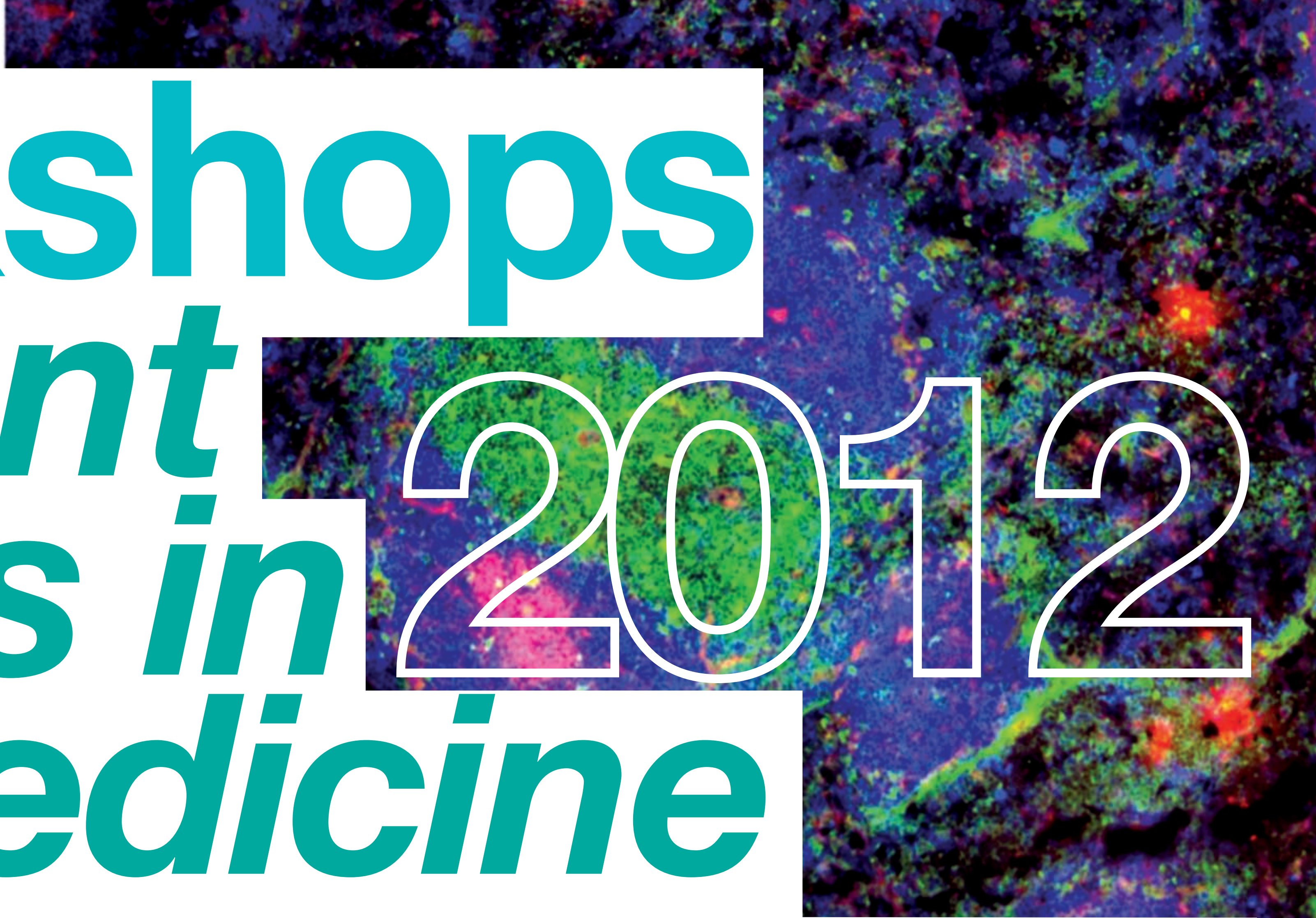
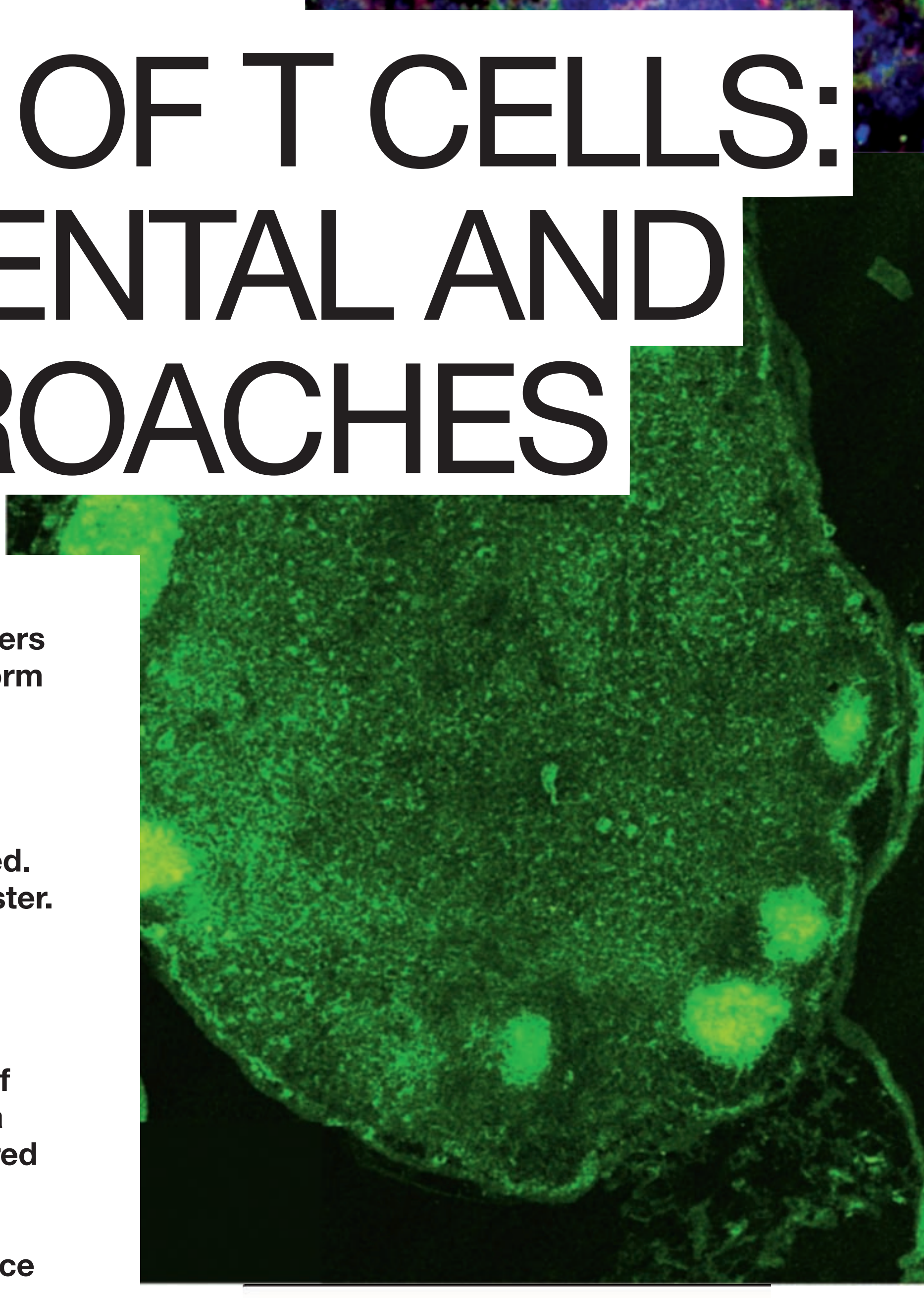
Workshops *Current trends in Biomedicine* 2012



