

**ikerbasque**

Basque Foundation for Science

**WE ARE  
CURIOUS**



**EUSKO JAURLARITZA**  
**GOBIERNO VASCO**

HEZKUNTZA SAILA  
DEPARTAMENTO DE EDUCACIÓN





Annual Report

# WE ARE CURIOUS

2022

# ikerbasque

In 2007, The Basque Government created Ikerbasque to reinforce the Basque scientific system through the attraction, recovery and retention of researchers from all around the world.

The Basque Foundation for Science is a consolidated organization with 345 researchers from 35 different countries, from all fields of knowledge and with a firm commitment to the hiring of female researchers, as well as to promoting the return of Basque researchers who are currently working outside of the Basque Country.

For all of this, Ikerbasque provides a comprehensive offer that has long term stability, covering the different stages of the researcher's career. Our researchers develop their work in the different universities and research centers of the Basque Country. This is all thanks to our allies, those who make it possible for us to achieve our goals and who allow us to see ourselves as an organization unrestricted by our physical boundaries.

Since Ikerbasque's creation, we have sought to be a stable yet motivating platform from which scientists and scientific institutions in the Basque Country can continue asking themselves new questions and contributing to the challenge of generating new knowledge.



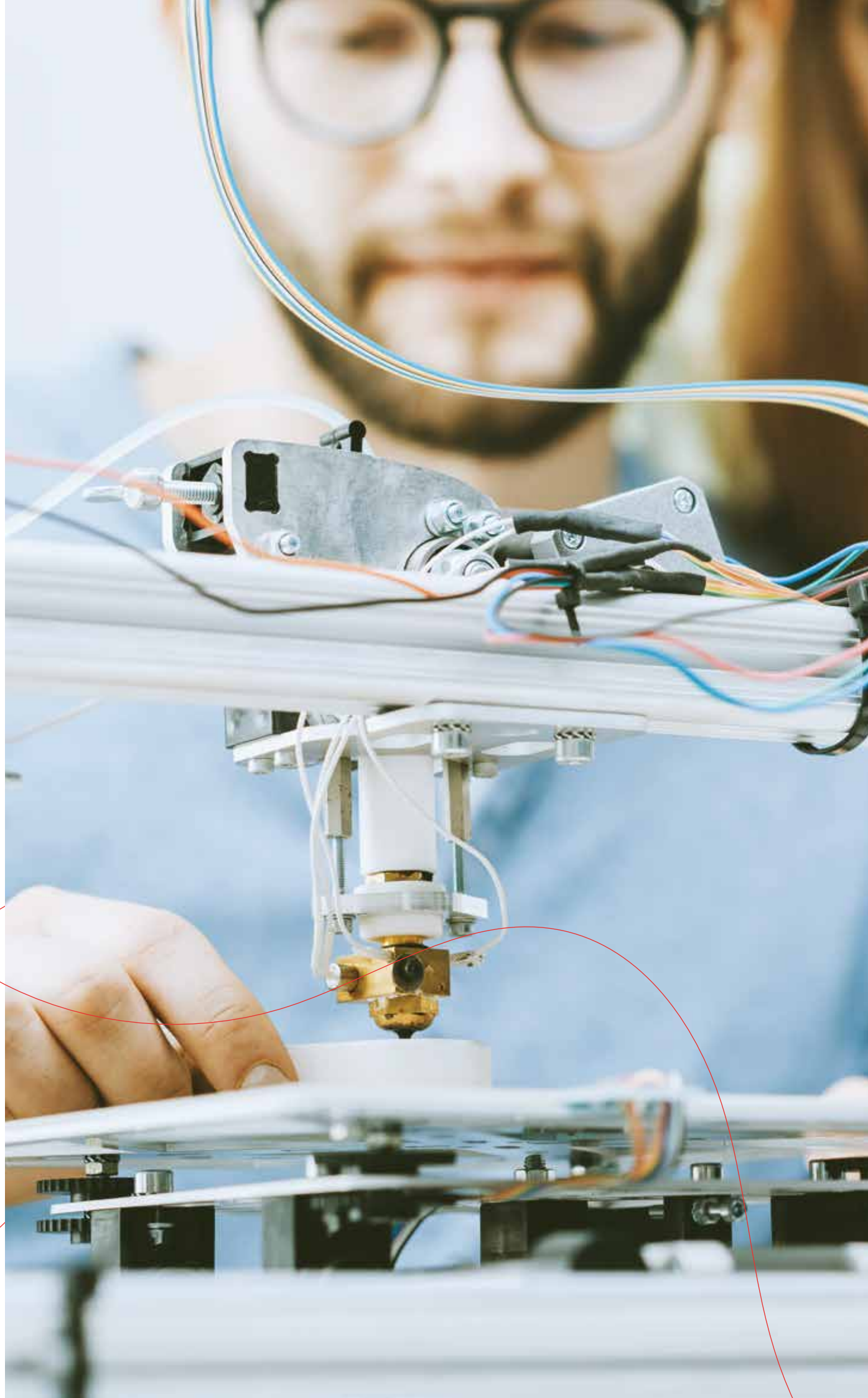
An ability to reason, persistence, critical spirit and open-mindedness are essential attitudes for a researcher, but if we had to choose one of them, that would be curiosity.

