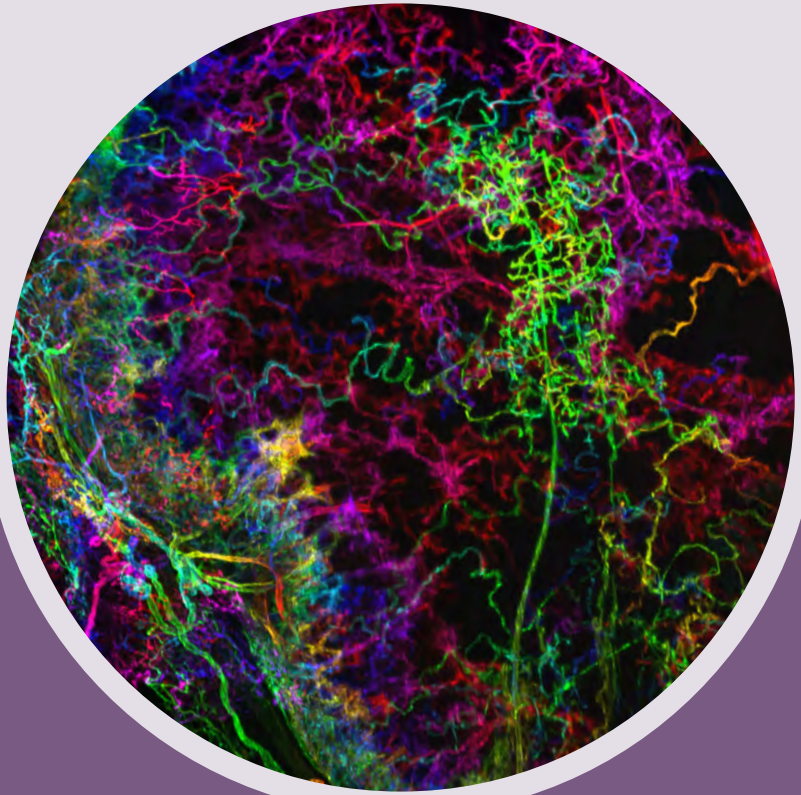
IRB BARCELONA

INSTITUTE FOR RESEARCH IN BIOMEDICINE



2012 ANNUAL REPORT SUMMARY

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2012
ANNUAL REPORT SUMMARY

IRB Barcelona's 2012 Annual Report once again this year is presented completely online. Through the stories, videos, photos and interactive features that appear in the report, we hope to paint a picture of how we have spent the year successfully delivering on our missions of conducting internationally recognized multidisciplinary research at the forefront of biomedicine, training and inspiring scientists at all stages of their careers, driving innovation through active technology transfer to the benefit of society, and creating an open dialogue with the public about an area of science with enormous potential to touch their lives.

Enjoy the full document here:
www.irbbarcelona.org/annualreport2012

Joan J. Guinovart
IRB Barcelona Director

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WEB DESIGN AND DEVELOPMENT
Formas Naturales S.L.

LEGAL DEPOSIT
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THE KEY TO OUR SUCCESS

Innovative approaches. Thinking big. Collaboration. These are the ethos at IRB Barcelona, and they are the key to our success. These characteristics are reflected in the quality of our science, our students, the translation of our researchers' ideas into real benefits for society, and how we communicate this to you. They permeate everything we do.

Over the course of 2012, IRB Barcelona continued to pursue science of excellence. In this printed summary, you will get an overview of the activities we set up to pursue our strategic missions and will have a taste of the enthusiasm that inspires us.

IRB Barcelona missions

- To conduct **multidisciplinary research of excellence** at the forefront of biomedicine
- To **train and inspire** scientists at all stages of their careers
- To **drive innovation** through active technology transfer
- To maintain an **open dialogue** with the public about our work

A DYNAMIC WORKING ENVIRONMENT

At the end of the year, the Institute saw the departure of several of its members for the sake of providing other deserving investigators the chance to excel. We are grateful to the esteemed members who have left us for their many contributions over the past six years to the success of the Institute and the advancement of their own research endeavours.

An international search for new faculty members was launched, which was made possible by the funding obtained from the *Severo Ochoa* Centres of Excellence Award and other sources. The response to the open call has been strong: more than 240 applications, 81% of which were from scientists currently living outside Spain, were received for positions available in chemical biology, structural biology, and the molecular basis of disease. New appointments will be made during the course of 2013.

