Emerging Scientists

Inés Antón

In 2003 I was awarded a Ramón y Cajal contract (Centro de Biología Molecular-CSIC-Universidad Autónoma de Madrid) after a two-year stay at the Universitá degli Studi di Torino and a six-year postdoctoral stay at Children´s Hospital (Harvard Medical School) in Boston.

In the laboratory of Prof. Geha I learnt about the primary immunodeficiency Wiskott-Aldrich Syndrome (WAS), caused by mutations in the cytoskeletal and signalling WAS protein (WASP), and WIP (WASP Interacting Protein), a ubiquitously distributed protein that regulates WASP activity and location and stabilizes actin filaments. I generated WIP-deficient mice that have turned into an invaluable tool for the study of actin-dependent functions.

At present, our work focuses on understanding the molecular mechanism that regulates actin polymerization during cellular processes (such as cell adhesion, motility and migration, inflammation, brain and neuronal development, synaptic activity, Golgi architecture and tumor invasion) in different cell types (fibroblasts, dendritic cells, primary neurons, astrocytes and breast cancer cell lines). In 2007 I joined CNB and since 2008 I teach at the Postgraduate Program in Biosciences (Masters in Molecular and Cell Biology, Universidad Autónoma de Madrid).

Sylvia Ayora Hirsch

Silvia Ayora studied Chemistry at the University of Zaragoza, Zaragoza (Spain) and moved to Germany where she made her PhD in the University of Tubingen, studying microbial extracellular proteases. In 1993 she moved to the Max-Planck Institute of Molecular Genetics of Berlin where she focused on the understanding of DNA repair coupled to transcription in the model system *Bacillus subtilis*.

Upon her return to Spain, she was awarded of a Reintegration Fellowship at the Spanish National Centre of Biotechnology (CNB-CSIC). At the CNB-CSIC she studied DNA replication and recombination in *B. subtilis* and their bacteriophages, followed by a position as a senior researcher ("Ramón y Cajal" and Assistant Professor) at the Universidad Autónoma of Madrid (UAM). Since 2006 she is a CSIC Staff Research Scientist and UAM Honorary Professor.

Her research focuses on understanding recombination-dependent DNA replication and the molecular mechanisms of horizontal gene transfer employing the Gram-positive bacterium *B. subtilis*, and its virus SPP1 as an experimental model.

Domingo F. Barber

Our group is focused in three main topics, all related with the role of lymphocytes in physiological and pathological processes: autoimmune inflammatory diseases, cancer immunotherapy, and nanomedicine.

First, we are trying to dissect the molecular and cellular mechanisms operating in autoimmune diseases. Our goal in this field is to investigate the molecular and cellular mechanisms operating in autoimmune diseases, with the aim of identifying new drug targets and strategies for therapeutic intervention in these diseases.

Second, we are studying the role of NKG2D in autoimmunity and tumour immunotherapy. NKG2D ligands are frequently overexpressed in cancer from multiple origins. In addition, inappropriate expression of NKG2D ligands in cells and tissues make them susceptible to the activation of autoreactive effector cells, therefore triggering or exacerbating autoinmune diseases.

Third, we are developing nanomedicine-based approaches as new therapeutic strategies for treating cancer and autoimmune diseases. Recently, we have shown in mouse models of cancer that IFN-γ-adsorbed DMSA-coated magnetic nanoparticles led to a notable reduction in tumour size. We are in the process of developing and validating a nanoparticle based system for controlled and localized release of small interfering RNAs (siRNAs), microRNAs, and antagomirs for specific gene silencing as a therapeutic application in cancer and autoimmune disorders.

Florencio Pazos

Our group is interested in different aspects of Bioinformatics, Computational Biology and Systems Biology. Our goal is to obtain new biological knowledge with an *in silico* approach which complements the *in vivo* and *in vitro* methodologies of Biology. This mainly involves mining the massive amounts of information stored in biological databases.

Our lines of scientific research can be framed in three main areas: prediction of protein functional and binding sites, prediction of protein interactions, and functional study of biological networks.

Besides these lines we also collaborate with experimental groups providing them with bioinformatics support for their specific needs, and participate in different teaching projects.

Emerging Scientists

Enrique Rojo

I was selected in 2006 to start a group at the CNB as an emerging scientist. Soon after, Dr.Jan Zouhar, a Czech scientist whom I have met during my posdoctoral stay in the US, joined me to develop a project studying vacuolar trafficking in plants. In 2008 the group grew considerably, with the additions of Dr. Michael Sauer, a German scientist, Dr. Alfonso Muñoz, a Spanish scientist, and Otilia Delgadillo, a Mexican PhD student.