Curiosity moves us to explain the world in which we live. Being curious is having the strength of thinking and asking questions. Curiosity makes us want to understand the things, not just know about them.

And curiosity has brought us here. This Report is the answer to the intellectual challenge of understanding things. It is the answer to curiosity.

**WE ARE CURIOUS**





# The Twelve challenges for 2024

**1.**  
Basque Country to reach  
**9,000 annual scientific**  
publications.

**12.**  
Ikerbasque researches  
to lead, **1,500 people in**  
their research groups.

**2.**  
**60% of scientific**  
productions publications  
to be carried out  
with **international**  
collaboration.

**11.**  
Ikerbasque  
researchers to  
develop **20 ERCs**.

**3.**  
A **third** of Basque  
Country's publication to  
appear in the **top 10%**  
of **maximum impact**  
journals (D1).

**10.**  
Ikerbasque to  
archive a return  
of **150 million**  
euros.

**4.**  
**BERCs** to publish  
**1,700 scientific**  
articles, **18%** of  
the Basque total.

**9.**  
50% of Ikerbasque  
publications in 2024 to  
appear in the **top 10%**  
of **maximum impact**  
journals (D1).

**5.**  
Ikerbasque to  
hire **100 new**  
researchers.

**8.**  
Ikerbasque researchers  
to publish more than  
**1,600 scientific**  
articles in 2024.

**6.**  
Ikerbasque  
to recruit **30**  
Basque fellows.

**7.**  
**More than 40%** of new  
research staff recruited  
by ikerbasque in 2024  
to be **women**.



# New Incomers



**Guillermo Abascal**  
UPV/EHU  
Molecular architecture of multi-subunit complexes involved in DNA/RNA-associated functions.



**Amaia Arranz**  
UPV/EHU  
Archaeobotany, Prehistory, Archaeology: study of human-environment interactions.



**Andrei Bernevig**  
DIPC  
Discovering the nature of quantum matter.



**Nerea Casado**  
POLYMAT  
Polymeric mixed ionic-electronic conductors for bioelectronics and energy storage.



**Tobias Grass**  
DIPC  
Theory of controllable quantum matter, quantum simulation, quantum optics.



**Arantxa Acera**  
UPV/EHU  
Lipidomics and proteomics in tear samples.



**Mariana Astiz**  
ACHUCARRO  
Circadian physiology of neurons and glia, perinatal development.



**Federico Calle-Vallejo**  
UPV/EHU  
Computational electrocatalysis.



**Juan Collar**  
DIPC  
Neutrino and dark matter physics.



**Tamas Horvath**  
ACHUCARRO  
The signaling flow and regulatory relationship within and between brain cells and peripheral organs.



**Miguel Aguilera**  
BCAM  
Nonequilibrium neural computation, Information thermodynamics.



**Anna Barbuscia**  
UPV/EHU  
Family demography and fertility.



**Marité Cárdenas**  
Biofisika Institutua  
Membrane Biophysics and Biocolloids.



**Agustín del Prado**  
BC3  
Climate change and agriculture. Terrestrial Ecosystems.



**Tania Huedo-Medina**  
UPV/EHU  
Statistical models of health behavior determinants.



**Ion Andreu**  
Biofisika Institutua  
Cell and tissue mechanobiology.



**Nora Bengoa**  
ACHUCARRO  
Aggregation and inflammation in neurodegenerative diseases.



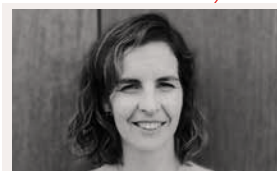
**Susana Carregal Romero**  
CIC biomaGUNE  
Multifunctional and bioinspired materials for biomedicine and biotechnology.



