



ANNUAL REPORT



2015

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Institut de Biotecnologia i de Biomedicina

Parc de Recerca UAB, Mòdul B – Bellaterra (Cerdanyoladel Vallès) 08193

ibb@uab.cat

Administrative Structure



Director: Xavier Daura Ribera
Vicedirector: Laura Masgrau Fontanet
Manager: Eva Vila Morros

Administrative Support: Natividad Infante Cabrera
Manuela Romero Chávez
Rosa Calzada Calvo
María Teresa Jiménez Batista
Alicia Zorrilla Guinot

Technical Support: Almudena Merino Palomar
Francesca Mestres Folch
Monica Serrano García
Fernando Hernández Escoriza





Genome Integrity and Instability

Group Leader	Rosa Miró Ametller
Senior Members	Montserrat García Caldés Aurora Ruíz-Herrera Ignasi Roig Immaculada Ponsa
Postdoctoral Fellow	Rosa Ana Sanchez Guillén
PhD Students	Marina Marcet Ortega Guillem Borràs Gas Laia Capilla Pérez Helena Castillo Ecija Ana Martínez Andros Maldonado Linares Covadonga Vara González

Overview

Our group's research focuses on three topics related to genome instability. Firstly, we study the mechanisms implicated in the origin of chromosome instability associated to solid tumors, in particular to colon and bladder cancer. We analyze the mechanisms involved in chromosome reorganizations and aneuploidy origin occurring in tumor cells. Secondly, we explore the implication of chromosome rearrangements as a possible source for the existing mammalian karyotype diversity and the involvement of meiotic recombination in these processes. Finally, we try to understand the mechanisms that control meiotic recombination in mammalian meiosis. Specially, we focus on identifying key players from the pathways that control double strand break repair and genome silencing during meiotic prophase.

Projects

Explorando la plasticidad estructural del genoma de los mamíferos. CGL2014-54317-P. 2015-2017. PI: Aurora Ruiz-Herrera.

Estudio de los mecanismos que regulan la progresión de la profase meiótica en mamíferos. BFU2013-43965-P. MICINN 2013-2015. PI: Ignasi Roig.

Others

PhD thesis

Genomics in Evolution and Disease



Laia Capilla. On the role of chromosomal rearrangements in evolution: Reconstruction of genome reshuffling in rodents and analysis of Robertsonian fusions in a house mouse chromosomal polymorphism zone. 2015. Directors: A.Ruiz-Herrera, J.Ventura.

Sarai Pacheco. Estudi de la funció d'ATR durant la gametogènesi de mamífers. 2015. Directors: I.Roig

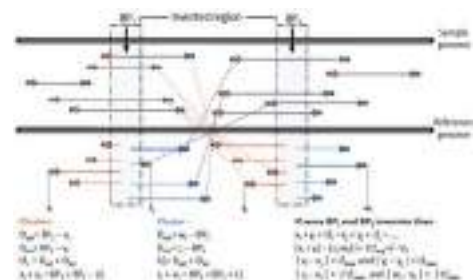


Comparative and Functional Genomics

Group Leader	Mario Cáceres Aguilar
Postdoctoral Fellow	Sònia Casillas Viladerrams Marta Puig Font
PhD Students	Roser Zaurin Quer Sarai Pacheco Piñol David Castellano Esteve Carla Giner Delgado Jon Lerga Jaso Isaac Noguera Guixà
Lab Technicians	David Izquierdo Fontanils M ^o Alejandra Delprat Obeaga Sergi Villatoro Gómez

Overview

Our laboratory is focused in the study of genome evolution and the genetic changes associated with individual and species differences, applying state of the art techniques and the wealth of available genomic data. In particular, a great degree of structural variation has been described in multiple organisms. In addition, we have information on the variation of expression levels of thousands of genes in different tissues and individuals. However, very little is known about the functional consequences of these changes and their role during evolution. To address these two questions, we use humans as a model and take a multidisciplinary approach that combines experimental and bioinformatic analysis, to generate results of interest in diverse fields.



Projects

La interpretacion de la variacion genomica desde la secuencia nucleotidica al fenotipo en drosophila y humanos. BFU2013-42649-P. 2013-2016. IP: Mario Caceres

Others

MSc Thesis

Jon Lerga Jaso. Landscape and functional impact of polymorphic inversions on the human genome. 2015. Director: Mario Cáceres

Maria Bellet Coll. Validation of differences in gene expression related to human polymorphic inversions. 2015. Director: Mario Cáceres

Organized meetings

Organization of the Seminar Series on Research in Genomics and Evolution at the Universitat Autònoma de Barcelona.

Patent

M. Cáceres, S. Villatoro, C. Aguado. An in vitro method of genotyping multiple inversions". EU Patent Application EP13382296.5.

Members of:

Coordinator of the Genomics and Proteomics Section of the Societat Catalana de Biologia.

Editorial work

BMC Genomics Associate Editor.

Bioinformatics of Genomics Diversity

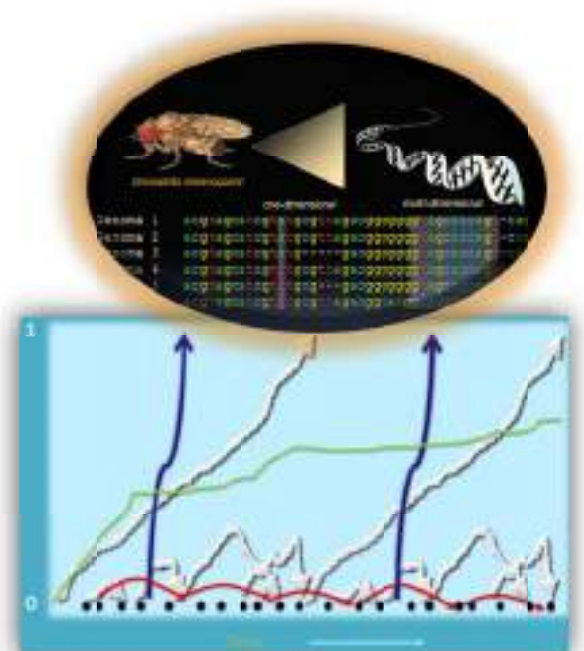
Group Leader	Antonio Barbadilla Prados
PhD Students	Sergio Hervás Fernández Marta Coronado Zamora
Lab Technicians	David Castellano Esteve

Overview

In our research we develop and implement population genetics models and estimators to analyze and interpret the pattern of genomic variation. Among the most recent achievements, we have charted the first high resolution map of the trail of natural selection along the genome.

Key words:

- Population Genomics
- Natural selection mapping
- Bioinformatics Genome Variation
- Genome Wide Association (GWA)
- Genome Variation Browsers



Projects

BFU2013-42649-P. Understanding genome variation from nucleotides to phenotypes in *Drosophila* and humans. Ministerio de Ecolomía y Competitividad. IP: Dr. Antonio Barbadilla i Dr. Mario Cáceres. 2014-2016.

UNAB13-74E-2138. Plataforma Big Data para el análisis bioinformático. IP: Dr. Antonio Barbadilla i Dr. Mario Cáceres. 2013-2015.

Others

PhD thesis

Miquel Ramia. Visualisation, description and analysis of the genome variation of a natural population of *Drosophila melanogaster*. 2015. Director: A. Barbadilla

Maite Barron. Patrones de variación nucleotídica y cartográfica de los bloques de selección ligada en el genoma de *Drosophila Melanogaster*. 2015. Director: A. Barbadilla

Members of:

Director of Bioinformatics Platform of campus UAB and UAB sphere Instituts of Health

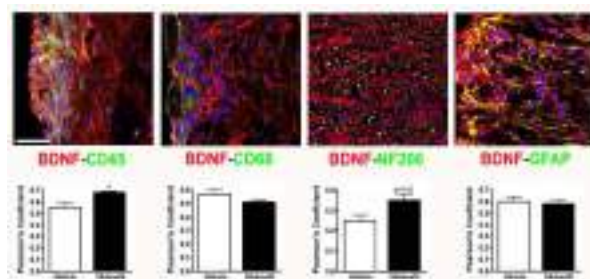
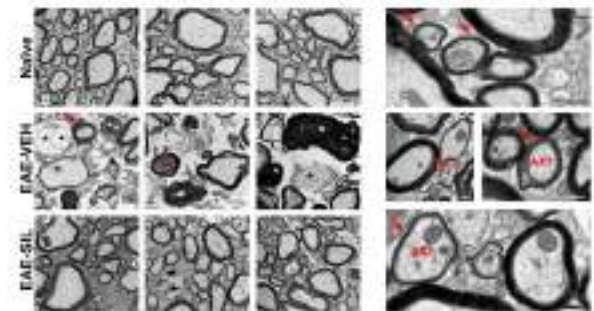
Promoter of a spin-off of Bioinformatics

Neuroimmunology

Group Leader	Agustina García Sánchez
Senior Member	Maria Antonia Baltrons Soler
Postdoctoral Fellow	Beatriz Moreno Bruna
Predocctoral Fellow	Daniela del Valle Diaz Lucena

Overview

Selective cyclic GMP phosphodiesterase 5 (PDE5) inhibitors, such as sildenafil (Viagra®), widely used for treatment of erectile dysfunction and pulmonary arterial hypertension, have been recently shown to exert neuroprotective actions in animal models of CNS injury and neurodegenerative diseases. Our group has demonstrated beneficial effects of PDE5 inhibitors in animal models of focal brain injury and of multiple sclerosis (MS) that are associated to down-regulation of neuroinflammation. In the later case, we have also shown that PDE5 inhibition can prevent demyelination and promote remyelination.



