

Scientific Report 2018



Institut de Recerca
CONTRA LA LEUCÈMIA
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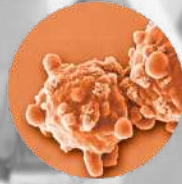
“After three decades of work we face a new challenge. We have to improve patients' quality of life, but above all we must find a definitive cure for leukaemia.

So, in 2010 the Josep Carreras Foundation, together with the Generalitat de Catalunya (Government of Catalonia), launched an historic and unprecedented project: the first European research centre devoted exclusively to leukaemia and other malignant blood diseases, and one of the few that exist in the world. On 2018, we have three campuses and a building devoted to this aim.”

Josep Carreras

President of the Board of Trustees
Josep Carreras Leukaemia Research Institute
(IJC)

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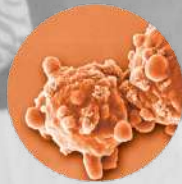
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About us





Welcome

Our teamwork makes us unstoppable against leukaemia!

Behind research there are not only researchers. Patients, clinical and citizen communities, hospitals, research centres, patrons and a great organization as the Josep Carreras Foundation make research happen and evolve.

2018 has been a year of colossal achievements for our institute that we couldn't even dream when we gave the first steps financing three research fellowships, as our main contribution to leukaemia research more than fifteen years ago. From then on, we have built a networked institute, with research groups related to three campuses that connect a multidisciplinary and enriched workforce from hospitals and universities. This year, we have expanded our facilities, with the opening of the new building in Badalona, made possible by funding from the Josep Carreras Foundation.



One of the most relevant steps forward has been the election of one of the most relevant world class researchers, Manel Esteller, as the General Director of our Institute, that will join our institution on 2019.

On the other hand, we look forward to grow up a management structure, with new units that ease the researchers job.

It is our pleasure to invite you to read more from the following pages about the achievements in 2018, which have earned this centre a leading position in biomedical research to confront leukaemia.

Evarist Feliu
President of the Delegate Committee of the Josep Carreras Leukaemia Research Institute

Who we are

Three campuses united to win the battle against leukaemia and other malignant blood diseases



The Josep Carreras Leukaemia Research Institute (IJC), a Generalitat de Catalunya Research Centre (CERCA), was established with the aim of promoting biomedical research into, and the development of, personalised medicine in the field of malignant blood diseases, especially leukaemia. It is a centre without precedent which, with the work and dedication of researchers from around the world, uses the most innovative technologies to try to vanquish leukaemia and other malignant blood diseases.

The IJC has three independent and coordinated scientific campuses: the Hospital Clínic-UB Campus, located at the research facilities of Barcelona's Hospital Clínic, and those of the University of Barcelona (UB) Faculty of Medicine, coordinated by Dr. Álvaro Urbano Ispizua, under the research direction of Dr. Pablo Menéndez; the Catalan Institute of Oncology/Germans Trias i Pujol Campus in Badalona, located near the Germans Trias i Pujol University Hospital and its research foundation and the Autonomous University of Barcelona (UAB) Germans Trias i Pujol Teaching Unit. The ICO-Germans Trias i Pujol Campus is coordinated by Dr. Evarist Feliu and the Research Director is Dr. Francesc Solé. The third campus is the Sant Pau Campus and its research foundation, located within the health care facilities of the Hospital de la Santa Creu i Sant Pau and the UAB's Sant Pau teaching unit, coordinated by Dr. Jordi Sierra.

The IJC's Hospital Clínic-UB Campus reaffirms the UB Faculty of Medicine and the Hospital Clínic's scientific commitment to excellence in the field of hematology, which commenced with the work of Prof. Farreras Valentí and which has been able to continue thanks to the extraordinary work carried out by Prof. Ciril Rozman and those who studied under him.



Mission

It is the mission of the Josep Carreras Leukaemia Research Institute to carry out research into the epidemiological, preventive, clinical, translational and basic aspects of leukaemia and other malignant blood diseases through innovation, in order to find a cure.

Vision

The Josep Carreras Leukaemia Research Institute's vision is to be a world-renowned, multi-campus research centre of excellence that contributes towards improved outcomes and a cure for patients suffering from leukaemia and other malignant blood diseases through innovation, sustainability, social responsibility, talent and professional expertise.

Values

Altruism, in accordance with the Foundation's principles.

Proximity, patient-orientated.

Staff commitment and correlation.

Mutual respect.

Corporate alignment of the 3 campuses and the Foundation.

Participative scientific leadership.

Continuing cooperation and the forging of alliances with stakeholders.

The integration of research and health care.

Continuous improvement and perseverance as a way of working.

Conceptual, methodological and technological innovation.

Management dynamics that respect the environment.

Efficacy and efficiency in the optimisation of resources

Transparency, integration with the fabric of society.

Continuous evaluation and accountability.



Challenges



01 TO DISCOVER THE CAUSES OF LEUKAEMIA AND OTHER MALIGNANT BLOOD DISEASES



02 TO ACHIEVE A CURE, NOT A CHRONIC CONDITION



03 TO REDUCE THE SIDE EFFECTS OF SOME TREATMENTS



04 TO CLASSIFY THE DISEASES INTO THEIR DIFFERENT SUB-TYPES



05 TO KNOW TO WHAT EXTENT WE HAVE ERADICATED THE DISEASE



06 TO GET THERE IN TIME



07 TO FIND THE RIGHT MEDICATION FOR EACH PATIENT



08 TO BETTER UNDERSTAND THE USUAL COMPLICATIONS

Aims

1

To understand the origin and development of leukaemia and other malignant blood diseases

2

To identify new therapeutic targets and to apply treatments that are increasingly more precise and less aggressive

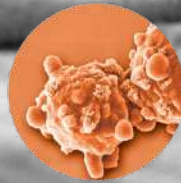
3

To contribute to finding a cure for these diseases in 100% of cases





Our team



Governing Bodies

The highest governing body is the Board of Trustees, on which are represented: the Josep Carreras Foundation, the Catalan Government Ministry of Business and Knowledge, the Catalan Government Ministry of Health, the Autonomous University of Barcelona (UAB), the University of Barcelona (UB), Badalona Town Council, the Directorate General for Health Research and Planning, the Catalan Institute of Oncology, the Northern Metropolitan Territorial Area Administration, the Catalan Foundation for Research and Innovation, the Hospital Clínic/August Pi i Sunyer Institute for Biomedical Research (Idibaps), the UB Hospital Coordination Committee and the Research Centres of Catalonia Institution Foundation (iCERCA).

