Rolf M. Zinkernagel Biography

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Contents

Rolf M. Zinkernagel Biography.....1

Contents.....2

Biography.....3

Biography

Rolf M. Zinkernagel, a Swiss microbiologist who won the Nobel Prize in medicine or physiology for research concerning structures on the surface of the cell that alert the immune system to the presence of foreign invaders, was born in Basel, Switzerland. Zinkernagel attended medical school in 1962 at the University of Basel and graduated in 1968. From 1969 to 1970, he worked as a postdoctoral fellow on electron microscopy at the Institute of Anatomy, University of Basel, and from 1971 to 1973 at the Institute of Biochemistry, University of Lausanne, Switzerland.

In 1973, Zinkernagel joined the Department of Microbiology at the Australian National University in Canberra to study immunity of infectious disease. Zinkernagel worked with Peter Doherty who studied inflammatory processes of the brain. Utilizing mice with lymphocytic choriomeningitis virus (LCMV), Zinkernagel and Doherty researched the immune responses that led to the discovery of major histocompatibility complex (MHC) restriction. They determined that T-lymphocytes (white blood cells) must recognize the foreign microorganism, in this case the virus, as well as the self molecules, in order to effectively kill virus-infected cells. This discovery came about when one strain of mice with LCMV developed killer T-lymphocytes that were able to protect the mice from the virus. However, when the T-lymphocytes were placed with virus-infected cells from another strain of mice in vitro, the T-lymphocytes did not kill the cells infected with the virus. The self molecules that are necessary in order for T-lymphocytes to recognize the foreign microorganism became known as major histocompatibility antigens. Zinkernagel and Doherty proposed a structural model to explain how the T-lymphocytes recognize both foreign microorganisms and major histocompatibility antigens. A peptide from a foreign microorganism becomes bound with a major histocompatibility antigen that forms a complex recognized by T-cell receptors, recognition molecules of T-lymphocytes.

In 1996, Zinkernagel was awarded the Nobel Prize in physiology or medicine in conjunction with Doherty for their discovery on the specificity of the cell mediated immune defense. Their discovery has provided further understanding of how the immune system can determine the difference between foreign microorganisms and major histocompatibility antigens, and is relevant to certain diseases such as cancer, multiple sclerosis, diabetes, and rheumatic conditions. Understanding how the immune system works provides new avenues for the development of vaccines.

Since 1992, Zinkernagel has served as the head of the Institute of Experimental Immunology in Zurich, Switzerland.