

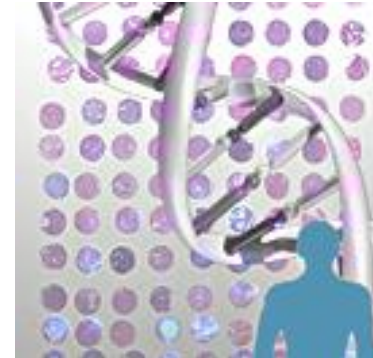
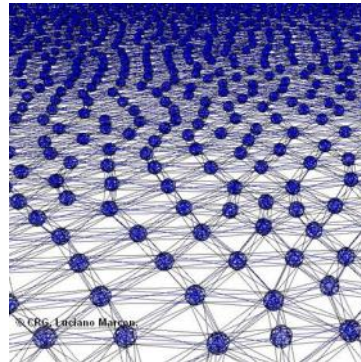
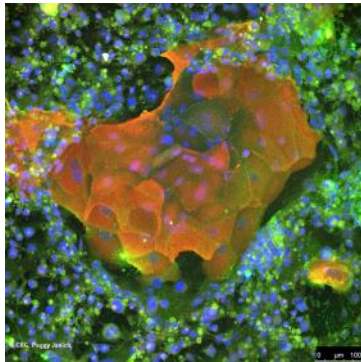
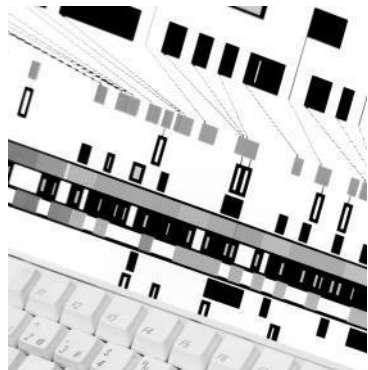


# THE CRG IN A NUTSHELL



- Founded in 2000
- 30 groups + 6 core facilities
- 425 staff
- 70% foreign researchers
- 197 publications, IF=8.8
- Budget: 27M€ (47% core – National and local government; 53% external)
- Position 9 worldwide Q1, Health - Scimago Reports (2007-2011)
- Severo Ochoa center of Excellence

Understanding the complexity of life from the genome to the cell to a whole organism and its interaction with the environment, offering an integrated view of genetic diseases.




**THE MEDICINE OF THE FUTURE DEPENDS ON  
THE GROUNDBREAKING SCIENCE OF TODAY**

***INTERNATIONAL  
COLLABORATION***

***ADVANCED  
TRAINING***

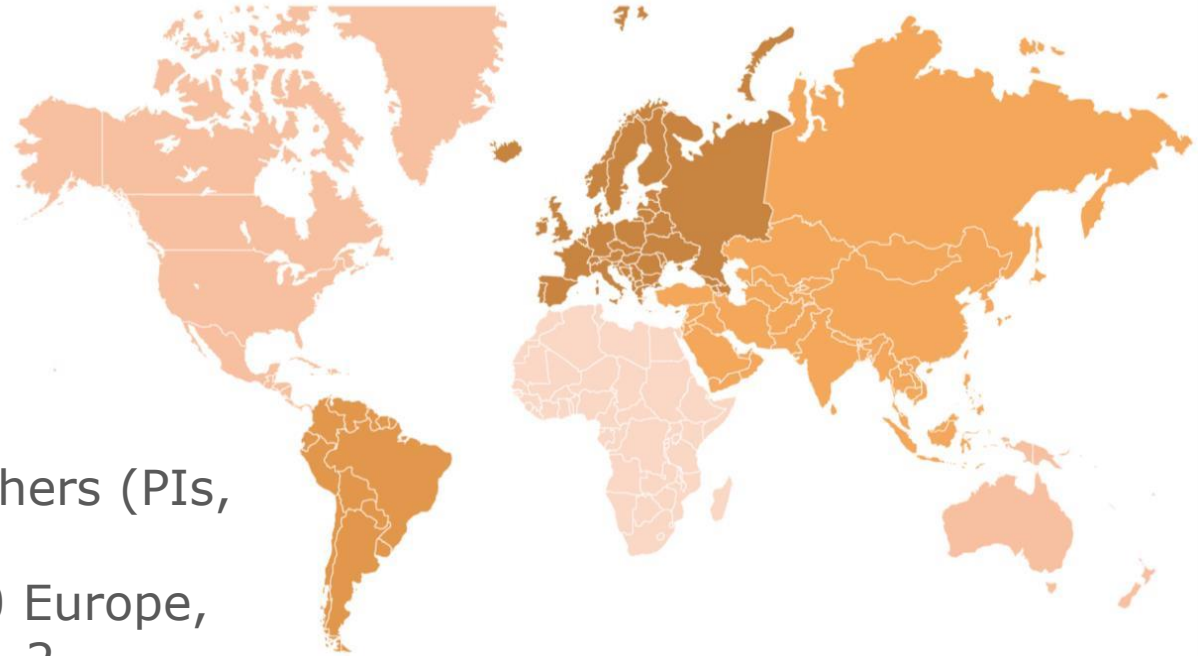
***FOREFRONT  
TECHNOLOGY***

A close-up photograph of a hand wearing a white nitrile glove, holding a clear glass test tube. The hand is positioned above a white plastic test tube rack that contains several other test tubes. The background is a blurred laboratory setting.