At present, we are investigating the mechanisms of the anti-inflammatory and remyelinating effects of PDE5 inhibitors in the animal model of MS, experimental autoimmune encephalomyelitis (EAE), as well as in immune cells from humans. Our final goal is to provide evidences that will support the notion of PDE5 as a therapeutic target for MS, taking it to a

preclinical stage. The group is also investigating if regulation of neuroinflammation is involved in the beneficial effects of sildenafil in cognition and β -amyloid burden reported by other groups in animal models of Alzheimer's disease.

Projects

Mecanismos celulares y moleculares del efecto neuroprotector y remielinizante del sildenafil en la encefalomielitits autoinmune experimental. (SAF2013-44671-P). Ministerio de Ciencia e Innovación. (2014). PI: Agustina García.

Molecular Immunology

Group Leader
Postdoctoral Fellow
Predoctoral Fellow

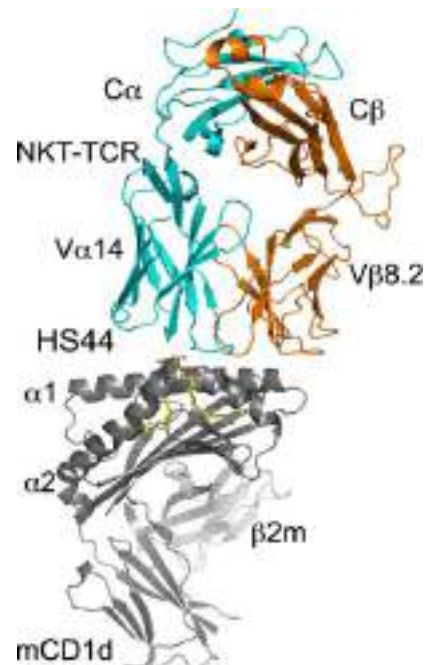
Ángel Raúl Castaño
Alari Pahissa, Elisenda
Ignasi Esteban
Noemí Saavedra Ávila

Overview

Activation of iNKT cells by CD1d-ligands is a immunotherapeutic tool under intensive investigation. α -GalCer is the prototypic agonist, but its excessive potency with contradictory activities hampers its potential therapeutic use. In search for novel ligands capable of overcoming these handicaps, we have obtained a series of synthetic analogs aiming for a controlled activation of the immune response

In vitro and in vivo studies demonstrate that some of these analogs are recognized by iNKT activating the immune response. One of them induces a robust IFN- γ production, without the characteristic cytokine storm induced by α -GalCer. Consequently, HS44 induces a very efficient antitumoral response in B16 tumor animal model able to completely avoid the establishment of lung metastasis. On the contrary, it is unable of inducing allergic responses making it suitable as immunotherapeutic reagent for future clinical applications.

New analogs aimed to further increase cellular Th1 response are being assayed as immune stimulants in “in vivo” models. Systemic induction of Th1 responses are being studied by wide spectrum serum cytokine analysis and their expected improved antitumoral capacities tested, and so far proved in one case, in tumor models. Cellular mechanism subjacent to their activation on the immune system, linking iNKT activation and antitumoral effectors, including movilization of innate cells from limfoid organs and the chemokines directing such traficking are ongoing efforts in our lab.



Projects

TV32013-130910. Antitumor activity of iNKT activators analogs of the α -GalactosylCeramide: towards immunotherapeutical reagents. IP: Raul Castaño 2014-2016.



Applied Immunology

Group Leader	Paz Martínez Ramírez
Senior Member	José Ramón Palacio
PhD Student	Carlos de la Haba
Lab Technician	Josefa Murillo

Overview

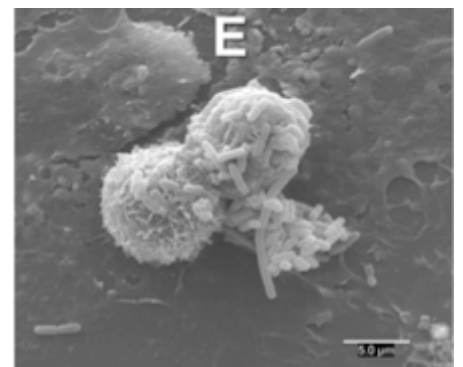
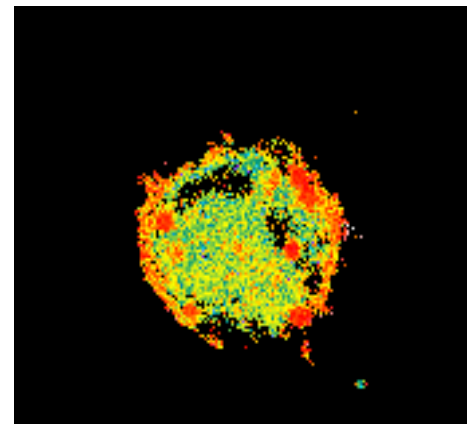
The group follows 3 main research lines:

1.- **Oxidative stress and inflammation in Reproduction.** Chronic inflammation together with oxidative stress modify the molecules which are involved in the materno-fetal dialogue during early embryo implantation. The study of antioxidant and/or anti-inflammatory therapies may contribute to the increase of implantation and pregnancy rates in assisted reproductive techniques.

2.- **Oxidative stress and biomembranes.** Lipid peroxidation may influence plasma membrane fluidity in cells from the innate and adaptative immune system (macrophages, lymphocytes). By using two-photon microscopy, a high resolution technique which allows the study of lipid dynamics *in vivo*, in individual cells, we detect how oxidative stress induces membrane changes so that the binding efficiency of ligand-receptor decreases, raft formation is prevented and cell activation may be inhibited.

A preliminary study on the relationship between oxidative stress, the biological age and quality of life in elderly people was performed. The influence of oxidative stress on membrane fluidity of immune cells, and how oxidative damage can modify the immune response is of great interest in the evaluation of disability in aging.

3.- **Nutrition and Immunology.** Probiotic and prebiotics have a protective role on several bacterial infections, so that they have been proposed as an alternative to the use of antibiotics and they are used in animal feeding to prevent neonatal diarrhea. We have investigated the protective effect of the probiotic *Saccharomyces cerevisiae* and a new developed prebiotic b-galactomannan, on epithelial intestinal cells and in a porcine model, and their immunomodulation ability in bacterial infections.



Others

Members of:

Soci ordinari de la Sociedad Española de Bioquímica, desde 1984.

Membre ordinari de la "European Society of Human Reproduction and Embryology", des de 1987.

Membre de la "International Society for Immunology of Reproduction" (I.S.I.R.) des de 1988.

Membre de la "American Society for Immunology of Reproduction" (A.S.I.R.) des de 1992.

Soci numerari de la Sociedad Española de Inmunología des de 1992.

Membre fundador de la European Society of Reproductive & Developmental Immunology (ESRADI)

Soci numerari de la Acadèmia de Ciències Mèdiques de Catalunya i de Balears des de 1996.

Directora científica del Servicio científico-técnico Cultivos Celulares, Producción de Anticuerpos y Citometría” de la UAB desde Junio de 2009

Celular Immunology

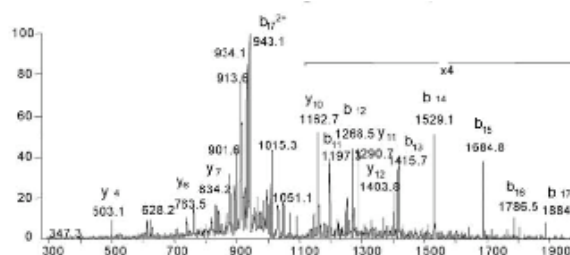
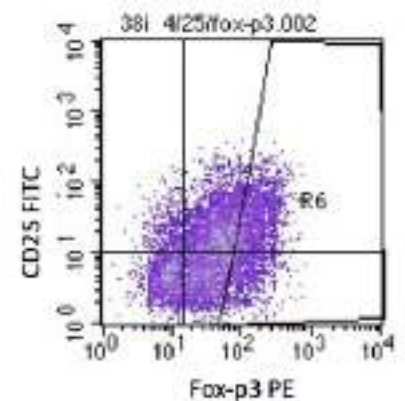
Group Leader	Dolores Jaraquemada
Senior Members	Mercè Martí Ripoll Iñaki Alvarez Pérez Carme Roura Mir
PhD Students	Teresa Ciudad Carolina Guitart Erika M. Scholz Lorena Usero Cristina Xufré
Lab Technician	Annabel Segura Anna Mestre Ferrer

Overview

The group's research interests are centered in the study of central tolerance, antigen processing, auto-antigen presentation and recognition in autoimmune diseases.

Specific lines include:

- Auto-antigen presentation in target organs.
- Autoreactive and regulatory T cells in autoimmunity.
- NKT Cells in Autoimmunity.
- Antigen processing in tolerance and autoimmunity.



Projects

SAF2012-35344 (subprogram MED, CICYT, Spanish Science Ministry). From antigens to TCR. A systematic approach to the immune response in type 1 diabetes. IP: Dolores Jaraquemada. 2012 – 2015.

Others

PhD thesis

Teresa Ciudad. Autoantigen processing. How immunodominant thyroglobulin peptides are generated and presented by HLA-DR molecules. 2015. Director: Dolores Jaraquemada.

MSc Thesis

Ana Sánchez. Pancreatic b-cells under cellular stress generate self-antigens recognized by iNKT cells. 2015. Dolores Jaraquemada.