SYSTEMS BIOLOGY OF T CELLS: CLINICAL, EXPERIMENTAL AND THEORETICAL APPROACHES



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Universidad Internacional de Andalucía

Scope

The immune system can be viewed as a coordinated set of cells and molecules that preserve the integrity of vertebrates' tissues and physiology. Thus, it defends against health-threatening microorganisms (such as viruses, bacteria, fungi and parasites) and tumours. In doing so, the immune system must be able to distinguish between harmful antigens and non-harmful self-antigens, which should be tolerated and/or not damaged. It must also distinguish different pathogens from each other, and sufficiently rapidly to mount an efficient response. These requirements have resulted in a system with many hundreds of different signalling molecules impacting and/or mediating the function of, at least, twenty different immune cell types.

Immunological processes span temporal and spatial scales from handfuls of interacting molecules within a cell to huge populations of proliferating lymphocytes. Thus, a profound physical and mathematical understanding and a range of deterministic and stochastic modelling approaches are required to describe them. Moreover, technical advances are providing ever-more-refined tools with which to probe immune responses and constrain the models. For example, recent advances in two-photon microscopy and cell labelling have made it possible to directly observe cells interacting *in vivo*, and are opening new perspectives in Immunology by generating a wealth of quantitative data. Theoretical understanding of these interactions and other processes is very much lacking, in some cases, apparently, for deep mathematical reasons. The integration of mathematical and computational models with immunological data poses a challenge that cannot be successfully managed by immunologists, biologists, clinicians, physicists or applied mathematicians on their own. An inter-disciplinary approach is required to provide answers to the current challenges of basic and clinical Immunology.