Board of Trustees

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President of the Josep Carreras Foundation and the Josep Carreras Leukaemia Research Institute

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Catalan Government Minister of Business and Knowledge

Second Vice-president

Catalan Government Minister of Health

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Director General for Health Research and Planning

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Director General Catalan Institute of Oncology

Administrator Northern Metropolitan Territorial Area

Secretary for Universities and Research, Catalan Government Ministry of Business and Knowledge

Director Catalan Foundation for Research and Innovation

Research Director Hospital Clínic - IDIBAPS

Treasurer of the Josep Carreras Leukaemia Foundation

Former Vice-president of the Josep Carreras Leukaemia Foundation

Vice-president of the Josep Carreras Leukaemia Foundation

Administrator of the Josep Carreras Leukaemia Foundation

Vice-rector for Research and Transferability, Autonomous University of Barcelona (UAB)

University of Barcelona Hospital Coordination Committee

Secretary

Director of the Research Centres of Catalonia Institution Foundation (iCERCA)



Delegate Committee

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Prof. Evarist Feliu,
Coordinator of the ICO-Germans Trias i Pujol
Campus

Members

Director General for Research, Catalan
Government Ministry of Business and Knowledge

Director general for health research and innovation

Director of the Catalan Health Service

Director of the Catalan Research Service

Director iCerca, CERCA Institution, Research
Centres of Catalonia

Administrator, Josep Carreras International
Foundation

University of Barcelona Hospital Coordination
Committee Chairman

Vice-rector for Strategic Projects and Planning,
Autonomous University of Barcelona

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Prof. Lucio Luzzatto, Nigerian Haematology
Association

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Center Boston

Prof. Francesco Lococo, Università degli Studi di Roma
"Tor Vergata"

Prof. Alberto Orfao, CIC Centro de Investigación del
Cáncer Salamanca.

Prof. Brigitte Schlegelberger, University of Hannover

Internal Scientific Committee

UB-Clínic Campus

Álvaro Urbano Ispizúa (Internal Scientific
Committee Coordinator)

Pablo Menéndez (Campus Research Director)

Jordi Esteve Reyner

Armando López Guillermo

Joan Bladé Creixentí

Francisco Cervantes Requena

ICO-GTiP Campus

Evarist Feliu Frasnado (President of the Delegate
Committee)

Francesc Solé (Campus Research Director)

Josep M^a Ribera Santasusana

Lurdes Zamora Plana

José Tomás Navarro Ferrando

Juan Manuel Sancho Cía

Sant Pau Campus

Jordi Sierra

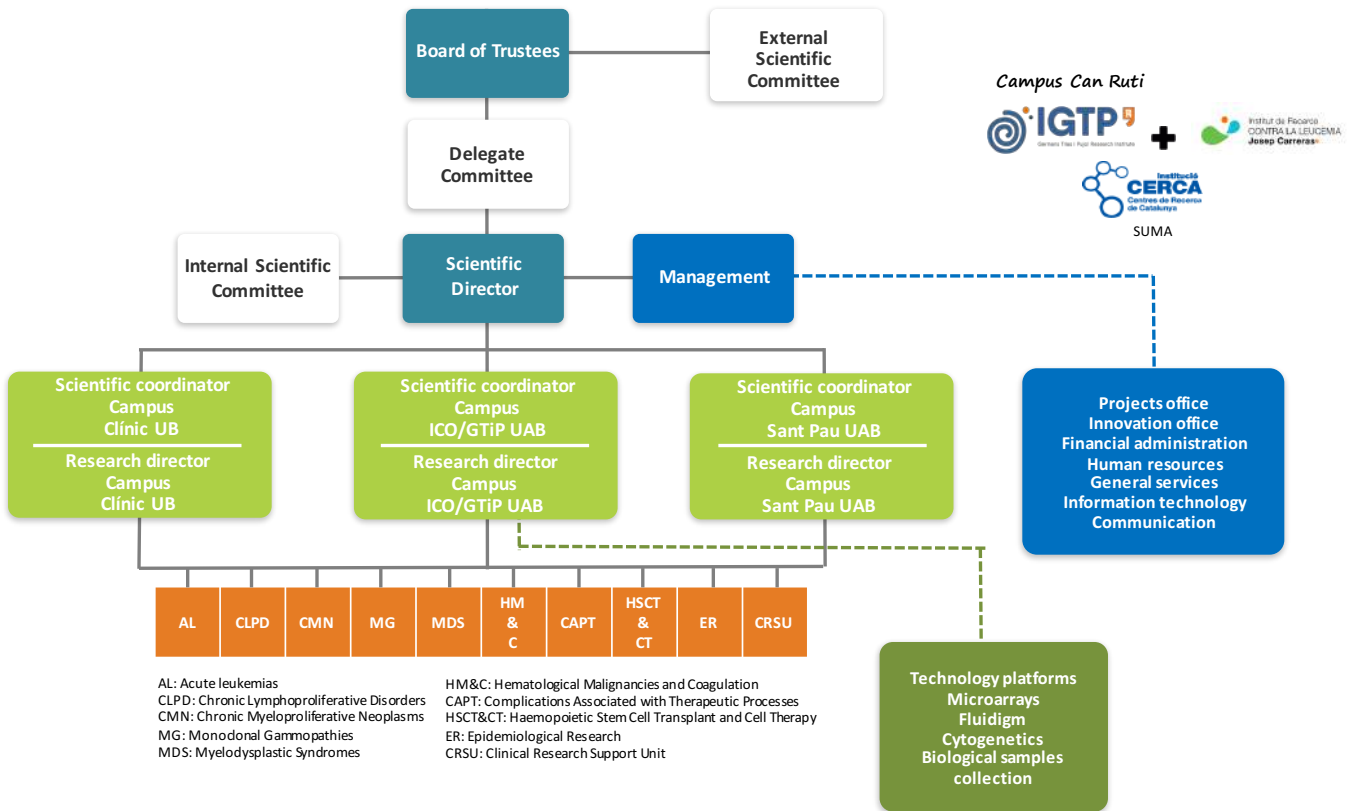
Josep Nomdedeu

Joan Carles Souto

Ramon Mangues

Carol Moreno

Organisational chart



Scientific Directors



Dr Evarist Feliu
President of the Delegate Committee
Josep Carreras Leukaemia Research
Institute (IIC)