Marta Castroviejo Bermejo. 2015. A systematic approach to insulin processing and presentation by T1d-associated hla-dr alleles. Dolores Jaraquemada.

María Sabater Arcís. 2015. Estudio de la capacidad adyuvante y su aplicación en la respuesta antitumoral del agonista de células iNKT AC11. Dolores Jaraquemada.



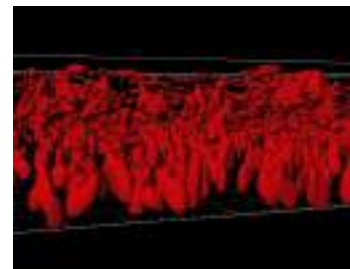
Bacterial Molecular Genetics and Pathogenesis

Group Leader	Isidre Gibert González
Postdoctoral Fellows	Daniel Yero Corona
PhD Students	Celeste Gómez Camacho
	Pol Huedo Moreno
	Sonia Martínez Servat
	Alba Sáez Fernández
	Pablo Rodríguez Fernández
	Roser Márquez Gómez

Overview

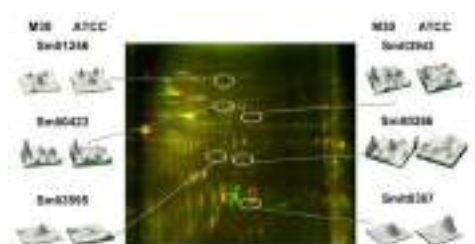
The main research interests of our group are:

- The molecular basis of bacterial pathogenesis and antimicrobial resistance.
- The identification and validation of new antimicrobial targets for Gram-negative pathogens.



Other research interest:

- Host-pathogen interactions and infection models: mouse, *C. elegans* and Zebrafish
- Bioinformatic approach to identify new potential candidates for vaccine and/or drug targets.



Keywords

Bacterial Pathogenesis, Virulence, Host-Pathogen Interactions Molecular Genetics, Genomics, Proteomics, Gene Expression, Antimicrobial Resistance, Antimicrobial Drug

Projects

Convenis de transferència i prestació de serveis en relació a programes de qualitat microbiològica amb Sociedad Española de Bioquímica Clínica y Patología Molecular i Fundació pel control de qualitat dels laboratoris clínics.

Procesos biológicos no esenciales en *Stenotrophomonas maltophilia* como dianas para el diseño de nuevas estrategias antimicrobianas. BIO2015-66674-R. PI: Isidre Gibert and Xavier Daura

Others

MSc Thesis

Gutiérrez Barragán, Sara. Sistemas de Quórum Sensing y estrategias anti-Quórum sensing como control de la formación de biopelículas bacterianas. 2015. Director del treball: Isidre Gibert

Ana Fernandez Carrascal. Utilidad de las técnicas de secuenciación en el estudio de *Staphylococcus aureus* resistente a la metililina. 2015. Director del treball: Isidre Gibert

Evolutionary Immunology

Group Leader	Nerea Roher Armentia
PhD Students	Debora Torrealba Sandoval
	Angels Ruyra Ripoll
	Jie Ji
	Jofre Gasion
	Eva Vallejos

Overview

➤ Development of nanovaccines for fish species of commercial interest

It's been a central focus of our work. We are searching for non-toxic, non-stressful and effective systems to protect commercial fish from diverse pathogenic challenges. Taking into account the particularities of the fish immune system, we have recently completed a nanoformulation (Ruyra et al., 2013) able to increase the survival of bacterial challenged fish (Ruyra et al, manuscript in preparation). The development of sustainable aquaculture, a strategic sector to feed the ever-increasing



human population (Khan et al, 2011), relies on disease prevention through the implementation of preventive immunostimulation and effective vaccination strategies (Evensen et al., 2009). In particular, fish immunologists face now a major challenge trying to prevent the massive economic losses caused by viral diseases. Development of novel vaccines to protect fish from viral diseases such as Spring Viremia Carp Virus, SVCV or Viral haemorrhagic septicemia viruses, VHSV (Gomez-Casado et al., 2011) will be a major goal of our research efforts during the next years. In collaboration with a fish virologist (Dr. A. Estepa) we aim to encapsulate plasmids coding for antigenic viral proteins into nanoliposomes and characterise them in zebrafish to finally, test the formulations in the real host. A hallmark of our work in the next five years would be to design and develop new nanovaccines against SVCV and VHSV.

➤ The evolution of pathogen recognition in vertebrates

In the last 7 years we have been investigating the molecular basis of the fish immune system, and we have been trying to decipher the particularities of its innate immune response. Most fish species lack the TLR4 receptor that senses the LPS presented in the outer membrane of bacterial cells. We are



interested to tackle the characterization of the molecule responsible for LPS sensing and why fish are less sensitive to the toxic and pro-inflammatory effects of LPS. Genomic tools have been of great importance for the fish research field during the last years. Fish genomes such as fugu, puffer fish, medaka, cod or salmon among others start to be available to the scientific community. A major achievement in fish biology has been the completion of the zebrafish reference genome sequence, with publication of the Zv9 assembly. The Sanger Institute provides the research community with a high-quality zebrafish genome sequence. The number of identified protein-coding genes in the zebrafish genome now stands at around 24000 and fish supplied by the Zebrafish Mutation Resource (Sanger Institute) can be used to study a wide range of biological processes such as response to pathogens, cancer, diabetes etc. Our lab will be provided with INF γ and IL-1 β mutant fish that will be used to investigate the anti-viral and the inflammatory response respectively. Our fish facility is open to house other mutants of interest for the research of groups in the IBB-MRB.

➤ **Defense mechanisms in *Branchiostoma lanceolatum***

Lastly, besides the above mentioned research lines, we will have an additional long-term research line aimed to explore the defense mechanisms in a non-vertebrate marine organism, the amphioxus (*Branchiostoma lanceolatum*) that would allow us for a better understanding of the vertebrate immune system. From an evolutionary point of view the amphioxus is an excellent living organism to study what was going on before vertebrates arose. The amphioxus is a cephalochordate with a small genome and simple body architecture that makes it very suitable for evolutionary studies. In collaboration with Dr. Bayes (IIB, Hospital de Sant Pau) we will study different aspects of amphioxus biology such as nervous system architecture, defense mechanisms or tolerance and biodistribution of nanoliposomes.

Projects

Desarrollo de nanoliposomas como vehículos de inmunoestimulantes/vacunas en especies de interés para la acuicultura. AGL2012-33877 (01/01/2013 – 31/12/2015).

Others

MSc Thesis

Lorena Luque. The regulation of the respiratory burst responses induced by Poly (I:C) and the gene expression of $\alpha 7$ nicotinic acetylcholine (nACh) receptor in different tissues of rainbow trout (*Oncorhynchus mykiss*). Master de Acuicultura 2014-15. Directora del treball: Nerea Roher

Response Mechanisms to Stress and Disease

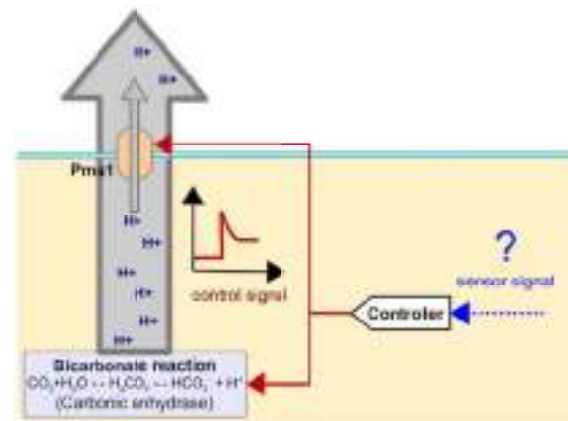


Yeast Molecular Biology

Group Leader	Joaquin Ariño Carmona
Senior Member	Antonio Casamayor Gracia
Postdoctoral Fellows	Maria López
PhD Students	Carlos Calafí
	Laura Tatjer Recordà
	Albert Serra Cardona
	Cristina Molero Merinero
	David Canadell i Sala
	Diego Velázquez
	Chun-Yi Zhang
	Carlos Santolaria Bello
Lab Technician	Montse Robledo Costas

Overview

Our group is interested in different aspects of the biochemistry, molecular biology and genomics of the yeast *Saccharomyces cerevisiae*, particularly in those involving cell signaling via phospho-dephosphorylation processes. This includes research on ion homeostasis, response to various forms of stress or cell cycle regulation. Particular emphasis is given to the interaction between ion and nutrient homeostases. The ultimate goal is to obtain a comprehensive view of the yeast response to perturbations in their environment that may lead to a deeper insight into the biology of this organism, as well as to new biotechnological applications. As an example, we are carrying out a project to develop new strains tolerant to acetic acid, to improve the fermentative processes involved in the generation of bio-alcohol from plant debris.



C) Plasmid	YPD	8.0 pH
YCp50 Ø		
YCp50-RAS2*		
YEplac112 Ø		
YEplac112-GPA2*		



Projects

Exploración de los mecanismos de homeostasis de cationes monovalentes como nueva diana antifúngica. (Ref. BFU2014-54591-C2-1-P). PI: Joaquin Ariño.

Others

PhD thesis

Albert Serra. PHO89 i ENA1 comparteixen una xarxa de regulació que permet el seu acoblament funcional en resposta a l'alcalinització ambiental". 2015. Director: J. Ariño.

David Canadell. La resposta dels llevats a la manca de potasi revela noves funcions del potassi. 2015. Director: J. Ariño.

Laura Tatjer. Aproximacions genètiques per l'estudi de les funcions de la proteïna fosfatasa PTC1 en *S. Cerevisiae*. 2015. Director: J. Ariño.