The internationality of our group is a reflection of that of the CNB. We have also had great technical support from María Lopez, who was contracted by the CNB to provide support to three emerging scientist groups. The increase in size allowed us to accelerate progress in the vacuolar trafficking project and also to develop a new line of research on the mechanisms that initiate cell differentiation in plants. The CNB has been a great place to initiate my career as an independent researcher, providing an excellent scientific environment and access to most of the equipment and facilities we have needed to develop our projects.

Carmen Rivas

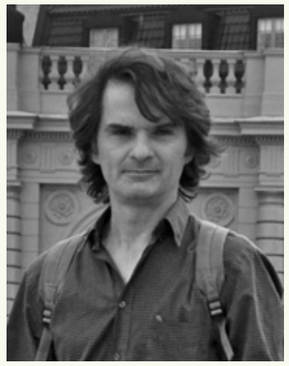
We are interested in the relationship between virus and cancer. We work on two main lines of investigation:

(i) the molecular mechanisms by which virus infection may cause cancer, using the Kaposi's sarcoma associated virus (KSHV) as a model of oncogenic virus and

(ii) to evaluate the importance of tumour suppressors in the complex innate antiviral host defence, and to identify the mechanism by which viruses try to evade the antiviral mechanism imposed by these cellular proteins.

In particular, we are also interested in the role that the cellular proteins, SUMO and ubiquitin, play in these processes.

Juan Poyatos



Modern Biology could be considered as the biggest reverse engineering project ever made, the ultimate task being to identify the function and evolution of the design principles of biological systems. This is the main goal of the Logic of Genomic Systems laboratory leaded by Juan F. Poyatos.

With a background in theoretical physics, Juan F. Poyatos is now trying to apply an interdisciplinary approach to study how the integration of many molecular elements, as biochemical circuits or networks, ultimately determines cellular function, and whether, and how, this integration is constrained by the intrinsic structure of the genome. These issues are multifaceted in nature, therefore his lab combines several complementary disciplines to address them, such as Systems Biology, Comparative Genomics and Synthetic Biology. Our aim is to understand the function and evolution of the genomic circuitry and also its potential of reprogramming.

Jesús María Salvador

In our group we are dissecting the signalling pathways involved in T cell activation and differentiation to identify novel therapeutic targets in autoimmune diseases and cancer.

T cells are central orchestrators of the cell-mediated immune responses in autoimmune diseases such as rheumatoid arthritis (RA). Antigen-activated T cells stimulate macrophages, monocytes and synovial fibroblasts to produce cytokines which drive inflammation in RA. The p38 MAP kinase (MAPK) regulates critical functions in T cells and it is important in the pathogenic immune response in RA.

We have analyzed p38 activation on T cells from healthy controls and patients with RA or ankylosing spondylitis (AS) to identify variables associated with p38 phosphorylation and disease activity. We found that p38 phosphorylation on Tyr323 was higher in T cells from patients with active RA, than in patients with RA in remission or with AS. Tyr323p38 phosphorylation was associated with disease activity determined by Disease Activity Score (DAS28).

Our results indicate that phosphorylation status on Tyr323p38 correlates with RA disease activity and suggest the Tyr323-dependent pathway as a selective target for downregulation of p38 activity in RA patients.

Carmen San Martín

Carmen San Martín started her career as manager of the Electron Microscopy Facility of the Centro de Biología Molecular "Severo Ochoa" (CBMSO, CSIC-UAM), while simultaneously working on her M.Sc. degree in Physics (Optics and Structure of the Matter, Universidad Autónoma de Madrid) and her Ph. D. Degree in Physics (Electronics and Computation, Universidad de Santiago de Compostela). She later joined the Wistar Institute in Philadelphia as postdoctoral fellow, funded by a succession of EMBO, HFSP and Spanish Ministry of Education fellowships.

Upon her return to Spain she was awarded a CSIC I3P research scientist position at the Centro Nacional de Biotecnología. Since 2005 she is a CSIC tenured assistant professor, and in 2007 she started her own research group as a CNB junior group leader. She has participated in the development of single particle and EM-Xray combination computational methods, and applied them to the study of replicative helicases and large icosahedral viruses. Her current interests focus on the structural and physical principles that govern assembly and stabilization of complex viruses. Her group approaches the problem from an interdisciplinary point of view, combining Biophysics, Computational, Structural and Molecular Biology techniques.