**Sabine Frerichs**  
IISL-IISJ  
Sociology of law; interactions of law, economy, and society.



**Ivan Infante**  
BCMATERIALS  
Computational and predictive nanochemistry. Energy conversion.



**Oihana Iriondo**  
CIC bioGUNE  
Molecular determinants of prostate cancer persister cells.



**Anne Lonjou**  
UPV/EHU  
Birational geometry and geometric group theory.



**Marta Olazabal**  
BC3  
Urban climate governance.



**Rosario Sánchez-Pernaute**  
Biocruces Bizkaia  
Advanced Therapies for Neurodegenerative disorders.



**Stepan Tsirkin**  
MPC - CFM  
Berry-phase effects on transport properties of solids.



**Marie Lallier**  
BCBL  
Language acquisition & Developmental Dyslexia.



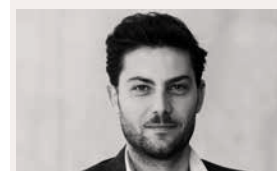
**Pablo Manzano**  
BC3  
Transdisciplinary research in sustainability of livestock-based socioecosystems.



**Dennis Ott**  
UPV/EHU  
Formal syntax and pragmatics.



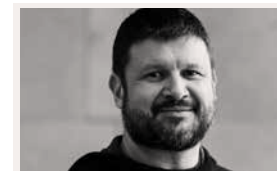
**Denis Scaini**  
UPV/EHU  
Nanotechnology applied to neuroscience and artificial 3D neuronal cell assemblies.



**Luca Unione**  
CIC bioGUNE  
Molecular recognition in Host/Pathogen interactions.



**Ester Verde**  
MPC - CFM  
Design and synthesis of smart single chain nanoparticles.



**Garikoitz Lerma-Usabiaga**  
BCBL  
Neural basis of vision and reading.



**Beatriz Martín**  
CIC nanoGUNE  
Development and spectroscopy study of low-dimensional materials.



**Paramaconi Rodríguez**  
CIC energiGIGUNE  
Electrocatalysis for energy applications and environmental remediation.



**Thomas C. Scott-Phillips**  
UPV/EHU  
Cognitive pragmatics; Evolution of language & culture.



**Iñigo Urteaga**  
BCAM  
Methodological and applied aspects of probabilistic machine learning.



**Timothy Long**  
POLYMAT  
Sustainable macromolecular materials and manufacturing.



**Karolina Milowska**  
CIC nanoGUNE  
Atomistic simulations of low-dimensional systems for sustainable energy generation.



**Edurne Rujas**  
UPV/EHU  
Antibody engineering for therapeutic purposes.



**Beatriz Trastoy**  
Biocruces Bizkaia  
Structural Glycoimmunology.

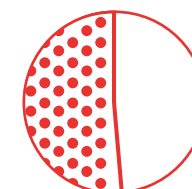


**Luis Varela**  
ACHUCARRO  
Role of hypothalamic astrocytes in the regulation of energy balance.

# 345 Researchers



## 178 Research Professors



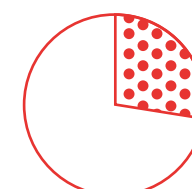
Senior independent researchers in all areas of knowledge with extensive research experience and leadership skills. They are assigned permanently to Basque universities and research centers.

## 73 Research Associates



Researchers with an established scientific career in all areas of knowledge. They have demonstrated maturity, intellectual independence and leadership ability. Ikerbasque offers them permanent research positions.

