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Beyond the first decade

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MINISTÉRIO DA CIÊNCIA, TECNOLOGIA E ENSINO SUPERIOR

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PORTUGAL, EUROPE AND THE EUROPEAN RESEARCH COUNCIL

Created in 2007 to foster top quality science, the European Research Council provides attractive funding to support investigators with innovative ideas to form a team and pursue high-risk/high-gain frontier research in every domain in Europe. ERC has attracted researchers to relocate from overseas and motivated talent to stay in Europe.

Since 2007, some 6,500 projects have been selected for funding from more than 62,000 applications. According to an independent study contracted by ERC, more than 70% of the projects achieved major scientific breakthroughs or advances. The ERC had a budget of €7.8 billion in Framework Programme 7 (15% of the FP7 budget) and € 13.1 billion in Horizon 2020 (17% of the overall budget of € 77 billion).

Portugal has successfully participated in ERC since the very first year, having secured 75 awards over 10 years, two of which used portability of the grant and later moved abroad. By the end of FP7, 20 projects had been approved in Life Sciences, 9 in Physical Sciences and Engineering and 7 in Social Sciences and Humanities – a total of 36 projects, which supported the work of 36 research teams including researchers of all levels of seniority, from graduate students to established leading scientists.

In the first 3 years of H2020, since 2014, 39 ERC grants have already been awarded to Portuguese host institutions. Institutions of the national scientific system are applying with success, and there is room for more.

ERC CORE GRANT SCHEMES

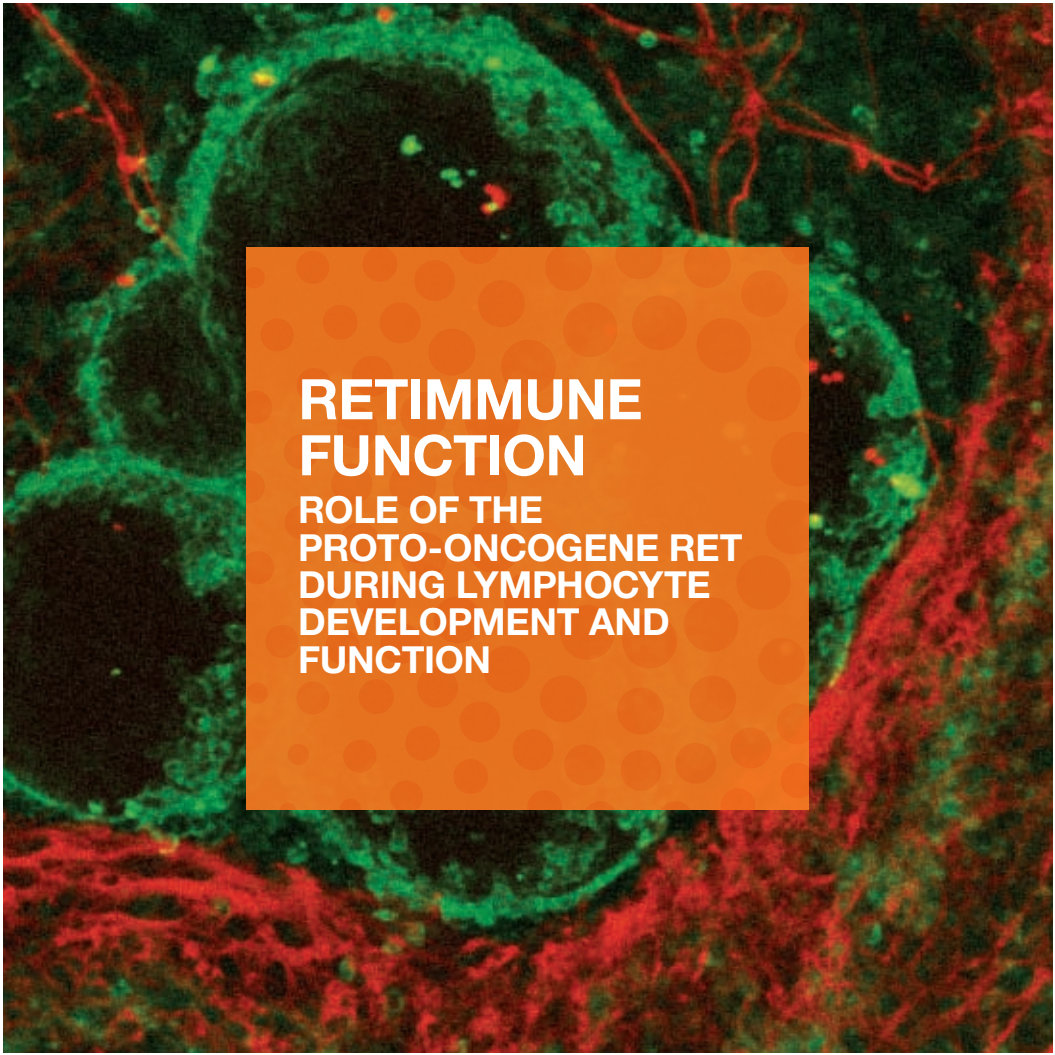
- **ERC Starting Grants** for early-career, emerging research leaders (2-7 years after PhD - up to €1.5M for 5 years)
- **ERC Consolidator Grants** for researchers who are already independent (7-12 years after PhD - up to €2M for 5 years)
- **ERC Advanced Grants** for established researchers (up to €2.5M for 5 years)
- **ERC Synergy Grants** for teams of 2-4 established leading scientist PIs (up to € 15M for 5 years)

ADDITIONAL FUNDING SCHEMES

- **ERC Proof of Concept** for ERC Grant holders only. Bridging the gap between research - earliest stage of marketable innovation (up to €150.000)
- **Other ERC Opportunities** for researchers wishing to work or gain experience in an ERC grantee's team

MORE INFORMATION

erc.europa.eu



RETIMMUNE FUNCTION

ROLE OF THE PROTO-ONCOGENE RET DURING LYMPHOCYTE DEVELOPMENT AND FUNCTION

RETIMMUNEFUNCTION

ROLE OF THE PROTO-ONCOGENE RET DURING LYMPHOCYTE DEVELOPMENT AND FUNCTION

There is growing evidence suggesting that cells from the immune system may sense environmental cues, but the mechanisms by which they perceive, integrate and respond to their environment remains poorly understood. Neurotrophic factors are critical molecules for development, survival and function of neurons. This project aimed at using the combined genetic, cellular, and molecular approaches in order to determine, quantify and manipulate the function of specific dietary and neurotrophic factors in white blood cell formation and function.
We found that neurotrophic factor receptors are expressed by discrete haematopoietic cells, controlling their function and setting haematopoietic activity and immune fitness. We found that neurotrophic factor receptor signals provide haematopoietic stem cells (HSC) with critical surviving cues, downstream of p38/MAP kinase and CREB activation. Importantly, activation of neurotrophic factor receptors results in improved HSC survival, expansion and in vivo transplantation efficiency. Remarkably, human cord-blood progenitor expansion and transplantation was also improved by neurotrophic factors, opening the way to explore neurotrophic factor agonists in human HSC transplantation. Our project showed that unconventional neurotrophic factor receptor responses in trans determine a novel adhesion dependent, chemokine independent triggering phase in enteric lymphoid morphogenesis, thus shedding light on how differential co-expression patterns of neurotrophic factor receptor/co-receptor allow distinct cell lineages to employ identical molecules yet ensuring different outcomes.

ERC Starting Grant
Host Institution: Instituto de Medicina Molecular
Principal Investigator: Henrique Veiga Fernandes
Starting Date: Nov 2008

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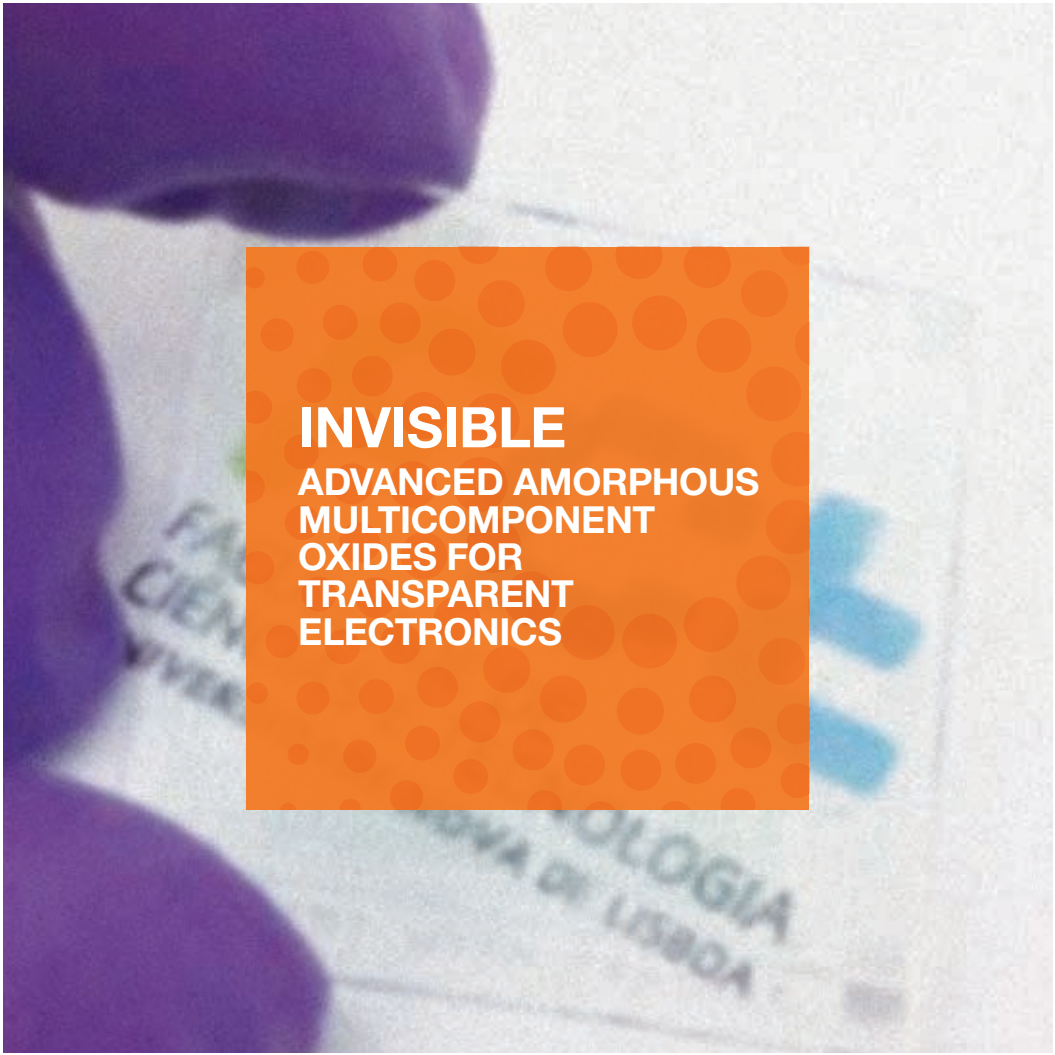
RESEAL
EPITHELIAL RESEALING

RESEAL
EPITHELIAL RESEALING

Epithelia have an essential role of acting as a barrier that protects living organisms and its organs from the surrounding milieu. Therefore, it is crucial for epithelial tissues to have robust ways of maintaining its integrity despite the frequent damage caused by normal cell turnover, inflammation and injury. This project focussed on the capacity that several simple epithelial tissues have to reseal small discontinuities through the contraction of an actomyosin purse string in the leading edge cells around the wound margin. The Drosophila embryonic epithelium was the primary model system. The project also addressed epithelial wounding assays in zebrafish simple epithelial tissues by studying the molecular mechanisms that the project will uncover using Drosophila.
RESEAL investigated the epithelial resealing using a combination of genetics and high resolution live imaging. The Drosophila embryonic epithelium was used to perform a RNAi genetic screen based on a large collection of transgenic lines. The work led to the discovery of new molecular and cellular mechanisms involved in wound repair and to the identification of several new genes that play important roles in this process.
The conservation of the function of those genes was studied in wounding assays in zebrafish simple epithelial tissues. It was demonstrated that genes identified in Drosophila wound repair also play important roles in vertebrates, opening the possibility to continue this studies in the future, in mammals and possibly in humans.

ERC Starting Grant
Host Institution: Fundação Calouste Gulbenkian
Principal Investigator: António Jacinto
Starting Date: Nov 2008



INVISIBLE

ADVANCED AMORPHOUS MULTICOMPONENT OXIDES FOR TRANSPARENT ELECTRONICS

INVISIBLE

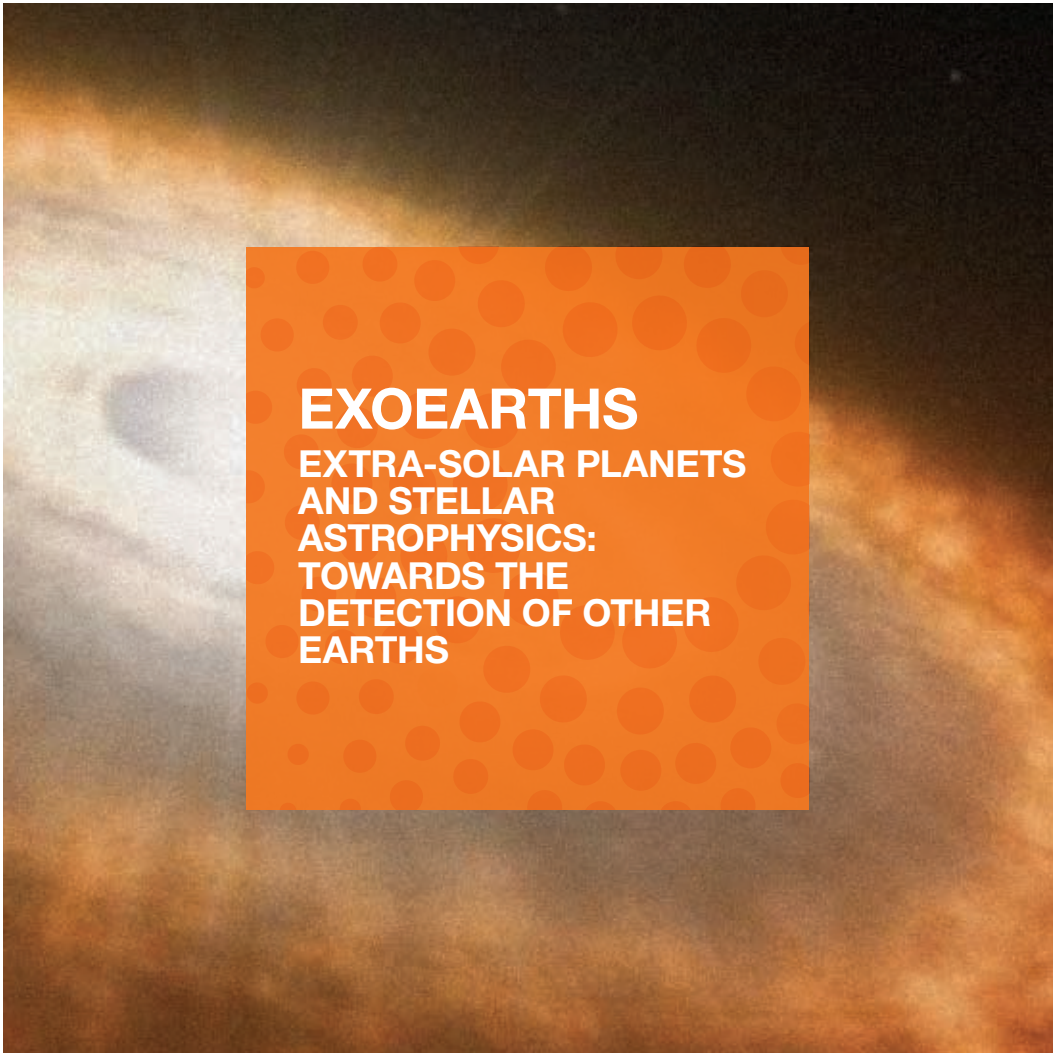
ADVANCED AMORPHOUS MULTICOMPONENT OXIDES FOR TRANSPARENT ELECTRONICS

Imagine having fully transparent and flexible, foldable, low cost, displays at the glass window of your home/office, a transparent electronic circuit, do you believe on that? Maybe you are asking if this is science fiction. No, it is not. This was an interdisciplinary research project aiming to develop a new class of transparent electronic components, based on multicomponent passive and active oxide semiconductors, to fabricate the novel generation of full transparent electronic devices and circuits, either using rigid or flexible substrates. The emphasis was put on developing thin film transistors (n and p-TFTs) and integrated circuits for a broad range of applications, boosting to its maximum their electronic performances for the next generation of invisible circuits. By doing so, INVISIBLE contributed for generating a free real state electronics able to add new electronic functionalities onto surfaces, which currently are not used in this manner and that silicon cannot contribute. These will facilitate a migration away from tradition silicon like fab based batch processing to large area, roll to roll manufacturing technology which will offer significant advantages.

As a result of INVISIBLE, paper batteries that can be used in cell phones, computers, tablets, games consoles, diagnostic kits and all other types of electronic devices were developed. The batteries are recharged by the atmosphere humidity, both indoors and outdoors, once the percentage of humidity in the air is higher than 40%, which is a constant all year round in countries with a humid temperate or tropical or boreal climate, and during most of the year in countries with a Mediterranean climate.

ERC Advanced Grant
Host Institution: Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa
Principal Investigator: Elvira Fortunato
Starting Date: Jan 2009

European Research Council



EXOEARTHS

EXTRA-SOLAR PLANETS AND STELLAR ASTROPHYSICS: TOWARDS THE DETECTION OF OTHER EARTHS

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EXTRA-SOLAR PLANETS AND STELLAR ASTROPHYSICS: TOWARDS THE DETECTION OF OTHER EARTHS

The detection of hundreds of extrasolar planets orbiting other solar-like stars opened the window to a new field of astrophysics. Since planets come as an output of the star formation process, the study of the stars hosting planets is of great importance. The EXOEarths program aimed at doing frontier research to explore: the stellar limitations of the radial-velocity technique in great detail; and to develop and apply software packages aiming at the study of the properties of the planets host stars. And we found that:
1) Stellar sources of noise must be taken into account for the detection and characterization of planets orbiting other stars. We can conclude that the avenue is now open to allow us to efficiently detect and characterize Earth-like planets orbiting other suns.
2) The study of planet-host stars is fundamental for the full characterization of planetary systems. We have discovered novel correlations between the properties of planets and those of their host stars. New methods to derive precise stellar parameters and abundances for FGK and M dwarfs were explored and proposed. These new methods will help to make the exploration of large samples of stars possible (e.g. like those that will be part of the PLATO2.0 mission), and to derive the properties of exoplanets with a unique precision.
These findings will improve our capacity to detect, study, and characterize new very low mass extra-solar planets. From a very general perspective we can certainly say that the results achieved by the team have strongly contributed to the understanding that planets, and in particular planets like our Earth, are common in our Galaxy.

ERC Starting Grant
Host Institution: Centro de Investigação em Astronomia e Astrofísica da Universidade do Porto
Principal Investigator: Nuno Miguel Cardoso Santos
Starting Date: Oct 2009

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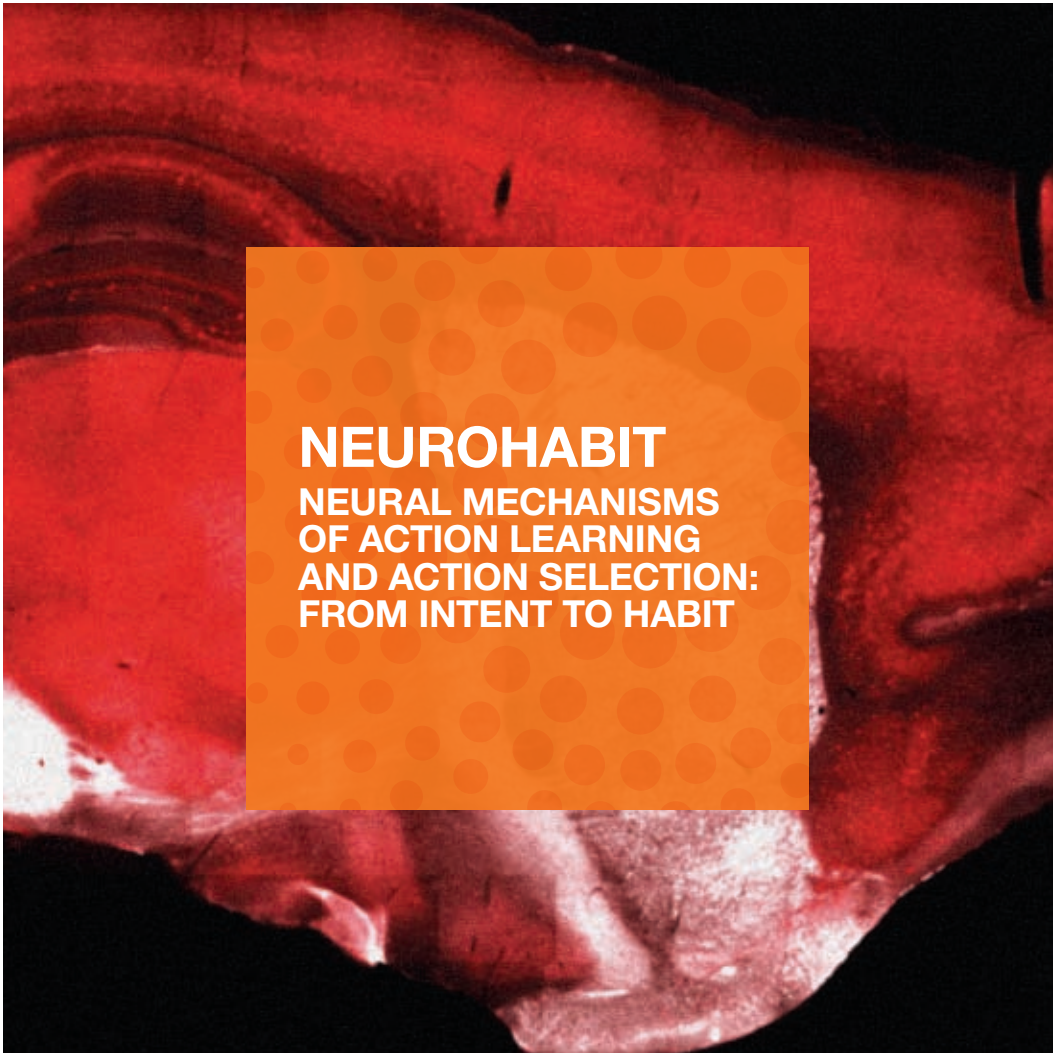


NEUROHABIT

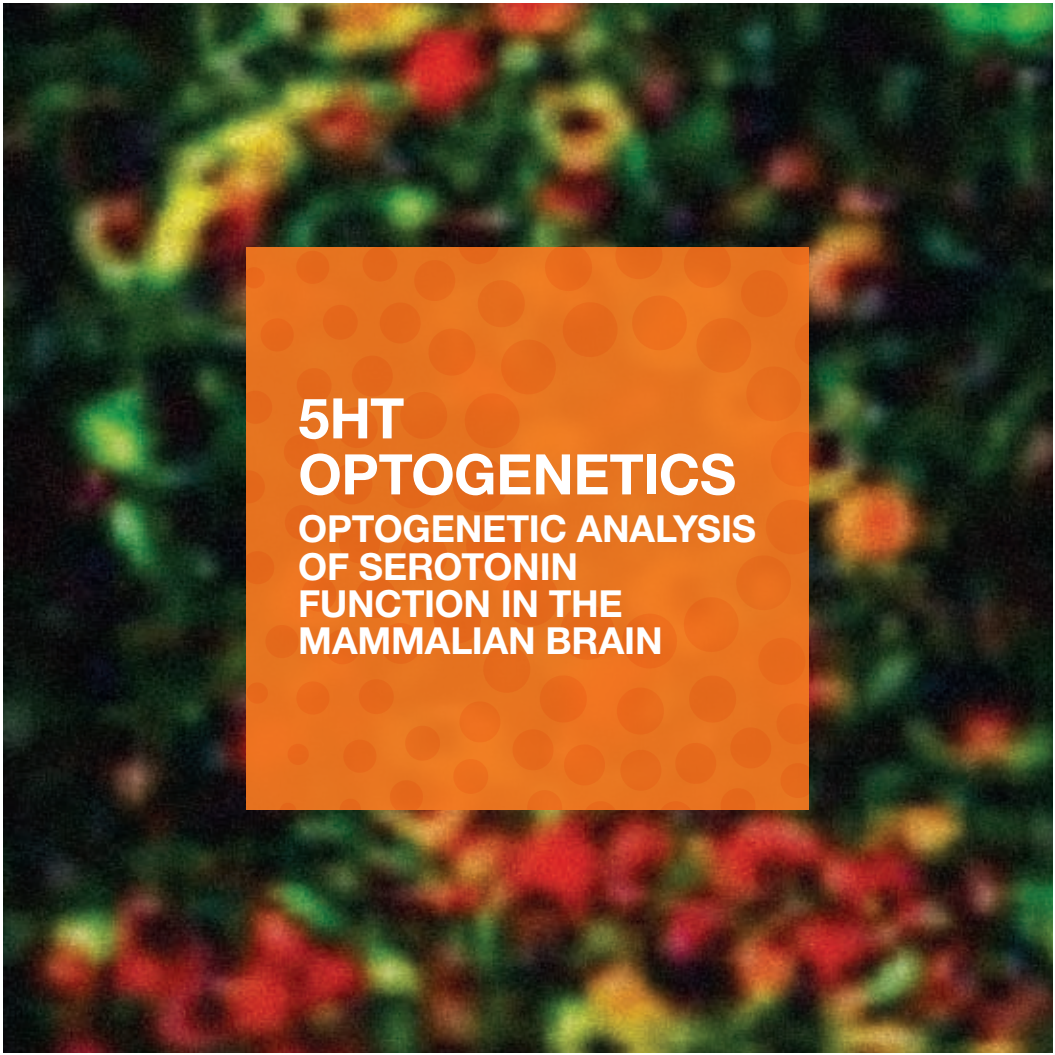
NEURAL MECHANISMS OF ACTION LEARNING AND ACTION SELECTION: FROM INTENT TO HABIT

NEUROHABIT

NEURAL MECHANISMS OF ACTION LEARNING AND ACTION SELECTION: FROM INTENT TO HABIT

In everyday life, we constantly have to select the appropriate actions to obtain specific outcomes. Actions can be selected based on their consequences, e.g., when we press an elevator button to get to the particular floor where we live. This goal-directed behaviour is crucial to face the ever-changing environment. One way to balance the need for flexibility and efficiency is through automatization of recurring decision processes as a habit. Habitual responses no longer need the evaluation of their consequences, and can be elicited by particular situations or stimuli, e.g., when we press the button for our home floor in a building that we are visiting for the first time. The dissection of the molecular and circuit mechanisms underlying goal-directed and habitual responses is critical to understand decision-making, and the origins of compulsive behaviour.
We developed a novel procedure where mice learn to shift between goal-directed and habitual lever-pressing in the same manipulandum, allowing to record, for the first time, the activity of the same neurons during goal-directed vs. habitual actions. We found that the same neurons displayed different activity during action execution depending on whether the action is goal-directed or habitual. We measured the direct- and indirect-pathway striatal neuron activity and documented transient increases in neural activity in both direct- and indirect-pathway spiny projection neurons when animals initiated actions, not shown when they were inactive. NEUROHABIT uncovered that inhibition of both direct and indirect pathway neurons would disrupt sequence initiation. Finally, it revealed that plasticity in corticostriatal circuits is necessary for the selection of behavioral and neural patterns and their crystallization.

ERC Starting Grant
Host Institution: Fundação Champalimaud
Principal Investigator: Rui Fernandes Costa
Starting Date: Nov 2009

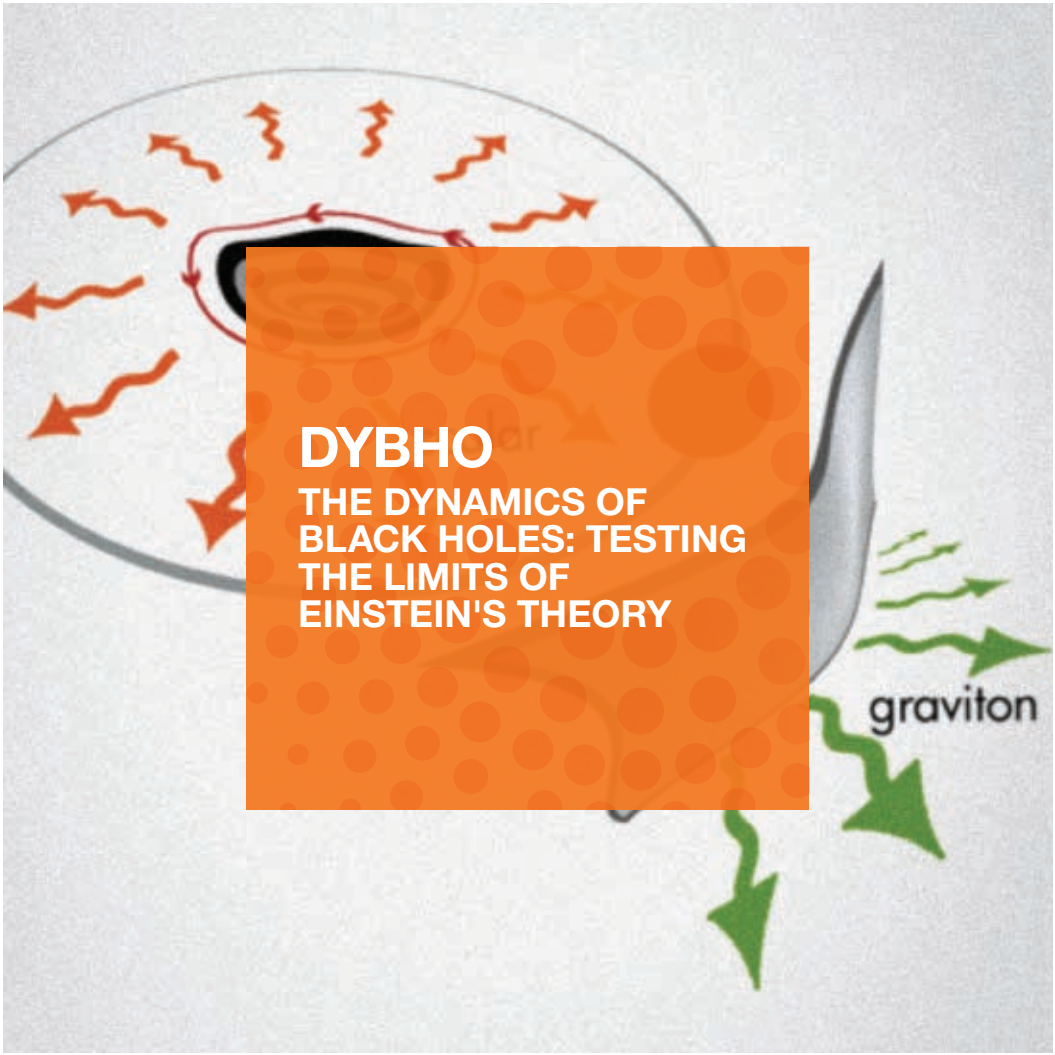

5HT
OPTOGENETICS
OPTOGENETIC ANALYSIS
OF SEROTONIN
FUNCTION IN THE
MAMMALIAN BRAIN

5HT-OPTOGENETICS

OPTOGENETIC ANALYSIS OF SEROTONIN FUNCTION IN THE MAMMALIAN BRAIN

The serotonin (5-HT) system is one of the most important targets of psychoactive drugs, being particularly important in the treatment of depression, anxiety, panic disorder, chronic pain and other psychiatric conditions. The aim of the project was to elucidate the behavioral function of the 5-HT system. Using a Cre-dependent expression AAV system in transgenic mice, Channelrhodopsin2 (ChR2) was successfully delivered into the 5-HT neurons in the dorsal raphe nucleus (DRN) of the brainstem. After stimulation with light (delivered through an implanted fiber), the neuronal activity of the 5-HT neurons was recorded both in vitro and in vivo. A new efficent methodology was developed to calibrate expression levels of ChR2 and placement of fiberoptic delivery and to demonstrate that 5-HT neurons can be rapidly and reliably activated using optogenetics. Using the same Cre-dependent expression viral system, a fluorescent protein sensitive to neuronal activity (GCaMP) was also specifically delivered in 5-HT neurons to monitor in real-time their activity during different behavioral assays. Specific expression of ChR2 in 5-HT neurons of the DRN allowed the manipulation of the serotonin system with high temporal specificity in a variaty of behavioral contexts aimed at testing motor activity, impulsive action and sensory imformation processing. The behavioral experiments perfomed for this project have mainly centered on the hyptheses: (i) that activation of the 5-HT system modulates sensory and motor processes, and (ii) that 5-HT acts as the negative functional counterpart of the dopamine system.

ERC Advanced Grant
Host Institution: Fundação Champalimaud
Principal Investigator: Zachary Mainen
Starting Date: Jan 2010



DYBHO

THE DYNAMICS OF BLACK HOLES: TESTING THE LIMITS OF EINSTEIN'S THEORY

DYBHO

THE DYNAMICS OF BLACK HOLES: TESTING THE LIMITS OF EINSTEIN'S THEORY

Black holes are now a pillar of modern physics. They play a leading role in high-energy astrophysical phenomena and are known to be tightly connected to their host galaxy growth, although the details of such mechanisms are unknown. From a conceptual viewpoint, they are fundamental in understanding for instance the cosmic censorship: are event horizons always present to hide curvature singularities?

Despite the progress of the last decades, an understanding of the dynamics of black hole spacetimes is missing: How do collisions between two black holes proceed? How do black holes interact with matter? How do we handle different field equations, different theories of gravity, etc.? The aim of the DYBHO project is to answer these questions, developing analytical tools and extending the numerical machinery for very generic frameworks.

Some of the most significant results obtained within DYBHO were:

- The understanding of high energy collisions in gravity-dominated processes, with consequences for fundamental issues such as Cosmic Censorship and the Hoop Conjecture. It was shown that two Black Holes colliding at nearly the speed of light release about 14% of their center- of-mass energy as gravitational waves;
- Extension of the methods of Numerical Relativity to generic spacetimes, including the organization of the first interdisciplinary meeting on Numerical Relativity methods in high-energy physics.
- The development of new methods to understand matter around black holes. The coupling of massive bosons to matter leads to two smoking-gun effects of new physics: floating orbits and superradiant instabilities, allowing novel constraints on their masses.

ERC Starting Grant
Host Institution: Instituto Superior Técnico
Principal Investigator: Vitor Cardoso
Starting date: Dec 2010

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T_CELL(S)_DIFFER

DIFFERENTIATION OF PRO-INFLAMMATORY T CELL SUBSETS IN VIVO

T_CELL(S)_DIFFER

DIFFERENTIATION OF PRO-INFLAMMATORY T CELL SUBSETS IN VIVO

T cells orchestrate immune responses to infections and tumours by producing pro-inflammatory cytokines such as interferon-g (IFN-g) and interleukin-17 (IL-17). In this project we have investigated the molecular mechanisms responsible for the generation of T cells selectively endowed with IFN-g or IL-17-production in vivo, with an emphasis on the still poorly understood gd T cell lineage. We have undertaken the first genome-wide characterization the histone modifications present in IFN-g versus IL-17-producing gd T cell subsets, which we have shown to be distinguishable on the basis of surface CD27 expression levels. We demonstrated that CD27+ gd T cells are epigenetically committed to Ifng expression, whereas CD27- gd T cells acquire Il17 expression in the thymus but can be induced to co-produce IFN-g under strong inflammatory conditions mediated by the cytokines IL-1b and IL-23. These signature molecular profiles included differential expression of master transcription factors; and translated into distinct cellular phenotypes in the tumour microenvironment, namely in ovarian cancer.

We further dissected the behaviour of CD27+ versus CD27- gd T cells in various tumour models: whereas in the B16 melanoma model, IFN-g-producing CD27+ gd T cells played a host-protective role in tumour progression, in the ID8 ovarian cancer model we found an unexpected pro-tumoural role of IL-17-producing CD27- gd T cells. This raised unprecedented awareness of the pleiotropic roles of gd T cells in cancer.

The results of this project have provided major advances to our understanding of the differentiation of pro-inflammatory gd T cell subsets in vivo with major implications for their manipulation in cancer immunotherapy.

