outcome, microbiome status, and the presence of molecular and biochemical biomarkers is determined. Personalization of nutritional recommendations according to their clinical conditions, phenotypic and genotypic results is performed, and applied in different clinical trials in collaboration with the endocrinological and oncological medical services of different hospitals.

- **Personalized nutritional advice for health promotion throughout the different stages of life.**

Design and clinical validation of genotyping panels with genetic variants related to obesity, energy balance, carbohydrate and lipid metabolism, metabolic response to exercise, food intolerances, biorhythm, ec..., in order to generate personalized nutritional recommendations to improve health throughout life. Specific physiological conditions, objectives and life stages are considered. *Funding: H2020, grant agreement 731349, INCluSilver*

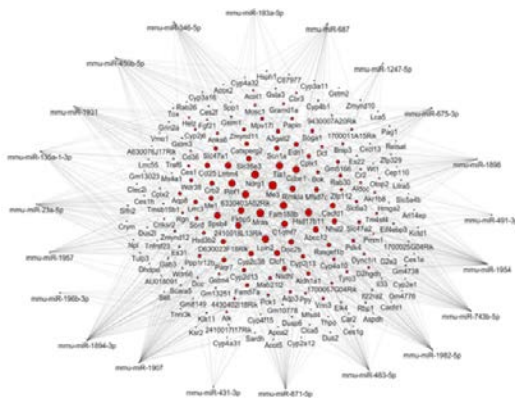




## Computational Biology and Biostatistics Unit

Dr. Enrique Carrillo / Dr. Gonzalo Colmenarejo

- **Biostatistical Analysis and Machine Learning**  
Analysis of nutritional randomized trials and observational data in clinical and nutritional settings, and application of machine learning and deep learning modeling to nutrition and health approaches.
- **Cheminformatics of bioactive compounds**  
Identification of mechanisms of action of Food components through computational approaches, structure-activity/property modeling. Generative design of new molecules with improved properties or activities.
- **Bioinformatics analysis of genomics data**  
Computational analysis of massive gene expression data, modelling of molecular networks to interpret associations between multi-omics data, integrative analysis of nutrigenomics experiments using distinct data mining techniques, data integration for functional interpretation of omics data. Development of algorithms and web-based applications for the study of molecular nutrition.



## GENYAL Lab

Dr. Susana Molina

- **Nutritional genomics lab**  
Genetic and genomic analysis, and their relationship with metabolites, cell metabolism and microbiome determinations in nutrition and health studies.
- **Therapeutic formulas of precision nutrition for cancer**  
The Genomic Laboratory GENYALab is member of REDLAB, the laboratories network of the Community of Madrid (registration number 440), and participates in ALIBIRD2020-CM project (S2018/BAA-4343, supported by programme call of R & D Activities among Research Groups of the Community of Madrid (Technologies 2018) and co-financed with European Union Structural Funds.





## Projects in focus

### GENYAL study to childhood obesity prevention

**Partners:** Colegios Públicos: Juan Zaragüeta, Fernando el Católico, Fernández Moratín, La Rioja, Concepción Arenal y Rosa Luxemburgo.

**Project Period.** 2017-2021

**Principal Investigator at IMDEA Food.** Dr. Viviana Loria

The main objective of this study is to design and validate a machine learning-based predictive model that identifies children who would benefit most from actions aimed at reducing the risk of obesity and its complications, considering both environmental and genetic factors, and applicable at the beginning of the school stage. The nutritional education developed in the intervention's schools will be also evaluated as part of the predictive model.



The third evaluation of schoolchildren was carried out during 2019 in this cluster randomized clinical trial with 5-year follow-up which initial evaluation was performed in 2017. We have collected new valuable information about the evolution of children nutritional status as well as dietary and physical activity habits. This data will allow to develop new nutrigenetic studies and scientific publications. Besides, schoolchildren, their parents and teachers have received new educative tools to improve their nutritional knowledge to prevent child obesity.



As part of the GENYAL study to childhood obesity prevention, the first study of the association between the BDNF-AS rs925946 polymorphism and calcium intake as potential modulators of the nutritional status was performed and published in 2019. The identification of different effects of calcium/dairy consumption based on the nutritional status and according to genetics may contribute to a personalized future nutritional advice.

#### Reference:

Association of calcium and dairy product consumption with childhood obesity and the presence of a Brain Derived Neurotropic Factor-Antisense (BDNF-AS) polymorphism. Marcos-Pasero H, Aguilar-Aguilar E, de la Iglesia R, Espinosa-Salinas I, Gómez-Patiño M, Colmenarejo G, Ramírez de Molina A, Reglero G, Loria-Kohen V. Clin Nutr. 2019 Dec;38(6):2616-2622.



## Precision nutrition therapeutic approaches for cancer patients. ALIBIRD2020-CM. S2018/BAA-4343

**Funding:** Programme call of R & D Activities among Research Groups of the Community of Madrid and European Union Structural Funds.

**Partners:** CSIC, UPM, IdiPAZ, IMDEA Food, HUIS, UAM.

**Project Period:** 2019 - 2022

**Principal Investigator at IMDEA Food.** Dr. Ana Ramírez de Molina / Dr. Isabel Espinosa

Cancer still results in the second leading cause of death and disability in our society. The objective of this project is to design and validate products together with precision nutrition strategies aimed at improving the prognosis and treatment of cancer patients. New molecular approaches to the design of therapeutic nutritional supplements are sought through the formulation of self-emulsifying and bioactive lipid carriers, combined with natural extracts from food sources and through synergies in bioavailability and bioactivity, resulting in effective products when directed to metabolic targets involved in processes of tumour proliferation, metastasis or resistance to chemotherapy.

The clinical validation of the effectiveness of these strategies is ongoing. The clinical trials include genetic analysis to identify high susceptibility to response to the treatment, as well as the analysis of the relationship between diet and the composition and metabolism of the

intestinal microbiota of the patients, in order to associate the microbiota with nutrition and cancer. Finally, the development and use of an ICT tool (App) that empowers users in the self-management of the strategies prescribed and that motivates them to adequately comply with the, in addition to sending doctors useful data for clinical monitoring, is also considered.

This multidisciplinary project ALIBIRD2020-CM (S2018/BAA-4343) “Therapeutic Formulas for Precision Nutrition in Cancer”, is financed in the 2018 Call for R&D Programmes in Technology of the Community of Madrid and co-financed with European Union Structural Funds.

### References:

Marigold Supercritical Extract as Potential Co-adjuvant in Pancreatic Cancer: The Energetic Catastrophe Induced via BMP8B Ends Up With Autophagy-Induced Cell Death. Gómez de Cedrón M, Mouhid L, García-Carrascosa E, Fornari T, Reglero G, Ramírez de Molina A. *Front Bioeng Biotechnol.* 2020 Jan 24;7:455. doi: 10.3389/fbioe.2019.00455. eCollection 2019.

Analysis of lipid metabolism genes in advanced small cell lung cancer. Merino M et al. *J Clin Oncol*, 2019, 37;15; e20621, reports from ASCO.

Tolerability and Safety of a Nutritional Supplement with Potential as Adjuvant in Colorectal Cancer Therapy: A Randomized Trial in Healthy Volunteers. Gómez de Cedrón M, Laparra JM, Loria-Kohen V, Molina S, Moreno-Rubio J, Montoya JJ, Torres C, Casado E, Reglero G, Ramírez de Molina A. *Nutrients.* 2019 Aug 24;11(9):2001.

MÁS INFORMACIÓN: [WWW.ALIBIRD.ORG/2020-CM](http://WWW.ALIBIRD.ORG/2020-CM)





# Scientific highlights

## Health-4-Aging (H4Aging): Genetic tests for precision nutritional and food supplement recommendations for a healthy aging

**Dr. Maria Isabel Espinosa**

Nutritional Genomics and Health Unit

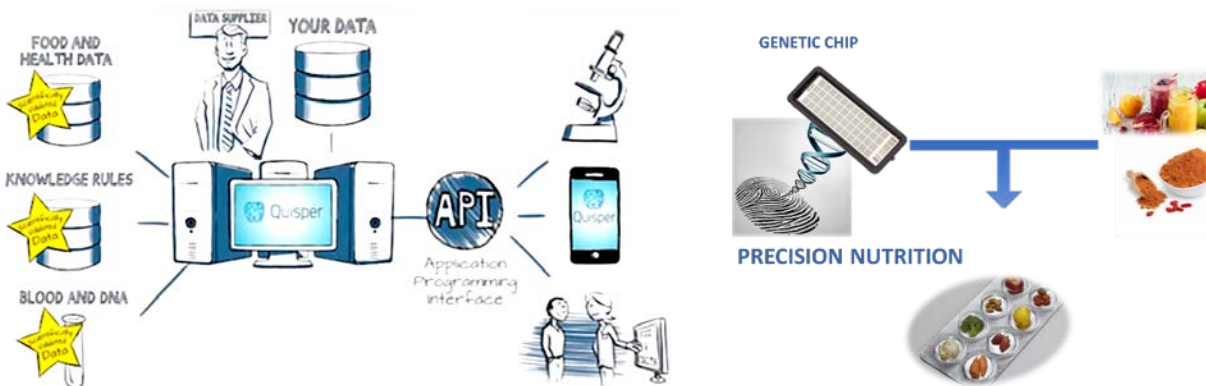


Given the advances in recent years in the “omic” sciences, it can be affirmed that each person responds in a different way to the environment, and therefore to the diet, and nutrients that it contains. As a consequence, the response of each individual will depend on an interaction of genetic and environmental factors, which must be taken into account in the prevention and development of food-related diseases, which gains great interest in the prevention of the development of chronic diseases through aging.

The objective of this project is to validate in an operational environment our innovative H4Aging e-health platform, based on validated genetic chips, which predict the response of individuals to aging. This innovative system will provide the silver population with nutritional recommendations and customized food supplement formulations according to their genetic profile, with an integration to the European personalized nutritional platform Quisper (H2020, grant agreement 731349, INCluSilver). A specific approach for maintenance and improvement of cognitive function will be developed (grant RTC2019- 007294-1).

### Reference:

GCKR rs780094 Polymorphism as A Genetic Variant Involved in Physical Exercise. Espinosa-Salinas I, de la Iglesia R, Colmenarejo G, Molina S, Reglero G, Martinez JA, Loria-Kohen V, Ramirez de Molina A. *Genes (Basel)*. 2019 Jul 28;10(8):570.





# principal investigators



## Programme Directors



### Prof. Guillermo J. Reglero Rada

Director of IMDEA Food

Ph.D. in Food Science by Autonomous University of Madrid, Spain.

#### Research Interests

Food as a preventive and therapeutic tool for health improvement. Design, study of the activity and demonstration of effects of food products for health specific use.

### Dr. Ana Ramírez de Molina

Deputy Director of IMDEA Food. Director of the Precision Nutrition and Cancer Programme

Ph.D. in Molecular Biology by Autonomoma University of Madrid, Spain.

#### Research Interests

Tumor cells reprogram the metabolism to obtain the energy and structural components needed to proliferate and invade other tissues. It has also been shown that there is an important metabolic regulation of the immune response, essential in the development and progression of tumors. Our main interest is to understand these processes in order to develop strategies that, through the regulation of metabolism and the enhancement of innate immunity, have a therapeutic effect on cancer. We carry out multidisciplinary research focused on: exploring metabolic reprogramming as a biomarker and therapeutic target in cancer; the study of the relationship between lifestyle factors (nutrition, physical activity), genetics (individual susceptibility), the consequent global metabolic state (healthy/unhealthy), its relationship with chronic inflammation and the immune response, and the development, progression, and response to treatment of patients with cancer.





### Manuel Serrano

Director of the Precision Nutrition and Aging Programme and Chair of the Ageing & Metabolism Programme, Institute for Research in Biomedicine (IRB)

Ph.D. in Biochemistry and Molecular Biology by the Autonomous University of Madrid, Spain

#### Research Interests:

Ageing, metabolism, cellular senescence, cellular reprogramming, fibrotic diseases, cancer

### Jose María Ordovás

Director of Precision Nutrition & Obesity Programme

Ph.D in Biochemistry by University of Zaragoza, Spain

#### Research Interests

His main research interests are the identification of novel gene-diet interactions that modulate individual response to lifestyle interventions to prevent cardiovascular disease, the integration of multiomic data in large population studies through n-equal-to-one and machine learning approaches to advance in the practical application of precision nutrition.