Dr Jordi Esteve
Scientific coordinator
Campus
Clínic UB



Dr Josep Maria Ribera
Scientific coordinator
Campus
ICO/GTIP UAB



Dr Jordi Sierra
Scientific coordinator
Campus
Sant Pau UAB



Dr Pablo Menéndez
Research director
Campus
Clínic UB



Dr Francesc Solé
Research director
Campus
ICO/GTIP UAB



Research director
Campus
Sant Pau UAB

Group Leaders

Acute Lymphoblastic Leukaemia (ALL), Josep María Ribera
Barcelona Endothelium Team (BET), Enric Carreras
Chromatin, Metabolism and Cell Fate (CMCF), Marcus Buschbeck
Endocrine Regulatory Genomics (ERG), Lorenzo Pasquali
Functional Cytomics (FC), Jordi Petriz
Genetics and Epigenetics in Myeloid Neoplasms (GEMN), Lurdes Zamora and Blanca Xicoy
Immunohematology and Glycobiology (IG), Fumiichiro Yamamoto
Iron Metabolism: Regulation and Diseases (IMRD), Mayka Sanchez
Leukaemia Stem Cell Group (LSCG), Ruth Muñoz Risueño
Lymphoid Neoplasms (LN), J Tomás Navarro and J Manuel Sancho
Multiple Myeloma Group (MMG), Albert Oriol and Joan Bladé
Myelodysplastic Syndromes (MS), Francesc Solé
Regulatory Genomics (RG), Tanya Vavouri
Stem Cells, Mesenchymal Cancer and Development (SCMCD), Pablo Menéndez
Hematopoietic Stem Cell Transplantation (HSCT), Álvaro Urbano
Red Blood Cell Defects and Hematopoietic Disorders Research Group (RBCDHD), Joan Lluís Vives
3D Chromatin Organization (3DCO), Biola M Javierre
Acute Myeloid Leukaemia (AML), Jordi Sierra
Oncogenesis and Antitumor Drug Group (OADG), Ramón Mangues
CART's Cell Therapy (CCT), Javier Briones and Álvaro Urbano

Human Resources

IJC Germans Trias ICO-UAB



Linked with hospital

Batlle, Montse. Post doc
Cabezón, Marta. Post doc
Cisneros, Adela. Pre doc
Feliu, Evarist. Director
Ferra, Christelle. LR
Granada, Isabel. Post doc
Grau, Javier. Post doc
Junca, Jordi. Post doc
Marce, Silvia. Post doc
Milla, Fuensanta. Post doc
Navarro, Tomàs. LR
Oriol, Albert. LR
Ribera, Josep Maria. LR
Rodríguez, Inés. Pre doc
Ruiz, Neus. Pre doc
Sancho, Juanma. LR
Vives, Susana. Pre doc
Xandri, Marisol. Pre doc
Xicoy, Blanca. LR
Zamora, Lurdes. LR

IJC Clínic-UB



Linked with hospital

Blade, Joan. LR
Esteve, Jordi. LR
Larrea, Carlos. Post doc
Urbano, Alvaro. Director

IJC Sant Pau

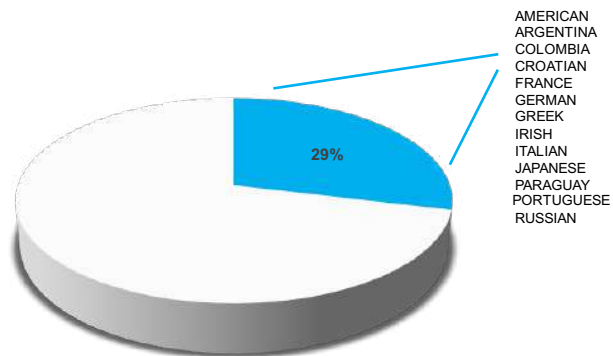
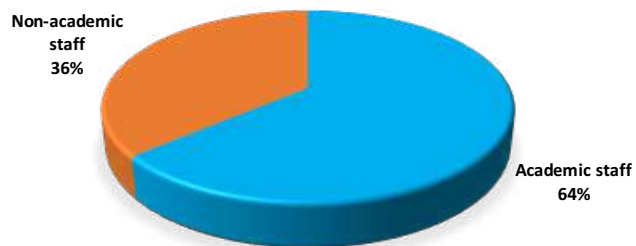


Linked with hospital

Barata, Ana. Post doc
Briones, Javier. LR
Mangues, Ramon. LR
Moreno, Carol. LR
Nomdedeu, Josep. LR
Pratcorona, Marta. Post doc
Sierra, Jordi. Director

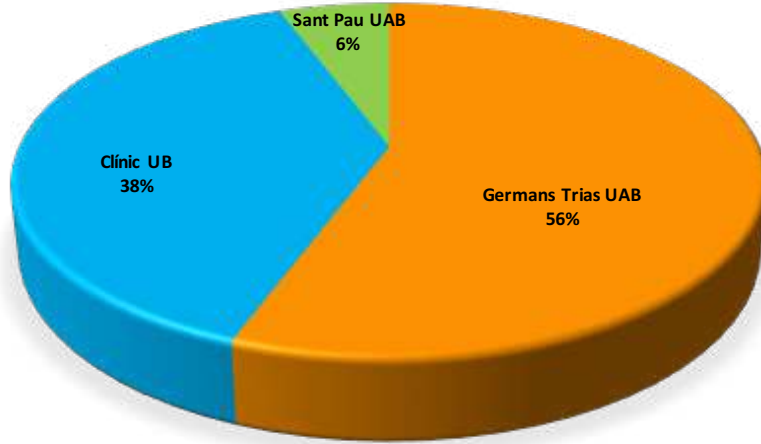
Human Resources*

187 80 Contracted IJC
 90 Shared Staff IGTP / collaborators
 17 Group Leaders ascribed

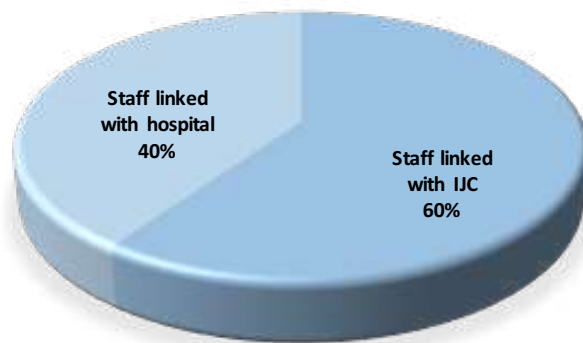


*Data updated in December 2022 due to improvements in institutional databases.



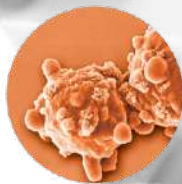


At the three hospitals where the IJC has a presence there has always been a great willingness to participate in clinical research. And there are clinics with a very considerable background in basic sciences. Integration, in this respect, must therefore not be just a question of maintaining present levels, but of increasing them in order to enhance the added value it represents in both the health sciences and in clinical practice.