MSc Thesis

Daniel Martínez Manuel. Dianas presents en hongos patógenos como posibles candidatas para el desarrollo de terapias antifúngicas (Máster oficial en Bioquímica y Biología Molecular, UAB). 2015. Joaquin Ariño.

Carlos Calafí Pascual. Anàlisi funcional dels mutants ARTs en la degradació de Pho89. antifúngicas (Máster oficial en Bioquímica y Biología Molecular, UAB). 2015. Joaquin Ariño.

Members of:

Joaquín Ariño ha sido nombrado miembro del Editorial Board de la nueva revista *Microbial Cell* (<http://microbialcell.com/>), editada por Shared Science Publishers OG. Editorial work.

Award to "Excelencia en Investigación 2010", Universitat Autònoma de Barcelona. (2010-2014)

Computational Biology

Group Leader	Xavier Daura Ribera
PhD Students	Michael Cristòfol Clough
Lab Technician	Oscar Conchillo Solé

Overview

The group's trajectory has been, until recent years, largely based on the use of molecular-dynamics simulation methods to study biomolecular systems at atomic resolution, mostly in connection with the process of polypeptide folding. Since 2007, however, the group has expanded its scope towards the proteomic analysis of pathogenic bacteria for the identification of antigens and putative drug targets. This expansion has been enabled by the incorporation of new members with expertise on additional computational and experimental techniques, and by teaming up with IBB's Bacterial Molecular Genetics group. Currently, the group has active projects, often intertwined, in the following topics:

- Study of biophysical properties of peptides and proteins by molecular-dynamics simulation methods.
- Computational compound screening and redesign for drug discovery.
- Bioinformatic and experimental identification and characterization of proteins of pathogenic bacteria for vaccine and antibacterial-drug development.

In general each of these topics is being developed within the context of a collaborative project.

Projects

Procesos biológicos no esenciales en *Stenotrophomonas maltophilia* como dianas para el diseño de nuevas estrategias antimicrobianas. BIO2015-66674-R. PI: Isidre Gibert and Xavier Daura

Others

Institutional responsibilities

Applied Proteomics and Protein Engineering



Director of the Institute of Biotechnology and Biomedicine (IBB) of UAB

Commissions of trust

Member of Three Delegate Commissions of UAB's Governing Council: Research (since 2011), Knowledge Transfer and Strategic Projects (since 2012) and Doctorate (since 2013).

Project evaluation for EU's H2020, since 2014.

Project evaluation for the Italian Association for Cancer Research (AIRC), Italy, since 2011.

Project evaluation for the Partnership for Advanced Computing in Europe (PRACE), EU, since 2012.

Peer review for several journals, including Journal of the American Chemical Society, Angewandte Chemie International Edition, PLoS Computational Biology, Journal of Chemical Theory and Computational, Bioinformatics, etc.

Patent

D. Yero, M. Indarte, O. Conchillo, I. Gibert, X. Daura. Enhanced antibiotic composition.

Theoretical Molecular Biology

Group Leader	Josep M. Lluch
Senior Members	Àngels González Lafont Mireia García Viloca Laura Masgrau
Postdoctoral Fellow	Patricia Saura Martínez
PhD Students	Ayax Pérez Gallego Maria Fernanda Mendoza

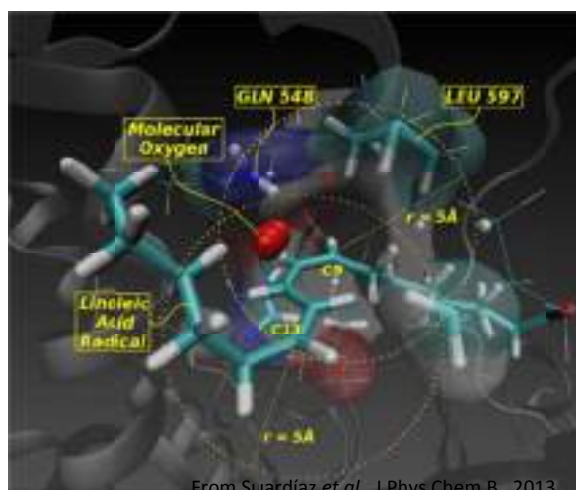
Overview

In the Theoretical Molecular Biology group we are interested in understanding how enzymes work at the atomic/molecular level. We are particularly specialized on the theoretical study of the chemical reactions taking place inside enzymes and in identifying the main actors that make possible these exquisite catalytic processes. Among other mechanistic aspects, for example, we analyse how the high regio and stereospecificity of this biological catalysis is achieved. Our final aim is to use all that knowledge to force conveniently modified enzymes to work in the way we need to achieve outstanding biomedical and biotechnological applications.

To do this, we apply and develop Theoretical and Computational Chemistry methods, including hybrid quantum mechanics/molecular mechanics methods on the solvated enzyme-substrate(s) system, molecular dynamics simulations, free energy calculations, the EA-VTST/MT scheme and protein-ligand dockings.

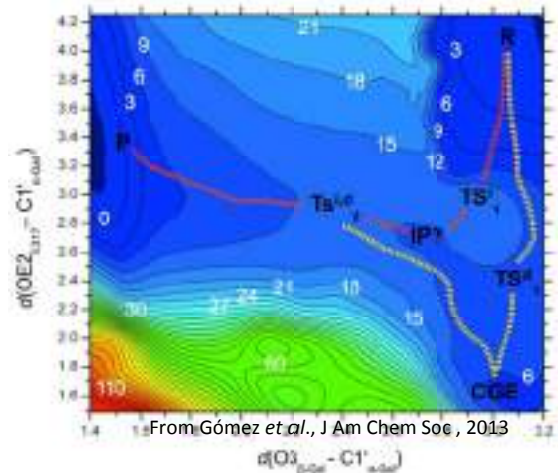
Our current main lines of research focus on:

- **Mammalian lipoxygenases (LOs)**: LOs are implicated in the pathogenesis of inflammatory and hyperproliferative diseases. Moreover, some isoforms like the 15S-LO, are highly regio and stereospecific in the hydroperoxidation reaction they catalyse; specificity required for its correct physiological function. We have been analysing the possible causes of this regiospecificity in the oxygen attack step catalysed by rabbit 15S-LO. Our results conclude that, among the different possibilities proposed in the literature, the steric-shielding hypothesis seems to be the operating one in this enzyme. On another hand, we have started the study of the hydrogen abstraction step.



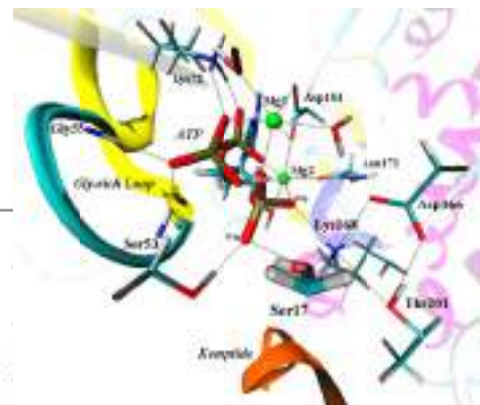
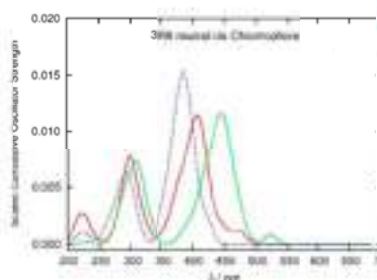
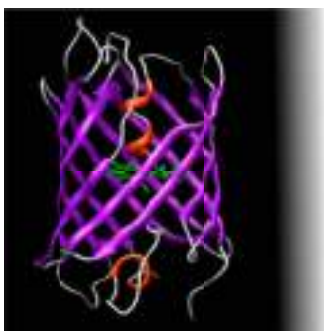
From Suardi az *et al.*, *J Phys Chem B*, 2013

- **Computational chemical glycobiology:** the biosynthesis of glycans has been the focus of this research line. In particular, we are providing computational evidences that are helping clarify the catalytic mechanism used by retaining glycosyltransferases, a matter that has been under debate for the last decades and has remained as one of the unanswered fundamental questions in glycosciences. We have studied *in silico* several of these enzymes, some of these works being compiled in the PhD thesis of H. Gómez, defended in October 2013.



- **Serine-threonine kinases:** The cAMP-dependent protein kinase A (PKA) is a prototypical kinase that plays pivotal roles in numerous signaling pathways. During this period, important progress has been done on the study of the reaction mechanisms (dissociative and associative) of the phosphoryl transfer catalyzed by PKA and the Asp166Ala mutant. As Asp166 has a fundamental role in the dissociative mechanism, the only way to explain the experimental activity observed for the mutant enzyme is via an associative process never taken into account by other modeling studies of this important catalytic process. The energetic and structural analysis of the catalytic reaction pathway performed in our laboratory is shedding some light on the origin of transition state stabilization within the kinase family.

- **Fluorescent Proteins:** Part of our group has a strong background in the study of chemical reactivity in excited states. In the last years, this experience is also being



applied to investigate several aspects related to the fluorescence phenomena in fluorescent proteins,

which have many applications in biomedicine as *in vivo* biomarkers. The Green Fluorescence Protein (GFP) and many members of the Red Fluorescence Protein (RFP) family are being the focus of our research. Especially we are working on the design of RFP variants that excite and emit in the optical window in which mammalian tissues are relatively transparent to light. This new fluorescent proteins for imaging in mammals should be useful for following biological processes “in vivo”.