SCIENTIFIC INFRASTRUCTURE

The list of services and facilities that support IRB Barcelona scientists grew in 2012 to include a new histology service, which will address researchers' needs in tissue analysis and molecular pathology. During the first period the facility is mainly self-service, and will provide training and consultation to researchers in need. In the future the facility will give full service to all users.

CHAIR OF GRADUATE TRAINING

Raúl Méndez took up the role of Chair of Graduate Training. In this capacity, Raúl will supervise graduate training activities and act as the students' interface to mediate with the Institute. He will also sit on the Internal Scientific Committee.

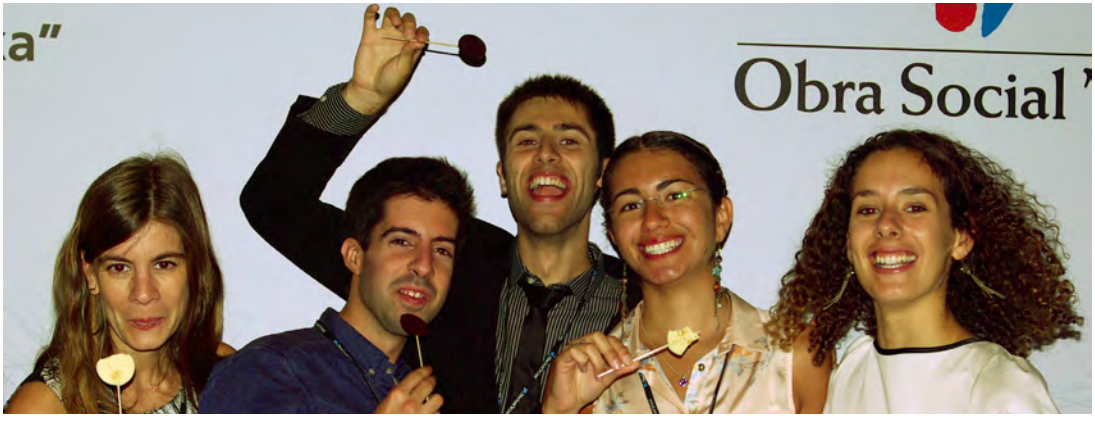
TRAINING ACTIVITIES

The end of 2012 saw the first PhD students of the "la Caixa"-IRB Barcelona International PhD Programme complete their doctoral work. They include Sean Doran and Eva Novoa. A good example of the accomplishments of this programme is the work of Eva with Lluís Ribas de Pouplana on "A role for tRNA Modifications in Genome Structure and Codon Usage" (Novoa *et al*, *Cell* 2012).

The "la Caixa" Foundation pledged their further support of IRB Barcelona, and continues to fund new PhD positions in 2013. These, added to the fellowships available through the Severo Ochoa award, the IRB Barcelona PhD Programme Fellowships, and the official ministerial calls continue to guarantee our top-quality training programmes.

A new addition to the calendar of events for training this year was the first Students' Day. This bottom-up initiative, organised completely by our PhD students, provided a welcome opportunity for our young scientists to participate in a full day of talks, presentations, poster sessions and other opportunities for scientific and social exchange, all geared towards letting students know about the exciting research they are working on, as well as possibilities for their careers and life after their degrees.

Fellowship opportunities at IRB Barcelona extend beyond the doctorate level. These include ten postdoc fellows from ten countries who took up their positions in IRB Barcelona labs in the autumn as part of the EU Marie Curie Actions programme (COFUND).



AWARDS AND HONOURS

In July 2012, IRB Barcelona was presented the prestigious *Narcís Monturiol* award by the Catalan Government. This is not only a tribute to IRB Barcelona's excellence as a research institute, but also a vote of confidence on the ability of the Institute to preserve its strength and international impact in an unfavourable economic context.

In November 2012, IRB Barcelona adjunct director Joan Massagué received the 36th *Lluís Carulla* Prize of Honour for the year 2012, in recognition of his "institutional leadership, scientific rigour and work ethic."

In April, Group Leader Modesto Orozco received one of the 12 new ICREA Academia Awards, which aim to foster cutting-edge research led by university professors in Catalonia.

Group Leader Raúl Méndez was nominated full member of the European Molecular Biology Organization in May. EMBO elects new members annually on the basis of scientific excellence.