Scientific activity



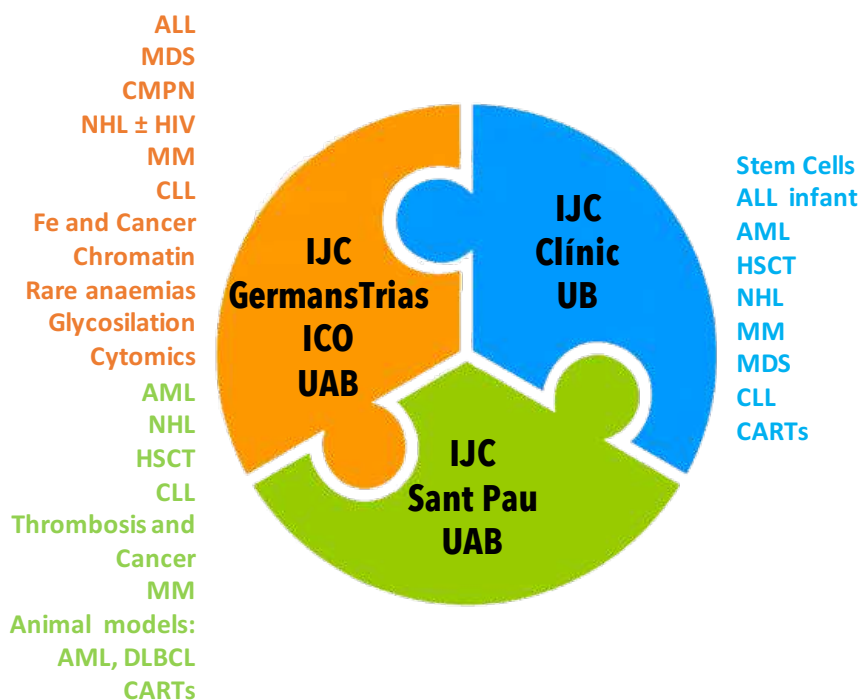
Lines of research

Vertical lines

- 1 Acute leukaemias
- 2 Lymphoproliferative disorders
- 3 Myeloproliferative neoplasms
- 4 Monoclonal gammopathies
- 5 Myelodysplastic syndromes
- 6 Erythropathology & haematopoiesis disorders. Rare anaemias

Horizontal lines

- 7 Malignant haemopathies & coagulation
- 8 Complications associated with therapeutic procedures
- 9 Transplant of haematopoietic progenitors & cell therapy
- 10 Epidemiological research
- 11 Clinical research
- 12 Basic research



Lines of research

Acute Lymphoblastic Leukaemia (ALL)

Our research is focused on Acute Lymphoblastic Leukaemia (ALL) disease, including B-cell precursor and T-precursor ALL. We want to resolve questions that require a full range of research from basic to clinical. We aim to provide the physician with new tools, by using basic research data that will have an impact on healthcare, in order to improve survival rates in patients with this type of leukaemia.

José María Ribera, Group Leader

Barcelona Endothelium Team (BET)

The Barcelona Endothelium Team (BET) is a research group that has dedicated many years to the study of the endothelium and endothelial damage in various pathologies. One of our most productive lines is devoted to the characterization of endothelial damage in the context of both autologous and allogeneic hematopoietic stem cell transplantation (HSCT). In this framework, we are deepening our knowledge of the mechanisms involved in endothelial dysfunction, the role of the endothelium in the development of some complications observed after HSCT, and the search of pharmaceutical agents that could protect the endothelia and consequently prevent these complications.

Enric Carreras, Group Leader

Chromatin, Metabolism and Cell Fate (CMCF)

Epigenetic information is written in chromatin. But how exactly do epigenetic mechanisms operate on the molecular level? How do chromatin alterations contribute to cell fate transitions? How does the environment influence these processes? And how does the metabolic state of a cell impact on its chromatin structure and its epigenetic memory?

These are questions we address in the lab. Studying stem cells and cancer we focus on molecular aspects of epigenetic regulation and on the question whether we can translate this knowledge into diagnostic and therapeutic tools for the management of diseases such as Leukaemia and myelodysplastic syndrome.

Marcus Buschbeck, Group Leader

Endocrine Regulatory Genomics (ERG)

The endocrine system consists of a collection of distinct cell identities organized in tissues and shaped into functional organs. These highly specialized tissues ensure the physiological equilibrium of an organism and its possibility, throughout life, to interact with the environment.

How do these cell populations preserve their identity? Which molecular mechanisms are required to maintain their phenotype stable for decades? How are gene regulatory networks altered in pathological conditions?

Our group combines molecular genetics and bioinformatic approaches to understand the regulatory mechanisms that control function and cell fate of the endocrine tissues central to diabetes.

Our group is also contributing to the insulin-producing beta-cells regulatory genomics by maintaining and developing the “islet regulome browser” a web tool that allows the visualization of different classes of regulatory elements, together with enhancer clusters, transcription factor binding sites, and binding motifs in human pancreatic islets.

Lorenzo Pasquali, Group Leader

Functional Cytomics (FC)

An important and challenging problem in Leukaemia research is the limited ability for many laboratories to perform functional analyses of primary patient cells. In order to increase our understanding of the biology of human leukemic malignancies, we perform advanced experimentation using living-cell systems. Functional information extracted from single-cell analysis, provides crucial data to understand cell-to-cell heterogeneity. By enabling functional cytomics, we are able to evaluate the state of patients with Leukaemia as well as to examine the changes that occur in the accumulation of drugs into the cells over time. The Functional Cytomics Group is mainly focused in the basic mechanisms that regulate CD34+ and CD34- Side Population stem cells. Stem cells reside in most of tissues in a quiescent state, but rapidly become activated to both repair and regenerate the adjacent tissues. We are studying several genes involved in different aspects of stem cell activation, including some that encode for ABC multidrug resistance transporters, and others that regulate self-renewal and differentiation.

Jordi Petriz, Group Leader

Genetics and Epigenetics in Myeloid Neoplasms (GEMN)

Genetic profiling for hematological malignancies means chasing a moving target. Only few years ago, leukaemias were stratified based on karyotype abnormalities. However, in recent years the knowledge of molecular genetics in haematology has increased significantly, something that offers new clinical opportunities. It has now been shown that gene expression, mutations and other genetic and epigenetic abnormalities also have diagnostic, prognostic and therapeutic implications. The aim of our group is to apply our research into three distinct haematological diseases: chronic myelomonocytic leukaemia, myelodysplastic syndromes and myeloproliferative neoplasms (PV, ET, PMF and CML), to finding better tools for diagnosis and prognosis stratification and to achieving an individual targeted therapies (personalized medicine).