**EXCELLENCE  
IN SCIENCE**

***TECHNOLOGY  
TRANSFER***

***SCIENCE &  
SOCIETY***



- 70% foreign researchers (PIs, Postdocs, PhDs)
- 41 nationalities (380 Europe, 15 America, 28 Asia, 2 Oceania)
- > 100 PhD students
- > 100 postdocs

# THE FACES OF OUR SCIENCE



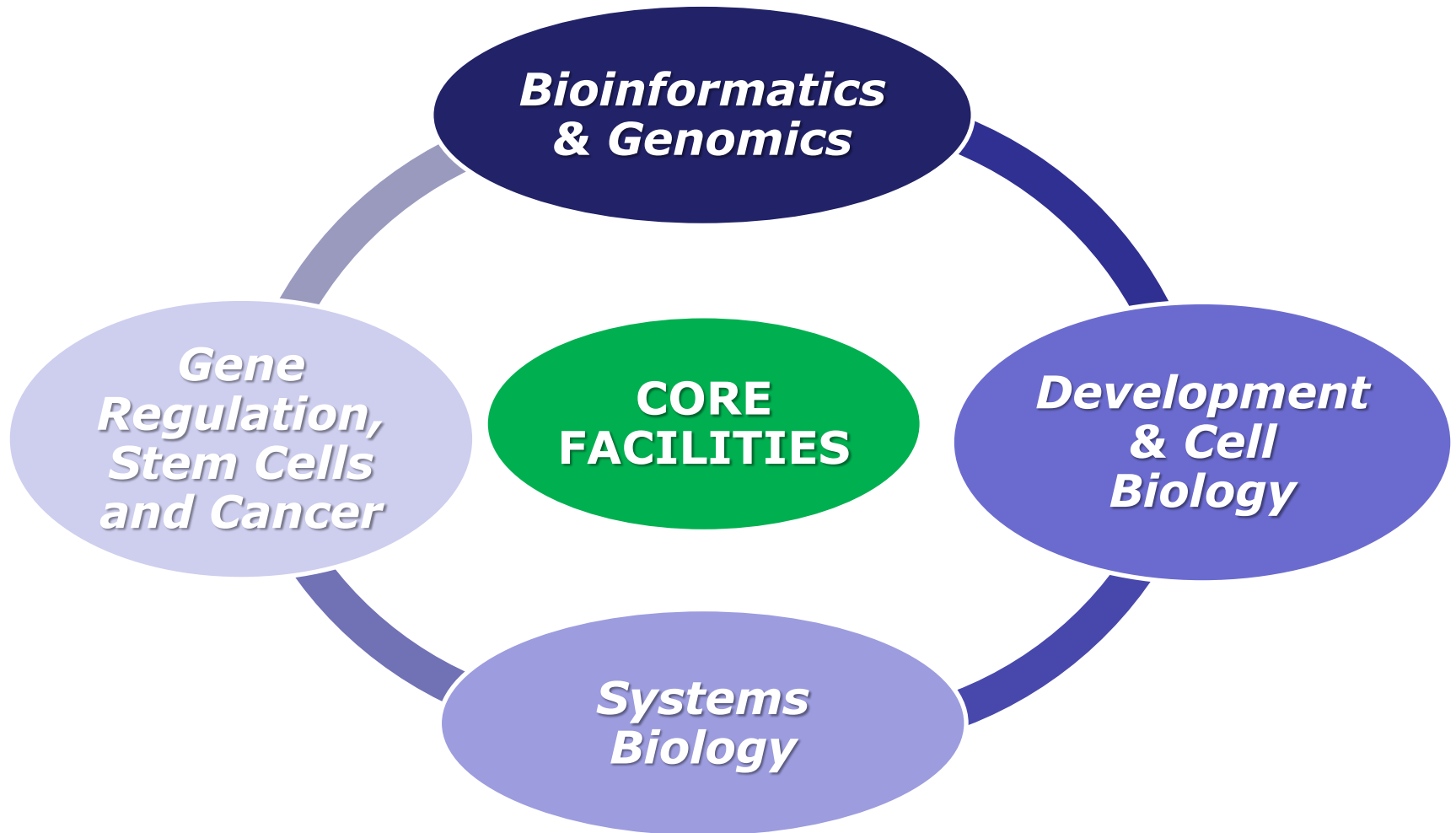
- 13 European Research Council (ERC) PIs
- 2 Howard Hughes Early Career Scientists (HHMI)
- 8 EMBO members
- 3 EMBO Young Investigators
- 2013 Eppendorf Young European Investigator
- 1 Merck Award ASBMB