### J. Alfredo Martínez

Director of the Precision Nutrition and Cardiometabolic Health Programme

Ph.D. Nutrition being also PharmD by University of Navarra and MD by University of Zaragoza, Spain

#### Research Interests

He has addressed the topic of Personalized (and Precision) Nutrition, nutrigenetics and nutrigenomics. Among these

publications are the position papers from ISNN (International Society of Nutrigenetics / Nutrigenomics). This research has been proposed as guides for the provision of personalized nutritional advice and the consolidation of knowledge in nutrigenetics and its applicability in personalized dietary advice. The integration of this knowledge allows every day a greater number of food and health professionals to offer this type of analysis for better management in nutritional prevention and treatment."

### Jesús Argente

Co-Director of the Childhood Precision Nutrition Programme. Full Professor, Autonomous University of Madrid, Director of Pediatrics and Director of Endocrinology, Hospital Infantil Universitario Niño Jesús, Madrid. Head of Group in the Spanish Network for the study of obesity and nutrition (CIBEROBN).



Ph.D in Medicine by University of Alcalá de Henares, Spain

#### Research Interests

Childhood obesity, the control of pubertal onset, growth abnormalities and eating disorders.



## Group Leaders



### Julie Chowen

Co-Director of the Childhood Precision Nutrition Programme. Senior Investigator, Foundation for Biomedical Investigation Hospital Infantil Niño Jesús

Ph.D. in Physiology and Biophysics by University of Washington, USA

#### Research interests

Neuroendocrine control of metabolism, Glial cell in metabolic control, Early nutritional and hormonal effects on long-term metabolism.

### Ana Ramírez de Molina

Molecular Oncology Group Leader



### Enrique Casado

Clinical Oncology Group Leader. Head of Medical Oncology Service, Infanta Sofia University Hospital.

Ph.D. in Medicine by the Complutense University of Madrid, Spain

#### Research interests

Precision Oncology.

### Jaime Feliú

Clinical Oncology Group Leader. Head of Medical Oncology Service, La Paz University Hospital.

Ph.D in Medicine by the Complutense University of Madrid, Spain

#### Research interests

Colon and pancreatic cancer, tumor biomarkers, epigenetics and genetics of cancer.







### José Moisés LaParra

Head of the Molecular Immunonutrition Group

Ph.D. in Pharmacy by the University of Valencia, Spain

#### Research Interests

Immunonutritional agonists, innate immune biology, macrophages, microbiota, micronutrients.

### Enrique Carrillo

Computational Biology Group Leader and Associate Professor of Biochemistry, Faculty of Medicine in Autonomous University of Madrid, Spain

Ph.D in Biology (Biochemistry & Molecular Biology) & MSc in Bioinformatics and Computational Biology from Complutense University of Madrid, Spain



#### Research Interests

Develop and apply integrative bioinformatic and computational solutions to study the variability and individual responses to food or bioactives and its relationship to complex diseases like cancer and other metabolic disorders, which will allow establishing precision personalized nutrition strategies based on individual molecular backgrounds with particular emphasis in genetic, epigenetic, metabolic and microbiota profiles.



### Pablo J. Fernández

Metabolic Syndrome Group Leader

Ph.D. in Molecular Biology by Autonomous University of Madrid, Spain

#### Research interests

Nutritional interventions that delay aging, more precisely on intermittent fasting (IF). IF elicits its unique metabolic responses affecting insulin, PI3K and mTOR signaling, mitochondrial function, autophagy, senescence

and redox homeostasis. In my group, we search for compounds that mimic fasting by eliciting these molecular mechanisms and study their mechanisms of action. We also investigate on the potential applications of intermittent fasting or fasting mimicking strategies, as the enhancement of chemotherapy in cancer patients or the prevention or treatment of obesity, diabetes or cardiovascular diseases.

### Rafael de Cabo

Nutritional Intervention Group Leader.

Ph.D. in Nutrition, Purdue University, USA

#### Research interests

Interventions for Healthy Aging Based on Manipulations of Energy Intake. Nutritional Strategies to Maintain Redox Homeostasis.







**Manuel Fernández**

Head of the Hepatic Regenerative Medicine Laboratory

Ph.D. in Biology by University of Barcelona 2005, Spain

**Research Interests**

Application of regenerative medicine against chronic liver diseases and cancer, metabolic disorders and aging-related diseases.



**Fernando Rodríguez-Artalejo**

Cardiovascular and Nutritional Epidemiology Group Leader

MD and Ph.D. in Medicine by Autonomous University of Madrid, Spain

**Research interests**

His main research interests are the study of the influence of non-cardiac factors on the prognosis of patients with heart failure, the population-based assessment of cardiovascular health, and the study of the effect of lifestyle on improving cardiovascular health and quality, as well as reversing frailty, in older adults.

**Cristina Ramírez**

Posttranscriptional Regulation of Metabolic Diseases Group Leader

Ph.D. in Molecular Biology and Cellular from University of La Laguna, Spain

**Research Interests**

Molecular Basis of the Regulation of Aging related-metabolic diseases by microRNAs and RNA binding proteins: Non-coding RNAs and RNA Binding Proteins in Aging; Posttranscriptional Regulators as molecular link between Diabetes, Obesity and Alzheimer's Disease. Targets of Insulin Resistance, Mitochondrial dysfunction and Autophagy; Role of non-coding RNAs and RNA Binding Proteins in the regulation of glucose homeostasis and their implication in Diabetes, Metabolic Syndrome and Obesity. Potential effect of Aging on endothelial dysfunction and Atherosclerosis: Role of Caveolin-1.



**Lidia Daimiel**

Nutritional Control of the Epigenome Group Leader

Ph.D. in Biology by Autonomous University of Madrid, Spain

**Research interests**

Her main research interest is the study of how nutrients modulate epigenetic mechanisms, with a focus on DNA methylation and microRNAs, related to nutrient sensing pathways and molecular hallmarks of aging.



**Jose María Ordovás**

Nutrition Genomics and Epigenomics Group Leader

**J. Alfredo Martínez**

Cardiometabolic Nutrition Group Leader

**Francesco Visioli**

Bioactive Ingredients Food  
Group Leader

Ph.D. in Biotechnology by  
University of Brescia, Italy

**Research interests**

Micronutrients, namely polyphenols, carotenoids, essential fatty acids and their incorporation in functional foods and nutraceuticals. Human trials and molecular medicine.

**Alberto Dávalos**

Epigenetics of Lipid  
Metabolism Group Leader

Ph.D. in Pharmacy by  
Complutense University of  
Madrid, Spain

**Research Interests**

Dr. Dávalos's research programme 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.

**Jesús Argente**

Childhood Obesity Group Leader

**Julie Chowen**

Childhood Obesity Group Leader

## Heads of Research Line

**María Ikonopoulou**

Heads of Research Line in  
Translational Venomics

Ph.D. in Biomedical Sciences  
by University of Queensland,  
Australia

**Research Interests**

We are focused on the biodiscovery, pharmacological characterisation, and optimisation of animal venom compounds for their therapeutic potentials and applications as anticancer, senolytic and anti-aging drug candidates. We utilise interdisciplinary approaches, including molecular, cell biology, venomics, animal models of chronic diseases, cancer, and metabolic disorders as well as medicinal chemistry. Our goal is to apply our candidates into clinic and attract the Biopharma industry for their commercialization applications.

**Aida Sierra**

Heads of Research Line in  
+Pec Proteomics

Ph.D. in Food Science and  
Technology by University of  
Lleida, Spain.

**Research Interests**

Clinical proteomics and mass spectrometry; protein post-translational modifications and their role(s) in health and disease investigated by unbiased discovery-driven shotgun proteomics; extracellular vesicles and intracellular communication; foodomics to research on food proteomes and cryptome-derived peptides.



**Almudena García Ruiz**

Heads of Research Line in smORFs- lipidic metabolism and human-microbiotic miRNA

Ph.D. in Food Science and Technology and Chemistry Engineering, by Autonomous University of Madrid, Spain.

**Research Interests**

Identification and characterization of smORF-encoded peptides (peptidomics, RNA-Seq, Ribo-Seq, CRISPR-Cas9) that

regulate lipid metabolism in the axis intestine-liver in response to dietary excess. Modulation of the gut microbiota composition by human miRNAs. Encapsulation of human miRNAs in dietary exosomes.

**Ildelfonso Rodríguez**

Senior Post-Doctoral-IF-MSCA Fellow and Head of Research Line on the Discovery and Characterization of Bioactive Compounds to Prevent the Progression of Non-Alcoholic Fatty Liver Disease.

Ph.D. by the Department of Biochemistry and Molecular Biology of Pharmacy in the University Complutense of Madrid, Spain

**Research interests**

My major research interest focuses on the molecular mechanisms underlying the impact of bioactive compounds on the prevention of metabolic diseases in the gut-liver axis.

**Visiting Scientists****Patricia de Carvalho Padilha**

Professor Universidade Federal do Rio de Janeiro (UFRJ), Brazil  
Researcher at Martagão Gesteira Institute of Child Care and Pediatrics (IPPMG / UFRJ)  
Vice-coordinator of the research group on Maternal and Child Health (GPSMI) in INJC / UFRJ

Ph.D. in Nutritional Sciences by Instituto de Nutrição Josué de Castro (INJC)/UFRJ. Brazil

**Research Interests**

Nutritional therapy in pediatrics, nutritional surveillance, prenatal nutritional assistance and nutritional deficiencies in the maternal and child group.



## Heads of Unit

### Guillermo J. Reglero Rada

Head of GENYAL Platform

### Ana Ramírez de Molina

Head and Scientific Director of GENYAL Platform

### Enrique Carrillo

Head of the Computational Biology and Biostatistics Unit



### Gonzalo Colmenarejo

Head of Biostatistics Unit and Senior Biostatistician

Ph.D. in Biology by the Complutense University of Madrid, Spain

#### Research Interests

Cheminformatics of food and bioactive compounds, using Statistical, Machine Learning and Deep Learning methods together with Computational Chemistry approaches and/or experimental data: structure-activity/property models, generative molecular design, virtual screening, pharmacophore building and molecular simulations. Aiming at understanding and predicting the biological effect and mechanism of action of food compounds on health and the design of novel bioactive molecules with improved efficacy and tailored functionality. Development of computational tools for the analysis and interpretation of experiments in the nutritional research field.



### Viviana Loria

Head of the Food and Clinical Trials Unit of GENYAL Platform. Nutritionist and Senior Researcher

Ph.D in Medicine and MSc in Clinical Nutrition by the Autonomous University of Madrid, Spain

#### Research interest:

Designing and development of clinical trials to provide strong experimental evidence between functional food components and health or disease. Designing nutrition programmes to improve or maintain the health of adult and child population and to develop preventive tools against obesity, heart disease, or other high prevalent diseases. Study of the gen-diet interactions. Identification of prevention/intervention profiles and development of personalized nutritional recommendations.

### María Isabel Espinosa

Head of the Nutritional Genomics and Health Unit of GENYAL Platform. Senior Nutritionist

Ph.D. in Biology and Food Sciences by the Autonomous University of Madrid, Spain

#### Research interests:

To measure and provide evidence of the effectiveness of precision nutritional strategies for health promotion.



### Susana Molina

LabManager and Technical Manager of the Genomics Laboratory

Ph.D. in Molecular Biology by the Autonomous University of Madrid, Spain

#### Research interests:

Genetics and genomics; cell biology; molecular biology.





### Sara Castillo

Head of Communication and Innovation, Public Dissemination and Marketing Specialist

Bachelor Degree in Economics by the Carlos III University, Spain

#### Research Interests:

Dissemination activities and communication projects linked to research, education, innovation and business creation

programmes. Development of international and national projects, to disseminate scientific and innovation results around Precision Nutrition. Encouraging the promotion of a healthier and sustainable Nutrition to improve the well-being of society.

### Maria Jesús Latasa

Head of Education.  
Researcher, Genomics and Food Innovation

Ph.D. in Pharmacy, Biochemistry and Molecular Biology by Alcalá University, Spain.