Lurdes Zamora and Blanca Xicoy, Group Leaders

Immunohematology and Glycobiology (IG)

Blood group ABO system consists of A and B oligosaccharide antigens and the antibodies against those antigens (anti-A and anti-B antibodies, respectively). Matching of ABO blood groups is fundamental for safe blood transfusion. Because A and B antigens may also be expressed on other types of cells than red blood cells, the ABO matching is also important in the transplantation of cells/tissues/organs. Starting from the cloning of the human blood group ABO genes and the elucidation of the allelic basis of the ABO system, we have been investigating ABO genes, the gene-encoded A and B glycosyltransferases, and A and B oligosaccharide antigens, their enzymatic reaction products. We have contributed to science and medicine in a variety of research fields such as molecular genetics, human genetics, population genetics, genotyping, enzymology, biochemistry, glycobiology, hematology, immunology, cellular and developmental biology, forensic science, cancer research, and even in the study of evolution. Fumiichiro Yamamoto, Group Leader

Iron Metabolism: Regulation and Diseases (IMRD)

Iron is an essential micronutrient for both benign and neoplastic cells and a tight regulation of its metabolism is crucial for health. Iron deficiency leads to anemia, a major world-wide public health problem, and iron overload increases the oxidative stress of body tissues leading to inflammation, cell death, system organ dysfunction, and cancer.

Inherited or acquired iron-related anaemias are a subset of heterogeneous diseases, some of them with a poor prognostic and quality of life for the patient and requiring bone marrow transplantation for a complete cure of the disease (i.e. Sideroblastic Anaemia non-responsive to pyridoxine, gen SLC25A38). Currently, in the unit Diagnostics in Iron Metabolism Diseases (D•IRON), we perform 21 genetic diagnostics for germ-line and acquired iron-related diseases, including the study of Myelodysplastic Syndrome (MDS) with ring sideroblasts (refractory anemia with sideroblasts ring, RARS, gene SF3B1).

The IRP/IRE post-transcriptional regulatory system is a key network controlling cellular iron homeostasis. The iron regulatory proteins (IRP1 and IRP2) can recognize a cis-regulatory mRNA motif termed IRE (iron responsive element), a conserved RNA element located in the untranslated regions (UTR) of mRNAs that encode proteins involved in iron metabolism. Our recent findings suggest that the IRP/IRE regulatory network is wider than previously thought, and include genes involved in cancer progression and metastasis.

Mayka Sanchez, Group Leader

Leukaemia Stem Cell Group (LSCG)

Acute Myeloid leukaemia (AML) is a blood cancer, characterized by the rapid growth of abnormal white blood cells that accumulate in the bone marrow and interfere with normal hematopoiesis. Although, remission rates with standard induction chemotherapy in patients with AML range from 50-85% the majority of patients will relapse and succumb to the disease within 5 years. As such, survival rates for the majority of patients with AML have not dramatically changed over the last decades and new therapeutic approaches are required for remission induction and prevention of relapse. Leukaemia stem cells (LSC) are the cell population within the tumor thought to be responsible for the initiation, maintenance and relapse of the Leukaemia. Therefore, development of specific therapies targeted at LSCs holds hope for improvement of survival and quality of life of Leukaemia patients.

Ruth Muñoz Risueño, Group Leader

Lymphoid Neoplasms (LN)

Research focuses on the study of clinical aspects and biological mechanisms of aggressive lymphomas, especially in HIV-infected patients. The research lines are: the study of the influence of viruses on the genetic and epigenetic mechanisms of lymphomagenesis and the implication of glycoproteins in the dissemination of lymphomas. Studies include the role of miRNAs in the lymphomagenesis of HIV-related non-Hodgkin's lymphomas, and the correlation of genetic and epigenetic profiles with the clinical-biological features and the prognosis of aggressive lymphomas. Future projects will focus on the mechanisms of lymphoma dissemination, especially to central nervous system.

J Tomás Navarro and J Manuel Sancho, Group Leaders

Multiple Myeloma Group (MMG)

The group is focused on translational research and most specifically in the analysis of the biological processes leading to the development of resistance of myeloma to specific drugs. We are linking biological and clinical research by the study by gene expression profiling and other methods of myeloma and immune cells from patients receiving specific treatments. We expect that type of research will ultimately lead to the understanding of mechanisms by which myeloma cells develop resistance to certain drugs, identify biomarkers to predict the risk of development of resistance and finally develop therapeutic strategies able to prevent the development of chemoresistance.

Our current research project aims to detect gene expression profiling biomarkers in myeloma cells and in normal lymphocytes of patients that predict early progression or long term response to lenalidomide in patients with relapsed multiple myeloma. New focus of interest are to study patient's immune response to treatment with antibodies anti-PD1 and PDL1 in combination with immunomodulatory drugs.

Albert Oriol and Joan Bladé, Group Leaders

Myelodysplastic Syndromes (MS)

MDS are a heterogeneous group of haematological stem cell disorders resulting in bone marrow failure and blood cytopenias. The severity of the disease depends on a variety of biological factors that translate into a spectrum of symptoms with a profound impact on the patient's quality of life and survival. A third of MDS patients will die after progressing to Acute Myeloid Leukaemia (AML). The remaining two thirds of patients will suffer from a combination of chronic anaemia, recurrent infections and bleeding episodes and will die from complications associated with cytopenias. MDS is one of the most common haematological malignancies of the elderly and its prevalence is increasing. Our research is focused in unravelling the heterogeneity of MDS beyond symptomatic and morphological description. Despite recent scientific advances in the field, there are still no clear disease markers which facilitate diagnosis and prognosis in clinical practice. No single genetic aberration is common to all subtypes or specific to MDS and patients present varying proportions of abnormal cells with different genetic defects. A more detailed knowledge of the genome of leukemic cells will allow us to make more informed medical decisions, to initiate appropriate therapies earlier, to achieve higher probability of successful treatment resulting in better targeted therapies.

Francesc Solé, Research Director

Regulatory Genomics (RG)

Our long-term goal is to understand how gene expression and genome packaging is affected by genetic and epigenetic changes that happen during evolution, development and in disease, in particular cancer. Our research approach is to computationally analyse global datasets in order to understand general mechanisms.

Tanya Vavouri, Group Leader

Stem Cells, Mesenchymal Cancer and Development (SCMCD)

Our lab studies human pluripotent stem cells (hESCs and iPSCs) and human multipotent stem cells (haematopoietic and mesenchymal) derived from different tissue sources in order to understand the intrinsic and extrinsic factors, and developmentally conserved pathways, driving blood endothelium and mesenchymal differentiation. We are also actively involved in modeling t(4;11) MLL-AF4+ Acute Lymphoblastic Leukaemia (with special interest in deciphering the cell-of-origin and cooperating oncogenic events) as well as other hematological malignancies using cord blood-derived HSPCs and hESC/hiPSC-derived blood derivatives. In parallel, we are also studying the contribution of MSCs to hematological malignancies and sarcomas.

Pablo Menéndez, Research Director

Hematopoietic Stem Cell Transplantation (HSCT)

Stem cell transplantation, either allogeneic (allo-SCT) or autologous (auto-SCT), is one of the treatment options for patients diagnosed with different types of hematological malignancies. However, this procedure is still associated with complications which decrease the survival of patients. Our main field of research is trying to find options to overcome the problems associated to this procedure including, how to improve the engraftment, how to decrease the morbidity and mortality and how to increase the possible anti-Leukaemia effect mediated either by donor lymphocytes in cases of allo-SCT or by the healthy T cells of the patient in cases of auto-SCT.