SCIENTIFIC EVENTS

The *Barcelona Biomed Conferences*, organised with the support of the BBVA Foundation, hosted three conferences with exceptional speakers and strong attendance.

Additional events included an *EMBO workshop on Structure, Function & Regulation of Centromeres and Kinetochores* and an *ISE Conference on Strengthening the European Research Area*. The MetCentre network continued to organised cross-disciplinary seminars involving researchers from centres across Barcelona working in metastasis.

OUTREACH AND EDUCATION

IRB Barcelona continued to expand its activities in the area of scientific outreach and education in 2012. A second edition of the successful course for high school teachers on *Drosophila* development was held in December in collaboration with the Fundació Catalunya - La Pedrera. The course provided 18 local secondary school teachers with an opportunity to experience first-hand the work our scientists are doing using *Drosophila* as a model system.

Again in collaboration with the Fundació Catalunya - La Pedrera, we launched a new exciting programme, Crazy About Biomedicine. This year-long training scheme allows 24 high school students from

across Catalonia to spend several Saturdays over the course of the year listening to scientific lectures and gaining hands-on experience in the labs, under the guidance of 12 of our PhD students. The first call was highly successful: more than 420 applications were received.

A LOOK TOWARD 2013

As previous years, 2013 promises to be a year filled with challenges and opportunities.

- We look forward to welcoming new research groups and strengthening our research in key areas.
- Our research will be bolstered by a new postdoctoral call that will be launched with funding secured from the EU.
- We will enhance our institutional collaborations with other research institutions, within Spain and at the European level.
- Our newly created Business Advisory Board will hold its first meeting.
- The much-anticipated third edition of the IRB Barcelona International PhD Symposium is scheduled for November.

Without the commitment and enthusiasm of all IRB Barcelona members, none of this would be possible. We look forward to the continued creativity, dedication and energy of all staff members as we head into another fruitful year. IRB Barcelona is in a privileged position and is firmly on track.

TECHNOLOGY TRANSFER AT IRB BARCELONA

Technology transfer activities at IRB Barcelona continue to go from strength to strength. Commercial contracts and patents at IRB Barcelona have grown over the year, with the filing of eleven patent applications, four international extensions and two licences for new technologies.

A new programme, **CancerTec,** was launched under the auspices of the "la Caixa" Foundation and four internal projects were awarded seed funding. Two projects from IRB Barcelona were also granted **Mind the Gap** competitive funds: *Colostage* and *Nostrum Drug Discovery*. The projects were two of the three chosen by the *Botín* Foundation, and will receive a total of one million euros of funding, as well as management and consulting support for two years.

Finally, a collaborative project on brain cancer run by IRB Barcelona and Vall d'Hebron Institute of Oncology (VHIO) received one of the funding concessions of the first call of the *Prova't* programme, aimed to foster transfer of research in the Catalan research centres network, CERCA.

TECHNOLOGY TRANSFER IN NUMBERS

90	Collaboration agreements
28	Joint ownership agreements
39	New inventions evaluated
20	Patents registered
4	Licenses
3	Spin-offs

from 2009-2012

BARCELONA BIOMED CONFERENCES

- Intensive 3-day conference, organised with the support of the BBVA Foundation
- 20 top speakers + 130 selected attendees
- Local + international organisers
- 2012 Themes:
  - *DNA Damage Response in Human Disease* (co-organised by Travis Stracker and John HJ Petrini)
  - *Normal and Tumour Stem Cells* (co-organised by Eduard Batlle and Hans Clevers)
  - *Bayesian Methods in Biostatistics and Bioinformatics* (co-organised by David Rossell, Donald Berry and Omiros Papaspiliopoulos)

BARCELONA BIOMED SEMINARS

During the year, 181 experts from more than 85 institutes in 22 countries covering a broad range of areas of the biomedical sciences came to IRB Barcelona share their results.

In 2012, IRB Barcelona researchers published a total of 201 articles in international peer-reviewed journals. We highlight three of them.

"Colon cancer metastasis: a test for patients at risk might be available in a few years"

How do colon cancer cells manage to grow in organs as distant and different as the liver and lung and trigger a new tumour, a metastasis? Three years of study and an innovative approach have allowed the group headed by Eduard Batlle and research associate Elena Sancho to begin to offer answers and to propose new diagnostic tools and new therapeutic targets to stop the disease from advancing. Postdoctoral Fellows Alexandre Calon and Elisa Espinet are the first authors of the study.