ERC Starting Grant
Host Institution: Instituto de Medicina Molecular
Principal Investigator: Bruno Silva-Santos
Starting Date: Dec 2010

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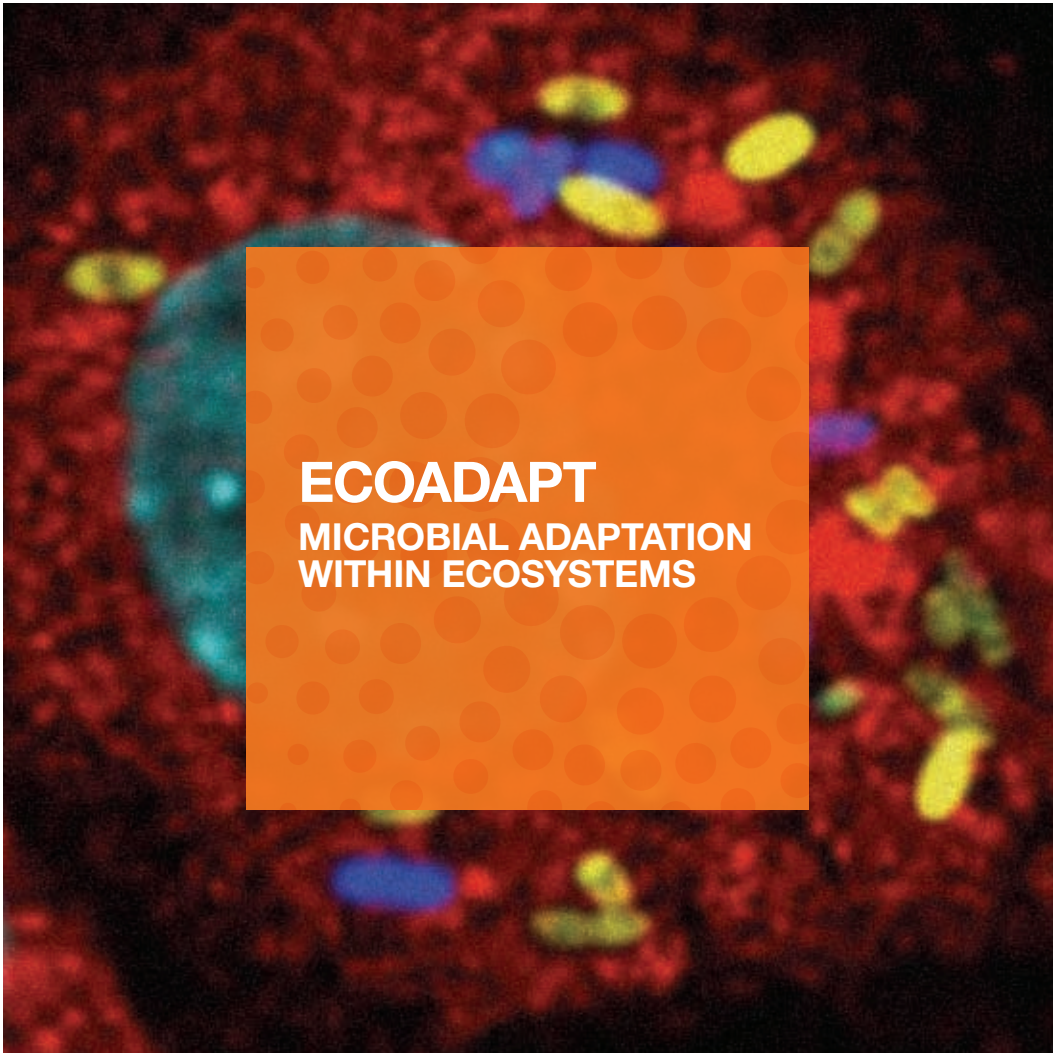

ECOADAPT
MICROBIAL ADAPTATION
WITHIN ECOSYSTEMS

ECOADAPT
MICROBIAL ADAPTATION WITHIN ECOSYSTEMS

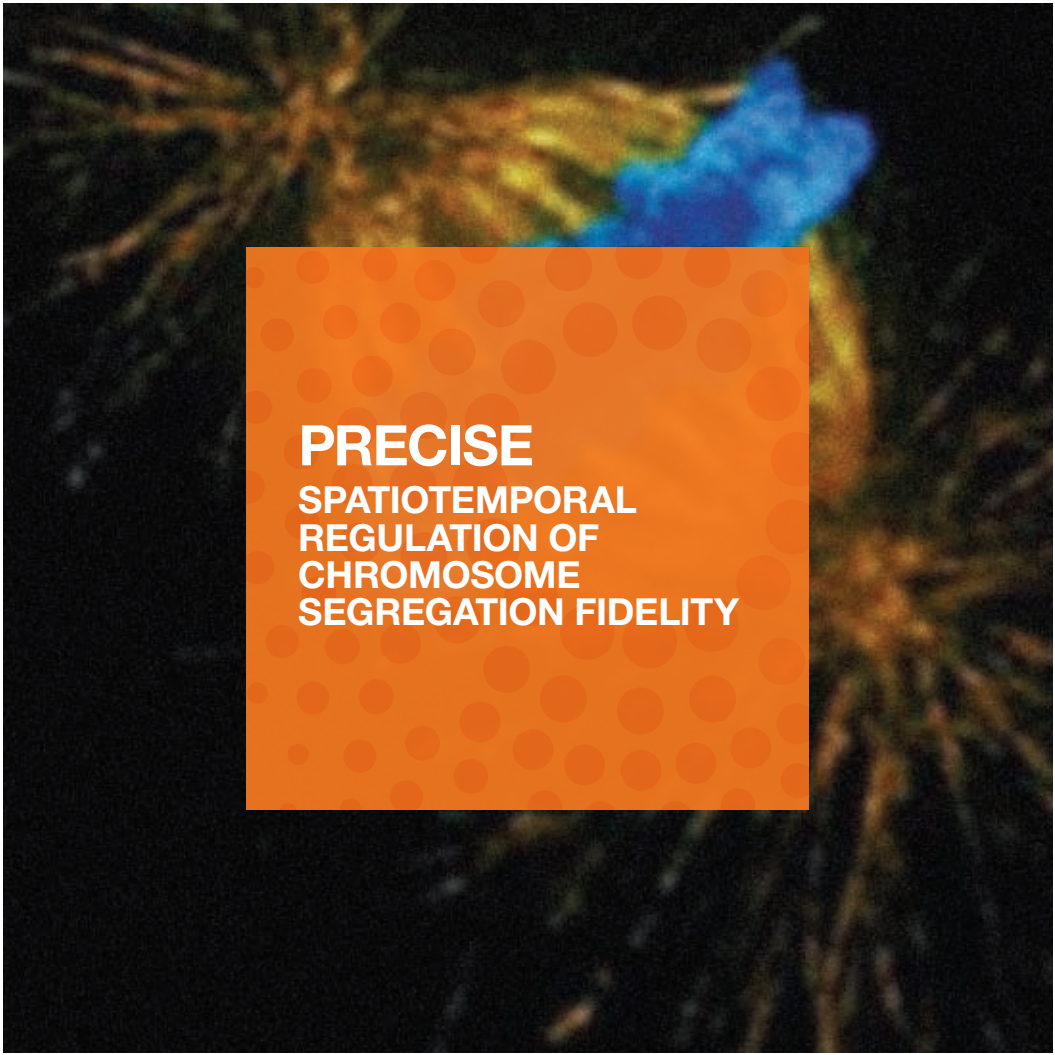
Natural populations are constantly subjected to new mutations, and frequently face new environments, to which they adapt. Experimental evolution with bacteria presents us the opportunity to measure key parameters and test theoretical predictions about the genetic basis of adaptive evolution in increasingly complex ecosystems. ECOADAPT aimed to understand bacterial adaptation in environments with different biotic interactions important in the context of health and disease.
ECOADAP produced two key findings:

- The selective pressure imposed by the host immune system is an important component in the transition between commensalism and pathogenicity. Results show that bacteria can evolve remarkably fast and acquire adaptations increasing survival inside cells of the innate immune system and/or ability to escape engulfment. Therefore, it is expected that such coincidental adaptation will increase the ability of bacteria to cause disease, since it simultaneously allows them to resist the immune system and their natural enemies;
- The study of the dynamics of adaptation of E. coli populations evolving in mammalian intestines showed that different advantageous mutations rapidly emerge and a large genetic variation in this species is generated over time. The evolution of E. coli in the gut of immunocompetent and immunocompromised mice is being compared aiming at understanding how the immune system influences the evolution of the microbiota.

These results have unraveled a layer of complexity of the gut microbiota, unknown so far, and will be instrumental for the development of new strategies to fight disease by manipulating gut microbes.

ERC Starting Grant
Host Institution: Instituto Gulbenkian Ciência
Principal Investigator: Isabel Antunes Mendes Gordo
Starting Date: Jan 2010

European Research Council


PRECISE
SPATIOTEMPORAL
REGULATION OF
CHROMOSOME
SEGREGATION FIDELITY

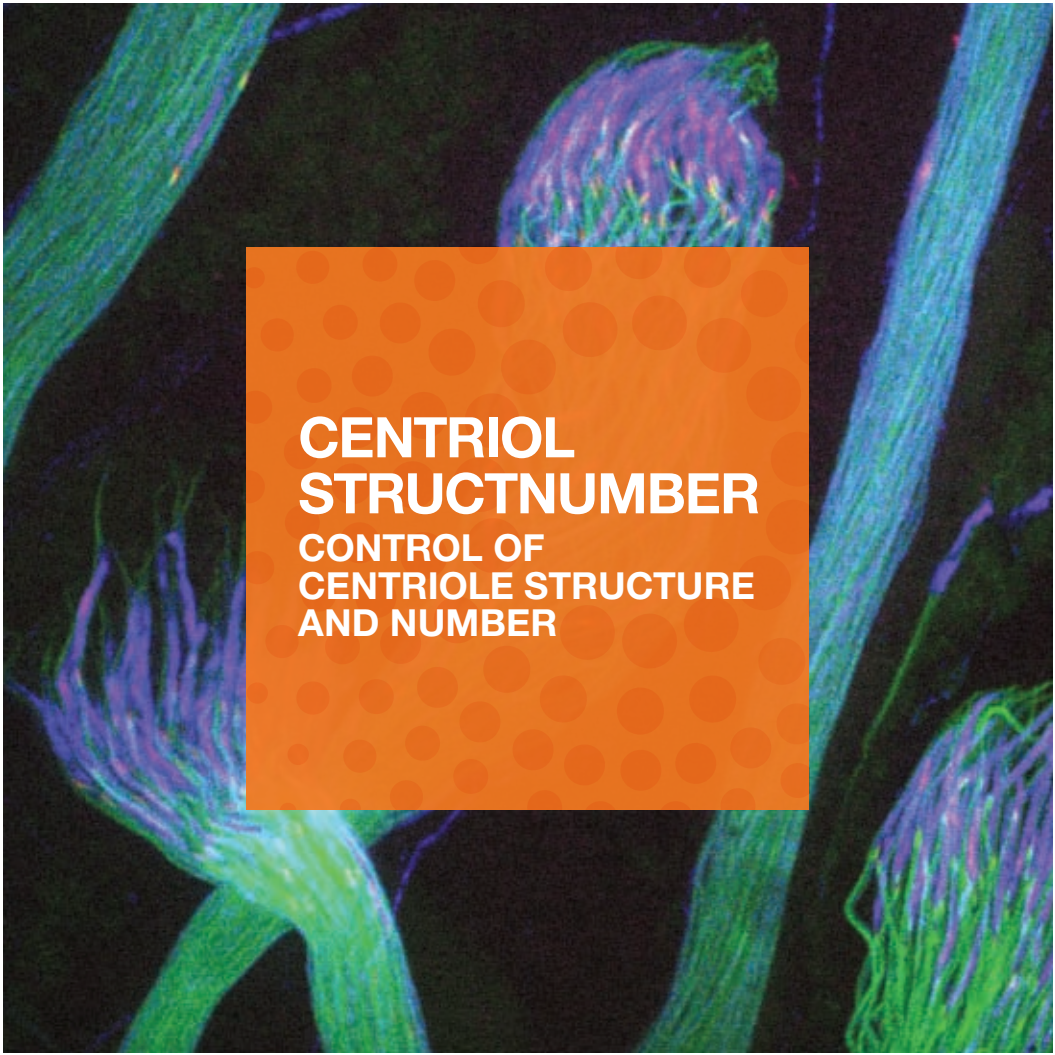
PRECISE

SPATIOTEMPORAL REGULATION OF CHROMOSOME SEGREGATION FIDELITY

At any given moment, 250 million cells are dividing in the human body through mitosis. Inaccuracy of mitosis leads directly to aneuploidy, a hallmark of several cancers and birth defects. Mitotic fidelity is controlled by the spindle assembly checkpoint (SAC), a signaling pathway that delays the progression of mitosis to ensure that all chromosomes are attached to mitotic spindle microtubules (MTs). The kinetochore (KT), a structure on each replicated sister-chromatid, promotes the rapid turnover of MTs to correct potential attachment errors during early mitotic stages. PRECISE proposed to dissect how the interaction between spindle MTs and KTs controls chromosome segregation fidelity in space and time. Our findings established the constitutive nature of a centrosome-independent spindle assembly program and how this program is adjusted to the presence/absence of centrosomes in animal somatic cells. We demonstrated that mammalian CLASPs contribute to mitotic fidelity not only by regulating KT-MT attachments, but also by preventing irreversible spindle multipolarity. Moreover, we found that congression of pole-proximal chromosomes depended on specific post-translational detyrosination of spindle microtubules that point to the equator. We proposed that microtubule detyrosination, as part of the “tubulin code”, works as a navigation system for kinetochore-based chromosome motility during mitosis. In parallel, we have identified a conserved feedback control mechanism that delays chromosome decondensation and NER in response to incomplete chromosome separation. Our findings strongly support a critical role for the CLASPs protein in fetal growth regulation, proper pulmonary maturation and nervous system function, being an essential protein for mammalian life after birth.

ERC Starting Grant
Host Institution: Instituto de Biologia Molecular e Celular
Principal Investigator: Hélder Maiato
Starting Date: Jan 2011

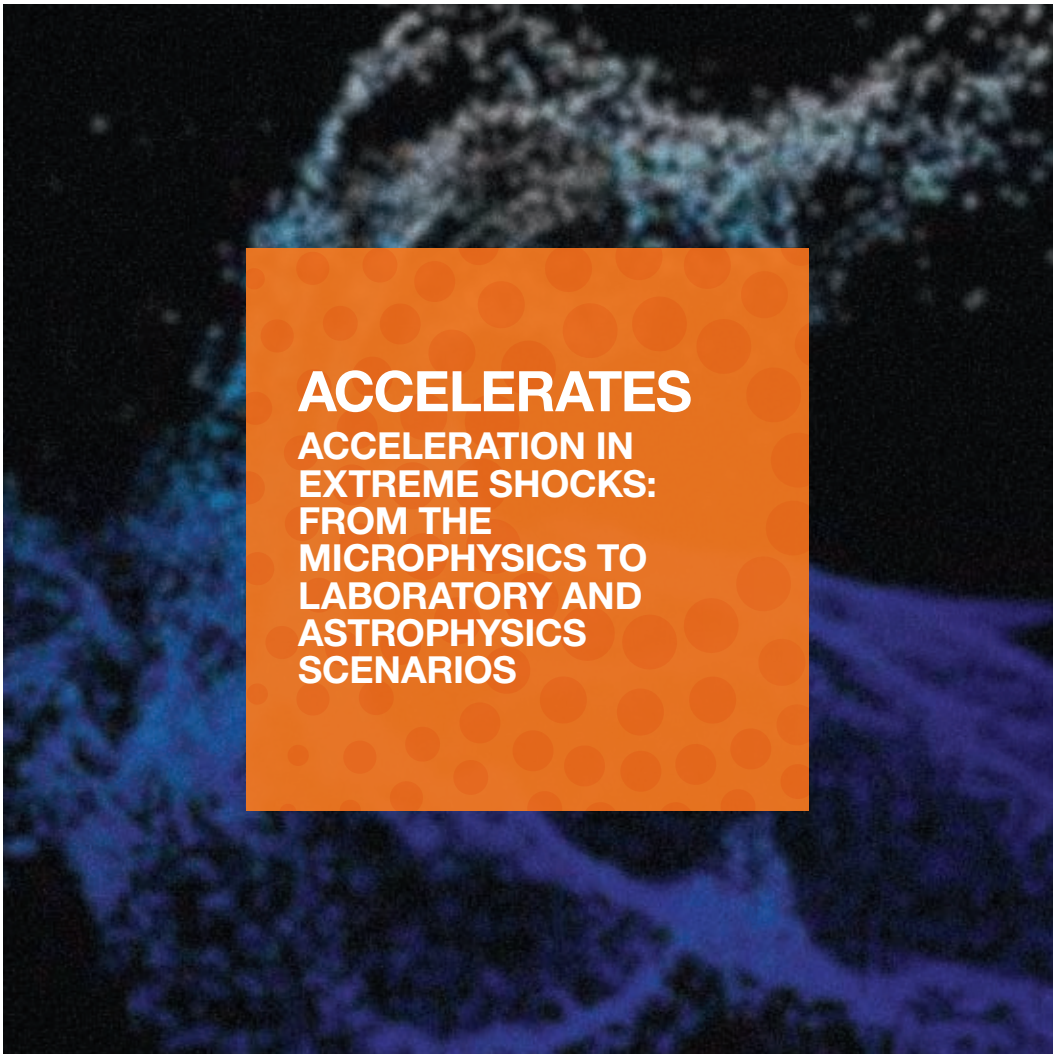
European Research Council


CENTRIOL
STRUCTNUMBER
CONTROL OF
CENTRIOLE STRUCTURE
AND NUMBER

CENTRIOLSTRUCTNUMBER
CONTROL OF CENTRIOLE STRUCTURE AND NUMBER

Centrioles form cilia, flagella and centrosomes, structures in our cells that are required for several functions, from cell motility to division. Centrosome defects are seen in many cancers, while abnormalities in cilia and flagella can lead to a variety of human diseases, such as polycystic kidney disease. CENTRIOLSTRUCTNUMBER is asking two fundamental questions that are central to human disease: how is centriole structure and number established and regulated in the cell. With CENTRIOLSTRUCTNUMBER we uncovered several mechanisms that regulate centriole number and length, including positive and negative feedback loops in PLK4 regulation that control centriole number, and how Bld10, SAS6 and CEP290 contribute to defining centriole length. Moreover, we found that differential regulation of core centriole proteins leads to the formation of different ciliary basis in different tissues, contributing to different ciliary functions. This may underlie why different mutations in the same gene may lead to different phenotypes in different patients. We uncovered that centrioles are not intrinsically stable, but their pericentriolar coating contributes to their stability and its removal causes their destabilization in certain tissues. This is particular important in the case of oocytes- if centrioles do not disappear the female is sterile. Finally, we found that centriole deregulation (number and size) is widespread in cancer and associated with poor prognosis. We are now collaborating with bioinformaticians to mine the data we obtained and hope to identify new causes of centriole amplification and forms of adaptation of cancer cells to centriole amplification. Since centriole amplification is only present in cancer cells, this provides a way of targeting specifically those cells.

ERC Starting Grant
Host Institution: Instituto Gulbenkian Ciência
Principal Investigator: Mónica Bettencourt Dias
Starting date: Jan 2011


ACCELERATES
ACCELERATION IN EXTREME SHOCKS: FROM THE MICROPHYSICS TO LABORATORY AND ASTROPHYSICS SCENARIOS

ACCELERATES

ACCELERATION IN EXTREME SHOCKS: FROM THE MICROPHYSICS TO LABORATORY AND ASTROPHYSICS SCENARIOS

Cosmic rays are the most energetic particles in the Universe. This project aimed to unveil the physics of the cosmic ray accelerators, thought to be relativistic shocks, by performing large scale numerical simulations, supported by theoretical studies, and by identifying the laboratory scenarios where collisionless shock waves can be generated by using the most intense lasers and relativistic particle beams.
ACCELERATES opened new avenues between theoretical and massive computational studies, laboratory experiments and astrophysical observations. It has demonstrated unprecedented parallel scalability of the numerical tool used in the project resorting to the largest supercomputer in the World. A novel mechanism to generate collisionless shocks in the laboratory with intense lasers has been identified and this mechanism can be used not only to understand the fundamental physics of cosmic rays acceleration, but also to accelerate protons to energies relevant for proton cancer therapy.
ACCELERATES has uncovered the laboratory conditions required for intense lasers to reproduce in the laboratory the relativistic shocks mediated by small scale magnetic fields thought to be pervasive in some of the most extreme events in the Universe.
Moreover, a new mechanism to generate magnetic fields was also discovered capable of producing intense magnetic fields at the boundary of relativistic jets.
Finally, the team of ACCELERATES has identified the laboratory conditions for electrostatic shocks generated by intense lasers to accelerate monoenergetic ions.
ACCELERATES demonstrated that this ion shock acceleration scheme can be scaled to energies in the 200 MeV range thus also of high relevance for novel compact laser based ion acceleration for proton cancer therapy.

ERC Advanced Grant
Host Institution: Instituto Superior Técnico
Principal Investigator: Luís O. Silva
Starting Date: Jun 2011

European Research Council


ALICE
STRANGE MIRRORS, UNSUSPECTED LESSONS: LEADING EUROPE TO A NEW WAY OF SHARING THE WORLD EXPERIENCES
alice©

ALICE

STRANGE MIRRORS, UNSUSPECTED LESSONS: LEADING EUROPE TO A NEW WAY OF SHARING THE WORLD EXPERIENCES

Alice seeks to re-think and renovate socio-scientific knowledge by drawing upon "Epistemologies of the South". The objective is to develop new theoretical and political paradigms of social transformation. Throughout Europe and the Global North as a whole, there is a sentiment of intellectual and political exhaustion.

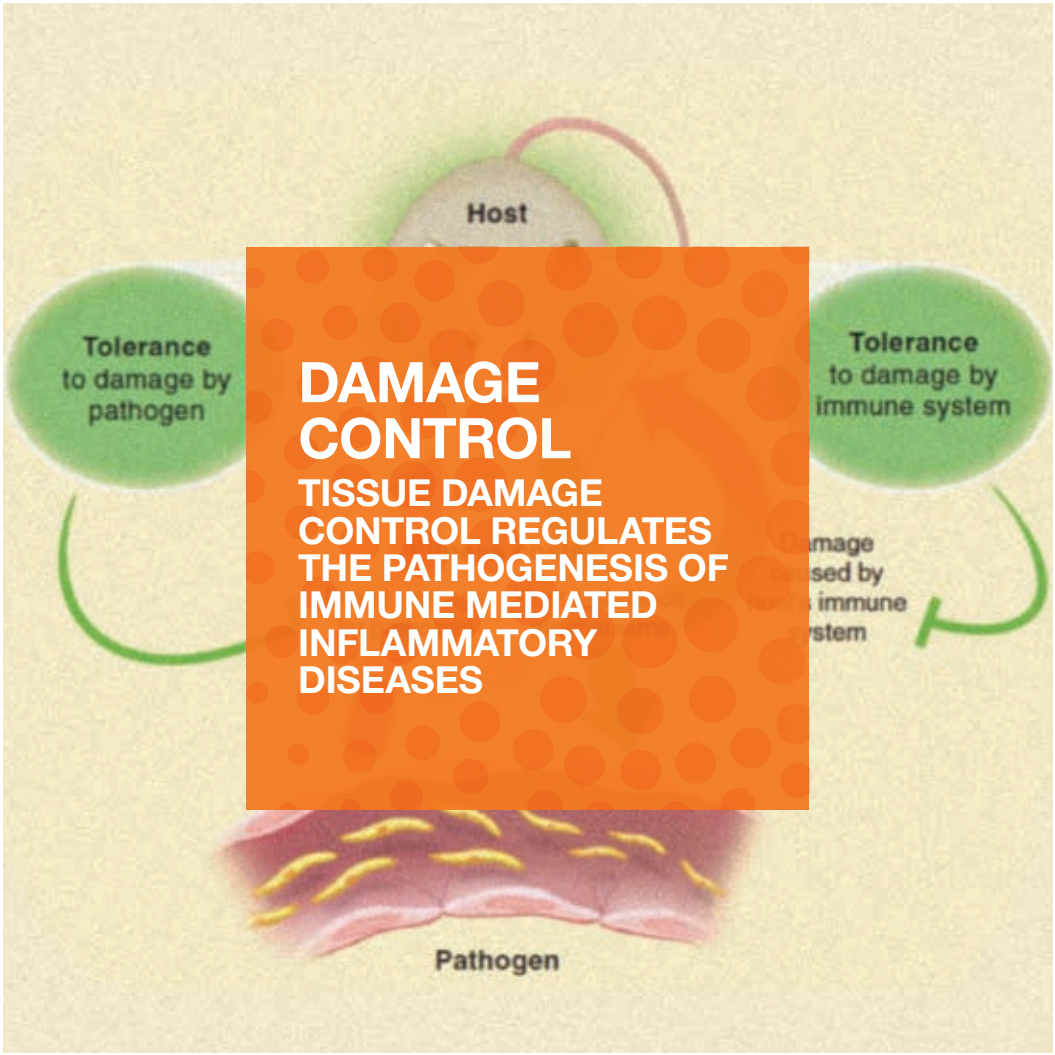
ALICE is grounded on a wager, i.e., that social, political and institutional change may largely benefit from the innovations occurring in countries and regions of the Global South. ALICE rests on the idea that there is a need for an alternative way of thinking about alternatives. The epistemological approach and main conceptual framework of the project demanded the implementation of new methodologies. ALICE has organized 12 Popular University of Social Movements (UPMS) workshops on specific themes with the aim of furthering the discussion and use of the main ALICE concepts and perspectives by scholars and social movements. Five of the UPMS took place in Brazil, and the other six were held in Portugal, Spain, Tunisia, Bolivia, Mozambique (2) and India.

The ALICE project placed special emphasis on knowledge dissemination and transfer among young publics, promoting the tools for a critical evaluation of the main challenges to Europe and the construction of alternatives. Accordingly, ALICE has organized two scientific initiatives for high school students.

The seminars and interviews from around the world explored the dialogue between the main ALICE conceptual framework and the theoretical and epistemological approaches of other scholars and social activists from different disciplinary and geographical backgrounds.

ERC Advanced Grant
Host Institution: Centro de Estudos Sociais
Principal Investigator: Boaventura de Sousa Santos
Starting Date: Jul 2011

European Research Council


Host
Tolerance to damage by pathogen
Tolerance to damage by immune system
DAMAGE CONTROL
TISSUE DAMAGE CONTROL REGULATES THE PATHOGENESIS OF IMMUNE MEDIATED INFLAMMATORY DISEASES
Pathogen

DAMAGECONTROL

TISSUE DAMAGE CONTROL REGULATES THE PATHOGENESIS OF IMMUNE MEDIATED INFLAMMATORY DISEASES

DAMAGECONTROL proposes to study evolutionarily conserved stress and damage-responsive genetic programs that limit the extent of tissue damage caused by infection, which, without a countervailing response, would lead to irreversible tissue damage and disease. This protective mechanism, referred as “tissue damage control”, is essential to the establishment of disease tolerance, an ancestral host defense strategy against infection that limits disease severity irrespectively of pathogen burden, as opposed to resistance to infection, which limits host disease severity by reducing pathogen burden. The central aim of DAMAGECONTROL is testing to what extent tissue damage control mechanisms are required to allow immune-mediated pathogen clearance to operate without causing tissue damage and disease.

DAMAGECONTROL should unveil what the team believes to be an essential component of immunity that decouples pathogen clearance from tissue damage and disease, namely tissue damage control. The data obtained is expected to provide new therapeutic targets to suppress the pathogenesis of a broad range of immune mediated inflammatory diseases. Data obtained under DAMAGECONTROL suggests that tissue damage control can be enforced by different mechanisms including: (i) cellular adaptive responses that prevent the deleterious effects of stress and damage; (ii) neutralization of toxins and other virulence factors causing stress and damage and/or; (iii) immunoregulation towards limiting stress and damage caused by resistance mechanisms. Failure of any of these regulatory mechanisms to prevent tissue damage during infection exacerbates disease, irrespectively of pathogen load.

ERC Advanced Grant
Host Institution: Instituto Gulbenkian Ciência
Principal Investigator: Miguel Parreira Soares
Starting Date: Apr 2012

European Research Council

P.S.

POST SCRIPTUM: A DIGITAL ARCHIVE OF ORDINARY WRITINGS (EARLY MODERN PORTUGAL AND SPAIN)

P.S.

POST SCRIPTUM: A DIGITAL ARCHIVE OF ORDINARY WRITINGS (EARLY MODERN PORTUGAL AND SPAIN)

The P.S. (Post Scriptum) Project deals with the publishing and historical-linguistic study of private letters written in Portugal and Spain in the Early Modern Ages (16th-19th centuries). This epistolary, from authors with different backgrounds, survived the Inquisition or the civil courts' persecution means to became part of court proceedings. They have an (almost) oral rhetoric, still underexplored, that when used as sociological interviews conducted by inquisitors and judges, grasp the context of interpersonal relations in traditional societies. P.S. collected a wide collection of private letters and carried a philological treatment through online digital edition and linguistic annotation. The teams' multidisciplinarity sustained the research along 4 lines: documents collection, scholarly digital edition, linguistic annotation, and cultural or linguistic studies.
About 6,300 letters were found and 2,600 of them transcribed in a rich XML-TEI format, and annotated to create linguistic corpora. Experiments of online publication resulted in TEITOK, a platform where the letters, the participants' stories, the historical context and the utterances grammar can be crossed and searched, and where letters are transcribed and automatically annotated. The project resulted in 46 presentations and 31 publications, national and international, across several fields, from digital humanities to generative syntax, from corpus linguistics to language history, from discourse analysis to cultural history. The PS project succeeded in creating a new compatibility between scholarly digital editions, designed to support historical studies (including language history) and robust annotated corpora, providing evidence for the study of language change within diachronic linguistics.

ERC Advanced Grant
Host Institution: Faculdade de Letras da Universidade de Lisboa
Principal Investigator: Rita Marquilhas
Starting Date: Apr 2012

European Research Council

NANOTRIGGER

TRIGGERABLE NANOMATERIALS TO MODULATE CELL ACTIVITY

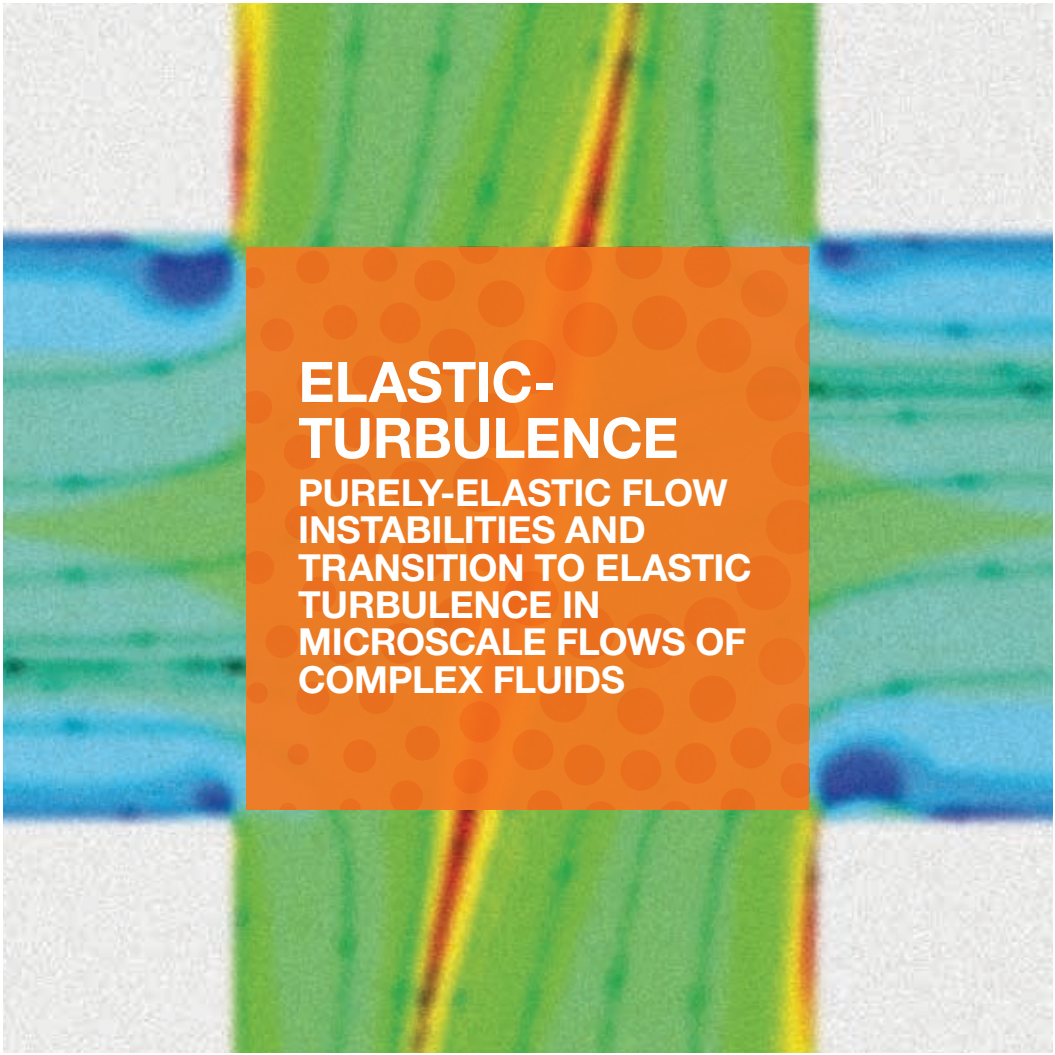
NANOTRIGGER

TRIGGERABLE NANOMATERIALS TO MODULATE CELL ACTIVITY

The advent of molecular reprogramming and the associated opportunities for personalized and therapeutic medicine requires the development of novel systems for on-demand delivery of reprogramming factors into cells in order to modulate their activity/identity.
Such triggerable systems should allow precise control of the timing, duration, magnitude and spatial release of the reprogramming factors. Nano Trigger aims at developing triggerable systems able to release efficiently reprogramming factors on demand.
The proposed research involves a highly multidisciplinary team formed by engineers, chemists, biologists, encompassing elements of engineering, chemistry, system biology, stem cell technology and nanomedicine.
The novelty of this project relies on the combination of three components: stem cells isolated from umbilical cord blood, mixed with cells of the blood vessels which are themselves derived stem cells and a biomimetic gel, i.e., a gel produced by components found in blood.
The present project aims at developing biocompatible triggerable nanomaterials able to release efficiently biomolecules on demand. We have tested the potential of this technology in the modulation of leukemic cells *in vivo*, at the bone marrow. Presently, we are using the technology to instructively modulate the activity of adult cells in the setting of hematopoietic stem cell niche and in the heart after an ischemic insult.

ERC Starting Grant
Host Institution: Centro de Neurociências e Biologia Celular
Principal Investigator: Lino Ferreira
Starting Date: Nov 2012

European Research Council



ELASTIC-TURBULENCE

PURELY-ELASTIC FLOW INSTABILITIES AND TRANSITION TO ELASTIC TURBULENCE IN MICROSCALE FLOWS OF COMPLEX FLUIDS

ELASTIC-TURBULENCE

PURELY-ELASTIC FLOW INSTABILITIES AND TRANSITION TO ELASTIC TURBULENCE IN MICROSCALE FLOWS OF COMPLEX FLUIDS

Flows of complex fluids are common in our daily life and are very important from an industrial perspective. Because of their inherent nonlinearity, the flow of complex viscoelastic fluids often leads to counterintuitive and complex behavior and, above critical conditions, can prompt flow instabilities. The primary goal of this project is to substantially expand the frontiers of current knowledge regarding the mechanisms that lead to the development of such purely-elastic flow instabilities, and ultimately to understand the transition to so-called elastic turbulence. Some of the outcomes achieved during the project were:

- Development of a stable high-order parallel viscoelastic flow solver for GPU-based computations;
- Numerical simulation and experimental analysis of the steady flow bifurcation observed in strong extensional flows of viscoelastic fluids;
- Experimental investigation of complex spatiotemporal flow instabilities of wormlike micellar solutions in long rectangular straight microchannels;
- Use of serpentine microchannels as micro-rheometers to measure relaxation times of dilute viscoelastic fluids and to investigate purely elastic flow instabilities;
- Experimental and numerical analysis of the onset of purely elastic flow instabilities and transition to chaotic flow in microfluidic channels;
- Investigation of purely-elastic instabilities in electro-osmotic flows of complex fluids;
- Development of a device for measuring the relaxation time of ultra-dilute polymer solutions in extensional flow;
- Design of novel microfluidic devices for generation of strong extensional flows with optimized flow kinematics, with relevant applications in extensional rheometry and controlled deformation of macromolecules and soft materials under homogeneous extensional flow.

ERC Starting Grant
Host Institution: Universidade do Porto
Principal Investigator: Manuel Moreira Alves
Starting Date: Oct 2012

European Research Council

DEPENDABLE CLOUD

TOWARDS THE DEPENDABLE CLOUD: BUILDING THE FOUNDATIONS FOR TOMORROW'S DEPENDABLE CLOUD COMPUTING

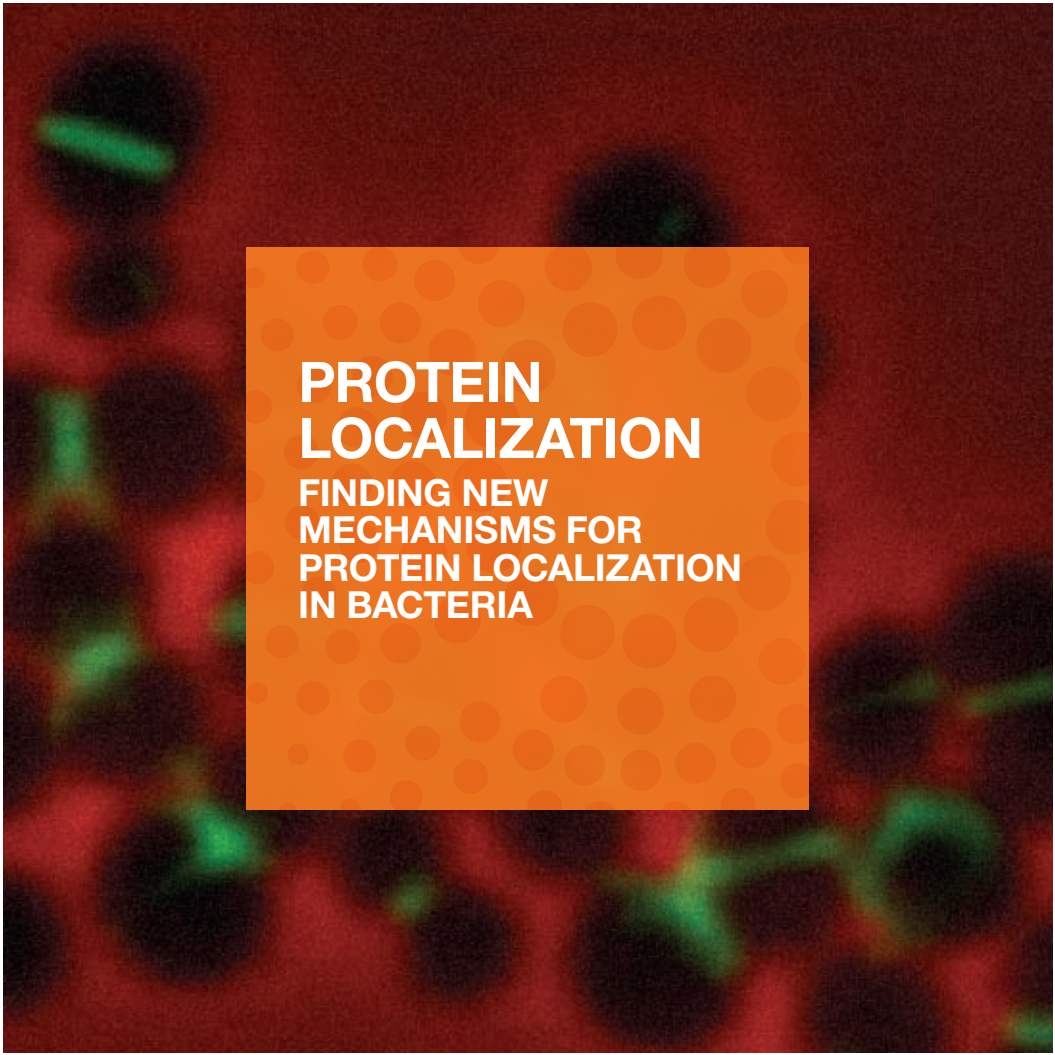
DEPENDABLECLOUD

TOWARDS THE DEPENDABLE CLOUD: BUILDING THE FOUNDATIONS FOR TOMORROW'S DEPENDABLE CLOUD COMPUTING

The general topic of DEPENDABLECLOUD is cloud computing, a new computing paradigm where companies and organizations transfer part of their IT and computing infrastructure to an external provider. This enables important gains, both in terms of lowering IT costs and providing access to a much larger computing infrastructure than the one that is owned and operated by those companies and organizations.
The infrastructure underlying cloud computing services has several novel characteristics, namely in terms of the scale of the data centres where such services run, and the geographic distribution of the servers where cloud data is replicated. In this context, the project aims to research new methods for developing the services that form the cloud infrastructure, in order to improve the reliability and performance of cloud services and meet the expectations of its users.
DEPENDABLECLOUD is developing a set of methods for improving the infrastructure that supports cloud services, and the applications that are deployed on top of that infrastructure. It is also developing a series of software artifacts that support these methods. In parallel, it is engaging in collaborations with a series of key players in cloud computing to increase the chances of adoption of the group's technologies.