Senior PIs with open-ended contracts

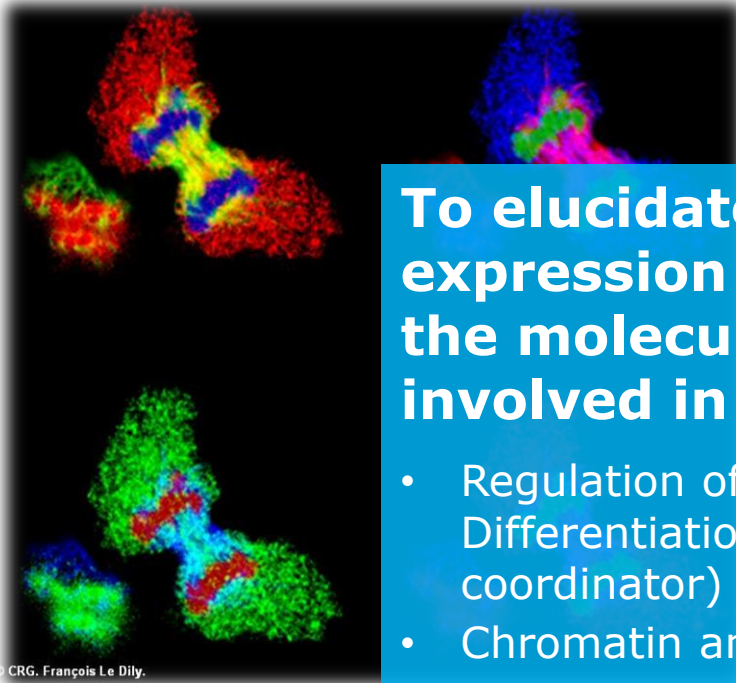
Junior PIs with 5 +4 contracts

Evaluation by SAB and *ad hoc* panel every 4 years  
according to high international standards



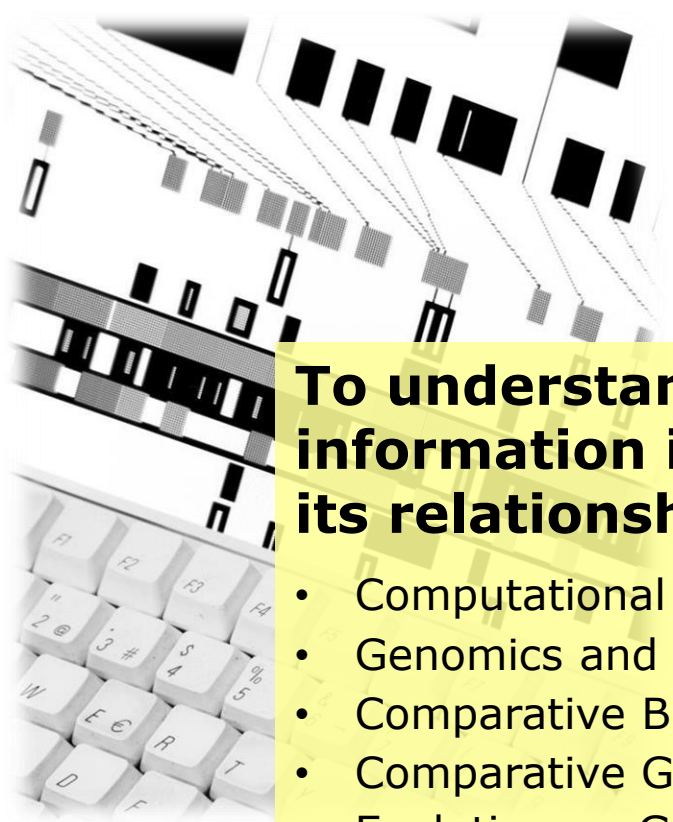






## To elucidate mechanisms of gene expression and epigenetic regulation, and the molecular basis of cellular decisions involved in tissue homeostasis and cancer

- Regulation of Alternative pre-mRNA Splicing during Cell Differentiation, Development and Disease (Valcárcel, coordinator)
- Chromatin and Gene Expression (Beato)
- Reprogramming and Regeneration (Cosma)
- Gene Function (De La Luna)
- Epigenetic Events in Cancer (Di Croce)
- Genome Architecture (Filion)
- Regulation of Protein Synthesis in Eukaryotes (Gebauer)
- Hematopoietic stem cell biology and differentiation (Graf)
- Mechanisms of cancer and aging (B. Keyes)
- Structural Genomics (Martí-Renom)