## 94 Research Fellows

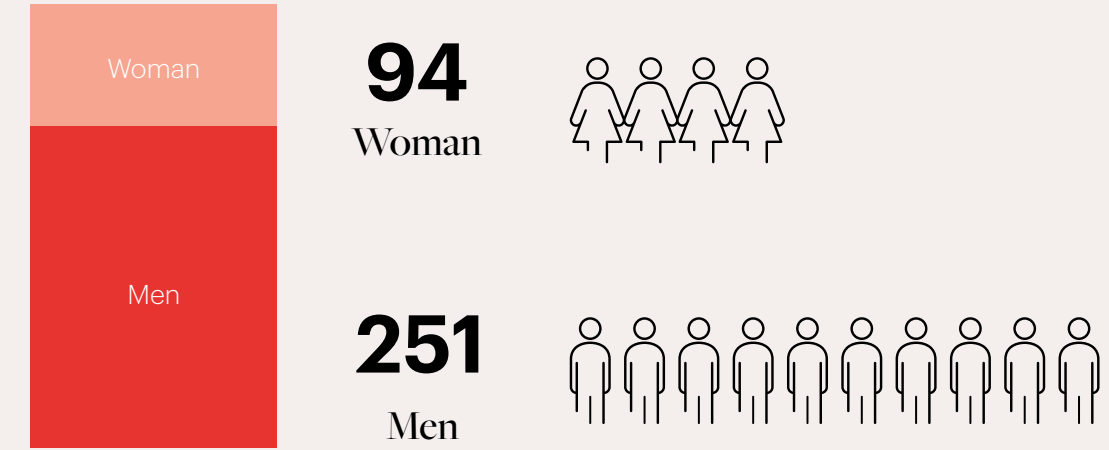


Young researchers with a promising scientific career and international experience. Ikerbasque offers them a 5-year research position with the aim of establishing a track towards an independent research career.



# Reserchers Profile

## Distribution by sex.



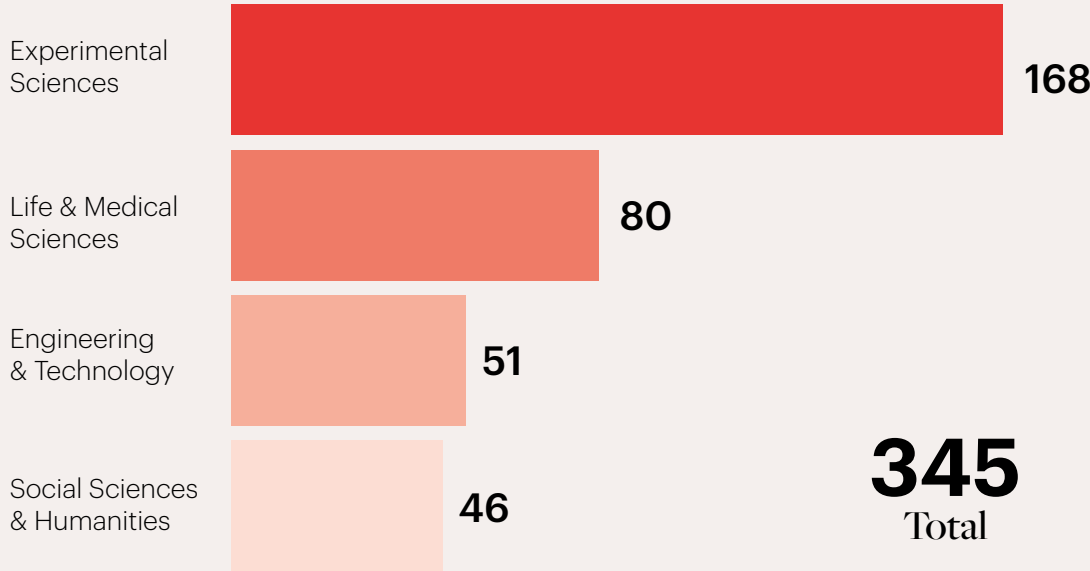
## Nationality of Researchers.

**35**  
Nationalities

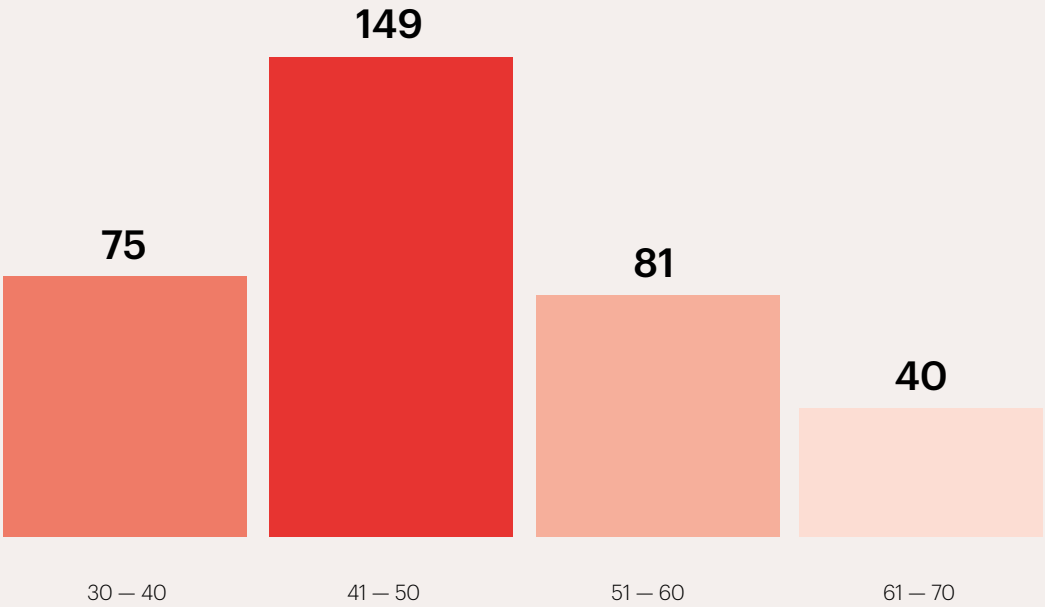
- |           |                |             |                |
|-----------|----------------|-------------|----------------|
| Australia | Czech Republic | Italy       | South Korea    |
| Austria   | Denmark        | Macedonia   | Spain          |
| Belgium   | France         | Mexico      | Sweden         |
| Brazil    | Germany        | Netherlands | Switzerland    |
| Canada    | Greece         | Pakistan    | Turkey         |
| Chile     | Hungary        | Poland      | Ukraine        |
| China     | India          | Portugal    | United Kingdom |
| Colombia  | Ireland        | Romania     | United States  |
| Croatia   | Israel         | Russia      |                |