The workshop is intended to cover cutting edge topics of T lymphocyte physiology, from thymic development and differentiation and T cell repertoire generation to peripheral homeostasis, activation and regulation, both in health and disease. The major focus of the workshop is to promote and stimulate the combination of theoretical approaches, whether mathematical or computational, with clinical and experimental ones. This inter-disciplinary approach has the advantage of providing a novel and quantitative insight to both basic and clinical immunology. The dual aspect of T cell physiology, health and disease, will then be covered from theoretical, clinical and experimental perspectives.

Format of the Workshop

The workshop will bring together 17 speakers and a maximum of 33-35 participants, to form a group of around 50 people. The scientific programme will start in the morning of Monday, October 22nd, and will end around noon on Wednesday, October 24th. Ample time for informal discussion will be reserved. Participants will be invited to present a poster.

Venue of the Workshop

The workshop will be held in Baeza, at the "Sede Antonio Machado", a XVII century building turned into a Conference Centre of the Universidad Internacional de Andalucía (UNIA). This Seat includes a recently restored residence, where participants will be accommodated. Baeza is a World Historic Heritage town, renowned for its Renaissance and Gothic buildings.

Organized by:

Balbino Alarcón
Centro de Biología Molecular "Severo Ochoa", CSIC-UAM. Madrid, Spain.

José Faro
Universidade de Vigo. Vigo, Spain.

Carmen Molina-París
School of Mathematics, University of Leeds. Leeds, UK.

Speakers

Balbino Alarcón. Departamento de Biología Celular e Inmunología, Centro de Biología Molecular "Severo Ochoa", CSIC–Universidad Autónoma de Madrid. Madrid, Spain.

Michael J. Bevan. Department of Immunology and the Howard Hughes Medical Institute, University of Washington. Seattle, WA, USA.

Arup K. Chakraborty. Departments of Chemical Engineering, Chemistry, and Biological Engineering, MIT / Ragon Institute of Massachusetts General Hospital, MIT, and Harvard University. Cambridge / Boston, MA, USA.

Rob J. de Boer. Theoretical Biology, Utrecht University. Utrecht, The Netherlands.

José Faro. Departamento de Bioquimica, Xenética, e Inmunoloxía, Universidade de Vigo. Vigo, Spain.

António A. Freitas. Lymphocyte Population Biology Unit, CNRS, URA 1961, Institut Pasteur. Paris, France.

Luis Graça. Instituto de Medicina Molecular, Universidade de Lisboa / Instituto Gulbenkian de Ciência. Lisboa / Oeiras, Portugal.

Zvi Grossman. Laboratory of Immunology, National Institute of Allergy and Infectious Diseases, National Institutes of Health. Bethesda, MD, USA.

Thomas Höfer. Division of Theoretical Systems Biology, German Cancer Research Center and BioQuant Center. Heidelberg, Germany.

Bruno Kyewski. Division of Developmental Immunology, Tumor Immunology Program, German Cancer Research Center. Heidelberg, Germany.

Martin Meier-Schellersheim. Laboratory of Systems Biology, National Institute of Allergy and Infectious Diseases, National Institutes of Health. Bethesda, MD, USA.

Carmen Molina-París. Department of Applied Mathematics, School of Mathematics, University of Leeds. Leeds, UK.

Ed Palmer. Laboratory of Transplantation Immunology and Nephrology, Department of Biomedicine, University Hospital Basel. Basel, Switzerland.

Ellen A. Robey. Department of Molecular and Cell Biology, University of California. Berkeley, CA, USA.

Alfred Singer. Experimental Immunology Branch, National Cancer Institute, National Institutes of Health. Bethesda, MD, USA.

María L. Toribio. Centro de Biología Molecular "Severo Ochoa", CSIC–Universidad Autónoma de Madrid. Madrid, Spain.

Veronika I. Zarnitsyna. Wallace H. Coulter Department of Biomedical Engineering, Georgia Institute of Technology. Atlanta, GA, USA.

Baeza, Spain • 22nd-24th October 2012

Deadline:

7th September 2012

Venue:

Sede Antonio Machado
Universidad Internacional de Andalucía
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Workshop coordinator:

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More information and application:

http://www.unia.es/biomedicine