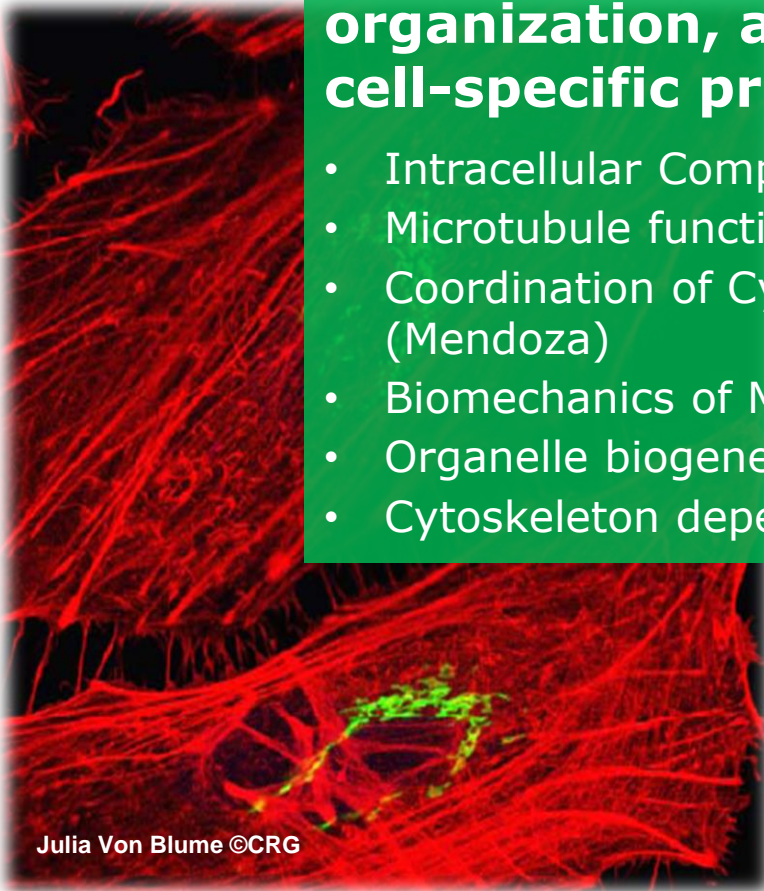


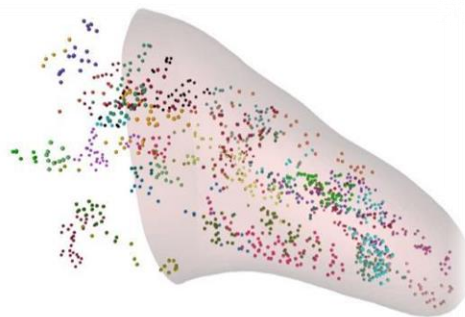
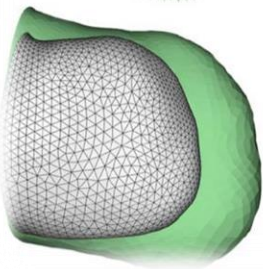
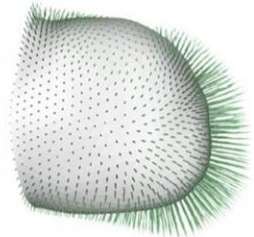
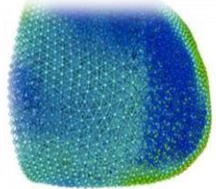
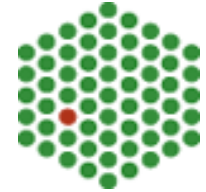
## **To understand the coding of biological information in the sequence of genomes and its relationship to human health**

- Computational Biology of RNA Processing (Guigó, coordinator)
- Genomics and Disease (Estivill)
- Comparative Bioinformatics (Notredame)
- Comparative Genomics (Gabaldón)
- Evolutionary Genomics (Kondrashov)
- Gene Function and Evolution (Tartaglia)
- Genomic and Epigenomic Variation in Disease (Ossowski)

## To understand the mechanisms of cell compartmentalization, division and tissue organization, and their roles in determining cell-specific properties

- Intracellular Compartmentation (Malhotra, coordinator)
- Microtubule function and cell division (Vernos)
- Coordination of Cytokinesis with Chromosome Segregation (Mendoza)
- Biomechanics of Morphogenesis (Solon)
- Organelle biogenesis and homeostasis (Carvalho)
- Cytoskeleton dependent RNA distribution mechanisms (Maurer)