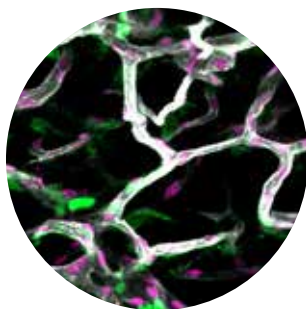
## Distribution by knowledge field.



## Distribution by age.



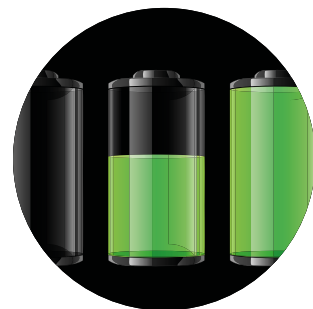
# Relevant Publications



## A study identifies obesity-regulating molecular communication guided by blood vessels.

The abundance and function of blood vessels in adipose tissue determines the development of obesity. This is the surprising conclusion drawn from a study co-led by **Arkaitz Carracedo**, Ikerbasque researcher at CIC bioGUNE. Years of research have led to the conclusion that blood vessels use a communication language based on small molecules, known as metabolites, to instruct adipose tissue. The adipocytes, in response to the message from the blood vessels, release fats, which the vessels take up as food to proliferate. This study sheds light on the importance of blood vessels in regulating health and disease in our bodies.

→ The study was published in the journal *NATURE METABOLISM*.



## Enhancing Battery Performance.

**Nagore Ortiz-Vitoriano**, Ikerbasque researcher at CIC energiGUNE, has investigated the use of two electrolyte additives in order to promote the stabilization of the discharge products in Na-O<sub>2</sub> batteries. These batteries, unlike Li-ion which rely on intercalation of Li<sup>+</sup> between the two electrodes, are based on conversion reactions. This means that during discharge sodium oxides are formed on the surface of the cathode or in the electrolyte which precipitate afterwards on the cathode. This process, the so called oxygen reduction reaction, determines the size and distribution of the products and in this study they have demonstrated the use of Cs cation as a great additive for Na-O<sub>2</sub> batteries with enhanced stability and longer cycle life.

→ The study was published in *ADVANCED ENERGY MATERIALS*.



## Pedagogical translanguaging.

A study co-led by **Durk Gorter**, Ikerbasque researcher at UPV/EHU has explored the identification of cognates (words with the same linguistic origin) in three languages in relation to language background and metalinguistic awareness. This new approach aims at improving language by using resources from the learner's whole linguistic repertoire. The results among primary school students indicate that linguistic characteristics of cognates are important, but having Basque or Spanish as a first language is not. Teaching cognates creates greater awareness and using all languages in the students' repertoire provides more opportunities for language learning.

→ The study was published in the *International Journal of BILINGUAL EDUCATION AND BILINGUALISM*.



## Advances in celiac disease based on RNA modifications.

Celiac disease is an autoimmune disorder affecting the intestine that develops in response to dietary gluten in individuals with genetic predisposition.