Applied Proteomics and Protein Engineering



Projects

Adscribed at the Department of Chemistry of the UAB.

Applied Proteomics and Protein Engineering



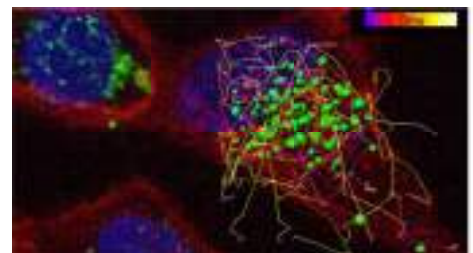
Nanobiotechnology

Group Leader	Antonio P. Villaverde
Senior Members	Neus Ferrer Esther Vazquez José Luis Corchero Elena Garcia Fruitós Joaquin Seras
PhD Students	Olivia Cano Mireia Pesarrodonna Paolo Saccardo Ugutz Unzueta Xu Zhikun Naroa Serna Laura Sanchez Fabián L. Rueda Esther Martínez José Vicente Carratalá Cristina Membrado Anna Pascual Eudald Pérez
Lab Technician	Rosa Mendoza



Overview

- Development of self-assembling protein nanoparticles for non-viral gene therapy.
- Development of new bacterial nanomaterials for tissue engineering.
- Design and production of enzymes and antibodies for cell therapy.
- Design of processes for production of recombinant proteins of therapeutic interest in bacteria, insect cells and mammal cells.
- Study of cell stress responses to the production of proteins of pharmacological interest.
- Study of the physiology and genetics of protein aggregation in recombinant bacteria.
- Generation and engineering of virus-like-particles of biomedical interest.
- Design of functionalized proteins for targeted drug delivery, endosomal escape and blood-brain barrier crossing.



Projects

Provision of operational and technical expertise in relation to chemical and biochemical processes and advanced product development. INNOTUNE BVBA. IP Antoni Villaverde

Genotoxic nanoparticles targeting colorectal cancer stem cells. TV32013-132031. IP Antoni Villaverde

Ingenieria de nanopartículas proteicas para la entrega dirigida de proteínas terapéuticas y de ácidos nucleicos. BIO2013-41019-P. IP Antoni Villaverde.

2014 SGR 132 Microbiologia bàsica i aplicada. . IP Antoni Villaverde

Ingeniería del vehículo y el cargo en la terapia génica no vírica del cáncer colorrectal metastásico. PI12/00327. IP Esther Vazquez Gomez.

Personalized nanomedicine for triple negative breast cancer stem cells. TV32013-133930. IP Esther Vazquez Gomez.

Others

PhD thesis

Eudald Pérez Pérez. Optimización de la producción de nanopartículas de interferón gamma bovino en Escherichia coli KPM335. Màster: Biotecnologia Avançada. 2015. Elena Garcia Fruitós i Neus Ferrer Miralles.

Cristina Membrado Corma. Nanopartículas recombinantes de poliéster producidas en Lactococcus lactis. Màster Microbiologia Aplicada. 2015. Elena Garcia Fruitós

Laura Sánchez García. Recombinant therapeutic proteins for clinical use. Màster Microbiologia Aplicada. 2015. Antonio Villaverde Corrales, Esther Vázquez Gómez, Neus Ferrer Miralles, Ugutz Unzueta.

MSc Thesis

Esther Ramirez. Analysis of the bacteriophage P22 viral spread within bacterial populations and its characterization as immunobiosensor. 2015 . A.Villaverde

Paolo Saccardo. Desenvolupament de virus artificials per nanomedicina i teràpia gènica. 2015. A.Villaverde, N.Ferrer, E.Rodríguez.

Xu Zhikun. Design of protein nanoparticles for cell targeting and blood brain barrier crossing. 2015. E.Vazquez, A.Villaverde, N.Ferrer.

Patent

Olivier LACZKA, Francisco Javier DEL CAMPO, Francisco Xavier MUÑOZ PASCUAL, Antonio P. VILLAVARDE CORRALES, Neus FERRER MIRALLES, Rosa María FERRAZ COLOMINA. Biosensor for detecting anti-hiv antibodies. WO2010026275A1. US20110233073 A1

Marco Colás, María Pilar; Pascual Durán, Nuria; Pastells Díez, Carme; Sanchez Baeza, Francisco; Villaverde Corrales, Antonio Pedro; Rodríguez Carmona, Escarlata. Haptens y conjugados derivados de piocianina, anticuerpos de los mismos, y método inmunoquímico para la detección de infecciones provocadas por pseudomonas aeruginosa. WO2014135730 A. US20160033489.

Miro Jaume Veciana, Bastardas Inmaculada Ratera, GIL César DÍEZ, Corrales Antonio Pedro Villaverde, Gómez Esther Vázquez, Fruitós Elena García. Inclusion bodies, bacterial cells and compositions containing them and uses thereof. WO2010026275A1. US20110233073 A1.

Miro Jaume Veciana, Bastardas Inmaculada Ratera, GIL César DÍEZ, Corrales Antonio Pedro Villaverde, Gómez Esther Vázquez, Fruitós Elena García. Inclusion bodies, bacterial cells and compositions containing them and uses thereof. WO2010076361 A1. US20110268773.

Rigat Isolda Casanova, Navarro María Virtudes Céspedes, Miralles Neus Ferrer, Bafalluy Ramon Mangues, Elorza Ugutz Unzueta, Gómez Esther Vázquez, Corrales Antonio Villaverde. Methods and reagents for efficient and targeted delivery of therapeutic molecules to cxcr4 cells. WO2012095527 A1. WO2012095527 A1.

Members of:

Member of CIBER en Biomateriales, Bioingeniería y Nanomedicina (ISCIII) since 2006.

Member of the Spanish Platform on Nanomedicine since 2007.

Member of the European technological Platform in Nanomedicine since 2008 and UAB representative.

Chairman B-DEBATE on "Nanotechnology in human and animal health". Barcelona, Spain, 2013.

Chairman 2st Workshop on Nanomedicine UAB-CEI. Barcelona, Spain, 2013.

Asian Congress on Biotechnology (Acb2013). India. 2013.

Applied Proteomics and Protein Engineering



Scientific advisor of the la TWAS, The academy of sciences for the developing world, since 2013

Editorial work:

BMC Genomics Associate Editor.

Editor-in-Chief de Microbial Cell Factories (ISSN: 1475-2859).

Editor de Microorganisms (ISSN 2076-2607) desde 2012.

Editor de Medical Sciences (ISSN 2076-3271) desde 2012.

Applied Proteomics and Protein Engineering

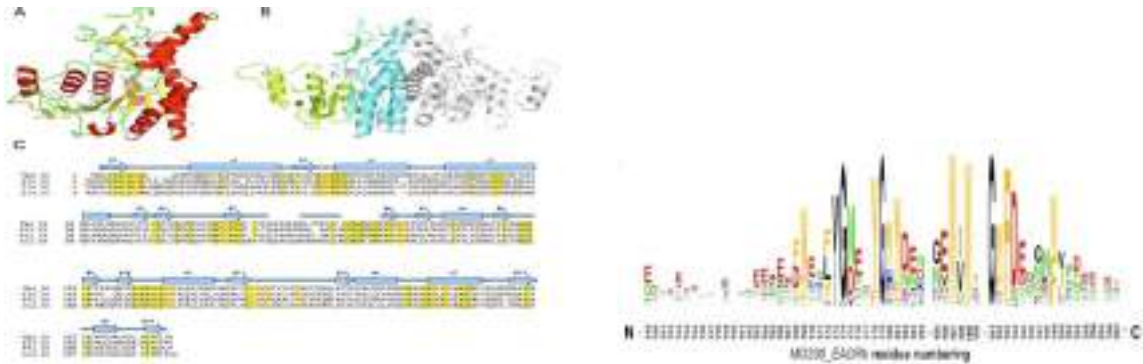


Molecular Biology

Group Leader	Enrique Querol Murillo
Senior Members	Jaume Piñol Ribas Josep A. Perez Pons
Postdoctoral Fellow	Ángel Mozo Xavier Serra Hartmann Oscar Quijada Merçe Ratera
PhD Students	Isaac Amela Abellán Luis González González Luis Franco Serrano Ana María, Martínez Luis García Morales Mario Huerta Casado Marta Hernández Solans Cristian Ponce Basco Sergi Torres Puis Juan Aibar

Overview

- Mycoplasma genitalium as a model of minimal cell and genome. Functional proteomics, adhesion and gliding mechanism, pathogenicity.
- Bioinformatics: Analysis of protein structure and function. Gene expression algorithms. Vaccine and drug target identification.
- Biotechnology: vaccine and diagnostic kits design.



Projects

¿Son la mayoría de las proteínas multifuncionales (MOONLIGHTING)? . BFU2013-50176-EXP. IP Enrique Querol.

Coordinació i dinamització Grups Tecnio UAB-CSIC a l'entorn del PRUAB. TECCIT12-1-0007-08. IP Enrique Querol.

Análisis de los mecanismos de virulencia y patogenicidad en micoplasmas: diseño de vacunas contra algunas especies de interés clínico. BIO2013-48704-R. IP Jaume Piñol.

Others

PhD thesis

Luis Gonzalez. Functional and structural analyses of the terminal organelle of *Mycoplasma genitalium*. 2015. Directors: E.Querol, J.Piñol.

Luis Garcia. Role of MG491 protein in the motile machinery of *Mycoplasma genitalium*. 2015. Directors: E.Querol, J.Piñol.

Sergio Hernández. Análisis bioinformático de las proteínas multifuncionales (moonlighting). 2015. Directors: E.Querol.