#### Research Interests:

The effect of diet on the regulation of microRNAs and other non-coding RNAs expression. Development of R&D&I activities to promote Innovation around nutrigenomics and nutrigenetics to implement Precision Nutrition – based strategies. Management and implementation of educational activities around Food Innovation through international and national programmes.



# annex

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R&D projects  
and contracts

87

fellowships

95

scientific  
results

100

technology  
offer

145

training, communication  
and outreach

147



## 1. R&D Projects and contracts

### 1.1. International Projects

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**Title:** Human Capital

**Company/Institution:** EIT Food & EIT Health

**Principal Investigator:** María Jesús Latasa

**Period:** 2019

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**Title:** The Future Kitchen Virtual Reality and Eating Healthy Infotainment Series

**Partners:** Matis, UAM, Döhler, EUFIC, Matis, University of Cambridge, Agrilution, Eskesso, Flatev, Natural Machines

**Period:** 2019

**Funding Institution/Programme:** EIT Food

**Principal Investigators:** Lorena Carrillo and Sara Castillo

---

**Title:** How to effectively change food habits: innovative techniques and personalized nutrition approaches

**Partners:** University of Turin, Universidad Autónoma de Madrid, Grupo AN, University Hohenheim, University of Reading, University of Turin, BeYou

**Period:** 2019

**Funding Institution/Programme:** EIT Food

**Principal Investigators:** Diana González

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**Title:** FOODMIO

**Partners:** University of Helsinki, University Hohenheim, Universidad Autónoma de Madrid, CSIC, Technion, Döhler, Grupo AN, Herbstreith & Fox

**Period:** 2019

**Funding Institution/Programme:** EIT Food

**Principal Investigators:** María Jesús Latasa (in collaboration with UAM)

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**Title:** MOOC 'Food, Agriculture and Plant Biotechnology'

**Partners:** University of Cambridge, Universidad Autónoma de Madrid CSIC, Herbstreith & Fox, John Deere, Koppert

**Period:** 2019

**Funding Institution/Programme:** EIT Food

**Principal Investigators:** María Jesús Latasa (in collaboration with UAM)

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**Title:** An Introduction to Food Systems: Scientific, Technical and Socioeconomic Principles to Facilitate the Creation of Food Value Networks

**Partners:** Universidad Autónoma de Madrid, KU Leuven, Queen's University Belfast, University Hohenheim, University of Reading, University of Turin, University of Warsaw.

**Period:** 2019

**Funding Institution/Programme:** EIT Food

**Principal Investigators:** María Jesús Latasa (in collaboration with UAM)

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**Title:** IValueFood

**Partners:** Universidad Autónoma de Madrid, AZTI, Koppert, Matis, Queen's University Belfast, Technion, University of Helsinki, University of Reading, University of Turin, University of Warsaw, Matis, Koppert, Eskesso, Flatev, EUFIC.

**Period:** 2019

**Funding Institution/Programme:** EIT Food

**Principal Investigators:** María Jesús Latasa

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**Title:** EcoPack: Finding solutions to enable consumers and retailers to pack on-the-go items in grocery stores ecologically.

**Partners:** University Hohenheim, Universidad Autónoma de Madrid, University of Helsinki, Robert Bosch Packaging Technology, CSIC, Puratos, Vleviso, Tipa.

**Period:** 2019

**Funding Institution/Programme:** EIT Food

**Principal Investigators:** María Jesús Latasa (in collaboration with UAM)

---

**Title:** The #AnnualFoodAgenda.

**Partners:** UAM, CSIC, Grupo AN, Maspex, PepsiCo, Institute of Animal Reproduction and Food Research, University of Cambridge.

**Period:** 2019

**Funding Institution/Programme:** EIT Food

**Principal Investigators:** Sara Castillo

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**Title:** From waste to worth – use of plant residues

**Partners:** UAM, CSIC, Queen's University Belfast, University Hohenheim, RethinkResource.

**Period:** 2019

**Funding Institution/Programme:** EIT Food

**Principal Investigators:** María Jesús Latasa (in collaboration with UAM)

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**Title:** MAKE-IT! An infrastructure to hack simpler and smarter food value chains.

**Partners:** UAM, AZTI, ETH Zürich, Deutsches Institut für Lebensmitteltechnik, Matis, Queen's University Belfast, RisingFoodStars, University of Cambridge, University of Warsaw, VTT Technical Research Centre of Finland.

**Period:** 2019

**Funding Institution/Programme:** EIT Food

**Principal Investigators:** María Perez

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**Title:** WE Lead.

**Partners:** UAM, EUFIC, PepsiCo, Queen's University of Belfast, RisingFoodStars, University of Cambridge.

**Period:** 2019

**Funding Institution/Programme:** EIT Food

**Principal Investigators:** Ana Ramírez and María Pérez

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**Title:** Food System Master of Science Programme.

**Partners:** EIT Food IVZW, UAM, ETH Zürich, Grupo AN, John Deere, KU Leuven, Maspex, PepsiCo, Queen's University of Belfast, Raben, Technion, University of Helsinki, University of Hohenheim, University of Reading, University of Turin, University of Warsaw, Valio, ABP Food Group, Waitrose.

**Period:** 2019

**Funding Institution/Programme:** EIT Food

**Principal Investigators:** María Jesús Latasa Sada

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**Title:** Global Food Venture Programme.

**Partners:** EIT Food IVZW, UAM, EPFL, ETH Zürich, KU Leuven, Queen's University of Belfast, TUM, Technion, University of Turin, University of Warsaw, CLC West.

**Period:** 2019

**Funding Institution/Programme:** CLC West

**Principal Investigators:** María Jesús Latasa Sada

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## 1.2. National R&D Projects

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**Title:** GLD18/00143 “Search for new biomarkers for diagnosis and stratification of NAFLD/NASH: can circulating exosomal mirnas play a role?”. Convenio VI Edición Becas Gilead a la Investigación Biomédica GLD18/00143.

**Period:** 2019-2021

**Funding Institution/Programme:** Gilead Foundation

**Principal Investigators:** Dr. Alberto Dávalos

---

**Title:** Formulación de productos alimentarios para la prevención y el tratamiento dirigido de enfermedades crónicas relacionadas con el metabolismo (AGL2016-76736-C3-3-R).

**Period:** 2016-2019

**Funding Institution/Programme:** Spanish Ministry of Economy and Competitiveness

**Principal Investigators:** Ana Ramírez de Molina

---

**Title:** Modulación terapéutica de ARNs no codificante a través de componentes bioactivos de la dieta: impacto sobre la regulación fisiopatológica del metabolismo lipídico intestinal (AGL2016-78922-R).

**Period:** 2016-2019

**Funding Institution/Programme:** Spanish Ministry of Economy and Competitiveness

**Principal Investigators:** Alberto Dávalos Herrera

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**Title:** PREDIMED+DM: Efecto de una pérdida de peso con dieta mediterránea hipocalórica y promoción de la actividad física en la prevención de la diabetes tipo 2 en personas con síndrome metabólico (PI17/00508).

**Period:** 2018-2020

**Funding Institution/Programme:** Carlos III Institute of Health

**Principal Investigators:** Lidia Daimiel Ruiz

---

**Title:** Nutrición de precisión y ejercicio físico como moduladores del epigenoma en patologías de los excesos alimenticios (AGL2017-90623-REDT).

**Period:** 2018-2020

**Funding Institution/Programme:** Spanish Ministry of Science, Innovation and Universities - AGI

**Principal Investigators:** Alberto Dávalos Herrera

---

**Title:** Caracterización de los mecanismos moleculares del ayuno de corta duración como potenciador de la quimioterapia. (SAF2017-85766-R).

**Period:** 2018-2020

**Funding Institution/Programme:** Spanish Ministry of Science, Innovation and Universities - AGI

**Principal Investigators:** Pablo Fernández Marcos

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**Title:** PCI2018-093009 “Estudio en los cambios inducidos por la dieta en el metelona y el transcriptoma para evaluar el impacto de la nutrición en la salud cardiometabólica”.

**Period:** 2019-2021

**Funding Institution/Programme:** Spanish Ministry of Science, Innovation and Universities

**Principal Investigators:** José María Ordovás

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**Title:** RTI2018-093873-A-I00 “Regulacion de la microbiota intestinal a traves de mirnas del hospedador y la dieta: exosomas dieteticos y exosomas mimeticos”.

**Period:** 2019-2021

**Funding Institution/Programme:** Spanish Ministry of Science, Innovation and Universities.

**Principal Investigators:** Almudena García Ruiz

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**Title:** RTI2018-095061-B-I00 “Nuevos reguladores postranscripcionales como vinculo molecular entre diabetes, obesidad y alzheimer”.

**Partners:** -

**Period:** 2019-2021

**Funding Institution/Programme:** Spanish Ministry of Science, Innovation and Universities

**Principal Investigators:** Cristina Ramírez Hidalgo

---

**Title:** RTI2018-095569-B-I00 “Identificacion de huellas de metilacion asociadas al consumo de alimentos ultraprocesados para prevenir enfermedades no transmisibles”.

**Period:** 2019-2021

**Funding Institution/Programme:** Spanish Ministry of Science, Innovation and Universities

**Principal Investigators:** José María Ordovás

---

**Title:** EIN2019-103470. Aplicaciones de tecnologia de los alimentos para modular el microbioma y la interferencia del mismo sobre celulas tumorales para el tratamiento del cancer colorrectal.

**Period:** 2019-2021

**Funding Institution/Programme:** Spanish Ministry of Science, Innovation and Universities

**Principal Investigators:** Laura Judith Marcos

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### 1.3. Regional Projects

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**Title:** CIFRA2-CM. Consorcio para el estudio del fracaso renal agudo: fisiopatología, nuevas terapias, biomarcadores y modelos experimentales (B2017/BMD-3686).

**Period:** 2018-2021

**Funding Institution/Programme:** Department of Education and Research. Madrid Regional Government

**Principal Investigators:** Moisés Laparra Llopis

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**Title:** ALIBIRD2020-CM. Fórmulas terapéuticas de nutrición de precisión para el cáncer (S2018/BAA-4343).

**Period:** 2019-2022

**Funding Institution/Programme:** Department of Education and Research. Madrid Regional Government

**Principal Investigators:** Ana Ramírez de Molina and Susana Molina

---

**Title:** OI2018/INNOLINK-5352. Dinamización del ecosistema alimentario madrileño basada en la innovación mediante la aplicación y expansión del proyecto europeo EIT-Food.

**Period:** 2019-2022

**Funding Institution/Programme:** Department of Education and Research. Madrid Regional Government

**Principal Investigators:** Ana Ramírez de Molina

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### 1.4. Privately-Funded R&D Projects

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**Title:** Modulación de exosomas transportadores de miRNAs y lncRNAs para la comunicación intercelular como herramienta terapéutica frente a la dislipidemia.

**Period:** 2017-2020

**Funding Institution/Programme:** Ramón Areces Foundation

**Principal Investigators:** Alberto Dávalos Herrera

---

**Title:** Nuevos productos bioactivos contra la obesidad y la diabetes.

**Period:** 2017-2020

**Funding Institution/Programme:** Ramón Areces Foundation

**Principal Investigators:** Pablo Fernández Marcos

---

**Title:** Sirtuins as biomarkers and targets in cancer: Sirt1 and Sirt3 in lung and liver carcinogenesis – SIRT BIO.

**Period:** 2018-2020

**Funding Institution/Programme:** Spanish Association against Cancer. AECC

**Principal Investigators:** Pablo Fernández Marcos

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**Title:** Nutritional strategies and bioactive compounds to target lipid metabolism alterations in cancer: Platform of Patient derived Paired Organoids for Precision Nutrition.

**Period:** 2019-2022

**Funding Institution/Programme:** Ramón Areces Foundation

**Principal Investigators:** Ana Ramírez de Molina

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## 1.5. R&D Contracts

Within the framework of the Strategic Programme for National Business Research Consortia (CIEN), two R&D contracts are being developed with companies to carry out the project *“Strategies for improving the quality of life of pre-senior and senior groups based on in precision nutrition (NUTRIPRECISION) ”*:

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**Company/Institution:** AMC INNOVA S.L.