**To achieve a global quantitative understanding of biological systems, developing models that capture biological complexity and have predictive value**

- Multicellular Systems Biology (Sharpe, coordinator)
- Design of Biological Systems (Serrano)
- Genetic Systems (Lehner)
- Sensory Systems and Behaviour (Louis)
- Comparative Analysis of Developmental Systems (Jaeger)
- Cellular & Systems Neurobiology (Dierssen)
- Transcriptomics of vertebrate development and evolution (Irimia)

Cell

## Senescence Is a Developmental Mechanism that Contributes to Embryonic Growth and Patterning

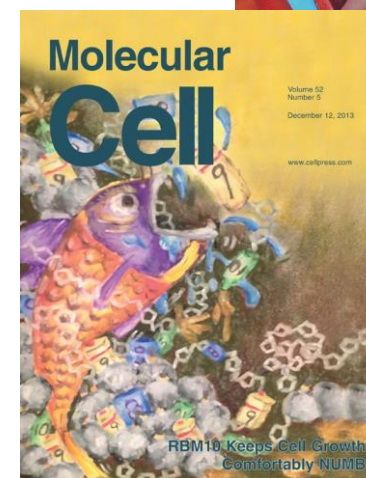
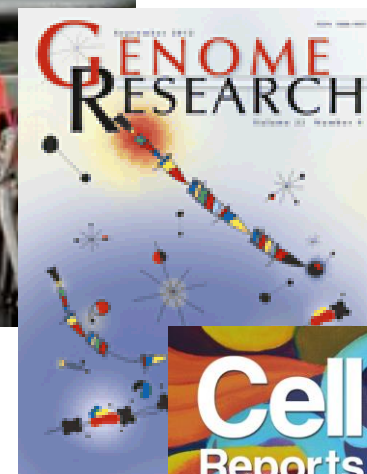
Mekayla Storer,<sup>1</sup> Alba Mas,<sup>1</sup> Alexandre Robert-Moreno,<sup>1</sup> Matteo Pecoraro,<sup>1</sup> M. Carmen Ortells,<sup>1</sup> Valeria Di Giacomo,<sup>1</sup> Reut Yosef,<sup>2</sup> Noam Pilpel,<sup>2</sup> Valery Krizhanovsky,<sup>2</sup> James Sharpe,<sup>1</sup> and William M. Keyes<sup>1,2</sup>

NATURE | LETTER



The effects of genetic variation on gene expression dynamics during development

Mirko Francesconi & Ben Lehner



LETTER

doi:10.1038/nature11510

## Epistasis as the primary factor in molecular evolution

Michael S. Breen<sup>1</sup>, Carsten Kemena<sup>1</sup>, Peter K. Vlasov<sup>1</sup>, Cedric Notredame<sup>1</sup> & Fyodor A. Kondrashov<sup>1,2</sup>



eLIFE Research article Cell biology

Article Figures & data Metrics Article & author info

## TRPM5-mediated calcium uptake regulates mucin secretion from human colon goblet cells

Sandra Mitrovic, Cristina Nogueira, Gerard Cantero-Recasens, Kerstin Kiefer, José M Fernández-Fernández, Jean-François Popoff, Laetitia Casano, Frederic A Bard, Raul Gomez, Miguel A Valverde, Vivek Malhotra

Molecular Systems Biology 9; Article number 653; doi:10.1038/msb.2013.6  
Citation: *Molecular Systems Biology* 9:653  
www.molecularsystemsbiology.com



molecular  
systems  
biology

## Dissecting the energy metabolism in *Mycoplasma pneumoniae* through genome-scale metabolic modeling

Judith AH Wodke<sup>1,2,3</sup>, Jacek Puchatka<sup>4,11</sup>, Maria Lluch-Senar<sup>1,2</sup>, Josep Marcos<sup>5,6</sup>, Eva Yus<sup>1,2</sup>, Miguel Godinho<sup>4,7</sup>, Ricardo Gutiérrez-Gallego<sup>5,6</sup>, Vitor AP Martins dos Santos<sup>1,8,9</sup>, Luis Serrano<sup>1,2,10,\*</sup>, Edda Klipp<sup>3,\*</sup> and Tobias Maier<sup>1,2,\*</sup>



## Advanced Light Microscopy

- Super-resolution (STED)
- Two-photon
- Confocal

## Proteomics

- Orbitrap mass spec

## Genomics

- Microarray
- NGS (Illumina and 454 platforms)

