

Der Vorsitzende des Stiftungsrates

presse-info • presse-info • presse-info • presse-info • presse-info

Frankfurt am Main, February 13, 2004

T cells play key role in specific immune response

Paul Ehrlich and Ludwig Darmstaedter Prize for 2004 awarded to immunologists Mark M. Davis and Tak W. Mak

FRANKFURT. Immunologists Professor Dr. Mark M. Davis (51), Stanford University, California, U.S.A., and Professor Dr. Tak W. Mak (57), University of Toronto, Canada, will receive the Paul Ehrlich and Ludwig Darmstaedter Prize for 2004, endowed with a total of € 100,000, for their discoveries on the specificity and function of the T cell receptor. This was resolved by the Scientific Council of the Paul Ehrlich Foundation. The prize, to be presented on March 14, 2004 in the Frankfurt Paulskirche, is one of the most important and internationally renowned awards conferred in the Federal Republic of Germany in the field of medicine.

An efficient immune system is essential to survival. If it fails, the result is almost inevitably death, usually due to serious and recurrent infections. The cells and molecules of this resistance system patrol constantly throughout the human body in search of health-damaging pathogens and other alien substances. They can recognize, track down and incapacitate a practically unlimited number of alien cells and substances. Moreover, they can "remember" each infection, so if it recurs they can respond faster and more effectively.

The specific, so-called "adaptive" part of our immune system consists of two arms: the antibody-producing B lymphocytes and the T lymphocytes. The B cells are the effector molecules of the so-called "humoral" immune response; for a specific immune reaction, they need the help of T cells. The T cells are responsible for the cell-mediated immune response; through T cell receptors they correspond with the antibody-producing immune cells, the macrophages, and the so-called "dendritic" cells, and thereby stimulate them.

Numerous researchers have spent many years trying to identify the molecules and genes responsible for the T cells' targeted defence response. It was considered certain that the activity of T cells is triggered through the T cell receptor on their plasma membrane as soon as it binds a specific antigen that matches it just like a key fits a lock.

Both prizewinners have done ground-breaking work in this area: Mark M. Davis "searched" for T cell receptor genes in T lymphocytes of mice, while Tak W. Mak used human T cell lines for his experiments. The starting point for their work was the idea that T cell receptors

are only formed in T cells, but not in B cells. In a series of elegant experiments, Davis and Mak showed that T lymphocytes have their own genetic capacity to produce millions of different antigen-specific T cell receptors. The two scientists and their teams identified and sequenced certain T cell receptor genes. From their analysis of these genes, they were able to derive many structural details of the T cell receptor.

In other experiments, Mark M. Davis developed cellular and molecular techniques that made it possible to examine the antigen-specificity of T cells in tissue when T cells bind their specific antigens. Parallel to this, Tak W. Mak examined the importance of selective gene deletions – where parts of a gene and thus the genetic information it contains are removed – for the function of the immune system, and especially for T cells, with the help of so-called "knockout mice", in which the functions of certain genes have been deactivated.

The Paul Ehrlich Prize

The Paul Ehrlich and Ludwig Darmstaedter Prize is traditionally awarded on Paul Ehrlich's birthday, March 14, in the Frankfurt Paulskirche. The presentation speech is being held this year by Professor Dr. Hans Wigzell, Karolinska Institute, Stockholm, Sweden. Ulla Schmidt, SPD, Federal Minister of Health, and Hilmar Kopper, Chairman of the Scientific Council, will present the prize.

The Paul Ehrlich Foundation

The Paul Ehrlich Foundation is a legally dependent foundation of the Association of Friends and Patrons of the Johann Wolfgang Goethe University Frankfurt am Main e. V. The Honorary President of the foundation, which was set up in 1929 by Hedwig Ehrlich, is the President of the Federal Republic of Germany, who also appoints the elected members of the Scientific Council and the Board of Trustees. The Chairman of the Association of Friends and Patrons is at the same time the Chairman of the Board of Trustees of the Paul Ehrlich Foundation. This committee, comprised of 14 nationally and internationally reputed scientists from five countries, selects the prizewinners. The prize is financed by tied donations from companies and from the Federal Ministry of Health.

Further information

A **Press Conference** with the two prizewinners and the members of the Scientific Council, Professor Dr. Hans Wigzell and Professor Dr. Joachim Robert Kalden, is planned for March 13 at 2 p.m. An invitation will be sent to you in February 2004.

The prizewinners' biographies and lists of their publications can be obtained from the Press Office of the University of Frankfurt (telephone: +49-69-798-23266, fax: +49-69-798-28530, e-mail: Moelders@ltg.uni-frankfurt.de).

You can obtain more information on **Professor Dr. Mark M. Davis** at:
<http://www.hhmi.org/research/investigators/davismm.html>

You can obtain further information on **Professor Dr. Tak W. Mak** at:
<http://www.oci.utoronto.ca/institutes/html/oci/cmb/mak.html>