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## Curriculum Vitae Prof. Dr. Jorge E. Galán



**Name:** Jorge Enrique Galán

**Born:** 19. October 1956

**Main areas of research:** *Salmonella enterica* and *Campylobacter jejuni*, Interactions between host and bacterial microorganisms, Type III secretion system, pathogenesis of *Salmonella typhi*

Jorge E. Galán is an Argentinian physician engaged in researching the molecular mechanisms of bacterial infections. His work has concentrated on *Salmonella enterica ssp.* and *Campylobacter jejuni*. His findings concerning the interactions between bacteria and their host cells have provided the basis for the development of new medicines and vaccines.

### Academic and Professional Career

- since 1998 Lucille P. Markey Professor for microbial pathogenesis and professor for cell biology at Yale University Medical School in New Haven, Connecticut, USA
- 1994 - 1998 Extraordinary professor at the department for molecular genetics and microbiology at the medical faculty at the State University of New York (SUNY) in Stony Brook, USA
- 1989 - 1994 Assistance professor at the department of molecular genetics and microbiology at the medical faculty at State University of New York (SUNY) in Stony Brook, USA
- 1986 - 1989 Postdoc at the Washington University in St. Louis, Missouri, USA
- 1986 Doctorate in microbiology at the veterinary faculty at the Cornell University, Ithaca, New York, USA
- 1981 Shift to veterinary medicine at Cornell University, Ithaca, New York, USA
- 1980 Doctorate in veterinary medicine at the National University of La Plata, Argentina  
Studies at the National University of La Plata, Argentina

## Functions in Scientific Societies and Committees

- 2013 Member of the scientific advisory board of the Biozentrum, University of Basel, Switzerland
- 2013 Member of the scientific advisory board of the „Millenium Science Initiative“ (MSI) from the chilean government
- 2010 Member of the scientific advisory board of the Global Health Institute (GHI) at the École Polytechnique Fédérale de Lausanne (EPFL), Switzerland
- 2008 Member of the scientific advisory board of the Max F. Perutz Laboratorien (MFPL) in Vienna, Austria
- 2008 Member of the scientific advisory board of the Pew Scholars Program
- 2006 Member of the Elli Lilly Award Selection Committee of the American Society for Microbiology
- 2004 - 2009 Member of the scientific advisory board of the Damon Runyon Cancer Research Foundation
- 2002 Member of the Scientific Review Board of the Howard Hughes Medical Institute
- 2000 - 2005 Member of the scientific advisory board of the Searle Scholars Program
- Member of the Editorial Board several professional journals, including Cell Host & Microbe (2006), PLoS Pathogens (2005), Microbiology and Molecular Biology Reviews (2002-2006), Biomed Central (2000), Cellular Microbiology (1999), Journal of Bacteriology (1997), Infection & Immunity (1994-2000)

## Project coordination, Membership in collaborative research projects

- 2015 - 2016 National Institute of Allergy and Infectious Diseases (NIAID): „Campylobacter jejuni colonization and the resident microbiota“
- 2014 - 2019 NIAID: „Typhoid Toxin and Salmonella Typhi pathogenesis“
- 2012 - 2017 National Center for Complementary and Integrative Health (NCCAM): „Mechanistic analysis of flavonoids on bacterial virulence“
- 2009 - 2011 NIAID: „Molecular Mechanisms of Salmonella typhi Pathogenicity“
- 2009 - 2010 NIAID: „Type III secretion antigen delivery system assembled in non-replicating platform“
- 2008 - 2015 NIAID: „Virulence factors of Salmonella Typhi“
- 2007 - 2010 NIAID: „The type III secretion effector protein interactome“
- 2000 - 2006 NIAID: „Salmonella Type 3 Secretion System for Antigen Delivery“
- 1995 - 2018 NIAID: „Host Cell Signaling Pathways Induced by Salmonella“