## Histology

## Bioinformatics

- NGS data analysis
- Data integration

## FACS

- Becton Dickinson site
- 5 analyzers and 2 sorters

## Screening / protein tech.

- High content screening
- LabChip, AKTA

# TOWARDS TRANSLATIONAL RESEARCH

## COLLABORATION

- HOSPITALS
- HEALTH INDUSTRY
- TRAINING FOR MD
- INSTITUTIONAL SEED FUNDS

**CRG**  
*Fundamental  
Knowledge*

MODELS

TISSUES, ORGANS

GENOMES

**TRANSLATION TOWARDS  
PERSONALIZED MEDICINE**

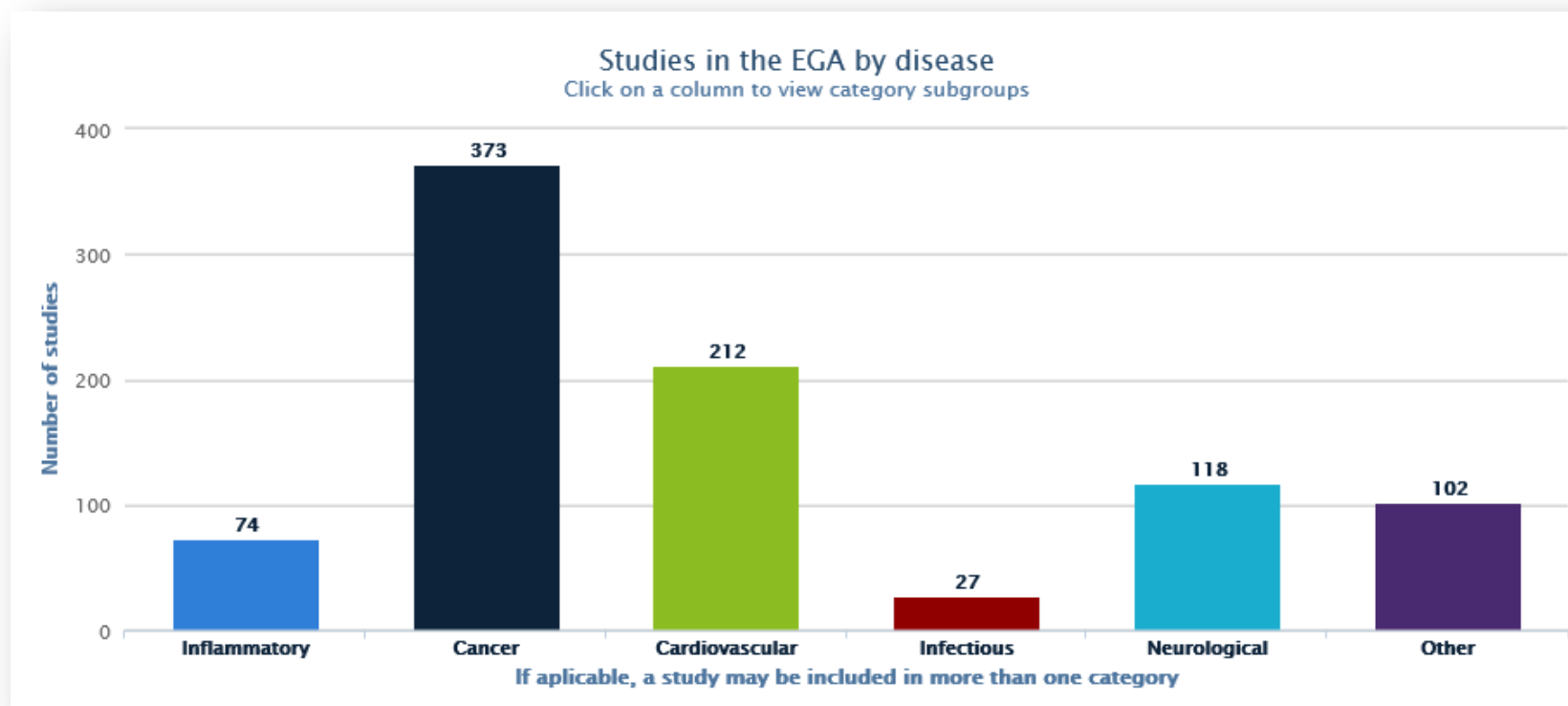
Individual  
patient



## RESOURCES

- EUROPEAN GENOME PHENOME ARCHIVE (**EGA**)
- MERGING WITH SPANISH NATIONAL SEQUENCING CENTER (**CNAG**)

- A service for **permanent archiving** and **secure sharing** of personally identifiable genetic and phenotypic data from biomedical research projects.
- A key resource for personalized systems medicine.
- **EBI-BSC-CRG** partnership to host, manage and improve the EGA.