ERC Starting Grant
Host Institution: Instituto de Engenharia de Sistemas e Computadores, Investigação e Desenvolvimento em Lisboa
Principal Investigator: Rodrigo Rodrigues
Starting Date: Oct 2012

European Research Council


PROTEIN
LOCALIZATION
FINDING NEW
MECHANISMS FOR
PROTEIN LOCALIZATION
IN BACTERIA

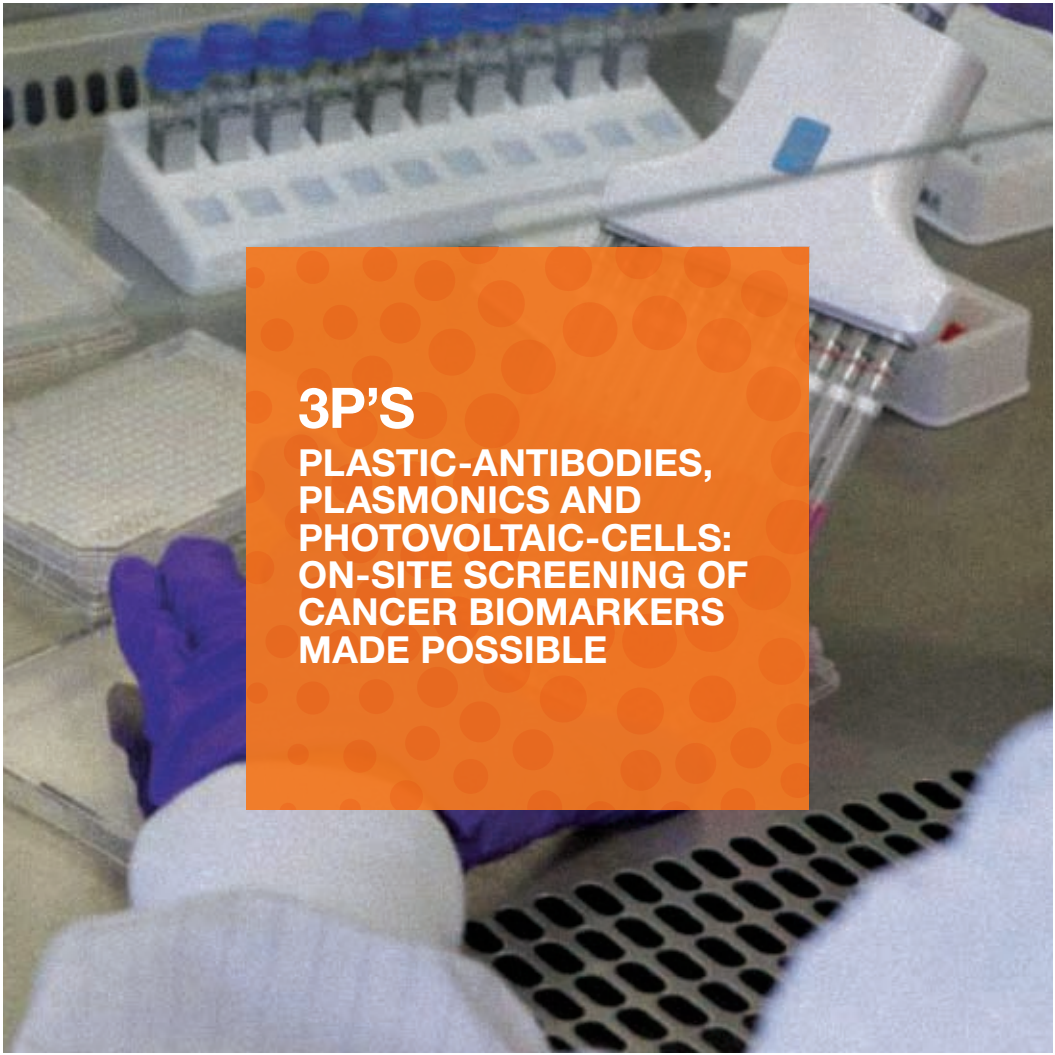
PROTEINLOCALIZATION

FINDING NEW MECHANISMS FOR PROTEIN LOCALIZATION IN BACTERIA

During infection, the host immune system interacts with the bacterial cell surface, a complex structure made of peptidoglycan, wall teichoic acids, lipoteichoic acids, capsule polysaccharide and peptidoglycan-attached proteins. A lot is known about the metabolic pathways for the synthesis of each individual cell surface component. Almost nothing is known about the coordination between the synthesis of the peptidoglycan, the major structural component of the cell surface and the main inflammatory component of gram-positive bacteria, and the synthesis of the other molecules present at the surface. However, this coordination is essential for the construction of a surface capable not only of performing its biological functions in cell protection and morphology, but also of masking its inflammatory components for evasion from host recognition.
Using the clinical pathogen Staphylococcus aureus as a model organism, PROTEINLOCALIZATION proposes to investigate the temporal and spatial regulation of the enzymes responsible for the synthesis of the cell surface components, as well as their dependence on the underlying divisome.
PROTEINLOCALIZATION will result in the identification of new mechanisms of protein localization, a fundamental question in cell biology, and in a better understanding of the process of assembly of the bacterial cell surface of successful bacterial pathogens.

ERC Starting Grant
Host Institution: Instituto de Tecnologia Química e Biológica
Principal Investigator: Mariana Pinho
Starting Date: Mar 2013

European Research Council



3P'S

PLASTIC-ANTIBODIES, PLASMONICS AND PHOTOVOLTAIC-CELLS: ON-SITE SCREENING OF CANCER BIOMARKERS MADE POSSIBLE

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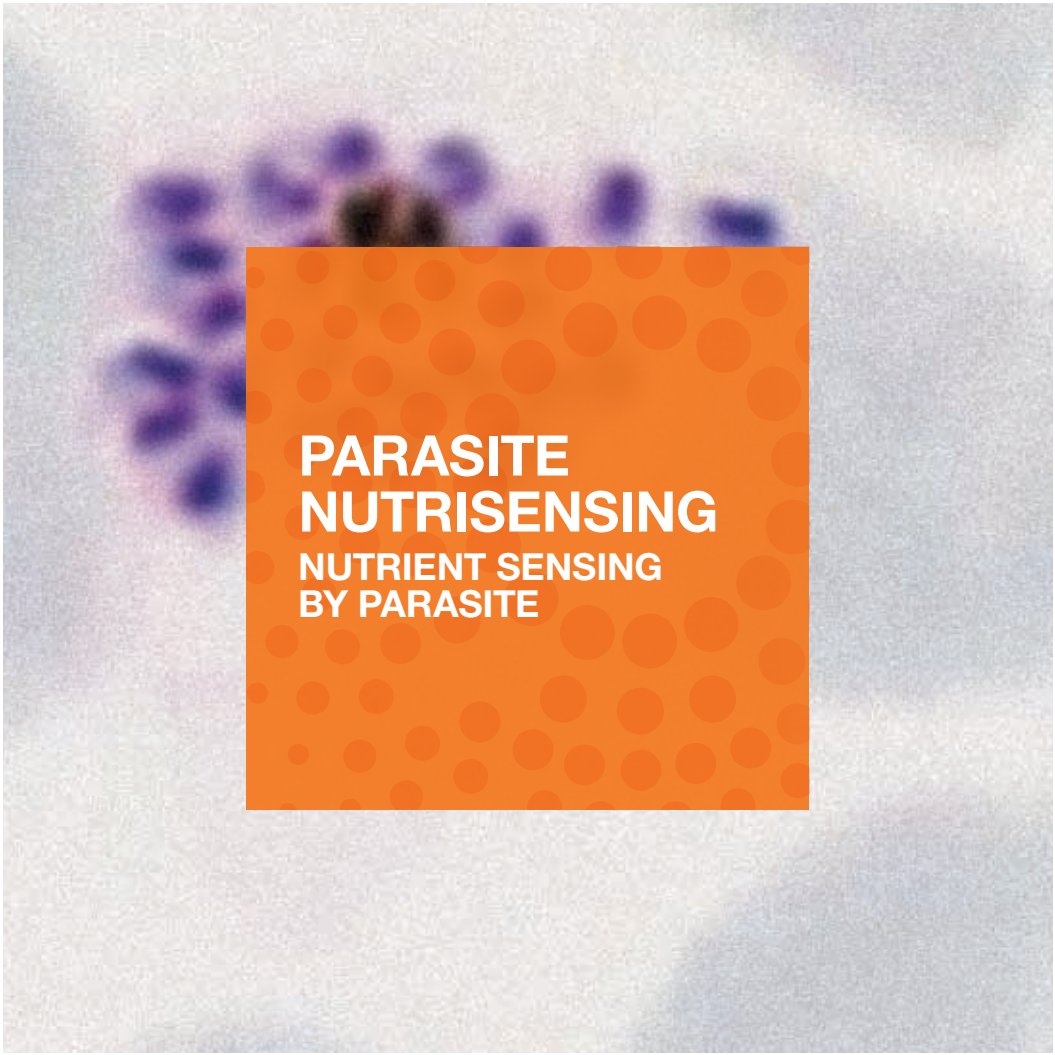
PLASTIC-ANTIBODIES, PLASMONICS AND PHOTOVOLTAIC-CELLS: ON-SITE SCREENING OF CANCER BIOMARKERS MADE POSSIBLE

Cancer diseases remain a major public health concern, and early screening is among the most important tools in the fight against these. Monitoring biomolecules that may indicate the presence/progression of the disease could be an effective early screening approach. The project 3P's presents a new concept for detection, diagnosis and monitoring cancer in point-of-care. The device under development will make use of the selectivity of the Plastic antibodies as sensing materials and the operation of a Photovoltaic cell acting as energy source, equipped with Plasmonic structures to enhance light absorption and cell efficiency. The device under development is expected to be easily operated and applied to the most frequent forms of cancer, namely breast, cervical and colorectal cancer. For this purpose, new synthetic surfaces must be designed to act like antibodies (known as Plastic antibodies, the 1st 'P' of the acronym) for specific cancer biomarkers that circulate in body fluids (serum, urine or saliva). These surfaces are then to be included in a photovoltaic cell (a 2nd 'P') and the final electrical output of the cell measured. When a cancer biomarker binds to this surface, the electrical signal of the cell is changed, and this change used to quantify the cancer biomarker. A successful 2P's device, for quantifying carcinoembryonic antigen (CEA) in biological samples, was already developed. Studies under the current project include the development of similar devices for other current biomarkers, such as CA15-3 and Carnitine (among others). This is being done by coupling Plasmonic nanostructures (3rd 'P') to the photovoltaic cell, among many other technical alterations to be introduced at the cell assembly.

ERC Starting Grant
Host Institution: Instituto Superior de Engenharia do Porto
Principal Investigator: Maria Goreti Sales
Starting Date: Feb 2013

European Research Council


PARASITE
NUTRISENSING
NUTRIENT SENSING
BY PARASITE

PARASITENUTRISENSING
NUTRIENT SENSING BY PARASITE

Malaria is one of the most serious parasitic infectious diseases, with a toll of up to 1 million deaths every year. While this unacceptable health burden and its economic and social impact have made it a focal point of the international development agenda, it became consensual that malaria control or elimination will never be feasible until we gain a better understanding of the complex interactions occurring between its main players: Plasmodium, the causative agent of disease, and its hosts.

As any other obligate parasite, *Plasmodium* depends on its mammalian and vector hosts and on the nutrients they provide to survive and complete its life cycle. Surprisingly, while nutrient sensing pathways have been studied from yeast to humans, nothing is known about Plasmodium's capacity to sense nutrients or its host's nutritional status and thereby reprogram its metabolism. The overall goal of the Project is to unveil the molecular mechanisms by which parasites are capable to sense and adapt to environmental signals originated from nutrients, and to determine its impact on the course and virulence of infection.

Our data provides unequivocal evidence that Plasmodium has the ability to sense the host low-nutrient status and adapt to it by decreasing its multiplication rate. Overall and so far, we have unveiled the master regulator of Plasmodium nutrient sensing and found several downstream effectors responsible for the impact of different nutrient availability in the course and virulence of infection. Notably the master regulator is a druggable kinase and its activation is expected to sustain low parasitemia in humans, which has been previously shown to be protective and represents an unconventional approach for chemical attenuation therapy towards malaria elimination.

ERC Starting Grant
Host Institution: Instituto de Medicina Molecular
Principal Investigator: Maria Mota
Starting Date: Dec 2012

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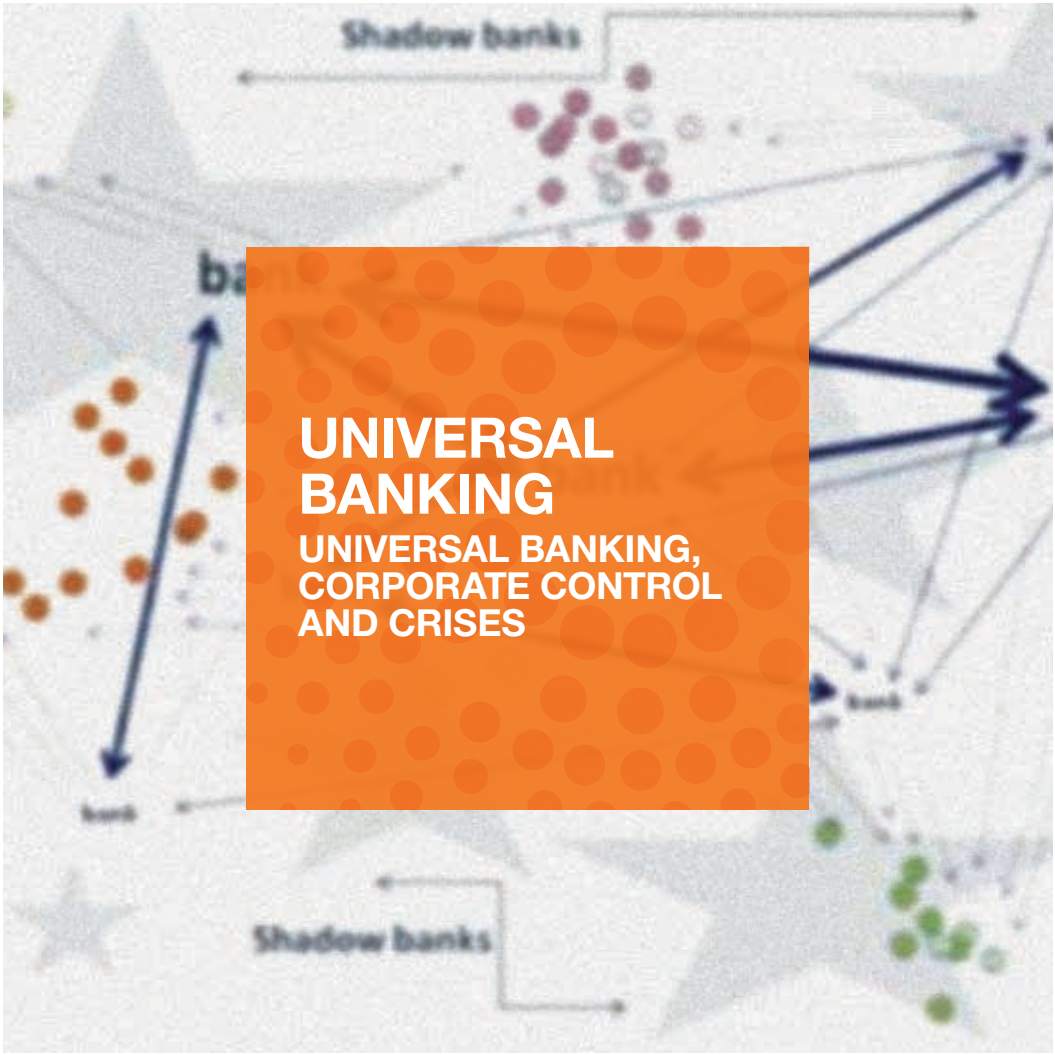
European Research Council



UNIVERSAL BANKING

UNIVERSAL BANKING, CORPORATE CONTROL AND CRISES

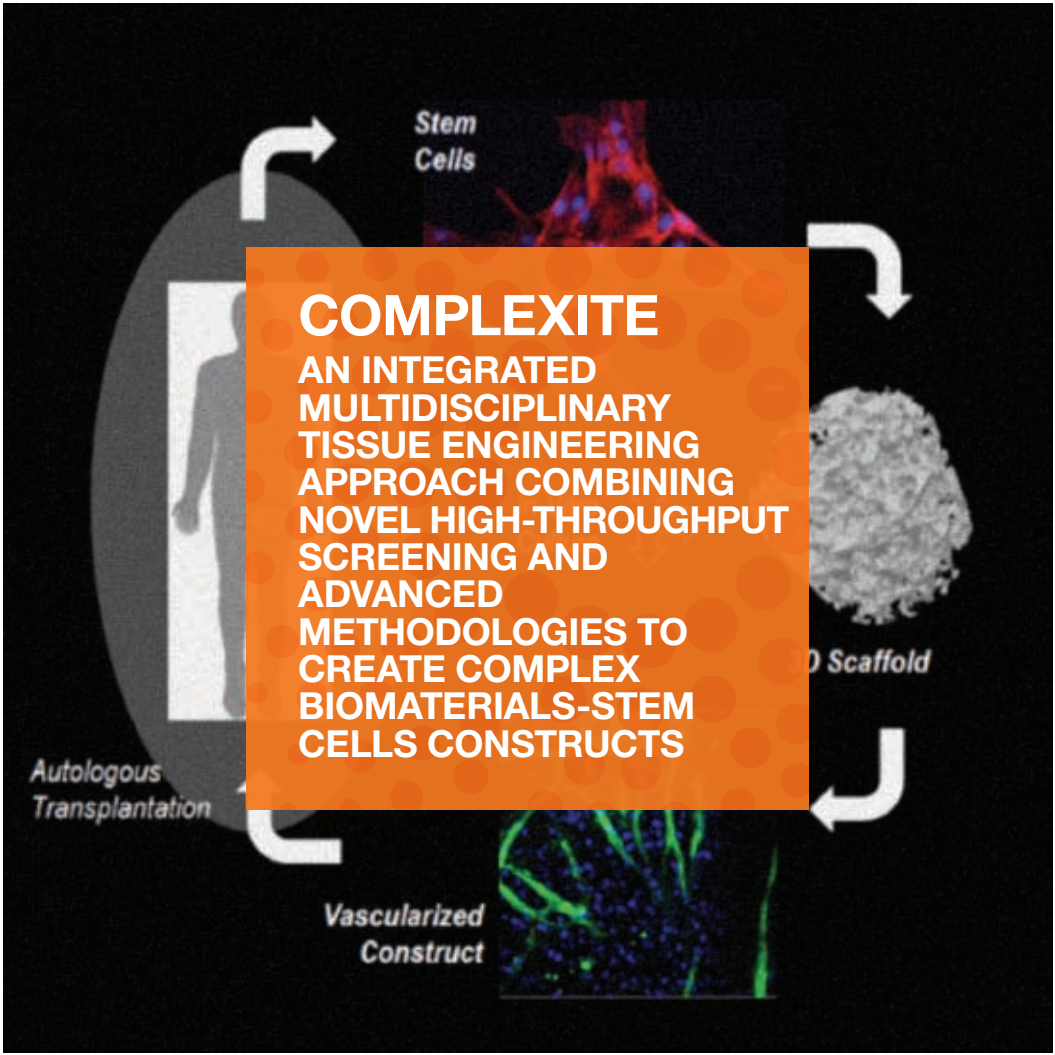
UNIVERSAL BANKING

UNIVERSAL BANKING, CORPORATE CONTROL AND CRISES

Financial intermediaries play a vital role in providing capital to corporations. The 2007-2009 financial crisis had dramatic consequences on the organization of the financial system that led to the rise of universal banking and financial conglomerates. This project studies the effect of control by financial conglomerates on corporation's performance, investment, and financing, as well as corporate governance policies. The aim of Universal Banking is to study whether the performance of funds' portfolios is affected by being affiliated to a financial conglomerate relative to being independent, non-affiliated, funds. Using a sample of nonfinancial firms from 34 countries during the 2007-2009 financial crisis with systemic and bank-specific shocks, we found that bank distress is associated with equity valuation losses and investment cuts to borrower firms with the strongest lending relationships with banks. The losses are not offset by borrowers' access to public debt markets and are concentrated in firms with the greatest information asymmetry problems and with the weakest financial positions. Additionally, using abnormal performance measures from a worldwide sample of mutual funds over 2000-2010, we found that funds affiliated with commercial banks underperform unaffiliated funds by 35 basis points per year and that most of this lower performance arises when the global economy experiences a period of economic recession. The project showed that portfolio managers of affiliated funds place larger bets in stocks of firms that borrow from their fund's affiliated bank relatively to stocks of non-borrowing firms. Moreover, it was found that, during economic recessions, stocks of lending clients underperform non-borrowing stocks.

ERC Starting Grant
Host Institution: Faculdade de Economia da Universidade Nova de Lisboa
Principal Investigator: Miguel Ferreira
Starting Date: Mar 2013

European Research Council



COMPLEXITE

AN INTEGRATED MULTIDISCIPLINARY TISSUE ENGINEERING APPROACH COMBINING NOVEL HIGH-THROUGHPUT SCREENING AND ADVANCED METHODOLOGIES TO CREATE COMPLEX BIOMATERIALS-STEM CELLS CONSTRUCTS

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New developments on tissue engineering strategies should realize the complexity of tissue remodeling and the inter-dependency of many variables associated to stem cells and biomaterials interactions. COMPLEXITE proposes an integrated approach to address such multiple factors in which different innovative methodologies are implemented, aiming at developing tissue-like substitutes with enhanced *in vivo* functionality. Several ground-breaking advances are expected to be achieved, including: improved methodologies for isolation and expansion of sub-populations of stem cells derived from standard and less explored sources such as bone marrow and adipose tissue; new macromolecules isolated from renewable resources, especially from marine origin; a microfluidic-based device for the automatic compounding of the cell-containing macromolecules liquid droplets to form hydrogel's beads and arrays; a new platform to independently screen the performance of (sub)- population(s) of stem cells with distinct biomaterials in 3D arrays; 3D bioreactors for improved culture of the produced beads coupled to a novel material sorting method; validated random 3D arrays that allow animal experimentation minimization; cues to produce novel constructs to support cells in clinical meaningful bone regeneration strategies; new 3D vascularized bone tissue engineering constructs combining distinct processing technologies and the identified relevant cues and culture conditions.

ERC Advanced Grant
Host Institution: Universidade do Minho
Principal Investigator: Rui Reis
Starting Date: May 2013

European Research Council

BI-DSC

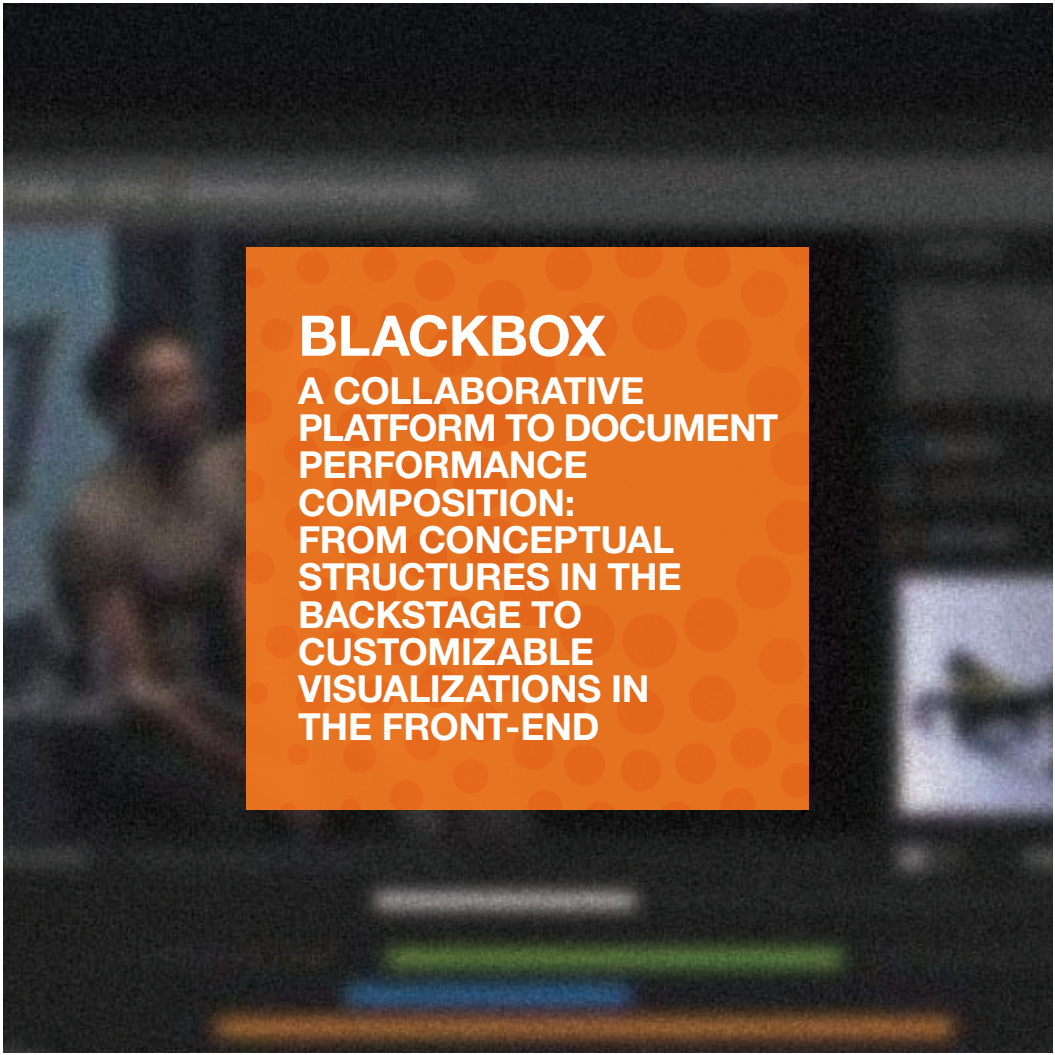
BUILDING INTEGRATED DYE SENSITIZED SOLAR CELLS

BI-DSC
BUILDING INTEGRATED DYE SENSITIZED SOLAR CELLS

In the last decade, solar and photovoltaic (PV) technologies have emerged as a potentially major technology for power generation in the world. So far, the PV field has been dominated by silicon devices, even though this technology is still expensive.
Dye-sensitized solar cells (DSC) are an important type of thin-film photovoltaics due to their potential for low- cost fabrication and versatile applications, and because their aesthetic appearance, semi-transparency and different color possibilities are attractive for architectural applications. BI-DSC is divided into two research, though parallel, directions: a fundamental research line, contributing to the development of the new generation DSC technology; and a more applied research line targets the development of a DSC functional module that can be used to pave the way for its industrialization.
BI-DSC project demonstrated the upscaling of the laser-sealing technology for assembling modules 30 × 30 cm^2 with four DSCs cells of 15 × 15 cm^2. For that a Laser Sealing Station is completely automatized and the following sealing processes are already optimized: 15 x 15 cm^2 DSC modules configuration (high-temperature sealing – 250 °C) and 7 x 7 cm^2 single PSC devices (low-temperature sealing – 120 °C).
Using this sealing prototype machine W-type modules were prepared. Then W-type configuration was used to construct a panel containing 10 modules 15 × 15 cm^2. The developed photoelectrode involves the deposition of a thin and highly conductive layer over a previous deposited template material with high surface area. The engineered photoelectrode provides higher conversion efficiencies due to the following advantages: 1) Higher electron conductivity; 2) Lower recombination; 3) Higher surface area.

ERC Advanced Grant
Host Institution: Universidade do Porto
Principal Investigator: Adélio Mendes
Starting Date: Mar 2013

European Research Council



BLACKBOX

A COLLABORATIVE PLATFORM TO DOCUMENT PERFORMANCE COMPOSITION: FROM CONCEPTUAL STRUCTURES IN THE BACKSTAGE TO CUSTOMIZABLE VISUALIZATIONS IN THE FRONT-END

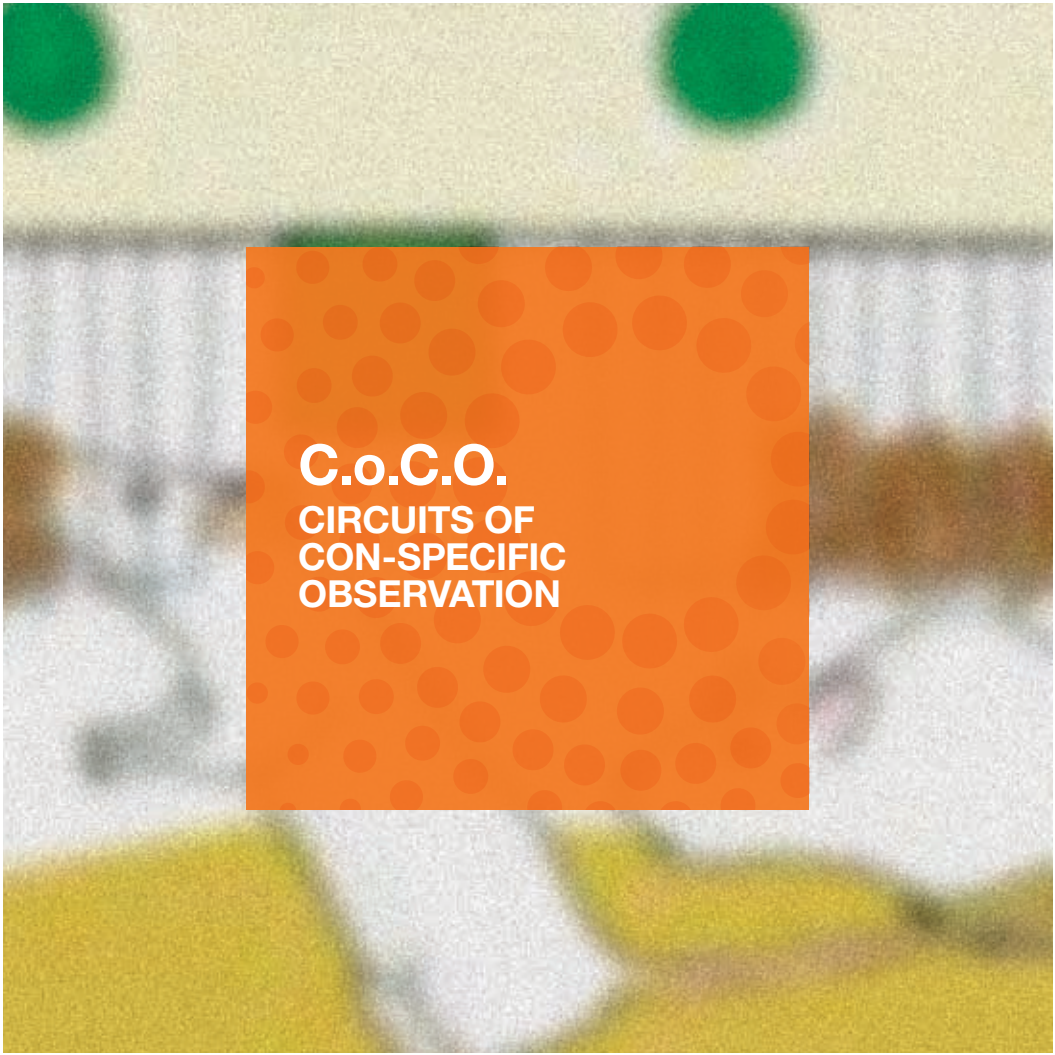
BLACKBOX

A COLLABORATIVE PLATFORM TO DOCUMENT PERFORMANCE COMPOSITION: FROM CONCEPTUAL STRUCTURES IN THE BACKSTAGE TO CUSTOMIZABLE VISUALIZATIONS IN THE FRONT-END

The global performing arts community is urging the need for innovative systems which document, transmit and preserve the unexplored knowledge contained in performance composition processes and assist artists with tools to facilitate their choreographic or dramaturgic practices, preferably on a collaborative basis. Currently existing digital archives for performing arts mostly function as linear e-libraries, not allowing higher degrees of interactivity or active user intervention. They rarely contemplate accessible video annotation tools or provide advanced relational querying functionalities based on artist-driven conceptual principles or idiosyncratic ontologies. The BlackBox project endeavours to fill this gap and create a new paradigm for the documentation of performance composition. As an Arts & Science project, it aims at the analysis of artists' unique conceptual structures, by combining the empirical insights of contemporary creators with research theories from Multimodal Communication (human interaction, gesture studies, cognitive science) and Digital Media studies. The main challenge is to design a cutting-edge model for a web-based collaborative platform enabling both a robust representation of the implicit knowledge behind performing practices and novel visualization technologies to support it. This challenge can be met by analysing recurring body movement patterns and by fostering online contributions of users to the multimodal contents stored in the platform.

ERC Starting Grant
Principal Investigator: Carla Fernandes
Host Institution: Faculdade de Ciências Sociais e Humanas da Universidade Nova de Lisboa
Starting Date: May 2014

European Research Council



C.o.C.O.

CIRCUITS OF CON-SPECIFIC OBSERVATION

C.o.C.O.
CIRCUITS OF CON-SPECIFIC OBSERVATION

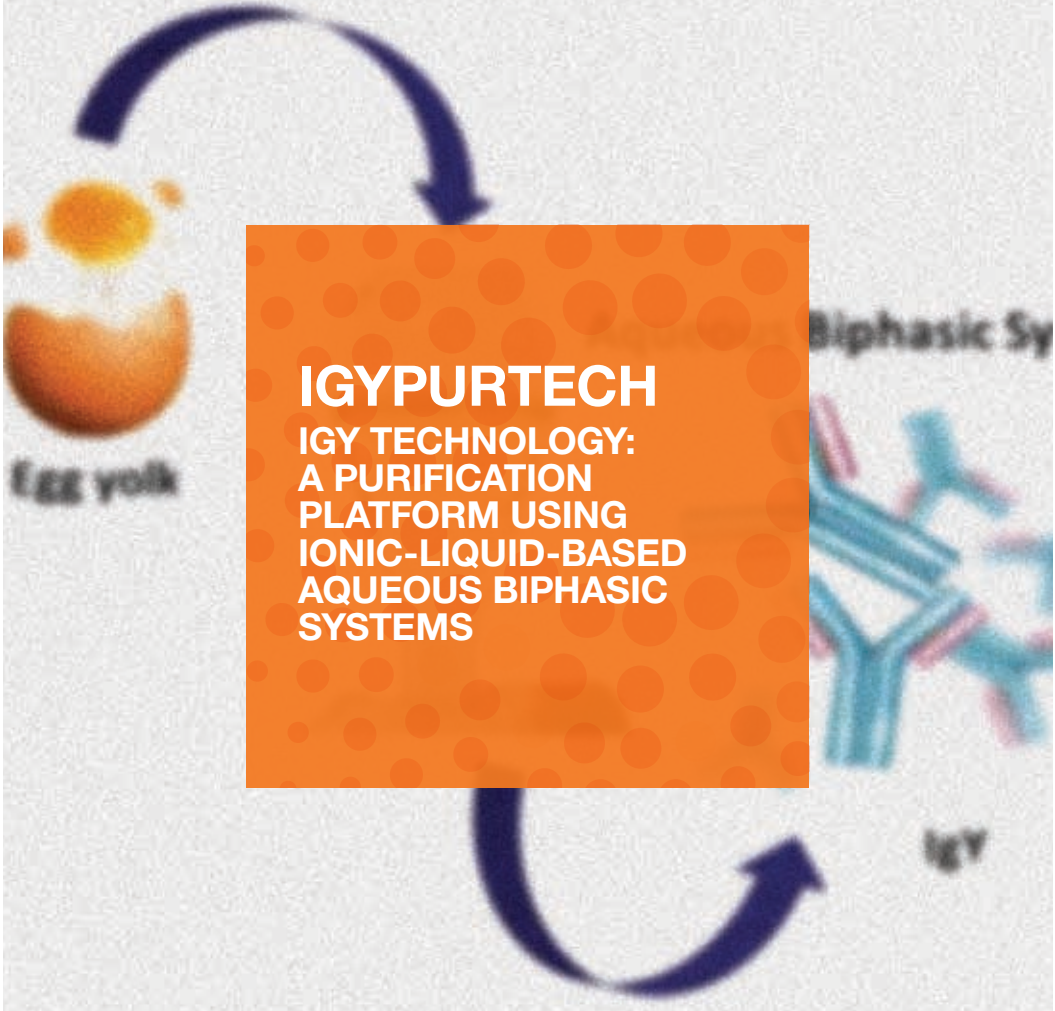
A great deal is known about the neural basis of associative fear learning. However, many animal species are able to use social cues to recognize threats, a defense mechanism that may be less costly than learning from self-experience. The team previously showed that rats perceive the cessation of movement-evoked sound as a signal of danger and its resumption as a signal of safety. To study transmission of fear between rats, the behaviour of an observer while witnessing a demonstrator rat display fear responses has been assessed.
With this paradigm C.o.C.O will take advantage of the accumulated knowledge on learned fear to investigate the neural mechanisms by which the social environment regulates defense behaviours.
C.o.C.O will unravel how the brain uses defense behaviours as signals of danger and how it contributes to defense mechanisms at the population level.
The neural circuits involved in detecting the transition from movement-evoked sound to silence will be unraveld. Moreover, the mechanism by which prior experience contributes to observational freezing will be determined. Finally, as the detection of and responses to threat are often inherently social, these behaviours will be studied in the context of large groups of individuals.
To circumvent the serious limitations in using large populations of rats, C.o.C.O will resort to a different model system, the fruit fly. Behavioural tasks, where conditioned demonstrator flies signal danger to other naïve ones, will be developed.