Patent

Inventores: L. González, J. Piñol, J. Montane, M. Camats, E. Querol, M. Sitja. "Cepas mutantes de *Mycoplasma hyopneumoniae*" WO2014/009586 A2. "Vectors for transforming *Mycoplasma hyopneumoniae*, transformed *M. hyopneumoniae* strains, and use thereof" EP 2 684959 A1".

Applied Proteomics and Protein Engineering



Inventors Gonzalez Luis Gonzalez, RIBAS Jaume PIÑOL, Giralt Jordi Montane, Malet Maria Camats, Murillo Enrique Querol, ARNAU Marta SITJA. WO2014135730 A1. Haptens y conjugados derivados de pirocianina, anticuerpos de los mismos, y método inmunoquímico para la detección de infecciones provocadas por pseudomonas aeruginosa. US20160033489

RIBAS Jaume PIÑOL, Virgili Sergi Bru, SOLER Laura FERRER, ARNAU Marta SITJA, Murillo Enrique Querol. WO2014009586 A3. Cepa viva atenuada de actinobacillus pleuropneumoniae. US20150306200

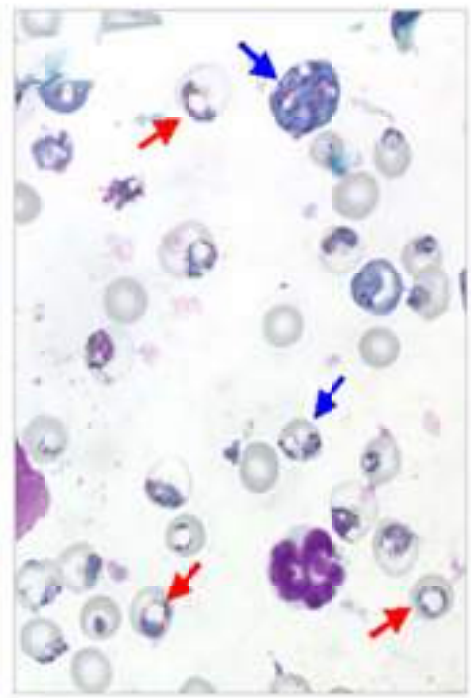
Protein Engineering and Proteomics

Group Leader	Francesc X. Avilés Puigvert
Senior Members	Josep Vendrell Roca Julia Lorenzo Rivera
PhD Students	Giovanny Covalada Olivia Tort Regas Javier Garcia Pardo Esther Berenguer de la Cuesta Roberto Fernández Álvarez María del Carmen García Guerrero Carla Granados Colomina Sergi Montané Bel David Montpeyó García-Moreno Irantzu Pallarés Goitiz Emi Evangelio Albert Fina David Martínez Threpthimol Ponnoth Sergi Rodríguez Salvio Suárez

Overview

Our group's interests lie in protein engineering, focusing on the study of protease precursors and inhibitors in general, and on metalloproteases in particular. Among this lines we work in redesigning proteins or organoproteic molecules capable of keeping these enzymes inactive, and in such way finding out determinant factors for their activation and inactivation.

We also develop methodologies for high-throughput proteomics as well as for the classification, structural prediction / simulation and modeling of proteins, ligand design, drug design and protein engineering in general.



Projects

Grup consolidat de la Generalitat de Catalunya 2014SGR1658. 2014. IP: F. X. Avilés.

Interactiva diseño de sondas e imagen de carboxipeptidasas. en transito de la funcion a la aplicabilidad. BIO2013-44973-R.2014. IP: F. X. Avilés

Others

PhD thesis

Javier Garcia. Structural and functional characterization of regulatory metallopeptidases: Studies on human carboxypeptidases D and Z, and the transthyretin-like domain. 2015. Directors: J.Lorenzo, F.X.Avilés.

Members of:

Evaluator/referee of different scientific journals and, particularly, of Eur. J. Biochem./ FEBS J./ Proteomics / J Biol Chem...etc... etc (1985-2015), and member of the Editorial Board of J. Protein Chem & The Protein Journal (2001- to now), Microbial Cell Factories (2004-2014) and J Biol Chem (1990-1995 & 2009-2014).

Protein Folding and Conformational Diseases

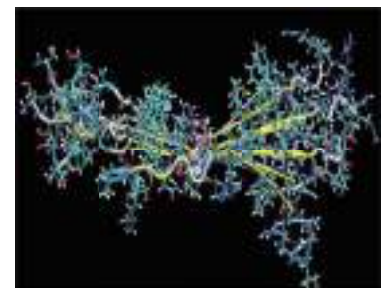
Group Leader	Salvador Ventura Zamora
Postdoctoral Fellow	Susana Navarro Cantero
Lab Technician	Natalia Sanchez de Groot
PhD Students	Ricardo Graña-Montes
	Patrizia Marinelli
	Anita Carija
	Marta Díaz Caballero
	Sebastián Andrés Esperante Bedani
	Francisca Pinheiro
	Ricardo Sant'Anna Oliveira
	Alex Mur
	Bruno Macedo
	Carlota Gómez
	Joan Serrano
	Jordi Pujols
	Marcos Gil
	Sergio Espinosa

Overview

We aim to understand the chemistry and biology of protein folding and how this reaction is competed in the cell by misfolding and aggregation processes, leading to the onset of a variety of human conformational diseases.

Among other achievements, in the present year:

1.- Using atomic force microscopy, single molecule force spectroscopy and molecular dynamics we have addressed the inner forces that stabilize amyloid fibrillar structures (Valle-Delgado JJ. et al. 2012)

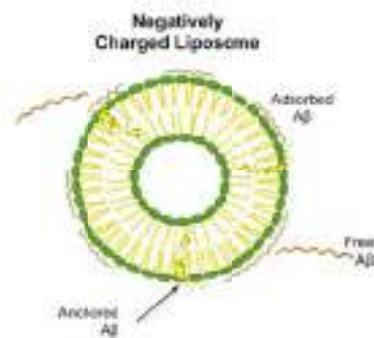


2.- We have deciphered the role played by disulfide bonds on the thermodynamic stability of proteins, folding kinetics and specially on the their aggregation into amyloid fibrils. They act as key molecular elements promoting the formation of stable functional forms and precluding the population of aggregating species that might trigger pathological processes. (Grana-Montes R, et al. 2012)

3.- The formation of aggregates by misfolding polypeptides is inherently toxic for the cell, decreasing cellular fitness. Using bacteria as a model organism we have developed a robust system to impact of protein aggregation in cell al., 2012a)

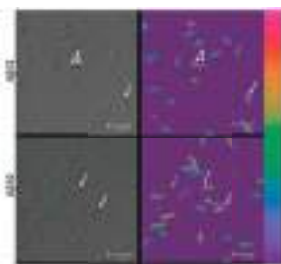
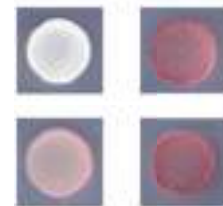


Using bacteria as a model model and quantify the homeostasis. (Villar-Pique et



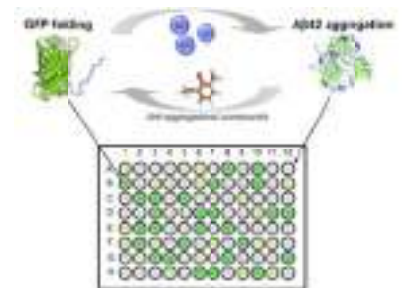
4- The neurotoxicity of the amyloid peptide Abeta is exerted through interactions with neuronal membranes. Using liposomes as model membranes, we have shown that it is the balance between peptide insertion and adsorption in the membrane that modulates its aggregation and toxicity (Sabate et al 2012a).

5- We have shown that bacterial cells might form infective amyloid structures and therefore that they can be used to generate and study prion proteins (Espargaro et al 2012a).



6- We have developed a method that exploits flow-cytometry to screen the impact of genetic mutations or chemical compounds in the aggregation of proteins involved in different pathologies (Espargaro et al 2012b).

7- We have developed a method based on GFP refolding to identify chemical compounds that promote or avoid the aggregation of biotechnological/biomedical relevant proteins (Villar-Pique et al., 2012a).



Projects

Grup d'estudis de proteïnes autoagregatives (2014SGR 938) 2014. Generalitat de Catalunya.

Applied Proteomics and Protein Engineering



ICREA-ACADEMIA Award 2009 in Life and Medical Sciences. 2010-2015. Generalitat de Catalunya. IP: Salvador Ventura

Descubrimiento, caracterización y diseño de nuevos amiloides funcionales auto-replicativos. BFU2013-44763-P. IP: Salvador Ventura.

Desarrollo de un medicamento para el tratamiento de la amiloidosis por transtiretina. Empresa: SOM INNOVATION BIOTECH SLU. RTC-2014-1931-1. IP: Salvador Ventura.

Diagnóstico y combate molecular de tres enfermedades neurodegenerativas (Parkinson, fenilcetonuria y amiloidosis TTR) NEUROMED. SOE4/P1/E831. IP: Salvador Ventura.

Others

PhD thesis

Patrizia Marinelli. From sequence to structure: Determinants of Functional and Non-functional protein aggregation. 2015. Director: S.Ventura, S.Navarro

Applied Proteomics and Protein Engineering



Protein Structure

Group Leader

David Reverter Cendrós

Postdoctoral Fellow

Nathalia Varejão Nogueira da Paz

PhD Students

Bing Liu

Gerard Casacuberta

Hèctor López

Jara Lascorz

Jéssica Angulo

Roger Canton

Overview

- Structural characterization of the activation cascade by the mitotic kinases NEK6, NEK7 and NEK9.
- Structural and functional studies of the de-ubiquitin proteases USP25 and USP28 regulated by SUMO modification.
- Structural characterization of the complex SMC5/SMC6 and its roles as a SUMO E3 ligase.