Álvaro Urbano-Ispizua, Campus Coordinator

Red Blood Cell Defects and Hematopoietic Disorders Research Group (RBCDHD)

The main objective of Red blood cell and hematopoietic disorders research group is to understand physiopathological pathways dealing with rare anaemias, namely haemoglobinopathies, thalassaemias, membranopathies and enzymopathies, as well as defects in erythropoiesis and to develop studies of correlation genotype-phenotype, clinical variation, biomarkers for diagnosis and prognosis of rare anaemias.

The group is focussed on two main research lines:

- a) Development of new diagnostic approaches for red blood cell disorders in collaboration with European teams experts on microfluidics and red blood cell physiopathology, including analysis of red blood cell deformability by ektacitometry and genetic characterization by gene panels and whole exome sequencing methodologies
- b) Research of physiopathological pathways leading to premature red blood cell removal and/or haemolytic hemolysis.

The group is also part of the coordination team the European Reference Network on Rare Hematological Diseases (ERN-EuroBloodNet), officially recognized by the European Commission in December 2016 as one of the 24 approved ERNs..

Joan Luis Vives Corrons, Group Leader

3D Chromatin Organization (3DCO)

Our group combines cutting-edge experimental and bioinformatics approaches to understand the specific 3D chromatin organization of haematopoietic cells and its alteration in blood cancers.

Chromatin interactions are crucial for cellular health due to their main role in genome expression regulation and errors in these interactions give rise to the development of a broad range of diseases including blood cancer. The investigation of these altered 3D structures can help us to improve our knowledge of the tumour process, providing new opportunities for the development of novel treatment approaches and diagnostic strategies.

By studying the physical interactions between gene promoter and regulatory elements we are able to connect blood cancer genetic alterations to putative target genes, prioritizing new disease-candidate genes and pathways, and revealing insights into genomic regulatory mechanisms underlying cancer. The interpretation of non-coding variation will also help us to improve the prediction of patient outcome as well as allowing us to design better and more personalized treatments.

Biola M Javierre, Group Leader

Acute Myeloid Leukaemia (AML)

We design treatment protocols with chemotherapy and hematopoietic progenitor transplants, or just chemotherapy, according to factors of prognosis.

Two decades ago the global survival rate for patients reaching the age of 60 was 15% and now it is between 40% and 50%. Nevertheless, we must continue with research to improve this percentage and to reduce the level of mortality for patients over the age of 60 because, for this group of patients, little progress has been made in recent years. Many patients can not undergo a bone marrow transplant or suffer a relapse, or both.

Further research is required into improving transplantation focusing, above all, on the prevention of infectious complications and the study of graft-versus-host disease, a common, post-transplant complication in which the organism recognises the donor's hematopoietic progenitors as being hostile.

Jordi Sierra, Group Leader

Oncogenesis and Antitumor Drug Group (OADG)

1. Development of animal models with disseminated hematological or solid neoplasias for the molecular study of metastatic cancer stem cells and metastasis development

2. Preclinical development of drug-nanoparticle conjugates and polypeptidic nanoparticles for, CXCR4 receptor-mediated, targeted drug delivery with high selectivity in their tumor uptake and high antimetastatic potency against hematological or solid neoplasias.

3. To carry out a phase 1 clinical assays, after completing preclinical regularity studies, of the first selective antimetastatic drug based on as nanoconjugate targeting CXCR4+ metastatic stem cells.

4. Identification of molecular markers predictive of response to targeted nanomedicines that are capable of increasing the precision of oncology therapeutics.

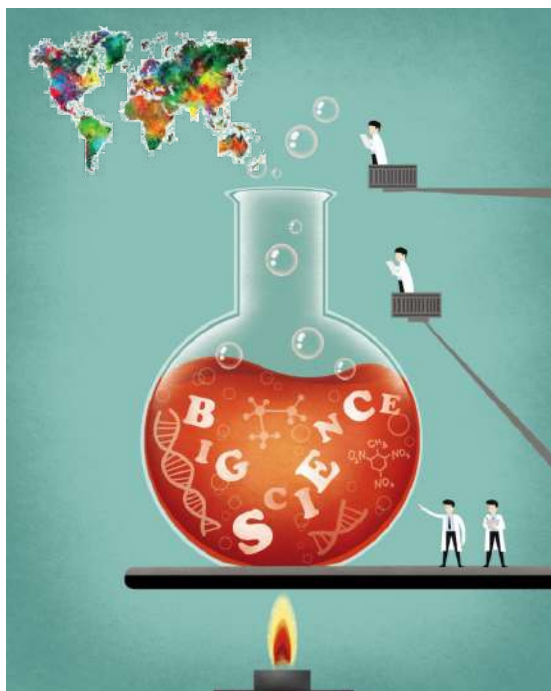
Ramón Mangués, Group Leader

CART's Cell Therapy (CCT)

A short time ago, some extremely powerful cells, called stem memory T cells, were discovered. These cells are very special and although

they are present in less than 1% of the blood, scientists have created mechanisms to create them in larger quantities and with enhanced and longer-lasting anti-cancer potency. If we genetically modify patients' own such cells through the action of a virus, they can be reintroduced into the patient's body using a technique known as CART, where they act on leukaemia cells until they destroy them..

Javier Briones and Álvaro Urbano, Group Leaders



Publications

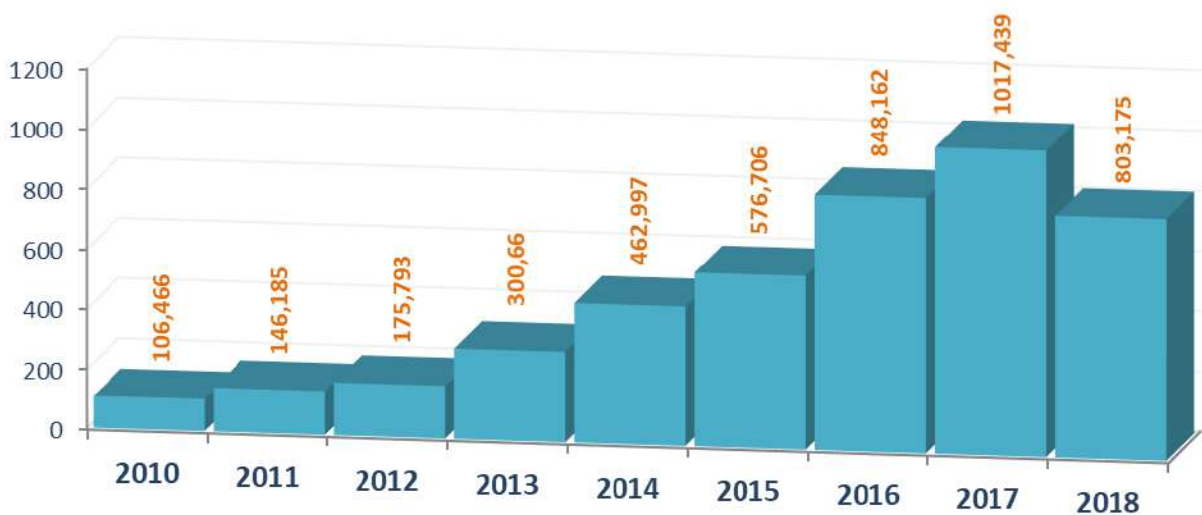
Number of indexed articles published per year