CORE FOR LIFE

## EU-LIFE

European Life Sciences Institutes for Excellence, [www.eu-life.eu](http://www.eu-life.eu)

**13 partners across Europe**

- **Promoting excellence**
- **Integration**
- **Attract talent, support mobility**
- **Sharing best practise in research and management**

PARTNERS: CRG, VIB, Curie, MDC, Babraham, IGC, FMI, NKI, CEITEC, CeMM, IEO, BRIC, FIMM

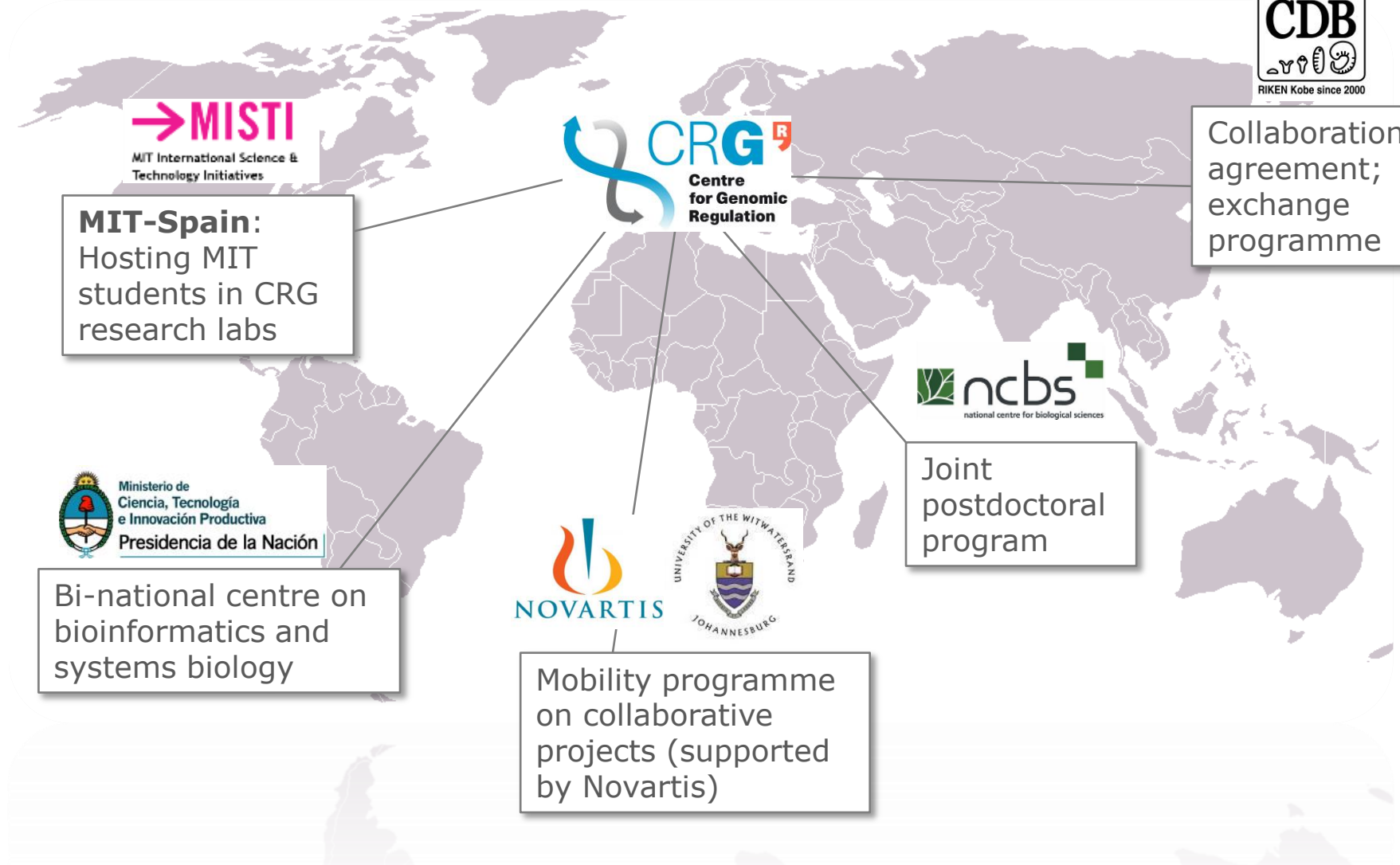
## CORE FOR LIFE

Excellence Alliance of Life Sciences Core Facilities in Europe, [www.coreforlife.eu](http://www.coreforlife.eu)

**7 partners across Europe**

- **Sharing best practice**
- **Training**
- **Scouting new technologies**
- **Capacity sharing**
- **Funding**

PARTNERS: CRG, VIB, EMBL, MPI-CBG, CSF - Vienna Biocente, FGCZ





**2013-2014 programme**

3 PhD students for 6 months on collaborative projects

A faint, light purple world map is visible in the background of the slide, centered behind the text box.