**Principal Investigators:** Guillermo Reglero Rada / Ana Ramírez de Molina

**Period:** 2017-2020

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**Company/Institution:** GALLETAS GULLÓN S.A.

**Principal Investigators:** Guillermo Reglero Rada

**Period:** 2017-2020

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**Title:** Determinación de variantes genéticas asociadas a estudios de genética

**Company/Institution:** PEACHES, S.L.

**Principal Investigators:** Ana Ramírez de Molina

**Period:** 2016-2018 (renewable)

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**Title:** Elagitaninos como herramienta para estudiar la viabilidad interindividual en el metabolismo de polifenoles: Relación con el genotipo y microbiota intestinal puerperio-lactancia, niños, adolescentes y adultos (normopeso, obesidad y síndrome metabólico)- Estudio PolyMicroBio.

**Company/Institution:** Centro de Edafología y Biología Aplicada del Segura (CEBAS-CSIC)

**Principal Investigators:** Ana Ramírez de Molina

**Period:** 2016-2019

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**Title:** Análisis de la toxicidad celular de 5 extractos vegetales y la realización de un experimento de metabolismo celular en células Caco-2 diferenciadas en transwell (21 días) de 6 pocillos.

**Company/Institution:** University of Lleida

**Principal Investigators:** Alberto Dávalos Herrera

**Period:** 2018-2019

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**Title:** Evaluación de la biodisponibilidad de un carotenoide procedente de la microalga *haematococcus pluvialis* (anstaxantihin (BGG) y un producto control con similares características en voluntarios sanos.

**Company/Institution:** BGG Europe SA

**Principal Investigators:** Viviana Loria Kohen and Francesco Visioli

**Period:** 2019-2020

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**Title:** Capacitar a los consumidores para prevenir enfermedades relacionadas con la dieta a través de las ciencias **ómicas** "PREVENTOMICS".

**Company/Institution:** Acondicionamiento Tarrasense LEITAT

**Principal Investigators:** Viviana Loria Kohen

**Period:** 2019-2020

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**Title:** Análisis de los efectos fisiológicos inducidos por dos tipos de moringa, uy un extracto de cazpacho biosabor enriquecido para su potencial uso como tratamiento frente a obesidad, diabetes II y envejecimiento

**Company/Institution:** BIOSABOR.

**Principal Investigators:** José Alberto Díaz-Ruiz

**Period:** 2019-2021

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**Title:** Servicios genómica.

**Company/Institution:** p4H

**Principal Investigators:** Susana Molina

**Period:** 15/01/2019 – renewable annually

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## 1.6. Licenses

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**Name:** SeneYn and ObeYn. Products to reduce metabolic decline and control obesity derived from the Patent ES2739133 licensed to the company Ynsadiet S.A. Madrid

**Licesors:** IMDEA Food, Universidad Autónoma de Madrid and Hospital Pal Paz de Madrid.

**Period:** 2019

**Principal Investigator:** Guillermo Reglero

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## 2. Fellowships

### 2.1. National

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**Programme:** Ramón y Cajal Grant for contracting (RYC-2015-18083)

**Project:** Influence of bioactive components in the entero-hepatic axis

**Period:** 2016-2021

**Funding Institution:** Spanish Ministry of Economy and Competitiveness

**José Moisés Laparra Llopis**

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**Programme:** Ramón y Cajal Grant for contracting (RYC2016-201546)

**Period:** 2018-2019

**Funding Institution:** Spanish Ministry of Science, Innovations and Universities

**David Martínez Gómez**

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**Programme:** PTA2017-14689-I

**Period:** 2019-2022

**Funding Institution:** Spanish Ministry of Science, Innovations and Universities

**José Luis López Aceituno**

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**Programme:** Ramón y Cajal Grant for contracting (RYC-2016-19435)

**Period:** 2019-2024

**Funding Institution:** Spanish Ministry of Science, Innovations and Universities

**Pablo Fernández Marcos**

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**Programme:** Predoctoral Grant in Oncology (APRO)

**Project:** Characterization of the molecular mechanisms of short term fasting as a chemotherapy enhancer

**Period:** 2019-2022

**Funding Institution:** Spanish Association against Cancer. AECC

**Andrés Pastor**

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**Programme:** IJC2018-038008-I

**Project:** Physical activity behaviors: determinants and relationships with social and mental health in old age

**Period:** 2019-2022

**Funding Institution:** Spanish Ministry of Science, Innovations and Universities

**Verónica Cabanas Sánchez**

---

**Programme:** FJC2018-038168-I (Juan de la Cierva-formation)

**Period:** 2019-2022

**Funding Institution:** Spanish Ministry of Science, Innovations and Universities

**Rodrigo San Cristóbal Blanco**

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## 2.2. International

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**Programme:** Research Fellowship SFRH/BD/124022/2016

**Period:** 2017-2020

**Funding Institution:** Foundation for Science and Technology Ministry of Science, Technology and Higher Education (Portugal)

**Luis Filipe Costa Machado**

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**Programme:** Marie Skłodowska-Curie Individual Fellowships-IF-2016/H2020-MSCA-746435

**Period:** 2018-2021

**Funding Institution:** European Commission

**Almudena García Ruíz**

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**Programme:** Marie Skłodowska-Curie Individual Fellowships-GA-832741-Food-PPP-NAFLD\_PF

**Period:** 2019-2022

**Funding Institution:** European Commission

**Ildefonso Rodríguez Ramiro**

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## 2.3. Regional

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**Programme:** Grant for the implementation of contracts for research assistants (PEJ16/BIO/AI-1590)

**Period:** 2017-2019

**Funding Institution:** Department of Education, Youth and Sport. Madrid Regional Government

**Sonia Wagner Reguero**

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**Programme:** Grant to carry out contracts Attracting talent Mode 1 (2016-T1/BIO-1854)

**Period:** 2017-2020

**Funding Institution:** Department of Education, Youth and Sport. Madrid Regional Government

**Manuel Alejandro Fernández Rojo**

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**Programme:** PEJD-2017 PRE/BIO 5100

**Period:** 2018-2020

**Funding Institution:** General Department of Research and Innovation. Madrid Regional Government

**Lorena del Pozo Acebo**

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**Programme:** PEJD-2017 PRE/BMD 4561

**Period:** 2018-2020

**Funding Institution:** General Department of Research and Innovation. Madrid Regional Government

**Arantzazu Sierra Ramírez**

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**Programme:** PEJD-2017 PRE/BMD 3541

**Period:** 2018-2019

**Funding Institution:** General Department of Research and Innovation. Madrid Regional Government

**Elena Borregón Rivilla**

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**Programme:** PEJD-2017 PRE/SAL 5109

**Period:** 2018-2020

**Funding Institution:** General Department of Research and Innovation. Madrid Regional Government

**Laura Díez Ricote**

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**Programme:** PEJD-2017 PRE/BMD 3394

**Period:** 2018-2020

**Funding Institution:** General Department of Research and Innovation. Madrid Regional Government

**Adriana Quijada Freire**

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**Programme:** AT1\_2017-T1/BMD-5333

**Period:** 2018-2022

**Funding Institution:** General Department of Research and Innovation. Madrid Regional Government

**Cristina Ramírez Hidalgo**

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**Programme:** TL\_PEJ-2017-TL/SAL-7141

**Period:** 2018-2022

**Funding Institution:** General Department of Research and Innovation. Madrid Regional Government

**Paloma Ruiz Valderrey**

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**Programme:** IND2017/BIO-7826

**Period:** 2018-2021

**Funding Institution:** General Department of Research and Innovation. Madrid Regional Government

**Marina Reguero Simón**

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**Programme:** IND2017/BIO-7857

**Period:** 2018-2021

**Funding Institution:** General Department of Research and Innovation. Madrid Regional Government

**Adrián Bouzas Muñoz**

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**Programme:** PEJD-2018-POST/BIO-8933

**Period:** 2018-2022

**Funding Institution:** General Department of Research and Innovation. Madrid Regional Government

**María Belén Ruiz Roso**

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**Programme:** PEJD-2018-POST/BMD-8900\_CR

**Period:** 2018-2022

**Funding Institution:** General Department of Research and Innovation. Madrid Regional Government

**Ana Pérez García**

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**Programme:** IND2018/BIO-10097

**Period:** 2019-2022

**Funding Institution:** General Department of Research and Innovation. Madrid Regional Government

**Sonia Wagner Reguero**

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**Programme:** 2018-T1/BMD-11966

**Period:** 2019-2023

**Funding Institution:** General Department of Research and Innovation. Madrid Regional Government

**José Alberto Díaz-Ruiz Ruiz**

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**Programme:** 2018-T1/BIO-11262

**Period:** 2019-2023

**Funding Institution:** General Department of Research and Innovation. Madrid Regional Government

**María Ikonomopoulou**

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**Programme:** 2018-T1/BIO-10633

**Period:** 2019-2023

**Funding Institution:** General Department of Research and Innovation. Madrid Regional Government

**Aida Serra Maqueda**

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**Programme:** PEJ-2018-AI/BMD-9724

**Period:** 2019-2021

**Funding Institution:** General Department of Research and Innovation. Madrid Regional Government

**María Torrecilla**

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**Programme:** CM-PEJ-2019-TL/BMD-15706\_ADR

**Period:** 2019-2021

**Funding Institution:** General Department of Research and Innovation. Madrid Regional Government

**Alberto Díaz-Ruiz Ruiz (Tutor)**

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**Programme:** CM-PEJD-2019-PREBMD-17041

**Period:** 2019-2021

**Funding Institution:** General Department of Research and Innovation. Madrid Regional Government

**Alberto Díaz-Ruiz Ruiz (Tutor)**

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**Programme:** CM-PEJD-2019-PREBMD-14499

**Period:** 2019-2021

**Funding Institution:** General Department of Research and Innovation. Madrid Regional Government

**Cristina Ramírez Hidalgo (Tutor)**

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**Programme:** CM-PEJD-2019-PRE/BIO-16475

**Period:** 2019-2021

**Funding Institution:** General Department of Research and Innovation. Madrid Regional Government

**Aida Serra Maqueda (Tutor)**

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**Programme:** CM-PEJD-2019-POSTBMD-14722

**Period:** 2019-2021

**Funding Institution:** General Department of Research and Innovation. Madrid Regional Government

**Manuel Fernández Rojo (Tutor)**

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**Programme:** CM-PEJD-2019-POSTBIO-15004

**Period:** 2019-2021

**Funding Institution:** General Department of Research and Innovation. Madrid Regional Government

**Ana Ramírez de Molina (Tutor)**

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**Programme:** CM-PEJD-2019-POST/SAL-15164

**Period:** 2019-2021

**Funding Institution:** General Department of Research and Innovation. Madrid Regional Government

**Lidia Daimiel Ruiz (Tutor)**

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**Programme:** CM-PEJD-2019-POST/SAL-15892

**Period:** 2019-2021

**Funding Institution:** General Department of Research and Innovation. Madrid Regional Government

**José María Ordovás Muñoz (Tutor)**

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### 3. Scientific results

#### 3.1. Publications

1. Abete, Itziar; Konieczna, Jadwiga; Angeles Zulet, M.; Galmes-Panades, Aina M.; Ibero-Baraibar, Idoia; Babio, Nancy; Estruch, Ramon; Vidal, Josep; Toledo, Estefania; Razquin, Cristina; Bartolome, Rafael; Diaz-Lopez, Andres; Fiol, Miquel; Casas, Rosa; Vera, Josep; Buil-Cosiales, Pilar; Pinto, Xavier; Corbella, Emili; Puy Portillo, Maria; Antonio de Paz, Jose; Martin, Vicente; Daimiel, Lidia; Goday, Albert; Rosique-Esteban, Nuria; Salas-Salvado, Jordi; Romaguera, Dora; Alfredo Martinez, J. *Association of lifestyle factors and inflammation with sarcopenic obesity: data from the PREDIMED-Plus trial.* **Journal of Cachexia Sarcopenia and Muscle** **5**, 974 – 984, 2019.
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  7. Angel de la Camara, Miguel; Higuera-Fresnillo, Sara; Martinez-Gomez, David; Veiga, Oscar L. *Interday Reliability of the IDEEA Activity Monitor for Measuring Movement and Nonmovement Behaviors in Older Adults. Journal of Aging and Physical Activity* **2**, 141-154, 2019.
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159. Visioli, Francesco; Poli, Andrea. *Prevention and Treatment of Atherosclerosis: The Use of Nutraceuticals and Functional Foods*. **Handbook of experimental pharmacology**, 2019.
160. Visioli, Francesco; Poli, Andrea. *Dietary advice to cardiovascular patients. A brief update for physicians*. **Monaldi archives for chest disease** **1**, 2019.
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### 3.2. Book chapters

1. Barradas M, Link W, Megias D, Fernandez-Marcos PJ. *High-Throughput Image-Based Screening to Identify Chemical Compounds Capable of Activating FOXO*. In **FOXO Transcription Factors: Methods and Protocols 1890**, 151-161, 2019.
2. Fernández-Musoles R, Garcia-Tejedor A, Laparra JM. *Immuno/oncological Nutrition* (in progress). **Nutriology of Latin-american crops**.
3. Haros CM, Laparra JM. *Metaanalysis of health benefits from Latin-American grains* (in progress). **Nutriology of Latin-american crops**.