ERC Starting Grant
Host Institution: Fundação Champalimaud
Principal Investigator: Marta Moita
Starting date: Dec 2013

European Research Council

IGYPURTECH

IGY TECHNOLOGY: A PURIFICATION PLATFORM USING IONIC-LIQUID-BASED AQUEOUS BIPHASIC SYSTEMS



IGYPURTECH

IGY TECHNOLOGY: A PURIFICATION PLATFORM USING IONIC-LIQUID-BASED AQUEOUS BIPHASIC SYSTEMS

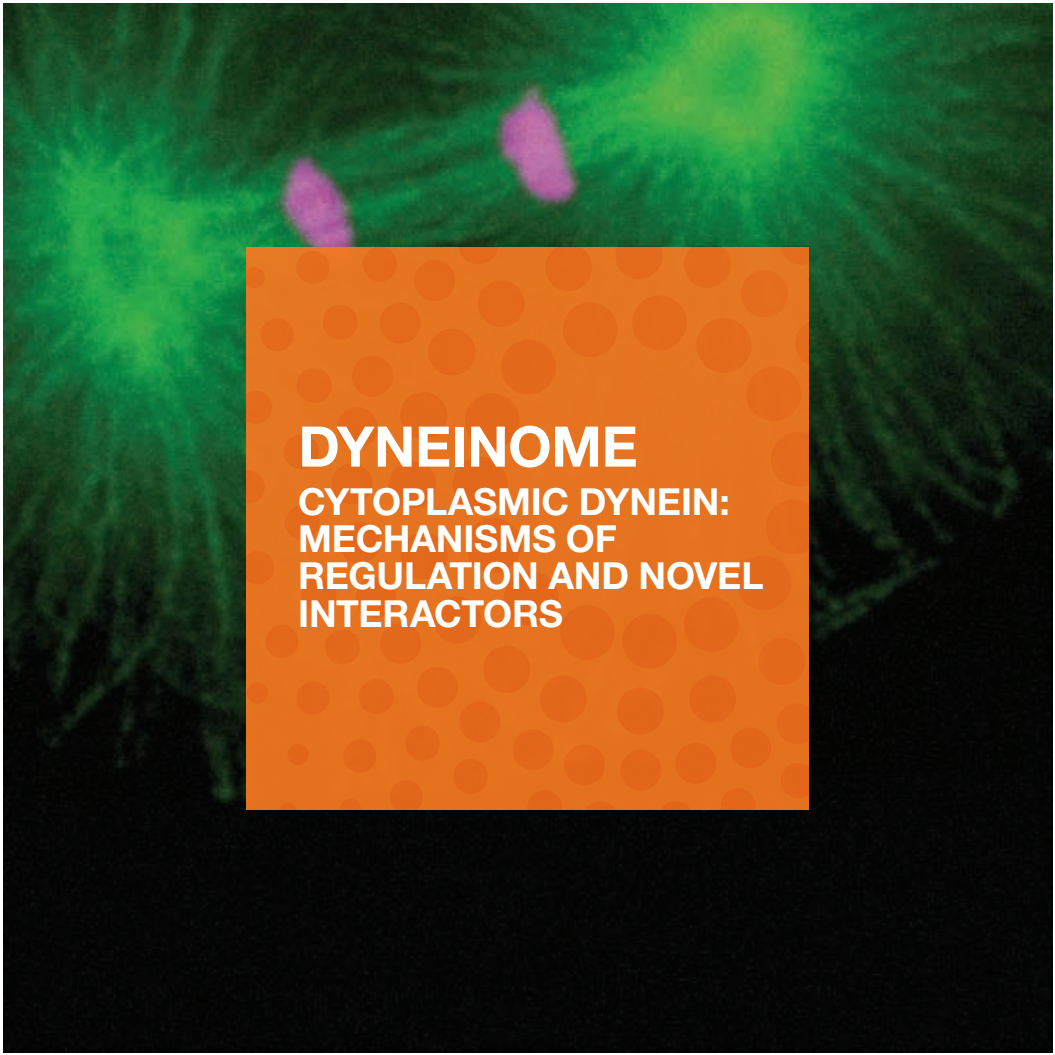
With the emergence of antibiotic-resistant pathogens, the development of antigen-specific antibodies for use in passive immunotherapy is nowadays a major concern in human society. Despite the most focused mammal antibodies, antibodies obtained from egg yolk of immunized hens, immunoglobulin Y (IgY), are an alternative option that can be obtained in higher quantities by non-stressful and non-invasive methods. This large amount of available antibodies opens the door for a new kind of cheaper biopharmaceuticals. However, the production cost of high-quality IgY for large-scale applications still remains higher than other drug therapies due to the lack of an efficient purification method. The search of new purification platforms is thus a vital demand to which liquid-liquid extraction using aqueous biphasic systems (ABS) could be the answer. Besides the conventional polymer-based systems, highly viscous and with a limited polarity/affinity range, a recent type of ABS composed of ionic liquids (ILs) may be employed. ILs are usually classified as “green solvents” due to their negligible vapour pressure. Yet, the major advantage of IL- based ABS relies on the possibility of tailoring their phases’ polarities aiming at extracting a target biomolecule.

The proposed project contemplates the optimization of purification systems at the laboratory scale and their application in countercurrent chromatography to achieve a simple, cost-effective and scalable process.

IgYPurTech is expected to develop a new technique for the extraction and purification of IgY from egg yolk using IL-based ABS. Its scalability to an industrial level will certainly allow the production of cheaper antibodies with a long-term impact in human healthcare.

ERC Starting Grant
Host Institution: Universidade de Aveiro
Principal Investigator: Mara Freire Martins
Starting Date: Feb 2014

European Research Council



DYNEINOME

CYTOPLASMIC DYNEIN: MECHANISMS OF REGULATION AND NOVEL INTERACTORS

DYNEINOME

CYTOPLASMIC DYNEIN: MECHANISMS OF REGULATION AND NOVEL INTERACTORS

Eukaryotic cells use ATP-fueled motor proteins to transport cargo (proteins, RNA, membrane-bound vesicles) along an intricate network of polarized actin filaments and microtubules. DYNEINOME focuses on one of these motor proteins, cytoplasmic dynein, which transports a diverse set of cargo along microtubule tracks towards their minus ends- dynein. Dynein also generates forces by pulling on microtubules, which is important for the correct spacial organization and positioning of the microtubule cytoskeleton, particularly during cell division. The goal of DYNEINOME is to enhance molecular understanding of how co-factors regulate dynein in space and time. The roundworm *Caenorhabditis elegans* is used as the animal model. *C. elegans* is fully transparent and offers powerful tools for manipulating gene expression, which allows to use fluorescence microscopy in live animals to study the function of dynein co-factors in dividing and non-dividing cells at different stages of development.

One of the goals of DYNEINOME is to understand how dynein prevents dividing cells from inheriting too many or too few chromosomes, a defect that is frequently observed in cancer cells and may contribute to tumorigenesis. It will study how co-factors recruit the motor to the unique site on each chromosome that interacts with microtubules to drive chromosome segregation.

Another goal is to identify and characterize novel co-factors that help dynein perform its many tasks. Finally, the function of the dynein co-factor dynactin, which is required for most if not all cellular processes that involve dynein, will be studied.

ERC Starting Grant
Host Institution: Instituto de Biologia Molecular e Celular
Principal Investigator: Reto Gassmann
Starting Date: Mar 2014

INTIMATE

CITIZENSHIP, CARE AND CHOICE: THE MICROPOLITICS OF INTIMACY IN SOUTHERN EUROPE

INTIMATE

CITIZENSHIP, CARE AND CHOICE: THE MICROPOLITICS OF INTIMACY IN SOUTHERN EUROPE

Changes in personal life in recent decades illustrate significant socio-cultural transformations. However, the focus of mainstream sociological literature has been the heterosexual, monogamous and reproductive couple, with little research exploring non-conventional intimacy in Southern Europe. INTIMATE's main aim is to contribute to legal, policy and cultural innovation through the findings of a comparative research project designed to rethink citizenship, care and choice from the point of view of non-standard intimacies in three contrasting Southern European countries: Italy, Portugal and Spain.

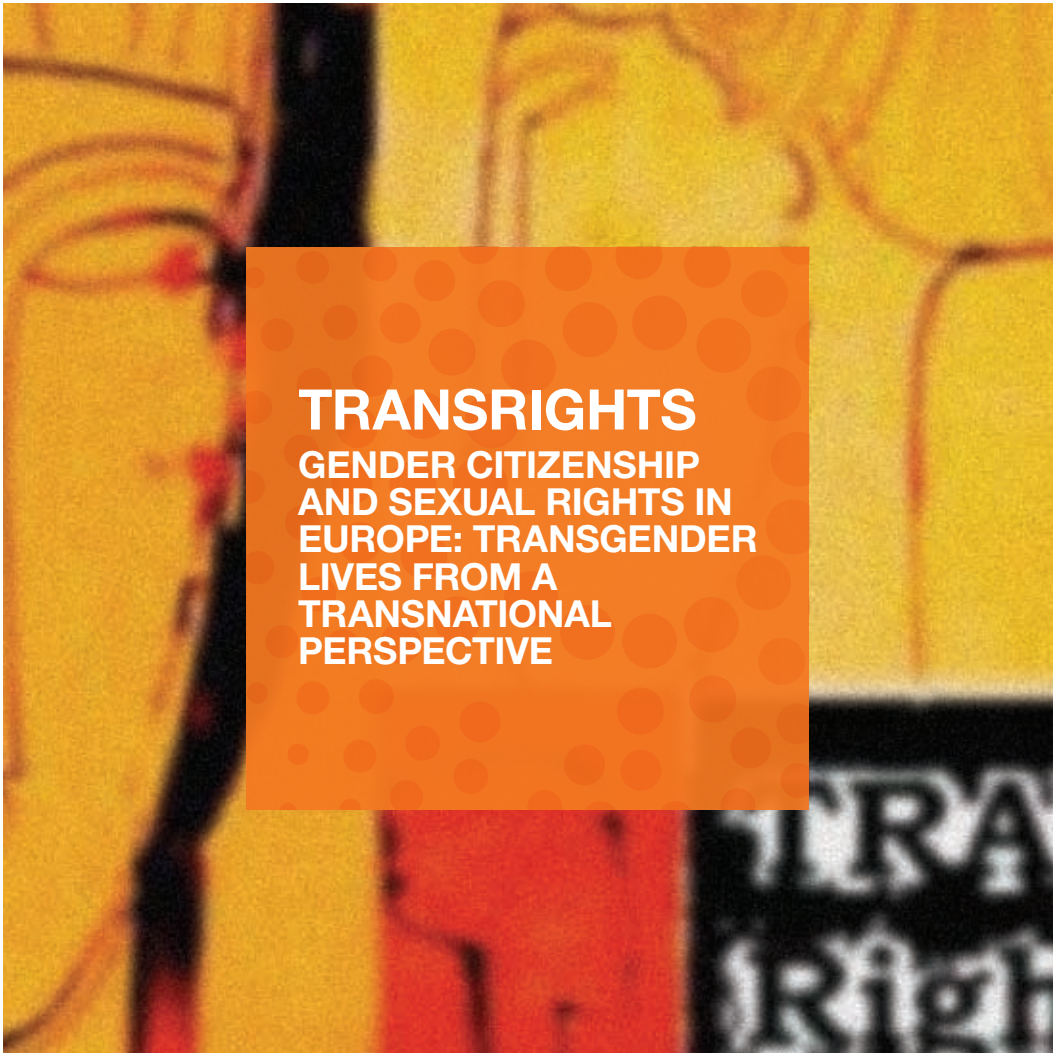
Guided by the fundamental sociological question of how change takes place and how law and social policy adjust to and/or shape the practices and expectations of individuals concerning personal life, this research will address intimacy from the perspective of those on the margins of social, legal and policy concerns in Southern Europe – lesbians, gay men, bisexuals and transgendered people.

INTIMATE is based on 3 strands – Strand 1: the micropolitics of partnering; Strand 2: the micropolitics of parenting; and Strand 3: the micropolitics of friendship. This qualitative research involves conducting 6 cross-national studies across the strands of partnering, parenting and friendship. The topics covered are lesbian coupledom, polyamorous relationships, assisted conception and surrogacy, naming a child, transgender and care, and living with friends in adult life.

INTIMATE's findings will impact on current legal, policy and cultural frameworks in Italy, Portugal and Spain, but also at the EU level.

ERC Starting Grant
Host Institution: Centro de Estudos Sociais
Principal Investigator: Ana Cristina Santos
Starting Date: Mar 2014

European Research Council



TRANSRIGHTS

GENDER CITIZENSHIP AND SEXUAL RIGHTS IN EUROPE: TRANSGENDER LIVES FROM A TRANSNATIONAL PERSPECTIVE

TRANSRIGHTS

GENDER CITIZENSHIP AND SEXUAL RIGHTS IN EUROPE: TRANSGENDER LIVES FROM A TRANSNATIONAL PERSPECTIVE

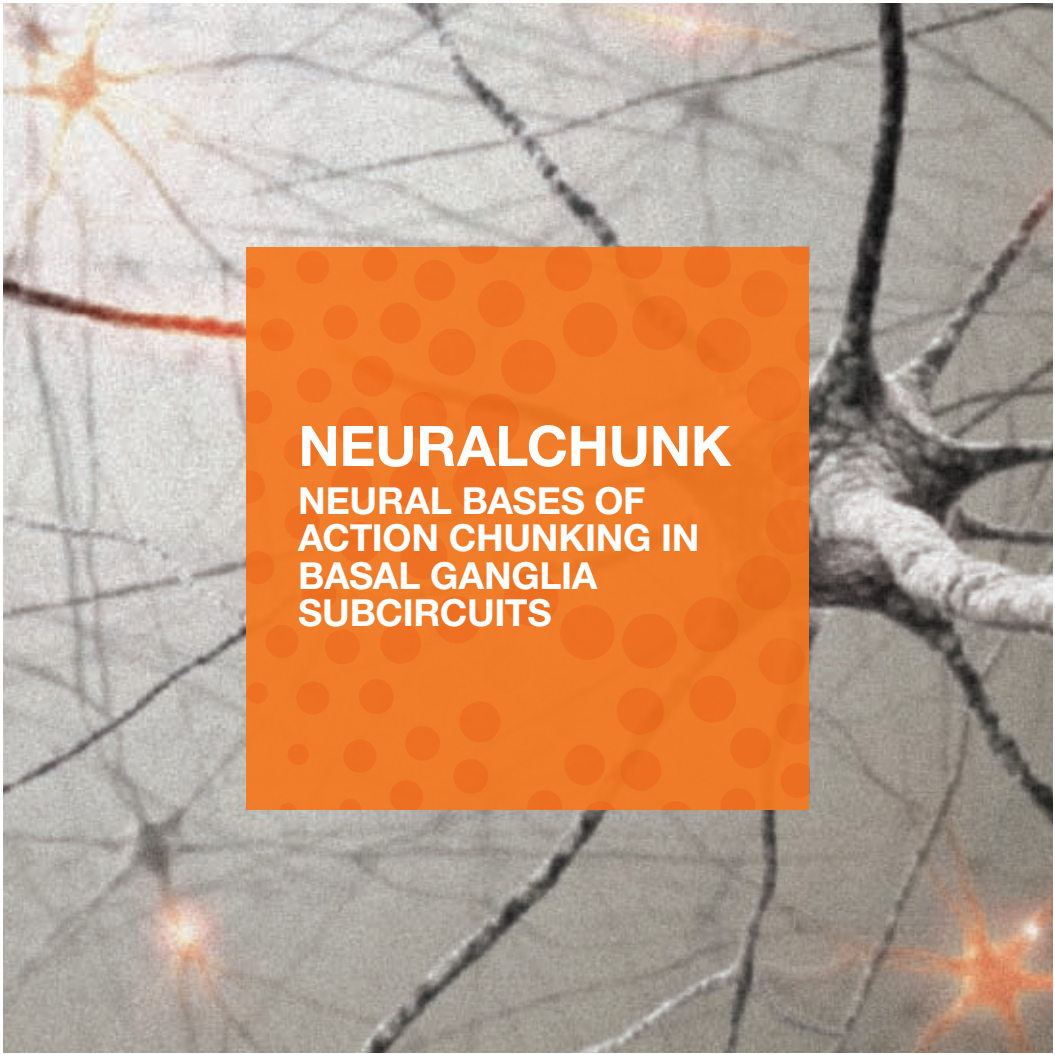
The TRANSRIGHTS project investigates transgender lives and the institutional apparatus that frames them.
Four lines of inquiry will be developed:

- Firstly, gender politics and sexual rights shall be analyzed as the opposition between politics of equality and of difference is unable to provide answers for the inclusion of trans-people.
- Secondly, by comparing the lives of trans-people in five European countries - Portugal, France, United Kingdom, the Netherlands and Sweden - the project wishes to establish an overview of how institutional frameworks impact on these lives.
- Thirdly, the approach of the project takes into account the immigration of trans-individuals to Europe, whether in search for recognition or as a way of survival, often leading to sex work.
- Fourthly, through a comparative strategy, the project also aims to identify the gaps between policies and rights and the categories actually mobilized for self-identification. Such a task implies examining the voices of trans-people, the effect of policies on the materiality of lives as well as conceptualizations of selfhood that do not necessarily confine to the European context.

By analyzing trans-people, TRANSRIGHTS is posing key questions on normality and subversion. In providing answers to this problem, it is not only discussing the viability of atypical lives and transitions but also further advancing the knowledge on how forms of recognition and redistribution are institutionally enacted. Project outputs will contribute to the fields of gender, sexuality and citizenship by providing a grounded theoretical debate, discussing the gender categories of citizenship.

ERC Consolidator Grant
Host Institution: Instituto de Ciências Sociais da Universidade de Lisboa
Principal Investigator: Sofia Aboim
Starting Date: Sep 2014

European Research Council


NEURALCHUNK
NEURAL BASES OF ACTION CHUNKING IN BASAL GANGLIA SUBCIRCUITS

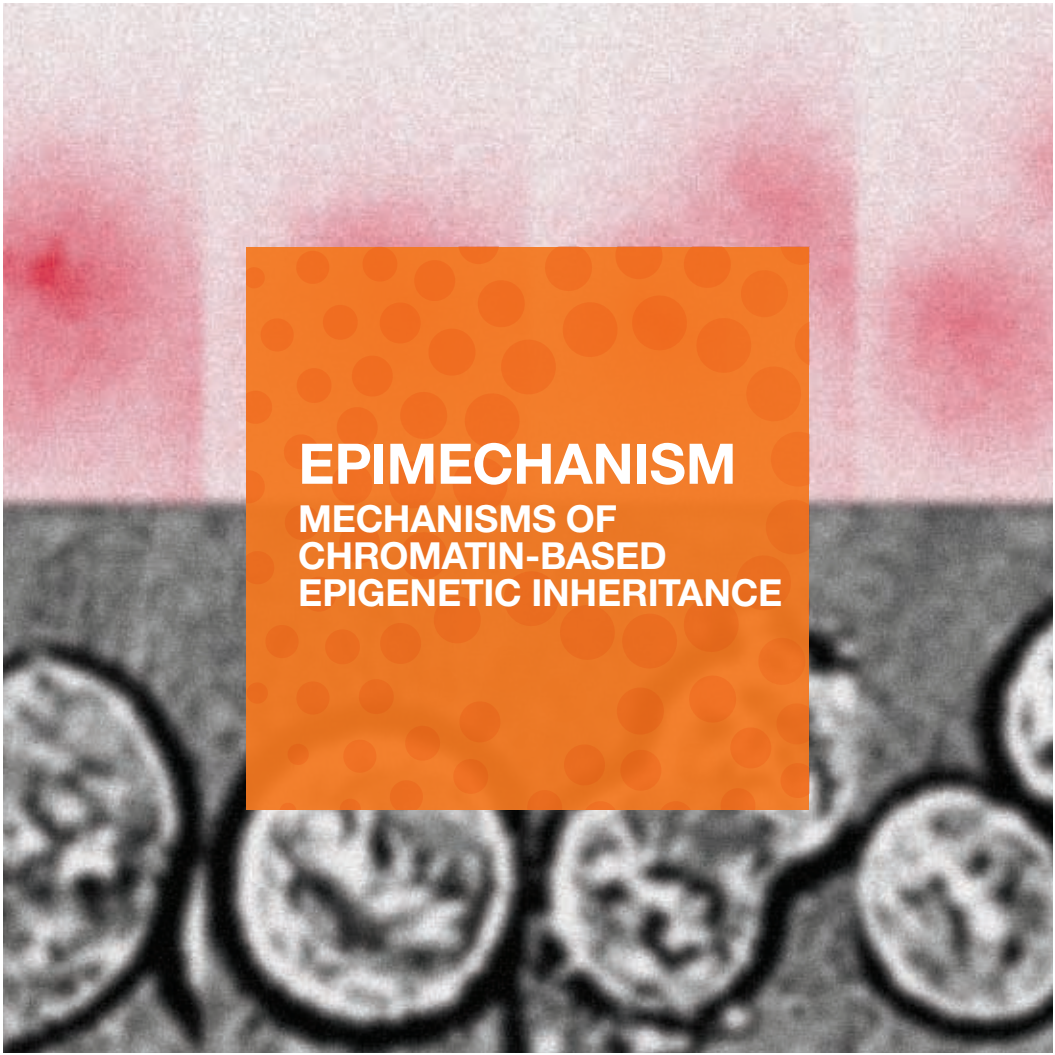
NEURALCHUNK

NEURAL BASES OF ACTION CHUNKING IN BASAL GANGLIA SUBCIRCUITS

How are we able to take seemingly unrelated small ideas and movements and create complex actions and concepts? The brain handles complex actions and memories, organizing them into small modules or sequences, in a process known as chunking. Although basal ganglia circuits have been implicated in action chunking, little is known about how individual elements are concatenated into a behavioral unit at the neuronal level. Using a differential reinforcement procedure where mice learn to chunk rapid action sequences, we uncovered neuronal activity encoding entire sequences as single actions in basal ganglia circuits. Besides activity signalling sequence initiation (start), we found neurons with sustained or inhibited activity throughout the execution of an entire sequence. These findings clearly show that basal ganglia circuits display neural activity related to the execution of whole action sequences, rather than unitary elements. Neurons with start, sustained and inhibited sequence-related activity were observed throughout the basal ganglia. However, the basal ganglia have different cell types/subcircuits linking input to output. Here we will 1) determine if these correlates of motor concatenation are differentially expressed in direct versus indirect basal ganglia pathways by optogenetic identification of cell types in the striatum and in vivo imaging, 2) test the necessity and sufficiency of these two pathways in action sequence initiation and performance, and 3) test if different basal ganglia output circuits express and mediate different aspects of action chunking. These experiments will dissect with unprecedented spatial and temporal precision the role of basal ganglia subcircuits in the initiation and performance of action chunks.

ERC Consolidator Grant
Host Institution: Fundação Champalimaud
Principal Investigator: Rui Costa
Starting Date: Nov 2014

European Research Council


EPIMECHANISM
MECHANISMS OF
CHROMATIN-BASED
EPIGENETIC INHERITANCE

EPIMECHANISM

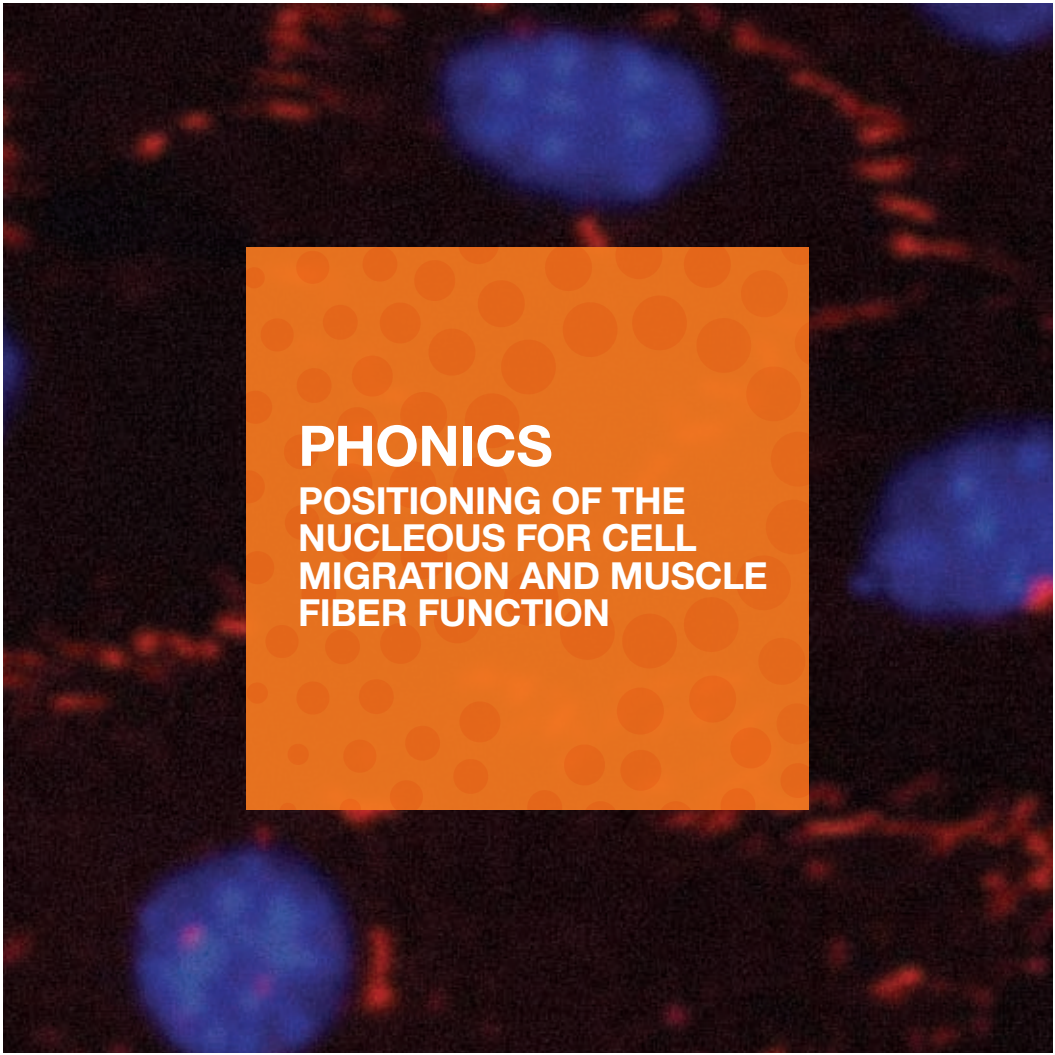
MECHANISMS OF CHROMATIN-BASED EPIGENETIC INHERITANCE

Epigenetic mechanisms heritably maintain gene expression states and chromosome organization across cell division. These include chromatin-based factors that are propagated independent of local DNA sequence elements, and are critical for normal development and prevent reprogramming, e.g. during induction of pluripotency. We focus on the role of nucleosomes, the histone-DNA complexes that make up chromatin. While prominently implicated in epigenetic memory, how histones and their local modifications can actually be inherited is largely unknown. We take aim at three fundamental aspects that we argue are central to this problem: stability of the epigenetic mark, self-templated duplication, and cell cycle coupling.

We developed a unique pulse-labeling strategy to determine whether silent and active chromatin can be inherited and how this relates to transcription, both in cancer cells and in vitro differentiating stem cells. By coupling this strategy to an imaging-based RNAi screen we aim to identify components controlling nucleosome assembly and heritability. We achieve this by focusing on the human centromere, the chromosome locus essential for chromosome segregation which serves as an ideal model for epigenetic memory. This locus is specified by nucleosomes carrying the histone H3 variant, CENP-A that we have previously shown to be highly stable in cycling cells and to be replicated in a strict cell cycle coupled manner. We build on our previous successes to uncover the molecular mechanism and cellular consequences of the coupling between CENP-A propagation and the cell cycle, which we postulate, ensures proper centromere size and mitotic fidelity. Furthermore, by genome engineering we developed a strategy to delete an endogenous centromere to determine how centromeres can form de novo and how CENP-A chromatin, once formed, can template its own duplication. With this multi-facetted approach, we aim to uncover general mechanistic principles of chromatin-based memory.

ERC Consolidator Grant
Host Institution: Instituto Gulbenkian de Ciência
Principal Investigator: Lars Jansen
Starting Date: Jun 2014

European Research Council


PHONICS
POSITIONING OF THE NUCLEOUS FOR CELL MIGRATION AND MUSCLE FIBER FUNCTION

PHONICS

POSITIONING OF THE NUCLEOUS FOR CELL MIGRATION AND MUSCLE FIBER FUNCTION

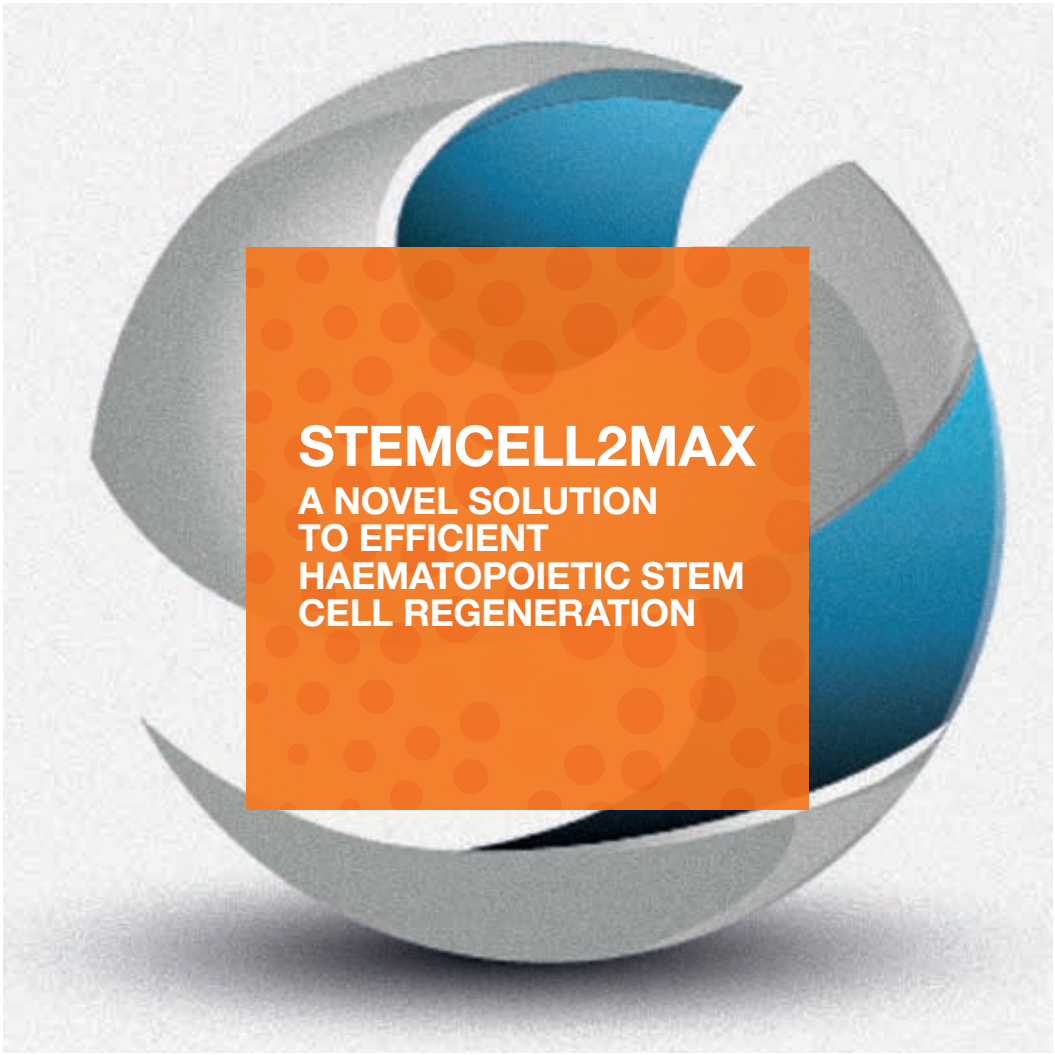
The cell nucleus is positioned at specific places within the cytoplasm and this position is important for different cellular, developmental and physiological processes. Nuclear positioning depends on connections between nuclear envelope proteins and the cytoskeleton. In cells that are moving in particular directions to specific locations, the nucleus is positioned away from the front of the cell and this event is important for cell polarization and migration. In the fully developed myofibers (fibers that compose the muscle), nuclei are specifically positioned at the periphery, while during development and regeneration, as well as in multiple muscle pathologies, the nucleus is centrally positioned. In previous studies, it has been shown that nuclear position is important for muscle function. However, the reason why nuclear positioning is important for myofiber activity still remains an open question.

PHONICS proposes to use unique systems to monitor cell migration and myofiber formation in combination with biochemistry, cell biology, high- and super-resolution microscopy approaches to: identify novel molecular mechanisms that mediate nuclear positioning and nuclear cytoskeleton connections during cell migration and myofiber formation; determine a role for nuclear positioning in myofiber function as well as the significance of altered nuclear positioning in different forms of muscle pathology.

The proposed work will establish new mechanisms for nuclear positioning. Importantly, by identifying mechanisms and understanding the role of nuclear positioning in myofiber function, it will lay the foundations for future studies to ameliorate or treat muscle disorders as well as other conditions where nucleus positioning may prove to play a role such as cancer.

ERC Consolidator Grant
Host Institution: Instituto de Medicina Molecular
Principal Investigator: Edgar Gomes
Starting Date: Jul 2014

European Research Council


STEMCELL2MAX
A NOVEL SOLUTION
TO EFFICIENT
HAEMATOPOIETIC STEM
CELL REGENERATION

STEMCELL2MAX

A NOVEL SOLUTION TO EFFICIENT HAEMATOPOIETIC STEM CELL REGENERATION

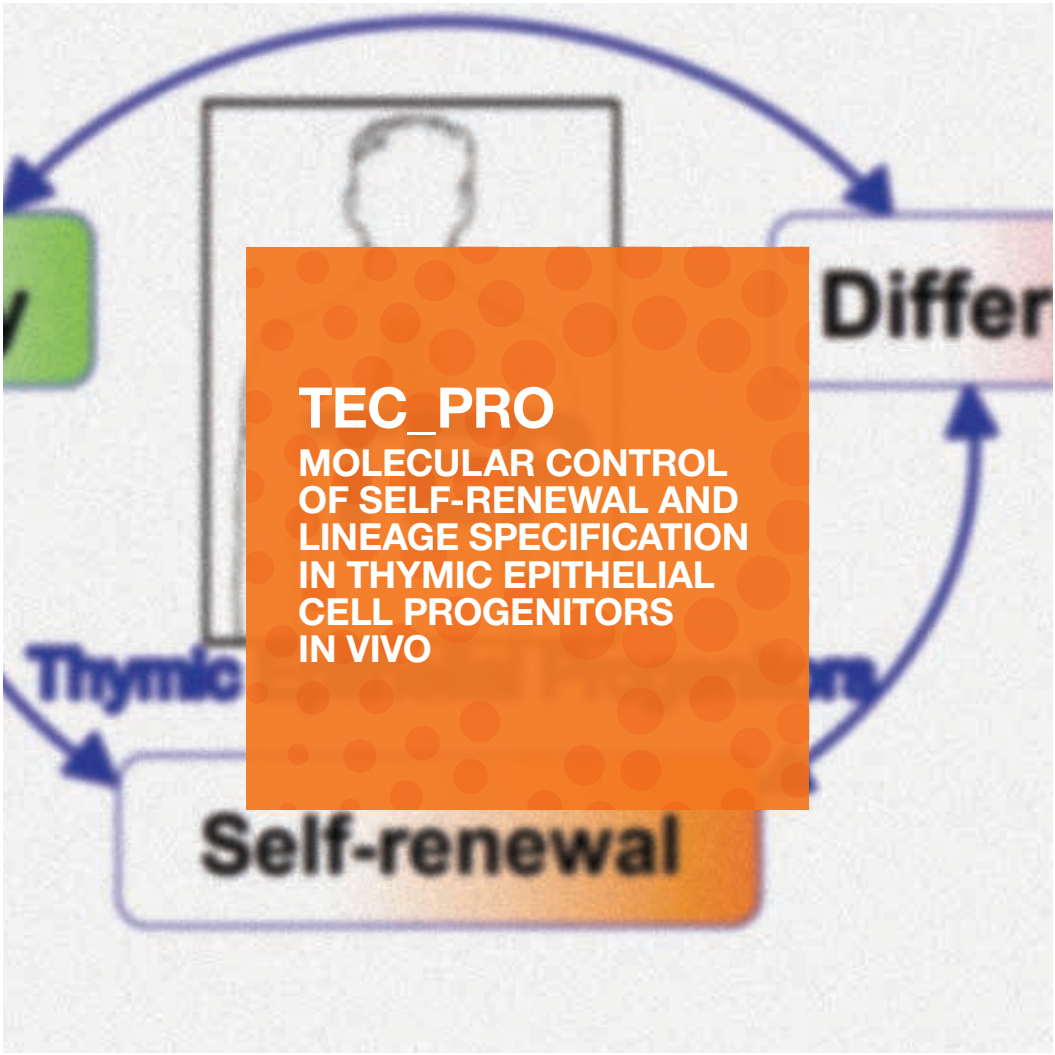
Haematopoietic stem cells (HSCs) give rise to cells of the blood and lymph system and are primarily concentrated in the bone marrow. They renew themselves continuously, while increasing numerous cell types in the human blood and lymph systems. Because of these properties, HSCs play a pivotal role in replacing worn out haematopoietic and lymphogenic cells. Hence, they are central to fundamental cell research and regenerative medicine research and the limited yield from existing HSC sources requires reliable techniques to expand harvested HSCs (quality and quantity). Obtaining HSCs is a laborious and invasive process and the yield of cells is often insufficient, and the commercial solutions for HSC expansion have had limited efficacy and/or do not safeguard self-renewal and differentiation, increasing the costs for medical research and limiting the scope and repetition of experiments.

This project develops a novel solution to efficient HSCs regeneration – rate and quality of HSCs expansion – based on previous work funded by an ERC StG, and considers its innovation potential, the economic and societal impact, and the protection of intellectual property and commercialisation processes.

Our business plan estimated a € 3 billion international market for stem cell research products (US with 32% share of this market, followed by Europe, 30%, and Asia, 26%). Our products can capture up to € 100 million of this expanding market and the exploitation of clinical applications of this solution (after 2016; in a € 570 million market) and other expansion solutions being explored will add value to these products. StemCell2Max, a start-up company, will seize this business opportunity, with products able to expand HSCs over existing standards whilst keeping their unique properties.

ERC Proof of Concept Grant
Host Institution: Instituto de Medicina Molecular
Principal Investigator: Henrique Veiga Fernandes
Starting Date: Mar 2014

European Research Council



TEC_PRO

MOLECULAR CONTROL OF SELF-RENEWAL AND LINEAGE SPECIFICATION IN THYMIC EPITHELIAL CELL PROGENITORS IN VIVO

TEC_PRO

MOLECULAR CONTROL OF SELF-RENEWAL AND LINEAGE SPECIFICATION IN THYMIC EPITHELIAL CELL PROGENITORS IN VIVO

The development of vaccines for the treatment of infectious diseases, cancer and autoimmunity depends on our knowledge of T-cell differentiation. TEC_pro is focused on studying the thymus, the organ responsible for the generation of T cells that are responsive against pathogen-derived antigens, and yet tolerant to self. Within the thymus, thymic epithelial cells (TECs) provide key inductive microenvironments for the development and selection of T cells that arise from hematopoietic progenitors. As a result, defects in TEC differentiation cause syndromes that range from immunodeficiency to autoimmunity, which makes the study of TECs of fundamental, and clinical, importance to understand immunity and tolerance induction.

TEC_pro aims to identify novel proteins involved in the intricate network that regulates the self-renewal and differentiation properties of TEC progenitors. Understanding these aspects is critical to comprehend how the immune system achieves the equilibrium between immunity and tolerance. We will identify TEC progenitors and their niches within the thymus, define new molecular components involved in their self-renewal and lineage potential, and elucidate the epigenetic codes that regulate the genetic programs during cTEC/mTEC fate decisions. We take a global approach to examine TEC differentiation, which integrates the study of molecular processes taking place at cellular level and the analysis of *in vivo* mouse models.