Published in *Cancer Cell*, the study conducted on 345 cases of colon cancer reveals that tumour cells alter the healthy environment around them, called the stroma, by releasing TGF-beta to ensure their survival and colonization of receptor organs. About 15% of patients with advanced cancer (stage III) never develop metastasis. This depends on whether or not the stroma has been modified.

Those patients with moderately advanced cancer (stage II) who have modified stroma are at high risk

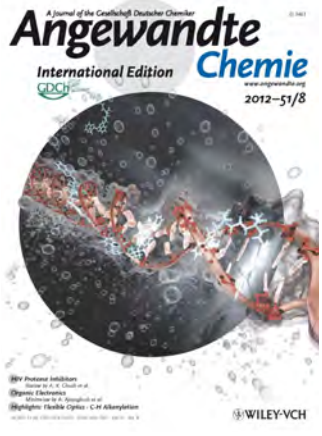
of developing metastasis after surgery. A diagnostic tool that analyses the genetic signature of the stroma might then help doctors to identify these patients.

"Evolutionary engine behind the genome of species revealed"

Scientists in the Gene Translation Lab headed by Lluís Ribas de Pouplana shed light on the evolution and genome diversity of different species with an article in *Cell*. PhD student Eva Maria Novoa is the first author of the study.

Comparing the distribution and abundance of transfer RNA genes -tRNA- in 500 species, the authors pinpoint that the appearance and selection of two enzymes favoured the divergent evolution of the genomes for archaebacteria, bacteria, and eukaryotes. They discovered that the structure of genomes was adapted to the activity of these enzymes, which differ for bacteria and eukaryotes and are absent in archaeabacteria. The enzymes are called UMs in bacteria and hetADATs in eukaryotes.

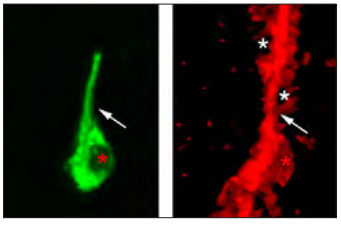
"Better than a natural hormone"



The collaboration between the Chemistry and Molecular Pharmacology Programme and the Structural and Computational Biology Programme resulted in the design of a peptide that is ten times more stable in blood than the natural hormone somatostatin and is more active than the two analogues currently available on the market. These hormones are used for the treatment of several kinds of cancer and diseases associated with the growth hormone. The first author of the article, published in *Angewandte Chemie*, is Pablo Martín Gago, PhD student in Antoni Riera's Asymmetric Synthesis Laboratory.

The success of the design lies in the substitution of two sequences in the natural sequence for two non-natural amino acids. Maria Macias' Protein NMR Spectroscopy Laboratory also provided for the first time structural data on the many conformations of natural somatostatin. The study opens the way for the further design of analogues that are selective in their interaction with other receptors.

RESEARCH PROGRAMMES AND CORE FACILITIES

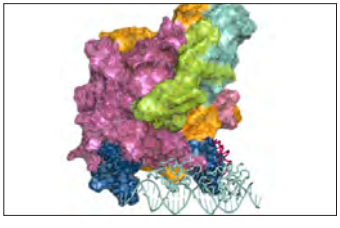


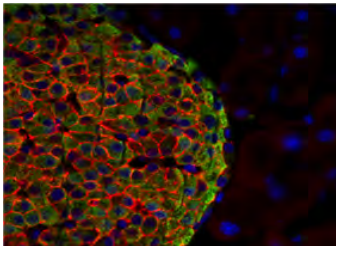
1. Cell and Developmental Biology Programme

The Programme comprises seven laboratories that address questions ranging from pure cell biology issues, such as how the subcellular machinery of the cells is organised and functions, to how cells are organised in time and space, how multicellular organisms develop from a single cell, and how alterations in these processes underlie pathological conditions.

2. Structural and Computational Biology Programme

Including six laboratories, this Programme brings together researchers from a variety of computational, physical, chemical, mathematical and statistical backgrounds with the common aim of studying biological processes from a structural viewpoint and increasing biomedical knowledge.