### 3.3. Invited & plenary talks, seminars and conferences

1. *Nutrigenética y Nutrición Personalizada: El farmacéutico como asesor en temas actuales de alimentación y nutrición*. Lidia Daimiel. **Ciclo de conferencias del Colegio Oficial de Farmacéuticos**. 16/01/2019. Madrid. España
2. *Posttranscripcional Regulation of Metabolism*. Cristina M. Ramírez Hidalgo. **Programa de Doctorado en Ciencias de la Salud (D4020)**, Universidad de Alcalá. 09/01/2019. Madrid. España
3. *Olio d'oliva e salute. Le evidenze scientifiche dopo 25 anni di ricerca*. Francesco Visioli. **Spazio Nutrizione**. 22/03/2019. Milán. Italia
4. *Trust in Food led by women*. Espinosa Salinas, María Isabel. **Annual Food Agenda de EIT Food. Dia Interaccional de la Mujer y Niña en la Ciencia**. 15/02/2019. Madrid. España
5. *Ciencia que alimenta*. Espinosa Salinas, María Isabel. **AULA y Feria de la Ciencia y la Innovación**. 30/03/2019. Madrid. España
6. *The gut microbiota and immunometabolic diseases*. Laparra José Moises. **Master IGBM-CSIC**. 08/02/2019. Valladolid. España
7. *Precision Nutrition and Cancer: Targeting lipid metabolism alterations*. Ana Ramírez de Molina. **Workshop on Nutrition, Physical activity and Cancer (Instituto Catalán de Oncología ICO)**. 01/03/2019. Barcelona. España
8. *The antiproliferative properties of gomesin-peptides against melanoma*. Maria Ikonomopoulou. **Veterinary Faculty, University of Santiago de Compostela**. 22/03/2019. Santiago de Compostela. España
9. *The antiproliferative properties of gomesin-peptides against melanoma*. Maria Ikonomopoulou. **Veterinary Faculty, University of Santiago de Compostela**. 22/03/2019. Santiago de Compostela. España
10. *Bite Back*. Maria Ikonomopoulou. **Veterinary Faculty, University of Santiago de Compostela**. 22/03/2019. Santiago de Compostela. España
11. *Venoms to Drugs: Mapping the antitumoural profile of spider-peptides against melanoma*. Maria Ikonomopoulou. **Center for Research in Biological Chemistry and Molecular Materials (CiQUS) & University of Santiago de Compostela**. 21/03/2019. Santiago de Compostela. España



12. *Venoms to Drugs: Mapping the antitumoural profile of spider-peptides against melanoma.* Maria Ikonomopoulou. **Biochemistry Department. Instituto de Investigaciones Biomédicas Alberto Sols.** 22/02/2019. Madrid. España
13. *Venoms to Drugs: The therapeutic potentials of spider-peptides against melanoma.* Maria Ikonomopoulou. **Biochemistry Department. Complutense de Madrid University.** 04/02/2019. Madrid. España
14. *Southern Illinois University School of Medicine.* Rafael de Cabo. 27/02/2019. Springfield. USA
15. *Novel genetic modulators of growth.* Jesus Argente. **6th International Meeting on Growth & Nutrition.** 07/03/2019. 09/03/2019. Valencia. España
16. *Precision Nutrition as a tool for the integrative management of cancer patients.* Ana Ramírez de Molina. **Workshop on innovative IT for healthcare (CNIO).** 01/04/2019. Madrid. España
17. *Innovating the joy of eating for healthy ageing. "Olive oil from ancient food to business opportunity.* Francesco Visioli. **INJoy.** 12/06/2019. Barcelona. España
18. *Molecular perspectives on short-term fasting as a nutritional strategy against aging-related diseases.* Pablo J. Fernández Marcos. **IMDEA Seminars.** 19/06/2019. Madrid. España
19. *Association of calcium and dairy product consumption with childhood obesity and the presence of a Brain Derived Neurotropic Factor-Antisense (BDNF-AS) polymorphism.* Loria Kohen V. **The second international Rita Levi Montalcini's Scientific Meeting: The multiple life of Nerve Growth Factor and on its potencial clinical applications.** 13/06/2019. Bologna. Italia
20. *Proyecto GENYAL para la prevención de la obesidad infantil.* Loria Kohen V. **I Jornada UAM Saludable.** 18/06/2019. Madrid. España





21. *La alimentación de las personas enfermas*. Aguilar, Aguilar Elena. **Auditoría oficial de sistemas de seguridad alimentaria en establecimientos con población vulnerable (3ra edición)**. Consejería de sanidad. Comunidad de Madrid. 29/06/2019. Madrid. España
22. *Consejos para el retorno en el mundo académico*. Cristina M. Ramírez Hidalgo. **Conferencia-mesa redonda, organizada por la Asociación de Científicos Españoles en USA (ECUSA)**. 09/04/2019. Nueva York, USA
23. *Nutrigenomics, metabolomics and personalized nutrition for obesity: ready for prime time?*. José M Ordovas. **Digestive Disease Week, American Gastroenterological Association**. 19/05/2019. San Diego (CA). USA
24. *La Nutrigenética: una Ciencia en Auge*. José M Ordovas. **Alimenta Tech. Jornada Innovación agroalimentaria Bayer**. 27/06/2019. Madrid España
25. *The epigenomic landscape of the hematopoiesis: The BLUEPRINT project*. Enrique Carrillo de Santa Pau. **ONCONET: Workshop on Molecular Biology, Cancer And Bioinformatics**. 16/05/2019. Pamplona. España
26. *ONCONET-SUDOE Workshop on Innovative IT for healthcare*. Enrique Carrillo de Santa Pau. 03/04/2019. Madrid. España
27. *The nature of fatty acids modulates Caveolin-1 association to the lipid droplets*. M.A. Fernández-Rojo. **1st EMBO Workshop: Caveolae and Nanodomains. Translating structural principles and dynamics into function**. 12/05/2019. Le Pouliguen. Francia
28. Universidad de Oviedo. M.A. Fernández-Rojo. 11/05/2019. Oviedo. España
29. *Bite Back: Venom-peptides targeting melanoma*. Maria Ikonomopoulou. **Cancer and Immunology Department, Centro National Biotecnología**. 22/05/2019. Madrid. España
30. *Caloric Restriction and Aging: An Update from NIA*. Rafael de Cabo. **University of Alabama - Nathan Shock Center**. 09/04/2019. 11/04/2019. Birmingham. USA
31. *Dietary Interventions for Healthy Aging: Where are we now?*. Rafael de Cabo. **Rutgers University - 12th Annual Nutrition, Endocrinology & Food Science (NEFS) Graduate Student Conference**. 01/04/2019. New Brunswick. Canadá
32. *Estrategias Antienviejamiento: from bench to bedside*. José Alberto Diaz-Ruiz Ruiz. **Ciclos de Seminarios IMIBIC**. 02/05/2019. Córdoba. España
33. *Andrea Prader Award Lecture*. Jesús Argente. **58th Annual Meeting of ESPE**. 20/09/2019. Viena. Austria
34. *Novel insights into genetic disorders of growth*. Jesús Argente. 20/09/2019. Viena. Austria
35. *Moderación ponencia titulada: "Hablando de lácteos, cáncer y sostenibilidad"*. Viviana Loria Kohen. **III Jornada Formativa de Nutrición para Dietistas-nutricionistas**. 28/09/2019. Madrid. España
36. *Participación actividad "IMDEA-CSI: Investigando en la escena del crimen"*. María Isabel Espinosa Salinas. **X Noche Europea de los Investigadores**. 27/09/2019. Madrid. España
37. *Participación actividad "X Noche europea de los investigadores e investigadoras"*. Helena Marcos Pasero. **X Noche Europea de los Investigadores**. Madrid. España



38. *Participación actividad "Escape Room: La alimentación y la salud en el arte"*. Helena Marcos Pasero. **Actividades Food Annual Agenda**. 08/07/2019. Madrid. España
39. *"Sindrome metabolica ed infiammazione nel determinismo della sindrome coronarica acuta"*. Visioli F. **Congresso Regionale A.R.C.A Emilia- Romagna**. 21/09/2019. Ferrara. Italia
40. *"Sviluppo di integratori ed alimenti funzionali tra scienza e marketing"*. Visioli F. **La chimica degli alimenti e i giovani ricercatori. II edizione**. 23/09/2019. Milan. Italia
41. *Lecture on Personalized Nutrition*. José M<sup>a</sup> Ordovás. **Grand Rounds for GSK Consumer Health Care**. 28/08/2019. New Jersey. EEUU

#### 3.4. Memberships in organizing committees

1. **Spanish Agency for Food Safety and Nutrition of the Ministry of Health**. Esther López García (Scientific Committee). Madrid, Spain.
2. **Nutrition and Obesity Observatory of the Ministry of Health**. Fernando Rodríguez Artalejo (President). Madrid, Spain.
3. **International Society of Nutrigenetics/Nutrigenomics**. Lidia Daimiel (Management Committee). North Carolina, USA.
4. **Spanish Society of Community Nutrition**. Lidia Daimiel (Full member). Madrid, Spain.
5. **Spanish Society of Arteriosclerosis**. Lidia Daimiel (Full member). Barcelona, Spain.
6. **PharmaNutrition (Elsevier)**. Francesco Visioli (Editor in Chief).
7. **PLEFA (Elsevier)**. Francesco Visioli (Associate Editor).
8. **Committee for the Defense of the Profession and Employment in CODINMA**. Elena Aguilar (Full member). Madrid, Spain.
9. **Spanish Society of Clinical Nutrition and Metabolism SENPE**. Viviana Loria (Full member). Madrid, Spain.
10. **Evaluation Committee of Dr. Victor Micó's doctoral thesis by the UAM, entitled "Effect of caloric restriction based on the Mediterranean diet and intake of traditional Mediterranean foods on the expression of microRNAs regulating molecular processes associated with aging"**. Cristina Ramírez Hidalgo (Court Member). Madrid, Spain.
11. **Atherosclerosis**. Cristina Ramírez Hidalgo (Review Editor). Netherlands.
12. **Redox Biology**. Cristina Ramírez Hidalgo (Review Editor). Netherlands.
13. **Frontiers in Cardiovascular Medicine**. Cristina Ramírez Hidalgo (Review Editor). Switzerland.
14. **Project Evaluation for the State Research Agency**. Cristina Ramírez Hidalgo (Assessor). Madrid, Spain.
15. **MAKE IT, EIT-Food**. Ana Ramírez de Molina, Lara Fernández Álvarez, Silvia Cruz Gil.
16. **WE Lead, EIT Food**. Ana Ramírez de Molina, Lara Fernández Álvarez, Silvia Cruz Gil.
17. **PlosOne 2018**. Ana Ramírez de Molina (Academic Editor).
18. **Project Evaluation for the State Research Agency**. Ana Ramírez de Molina (Assessor). Madrid, Spain.
19. **Committee State Agency**. Jose M Ordovas (Scientific Committee). Madrid, Spain.