Projects

Estudio funcional y estructural de las modificaciones post-traduccionales por la familia ubiquitin/ubiquitinlike (Ref. BFU2012-37116). MEC 2013-2015.

NMR Applications in Biomedicine (GABRMN)

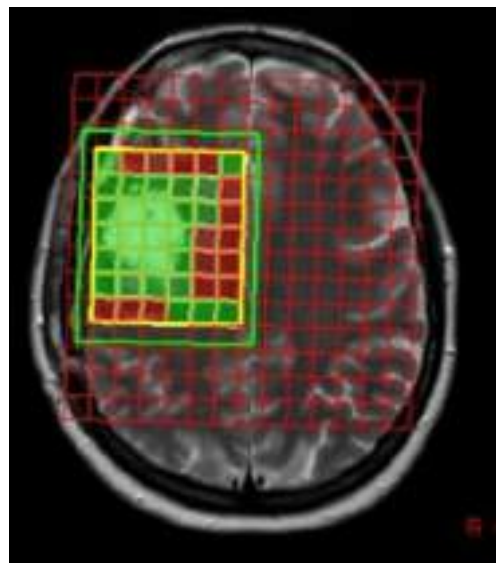
Group Leader	Carles Arús Caraltó
Senior Members	Margarida Julià Sapé Ana Paula Candiota
PhD Students	Magdalena Ciezka Victor Mocioiu Laura Ferrer Font Xavier Serra Mocioiu Yanisleydis Hernández

Overview

GABRMN stands for "Grup d'Aplicacions Biomèdiques de la Ressonància Magnètica Nuclear".

Our research group is located jointly at the IBB and at the Unitat de Biociències of the Departament de Bioquímica i Biologia Molecular, located at the Faculty of Biosciences of the Universitat Autònoma de Barcelona, UAB.

The GABRMN@IBB hosts all infrastructure and personnel related to bioinformatics developments needed to fulfil our research lines. The GABRMN@IBB hosts, jointly with the Servei de Ressonància Magnètica (Nuclear Magnetic Resonance Facility) (SeRMN) (<http://sermn.uab.cat/>) of the UAB, one of the CIBER-BBN platform units, the Platform of Biomedical Applications of Nuclear Magnetic Resonance at the Universitat Autònoma de Barcelona.



The bioinformatics platform @IBB, with a total storage capacity of 12TB, is accessible through the UAB network (agarcia@gabrmn.uab.es for access). It hosts two multicentre databases (INTERPRET and eTUMOUR), with NMR and clinical data for more than 1000 human brain tumour patients and provides consultancy in processing and mathematical analysis of MRSI data, preclinical and clinical.

The platform also distributes GABRMN software packages such as the INTERPRET decision-support system for human brain tumour diagnosis based on MRS and SpectraClassifier, for pattern recognition of in vivo MRS data.

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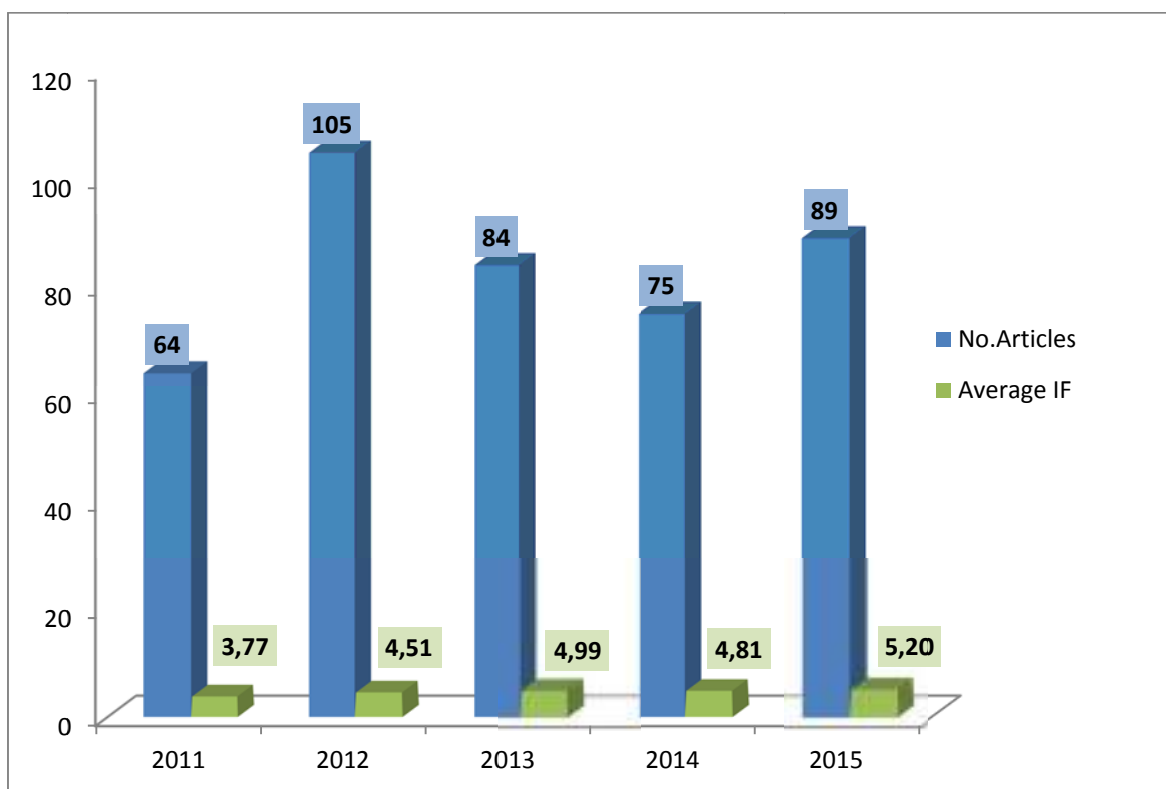
Others

Editorial work

Carles Arús is member of the editorial board of “MAGMA Magnetic Resonance Materials in Physics, Biology and Medicine”.

Publications

Year	No.Articles	Total IF	Average IF
2011	64	241,49	3,77
2012	105	473,86	4,51
2013	84	418,86	4,99
2014	75	360,66	4,81
2015	89	462,45	5,20



Abrie, J. A., C. Molero, J. Arino, and E. Strauss. 2015. "Complex stability and dynamic subunit interchange modulates the disparate activities of the yeast moonlighting proteins Hal3 and Vhs3." *Scientific Reports* 5.

Alamo, P., A. Gallardo, F. Di Nicolantonio, M. A. Pavon, I. Casanova, M. Trias, M. A. Mangues, A. Lopez-Pousa, A. Villaverde, E. Vazquez, A. Bardelli, M. V. Cespedes, and R. Mangues. 2015. "Higher metastatic efficiency of KRas G12V than KRas G13D in a colorectal cancer model." *Faseb Journal* 29 (2): 464-476.

Albesa-Jove, David, Fernanda Mendoza, Ane Rodrigo-Unzueta, Fernando Gomollon-Bel, Javier O. Cifuentes, Saioa Urresti, Natalia Comino, Hansel Gomez, Javier Romero-Garcia, Jose M. Lluch, Enea Sancho-Vaello, Xevi Biarnes, Antoni Planas, Pedro Merino, Laura Masgrau, and Marcelo E. Guerin. 2015. "A Native Ternary Complex Trapped in a Crystal Reveals the Catalytic Mechanism of a Retaining Glycosyltransferase." *Angewandte Chemie-International Edition* 54 (34): 9898-9902

Alvarez, I., J. A. Collado, R. Colobran, M. Carrascal, M. T. Ciudad, F. Canals, E. A. James, W. W. Kwok, M. Gartner, B. Kyewski, R. Pujol-Borrell, and D. Jaraquemada. 2015. "Central T cell tolerance: Identification of tissue-restricted autoantigens in the thymus HLA-DR peptidome." *Journal of Autoimmunity* 60: 12-19.

Argyris, J. M., A. Ruiz-Herrera, P. Madriz-Masis, W. Sanseverino, J. Morata, M. Pujol, S. E. Ramos-Onsins, and J. Garcia-Mas. 2015. "Use of targeted SNP selection for an improved anchoring of the melon (*Cucumis melo* L.) scaffold genome assembly." *Bmc Genomics* 16.

Armengol, P., R. Gelabert, M. Moreno, and J. M. Lluch. 2015. "Unveiling How an Archetypal Fluorescent Protein Operates: Theoretical Perspective on the Ultrafast Excited State Dynamics of GFP Variant 565T/H148D." *Journal of Physical Chemistry B* 119 (6): 2274-2291.

Armengol, Pau, Ricard Gelabert, Miquel Moreno, and Jose M. Lluch. 2015. "Theoretical Computer-Aided Mutagenic Study on the Triple Green Fluorescent Protein Mutant S65T/H148D/Y145F." *Chemphyschem* 16 (10): 2134-2139.

Ata-Ali, J., A. J. Flichy-Fernandez, T. Alegre-Domingo, F. Ata-Ali, J. Palacio, and M. Penarrocha-Diago. 2015. "Clinical, microbiological, and immunological aspects of healthy versus peri-implantitis tissue in full arch reconstruction patients: a prospective cross-sectional study." *Bmc Oral Health* 15.