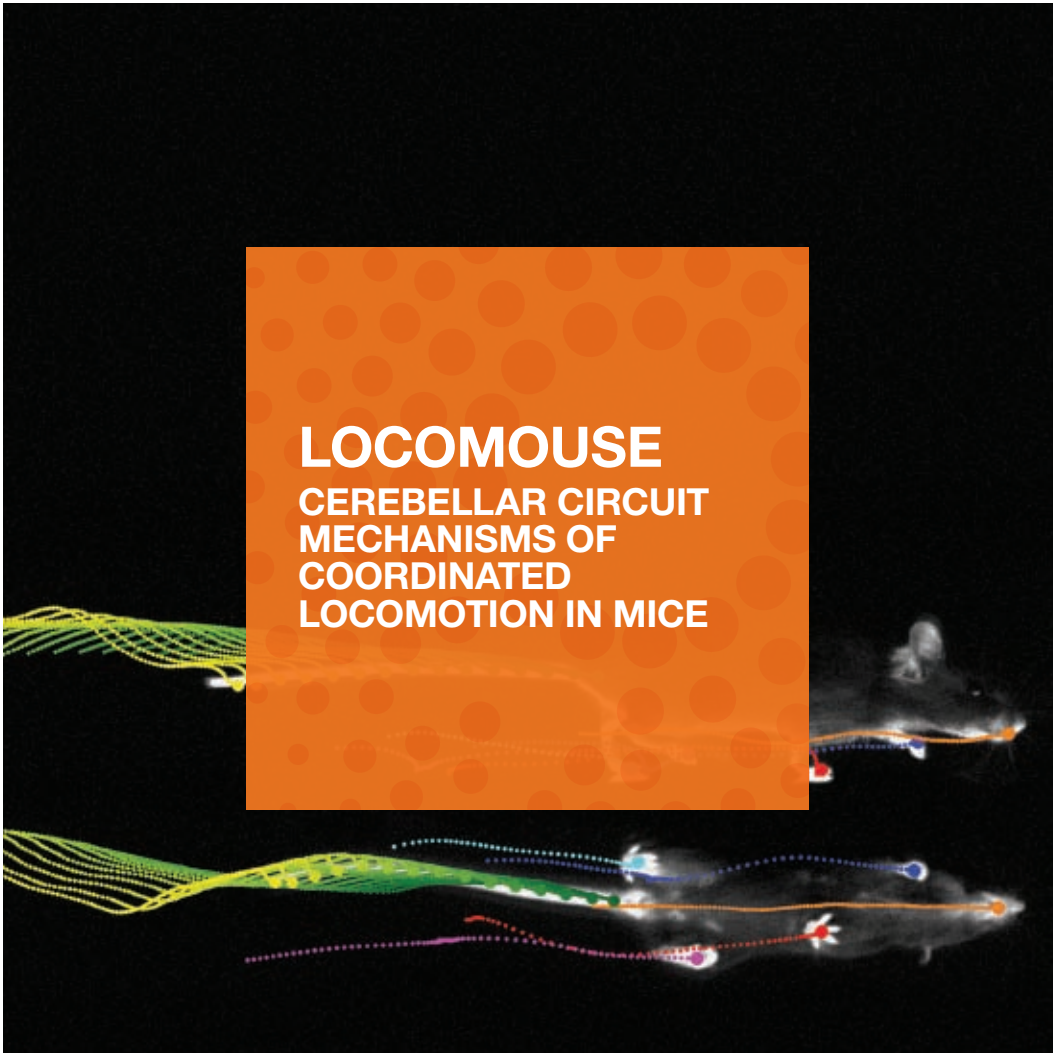
TEC_pro has the potential to make significant advances in solving one of the great goals of modern immunology - regulating thymus function through the induction of bipotent TEC progenitors - and thus, will become of great value in Immunological research and Health Sciences in general.

ERC Starting Grant
Host Institution: Instituto de Biologia Molecular e Celular
Principal Investigator: Nuno Alves
Starting Date: Jul 2015

European Research Council

LOCOMOUSE

CEREBELLAR CIRCUIT MECHANISMS OF COORDINATED LOCOMOTION IN MICE



LOCOMOUSE

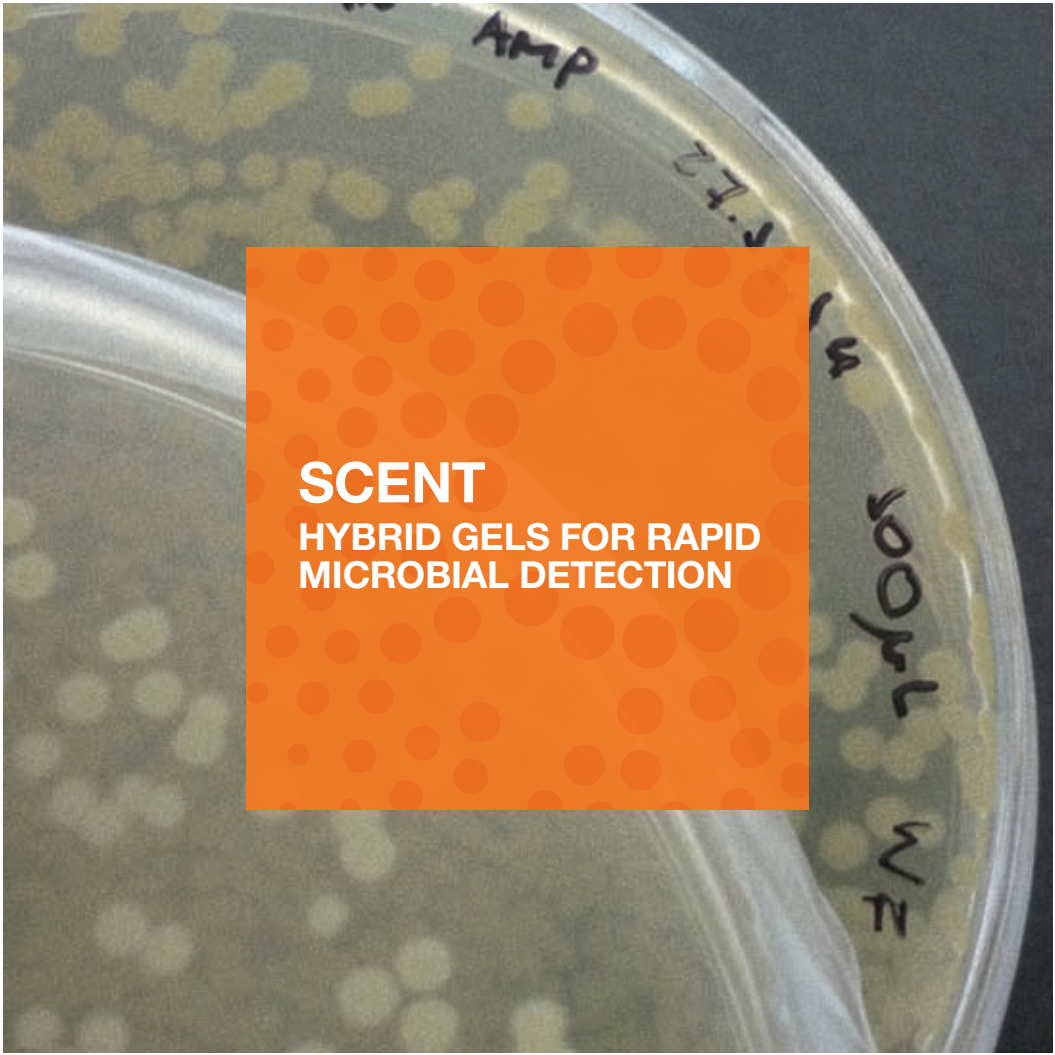
CEREBELLAR CIRCUIT MECHANISMS OF COORDINATED LOCOMOTION IN MICE

A remarkable aspect of motor control is our seemingly effortless ability to generate coordinated movements. The cerebellum is critical for coordinated movement, and the well-described, stereotyped circuitry of the cerebellum has made it an attractive system for neural circuits research. We have developed a custom-built system (LocoMouse) to analyze mouse locomotor coordination. It tracks continuous paw, snout, and tail trajectories in 3D with unprecedented spatiotemporal resolution and it has allowed us to identify specific, quantitative locomotor elements that depend on intact cerebellar function. LocoMouse will combine this quantitative behavioral approach with electrophysiology and optogenetics to investigate circuit mechanisms of locomotor coordination. We will: optogenetically silence the output of cerebellar subregions to understand their distinct contributions to locomotion; record from identified neurons and correlate their activity with specific locomotor parameters; and optogenetically stimulate defined cell types to investigate circuit mechanisms of coordinated locomotion. These experiments will establish causal relationships between neural circuit activity and coordinated motor control, a problem with important implications for both health and disease.

LocoMouse will map the relation between the activity of specific neurons in the cerebellum and the generation of coordinated movementl, and improve our fundamental understanding of the function of neural circuits as the basis of behavior. The expected results from LocoMouse have possible applications in robotics and treatments for patients suffering, for example, from cerebellar ataxia.

ERC Starting Grant
Host Institution: Fundação Champalimaud
Principal Investigator: Megan Carey
Starting Date: May 2015

European Research Council



SCENT

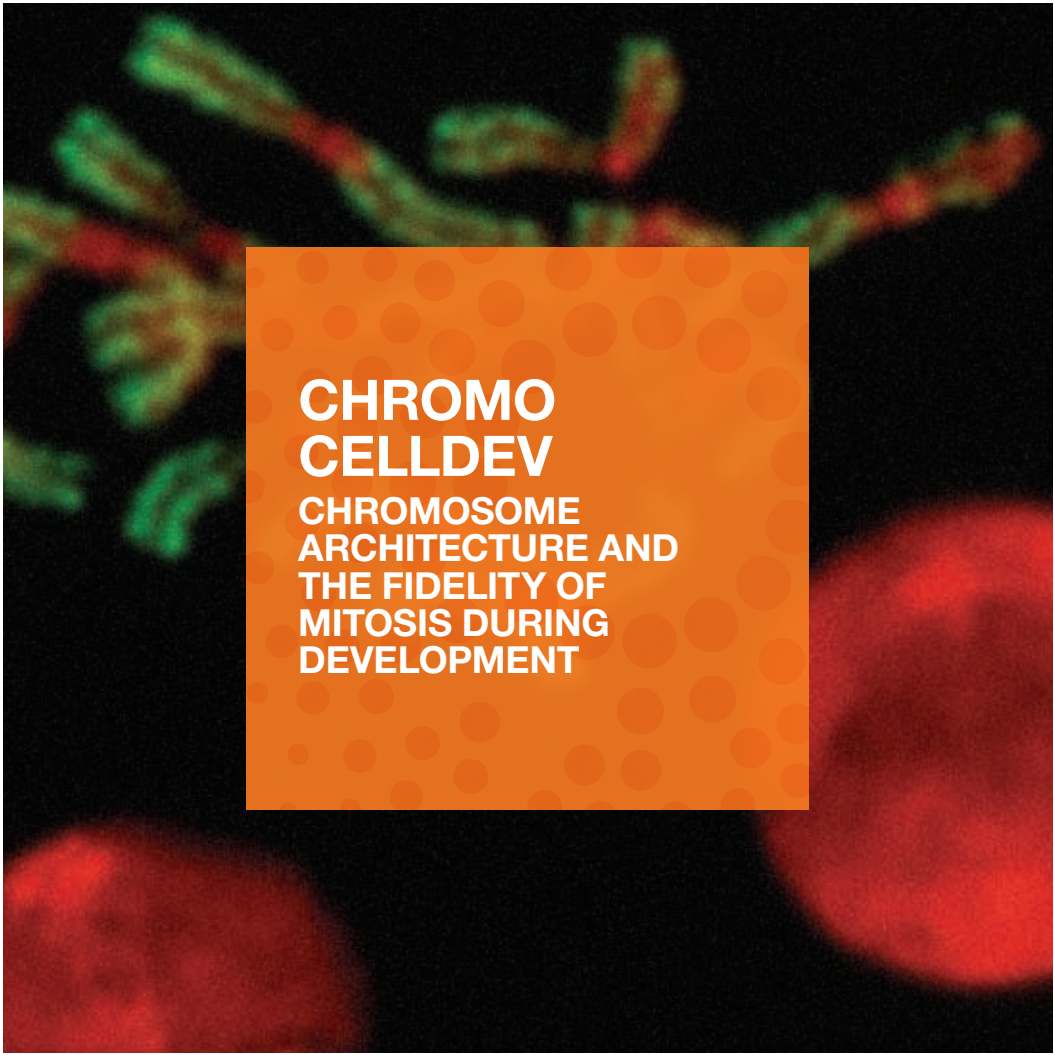
HYBRID GELS FOR RAPID MICROBIAL DETECTION

SCENT
HYBRID GELS FOR RAPID MICROBIAL DETECTION

Antimicrobial resistant bacteria are a global threat to the effective prevention and treatment of an ever-increasing range of infections, causing over 25,000 deaths annually in the EU and costing over €1.5 billion a year. At present, microbial detection and identification takes between 24 and 36 hours, but for slow-growing bacteria, such as those causing tuberculosis, it can take more than a week. The main objective of SCENT is to develop the urgently needed tools for rapid identification of bacterial infections.
Unusual human odours have been recognised as disease indicators since Hippocrates. Recent works demonstrate that fast microbial identification is possible with chemical nose sensors. These sensors usually present limited stability and selectivity, and require aggressive conditions during processing and operation. Bioinspired nose sensors employing biological olfactory receptors are an alternative. Unfortunately, their complexity and low stability are a limitation. The class of stimulus-responsive gels developed by SCENT's team tackle these key challenges. SCENT's team will investigate how these new materials will be able to detect and identify bacteria, in particular those most prevalent in human infections and associated with antibiotic resistance.
SCENT will reduce detection times to a matter of seconds, and it is expected that by identifying bacterial infections so much sooner, lives will be saved, antibiotic abuse restrained, and the spread of infection better controlled.

ERC Starting Grant
Host Institution: Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa
Principal Investigator: Ana Cecília Afonso Roque
Starting Date: Dec 2015

European Research Council


CHROMO
CELLDEV
CHROMOSOME ARCHITECTURE AND THE FIDELITY OF MITOSIS DURING DEVELOPMENT

CHROMOCELLDEV

CHROMOSOME ARCHITECTURE AND THE FIDELITY OF MITOSIS DURING DEVELOPMENT

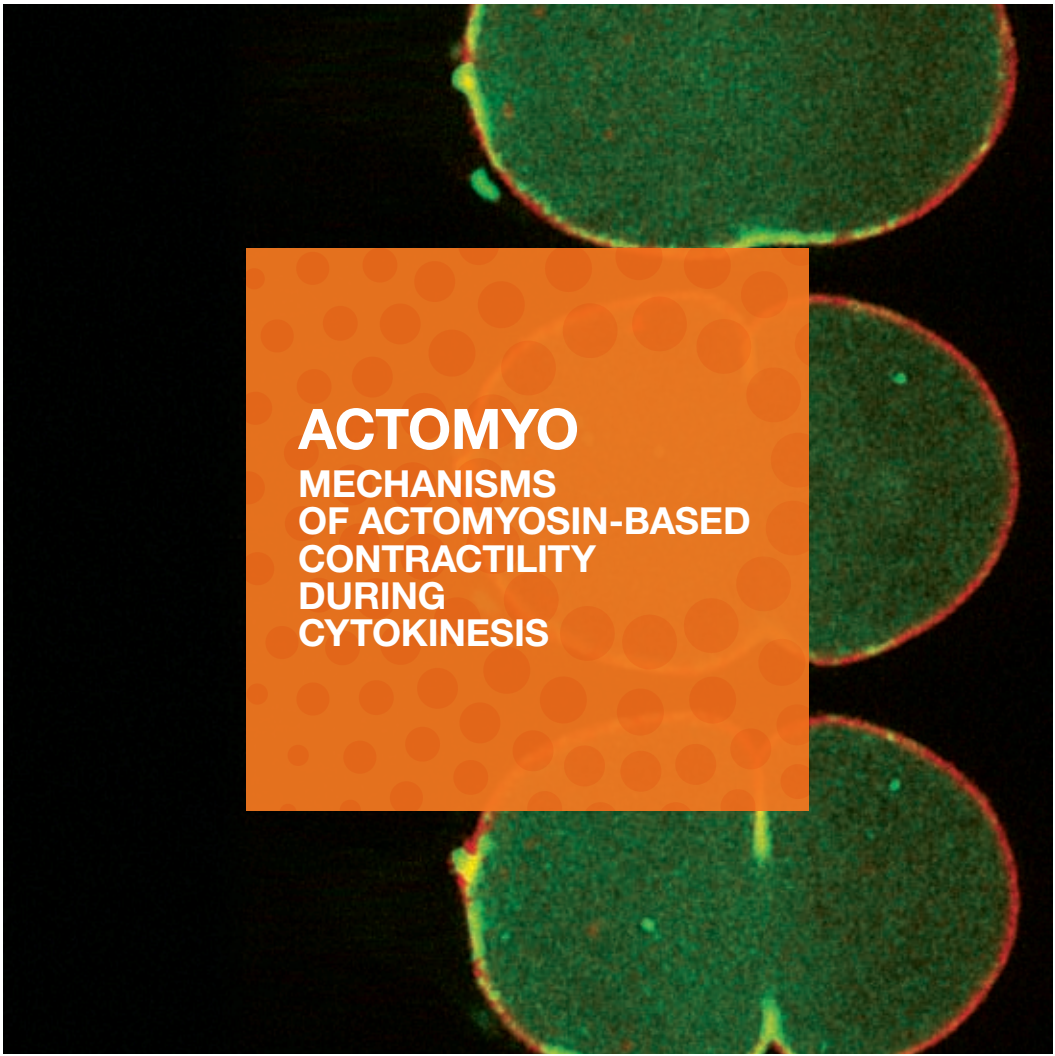
Genome stability relies on accurate partition of the genome during nuclear division. Proper mitosis, in turn, depends on changes in chromosome organization, such as chromosome condensation and sister chromatid cohesion. Despite the importance of these structural changes, chromatin itself has been long assumed to play a rather passive role during mitosis and chromosomes are usually compared to a “corpse at a funeral: they provide the reason for the proceedings but do not take an active part in them”. Recent evidence, however, suggests that chromosomes play a more active role in the process of their own segregation. ChromoCellDev tests the “active chromosome” hypothesis by investigating how chromosome morphology influences the fidelity of mitosis. Innovative methods for acute protein inactivation, previously developed by the team, will be used to evaluate the role of two key protein complexes involved in mitotic chromosome architecture - Condensins and Cohesins.

ChromoCellDev aims to investigate the role of mitotic chromosomes in the fidelity of mitosis at three different levels. The first one will use novel approaches to uncover the process of mitotic chromosome assembly. The second will explore how mitotic chromosomes take an active part in mitosis by examining how chromosome condensation and cohesion influence chromosome movement and the signalling of the surveillance mechanisms that control nuclear division. Lastly, mitotic errors arising from abnormal chromosome structure impact on development will be evaluated.

ChromoCellDev will provide an integrated view on chromosome morphology that ranges from the fundamental aspects of chromosome assembly to the impact of chromosome abnormalities in organism development and tissue homeostasis.

ERC Starting Grant
Host Institution: Instituto Gulbenkian Ciência
Principal Investigator: Raquel Oliveira
Starting date: Oct 2015

European Research Council


ACTOMYO
MECHANISMS
OF ACTOMYOSIN-BASED
CONTRACTILITY
DURING
CYTOKINESIS

ACTOMYO

MECHANISMS OF ACTOMYOSIN-BASED CONTRACTILITY DURING CYTOKINESIS

Cytokinesis completes cell division by partitioning the contents of the mother cell to the two daughter cells. This process is accomplished through the assembly and constriction of a contractile ring, a complex actomyosin network that remains poorly understood on the molecular level.

The research proposed under ACTOMYO addresses fundamental questions about the structural and functional properties of the contractile ring itself.

The nematode Caenorhabditis elegans will be used to exploit the power of quantitative live imaging assays in an experimentally tractable metazoan organism. Its early embryo is uniquely suited to the study of the contractile ring, as cells dividing perpendicularly to the imaging plane provide a full end-on view of the contractile ring throughout constriction. Combining image-based assays with powerful molecular replacement technology for structure-function studies, we will determine the contribution of branched and non-branched actin filament populations to contractile ring formation; explore its ultra-structural organization in collaboration with a world expert in electron microcopy; investigate how the contractile ring network is dynamically remodeled during constriction with the help of a novel laser microsurgery assay that has uncovered a remarkably robust ring repair mechanism; and use a targeted RNAi screen and phenotype profiling to identify new components of actomyosin contractile networks.

By investigating the function, distribution and dynamics of major contractile ring components as well as studying the architecture of the ring, we expect to significantly enhance our mechanistic understanding of contractile ring assembly and constriction in animal cells.

ERC Starting Grant
Host Institution: Instituto de Biologia Molecular e Celular
Principal Investigator: Ana Carvalho
Starting date: Jul 2015

European Research Council

NEW_FUN

NEW ERA OF PRINTED PAPER ELECTRONICS BASED ON ADVANCED FUNCTIONAL CELLULOSE

NEW_FUN

NEW ERA OF PRINTED PAPER ELECTRONICS BASED ON ADVANCED FUNCTIONAL CELLULOSE

Fully recyclable and low cost electronic goods are still far from reality. That is why environmental friendly advanced functional materials and processes able to result in a new class of paper based electronic products are very interesting to create. This represents a reborn of the paper millenary industry for a plethora of low cost, recyclable and disposable electronics, putting Europe in the front line of a new era of consumer electronics.

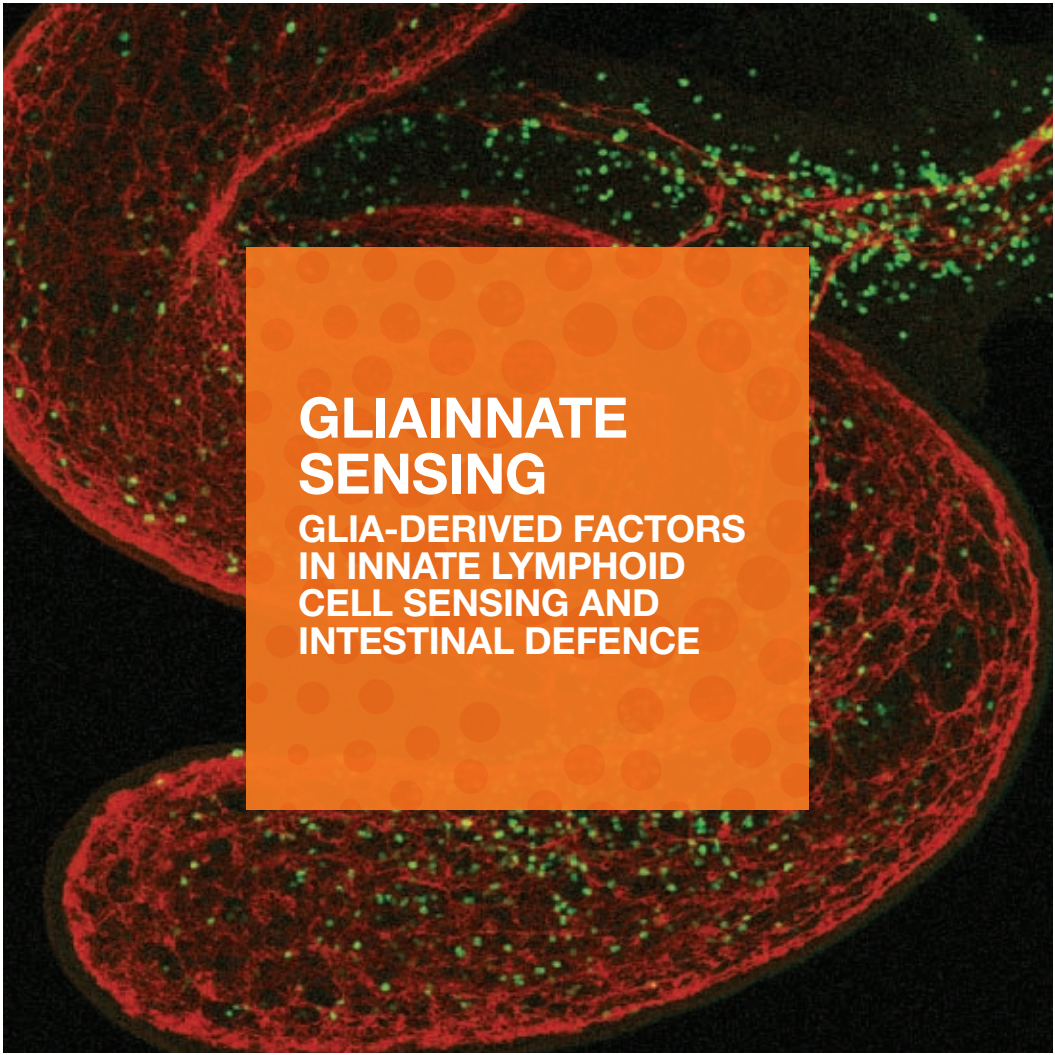
While the vision of NEW_FUN is a very ambitious one, NEW_FUN team's ground-breaking research work related with oxide based transistors on paper has contributed to the basic technological breakthroughs needed to create the key elements to establish a new era of paper electronics.

What NEW_FUN proposes now is to reinvent the concept of paper electronics. In NEW_FUN a completely new and disruptive approach will be developed where functionalized cellulose fibers will be used not only as dielectric but also as semiconductor and conductor able to coexist in a multilayer paper structure. That is, assembling paper that can have different functionalities locally, on each face or even along its entire thickness/bulk. This way issues such as failure under bending, mechanical robustness and stability can be minimized. Doing so, electronic and electrochemical devices can be produced not only on paper but also from paper.

The outputs of NEW_FUN will open the door to turn paper into a real electronic material, making possible disposable/recyclable electronic products, such as smart labels/packages (e.g. food and medicine industry), sensors for air quality control (car, house and industry environments), disposable electronic devices such as bio-detection platforms, lab-on-paper systems, among others.

ERC Starting Grant
Host Institution: Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa
Principal Investigator: Luís Pereira
Starting Date: Sep 2015

European Research Council



GLIAINNATE SENSING

GLIA-DERIVED FACTORS IN INNATE LYMPHOID CELL SENSING AND INTESTINAL DEFENCE

GLIAINNATESENSING

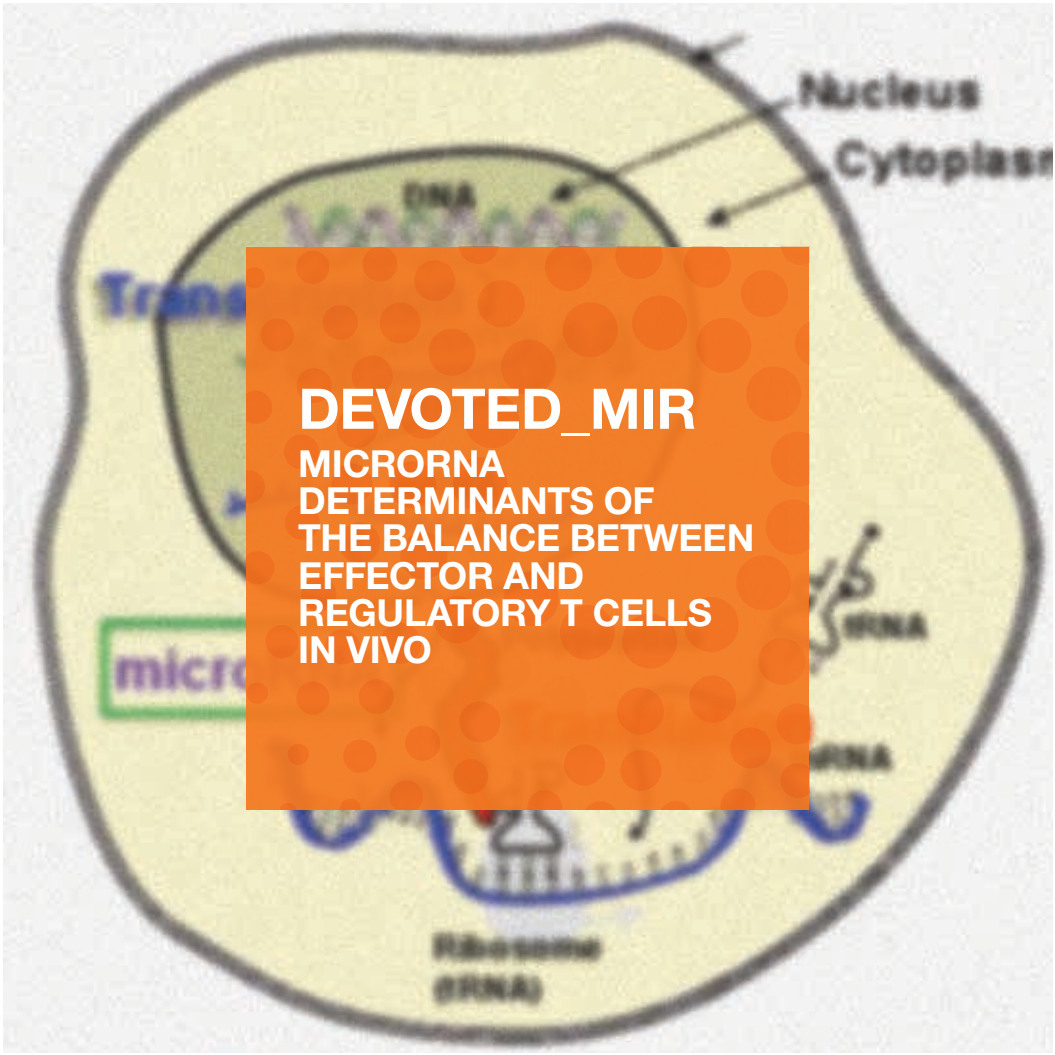
GLIA-DERIVED FACTORS IN INNATE LYMPHOID CELL SENSING AND INTESTINAL DEFENCE

The interplay between intestinal microbes and immune cells ensures vital functions of the organism. However, inadequate host-microbe relationships lead to inflammatory diseases that are major public health concerns. Innate lymphoid cells (ILC) are an emergent family of effectors abundantly present at mucosal sites. Group 3 ILC (ILC3) produce pro-inflammatory cytokines and regulate mucosal homeostasis, anti-microbial defence and adaptive immune responses. ILC development and function have been widely perceived to be programmed. However, recent evidence indicates that ILC are also controlled by dietary signals. Nevertheless, how ILC3 perceive, integrate and respond to environmental cues remains utterly unexplored. It is hypothesised that ILC3 sense their environment and exert their function as part of a novel epithelial-glial-ILC unit orchestrated by neurotrophic factors.

GliaInnateSensing proposes to employ genetic, cellular and molecular approaches to decipher how this unconventional multi-cellular unit is controlled and how glial-derived factors set ILC3 function and intestinal homeostasis. GliaInnateSensing proposes to decipher the anatomical and functional basis for the enteric epithelial-glial-ILC unit. To this end GliaInnateSensing will employ high-resolution imaging, genome-wide expression analysis and tissue-specific mutants for define target genes. Our ground-breaking research will establish a novel sensing program by which ILC3 integrate environmental cues and will define a key multi-cellular unit at the core of intestinal homeostasis and defence. GliaInnateSensing will reveal new pathways that may be targeted in inflammatory diseases that are major Public Health concerns.

ERC Consolidator Grant
Host Institution: Instituto de Medicina Molecular
Principal Investigator: Henrique Veiga Fernandes
Starting Date: Jul 2015

European Research Council



DEVOTED_MIR

MICRORNA DETERMINANTS OF THE BALANCE BETWEEN EFFECTOR AND REGULATORY T CELLS IN VIVO

DEVOTED_MIR

MICRORNA DETERMINANTS OF THE BALANCE BETWEEN EFFECTOR AND REGULATORY T CELLS IN VIVO

T lymphocytes are key components of the immune system. Upon activation, T cells produce soluble proteins, called cytokines, that mediate inflammation – either promoting it or inhibiting it.
DevoTed_miR will dissect the contribution of a class of small molecules, microRNAs, to the generation of the T cell subsets that orchestrate inflammatory responses, namely those that underlie infections, autoimmune diseases or cancer. DevoTed_miR will use experimental models of infection (such as malaria), autoimmunity (such as multiple sclerosis or colitis) and cancer (likes melanoma or ovarian cancer) to investigate how microRNAs may control the balance between pro- and anti-inflammatory T cell subsets. DevoTed_miR will identify the critical microRNAs implicated in these processes, and manipulate them (up or down) in order to impact on disease pathogenesis.
The project aims to unravel a new molecular layer in which we may intervene towards preventing chronic inflammation and autoimmunity, or rather stimulating the immune response against cancer.

ERC Consolidator Grant
Host Institution: Instituto de Medicina Molecular
Principal Investigator: Bruno Silva-Santos
Starting Date: Jul 2015

European Research Council

MIMESIS

DEVELOPMENT OF BIOMATERIALS THROUGH MIMESIS OF PLANT DEFENSIVE INTERFACES TO FIGHT WOUND INFECTIONS

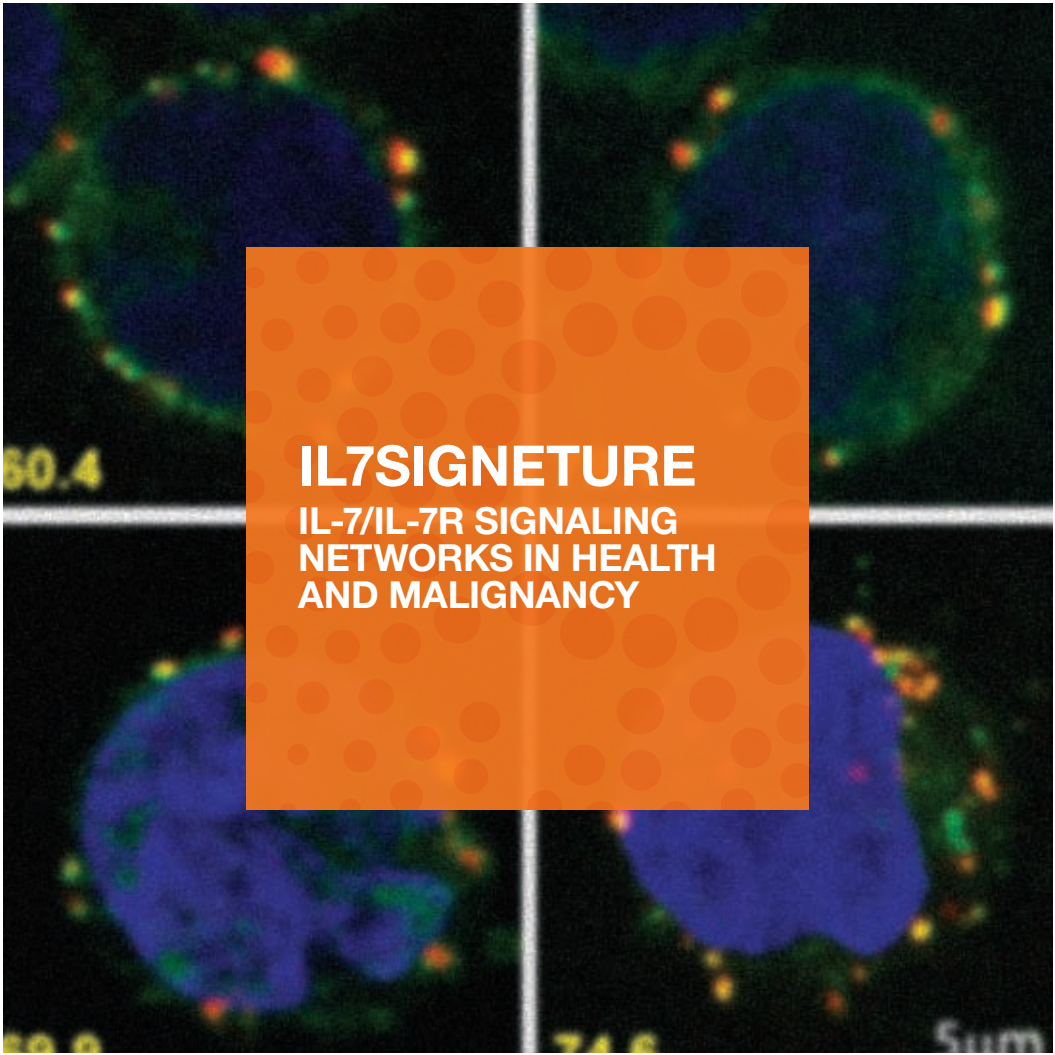
MIMESIS

DEVELOPMENT OF BIOMATERIALS THROUGH MIMESIS OF PLANT DEFENSIVE INTERFACES TO FIGHT WOUND INFECTIONS

Fighting microbial infection of wounds, especially in immunocompromised patients, is a major challenge in the 21st century. The skin barrier is the primary defence against microbial (opportunistic) pathogens. When this barrier is breached, even non-pathogenic fungi may cause devastating infections, most of which provoked by crossover fungi able to infect both plant and humans. Hence, diabetic patients (ca. 6.4% of the world population), who are prone to develop chronic non-healing wounds, constitute a major risk group.
MIMESIS is driven by the vision of mimicking the functionality of plant polyesters to develop wound dressing biomaterials that combine antimicrobial and skin regeneration properties.
MIMESIS aims to: 1. Elucidate which native plant polyester compositions reconstitute *ex-situ* as stronger antimicrobial films. By doing so, we will identify how chemical species, their proportion and cross-linking influence the properties of the reconstituted films. This will allow improving the quality of the extracted plant polyester (an abundant aliphatic-aromatic polymer), furthering our understanding on its chemical and structural characterization. 2. Unravel the antimicrobial mechanism of action of plant polyester films. This will also broaden our understanding of their physiological role and significance in signaling plant-pathogen interactions. By doing so, our understanding on how to develop safer antimicrobial treatments, particularly antifungal, furthering the clinical application of these materials, will improve.
MIMESIS outcomes will promote knowledge-based development of plant polyester materials for clinical applications. This is important to fight wound infections in diabetic patients, whose number is globally increasing especially in developing countries.