20. **Spanish Nutrition Foundation.** Jose M Ordovas (Consultant). Madrid, Spain.
21. **IMIBIC.** Jose M Ordovás (External Scientific Advisory). Cordoba, Spain.
22. **Medical Research Council.** Jose M Ordovás (Expert). London, UK.
23. **Heart Research UK.** Jose M Ordovás (Expert). London, UK.
24. **Pfizer Consumer Health Care.** Jose M Ordovás (Advisory Board). New Jersey, USA.
25. **Netherlands Organisation for Scientific Research.** Jose M Ordovás (Expert). Amsterdam, Netherlands.
26. **CA18131-Statistical and machine learning techniques in human microbiome studies.** Enrique Carrillo de Santa Pau (MC Substitute). USA.
27. **TransBloNet.** Enrique Carrillo de Santa Pau (Full member). Madrid, Spain.
28. **Madiabetes.** Enrique Carrillo de Santa Pau (Full member). Madrid, Spain.
29. **DFG-Network Epigenomic Profiling in paediatric lymphoid leukaemias-perspectives for diagnostics, prognosis and therapy.** Enrique Carrillo de Santa Pau (Full member). Germany.
30. **European Society of Clinical Microbiology and Infectious Diseases.** Laura J Marcos-Zambrano (Full member). USA.
31. **LifeTime.** Enrique Carrillo de Santa Pau (Individual Supporter). USA.
32. **Biologia.** Maria Ikonomopoulou (Review editor).
33. **Toxins.** Maria Ikonomopoulou (Review editor). Basel, Switzerland.
34. **Toxicon (Elsevier).** Maria Ikonomopoulou (Review editor).
35. **Scientific Committee III Conference CODINMA.** Viviana Loria Kohen (Scientific Committee). Madrid, Spain.
36. **Biostatnet.** Gonzalo Colmenarejo (Full member). Madrid, Spain.
37. **Severo Ochoa aid programme for research and teaching training.** Cristina M. Ramírez Hidalgo (Assessor). Madrid, Spain.
38. **BMC Cardiovascular Disorders (Springer Nature).** Cristina M. Ramírez Hidalgo (Review editor). Heidelberg, Germany.
39. **Scientific Committee III Conference CODINMA.** Elena Aguilar (Scientific Committee). Madrid, Spain.







### 3.5. Awards

1. AECOSAN. Primer Accesit del Premi d'Estratègia NAOS en el àmbit sanitari - XII Premis Estratègia NAOS. May 2019. **Lidia Daimiel Ruiz**.
2. American Society for Nutrition. The Dannon Institute Mentorship Award - Nutrition 2019. June 2019. **Jose María Ordovás Muñoz**.
3. Camilo Jose Cela University. Commencement Address, Class 2019 - Graduation. June 2019. **Jose María Ordovás Muñoz**.
4. Woman in data Science. The W Travel Grant - Woman in Data Science Conference. April 2019. **Teresa Laguna Lobo**.
5. European Society for Paediatric Endocrinology (ESPE). Andrea Prader Award. September 2019. **Jesús Argente**.
6. 13th Congress of the International Society of Nutrigenetics/Nutrigenomics (ISNN). Award of excellence for outstanding work in nutrigenomics/nutrigenetics. July 2019. **Víctor Micó Moreno**.
7. Elife Journal - Life and Biomedical Sciences. Registration Waiver Fellowship Advances in Computational Biology Conference. September 2019. **Laura J Marcos Zambrano**.

### 3.6. Seminars

1. *"Posttranscriptional Regulation of Metabolism"*. **Cristina M. Ramírez Hidalgo**, from IMDEA Food. January 2019.
2. *"From phenotypic screens to the structure of a smallmolecule bound to its target, and the challenges beyond"*. **Sonia Laín**, from Instituto Karolinska. January 2019.
3. *"Microbiome and Cáncer"*. **José Antonio Lopez**, from UFTO. January 2019.
4. *"Desarrollo de nuevos fármacos frente al cáncer infantil"*. **Lucas Moreno**, from Hospital Niño Jesús. January 2019.
5. *"Venoms to Drugs: The therapeutic potentials of spider-peptides against melanoma"*. **Maria Ikonomopoulou**, from IMDEA Food. February 2019.
6. *"Venoms to Drugs: Mapping the antitumoural profile of spider-peptides against melanoma"*. **Maria Ikonomopoulou**, from IMDEA Food. February 2019.
7. *"Respuesta transcripcional a la hipoxia"*. **Luis del Peso**, from UAM. February 2019.
8. *"Venoms to Drugs: Mapping the antitumoural profile of spider-peptides against melanoma"*. **Maria Ikonomopoulou**, from IMDEA Food. March 2019.
9. *"Mining the microproteome to find novel modulators of cancer cell plasticity"*. **María Abad**. From Instituto de Oncología Vall d'Hebron. March 2019.
10. *"The antiproliferative properties of gomesin-peptides against melanoma"*. **Maria Ikonomopoulou**, from IMDEA Food. March 2019.
11. *"Bite Back"*. **Maria Ikonomopoulou**, from IMDEA Food. March 2019.
12. *"Dietary Interventions for Healthy Aging: Where are we now?"*. **Rafael de Cabo**, from IMDEA Food. April 2019.



13. *"Caloric Restriction and Aging: An Update from NIA"*. **Rafael de Cabo**, from IMDEA Food. April 2019.
14. *"Bioinformatics for Cardiovascular Precision Medicine"*. **Fátima Sánchez**, from CNIC. April 2019.
15. *"Estrategias Antienvjecimiento: from bench to bedside"*. **José Alberto Díaz-Ruiz Ruiz**, from IMDEA Food. May 2019.
16. *"Bite Back: Venom-peptides targeting melanoma"*. **Maria Ikonopoulou**, from IMDEA Food. May 2019.
17. *"Metabolic and Immune Reprogramming in Macrophages during Cell Clearance"*. **Noelia Alonso**, from Westfälische Wilhelms-Universität Münster/ Institute of Immunology Röntgenstr. June 2019.
18. *"Molecular perspectives on short-term fasting as a nutritional strategy against aging-related diseases"*. **Pablo J. Fernández Marcos**, from IMDEA Food. June 2019.
19. *"NutrigenomeDB: connecting foods and bioactive molecules with healthy properties for precision nutrition"*. **Roberto Martín**, from IMDEA Food. July 2019.
20. *"Childhood obesity: from clinic to genetics. Treatment with melanocortine agonist"*. **Jesús Argente**, from IMDEA Food. July 2019.
21. *"Ultraprocessed food consumption is associated with total mortality and frailty in Spain"*. **Pilar Guallar**, from IMDEA Food. July 2019
22. *"Conventional and novel weight loss strategies"*. **Alfredo Martínez**, from IMDEA Food. July 2019.
23. *"Development of Precision Nutrition"*. **Viviana Loria**, from IMDEA Food. September 2019.
24. *"Targeting Aging through energy restriction"*. **Alberto Díaz Ruiz**, from IMDEA Food. September 2019.
25. *"Lipid Metabolism Alterations in cancer: Biomarkers for Clinical Prognosis"*. **Lara P. Fernández**, from IMDEA Food. October 2019.
26. *"The UAM Cohorts of older adults a tool to assess the role of diet and physical activity on functional decline"*. **Fernando Rodríguez Artalejo**, from IMDEA Food. October 2019.
27. *"The good, the bad and the ugly: olive oil, palm oil and food industry"*. **Belén Ruiz Roso**, from IMDEA Food. November 2019.
28. *"Modeling microbime personalized treatments under dynamic nutritional perturbations"*. **Beatriz García Jiménez**, from Centro de Biotecnología y Genómica de Plantas (CBGP, UPM-INIA)- Centro Excelencia Severo Ochoa. December 2019.
29. *"Immunonutritional Strategies Shaping Lipid homeostasis and Gut microbiota"*. **Moisés Laparra**, from IMDEA Food. December 2019.



## 4. Technology offer

The Institute has a portfolio of 5 patents, two patents already granted and two applied for in 2018, a new one in Spain and an international extension. Two of them have been transferred to the company CANAAN through the concession of an exclusive license with the right to sublicense, to develop, use and market the international patent PCT/ES2017/070263 and the Spanish priority patent number P201131733, and the company YNSADIET has been licensed two products derived from the invention P201830740. In January 2018, an EBT (technology-based company) was set up, in which IMDEA Alimentación, p4H has a stake, and the creation of another EBT (4CHRONIC) is about to be completed, based on the research results obtained at the Institute.

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**Publication number:** ES24087301B1

**Title:** Supercritical Rosemary extract for cancer treatment

**Owners:** IMDEA Food, Universidad Autónoma de Madrid

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

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**Publication number:** ES2475366B1

**Title:** Methods and kits for prognosis of colorectal cancer

**Owners:** IMDEA Food, Hospital La Paz Institute for Health Research  
**Inventors:** Ana Ramírez de Molina, Guillermo Reglero Rada, Teodoro Vargas Alonso, Susana Molina Arranz, Margarita González-Vallinas Garrachón, Juan Moreno Rubio, Paloma Cejas Guerrero, Jaime Feliú Batlle  
Application number: PCT/ES2017/070263 (Licensed to Canaan)

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**Publication number:** EP3453399

**Title:** Formulations Comprising Lipid Systems Carrying Bioactive Compounds, for Use as Immunotherapy Potentiators Or Adjuvants For Patients With Cancer or Immunological Disorders

**Owners:** IMDEA Food, Universidad Autónoma de Madrid and Hospital Universitario Infanta Sofía. Licensed to Forchronic SL

**Inventors:** Ana Ramírez de Molina, Guillermo Reglero Rada, Carlos Torres Olivares, Luis Vázquez de Frutos, Marta Corzo, Pablo Arranz, Viviana Loria Kohen, Marta Gómez de Cedrón, Juan Moreno Rubio, Moisés Laparra Llopis, Enrique Casado Sáenz

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**Application number:** P201730304

**Title:** Uso de la apolipoproteína A1 como inhibidor de proliferación, migración e invasión celular en cáncer

**Owners:** IMDEA Food

**Inventors:** Cristina Aguirre Portolés, Ana Ramírez de Molina, Guillermo Reglero

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**Application number:** P201830740

**Title:** Composición para la reducción del declive metabólico asociado al envejecimiento y/o el metabolismo lipídico

**Owners:** IMDEA Food, Universidad Autónoma de Madrid, Fundación Hospital Universitario La Paz, Igenfarma

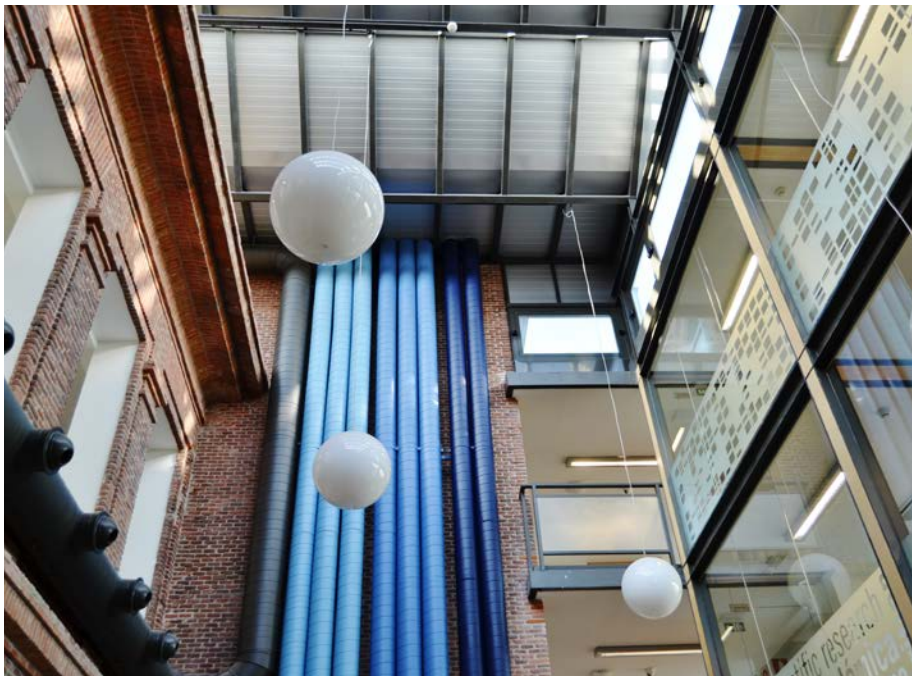
**Inventors:** Maria Taberero, Ana Ramírez de Molina, Carlos Torres Olivares, Enrique de Miguel del Campo, Ignacio Alvarez Gómez de Segura, Carlota Largo Aramburu, Mónica Santamaría Ramiro, Gonzalo Polo Paredes, Daniel Ruíz Pérez

**Spin-off:** Precision ForHealth SL (P4H)

Technological Base Company belonging IMDEA Food Institute and recog-nized by Agreement of the Delegate Committee of the IMDEA Food's Board of Trustees on December 11, 2017, and Knowledge Based Company of the Autonomous University of Madrid, recognized by agreement of the Government Council of the UAM dated on November 17, 2017. Incorporation date January 10, 2018. The capital contribution was 1,000 euros (10%).

