

ISHR Research Achievement Award

The purpose of this award is to recognize an outstanding scientist who (i) has made major and independent contributions to the advancement of cardiovascular science, and (ii) is likely to further develop his/her research in the future. The main criteria for selecting awardees are scientific excellence and potential for future research contributions. While the Peter Harris Award recognizes lifelong accomplishments and the Richard Bing Award recognizes young investigators, the Research Achievement Award is targeted at scientists in the intermediate phase of their career.

The Research Achievement Award is presented triennially at the ISHR World Congress, where the winner presents a major lecture. The Award consists of a plaque and a monetary prize of \$30,000, which will be used to support the research program of the awardee. An announcement of this Award, along with a photograph and a biosketch, will be published in the *Journal of Molecular and Cellular Cardiology* and in *Heart News and Views*, and posted in the ISHR website.

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ISHR

International Society for Heart Research

The Research Achievement Award 2007



Award Winner

Dr. Martin Lohse

“Finding Targets for Heart
Failure Therapy”

2007 Award Winner
Bologna, Italy

Martin Lohse, M.D.

Martin Lohse studied medicine and philosophy in Göttingen, London and Paris. He did his doctoral thesis in neurobiology at the Max-Planck-Institute for Biophysical Chemistry (director Otto Creutzfeldt) in Göttingen (1981). Following his postdoctoral years with Ulrich Schwabe in the Pharmacological Institute of the University of Heidelberg (1983-7) he joined the group of Robert Lefkowitz at the Howard Hughes Medical Institute, Duke University, Durham, NC, USA. He became an assistant medical research professor at Duke University in 1990. From the end of 1990 to 1993 he was a group leader at the Laboratory of Molecular Biology of the University of Munich / Max-Planck-Institute of Biochemistry in Martinsried, Germany, and in 1993 he moved to his current position as Chairman of the Institute of Pharmacology and Toxicology at the University of Würzburg. In 2001 he also became the Founding Director of the Rudolf-Virchow-Center/ DFG-Research Center for Experimental Biomedicine, one of the first three national Centers of Excellence funded by the German Research Council (DFG).

Dr. Lohse's research focuses on cell surface receptors and their mediators, and on the biochemical and physiological signals that they produce. His most important contributions include the discovery of a key mechanism that switches off receptors and its critical role in heart failure, the development of several receptor-selective ligands, and the development of technologies that permit the visualization of receptor activation and signaling in living cells.

During his years in Heidelberg, he investigated receptors for adenosine, a prototypical family of G-protein coupled receptors that mediate, among other functions, inhibition of neurotransmitter release, control of cardiac function and vasodilatation. This

work led to the development of several highly selective adenosine receptor ligands that proved useful for an array of pharmacological and biochemical studies. For example, they permitted the study of A₁-receptors in the heart as well as the characterization and partial purification of A₂-receptors in the brain and in platelets. Studies with new UV-sensitive radioligands allowed the first identification of these receptors by photoaffinity labeling.

Martin Lohse's subsequent investigations with Robert Lefkowitz were concerned with the dynamic regulation of receptors. These studies led to the discovery of β -arrestin, a protein that binds to and thereby desensitizes many G-protein coupled receptors. Such desensitization was found to proceed as a two-step mechanism: First, activated receptors are phosphorylated by a family of kinases called G-protein coupled receptor kinases (GRKs), and second, β -arrestins bind to the phosphorylated receptors. This mechanism appears to be responsible for the loss of effects of many drugs that activate receptors, such as opiates and antiasthmatic β -receptor agonists.

Martin Lohse's group in Munich then discovered that this mechanism is highly active in failing hearts, and that this may be a key factor in a vicious circle of loss of cardiac responsiveness and increased activity of sympathetic nerves. Various transgenic models led to the identification of mechanisms that link chronic stimulation of the cardiac adrenergic receptors to structural and functional damage of the heart. Several such mechanisms were discovered that appear to be critical for the development of heart failure. These discoveries provide a rationale for the treatment of heart failure with β -blockers, and they may also pave the way for new treatment strategies.

In recent years, Martin Lohse and his group have been developing technologies to visualize recep-

tor activation and signaling in living cells. These studies are based on the design of fluorescently labeled receptors and signaling proteins and provide the means to see entire signaling cascades under the microscope. The transfer of these technologies into transgenic models now provides a new way to study receptor signaling *in vivo*. They demonstrate that receptor signals in a cell can show dramatic changes in space and time. Receptors may thus excite an entire cell or only small regions, and the signals can be steady or rapidly oscillating.

Martin Lohse has received numerous awards and is member of many scientific societies. He was the recipient of the Leibniz Award of the German Research Foundation, of the Ernst-Jung Prize for Medicine, and he is a member of the Leopoldina German Academy of Sciences and the Bavarian Academy of Sciences. He is the author of more than 200 peer-reviewed publications, and many of these have been quoted several hundred times. He is the mentor of many scientists who have then established their own laboratories and have become professors in universities all over the world. For many years he has served on a large number of committees and advisory boards, both in Germany and internationally. Among other duties, he is the director of the International Graduate School of the University of Würzburg, a member of the Senate of the German Research Council (DFG) and of the National Ethics Council.

Past Award Winners...

Roberto Bolli, M.D.

2004: Brisbane, Australia

Eduardo Marban, M.D.

2001: Winnipeg, Manitoba