

Descartes Prize for Josef Penninger's Research

EU Honours International Project on Cell Death

The Project "Apoptosis", developed by research groups from six EU countries, was awarded the Descartes Prize 2007 by the European Commission. Josef Penninger, director of the Institute of Molecular Biotechnology of the Austrian Academy of Sciences, participates in the project. Coordinator Guido Kroemer accepted the award on March 7 in Brussels. The six teams from France, Austria, Denmark, Italy, Sweden, and Germany each receive 40,000 Euros in prize money.

Apoptosis: the Self-Destruction Program of Cells

Apoptosis is the name of programmed cell death, one of the elementary processes of biology. In the body of a human being, many millions of cells "commit suicide" every second. Superfluous, old, damaged, or mutated cells are taken out of the body's circulation in this way. This is a vital life process.

In many illnesses, the regulation of apoptosis is compromised. Excessive apoptosis rates lead to massive cell loss, as in a stroke, heart attack, or poisoning. Also, chronic progressive illnesses such as AIDS are accompanied by increased cell death. The opposite, a blockade of the apoptosis program, leads to uncontrolled cell growth and the development of tumours. Suppressed apoptosis is also responsible when cancer cells no longer respond to chemotherapy.

Joint European Apoptosis Research

Within the framework of the recently rewarded EU project, specialists in the field of apoptosis research have come together to examine and explain the involved mechanisms. Guido Kroemer, coordinator of the project, leads the research group entitled "Apoptosis, Cancer, and Immunity". Kroemer is an Austrian citizen and one of the most successful scientists in the field of biomedicine.

Josef Penninger and Guido Kroemer share a long working relationship and a personal friendship that goes back to their college years in Innsbruck. Eight years ago, Kroemer and Penninger identified a protein that is primarily involved in cell death. This so-called "apoptosis-inducing factor" (AIF) is located in the mitochondria, the "power plants" of the cell. If the suicide program of the cell is started, AIF is transported to the cell nucleus. The essay in the journal *Nature*, where the researchers first described the protein, has become an essential publication for the entire research field. Since being classified by the organization *Science Watch* as a "red hot paper" in 1999, the article has been quoted 1494 times.

The protein AIF continues to be intensively researched by Josef Penninger's working group. By eliminating the AIF genes in mice and fly cells, the scientists could circle in on the function of the protein. In addition to its role in programmed cell death, they discovered another important responsibility: AIF also regulates the allocation of energy in the cell. Currently, Josef Penninger's group is examining the role of AIF in diabetes and obesity. "Defects in the energy production are currently seen as the cause for diabetes. However, this has never been proven by experiments," said Penninger. "With AIF, we have the ideal genetic model system to analyze this important point critically and in controlled experiments."

Medical Implementation of the Research Results

In the project Apoptosis, the group pursued clear medical goals. One of which was the search for medicine that prevents enormous amounts of cell death, such as after strokes. The central question, how the cell "decides" to destroy itself can essentially already be answered. The "point of no return" reveals itself when the outer surface of the mitochondria becomes porous. Therapy that is applied after this event is doomed to failure.

The AIF factor could be a suitable starting point for the prevention of pathological cell loss. In animal models, the researchers simulated strokes, decreased circulation during birth, and insulin coma. When the function of AIF is suppressed, the damage that occurs to nerve cells is reduced.

The participating scientists hope that additional applications can be found in the field of cancer and AIDS research. The goal in cancer patients is to prevent the resistance to chemotherapy. Metabolism routes that suppress apoptosis must be blocked. In the case of an AIDS infection, the problem is exactly the opposite. Here it is important to prevent cell death caused by the HI virus in the lymphatic system and the brain. In both areas, successes have already been achieved.

Descartes Prize Confirms the Academy of Sciences

The Descartes Prize for Research is awarded every year by the European Commission to the most successful transnational research projects in Europe. The award is being given this year for the eighth time, and it honours the most outstanding scientific and technological achievements through international cooperation. The total prize money for the award is one million euros.

Prof. Peter Schuster, president of the Austrian Academy of Sciences (ÖAW), spoke of the recognition: "This Prize pleases me especially, not only as the leader of the support organization ÖAW, but also because in 2002, I was able to get Josef Penninger as director of the IMBA from Canada back to Austria. The award confirms the Austrian Academy of Sciences' strategy of creating

conditions under which highly talented scientists can conduct the most independent ground breaking research as possible.”

IMBA

The IMBA – Institute for Molecular Biotechnology of the Austrian Academy of Sciences combines fundamental and applied research in the field of Biomedicine. Interdisciplinarily constructed research groups solve functional genetic questions, particularly those related to the origin of diseases and sicknesses. Its goal is to implement acquired knowledge into the development of innovative applications for prevention, diagnosis, and therapy of sicknesses.

IMP – IMBA Research Center

Between the Research Institute for Molecular Pathology (IMP), that was founded by Boehringer Ingelheim in 1988, and the Institute for Molecular Biotechnology of the Austrian Academy of Sciences (IMBA) which has operated since 2003, close research cooperation has been organized. Under the name of the “IMP – IMBA Research Center”, both institutes have access to a combined infrastructure in scientific and administrative areas.

Both institutes employ altogether 300 workers from 30 nations and are members of the Campus Vienna Biocenter.

Josef Penninger

Josef Penninger was born in 1964 in Upper Austria and studied medicine and art history in Innsbruck. After graduation, he spent four years as a post doctorate at the Ontario Cancer Institute in Toronto and afterwards went to the Amgen Research Institute of the University of Toronto as Principle Investigator. Since 2002, he is the scientific director of the Institute for Molecular Biotechnology of the Austrian Academy of Science (IMBA). Josef Penninger is Professor in the Department of Immunology and Medical Biophysics of the University of Toronto, Honorary Professor for Genetics at the University of Vienna and Honorary Professor of the Chinese Academy of Medical Sciences.

Contact

Dr. Heidemarie Hurlt
IMP-IMBA Communications
+43 1 79730 3625
heidemarie.hurlt@imba.oeaw.ac.at