

Brussels, 26 September 2013

- Examples of ERC Advanced Grant projects 2013 -

Physical Sciences and Engineering (PE)

Exploring the limits of life on Mars

The low average temperature and water activity of Mars makes it challenging for living organisms to develop. To understand the habitability potential of this planet, Prof. Schulze-Makuch will test different types of soils and some of Earth's hardiest organisms to see if they can survive and perhaps even grow under the various environmental stresses known to exist on Mars. A major tool will be the state-of-the-art Mars Simulation Chamber at the German AeroSpace Center. The planned experiments will be concurrently updated by analysed mission data, notably from the Curiosity rover. Research results will timely provide critical scientific knowledge to interpret incoming data from ESA's ExoMars mission to be launched in 2016/2018.

ERC grantee: Prof. Dirk Schulze-Makuch

Host institution: Technische Universitat Berlin, Germany

ERC project: Habitability of Martian Environments: Exploring the Physiological and

Environmental Limits of Life (HOME)

ERC funding: €2.5 million

Understanding molecular mechanisms behind Alzheimer's disease

Amyloid beta is the main component of amyloid plaques and other deposits found in the brains of patients with Alzheimer's disease, the most common form of dementia. Prof. Linse's project aims at understanding very precisely the different steps of amyloid beta aggregation. With a physical chemistry approach, she will study the molecular mechanisms behind the process in terms of the underlying microscopic steps and the molecular driving forces governing each step. Research results may lead to improved diagnostics and therapeutics of Alzheimer disease.

ERC grantee: Prof. Sara Linse

Host institution: Lund University, Sweden

ERC project: Molecular mechanism of amyloid β aggregation (MAMBA)

ERC funding: €2.6 million





Established by the European commission

Life Sciences (LS)

Herpes simplex virus to kill cancer cells

Cancer remains a major health burden worldwide. Aggressive treatments can prolong life, but at a tremendous cost to patient life quality. What is still missing is a therapeutic agent that kills cancer cells and spares normal cells. In the past two decades, there has been considerable effort to develop attenuated viruses to kill cancer cells. Attenuated herpes simplex viruses (HSVs) are among the most promising and safe. Prof. Campadelli-Fiume and her team have genetically modified HSVs so that they specifically infect and kill cancer cells and cannot infect normal cells. They will further develop and test this prototype HSV that targets specific proteins in breast, ovary and other tumors.

ERC grantee: Prof. Gabriella Campadelli-Fiume

Host institution: Alma Mater Studiorum-Università di Bologna, Italy

ERC project: Oncolytic herpes virus retargeted to cancer-specific receptors (ONCOLYTIC-

HERPES)

ERC funding: €2.5 million

Photonics to see through cataractous eyes

Cataracts is the opacification of the crystalline lens of the human eye. It is one of the leading causes of blindness. The current solution is to perform surgery to replace the natural lens by an artificial intraocular lens, an operation that is quite successful, but not possible in all cases. Prof. Artal works on a totally new approach that would enable patients to "see" through a cataractous eye. He proposes the use of advanced photonics techniques for creating images through the cataractous lens. Opto-electronics glasses would be developed to restore vision in some patients. Since light trajectories are reversible, doctors could also see the patient's retina through the turbid eye. This innovative project could present immediate and significant benefits to millions of people around the world.

ERC grantee: Prof. Pablo Artal

Host institution: Universidad de Murcia, Spain

ERC project: Seeing through cataracts with advanced photonics (SEECAT)

ERC funding: €2.5 million





Social Sciences and Humanities (SHH)

The challenge of health expectancy in ageing populations

By 2050 numbers of people aged 60 and over will have increased by 1.25 billion, accounting for 22% of the world's population. Population ageing is less advanced, but more rapid in low and middle income countries. Prof. Prince's project aims at describing and explaining population aging and age-related burden of disease in Latin America, China and India. Expected results are likely to have direct policy implications by improving early risk assessment and management of care of older people in less developed countries. Whether, in ageing societies, we can add 'life to years' as well as 'years to life' is a central question for humankind, and a major public health and scientific challenge.

ERC grantee: Prof. Martin Prince

Host institution: King's College London, UK

ERC project: 10/66 ten years on – monitoring and improving health expectancy by targeting

frailty among older people in middle income countries (LIFE2YEARS1066 project)

ERC funding: €2.5 million

Unveiling the roots of inequality in capitalist societies

Income and wealth inequality has widened significantly in many developed countries during the past 40 years. In some countries, for example the US, income concentration is now higher than in the early decades of the 20th century. EU trends are less strong, but push in the same direction. Yet, despite these puzzling facts, still very little is known about the forces behind the long run evolution of income and wealth distribution. Prof. Piketty and his team will investigate the long run rise in inequality. The development of a public "World Wealth and Income Database" is at the core of this project.

ERC grantee: Prof. Thomas Piketty

Host institution: Paris School of Economics, France

ERC project: The Distribution and Redistribution of Income and Wealth: A Global and

Historical Perspective (DRIWGHP)

ERC funding: €2.5 million