ERC Consolidator Grant
Host Institution: Instituto de Tecnologia Química e Biológica da Universidade de Lisboa
Principal Investigator: Cristina Silva Pereira
Starting Date: Sep 2015

European Research Council



IL7SIGNETURE

IL-7/IL-7R SIGNALING NETWORKS IN HEALTH AND MALIGNANCY

IL7SIGNETURE

IL-7/IL-7R SIGNALING NETWORKS IN HEALTH AND MALIGNANCY

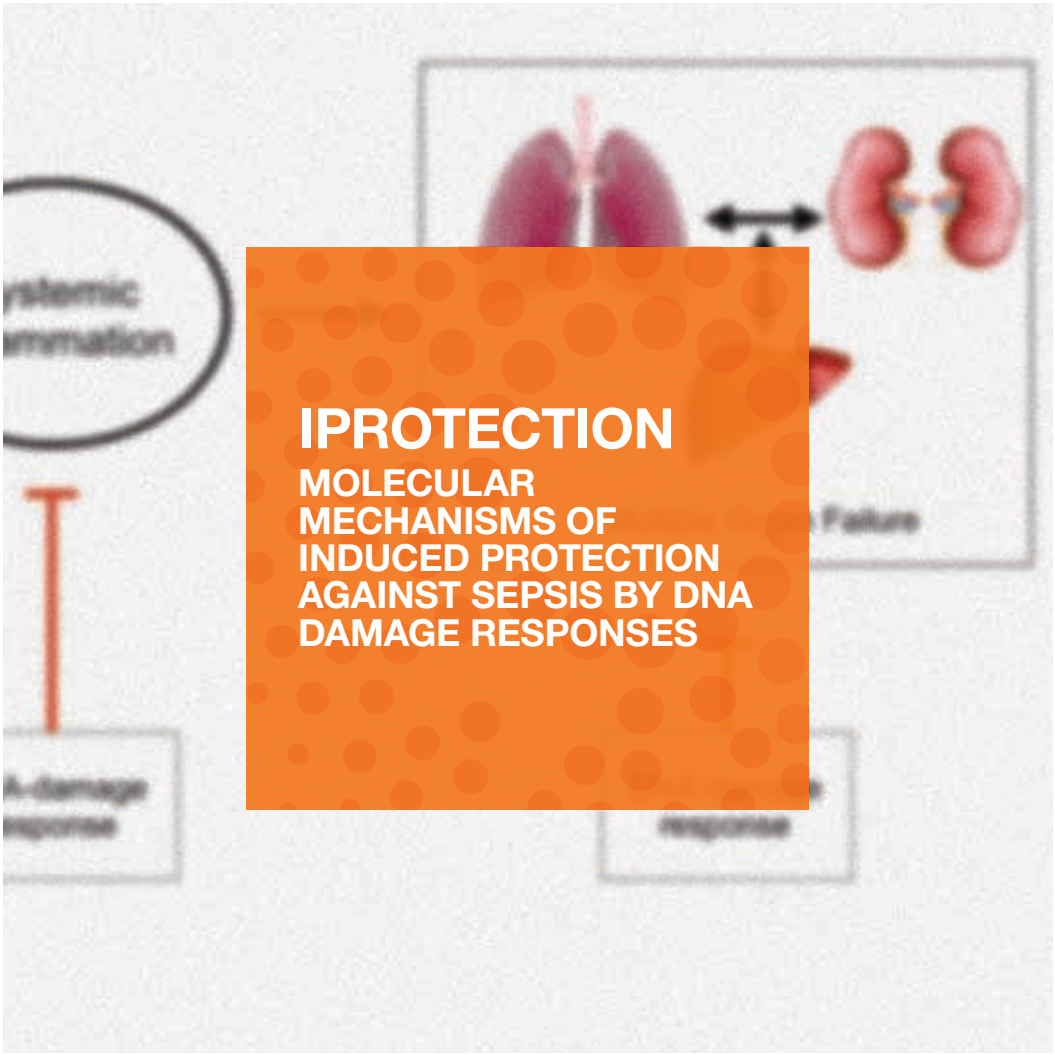
Deregulation of signal transduction is a feature of tumor cells and signaling therapies are gaining importance in the growing arsenal against cancer. However, their full potential can only be achieved once we overcome the limited knowledge on how signaling networks are wired in cancer cells. Interleukin 7 (IL7) and its receptor (IL7R) are essential for normal T-cell development and function, but they can also promote autoimmunity, chronic inflammation and cancer. Despite the biological relevance of IL7 and IL7R, the characterization of their signaling effectors remains limited.

IL7sigNETure proposes to move from the single molecule/pathway-centered analysis, that has characterized the research on IL7/IL7R signaling, into a 'holistic' view of the IL7/IL7R signaling landscape. To do so, a multidisciplinary strategy will be employed, in which data from complementary high throughput analyses, informing on different levels of regulation of the IL7/IL7R signaling network, will be integrated via a systems biology approach, and complemented by cell and molecular biology experimentation and state-of-the-art *in vivo* models.

The knowledge IL7sigNETure will generate should have a profound impact on the understanding of the fundamental mechanisms by which IL7/IL7R signaling promotes leukemia and reveal novel targets for fine-tuned therapeutic intervention in T-ALL. Our in-depth, systems-level characterization of IL7/IL7R signaling will constitute a platform with extraordinary potential to illuminate the molecular role of the IL7/IL7R axis in other cancers (e.g. breast and lung) and pathological settings where IL7 has been implicated, such as HIV infection, multiple sclerosis and rheumatoid arthritis.

ERC Consolidator Grant
Host Institution: Instituto de Medicina Molecular
Principal Investigator: João Pedro Taborda Barata
Starting Date: Sep 2015

European Research Council



IPROTECTION

MOLECULAR MECHANISMS OF INDUCED PROTECTION AGAINST SEPSIS BY DNA DAMAGE RESPONSES

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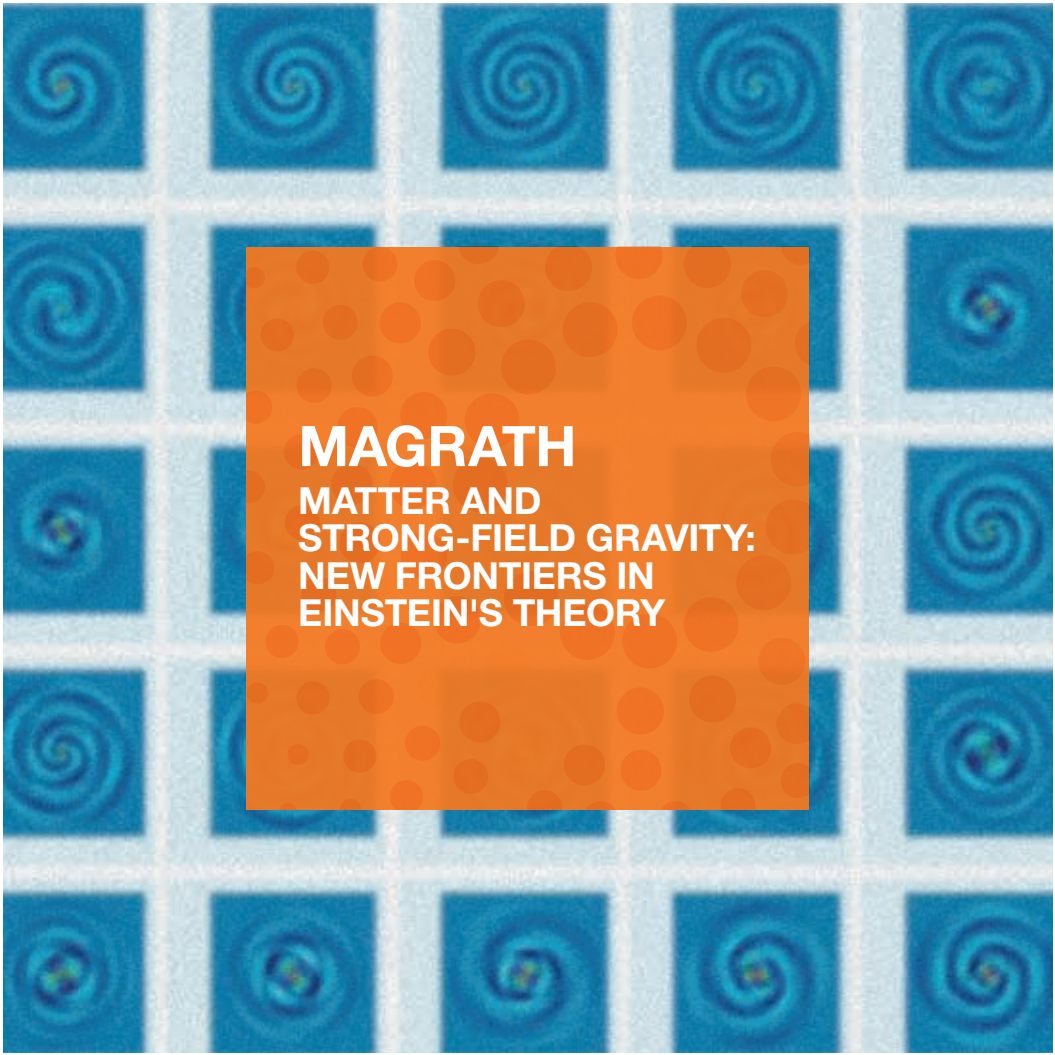
MOLECULAR MECHANISMS OF INDUCED PROTECTION AGAINST SEPSIS BY DNA DAMAGE RESPONSES

Severe sepsis remains a poorly understood systemic inflammatory condition with high mortality rates and limited therapeutic options outside of infection control and organ support measures.
Based on the team's recent discovery that anthracycline drugs prevent organ failure without affecting the bacterial burden in a model of severe sepsis, iPROTECTION proposes that strategies aimed at target organ protection have extraordinary potential for the treatment of sepsis and possibly for other inflammation-driven conditions. The central goal of iPROTECTION is to identify and characterize novel cytoprotective mechanisms, with a focus on DNA damage response dependent protection activated by anthracyclines as a window into stress-induced genetic programs conferring disease tolerance. To that end, a combination of candidate and unbiased approaches for the *in vivo* identification of ATM-dependent and independent mechanisms of tissue protection will be carried out. iPROTECTION will validate the leading candidates for gene silencing (loss-of-function) to the lung, based on recent findings that rescuing this organ is essential and perhaps sufficient in anthracycline-induced protection against severe sepsis. The most promissing candidates will be characterized using a combination of *in vitro* and *in vivo* genetic, biochemical, cell biological and physiological methods.
The results arising from iPROTECTION are likely not only to inspire the design of transformative therapies for sepsis but also to open a completely new field of opportunity to molecularly understand core surveillance mechanisms of basic cellular processes with a critical role in the homeostasis of organ function, whose activation can ultimately promote quality of life during aging and increase lifespan.

ERC Consolidator Grant
Host Institution: Instituto Gulbenkian Ciência
Principal Investigator: Luis Ferreira Moita
Starting Date: Oct 2015


MAGRATH
MATTER AND
STRONG-FIELD GRAVITY:
NEW FRONTIERS IN
EINSTEIN'S THEORY

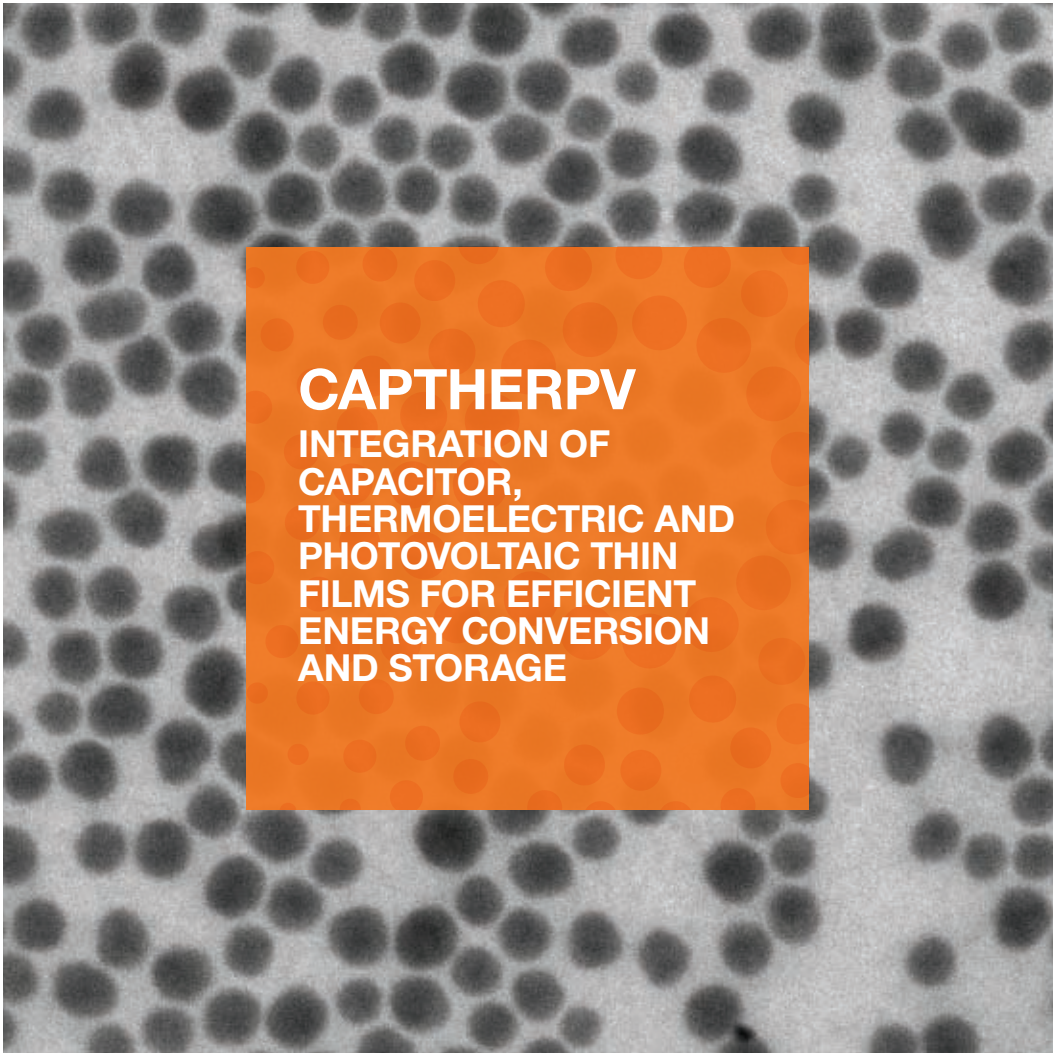
MAGRATH

MATTER AND STRONG-FIELD GRAVITY: NEW FRONTIERS IN EINSTEIN'S THEORY

Gravity is the weakest but the most intriguing fundamental interaction in the Universe. In the last decades a formidable intellectual effort has shown that the full-fledged geometric nature of gravity offers much more than a beautiful description and understanding of all stellar and galactic. MaGRaTh team has been involved in groundbreaking research into the nature of strong-field effects in curved spacetime with applications in various fields, thus establishing international leadership in the field. MaGRaTh aims at understanding, via perturbative techniques and full-blown nonlinear evolutions, the strong-field regime of gravity, and includes challenging nonlinear evolutions describing gravitational collapse, compact binary inspirals and collisions in the presence of fundamental fields.
The MaGRaTh programme will significantly advance our knowledge of Einstein's field equations and their role in fundamental questions (e.g. cosmic censorship, hoop conjecture, spacetime stability, no hair theorems), but also its interplay with high energy, astro and particle physics (testing the precise nature of the interaction between compact objects and matter, such as dark matter candidates or accretion disks, and its imprint on gravitational wave emission, understanding gravitational-led turbulence,etc).
MaGRaTh will make substantial contribution towards understanding strong-field gravity phenomena and the two-body dynamics in GR using perturbative and numerical techniques. This cross-cutting and multidisciplinary program will impact our understanding of gravity at all scales, our perception of black hole-powered phenomena and our knowledge on gravitational-wave and particle physics.

ERC Consolidator Grant
Host Institution: Instituto Superior Técnico
Principal Investigator: Vítor Cardoso
Starting Date: Dec 2015

European Research Council


CAPTHERPV
INTEGRATION OF CAPACITOR, THERMOELECTRIC AND PHOTOVOLTAIC THIN FILMS FOR EFFICIENT ENERGY CONVERSION AND STORAGE

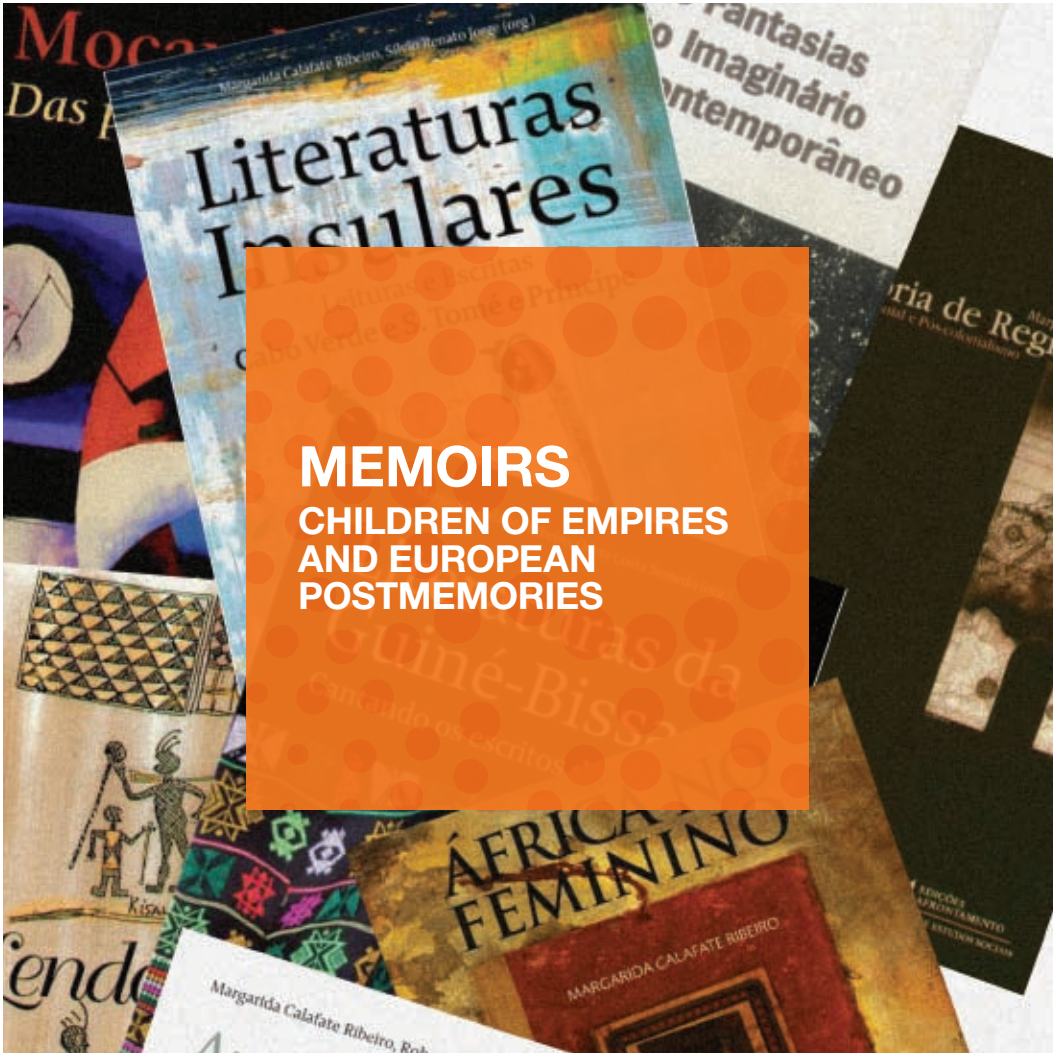
CAPTHERPV

INTEGRATION OF CAPACITOR, THERMOELECTRIC AND PHOTOVOLTAIC THIN FILMS FOR EFFICIENT ENERGY CONVERSION AND STORAGE

The possibility of having a unique device that converts thermal and photonics energy into electrical energy and simultaneously stores it is the main goal of CapTherPV. To achieve that goal, this project aims to gather, in a single substrate, solar cells with up-conversion nanoparticles, thermoelectrics and graphene super-capacitor, all made of thin films. These three main components will be developed separately and integrated sequentially. The innovation proposed is not limited to the integration of components, but rely in ground-breaking concepts: thermoelectric elements based on thin film (TE-TF) oxides; plasmonic nanoparticles for up conversion of near infrared radiation to visible emission in solar cells; graphene super-capacitors; and integration and optimization of all components in a single CapTherPV device. CapTherPV will bring new insights at large area, low cost and flexible energy harvesting and comes from an old idea of combining energy conversion and storage. CapTherPV's research team has a wide experience in amorphous silicon thin film solar cells, in the development of thin film batteries in thermoelectric films.
New thermoelectric materials, hybrid solar cells and energy storage devices are expected to be developed during the first three years of the project. After, the holist integration of the solar and thermal energy harvesting and its storage will demonstrate a new concept of energy conversion and supply.

ERC Consolidator Grant
Host Institution: Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa
Principal Investigator: Isabel Mercês Ferreira
Starting Date: Jul 2015

European Research Council



MEMOIRS

CHILDREN OF EMPIRES AND EUROPEAN POSTMEMORIES

MEMOIRS
CHILDREN OF EMPIRES AND EUROPEAN POSTMEMORIES

MEMOIRS will break new ground by focusing on the inherited memories of the children and grandchildren of the generation that lived through the dying days of colonialism, the struggles for independence and the decolonization process of colonies held by France, Portugal and Belgium. Through interviews of this second and third generation, and a comparative analysis of the cultures influenced by the postmemory of the colonial wars and the end of empire, Europe's postcolonial heritage will be reinterrogated, and a new understanding of the contemporary continent will be developed.

MEMOIRS aims to demonstrate that colonialism never ends with those who enforced or suffered it. Traces of a colonial mindset impregnate generations to come and understanding those traces is what motivates this project. It points to a relation to the past mediated by both historical knowledge and a strong subjective investment manifest in family narratives in which the imagination of a non-experienced past becomes the privileged ground for identity construction and intercultural role-playing both within Europe and on North South axis. This is a comparative project that will illuminate how inter-generational memories still structure the identities of the three nations under analysis and it is expected that it will provide a framework for further studies in other national contexts.

MEMOIRS results will demonstrate the importance of the social sciences and humanities in the study of human relationships and in the search for solutions to the impediments on political success and social cohesion in European societies marked by both respect for difference as well as individual liberty—core values at the heart of the European ideal.

ERC Consolidator Grant
Host Institution: Centro de Estudos Sociais
Principal Investigator: Margarida Calafate Ribeiro
Starting Date: Nov 2015

European Research Council

EXCHANGE

FORENSIC GENETICISTS AND THE TRANSNATIONAL EXCHANGE OF DNA DATA IN THE EU: ENGAGING SCIENCE WITH SOCIAL CONTROL, CITIZENSHIP AND DEMOCRACY

EXCHANGE

FORENSIC GENETICISTS AND THE TRANSNATIONAL EXCHANGE OF DNA DATA IN THE EU: ENGAGING SCIENCE WITH SOCIAL CONTROL, CITIZENSHIP AND DEMOCRACY

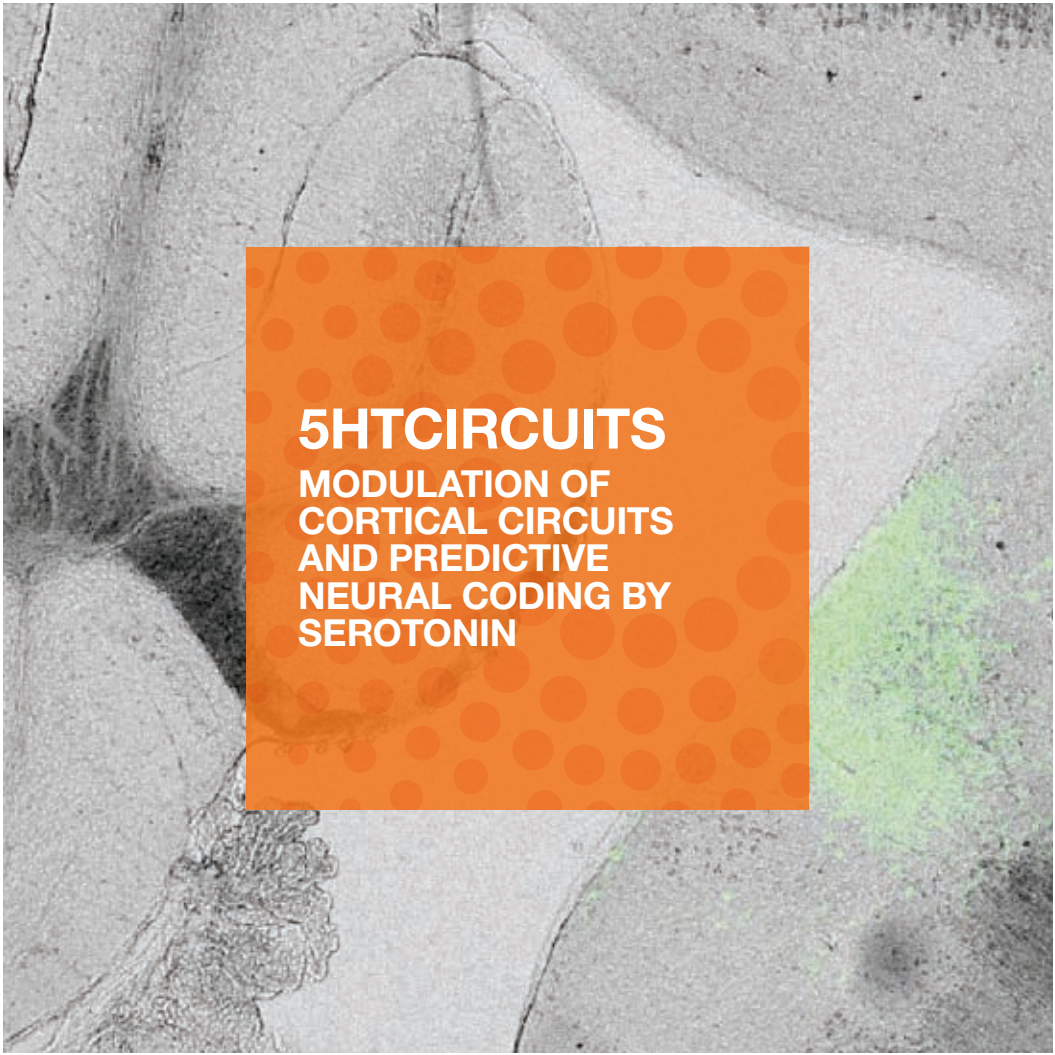
We are living in the "genetic age" of criminal investigation. There is a widespread cultural belief that DNA technology has the unrivalled capacity to identify authors of crimes. EU Law (Prüm Decision, 2008) obliges all Member States to create the conditions for the reciprocal automated searching and comparison of information on DNA data for the purpose of combating cross-border crime, terrorism and illegal immigration. Forensic geneticists play a crucial role in this scenario: they develop the techno-scientific procedures that enable DNA data to be shared across countries.

EXCHANGE studies the close links between a highly specialized field of expert knowledge – forensic genetics – and surveillance in the EU. If the EU succeeds in this political project, about 10 million genetic profiles of identified individuals will be exchanged between agencies in all EU countries. This raises acute cultural, political and societal challenges. EXCHANGE aims to address these challenges by scrutinizing how forensic geneticists, within the context of the transnational exchange of DNA data in the EU, engage science with the social values attributed to social control, citizenship and democracy.

EXCHANGE stimulates interdisciplinary dialogue between the social sciences and the forensic genetics. This research tackles questions that are relevant to the actors involved in criminal justice cooperation in the EU. The results might be applied in governance and policy-making founded on a respect for human rights, transparency and public trust.

ERC Consolidator Grant
Host Institution: Centro de Estudos Sociais
Principal Investigator: Helena Cristina Ferreira Machado
Starting Date: Oct 2015

European Research Council


5HTCIRCUITS
MODULATION OF CORTICAL CIRCUITS AND PREDICTIVE NEURAL CODING BY SEROTONIN

5HTCIRCUITS

MODULATION OF CORTICAL CIRCUITS AND PREDICTIVE NEURAL CODING BY SEROTONIN

Serotonin (5-HT) is a central neuromodulator and a major target of therapeutic psychoactive drugs, but relatively little is known about how it modulates information processing in neural circuits.

The theory of predictive coding postulates that the brain combines raw bottom-up sensory information with top-down information from internal models to make perceptual inferences about the world. It is hypothesized that a role of 5-HT in this process is to report prediction errors and promote the suppression and weakening of erroneous internal models. It is proposed that it does so by inhibiting top-down relative to bottom-up cortical information flow.

To test this, 5HTCircuits proposes a set of experiments in mice performing olfactory perceptual tasks. The specific aims of 5HTCircuits are: to test whether 5-HT neurons encode sensory prediction errors and their causal role in using predictive cues to guide perceptual decisions; to characterize how 5-HT influences the encoding of sensory information by neuronal populations in the olfactory cortex and identify the underlying circuitry; and to map the effects of 5-HT across the whole brain and use this information to target further causal manipulations to specific 5-HT projections.

These experiments will tackle multiple facets of an important general computational question, bringing to bear an array of cutting-edge technologies to address how 5-HT impacts neural coding and perceptual decision-making.

5HTCircuits will determine how serotonin affects the way that expectations and sensory combine to form our perception of the world.

ERC Advanced Grant
Host Institution: Fundação Champalimaud
Principal Investigator: Zachary Mainen
Starting date: Jan 2016

European Research Council


ATLAS
BIOENGINEERED AUTONOMOUS CELL-BIOMATERIALS DEVICES FOR GENERATING HUMANISED MICROTISSUES FOR REGENERATIVE MEDICINE

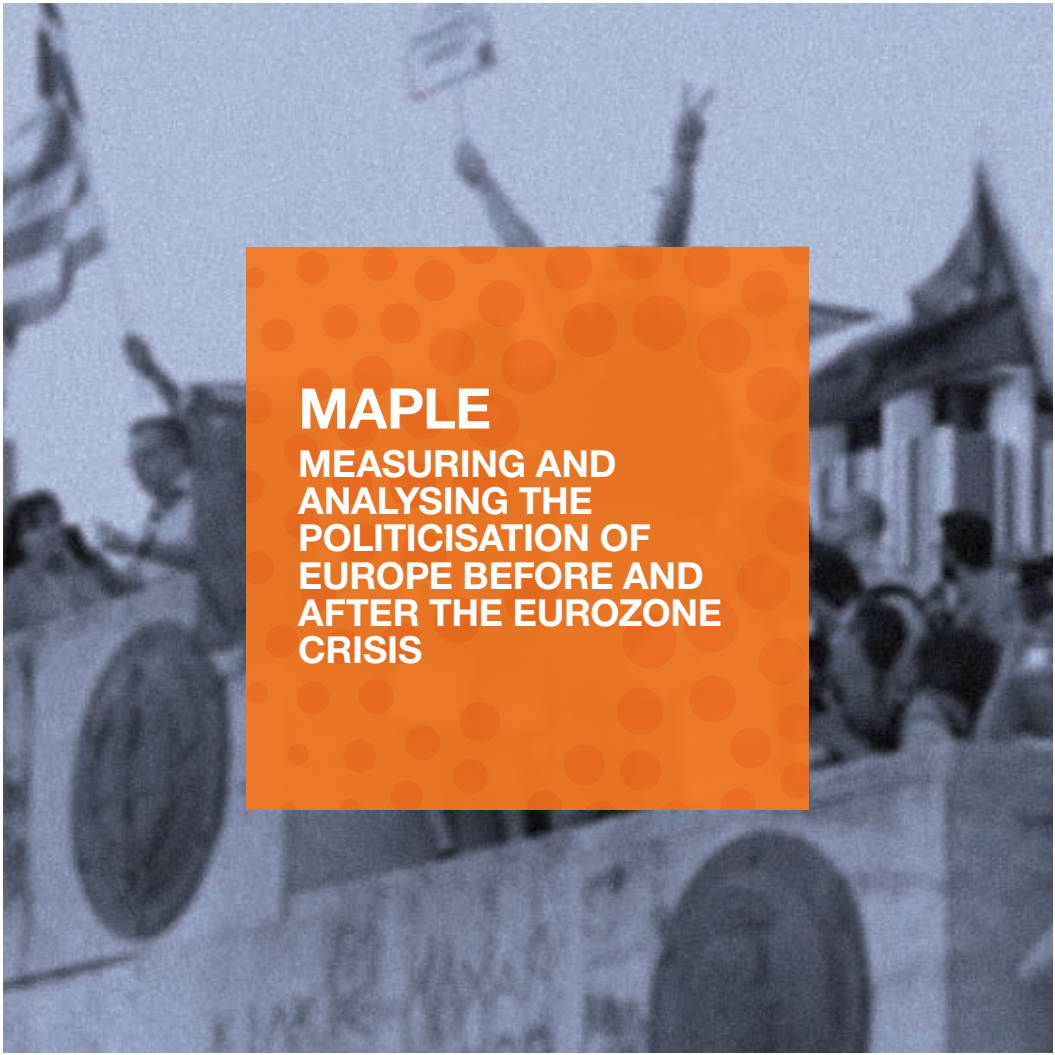
ATLAS

BIOENGINEERED AUTONOMOUS CELL-BIOMATERIALS DEVICES FOR GENERATING HUMANISED MICROTISSUES FOR REGENERATIVE MEDICINE

New generations of devices for tissue engineering (TE) should rationalize better the physical and biochemical cues operating in tandem during native regeneration.
ATLAS proposes unique toolboxes combining smart biomaterials and cells for the ground-breaking advances of engineering fully time-self-regulated complex 2D and 3D devices, able to adjust the cascade of processes leading to faster high-quality new tissue formation with minimum pre-processing of cells. Versatile biomaterials based on marine-origin macromolecules will be used and the backbone of these biopolymers will be equipped with a variety of (bio)chemical elements permitting: post-processing chemistry and micro-patterning, specific/non-specific cell attachment, and cell-controlled degradation.
Aiming at being applied in bone TE, ATLAS will integrate cells from different units of tissue physiology and consider the interactions between the immune and skeletal systems. This will permit to architect innovative films with high-level dialogue control with cells, but in particular sophisticated quasi-closed 3D capsules able to compartmentalise such components in a “globe-like” organization.
ATLAS aims to create a platform based on miniaturized self-regulated devices able to compartmentalise a variety of different "ingredients", including different types of cells. It is expected that these small reservoirs can be introduced and fixed inside the body through minimally invasive procedures, guiding the regeneration of tissues and organs in an autonomous way. Besides *in vivo* applications, these sophisticated devices are also envisaged to serve as disease models in order to test new drugs and therapies as an alternative to animal or clinical tests.

ERC Advanced Grant
Host Institution: Universidade de Aveiro
Principal Investigator: João Filipe Colardelle da Luz Mano
Starting Date: Dec 2015

European Research Council



MAPLE

MEASURING AND ANALYSING THE POLITICISATION OF EUROPE BEFORE AND AFTER THE EUROZONE CRISIS

MAPLE

MEASURING AND ANALYSING THE POLITICISATION OF EUROPE BEFORE AND AFTER THE EUROZONE CRISIS

The Eurozone crisis forces us to reconsider the conventional wisdom that “Europe” has little effect on national electoral politics. MAPLE’S central goal is to analyze the degree of politicization the European issue has acquired following the onset of the Eurozone crisis, in Belgium, Germany, Greece, Ireland, Portugal and Spain in 2000-2016.

We consider how public discourse on Europe has been conveyed by print media during legislative election campaigns and how parliamentary debates on Europe have occurred among parties.

In each dimension salience and polarization of the European issue will be measured. The combined analysis of theses dimensions will allow us to build an Index of Politicization of the EU (IPEU). This Index will provide a ground-breaking integrated yardstick to account for the level and timing of politicization.

To assess the institutional and economic causes of IPEU, we make use of the longitudinal data on IPEU in both quantitative and qualitative ways. Next, building on our findings about politicization, we will set up a two-wave web panel survey to test the consequences politicization has on political attitudes and voting behaviour at the national level in each country.

MAPLE is interdisciplinary: it combines approaches from social psychology and political science. It includes qualitative data collection followed by qualitative and quantitative data analysis.

The combined endeavour of creating IPEU and then using it to understand how politicization impacts on voting behaviour following the onset of the Eurozone crisis is totally innovative, and will ultimately illuminate the way in which Europe has decisively entered national electoral politics and with what consequences for the vote calculus.

ERC Consolidator Grant
Host Institution: Instituto de Ciências Sociais da Universidade de Lisboa
Principal Investigator: Marina Costa Lobo
Starting Date: Jun 2016

European Research Council

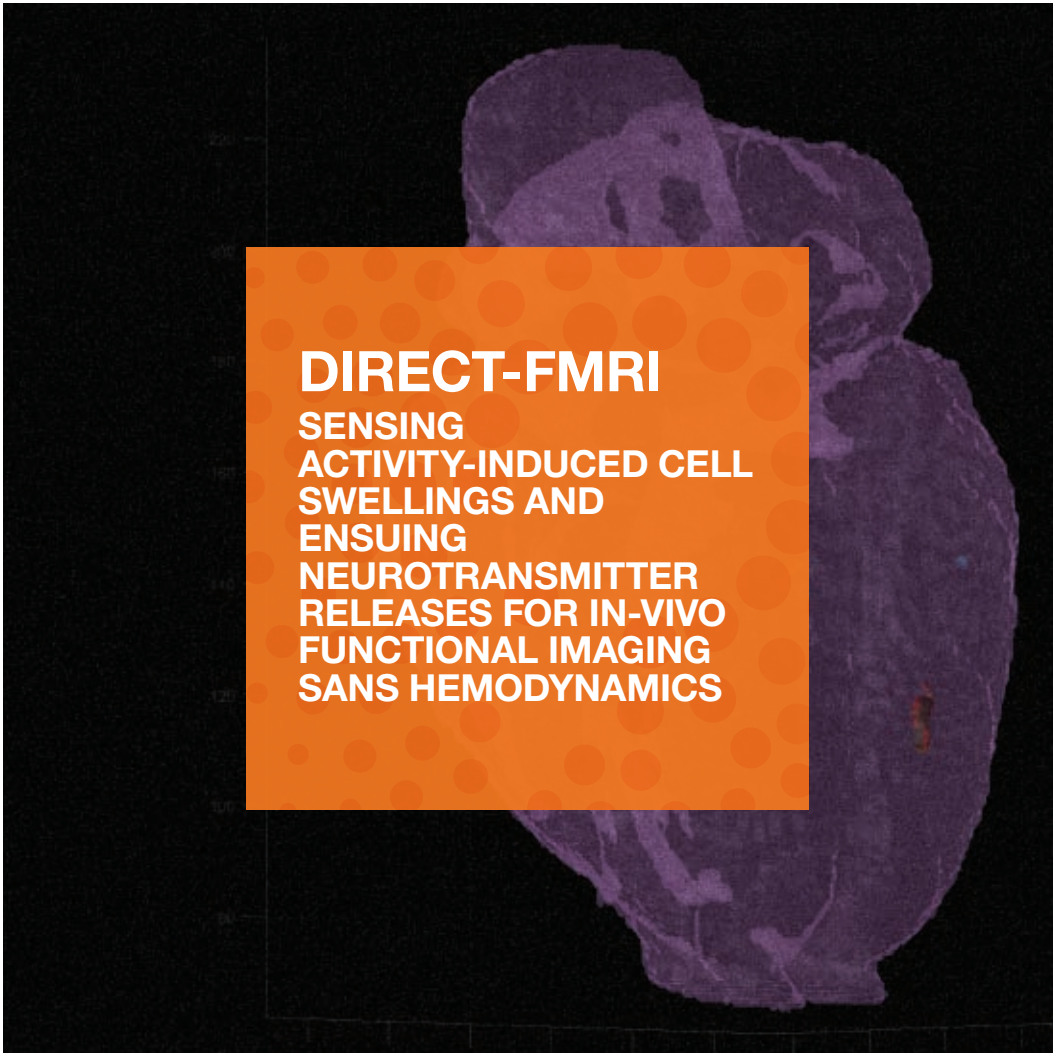

CENTRIOLE
BIRTHDEATH
MECHANISM OF
CENTRIOLE INHERITANCE
AND MAINTENANCE

CENTRIOLEBIRTHDEATH

MECHANISM OF CENTRIOLE INHERITANCE AND MAINTENANCE

Centrioles assemble centrosomes and cilia/flagella, critical structures for cell division, polarity, motility and signaling, which are often deregulated in human disease.
I propose to investigate, in an integrative and quantitative way, how centrioles are formed in the right numbers at the right time and place, and how they are maintained to ensure their function and inheritance.
We first ask how centrioles guide their own assembly position and centriole copy number. Our recent work highlighted several properties of the system which we will explore through a combination of biochemistry, quantitative live cell microscopy and computational modelling. We then ask how the centrosome and the cell cycle are both coordinated. We identified the triggering event in centriole biogenesis and how its regulation is akin to cell cycle control of DNA replication and centromere assembly.
Lastly, we ask how centriole maintenance is regulated. By studying centriole disappearance in the female germline, we uncovered that centrioles need to be actively maintained by their surrounding matrix. We propose to investigate how that matrix provides stability to the centrioles, whether this is differently regulated in different cell types and the possible consequences of its misregulation for the organism. We will take advantage of several experimental systems (*in silico*, *ex-vivo*, flies, and human cells), tailoring the assay to the question and allowing for comparisons across experimental systems.
This study will provide us with insights into the consequences of misregulation of centrioles to the cell and the organism, which is particularly relevant for cancer and ciliopathies, and that we will explore in other projects.

