

Public release date: 23-Dec-2008[[Print Article](#) | [E-mail Article](#) | [Close Window](#)]

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Institute for Research in Biomedicine (IRB Barcelona)

IRB Barcelona to coordinate two European projects on biomedicine

Europe has given the go-ahead to researchers Ribas de Pouplana and Zorzano to head studies into malaria and diabetes, two diseases that affect millions of people worldwide

The Institute for Research in Biomedicine (IRB Barcelona) has been chosen by the European Commission (EC) to coordinate two European health research projects, as part of the second call of the VII Framework Programme. This concession makes IRB Barcelona a leader in European projects in Spain, together with the Spanish National Research Council. In all, Spanish centres will be heading ten projects. The EC will grant IRB Barcelona funding of more than 5 million euros from 2009 to 2011. Malaria and diabetes will be the topics addressed by the consortia headed by the researchers Lluís Ribas de Pouplana and Antonio Zorzano.

DISARMING THE PARASITE THAT CAUSES MALARIA

The consortium coordinated by Lluís Ribas de Pouplana, ICREA researcher and head of the Gene Translation Laboratory at IRB Barcelona, will explore a promising line of investigation to find new anti-malarial compounds. The project, called Mephitis, is included in the call "Projects for diseases of the Third World in collaboration with laboratories in India". Malaria is caused by the parasite *Plasmodium falciparum*, which is carried by some female *Anopheles* mosquitoes. Infection is via a mosquito bite, which introduces the parasite into our bodies, where it attacks red blood cells. At present, between 300 and 500 million infections are reported worldwide each year and more than a million people die from malaria every year, mainly children in Africa and Asia.

The project seeks to elucidate the formation of proteins in the parasite that are involved the transmission of malaria, with the aim to identify the key components that inhibit this process and allow the development of anti-malarial drugs. The rationale behind Ribas de Pouplana's project is that "we now have enough knowledge about protein synthesis in organisms such as the bacteria *E. coli* or the yeast *Saccharomyces cerevisiae*, and we now want to transfer this knowledge base to organisms of medical relevance such as *Plasmodium*". This new strategy will provide crucial information to "fight effectively against the parasite".

Ribas has brought together experts from several fields: *Plasmodium* biology, protein synthesis processes, and advanced tools used in crystallography, bioinformatics, genome dynamics, transcriptomics and proteomics. The Combinatorial Chemistry Programme of the Barcelona Science Park, the centre that hosts IRB Barcelona, is managed by the researcher Miriam Royo and is one of the eight laboratories included in the consortium. In addition to the two groups in Barcelona, there are two from India, one from France, one from Italy, one from Portugal and one from Australia.

BIOINFORMATICS AND MOLECULAR MEDICINE, UNITED AGAINST DIABETES

Antonio Zorzano, head of the Molecular Medicine Programme at IRB Barcelona and senior professor at the University of Barcelona, will coordinate a pioneering project to fight against diabetes, a disease described as the epidemic of the XXI century. The MITIN Project is innovative because it will be the first time that bioinformatics is applied to obtain information about complex diseases such as diabetes, which is the result of a combination of environmental and genetic factors. "Systems biology", explains Zorzano, "can hold and integrate many data about a single disease and can reveal the existence of gene networks and interactions between proteins that are responsible for the key alterations in a disease".

The six groups that comprise the consortia seek to identify the processes that occur in mitochondria – an intracellular organelle that transforms molecules from the food we ingest into energy -, and that are responsible for insulin resistance. Insulin is a hormone generated by the pancreas and serves to allow glucose to enter cells. People who suffer from the so-called Insulin Resistance Syndrome generally present high levels of triglycerides (fats) in blood and low levels of healthy cholesterol. Furthermore, hypertension and obesity may be behind insulin resistance. This metabolic disorder increases the risk of suffering from diabetes and coronary disease.

To develop the project, Zorzano is supported by two expert groups in systems biology. One is from the Barcelona Supercomputing Center, a facility that hosts the MareNostrum supercomputer, one of the most powerful in the world. This group will work on designing a computational programme that includes experimental data. The second group, from Finland, has expertise in the technique called lipidomics, which allows the determination of fat composition in body tissues and fluids. The four remaining laboratories, two in England, one in Germany and Zorzano's own lab, will apply their experience to the study of insulin resistance and diabetes in two animal models, the mouse and the fruit fly (*Drosophila melanogaster*), and to the manipulation of individual mammalian cells. "We will work at distinct levels of complexity and with two animal models to discover whether systems biology is a suitable approach to answer questions related to complex diseases. It is a huge challenge and if we obtain positive results, systems biology will become a key technique in future research into these types of disease", explains the project's coordinator.

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