Publicaciones indexadas



Cumulative Impact Factor per year

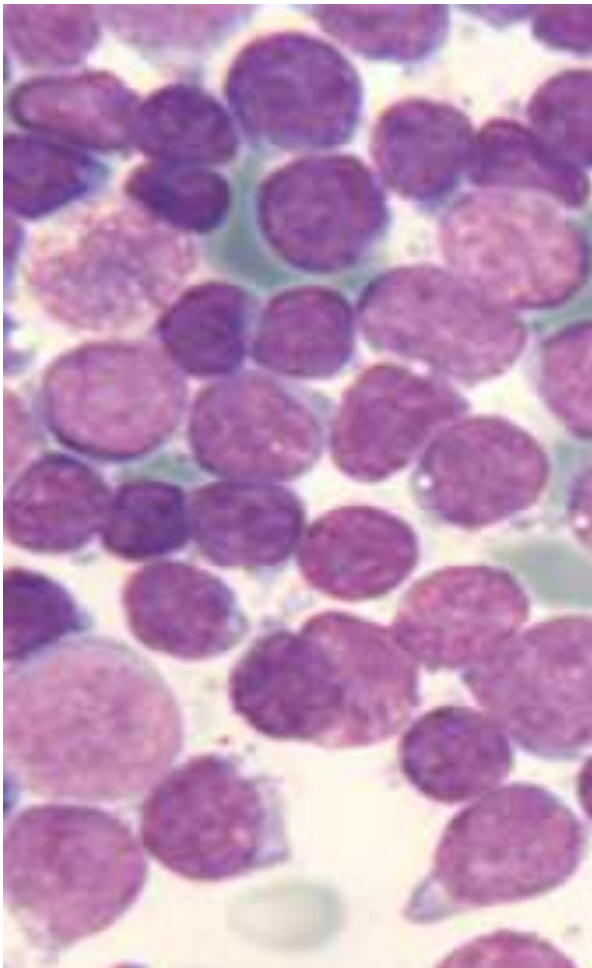
Factor de impacto



Clinical trials

Clinical trials are a fundamental part of our research. In this regard, the IJC evaluates treatments, the efficacy of drugs, and the suitability of equipment.

It enables new treatments to be tested to prevent, relieve or cure diseases.



Transferability and innovation

The IJC vouches for the transferability of knowledge, and the value of and search for market opportunities, in the broadest terms. As well as being in its own interests, it contributes to society and our country's progress.

Leukos Biotech is born to bring new cures for Acute Myeloid Leukaemia and other haematological malignancies.

LEUKOS  BIOTECH

CAR T-cells for the treatment of CD1a-positive cancer

They have shown that CAR T specific CD1 a show an intense cytotoxicity against the CD1a + T-ALL cell lines and the primary cortical cells of T-ALL, both in vitro and in vivo, resistant to the fratricidal effect.

Technology platforms

Cytogenetics platform



The Josep Carreras Leukaemia Research Institute cytogenetics platform is directed by Dr. Francesc Solé. The platform includes the Catalan Institute of Oncology's (ICO) Cytogenetics Laboratory and the 32K Bacterial Artificial Chromosome (BAK) library.

Affymetrix Microarrays Platform



The Affymetrix® Microarrays Platform (AMP) is a service focused on microarray DNA and RNA solutions provided by Affymetrix. The main aim is to find solutions, based on basic research, applied research and diagnosis, that lead towards personalised medicine.

Blood cancer samples



The administration of the collection, processing and storage of blood cancer samples. These samples are stored in a collection called 'Collection of samples from patients with hematologic neoplasms'.

Fluidigm Platform



The Fluidigm platform is used to create integrated fluid circuits (IFCs) which are single-use biochips which automate PCR reactions using the volumes of nanolitres from two samples and reagents to produce consistent results.

Teaching

The IJC provides a high-quality teaching programme for students, scientists, technicians and others with an interest in achieving a solid and up-to-date grounding in the field of leukaemia and malignant blood diseases.

The IJC organises a Doctorate in Hematology, a Master's degree in malignant blood diseases and it participates in the teaching for degrees in medicine and biomedicine.

Staff linked to the University

8

Theses read

9

Doctorates being prepared

12



Training

The IJC organises complementary training activities at all levels, from scientific conferences, monthly seminars and technology sessions, to specialised courses.

Training courses

6

Scientific conference

2

Scientific seminars

26



Internal sessions

MDS GRUP

Francesc Solé
Francisco Fuster

MPN GROUP

Lurdes Zamora, Blanca Xicoy
Natalia Estrada, Laura Palomo

GLICOLSILATION GROUP

Fumi Yamamoto
Emili Cid

ALL GROUP

JM Ribera
Eulalia Genescà, Jordi Ribera

MYELOMA GROUP

Albert Oriol
Paula Gomez

CLL GROUP

M^a Joao Batista, Christelle Ferra
Maria Joao Baptista

FUNCTIONAL CYTOMICS

Jordi Petriz
Laura Garcia

IRON GROUP

Mayka Sanchez
Jorge Couso, Ana Barque

CHROMATIN GROUP

Marcus Buschbeck
Anna Palau, Sara Alvarez, Jeannine Diesch

External speakers

19 February, 15:00h

"Investigation into the functional role of nuclear ATP derived from ADPR in cancer progression".

Roni Wright, CRG, Barcelona.

5 March, 12:00h

"From NGS to DNA editing in lymphoid malignancies".

Jesús M^a Hernández Rivas, Servicio Hematología. Hospital Universitario de Salamanca.

12 March, 15:30h

"Tet2 orchestrates dynamics of active enhancer demethylation during rapid reprogramming of pre-B cells into iPSCs".

José Luis Sardinia, Hematopoietic Stem Cells, Transdifferentiation and Reprogramming Laboratory. Center for Genomic Regulation, CRG

11 May, 13:00h

"Effect of somatic mutations in Myelodysplastic Syndromes"

Dr. Rafael Bejar, Moores Cancer Center. UC San Diego Health - La Jolla
Moores Cancer Center. 3855 Health Sciences Drive. La Jolla, CA. USA

22 May, 15:30h

"Restoring immunocompetence after allogeneic stem cell transplantation, principal challenges and limitations".