- 1994 - 1998 NIAID: „Novel Salmonella Antigen Delivery Vectors“
- 1991 - 2020 NIAID: „Mechanisms of Type III protein secretion“
- 1991 - 2015 NIAID: „Molecular Genetic Analysis of Salmonella Cell Invasion“

### Honours and Awarded Membership

- since 2013 Member of the Connecticut Academy of Science and Engineering
- since 2012 Member of the National Academy of Sciences (USA)
- 2011 Robert Koch Prize
- since 2009 Member of the National Academy of Sciences Leopoldina
- 2004 Ellison Medical Foundation Award in Global Infectious Diseases
- since 2003 Member of the American Academy of Microbiology
- 2002 Hans Sigrist Prize of the University of Bern, Switzerland
- 2000 MERIT Award of the National Institutes of Health
- 1994 Established Investigator of the American Heart Association
- 1991 Searle Scholar of the Chicago Community Trust
- 1991 Sinsheimer Scholar in the Biomedical Sciences
- 1990 - 1994 Pew Scholar in the Biomedical Sciences
- 1985 James M. Sherman Award to Outstanding Graduate Research in Microbiology

### Major Scientific Interests

Jorge E. Galán is an Argentinian physician engaged in researching the molecular mechanisms of bacterial infections. His work has concentrated on *Salmonella enterica ssp.* and *Campylobacter jejuni*. His findings concerning the interactions between bacteria and their host cells have provided the basis for the development of new medicines and vaccines.

Galán began his scientific career as a veterinarian. He concerned himself early on with infectious diseases, at first mainly with those in horses. His interest in salmonella arose during his postdoc studies at Washington University in St. Louis. These rod-shaped bacteria, which are the most common cause of diarrhoea resulting from food poisoning, invade the epithelial cells of the small intestine's mucous membrane in order to eventually migrate into the tissue beneath it. Many central questions, however, remained unanswered. How is that microorganism able to gain entry into the host cell? How does it succeed in evading the immune system's defences? Why is salmonella only able to cause life-threatening typhoid fever in humans but not in other mammals?

Upon closer inspection, Galán realized that a bacterium manipulates its host cell in a very complex and simultaneously elegant way in order to instrumentalize it for its own purposes. His proof that

salmonella – much like other bacteria – uses the Type III secretion system, a kind of molecular "shot", in order to infiltrate host-cells, has proven to be of fundamental significance. Great attention has been given to Galepidermal growth factor receptor on the surface of the small intestine's cells as the "door opener". The bacteria are able to gain control of the receptor by attaching to a suitable molecule without causing the host-cell to be destroyed. In order to avoid destruction by macrophages, the bacteria immediately activate a protein that alters the lipid composition of the vacuoles within which they have been enveloped.

Apparently the salmonella bacteria have acquired intimate knowledge about their host-cells in the course of millions of years. Galán was constantly fascinated by the enormity of this adaptation process. The proteins necessary for the invasion of the host-cell were put into position on a kind of "sorting platform" so that their services could be called upon at any time – as our researcher was able to demonstrate. According to Galán, a difference in one single oxygen atom in the receptor for the toxin of „Salmonella typhi“ accounted for the fact that only people are afflicted with life-threatening typhoid fever while other mammals are not. The multidisciplinary application of genetic, immunological, and cellular and structural biological methods provided him insights into the fundamental biological functions of cells.

Galán places great importance on doing research that will lead to improvements in public health. His findings regarding the interaction between salmonella and its host-cell provided different initiating steps for the development of novel medicines against which these bacteria will possibly find it much more difficult to develop resistances like they are able to do against conventional antibiotics. For a number of years, Galan's Yale University lab has employed the same meticulousness that was applied to salmonella to examining infections caused by *Campylobacter jejuni*, the danger of which has become more and more of a public concern. He has sustained his commitment to supporting young scientists in his area of expertise by establishing a predoctoral Training Program in Microbial Pathogenesis.