## 2014-2015 programme

- 3 fellowships for PhD students or postdocs for 6 months on collaborative projects (January – July 2015)
- Open up to other SA Universities and research centres

# EUROPEAN COORDINATED PROJECTS

## 4DCellFate

Global understanding of the PRC and NuRD complexes in stem cells and disease.



## SystemTb

Systems Biology of *M. tuberculosis* and its interaction with the host.



## FLiACT

Systems neuroscience in *Drosophila* (training network).



## SWARMORGAN

Theoretical framework for swarms of GRN-controlled agents in morphogenesis and robotics.



## BioPreDyn

New systems biology and bioinformatics tools for biotechnology applications.



## IHEC

A BLUEPRINT of  
Haematopoietic  
Epigenomes (FP7)



## GTEx

Genotype-tissue  
Expression Portal  
(NIH funded)



## ICGC

Genome sequencing  
of chronic  
lymphocytic  
leukemia (CLL)



## ENCODE

The Encyclopedia Of  
DNA Elements (NIH-  
funded)





## Training the next generation of scientists

- International PhD Programme
- International Postdoctoral Programme
- Programme for visiting scientists
- Courses@CRG
- Teaching and Training LAB
- Training Unit
- Seminars, data clubs, retreats, courses

- Personalized mentoring
- Advanced training and courses
- Weekly journal clubs, data seminars, Courses @ CRG
- Career development and transferable skills
- PhD symposia and retreats
- Social activities





- Training through research
- Advanced courses
- Teaching and mentoring activities
- Weekly journal clubs, data seminars, Courses @ CRG
- Career development and transferable skills
- Postdoc symposia and retreats
- Collaboration and mobility opportunities
- Social activities
- ***New calls open now (ImPULSE)***



 **International Interdisciplinary Postdoctoral Programme (INTERPOD)**

**BOOST YOUR CAREER!  
Come to Barcelona!**

International scientific environment  
Cutting-edge core facilities  
Advanced research training  
Career development

**Deadline for applications: March 16, 2012**  
Online application: [www.crg.eu/interpod](http://www.crg.eu/interpod)  
For further information: [interpodcrg@crg.eu](mailto:interpodcrg@crg.eu)

Co-funded by:  

07/07/2014 - 11/07/2014 **Advanced proteomics course for molecular biologists and clinicians**

15/09/2014 - 20/09/2014 **Genome wide approaches to study functional protein/RNA interactions**

28/09/2014 - 03/10/2014 **EMBO Practical course on targeted proteomics: experimental design and data analysis**

06/10/2014 - 10/10/2014 **Next Generation Sequencing: lab methods and computational challenges**

27/10/2014 - 05/11/2014 **Stem Cells and induced Pluripotent Stem Cells**

**Advanced proteomics course for molecular biologists and clinicians**

7-11 July 2014

Teachers  
Eduardo COOPER, CIBER Proteómica, Barcelona, Spain

Barcelona, Spain  
Barcelona, Spain  
Barcelona, Spain  
Barcelona, Spain  
Barcelona, Spain

**Genome wide approaches to study functional protein/RNA interactions**

15-20 September 2014

#### Speakers

Fatima GEBAUER, CRG, Spain  
Nicholas T. INGOLIA, UC Berkeley, USA  
Julian KÖNIG, IMB, Germany  
Reinhard LÜHRMANN, MPI, Germany  
Maria Paola PARONETTO, CERC Fondazione Santa Lucia, Italy  
Michael SATTLER, STB, Germany

#### Trainers

Elias BECHARA, CRG, Spain  
Julian KÖNIG, IMB, Germany  
Maria Paola PARONETTO, CERC Fondazione Santa Lucia, Italy  
Laurence WURTH, CRG, Spain

#### Organizers

Elias BECHARA,  
Centre for Genomic Regulation (CRG)  
Juan VALCÁRCEL,  
ICREA and Center for Genomic Regulation (CRG)

More information and online registration at:  
[www.crg.eu/RNACourse14](http://www.crg.eu/RNACourse14)



Members of the Board of Trustees:  
Generalitat de Catalunya



Dedicated Technology  
Transfer Office

A green rectangular sign with white, bold, sans-serif capital letters spelling 'INNOVATION'. The sign is mounted on a black metal pole and is angled upwards against a clear blue sky. In the background, a modern building with a grid of windows is visible.

INNOVATION

Translating new scientific  
knowledge into benefits for  
health and value for society

- Licensing and patent portfolio in cancer, CNS, dermatology, HIV/AIDS, methods
- Contract research agreements with pharmaceutical and biotech companies
- Strategic research agreement with **Sanofi**
- Q-Genomics



## Encouraging critical thinking and offering new educational resources

- Science & Art: scientific artistic contest
- Workshops for primary & high schools
- Scientific cafes
- "Easy Science" conferences
- Molecular biology summer campus
- Summer internships



# THANKS!

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