Dr. Martin Guimond, Department of Microbiology-Infectiology and Immunology, Faculty Medicine, University of Montreal.

18 June, 15:30h

"Cytogenetics of MDS"

Dr. Detlef Haase, Hospital Gottinguen. Germany.

20 July, 13:00h

"Science advice and science diplomacy: connecting science to public policies"

Dr. Lorenzo Melchor, Science coordinator in the Spanish embassy in London. Fundación Española para la Ciencia y la Tecnología (FECYT).

17 September, 15:30h

"Diagnostic problems in MDS and related disorders".

Dr. Ulrich Germing, Klinik für Hämatologie, Onkologie und Klinische Immunologie, Heinrich-Heine-Universität Düsseldorf. Germany.

12 November, 15:00h

"JAK2 signaling networks mediate persistence of MPN"

Dr. Florian Heidel, Faculty of Medicine, Friedrich-Schiller-University Jena, Germany

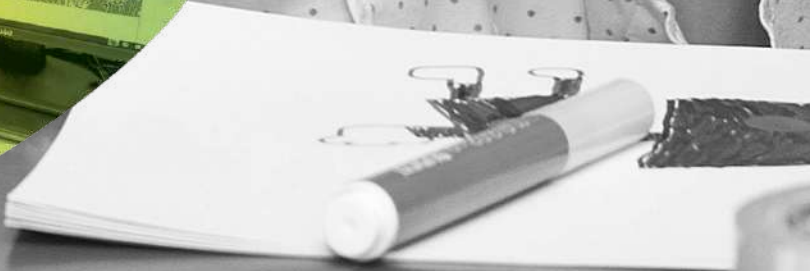
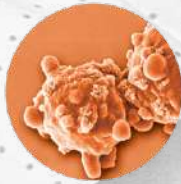
19 November, 15:00h

"From phenotype to WGS. Diagnosis in Hematology".

Dr. Torsten Haferlach, Director of MLL laboratory. Munich. Germany.



Cooperation



Funding & Support

The IJC makes a great effort to establish continuing cooperation agreements, and it aims to broaden its strategic alliances and agreements with the pharmaceutical industry, as well as other private organisations. At the present time the following institutions are connected with the IJC:

FOUNDING MEMBERS:



WITH THE INSTITUTIONAL COLLABORATION OF:



IN SCIENTIFIC ASSOCIATION WITH:



WITH THE INESTIMABLE SUPPORT OF:



PUBLIC FUNDING:



SPANISH GRANTS:



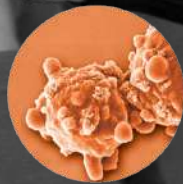
PRIVATE FUNDING:



CONSORTIA:



Communication



Communication

It is of prime importance to disseminate our work and to strengthen our bonds with society and its citizens. We wish to integrate social corporate responsibility into our management model. This desire is closely linked to the organisational values of the Josep Carreras Foundation.

During 2018, the IJC has actively participated in scientific dissemination, citizen participation and engagement of high school students to understand better what medical research consists of.

Màgic Badalona Running 2018



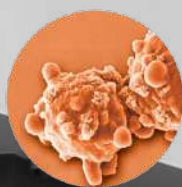
Patient's Day



Science week, Badalona town council



Financial data



Annual economic results

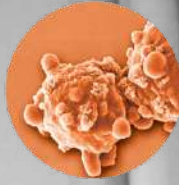
In 2018 there was an increase of more than 12% in income from the capture of public funds and the provision of services.

With regard to expenses, 62% of the IJC's outlay corresponds to staffing, with an increase of 17%.

At this early stage the evolution of income, expenses and investments gives a negative result of €851.362

	DECEMBER
INCOMES	5.226.655
CONTRIBUTIONS FROM THE GENERALITAT	1.215.944
OTHER TRANSFERS (FIJC)	895.515
SERVICES	274.979
PROJECT IMPLEMENTATION	2.444.395
OVERHEADS	395.823
OPERATIONAL EXPENSES	5.203.788
STAFFING COSTS	1.172.163
INFORMATION TECHNOLOGIES SERVICES	52.529
COMMUNICATION	870
BUILDING MAINTENANCE	497.866
LABORATORIES MAINTENANCE	128.206
RESEARCH SUPPORT	24.950
PROJECT IMPLEMENTATION	2.444.395
SCIENTIFIC-TECHNICAL SERVICES (Platforms)	246.368
BIOBANK	11.841
MANAGEMENT SUPPORT SERVICES	116.743
OTHER	328.406
VAT PRORATA	81.235
Expenditure on investments pending activation	58.377
Heritage	22.748
Reimbursement of subsidies and other management losses	17.091
RESULT OF THE ACTIVITY	22.867
Extraordinary result	14.663
OPERATING INCOME	37.531
FINANCIAL PERFORMANCE	-35.789
RESULT	-851.362

Upcoming challenges



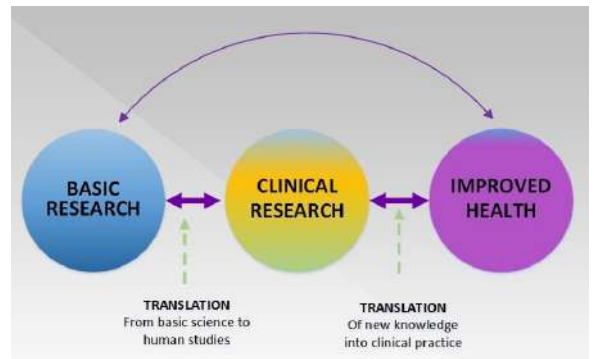
Upcoming challenges

Grow the management team



The new challenge of the Josep Carreras Leukaemia Research Institute in 2019 is to constitute a bigger management structure that can give support in competitive research calls and awards, communication, tech transfer, clinical trials, purchasing, finances, information technologies, among other services that actually depend on the SUMA agreement with the GTiP Institute, are common and shared. The growth of the Institute demands a complete dedication to the research groups of new personnel, and the Institute expects to invest in new management personnel.

Structure of the Institute's Research.

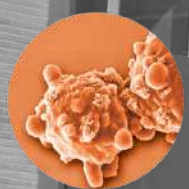


Our work to find a cure to leukaemia must have a plan that integrates all the results of the Research of all groups and focuses on the interfaces between the work of all of them.

Research Groups have different degrees of basic, translational, clinical, and epidemiological application of their group. The new Director, Manel Esteller, will provide a new research structure that allow us to be a first level research centre in biomedical research focused on Leukaemia and other hemopathies diagnosis, prognosis and treatments

ARQUIMA

Annex





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