**Ainara Castellanos**, Ikerbasque researcher at UPV/EHU, has led an study in which they have shown for the first time that gluten has the ability to alter RNA modifications. Additionally, they have described the implication of a genetic variant associated to celiac disease in the development of the intestinal inflammation characteristic of this disease. The results provide novel information about the development of inflammation and open the door to the development of novel therapeutic interventions for celiac disease based on RNA modifications.

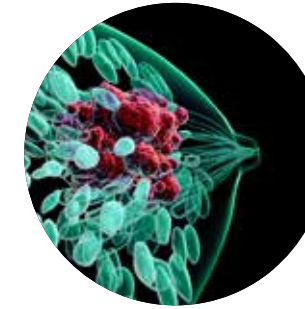
→ The study was published in *GUT*.



## A supernova in distant space allows us to understand the origin of the elements of the universe.

A supernova is a stellar explosion, which occurs when the lives of some really massive stars come to an end. An international team with the participation of **Tom Broadhurst**, Ikerbasque researcher at UPV/EHU and Associate of the Donostia International Physics Center (DIPC), has obtained three images, each in a different colour, of the same supernova in the distant universe, thanks to the magnifying power of a galaxy located in the foreground. The discovery was made possible by images captured by the Hubble Space Telescope.

→ The results of the research were published in the prestigious journal *NATURE*.



## New mechanism that explains how the different cells within breast tumors communicate with each other.

**Maria Caffarel**, Ikerbasque researcher at Biodonostia, and her group have showed for the first time that the proinflammatory cytokine Oncostatin M (OSM) favors breast cancer progression and metastasis, acting as a messenger between different populations of the tumor microenvironment. According to the results of the research, tumors with high levels of OSM are associated with a worse prognosis in patients, opening a new possible treatment strategy based on inhibiting OSM in breast cancer tumors. This finding may lead to the development of new therapeutic strategies for breast cancer.

→ The article was published in the *Journal of CLINICAL INVESTIGATION*.



# Relevant Data



**€+40 Million**

Return on investment.

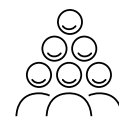
Total funds that Ikerbasque researchers obtained from competitive calls in 2022.



**1,437**

Articles.

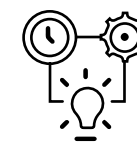
Published by Ikerbasque researchers in indexed publications.



**1,593**

People.

Working in research groups led by Ikerbasque



**1,058**

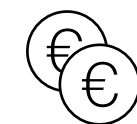
Projects.

With external funding in which Ikerbasque researchers participate.



**345**

Researchers.



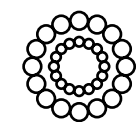
**€22 Million**

Annual Budget.



**88**

PhD theses mentored in 2022.



**20**

ERC.

Led by Ikerbasque researchers in 2022. The ERC (European Research Council) is the main European organization that promotes research projects based on scientific excellence.

# Accumulated Data

**€335 Million**

Return on investment since 2007.



**+12,000**

Articles published by Ikerbasque researchers  
in indexed publications.



**+335,000**

Citations.



**35 spin-off**

Created by Ikerbasque researchers.



**41 ERC**

Obtained by Ikerbasque researchers.



**197**

H-index.



# Host Centers

Ikerbasque researchers have joined the following centers in the Basque Country.

**Achucarro**

Basque center for neurosciences.

**Azti**

Marine and food innovation.

**BC3**

Basque centre for climate change.

**BCAM**

Basque center for applied mathematics.

**BCBL**

Basque center on cognition brain and language.

**BCMaterials**

Basque center for materials, applications & nanostructures.

**Biocruces Bizkaia**

Health Research Institute.

**Biodonostia**

Health Research Institute.

**Biofisika Institutua**

Basque centre for biophysics.

**CIC energiGUNE**

Energy cooperative research center.

**CIC bioGUNE**

Center for cooperative research in biosciences.

**CIC biomaGUNE**

Center for cooperative research in biomaterials.

**CIC nanoGUNE**

Nanoscience cooperative research center.

**CFM-MPC**

Materials physics center.

**Deusto**

University of Deusto.

**DIPC**

Donostia international physics center.

**Globernance**

Institute for democratic governance.

**IISL/IISJ**

Law&Society: Socio-legal studies.

**Neiker**

Basque Institute for Agricultural Research and Development.

**Polymat**

Basque center for macromolecular design and engineering.

**Tecnalia**

Technology corporation.

**Tecnun**

University of Navarra.

**Mondragon**

Unibertsitatea University of Mondragon.

**UPV/EHU**

University of the Basque Country.



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