ERC Consolidator Grant
Host Institution: Instituto Gulbenkian Ciência
Principal Investigator: Mónica Bettencourt Dias
Starting Date: Jan 2017



DIRECT-FMRI

SENSING ACTIVITY-INDUCED CELL SWELLINGS AND ENSUING NEUROTRANSMITTER RELEASES FOR IN-VIVO FUNCTIONAL IMAGING SANS HEMODYNAMICS

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SENSING ACTIVITY-INDUCED CELL SWELLINGS AND ENSUING NEUROTRANSMITTER RELEASES FOR IN-VIVO FUNCTIONAL IMAGING SANS HEMODYNAMICS

Functional-Magnetic Resonance Imaging (fMRI) has transformed our understanding of brain function due to its ability to noninvasively tag 'active' brain regions. Nevertheless, fMRI only detects neural activity indirectly, by relying on slow hemodynamic couplings whose relationships with underlying neural activity are not fully known.
We have recently pioneered two unique MR approaches: Non-Uniform Oscillating-Gradient Spin-Echo (NOGSE) MRI and Relaxation Enhanced MR Spectroscopy (RE MRS). NOGSE-MRI is an exquisite microstructural probe, sensing cell sizes (l) with an unprecedented l^6 sensitivity (compared to l^2 in conventional approaches); RE MRS is a new spectral technique capable of recording metabolic signals with extraordinary fidelity at ultrahigh fields.
This proposal aims to harness these novel concepts for mapping neural activity directly, without relying on hemodynamics. The specific objectives of this proposal are: mapping neural activity via sensing cell swellings upon activity (μfMRI); probing the nature of elicited activity via detection of neurotransmitter release; network mapping in optogenetically-stimulated, behaving mice.
Simulations for μfMRI predict >4% signal changes upon subtle cell swellings; further, our *in vivo* RE MRS experiments have detected metabolites with SNR>50 in only 6 seconds. Hence, these two complementary – and importantly, hemodynamics-independent – approaches will represent a true paradigm shift: from indirect detection of neurovasculature couplings towards direct and noninvasive mapping of neural activity *in vivo*.

ERC Starting Grant
Host Institution: Fundação Champalimaud
Principal Investigator: Noam Shemesh
Starting Date: Mar 2016

European Research Council

SYNAPTIC MITOCHONDRIA

QUALITY CONTROL AND MAINTENANCE OF SYNAPTIC MITOCHONDRIA

SYNAPTICMITOCHONDRIA

QUALITY CONTROL AND MAINTENANCE OF SYNAPTIC MITOCHONDRIA

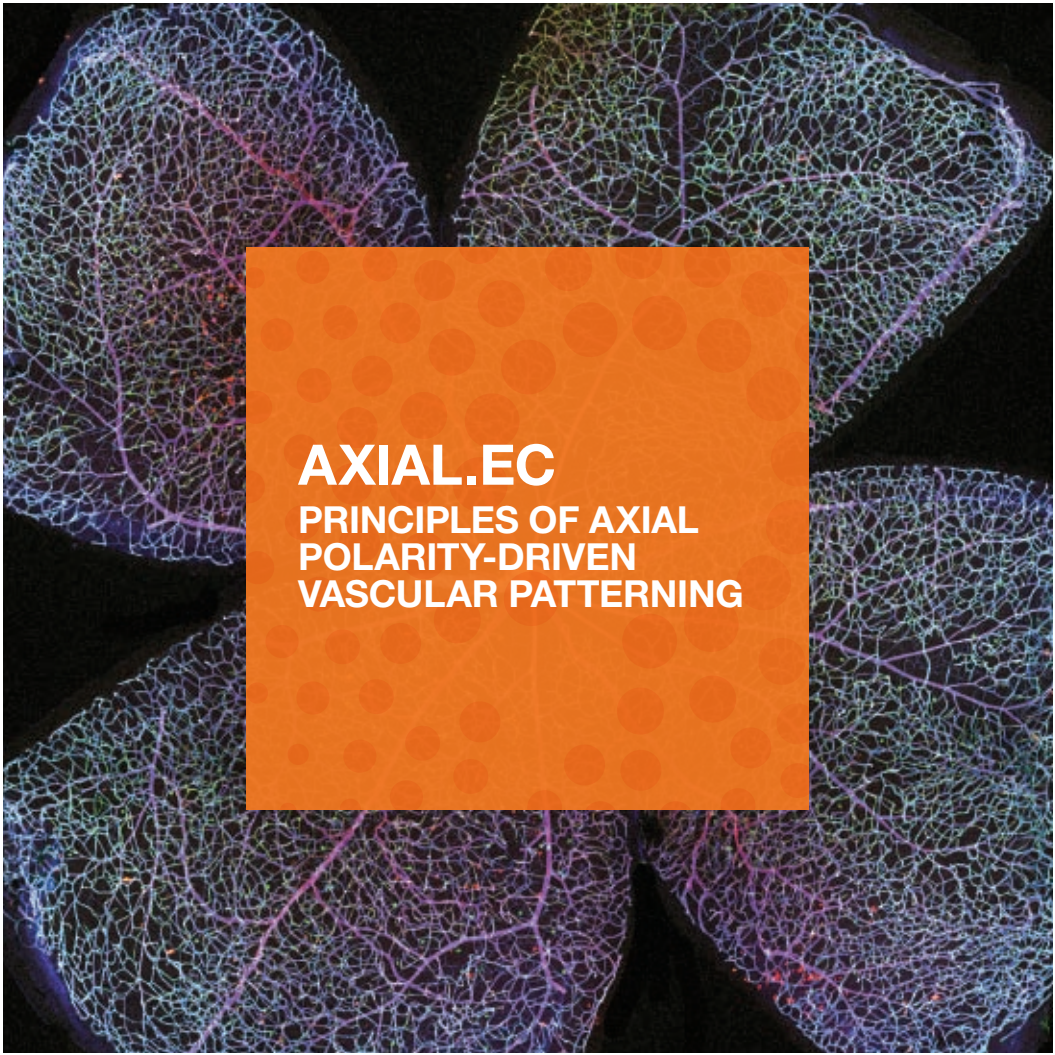
Mitochondria at the synapse have a pivotal role in neurotransmitter release, but almost nothing is known about synaptic mitochondria composition or specific functions. Synaptic mitochondria compared to mitochondria in other cells, need to cope with increased calcium load, more oxidative stress, and high demands of energy generation during synaptic activity. My hypothesis is that synaptic mitochondria have acquired specific mechanisms to manage local stress and that disruption of these mechanisms contributes to neurodegeneration.

How mitochondria sense their dysfunction is unclear. Even more intriguing is the question of how they decide whether their failure should lead to removal of the organelle or dismissal of the complete neuron via cell death. We anticipate that these decisions are not only operational during disease, but might constitute a fundamental mechanism relevant for maintenance of synaptic activity and establishment of new synapses.

I propose to use proteomic approaches to identify the protein fingerprint of synaptic mitochondria and to compare them to mitochondria from other tissues. I plan to identify key players of the proposed regulatory pathways involved in intrinsic mitochondria quality control. In a complimentary approach, I will exploit our findings and use *in vitro* and *in vivo* experimental approaches to measure mitochondrial function of synaptic versus non-synaptic mitochondria and the relevance of those changes for synaptic function. Our work will unravel the specific properties of synaptic mitochondria and provide much needed insight in their hypothesized predominant role in neurodegenerative disorders.

ERC Starting Grant
Host Institution: Instituto de Medicina Molecular
Principal Investigator: Vanessa Morais
Starting Date: Oct 2016

European Research Council



AXIAL.EC

PRINCIPLES OF AXIAL POLARITY-DRIVEN VASCULAR PATTERNING

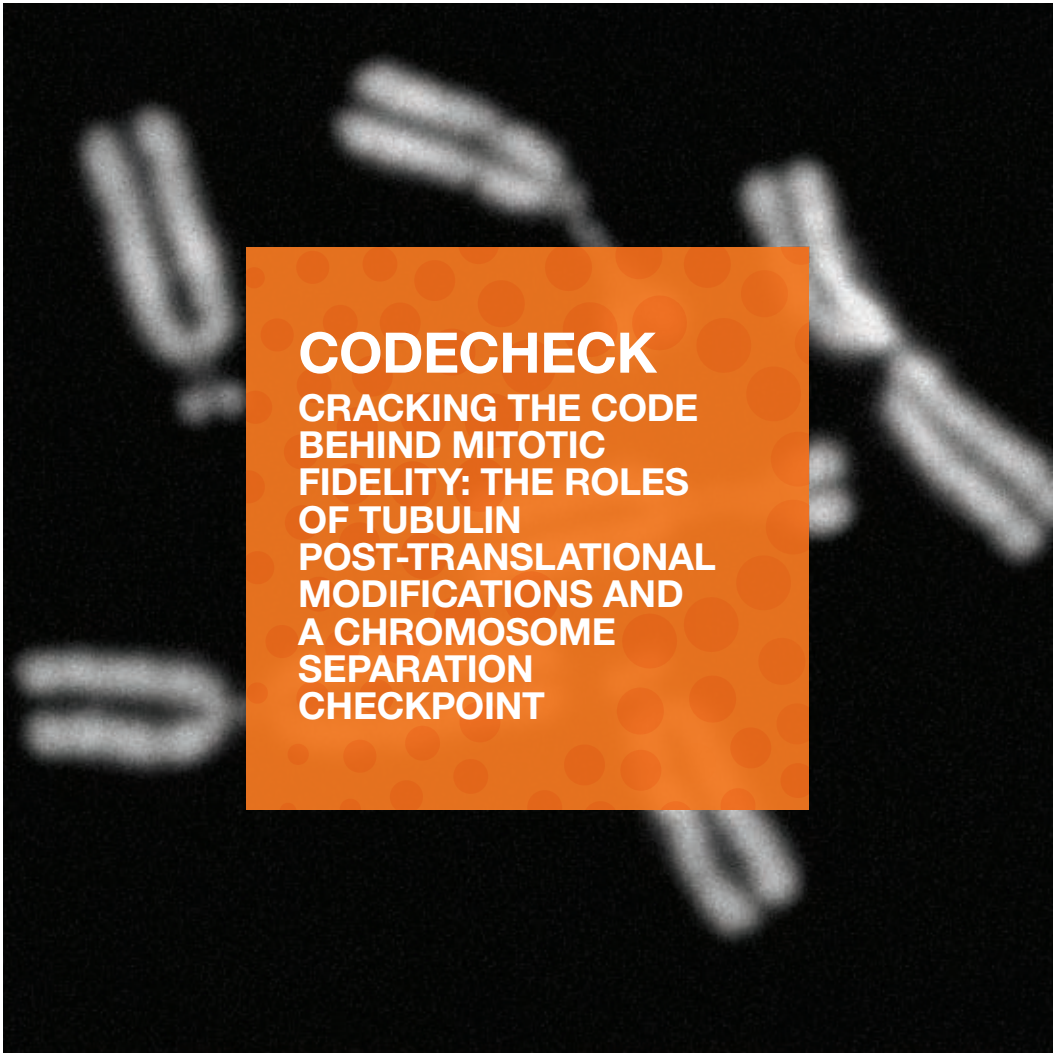
AXIAL.EC

PRINCIPLES OF AXIAL POLARITY-DRIVEN VASCULAR PATTERNING

The formation of a functional patterned vascular network is essential for development, tissue growth and organ physiology. Several human vascular disorders arise from the mis-patterning of blood vessels, such as arteriovenous malformations, aneurysms and diabetic retinopathy. Although blood flow is recognized as a stimulus for vascular patterning, very little is known about the molecular mechanisms that regulate endothelial cell behaviour in response to flow and promote vascular patterning. Recently, we uncovered that endothelial cells migrate extensively in the immature vascular network, and that endothelial cells polarize against the blood flow direction. Here, we put forward the hypothesis that vascular patterning is dependent on the polarization and migration of endothelial cells against the flow direction, in a continuous flux of cells going from low-shear stress to high-shear stress regions. We will establish new reporter mouse lines to observe and manipulate endothelial polarity *in vivo* in order to investigate how polarization and coordination of endothelial cells movements are orchestrated to generate vascular patterning. We will manipulate cell polarity using mouse models to understand the importance of cell polarization in vascular patterning. Also, using a unique zebrafish line allowing analysis of endothelial cell polarity, we will perform a screen to identify novel regulators of vascular patterning. Finally, we will explore the hypothesis that defective flow-dependent endothelial polarization underlies arteriovenous malformations using two genetic models.
Given the physiological relevance of vascular patterning in health and disease, this research plan will set the basis for the development of novel clinical therapies targeting vascular disorders.

ERC Starting Grant
Host Institution: Instituto de Medicina Molecular
Principal Investigator: Cláudio Franco
Starting Date: Sep 2016

European Research Council



CODECHECK

CRACKING THE CODE BEHIND MITOTIC FIDELITY: THE ROLES OF TUBULIN POST-TRANSLATIONAL MODIFICATIONS AND A CHROMOSOME SEPARATION CHECKPOINT

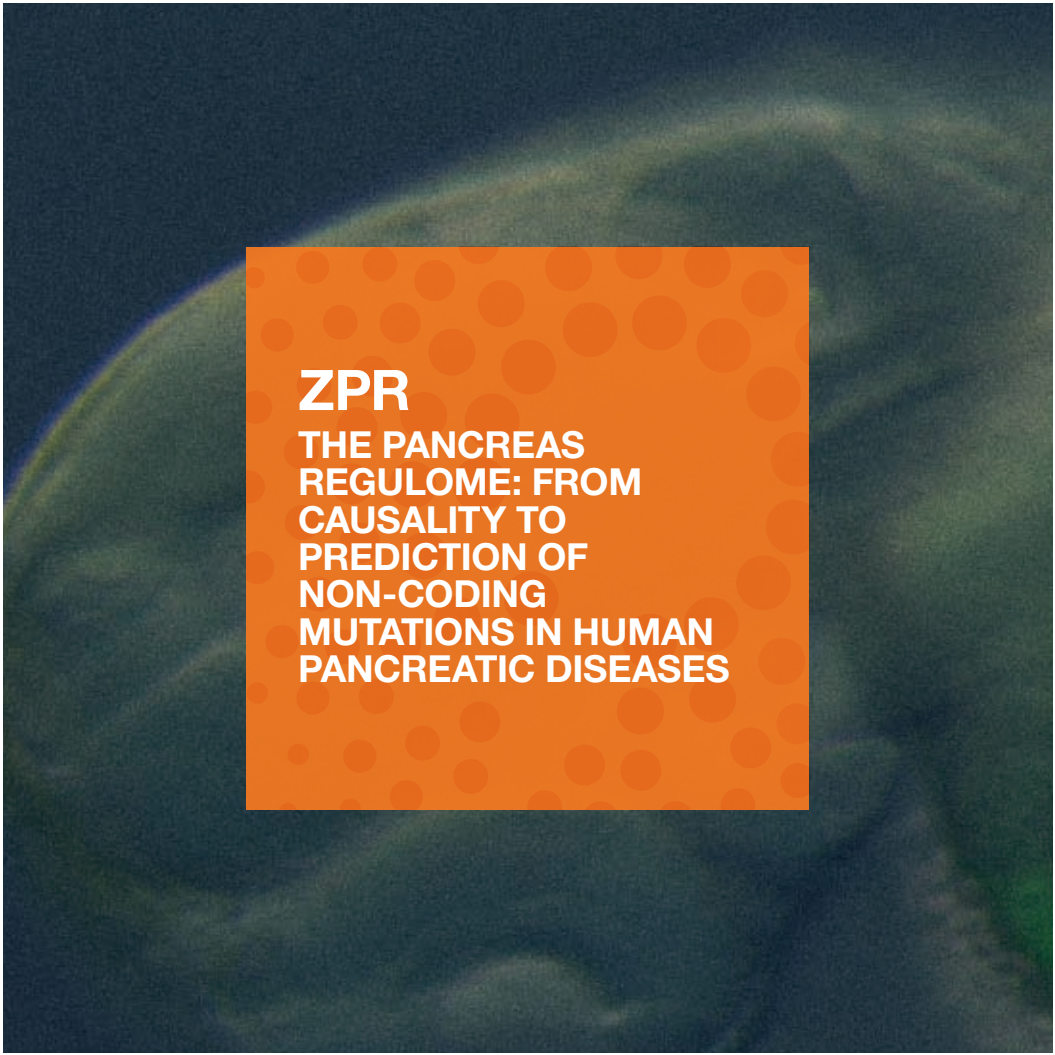
CODECHECK

CRACKING THE CODE BEHIND MITOTIC FIDELITY: THE ROLES OF TUBULIN POST-TRANSLATIONAL MODIFICATIONS AND A CHROMOSOME SEPARATION CHECKPOINT

At every cell division cycle, the previously replicated genome must be accurately distributed into the two daughter cells during mitosis. In mitosis, the DNA condenses into chromosomes that are segregated after the establishment of stable interactions between specialized centromeric regions called kinetochores and a microtubule-based structure known as the mitotic spindle. Due to the stochastic nature of chromosome/kinetochore interactions with mitotic spindle microtubules, mitosis is prone to errors that can lead to aneuploidy, a condition that is the most frequent abnormality in human cancers. Thus, understanding the cellular mechanisms that ensure mitotic fidelity is not only important for our comprehension of life, but also has strong implications to human health. Here we will test and build on two original concepts with strong implications for chromosome segregation fidelity. The first is based on the “tubulin code” hypothesis, which predicts that molecular motors “read” tubulin post-translational modifications on spindle microtubules that work as a navigation system to guide chromosomes during mitosis. The second is centered on the molecular dissection of a recently uncovered chromosome separation checkpoint mediated by a midzone-associated Aurora B gradient, which delays nuclear envelope reformation in response to incompletely separated chromosomes. To test and explore these original concepts we defined three ground-breaking objectives: comprehensive analysis of the tubulin code during mitosis; molecular and functional dissection of a chromosome separation checkpoint; and implementation of Indian muntjac cells as a model system for mitosis. Our findings will likely open new avenues for translational research and clinical applications related to cancer therapies.

ERC Consolidator Grant
Host Institution: Instituto de Biologia Molecular e Celular
Principal Investigator: Helder Maiato
Starting Date: Jul 2016

European Research Council



ZPR

THE PANCREAS REGULOME: FROM CAUSALITY TO PREDICTION OF NON-CODING MUTATIONS IN HUMAN PANCREATIC DISEASES

ZPR

THE PANCREAS REGULOME: FROM CAUSALITY TO PREDICTION OF NON-CODING MUTATIONS IN HUMAN PANCREATIC DISEASES

Several human pancreatic diseases have been characterized, being the diabetes the most common. Like others, this genetic disease is related to disrupted non-coding cis-regulatory elements (CREs) that culminate in altered gene expression. Although Genome Wide Association Studies support this hypothesis, it's still unclear how mutations on CREs contribute to disease.

We aim to uncover the implications of the disruption of pancreas CREs and how they contribute to diabetes *in vivo*. For this we will study transcriptional regulation of genes in zebrafish. The similarities between zebrafish and mammal pancreas and the evolutionary conservation of pancreas transcription factors (TF) make it an excellent model to approach and study this disease.

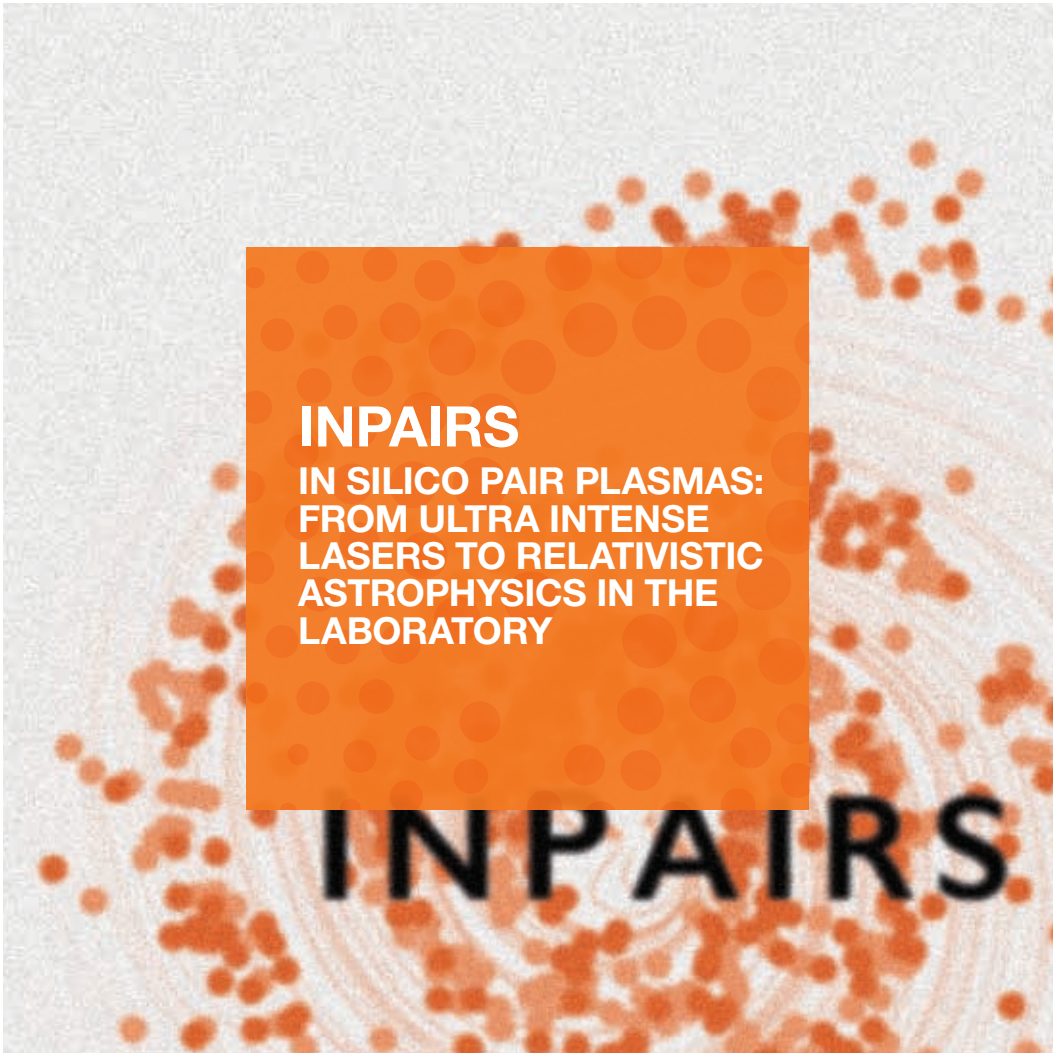
In this project, we will characterize the zebrafish insulin producing beta-cell regulome, by determining the active CREs in this cell type and their bound TFs. Then we will compare this information with a similar dataset recently available for human beta-cells, to define functional orthologs in these species. Selected CREs will be tested by *in vivo* gene reporter assays in zebrafish, focusing on those functionally equivalent to human CREs where risk alleles have been associated with diabetes or those regulating genes involved in diabetes. Later these CREs will be mutated in the zebrafish genome to validate their contribution to diabetes. Finally, we will translate this to predict new human disease-associated CREs by focusing on the regulatory landscape of diabetes-associated genes, without the need of having countless patients to uncover them.

We will create a model system that will allow the identification of new diabetes-associated CREs, which might have a great impact in clinical management of this epidemic disease.

ERC Starting Grant
Host Institution: Instituto de Biologia Molecular e Celular
Principal Investigator: José Bessa
Starting Date: Jun 2016

INPAIRS

IN SILICO PAIR PLASMAS: FROM ULTRA INTENSE LASERS TO RELATIVISTIC ASTROPHYSICS IN THE LABORATORY



INPAIRS

IN SILICO PAIR PLASMAS: FROM ULTRA INTENSE LASERS TO RELATIVISTIC ASTROPHYSICS IN THE LABORATORY

How do extreme electromagnetic fields modify the dynamics of matter? Will quantum electrodynamics effects be important at the focus of an ultra-intense laser? How are the magnetospheres of compact stellar remnants formed, and can we capture the physics of these environments in the laboratory? These are all longstanding questions with an overarching connection to extreme plasma physics.

Electron-positron pair plasmas are pervasive in all these scenarios. Highly nonlinear phenomena such as QED processes, magnetogenesis, radiation, field dynamics in complex geometries, and particle acceleration, are all linked with the collective dynamics of pair plasmas through mechanisms that remain poorly understood.

InPairs aims to understand the multidimensional dynamics of electron-positron plasmas under extreme laboratory and astrophysical fields, to determine the signatures of the radiative processes on pair plasmas, and to identify the physics of the magnetospheres of compact stellar remnants, focusing on the electrodynamics of pulsars, that can be mimicked in laboratory experiments using ultra high intensity lasers and charged particle beams.

InPairs relies on massively parallel simulations to bridge the gap, for the first time, between the pair plasma creation mechanisms, the collective multidimensional microphysics, and their global dynamics in complex geometries associated with laboratory and astrophysical systems. Emphasis will be given to detectable signatures e.g. radiation and accelerated particles, with the ultimate goal of solving some of the central questions in extreme plasma physics, thus opening new connections between computational studies, laboratory experiments, and relativistic plasma astrophysics.

ERC Advanced Grant
Host Institution: Instituto Superior Técnico
Principal Investigator: Luís O. Silva
Starting Date: Sep 2016

European Research Council

COLOUR

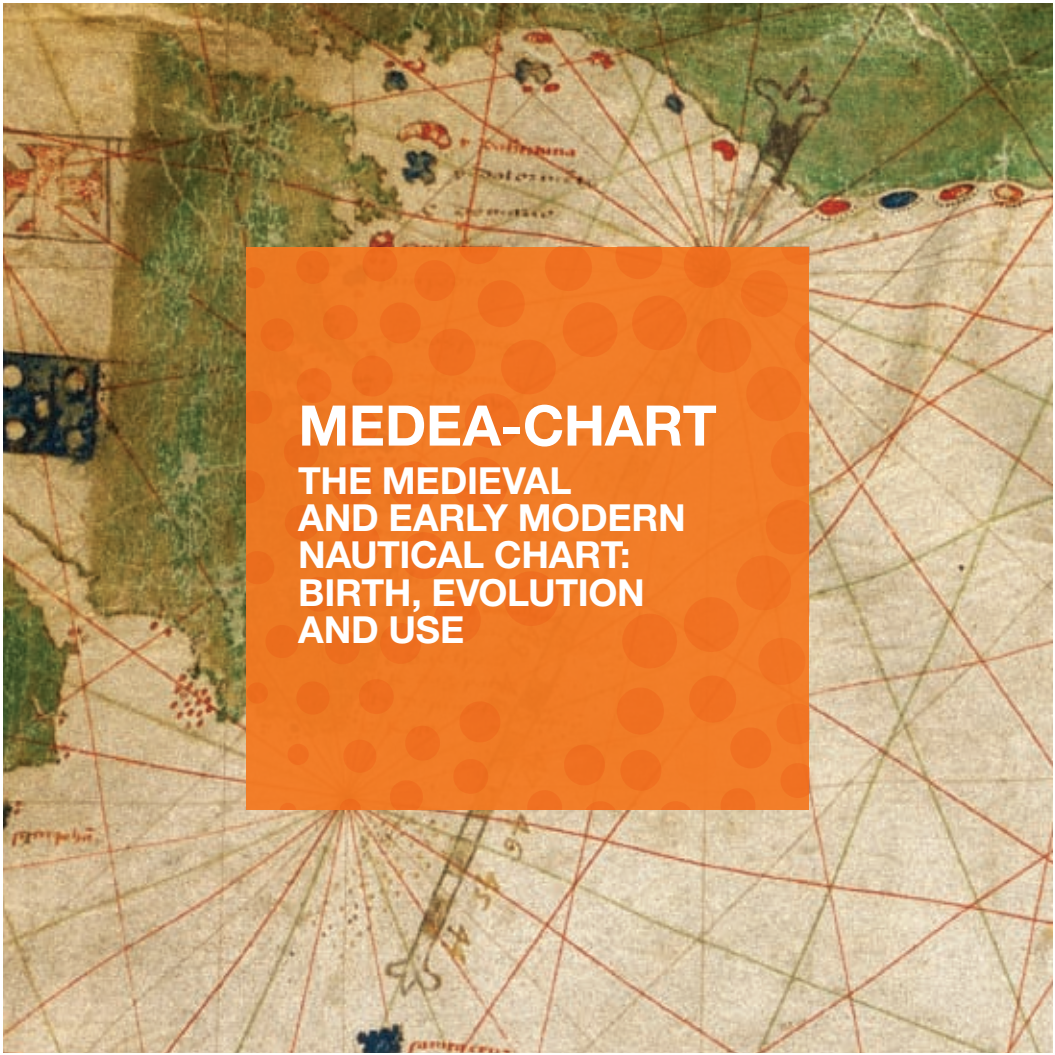
THE COLOUR OF LABOUR: THE RACIALIZED LIVES OF MIGRANTS

COLOUR
THE COLOUR OF LABOUR: THE RACIALIZED LIVES OF MIGRANTS

This project is about the racialization of migrant labourers across political boundaries, with a main focus on impoverished Europeans who served in huge numbers as indentured labourers in nineteenth-century sugar plantations (in the Guianas, the Caribbean, and Hawaii) and in the workforce of late nineteenth and early twentieth century New England cotton mills.
With this project I aim to provide major, innovative contributions on three fronts: theory-making, by working the concepts of race, racism, racialization, embodiment and memory in association with migrant work across political boundaries and imperial classifications; social relevance of basic research, by linking an issue of pressing urgency in contemporary Europe to substantive, broad-scope, and multi-sited anthropological/historical research on the wider structures of domination, rather than to targeted problem-solving research of immediate applicability; disciplinary scope, by proposing to unsettle historical anthropology and ethnographic history from within the boundaries of a single empire, and to overcome the limitations of existing comparative studies, by inquiring into the flows and interactions between competing empires.
We expect to strengthen the methodology for multi-sited, multi-period research in anthropology; contribute to an anthropology of global connections and trans-local approaches; promote the multidisciplinary and combined-methods approach to complex subjects; narrate a poorly known set of historical situations of labour racializations involving Europeans and document the ways they reverberate through generations; and make the analysis available to both academic audiences and the different communities involved in the research.

ERC Advanced Grant
Host Institution: Instituto de Ciências Sociais da Universidade de Lisboa
Principal Investigator: Cristiana Bastos
Starting Date: Sep 2016

European Research Council



MEDEA-CHART

THE MEDIEVAL AND EARLY MODERN NAUTICAL CHART: BIRTH, EVOLUTION AND USE

MEDEA-CHART

THE MEDIEVAL AND EARLY MODERN NAUTICAL CHART: BIRTH, EVOLUTION AND USE

Of all the technical and scientific developments that made possible the early modern maritime expansion, the nautical chart is perhaps the least studied and understood. What is the origin of the pre-Mercator nautical chart, how charts evolved technically over time and how they were used at sea are all critical questions that remain to be answered.
I intend to approach these challenges in a truly interdisciplinary way, by using innovative and powerful tools as a complement to the traditional methods of historical research: analytical cartometric methods, numerical modelling and the examination of the manuscripts through special lighting. By applying these tools to a large sample of charts of various periods and origins, I aim to unveil hidden graphic content related to their construction and use, to characterize their main geometric features, to establish meaningful connections with contemporary navigational methods and exploration missions, and to numerically simulate their construction by taking into account the explanations given in the textual sources.
The project aims to provide good answers to some historiographical questions such as: when and where were the first portolan charts of the Mediterranean produced; how were the first portolan charts of the Mediterranean constructed; how were portolan charts updated with new geographical information; how did the latitude charts evolve technically; how did cosmographers, cartographers and pilots deal with the geometric inconsistencies of the early modern charts; or how were nautical charts used by the pilots at sea. The clarification of these issues will have a ground-breaking impact, not only in the strict field of the History of Cartography, but also in the context of the intellectual history at large.

ERC Starting Grant
Host Institution: Faculdade de Ciências da Universidade de Lisboa
Principal Investigator: Joaquim Alves Gaspar
Starting Date: Mar 2017

European Research Council

CROME

CROSSED MEMORIES, POLITICS OF SILENCE: THE COLONIAL-LIBERATION WARS IN POSTCOLONIAL TIMES

CROME

CROSSED MEMORIES, POLITICS OF SILENCE: THE COLONIAL-LIBERATION WARS IN POSTCOLONIAL TIMES

CROME's main objective is to produce a history of the memory of the colonial-liberation wars fought by the Portuguese state and pro-independence African movements. The key hypothesis is that wars, colonial legacies and anticolonial struggles triggered memorialisation and silencing processes which have their own historicity, according to each country and social-political context.

CROME is divided into two strands: the first looks at the role of states in mobilising, articulating and recognising the past; the second strand highlights uses of the past and dynamics between social and individual memories. The intersection of both will allow the systematization of problems of the historical role that states, societies and individuals played in terms of generating 'strong' and 'weak' memories, and to identify how the memory of this major historical event has been historicised over the last forty years.

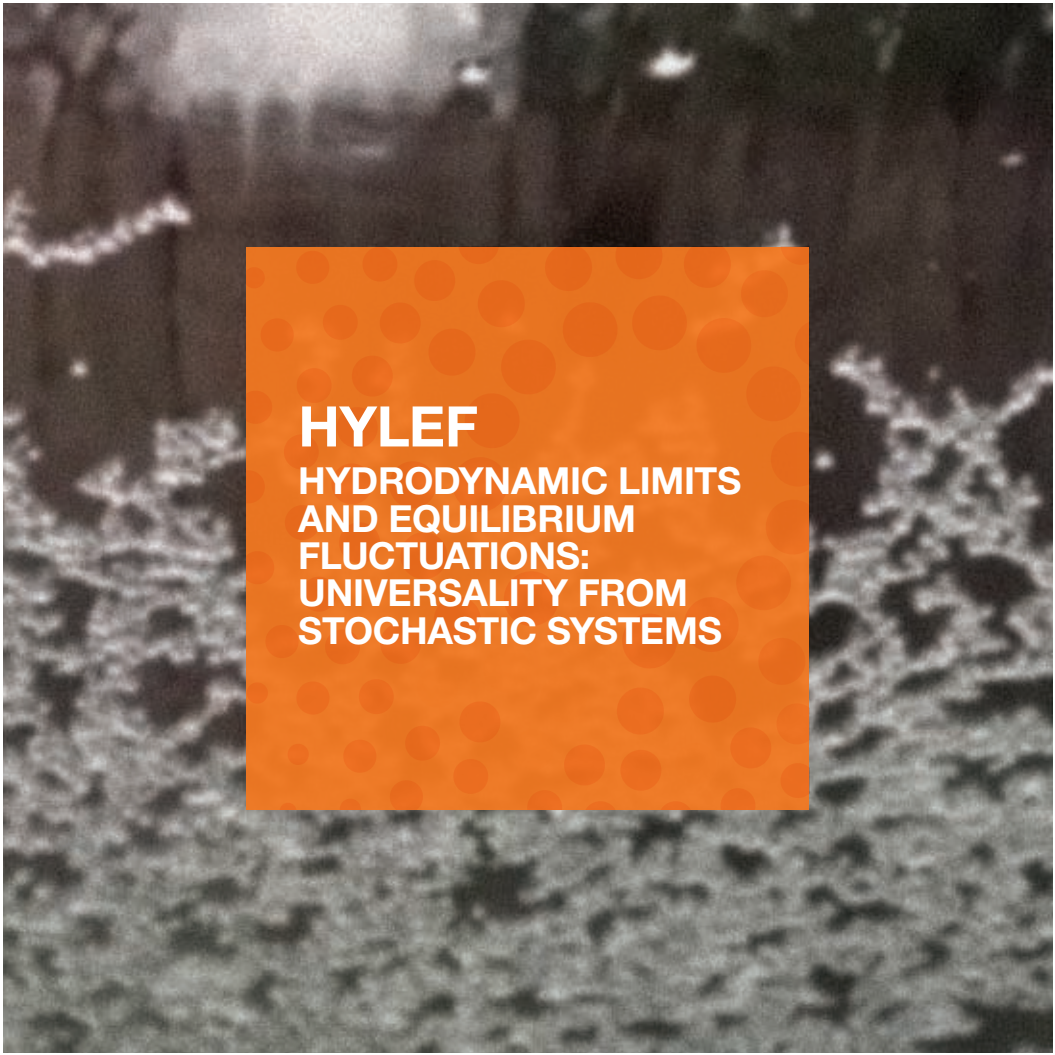
CROME is based upon a combination of different types of sources (written, oral, visual) and will cross different instances of memory production.

Three main challenges will drive the project. The first is that of rethinking the colonial-liberation wars from both a diachronic and comparative perspective. The second one seeks to operationalise the concept of 'politics of silence', understood as a set of political, social, discursive and subjective mechanisms which contribute to form selective representations of the past. Finally, CROME will examine the processes of historical memory and bring about conceptual frameworks able to analyse them.

CROME will develop an innovative input into Afro-Portuguese War studies. It will bring the comparative dimension to the forefront, by setting to write an unprecedented history of the Afro-Portuguese war memories.