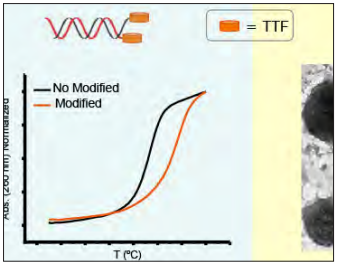


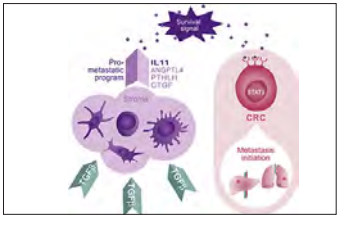
3. Molecular Medicine Programme

In this Programme, six laboratories seek to further our knowledge of the molecular mechanisms that underlie physiological processes and their associated diseases and, conversely, to use insights from the alterations found in human diseases to answer fundamental biological questions. The creation of an active interface between the member research groups and clinical researchers is one of its goals.

4. Chemical and Molecular Pharmacology Programme

Comprising five laboratories, this is one of the key assets of the Institute. Its goals include the conception, design and synthesis of new molecules with potential therapeutic interest, conformational analyses, and molecular recognition studies. Well-consolidated collaborations support its interdisciplinary approach to performing research of excellence at the interface between chemistry and biology.





5. Oncology Programme

The four groups that form this Programme aim to improve the prognosis, prevention and treatment of cancer by studying the basic principles of development of this disease and to explore, in collaboration with partners in university hospitals and the pharmaceutical industry, the potential of new diagnostic tools and therapies for cancer.

Core facilities

Scientists at IRB Barcelona are supported by an extensive range of common core facilities that provide state-of-the-art technologies and scientific services. These facilities are a key asset for our research. Six facilities currently operate at the Institute: **Advanced Digital Microscopy, Functional Genomics, Biostatistics/Bioinformatics, Mass Spectrometry, Mouse Mutant, Protein Expression** and the newly created **Histology Service.**

FACTS AND FIGURES

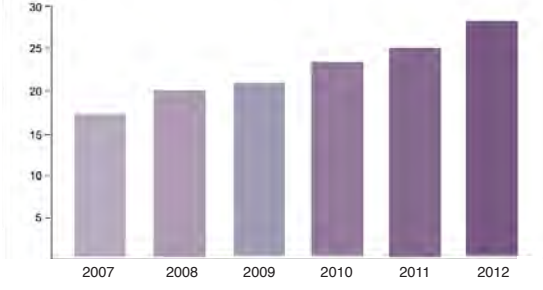
14 402 575 €

Total amount obtained in 2012 by IRB Barcelona researchers through grants, networks and personnel grants

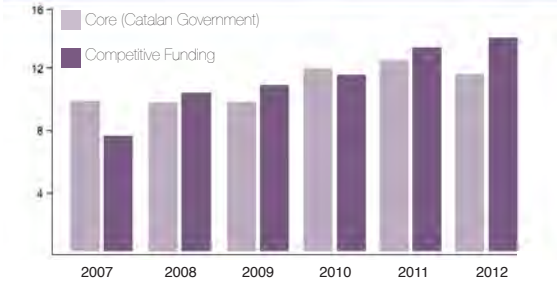
15% more than in 2011

FUNDING

Running Budget
(million €)



Core vs. Competitive Funding



Funding Sources *(2012)*	
51%	Spanish Government
4%	Catalan Governement (AGAUR)
22%	European Commission
23%	Private Foundations/Industry

171

National and international research projects and networks

Personnel Distribution

485 people

86.6%	Laboratories
8.2%	Administration
5.2%	Core Facilities

Personnel in laboratories

420 people

28	Group Leaders
39	Research Associates
117	Postdoctoral Fellows
161	PhD Students
65	Technicians

42%
International PhD student community

58%
International Postdoc community

At IRB Barcelona:

39
Countries

26
Languages

IRB BARCELONA

INSTITUTE FOR RESEARCH IN BIOMEDICINE

Parc Cientific de Barcelona
C/ Baldiri Reixac 10
08028 Barcelona - Spain
Tel: +34 93 402 02 50
info@irbbarcelona.org
www.irbbarcelona.org

Recognized as:

EXCELENCIA SEVERO OCHOA

Trustees:

Generalitat de Catalunya

Universitat de Barcelona

Location:

Parc Cientific de Barcelona

With the collaboration of:

European Union

Tumour xenograft for the study of angiogenesis. Blood vessel network labelled with fluorescently conjugated lectin.
Sample preparation: Alexandre Calon & Lidia Bardia. Image: Julien Colombelli.