Bermudez-Lopez, M., I. Pocino-Merino, H. Sanchez, A. Bueno, C. Guasch, S. Almedawar, S. Bru-Virgili, E. Gari, C. Wyman, D. Reverter, N. Colomina, and J. Torres-Rosell. 2015. "ATPase-Dependent Control of the Mms21 SUMO Ligase during DNA Repair." *Plos Biology* 13 (3): e1002089

Caceres, M. 2015. "Structural variants, much ado about nothing?" *Briefings in Functional Genomics* 14 (5): 303-304.

Callol, A., D. Pajuelo, L. Ebbesson, M. Teles, S. MacKenzie, and C. Amaro. 2015a. "Early steps in the European eel (*Anguilla anguilla*)-*Vibrio vulnificus* interaction in the gills: Role of the RtxA1(3) toxin." *Fish & Shellfish Immunology* 43 (2): 502-509.

Callol, A., F. E. Reyes-Lopez, F. J. Roig, G. Goetz, F. W. Goetz, C. Amaro, and S. A. MacKenzie. 2015b. "An Enriched European Eel Transcriptome Sheds Light upon Host-Pathogen Interactions with *Vibrio vulnificus*." *Plos One* 10 (7).

Canadell, D., A. Gonzalez, C. Casado, and J. Arino. 2015. "Functional interactions between potassium and phosphate homeostasis in *Saccharomyces cerevisiae*." *Molecular Microbiology* 95 (3): 555-572.

Canadell, D., J. Garcia-Martinez, P. Alepuz, J. E. Perez-Ortin, and J. Arino. 2015. "Impact of high pH stress on yeast gene expression: A comprehensive analysis of mRNA turnover during stress responses." *Yeast* 32: S69-S69.

Canadell, David, Jose Garcia-Martinez, Paula Alepuz, Jose E. Perez-Ortin, and Joaquin Arino. 2015. "Impact of high pH stress on yeast gene expression: A comprehensive analysis of mRNA turnover during stress responses." *Biochimica Et Biophysica Acta-Genes Regulatory Mechanisms* 1849 (6): 653-664.

Cano-Garrido, O., J. Seras-Franzoso, and E. Garcia-Fruitos. 2015. "Lactic acid bacteria: reviewing the potential of a promising delivery live vector for biomedical purposes." *Microbial Cell Factories* 14.

Carinelli, S., C. X. Ballesteros, M. Marti, S. Alegret, and M. I. Pividori. 2015. "Electrochemical magneto-actuated biosensor for CD4 count in AIDS diagnosis and monitoring." *Biosensors & Bioelectronics* 74: 974-980.

Carinelli, S., M. Marti, S. Alegret, and M. I. Pividori. 2015. "Biomarker detection of global infectious diseases based on magnetic particles." *New Biotechnology* 32 (5): 521-532.

Castells, X., J. J. Acebes, C. Majos, S. Boluda, M. Julia-Sape, A. P. Candiota, J. Arino, A. Barcelo, and C. Arus. 2015. "Robustness of Equations that Define Molecular Subtypes of Glioblastoma Tumors Based on Five Transcripts Measured by RT-PCR." *Omics-a Journal of Integrative Biology* 19 (1): 41-51.

Ciudad, M. T., A. Kim, J. A. Collado, E. A. James, W. W. Kwok, S. Sadegh-Nasseri, and D. Jaraquemada. 2015. "In vitro study of thyroglobulin peptides associated to HLA-DR3 under thyroid antigen presentation conditions." *Molecular Immunology* 68 (2): 162-162.

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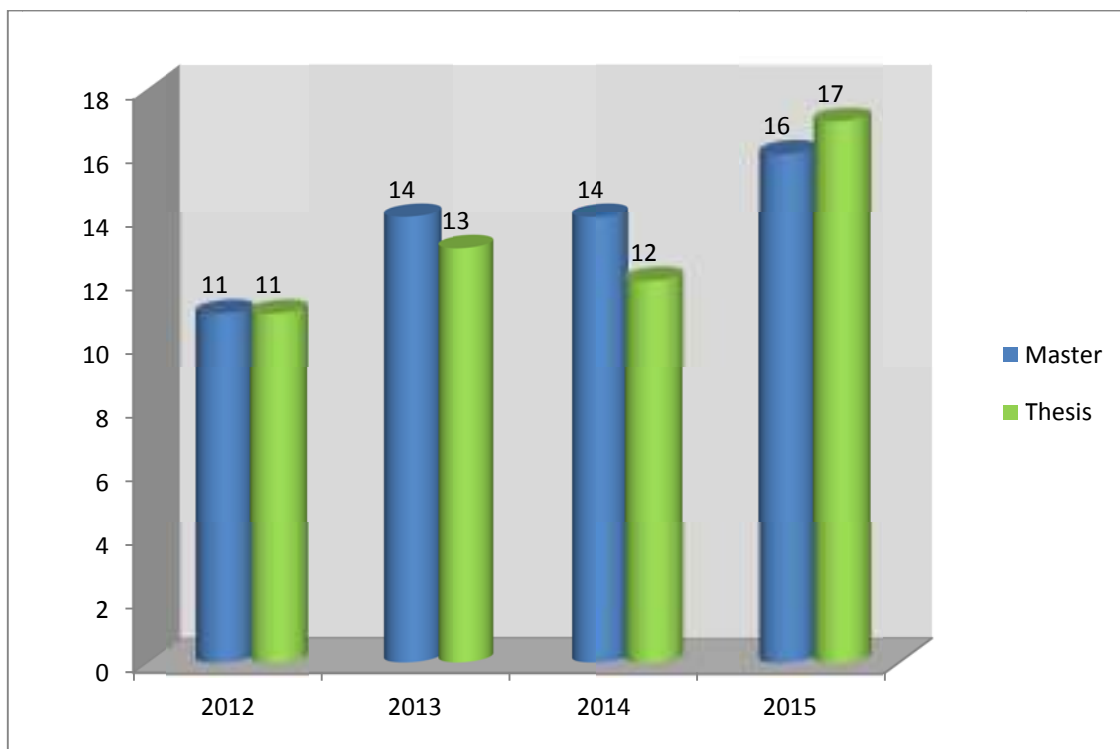
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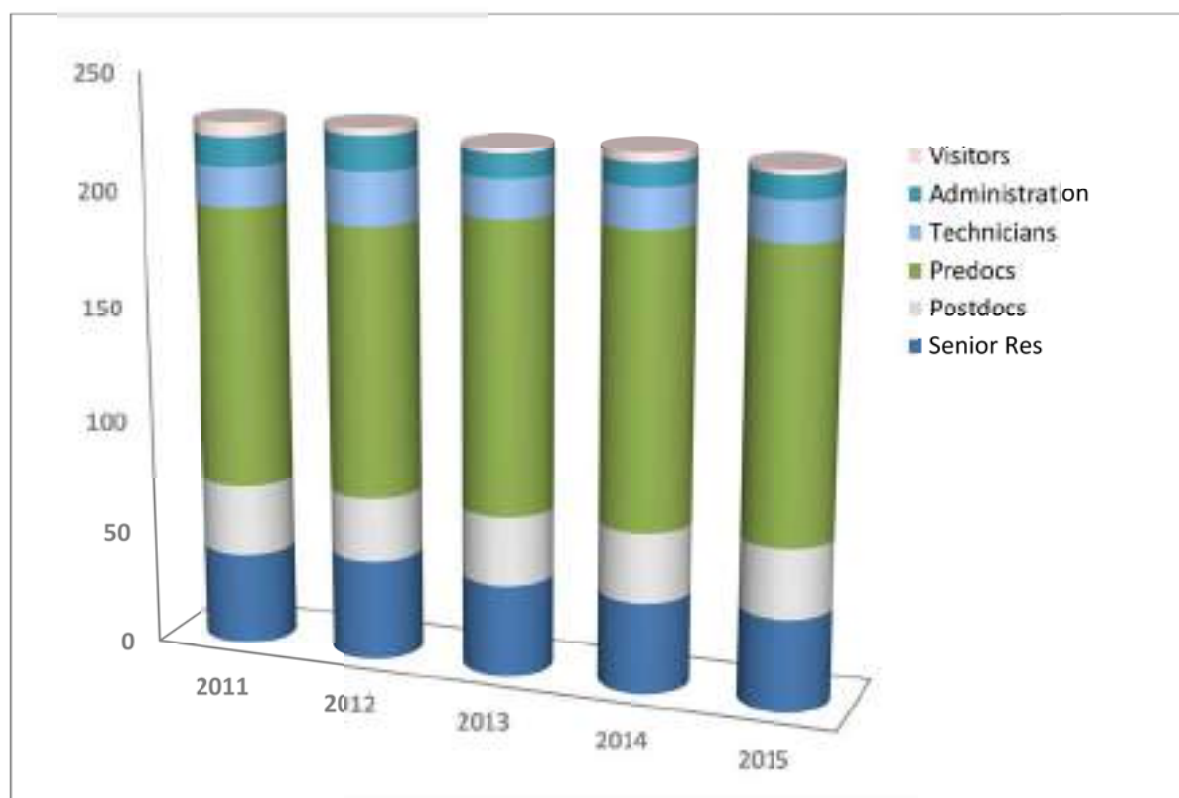
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Thesis



Human Resources

	Senior Res	Postdocs	Predocs	Technicians	Administration	Visitors	Total
2011	40	31	122	17	13	6	229
2012	44	28	117	23	15	3	230
2013	40	30	126	17	10	2	225
2014	40	30	126	17	10	4	227
2015	40	30	125	17	10	2	224



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