P4H is constituted for the industrial and commercial exploitation, of in-novations derived from the IMDEA Food and UAM in the field of precision nutrition, that is to say in the design and application of effective nutritional strategies in the improvement of health, adapted to the genetic profile of people and their lifestyle or physiological situation.

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## 5. Training, Communication and outreach

### 5.1. Theses

1. *“Effect of a caloric restriction based on the Mediterranean diet and intake of traditional Mediterranean foods on the expression of microRNAs regulating molecular processes associated with aging”*.  
Student: Víctor Micó Moreno.  
Advisors: Lidia Daimiel.  
Date of defense: January 2019.
2. *“Lipid metabolism alterations in colorectal cancer: potential clinical relevance in the prognosis of the disease”*.  
Student: Silvia Cruz Gil.  
Advisors: Ana Ramírez de Molina and Ruth Sánchez Martínez.  
Date of defense: January 2019.
3. *“Extracto Supercrítico de Milenrama (Achillea millefollium) como potencial suplemento nutricional en el tratamiento del cáncer de pancreas y alteraciones metabólicas”*.  
Student: Lamia Mouhid Al Achbili.  
Advisors: Ana Ramírez de Molina and Tiziana Fornari Reale.  
Date of defense: February 2019.
4. *“Abordaje molecular y computacional al nexo entre nutrición y cáncer”*.  
Student: Jorge Martínez-Romero.  
Advisors: Ana Ramirez de Molina and Guillermo Reglero Rada.  
Date of defense: November 2019.
5. *“Nutrigenómica: análisis experimental, integrativo y desarrollo de una plataforma de minería de datos”*.  
Student: Roberto Martín Hernández  
Advisors: Alberto Dávalos Herrera and Guillermo Reglero Rada  
Date of defense: December 2019.

### 5.2. Internships /visiting students

1. Student: *Yazmin Beltran*  
Advisor: Moisés Laparra Llopis  
Visiting student from: Autonomous University of Mexico
2. Student: *Masa Sdic*  
Advisor: Moisés Laparra Llopis  
Visiting student from: University of Zagreb
3. Student: *Ivana Ovcina*  
Advisor: Moisés Laparra Llopis  
Visiting student from: University of Zagreb
4. Student: *Azahara García Ramos*  
Advisor: Moisés Laparra Llopis  
Visiting student from: Complutense University of Madrid
5. Student: *Raquel Selma García*  
Advisor: Moisés Laparra Llopis  
Visiting student from: Universitat de Valencia
6. Student: *Daniel Reynaldo Brown Romero*  
Advisor: Moisés Laparra Llopis  
Visiting student from: Autonomous University of Madrid
7. Student: *Nina Padrón Esa*  
Advisor: Moisés Laparra Llopis  
Visiting student from: Complutense University of Madrid
8. Student: *Laura Gonzalez Moreno*  
Advisor: Moisés Laparra Llopis  
Visiting student from: Complutense University of Madrid
9. Student: *Marta Redondo Gutiérrez*  
Advisor: Moisés Laparra Llopis  
Visiting student from: Complutense University of Madrid
10. Student: *Blanca Sainz Fidalgo*  
Advisor: Moisés Laparra Llopis  
Visiting student from: Autonomous University of Madrid





11. **Student:** *Jana Baranda Prellezo*  
**Advisor:** Moisés Laparra Llopis  
**Visiting student from:** Autonomous University of Madrid
12. **Student:** *Luis Zamora Rueda*  
**Advisor:** Lidia Daimiel Ruiz  
**Visiting student from:** Autonomous University of Madrid
13. **Student:** *María Tanarro Gracia*  
**Advisor:** Lidia Daimiel Ruiz  
**Visiting student from:** Autonomous University of Madrid
14. **Student:** *Elena Pulgar Lazanco*  
**Advisor:** Lidia Daimiel Ruiz  
**Visiting student from:** Autonomous University of Madrid
15. **Student:** *Sofía Quirós Viñuales*  
**Advisor:** Lidia Daimiel Ruiz  
**Visiting student from:** CEU San Pablo University
16. **Student:** *Chelsea Vinckier*  
**Advisor:** Lidia Daimiel Ruiz  
**Visiting student from:** CEU San Pablo University
17. **Student:** *Sheila El Halui Mohamed*  
**Advisor:** Lidia Daimiel Ruiz  
**Visiting student from:** University of Granada
18. **Student:** *Cristina Climent Mainar*  
**Advisor:** Lidia Daimiel Ruiz  
**Visiting student from:** University of Balearic Islands.
19. **Student:** *Tomas Liundain*  
**Advisor:** Lidia Daimiel Ruiz  
**Visiting student from:** CEU San Pablo University
20. **Student:** *Tomas Liundain*  
**Advisor:** Lidia Daimiel Ruiz  
**Visiting student from:** University of Cadiz
21. **Student:** *Ana Peropadre Lopez*  
**Advisor:** Lidia Daimiel Ruiz  
**Visiting student from:** Autonomous University of Madrid
22. **Student:** *Dasha Shvaikovskaya*  
**Advisor:** Sara Castillo  
**Visiting student from:** Karolinska Institutet
23. **Student:** *Patricia Triguero Arranz*  
**Advisor:** Guillermo Reglero Rada  
**Visiting student from:** Autonomous University of Madrid
24. **Student:** *Patricia Triguero Arranz*  
**Advisor:** Guillermo Reglero Rada  
**Visiting student from:** Autonomous University of Madrid
25. **Student:** *Sara Garrido Galand*  
**Advisor:** Guillermo Reglero Rada  
**Visiting student from:** Autonomous University of Madrid
26. **Student:** *Beatriz Fernandez Diaz de Entresotos*  
**Advisor:** Guillermo Reglero Rada  
**Visiting student from:** Autonomous University of Madrid
27. **Student:** *Berta Muñoz Albert*  
**Advisor:** Guillermo Reglero Rada  
**Visiting student from:** Autonomous University of Madrid
28. **Student:** *Guillermo Delgado Muro*  
**Advisor:** Guillermo Reglero Rada  
**Visiting student from:** Autonomous University of Madrid
29. **Student:** *Paula Perez Santos*  
**Advisor:** Guillermo Reglero Rada  
**Visiting student from:** Autonomous University of Madrid



30. **Student:** *Marina Camblor Murube*  
**Advisor:** Viviana Loria Kohen  
**Visiting student from:** Master in Nutrición Humana y Dietética Aplicada; UCM
31. **Student:** *Nerea López Guerrero*  
**Advisor:** Viviana Loria Kohen  
**Visiting student from:** Degree in Nutrición Humana y Dietética; UAM
32. **Student:** *Lucy Ysa Sánchez*  
**Advisor:** Viviana Loria Kohen  
**Visiting student from:** Degree in Nutrición Humana y Dietética; UCM
33. **Student:** *Bertrán Juan Nuria*  
**Advisor:** Viviana Loria Kohen  
**Visiting student from:** Degree in Nutrición Humana y Dietética; Universidad Alfonso X El Sabio
34. **Student:** *Zoi- Polytimi Manolakou*  
**Advisor:** Viviana Loria Kohen  
**Visiting student from:** Harokopio University School of Health Science and Education, Department of Nutrition and Dietetics, Greece. Erasmus Fellowship
35. **Student:** *Hafize Hilal Topal*  
**Advisor:** Viviana Loria Kohen  
**Visiting student from:** EIT Food RIS Fellowships project -RIS Talents component. Turkey.

### 5.3. Teaching in masters

1. *“Analysis and interpretation of omic data”* in the Master’s in Bioinformatics Applied to Personalized Medicine and Health. UAM. Teresa Laguna Lobo.
2. *“Precision Nutrition and Chronic Diseases”* in the Master’s in food systems. EIT Food. Enrique Carrillo de Santa Pau, Alberto Dávalos, Mayka, Lidia Daimiel, Rodrigo San Cristobal, María Isabel Espinosa, Susana Molina, Gonzalo Colmenarejo, Elena Alguilar, Ana Ramírez de Molina, Silvia Cruz, Marta Gómez de Cedrón, Moises Laparra, Fernando Rodríguez-Artalejo, Esther López García, Pablo J. Fernández, Alberto Diez, Cristina Ramírez, Teresa Laguna Lobo and Laura J. Marcos.
3. Master’s in Bioinformatics and Computational Biology. UAM. Enrique Carrillo de Santa Pau.
4. Degree in Biotechnology, Biotechnology-+Pharmacy and Master’s in Management of Biotechnology Companies. CEU San Pablo University. Lidia Daimiel.
5. Master in Advanced Therapies. Francisco de Vitoria Univerity. Ana Ramírez de Molina.
6. Master in Molecular Oncology. Centro de Estudios Biosanitarios. Ana Ramírez de Molina.
1. *Specialization in physical exercise and cancer patients.* Autónoma University of Madrid. Ana Ramírez de Molina.



#### 5.4. Outreach

1. *Science and Innovation Fair in Madrid. Madri+d Foundation.* March 2019. Guillermo Reglero, Ana Ramírez, Susana Molina, M<sup>a</sup> Victoria Moreno Arribas.
2. *Guided visit of Rusadir High School (Melilla) 30 students to IMDEA Food.* IMDEA Food. January 2019.
3. *EIT Food Match Making Event 2020. EIT Food.* January 2019. Sara Castillo, Lorena Carrillo, María Jesús Latasa, Ana Ramírez de Molina and María Tabernero.
4. *Participation in the Kick-Off Meeting of #FutureKitchen (EIT Food).* EIT Food. January 2019. Sara Castillo and Lorena Carrillo.
5. *Organization of the Kick-Off Meeting of #AnnualFoodAgenda (EIT Food).* EIT Food. January 2019. Sara Castillo and Lorena Carrillo.
6. *Co-organizing the school workshops "Do you want to know more than your parents when you go shopping?" in the framework of the project The #Annual Food agenda (EIT Food).* IMDEA Food. February 2019. Sara Castillo and Lorena Carrillo.
7. *Participation in the event "The endless story of the truths and lies of food, told by women with a lot of science" organized in CIAL, in the framework of the project The #Annual Food agenda (EIT Food).* CSIC. February 2019. Sara Castillo and Lorena Carrillo.
8. *Organization of the event "Siri, what do I eat today? Ask your genes" during Science and Innovation Fair in Madrid, within the framework of the project The #Annual Food agenda (EIT Food).* IMDEA Food. March 2019. Sara Castillo and Lorena Carrillo.
9. *Participation in the Kick-Off Meeting of WE Lead (EIT Food).* EIT Food. January 2019. Ana Ramírez and María Tabernero.
10. *Participation in the Kick-Off Meeting of IValueFood (EIT Food).* EIT Food. January 2019. María Jesús Latasa.
11. *Participation in the Master's in Food Systems Meeting (EIT Food).* EIT Food. January 2019. María Jesús Latasa.
12. *Hosting of the Kickoff Meeting of the Summer School Activity for the Global Food Venture Programme (EIT Food).* IMDEA Food. February 2019. María Jesús Latasa Sada and Enrique Carrillo.
13. *Participation in the Kick-Off Meeting of the X-KIC Project (EIT Food).* EIT Food. March 2019. María Jesús Latasa.
14. *Participation in the Kick-Off Meeting of MAKE-IT (EIT Food).* EIT Food. January 2019. Ana Ramírez and María Tabernero.
15. *Organization and Coordination of the Summer School Activity for the Global Food Venture Programme (EIT Food).* IMDEA Food. June 2019. Ana Ramírez de Molina, Enrique Carrillo, M<sup>a</sup> Jesús Latasa, Sara Castillo, Lorena Carrillo and Carolina Rodríguez.
16. *Scientific Coordinator of the Master's in Bioinformatics Applied to Personalized Medicine and Health.* February 2019. Enrique Carrillo de Santa Pau.
17. *Organization of the event "Discover personalized nutrition, a new trend in the food of the future" as part of the project The #AnnualFoodAgenda (EIT Food).* IMDEA Food. April 2019. Sara Castillo and Lorena Carrillo.