ERC Starting Grant
Host Institution: Centro de Estudos Sociais
Principal Investigator: Miguel Cardina
Starting Date: Feb 2017

European Research Council



HYLEF

HYDRODYNAMIC LIMITS AND EQUILIBRIUM FLUCTUATIONS: UNIVERSALITY FROM STOCHASTIC SYSTEMS

HYLEF

HYDRODYNAMIC LIMITS AND EQUILIBRIUM FLUCTUATIONS: UNIVERSALITY FROM STOCHASTIC SYSTEMS

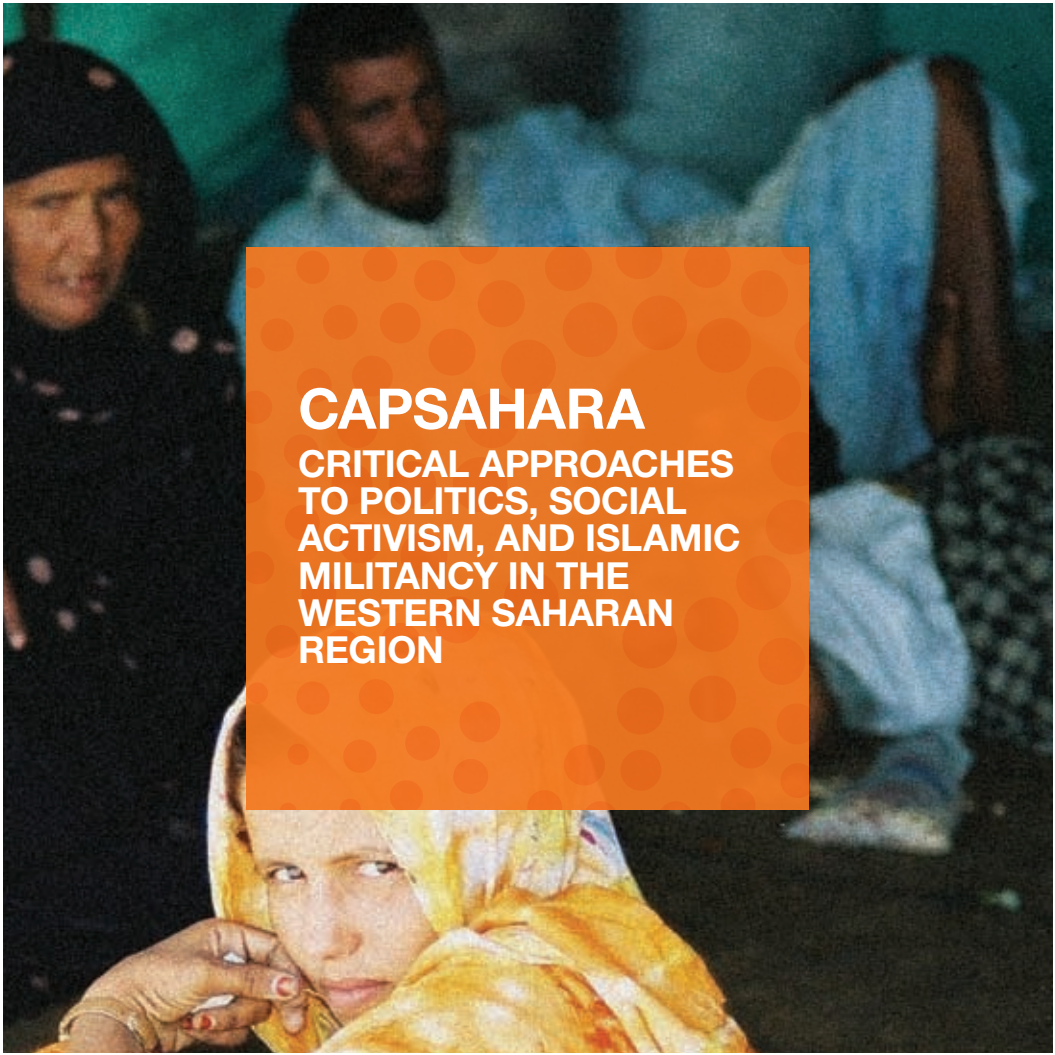
Many different physical systems, when analyzed from a mathematical point of view, show identical patterns of growth. This slightly mysterious tendency for very different things to behave in very similar ways is the essence of universality. The “shape” of these patterns is the subject of this project.

This project focus on the sticky deposition in the KPZ universality class, one of the classes used in Mathematics to characterize the systems that somehow “share the same properties”. In this project, I want to explore the universality of this macroscopic law from underlying microscopic stochastic dynamics. Here are some of the questions that I look for answers: What are the macroscopic laws governing the evolution of the conserved quantities of a microscopic stochastic dynamic? What are the universality classes to which the models, with certain general features, belong to? What is the relation between these classes? Are they linked by some parameter prescribed on the underlying microscopic stochastic dynamics? How local dynamical perturbations are "felt" at the macroscopic level?

With this study, we want to characterize what is known as the KPZ universality class. Our goal is threefold: first, to derive the KPZ equation from general weakly asymmetric systems, showing its universality; second, to derive new SPDE, which are less studied in the literature, as the fractional KPZ from IPS which allow long jumps, the KPZ with boundary conditions from IPS in contact with reservoirs or with defects, and coupled KPZ from interacting particle systems with more than one conserved quantity. Finally, we will analyze the fluctuations of purely strong asymmetric systems, which are conjectured to be given by the *KPZ fixed point*.

ERC Starting Grant
Host Institution: Instituto Superior Técnico
Principal Investigator: Patrícia Gonçalves
Starting Date: Dec 2016

European Research Council



CAPSAHARA

CRITICAL APPROACHES TO POLITICS, SOCIAL ACTIVISM, AND ISLAMIC MILITANCY IN THE WESTERN SAHARAN REGION

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CRITICAL APPROACHES TO POLITICS, SOCIAL ACTIVISM, AND ISLAMIC MILITANCY IN THE WESTERN SAHARAN REGION

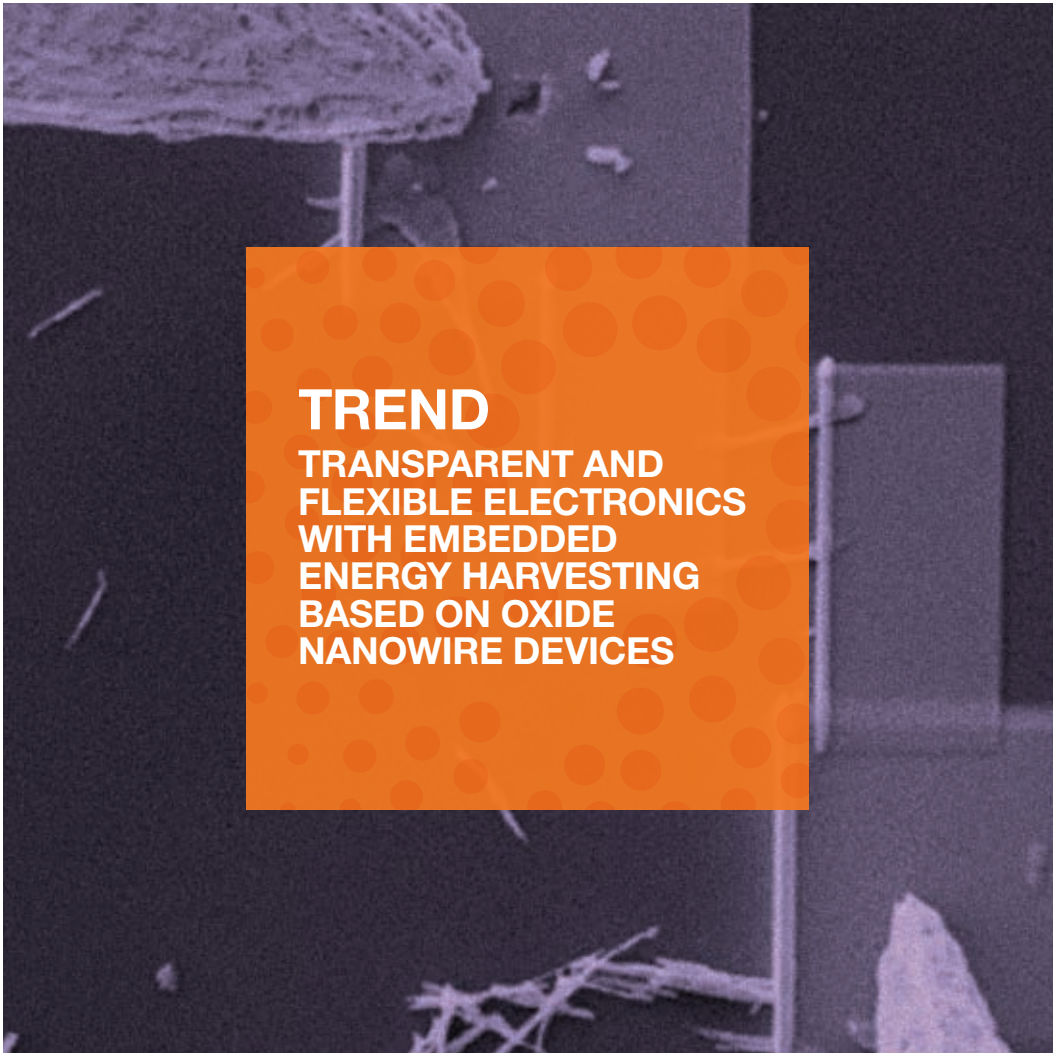
CAPSAHARA proposes an analysis of the reconfigurations established in the socio-political vocabulary of the western Saharan region from the "post-empire" to the contemporary period. The project should produce an analysis of the social and political structures shared in the region, the local variations of those structures, based on case studies, their specific configurations, based on social markers such as gender, age, and class, the use of those structures in different historical periods. All these will be under theoretical and ethnographic scrutiny in order to achieve its main goal: to understand the recent articulation of the social and political structures of the Western Saharan region, with broader and often exogenous political vocabularies.

The project's main goal is to analyse the types of interplay established between pre-modern sociopolitical traditions and contemporary political expression and activism, in a particularly sensitive – and academically disregarded – region. Its effort to integrate a context that is usually compartmentalized, as well as to put together a group of researchers generally "isolated" in their particular areas of expertise, geographies, or nations, should also be valued.

The project's results should enable the different contexts under study to be integrated into the wider maps of current scientific research, providing, at the same time a dissemination of its outputs to an extended audience.

ERC Starting Grant
Host Institution: Centro em Rede de Investigação em Antropologia
Principal Investigator: Francisco Freire
Starting Date: Apr 2017

European Research Council



TREND

TRANSPARENT AND FLEXIBLE ELECTRONICS WITH EMBEDDED ENERGY HARVESTING BASED ON OXIDE NANOWIRE DEVICES

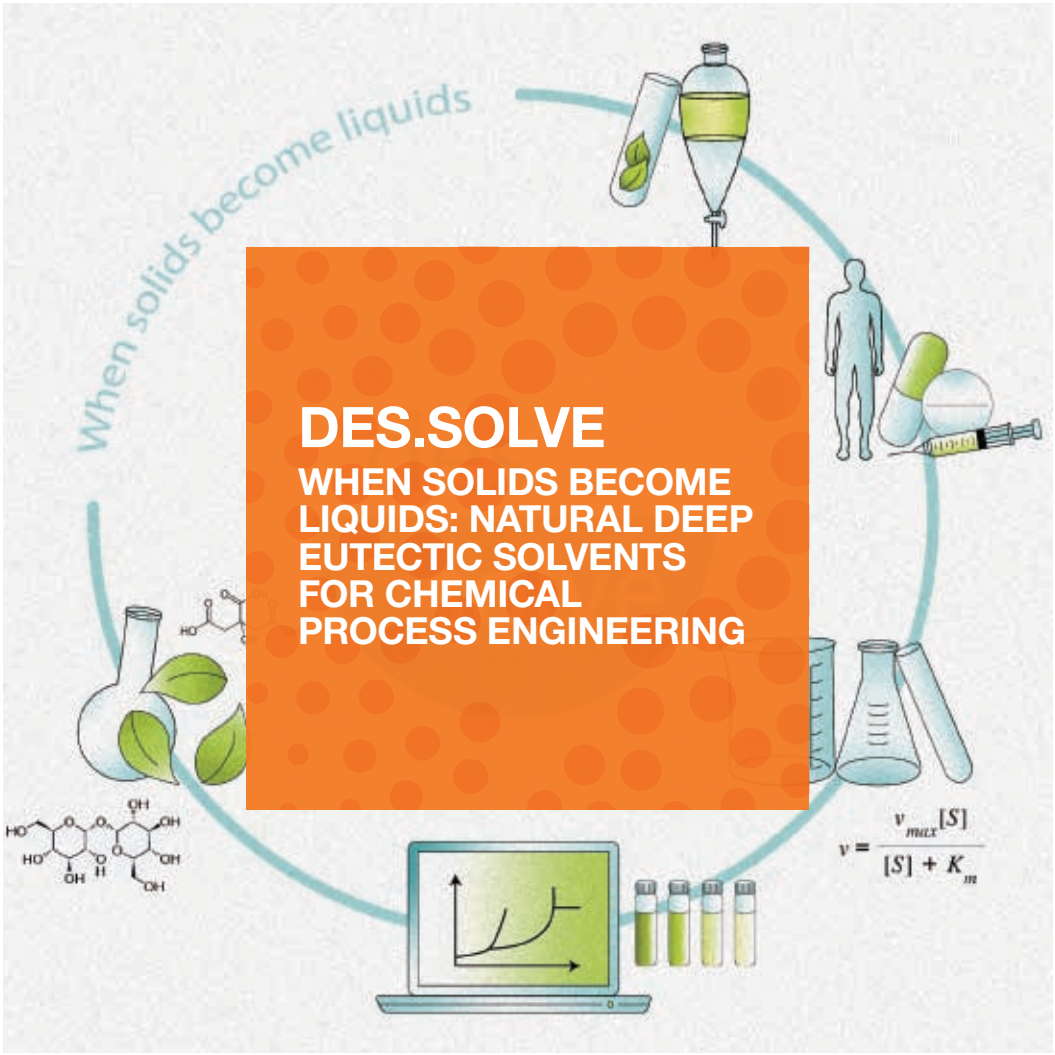
TREND

TRANSPARENT AND FLEXIBLE ELECTRONICS WITH EMBEDDED ENERGY HARVESTING BASED ON OXIDE NANOWIRE DEVICES

The Internet of Things is shaping the evolution of information society, requiring an increasing number of objects with embedded electronics, sensors and connectivity. This spurs the need for systems where summing to performance and low cost, multifunctionality has to be assured.
In this context, TREND aims to take transparent electronics into as-of-yet unexplored levels of integration, by combining on flexible substrates transparent and high-speed nanocircuits with energy harvesting capabilities, all based on multicomponent metal oxide nanowires (NWs). For this end, sustainable and recyclable materials as ZnO, SnO_2, TiO_2 and Cu_2O will be synthesized in different forms of heterostructured NWs, using low-temperature and low-cost solution processes. For precise positioning, NWs will be directly grown on flexible substrates using seed layers patterned by nanoimprint lithography. This will be crucial for integration in different nanotransistor structures, which will be combined into digital/analog nanocircuits following planar and 3D approaches. Energy will be provided by piezoelectric nanogenerators with innovative structures and materials. Final platform of nanocircuits+nanogenerators will make use of NW interconnects, bringing a new dimension to the systems-on-foil concept.
TREND is an ambitious multidisciplinary project motivating advances in materials science, engineering, physics and chemistry, with impact extending from consumer electronics to health monitoring wearable devices. By promoting new ideas for practical ends, it will contribute to place Europe in the leading position of such strategic areas, where sustainability and innovation are key factors.

ERC Starting Grant
Host Institution: Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa
Principal Investigator: Pedro Barquinha
Starting Date: Jan 2017

European Research Council


When solids become liquids
DES.SOLVE
WHEN SOLIDS BECOME LIQUIDS: NATURAL DEEP EUTECTIC SOLVENTS FOR CHEMICAL PROCESS ENGINEERING
$v = \frac{v_{max}[S]}{[S] + K_m}$

DES.SOLVE

WHEN SOLIDS BECOME LIQUIDS: NATURAL DEEP EUTECTIC SOLVENTS FOR CHEMICAL PROCESS ENGINEERING

Sugars, aminoacids or organic acids are typically solid at room temperature. Nonetheless, when combined at a particular molar fraction they present a high melting point depression, becoming liquids at room temperature. These are called Natural Deep Eutectic Solvents – NADES. NADES are envisaged to play a major role on different chemical engineering processes in the future, playing a significant role towards the development of greener and sustainable processes. However, there is a significant lack of knowledge on fundamental and basic research on NADES, which is hindering their industrial applications.

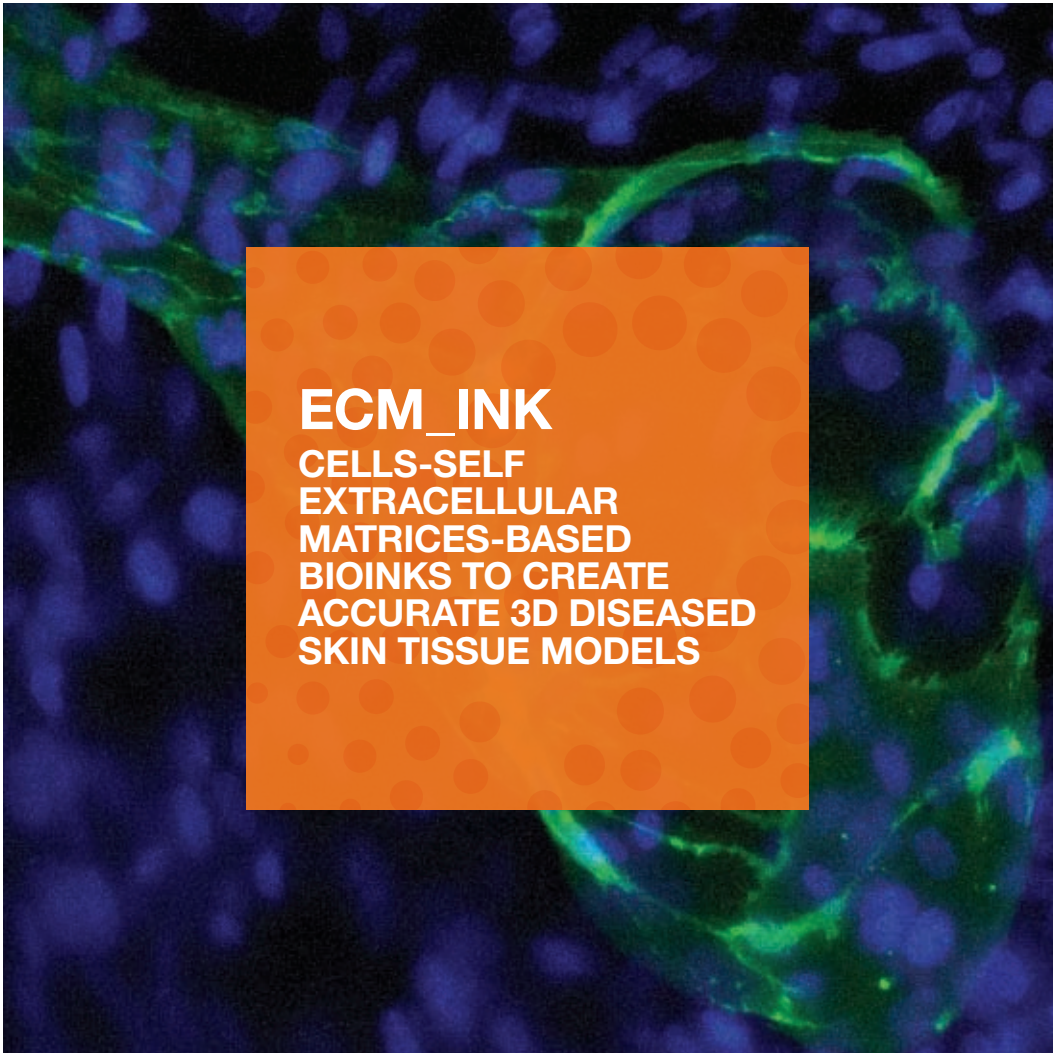
Des.solve encompasses four major themes of research: development of NADES and therapeutic deep eutectic solvents – THEDES; characterization of the obtained mixtures and computer simulation of NADES/THEDES properties; phase behaviour of binary/ternary systems NADES/THEDES + carbon dioxide and thermodynamic modelling; application development.

NADES applications go beyond chemical or materials engineering and cover a wide range of fields from biocatalysis, extraction, lignocellulosic biomass processing, carbon dioxide capture or biomedical applications. NADES application development will be carried out mostly coupled with supercritical fluid technology - a green and environmentally friendly technology, based on the ability of certain fluids to reach the supercritical region.

Potentially, the research outcomes of this project can become a cornerstone for the initial development of NADES industrial applications. We expect that the knowledge that will be created by Des.solve will have a major impact not only in the scientific community, but also in society, economy and industry.

ERC Consolidator Grant
Host Institution: Universidade do Minho
Principal Investigator: Ana Rita Cruz Duarte
Starting Date: Mar 2017

European Research Council



ECM_INK

CELLS-SELF EXTRACELLULAR MATRICES-BASED BIOINKS TO CREATE ACCURATE 3D DISEASED SKIN TISSUE MODELS

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CELLS-SELF EXTRACELLULAR MATRICES-BASED BIOINKS TO CREATE ACCURATE 3D DISEASED SKIN TISSUE MODELS

It has been recognized that growing cells within 3D structures reduces the gap between 2D in vitro cell cultures and native tissue physiology. This has been paving the way for the development of reliable 3D in vitro cell-based platforms with major impact in the reduction/elimination of animal experimentation, diseases modelling and drug development. Nonetheless, among the components required for bioprinting, bioinks in particular have demanding requirements and much has still to be done regarding their intrinsic formulation to lead cell behaviour and support specific functionalities.
ECM_INK intends to tackle this issue by developing cells-self extracellular matrices-based bioinks to create accurate and pathophysiological relevant 3D *in vitro* diseased skin tissue models. The development of cell phenotype-driven bioinks will generate complex microenvironments comprising varied cell types within matrices that were specifically designed to attain a particular response from each one of those cell types. The use of cells from patients suffering from chronic, genetic and neoplastic skin diseases represents a major advantage that will be reflected in the accuracy and functionality of the respective 3D *in vitro* models.
ECM_INK will be exploring concepts from two main areas for the development of 3D *in vitro* models representing chronic genetic and neoplastic skin diseases. The integration of material science, cell biology and biomedical engineering principles will allow attaining precisely tailored cells-self extracellular matrix and hydrogels as innovative bioinks with enhanced intrinsic biofunctionalities. This will impact fields that eventually have the power to directly affect the economy and human life.

ERC Consolidator Grant
Host Institution: Universidade do Minho
Principal Investigator: Alexandra Marques
Starting Date: 2017

European Research Council

COMPCON

COMPETITION UNDER (NICHE) CONSTRUCTION

COMPCON
COMPETITION UNDER (NICHE) CONSTRUCTION

Interspecific competition is arguably the best interaction to address how individual trait variation and eco-evolutionary feedbacks shape species distributions and trait evolution, due to its indirect effects via the shared resource. With COMPCON, we will address how individual variation, niche width, niche construction and the presence of competitors, shape species distributions and trait evolution, using a system amenable to manipulation of all these variables. The system is composed of two spider mite species, *Tetranychus urticae* and *T. ludeni*, that up- and down-regulate plant defenses. Tomato mutant plants with low defenses will be used as an environment in which niche construction is not expressed. Furthermore, tomato plants will be grown under different cadmium concentrations, allowing quantitative variation of available niches. Using isogenic lines, we will measure individual variation in niche width, niche construction and competitive ability. Different combinations of lines will then be used to test key predictions of recent theory on how such variation affects coexistence with competitors. Subsequently, mite populations will evolve in environments with either one or more potential niches, in plants where niche construction is possible or not, and in presence or absence of competitors. We will test how these selection pressures affect niche width, niche construction and competitive ability, as well as plant damage. Finally, we will re-derive isogenic lines from these treatments, to test how evolution under different scenarios affects individual variation in niche width.
COMPCON will shed new light on the role of competition in shaping eco-evolutionary communities, with bearings on disciplines ranging from macro-ecology to evolutionary genetics.

ERC Consolidator Grant
Host Institution: Universidade de Lisboa
Principal Investigator: Sara Magalhães
Starting Date: May 2017

European Research Council

POLITICS

THE POLITICS OF ANTI-RACISM IN EUROPE AND LATIN AMERICA: KNOWLEDGE PRODUCTION, DECISION-MAKING AND COLLECTIVE STRUGGLES

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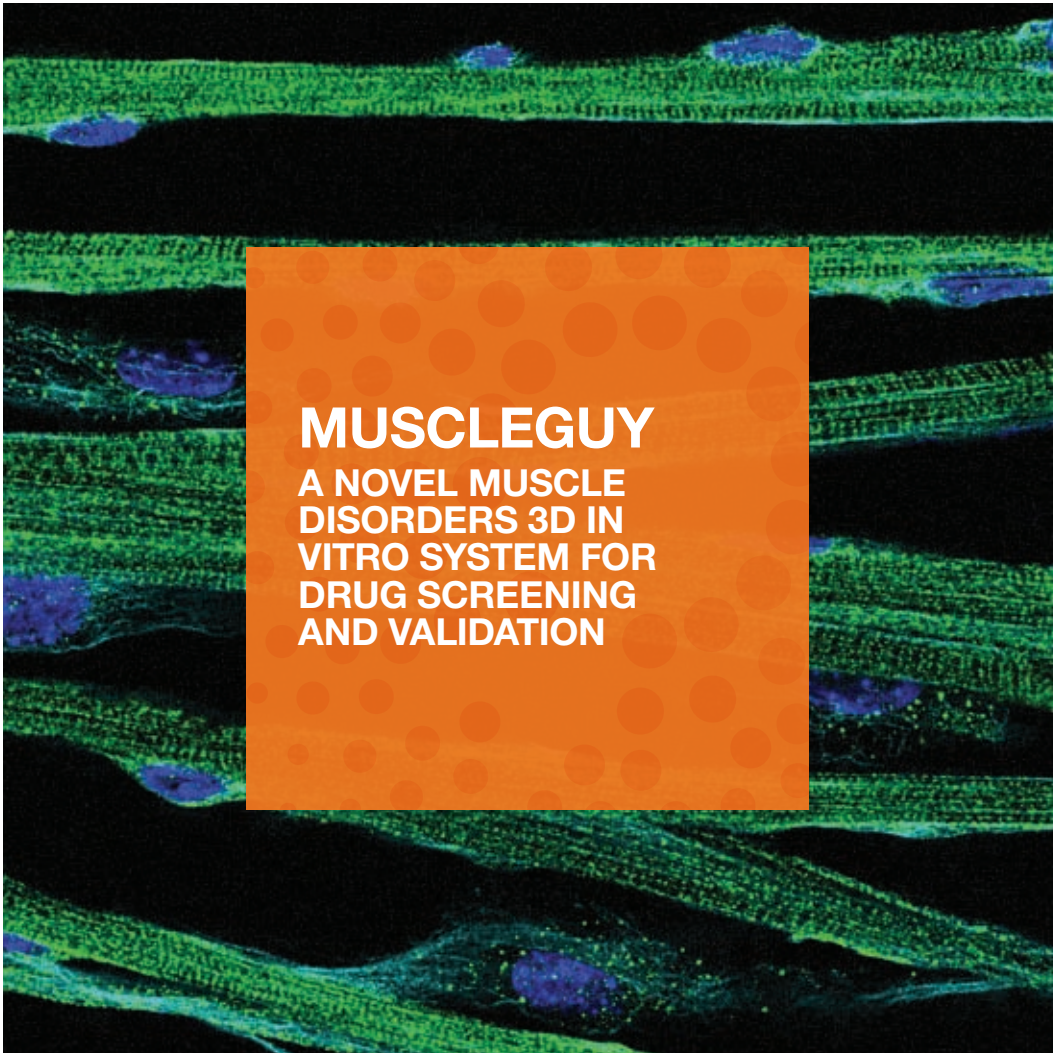
The main objective of POLITICS is to innovate knowledge on anti-racism that brings about a greater understanding of how historically rooted injustices are being challenged by institutions and grassroots movements. Considering the centrality and mutual influence of Europe and Latin America in the global processes of racial formation, POLITICS will develop an interdisciplinary and comprehensive approach towards two core goals: the analysis of processes of knowledge production about 'race' and (anti-)racism in the spheres of (inter)national governmental politics, State universities and grassroots movements; the examination of diverse paths of denunciation and collective mobilization against everyday racism concerning police practice and representations in the mass media.
POLITICS embraces a multilevel analysis and information-oriented selection of case-studies in three interrelated research streams: Global, regional and state-sponsored political frameworks and public policies; Cultures of scholarship and the study of racism and (post)colonialism at State universities; Processes of denunciation, political mobilization and case-law concerning police practice, and racist representations in the mass media.
The research challenges the shortcomings of evaluative comparisons and the selection of research contexts enables interrogating the relations between the global, national and local levels. They include the Organization of American States, the European Union and national and local politics in Brazil, Peru, Portugal and Spain.
POLITICS will unravel the configuration of different notions of dignity, justice and equality resulting from anti-racist struggles and policy interventions and their significance for envisaging decolonial horizons.

ERC Consolidator Grant
Host Institution: Centro de Estudos Sociais
Principal Investigator: Silvia Rodríguez Maeso
Starting Date: Sep 2017

European Research Council



MUSCLEGUY

A NOVEL MUSCLE DISORDERS 3D IN VITRO SYSTEM FOR DRUG SCREENING AND VALIDATION

MUSCLEGUY

A NOVEL MUSCLE DISORDERS 3D IN VITRO SYSTEM FOR DRUG SCREENING AND VALIDATION

MUSCLEGUY represents a unique opportunity to commercialize a novel 3D *in vitro* system for screening and validation of drug candidates to treat muscle disorders. Although skeletal muscle disorders are relatively rare, they pose a huge socioeconomic burden. Currently there is a lack of therapeutic options for the majority of patients. This is, for an important part, due to the lack of reliable, reproducible, and physiological relevant *in vitro* models of muscle disorders that accurately reflect the *in vivo* reality on which novel therapeutic strategies may be developed.

We generated a novel 3D *in vitro* system of highly matured myofibers, the relevant functional unit of the muscle affected in most muscle disorders and used it to identify novel therapeutic targets of muscle disorders.

During MUSCLEGUY, we will further technically optimize our *in vitro* system to generate human relevant disease models for muscle disorder. We expect to develop a 96-well plate for HTS. This will involve a standardized number of muscle cells that are aligned and mimic *in vivo* conditions and muscle disorders. Such systems can be used for drug screening and validation. Our novel 3D *in vitro* system for muscle disorder has the potential to meet the requirements for pharmaceutical drug discovery research (HTS format, reproducible and robust) and drastically reduce the associated costs and the number of animals used. This technology will promote the drug chain process thereby increasing therapeutic possibilities for a sector lacking curative treatments.

We will assess the commercial feasibility of our product by conducting an elaborate market analysis and establishing a strong IP portfolio. The ultimate aim of MUSCLEGUY is to develop a business plan to convince the relevant stakeholders and investors.

ERC Proof of Concept
Host Institution: Instituto de Medicina Molecular
Principal Investigator: Edgar Gomes
Starting Date: Oct 2016

European Research Council

BRAINCONTROL

STABLE BRAIN-MACHINE CONTROL VIA A LEARNABLE STANDALONE INTERFACE

BRAINCONTROL

STABLE BRAIN-MACHINE CONTROL VIA A LEARNABLE STANDALONE INTERFACE

Non-invasive Brain Machine Interfaces (BMI) bring great promise for neuro-rehabilitation and neuro-prosthesis, as well as for brain control of everyday devices and performance of simple tasks. Over the last 15 years the interest in BMIs has grown substantially, and a variety of interfaces have been developed. However, non-invasive BMIs have failed to reach the impressive control seen by BMIs implanted in the brain. To date, they require considerable training to reach a moderate level of control, they are susceptible to noise and interference, do not generalize between people and devices, and performance does not show long-term consolidation.

We propose to develop a prototype for a novel, standalone, non-invasive, noise-resistant BMI, based on an unexplored BMI learning paradigm. In this Proof of Concept project we will refine the brain signal interface (decoder) to be automatically customizable to each individual, producing faster training. We will implement our BMI technology into a portable hardware-based system, and develop a virtual reality/gaming training platform that will increase learning, performance and consolidation of BMI control. In addition to these technical aims, we propose to explore commercial opportunities and societal benefits, in particular in the health sector. We will conduct market analysis and develop a business plan for this product, while expanding industry contacts for production and commercialization.

The work proposed in this PoC grant will permit, for the first time to our knowledge, the development of a portable, stand-alone, noise-resistant, and easy to learn BMI, applicable across a wide set of devices, which will bring a significant social impact in health, entertainment and other applications.

ERC Proof of Concept
Host Institution: Fundação Champalimaud
Principal Investigator: Rui Costa
Starting Date: Sep 2016

European Research Council

EMODI

EPITHELIAL RESISTANCE MODULATION TO TREAT DISEASE

EMODI

EPITHELIAL RESISTANCE MODULATION TO TREAT DISEASE

Epithelial barriers are essential for organism's homeostasis and survival. Defects in resistance of body barrier epithelial tissues and their repair are thought to underlie a range of diseases.
Our group has discovered that Septate/Tight Junctions are essential for epithelial repair. These cell-cell junctions can be potentially targeted by candidate compounds that have been identified by Thelial, a Start-Up that will collaborate in this project.
In EMODI we will complete preclinical proof of concept of the potential therapeutic activity of two selected compounds. Regarding clinical application, we will focus on rare (orphan) diseases which have been associated to impaired epithelial repair in the gastro-intestinal track for which there are very limited treatment options: Sjoergen Syndrome (SjS) and Eosinophilic Esophagitis (EoE). The plan of activities involves the following steps: biological efficacy testing of the-1 and the-2 in a zebrafish Tight Junction model and in mouse models of the diseases under focus; development of IPR based on the biological testing; consolidate outcomes of steps 1 and 2 into a business plan; present the business plan to VC funds to seek for extra round of funding. In the context of zebrafish and Drosophila wound models, we predict a positive modulation of wound closure dynamics and epithelial repair. In pre-clinical mouse models of EoE and SjS, we envisage an increased barrier function of the gastro-intestinal track epithelia and reduced damage induced by immune cells infiltration.
The long-term aim is clinical development of our candidates not only in the context of SjS and EoE but also towards a range of o diseases where impaired epithelial barrier function is impaired and a cause of morbidity.

ERC Proof of Concept
Host Institution: NOVA Medical School
Principal Investigator: António Jacinto
Starting Date: Oct 2016

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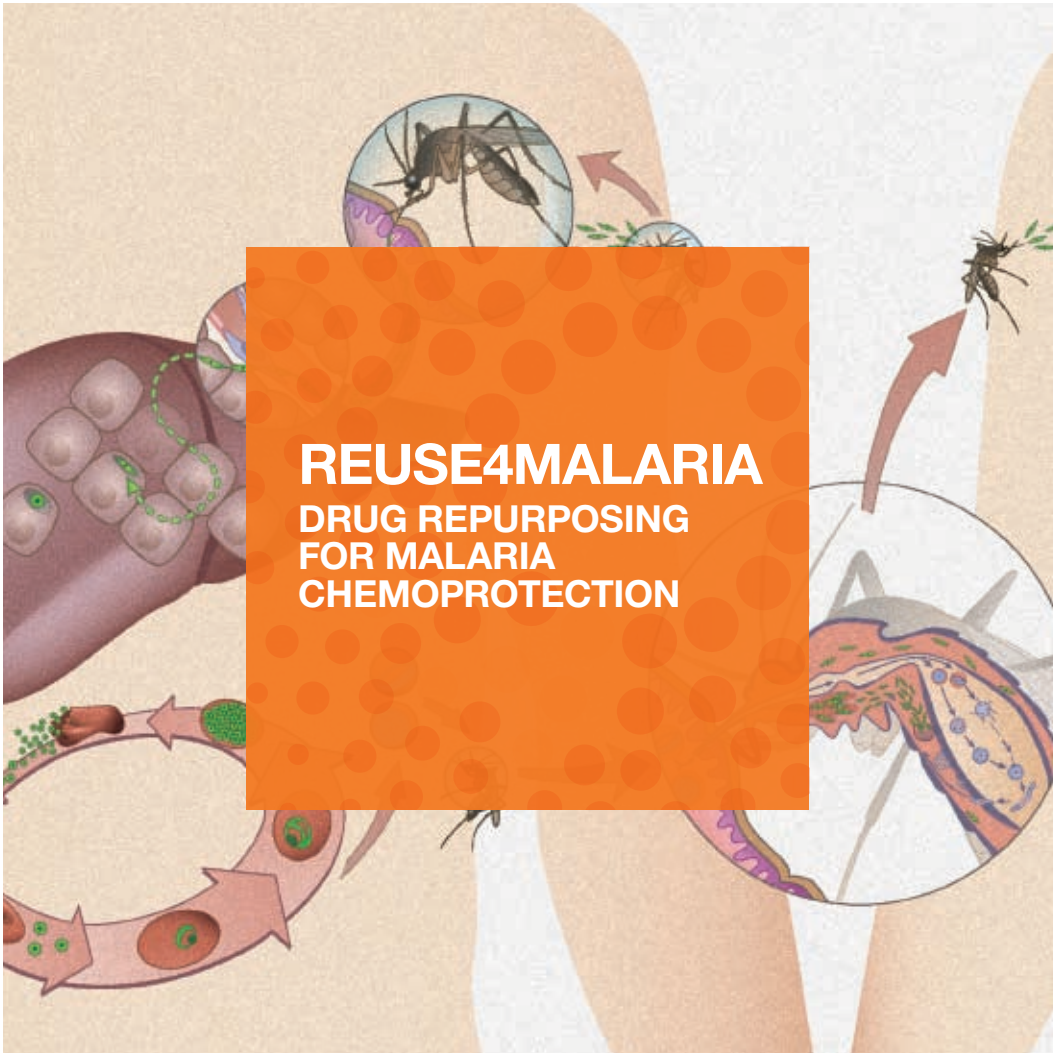
European Research Council



REUSE4MALARIA

DRUG REPURPOSING FOR MALARIA CHEMOPROTECTION

REUSE4MALARIA

DRUG REPURPOSING FOR MALARIA CHEMOPROTECTION

Malaria is a serious parasitic disease afflicting 198 million people in 2013, with an estimated death toll of approximately 600.000. Approximately half the world's population is at risk and so far there is no cure/vaccine against malaria and current chemoprotective treatments have shortcomings.

Our ERC-funded research uncovered a novel mechanism of action that can be targeted for malaria chemoprotection, with fewer side effects and reduced propensity to generate parasite resistance, on which we filed for IP protection. Furthermore, we have identified a set of likely drug candidates already validated in the clinic, which are likely candidates for malaria chemoprotection. In fact, our preliminary data indicates that a known anti-diabetic drug significantly affects parasite growth.

This PoC funding will allow us to complete the following aims: *in vitro* profiling to define therapeutic dose for malaria chemoprotection; *in vivo* profiling to perform efficacy and toxicity studies; further define IP Strategy; draft early stage Regulatory Approval Roadmap; conduct Market Analysis and develop a Business Case.

Our goal is to develop a chemoprotective treatment against malaria, with fewer side effects and less prone to parasite resistance than current therapies. If successful, this will have significant social impact in developing countries, maninly by decreasing malaria-related mortality and morbidity, and with great social, cultural and economic gains.

ERC Proof of Concept
Host Institution: Instituto de Medicina Molecular
Principal Investigator: Maria Mota
Starting Date: Dec 2016

European Research Council

ERC IN PORTUGAL

FCT
Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA CIÊNCIA, TECNOLOGIA E ENSINO SUPERIOR

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Established by the European Commission

Horizon 2020
European Union Funding
for Research & Innovation

REPÚBLICA PORTUGUESA
CIÊNCIA, TECNOLOGIA E ENSINO SUPERIOR