18. *Organization of the activity with school children "Food and Virtual Reality" in the framework of the #FutureKitchen project (EIT Food).* IMDEA Food. April 2019. Sara Castillo and Lorena Carrillo.
19. *Organization of the activity "Food Trends and Future Consumers" at IFEMA during the event "Tomorrow", in the framework of the project The #AnnualFoodAgenda (EIT Food).* IMDEA Food. June 2019. Sara Castillo, Lorena Carrillo and Carolina Rodríguez.
20. *Organization of the Workshop with Primary School teachers in the framework of the X-KIC Project (EIT Food).* IMDEA Food. June 2019. María Jesús Latasa and Enrique Carrillo.
21. *Participation in the Meeting of the Steering Board of the Master's in Food Systems Project (EIT Food).* IMDEA Food. June 2019. María Jesús Latasa.
22. *Participation in the Presentation Meeting of the Master's in Food Systems Project (EIT Food).* IMDEA Food. May 2019. María Jesús Latasa.
23. *Participation in the Summer Course "Application of "omics" and classical techniques to oncology practice".* UAM. September 2019. Ana Ramírez and Silvia Cruz.
24. *Participation in the GFM.* UAM. 2019. Marta Gómez de Cedrón, Lara Fernández, Silvia Cruz.
25. *Participation in the Researchers' Night.* Madrid+d Foundation. September 2019. Sara Castillo.
26. *Participation in the MAKE-IT Sugar Hackathon (EIT Food).* University of Cambridge. September 2019. Ana Ramírez de Molina.
27. *Escape Room: Food and health in art in the Scientific Summer Camp (UAM).* IMDEA Food. July 2019.
28. *#FutureKitchen: Virtual Reality Experience Session with Nosa Señora De Os Ollos Grandes High School.* IMDEA Food. September 2019.
29. *Reduction of mortality from diet-related diseases and unhealthy lifestyles. #GlobalGoalsJam. Co-creation sessions.* IMDEA Food. September 2019.
30. *Nutri Scape Room in the European Researchers Night of Madrid (Madrid+d Foundation).* IMDEA Food. September 2019.



## 5.5. IMDEA Food in the media

### ABC

Los alimentos hechos con residuos que sí te comerías.

**María Jesús Latasa Sada**

[ABC.es](http://ABC.es)



La UAM lidera un proyecto que busca fórmulas terapéuticas de nutrición contra el cáncer.

**Ana Ramírez de Molina, ONCOGENOM,**

**IMDEA Food**

[COPE](http://COPE)



Día Mundial Contra el Cáncer: Investigación en nutrición.

**Ana Ramírez de Molina, ONCOGENOM,**

**IMDEA Food**

[Revista Alimentaria](http://RevistaAlimentaria)



Agenda de actividades para conmemorar el Día Internacional de la mujer y la Niña en la Ciencia.

**IMDEA Food**

[envillaviciosa de odon.es](http://envillaviciosa de odon.es)

### EL PAÍS

14 cosas que hacían antes nuestros padres y hoy serían impensables.

**María Tabernero**

[El País](http://ElPaís)

### LA CAPITAL

Desmienten que una copa de alcohol al día sea beneficiosa para la salud.

**IMDEA Food**

[lacapital.com](http://lacapital.com)



Una estudio desmonta la teoría de que beber poco alcohol reduce la mortalidad.

**IMDEA Food**

[Eldiario.es](http://Eldiario.es)

### La Voz de Galicia

Beber un poco de alcohol no reduce la mortalidad.

**IMDEA Food**

[Lavozdegalicia.es](http://Lavozdegalicia.es)

### infosalus.com

Beber alcohol moderadamente no tiene ningún beneficio sobre la reducción de la mortalidad.

**IMDEA Food**

[Infosalus.com](http://Infosalus.com)

### Córdoba Buenas Noticias

[www.cordobabuenasnoticias.com](http://www.cordobabuenasnoticias.com)

Una copa de vino o cerveza al día no reduce la mortalidad, como se suele comentar.

**IMDEA Food**

[Cordobabuenasnoticias.com](http://Cordobabuenasnoticias.com)



Un estudio desmonta la teoría de que beber poco alcohol reduce la mortalidad.

**IMDEA Food**

[Deia.eus](http://Deia.eus)

### EL DIARIO VASCO

Desmontan la teoría de que beber pequeñas cantidades de alcohol reduce la mortalidad.

**IMDEA Food**

[Diario Vasco](http://DiarioVasco)

### infosalus.com

La actividad física puede reducir la mortalidad en mayores con fragilidad física y deterioro cognitivo.

**IMDEA Food**

[Infosalus.com](http://Infosalus.com)

### IDEAL

Practicar actividad física podría reducir la mortalidad en personas.

**IMDEA Food**

[Ideal.es](http://Ideal.es)

### IDEAL

Practicar actividad física podría reducir la mortalidad en personas.

**IMDEA Food**

[Ideal.es](http://Ideal.es)



Atenuar mediante ejercicio físico el riesgo de mortalidad en gente anciana, frágil y con deterioro cognitivo.

**IMDEA Food**

[NoticiasdeLaCiencia.com](http://NoticiasdeLaCiencia.com)

### infosalus.com

Investigadores asocian la resistencia a las hormonas tiroideas con la obesidad y la diabetes.

**IMDEA Food**

[Infosalus.com](http://Infosalus.com)





## redacción médica

*Un estudio aragonés vincula el síndrome metabólico, obesidad y diabetes.*

**IMDEA Food**

[Redaccionmedica.com](http://Redaccionmedica.com)



**TeleMadrid**

*La mala alimentación mata.*

**Ana Ramírez de Molina**

[Telemadrid TV](http://Telemadrid TV)

## madriod

*IMDEA Alimentación inspira a las nuevas generaciones a comer de forma saludable y sostenible en la Feria Madrid por la Ciencia y la Innovación.*

**Sara Castillo**

[Madrimasd.org](http://Madrimasd.org)

## iNNOVASPAiN

EL PORTAL LÍDER DE LA INNOVACIÓN EN ESPAÑOL

*Comunidad de Madrid, locomotora de innovación.*

**Ana Ramírez de Molina**

[Innovaspain.com](http://Innovaspain.com)



**madridiario**

*Fundación Ramón Areces: más de cuatro décadas de impulso al talento científico.*

**IMDEA Food**

[Madridiario.es](http://Madridiario.es)



**TeleMadrid**

*¡Bendito veneno!*

**Manuel Fernández Rojo and Maria**

**Ikonomopolou**

[Telemadrid TV](http://Telemadrid TV)

## LA VANGUARDIA

*El café reduce el riesgo de caídas en mayores, según un estudio de la Autónoma.*

**IMDEA Food**

[La Vanguardia](http://La Vanguardia)

## Córdoba Buenas Noticias

[www.cordobabuenasnoticias.com](http://www.cordobabuenasnoticias.com)

*El consumo habitual de café está asociado con un menor riesgo de caídas en adultos mayores.*

**IMDEA Food**

[Cordobabuenasnoticias.com](http://Cordobabuenasnoticias.com)

## AULA MAGNA Desde 1992

*El café ayuda a un menor riesgo de caídas en adultos mayores.*

**IMDEA Food**

[Aulamagna.com.es](http://Aulamagna.com.es)

## NCYT Amazing Noticias de la Ciencia y la Tecnología Divulgando la Ciencia por Internet desde 1997

*Asocian el consumo habitual de café con un menor riesgo de caídas en gente mayor.*

**IMDEA Food**

[NoticiasdelaCiencia.com](http://NoticiasdelaCiencia.com)

## hostelVending

*El consumo habitual de café reduce el riesgo de caídas en personas mayores.*

**IMDEA Food**

[Hostelvending.com](http://Hostelvending.com)

## mdo madridiario

*IMDEA Food: food as an indispensable tool to improve health.*

**IMDEA Food**

[Madrid Diario](http://Madrid Diario)

## mujerhoy

*Anorexia: What It Is and Why It is being produced.*

**Guillermo Reglero**

[Mujer Hoy](http://Mujer Hoy)



**CORDIS**

Resultados de investigaciones de la UE

*Virtual Reality to connect people with new food technology.*

**IMDEA Food**

[Cordis Europa](http://Cordis Europa)

## SCIENCE TRENDS

*Organoids reproduce metabolic alterations of colorectal cancer: a good tool to choose the best drug based on tumor stage.*

**Ana Ramírez de Molina and Silvia Cruz-Gil**

[Science Trends](http://Science Trends)

## LA RAZÓN

*Are there foods with negative calories?*

**Viviana Loria Kohen**

[La Razon](http://La Razon)



**EL ESPAÑOL**

*This is the most unknown benefit of drinking coffee every day.*

**IMDEA Food**

[El Español](http://El Español)

## LA VANGUARDIA

*Do you want to spend the night with science?*

**IMDEA Food**

[La Vanguardia](http://La Vanguardia)



## EcoDiario.es

*The European Researchers Night returns this Friday with more than 60 activities.*

IMDEA Food

[Ecodiario](#)



*IMDEA Alimentación participa en la validación de una nueva diana terapéutica contra la malaria.*

**Gonzalo Colmenarejo**

[ETBC Caracol](#)

## infosalus.com

*IMDEA Alimentación participa en la validación de una nueva diana terapéutica contra la malaria.*

**Gonzalo Colmenarejo**

[Infosalus.com](#)

## redacción médica

*IMDEA Alimentación participa en la validación de una nueva diana terapéutica contra la malaria.*

**Gonzalo Colmenarejo**

[Redacción Médica](#)



*IMDEA Alimentación participa en la validación de una nueva diana terapéutica contra la malaria.*

**Gonzalo Colmenarejo**

[Madrimasd](#)

## salamanca24horas.com

*Los científicos confirman que la dieta mediterránea también es 'realfood'.*

**Jose María Ordovás**

[Salamanca 24h](#)

## ABC

*Evitar los ultraprocesados es posible con la dieta mediterránea.*

**Jose María Ordovás**

[ABC](#)

### Comunidad de Madrid \*\*\*\*

*Avanzamos en el tratamiento y prevención de la malaria.*

**Gonzalo Colmenarejo**

[Community of Madrid website](#)

## LA VANGUARDIA

*Expertos madrileños colaboran en un estudio para tratar y prevenir la malaria.*

**Gonzalo Colmenarejo**

[La Vanguardia](#)



*La Comunidad de Madrid avanza en el tratamiento y prevención de la malaria.*

**Gonzalo Colmenarejo**

[ConSalud](#)

## LA RAZÓN

*Un científico madrileño abre una vía para frenar la malaria.*

**Gonzalo Colmenarejo**

[La Razon](#)



*Madrid participa en una investigación sobre tratamiento y prevención de la malaria.*

**Gonzalo Colmenarejo**

[Acta Sanitaria](#)



Noroeste Madrid

*Avances en el tratamiento y prevención de la malaria*

**Gonzalo Colmenarejo**

[Noroeste Madrid](#)

## La Voz de Galicia

*Un fármaco para el corazón puede retrasar el envejecimiento y mejorar las terapias anticáncer.*

**IMDEA Food**

[La Voz de Galicia](#)



*Grupo Editorial Agrícola clausura el 9º tour 'Conocer la Agricultura y la Ganadería'.*

**IMDEA Food**

[Agronews Castilla y León](#)

### Comunidad de Madrid \*\*\*\*

*Aguado: "Invertir en innovación y en investigación es una prioridad para este Gobierno"*

**IMDEA Food**

[Community of Madrid website.](#)



*Una fórmula con extracto de romero combate el cáncer de colon.*

**Guillermo Reglero**

[NCYT](#)



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