PROF. DR. PEDRO GARCIA BARRENO

E D U C A T I O N

1966	**B.Sc.**	Medicine, Complutense University of Madrid.
1966	**Diploma**	Complutense University of Madrid.
1970	**Specialization**	Surgery, Ministry of Education and Science.
1973	**Ph.D.**	Extraordinary Distinction, Medicine, Complutense University of Madrid.

ADDITIONAL STUDIES

- Molecular and Biochemical Studies, Faculty of Chemistry and Mathematical Differential Equations, Complutense University of Madrid.
- Electron Microscopy, National Centre of Microbiology, Carlos III Health Institute.
- Medical Informatics, Institute of Informatics, Ministry of Education and Science.
- Management and Administration of Research and Development, National Institute of Public Administration
- Preclinical Studies, Veterinary.
- Diploma, National Defense, Superior Centre of National Defense Studies (CESEDEN)-Chief of Defense.
- MBA, Instituto de Empresa (IE), Madrid.

E X P E R I E N C E

Provincial Hospital Madrid (now Gregorio Marañon)
Training

Cardiff University Hospital (Sully Hospital, Thoracic Centre, Sully, Glamorgan)
Training

Michigan & Wane State – Detroit Receiving Hospital
Training

MD Anderson Cancer Center, Houston
Training

Autonomous University of Barcelona
Associate Professor, Experimental Surgery

Complutense University of Madrid
Chair of Physiopathology and Propaedeutic Surgery.
Honorary Professor.
Professor Emeritus.
Professor Molecular Physiopathology, Department of Biochemistry and Molecular Biology, Faculty of Chemistry and Biology.
Invited Professor, Department of Analytical Mathematics, Faculty of Mathematics.

Gregorio Marañon General University Hospital, Madrid
Medical Director
Subdirector of Research
Director, Clinical Surgery

National Distance Education University
External Professor, Masters in Sciences and Law

National Plan for Disability Prevention
Director

National Committee on Toxic Syndrome
President

Military Health Unit of the Defense Ministry
Director

Regional Administration of the Community of Madrid
Vice-President Ethics Committee
Vice-President Ethics Committee on Clinical Research

International Academy Panel (IAP) and the InterAcademy Council (IAC)
Member, **Development** Advisory Committee (DAC)

ONCE Foundation
Scientific Board Member

CEU/AIDHOS University
Co-Director, Masters in Hospital Architecture and Engineering

Alcala de Henares University, Centre of Public Policy Studies and Governance
Director, Science and Technology Forum

Scientific Journal ARBOR, of the National Science and Research Council.
Director

National Social Security Program
Director, General Surgery

Municipal Charity of Madrid
Permanent Medical Member

Central Hospital, Spanish Air Force
Medical Lieutenant

MEMBERSHIPS /ASSOCIATIONS

- Vice-Chancellor, Engineering and Biomedical Science, Carlos III University, Madrid
- Vice-Chancellor, Special Programs, Cantabria University
- Scientific Council and Coordinator, Science Area, Botin Foundation

- Trustee, Nebrija University
- Trustee, Vodafone Foundation
- Scientific Council, Foundation for research in law and business administration (FIDE)
- Member, Royal Spanish Academy
- Member, Royal Academy of Exact, Physical, and Natural Sciences (Spain)
- Secretary General, Institute of Spain
- Member, Spanish Scientific Society of Biochemistry and Molecular Biology
- Member, Spanish Scientific Society of Surgery
- Member, Spanish Scientific Society of Investigational Surgery and Medicine
- Member and Secretary of Spanish node, International College of Surgeons
- Member, Philosophy of Science Association
- Member, USA Shock Society & European Shock Society
- Member, Leukocyte Biology
- Member, Society for General Microbiology
- Member, Society for Health and Human Values
- Member, American Society of Zoologists
- Member, Royal Society of Medicine
- Founding Member, European Biomedical Research Association
- Member, European Society for Surgical Research
- Member, The International Association for Human Relations Laboratory Training
- Honorary Member of the Spanish Association of Technical Experts in Scientific Photography

SPECIAL AWARDS/NOMINATIONS/PUBLICATIONS

- Medal of Honor, Carlos III University, Madrid
- Inauguration of the "Prof. Pedro Garcia Barreno" Library, Faculty of Medicine, Complutense University of Madrid
- Medal from the Department of Surgery, Faculty of Medicine, Complutense University of Madrid
- "Tribute to Pedro Garcia Barreno. Biomedicine in Spain and Pedro Garcia Barreno", J. Ávila- J.J. Guinovart, M.T. Miras, ed., Madrid: Realigraf, 2010.
- "Condesa de Fenosa de Investigación Quirúrgica" award
- "Scientific Foundation of the Spanish Society against Cancer" award
- "Chamber of Commerce – Business Union to Innovation" award
- "Certificate of Merit for Distinguished Service to the Community – Dictionary of International Biography, award
- "Community Leaders of the World -The American Biographical Institute" award.
- Guest Lecturer, Department of Mathematics (Prof. Eduardo L. Ortíz), Imperial College, London
- Educational Council for Foreign Medical Graduates Award, USA (Cert. No. 099-005-1, sept. 1968)

RESEARCH AREAS

Introducción. Half a dozen references, accumulated over time, have accompanied all my profesional activity. *Wisconsin Idea*: «*Never be content until the beneficent influence of the university reaches every family in the state. It is not an abstract concept; it is the idealistic and the humane concern that knowledge could and should have practical impact on the needs, problems and aspirations of people*». With this commitmment in mind, the statement from Karl R. Popper: « *We are not students of some subject matter but students of problems. And problems may cut right across the borders of any subjectmatter or discipline.We are scholars of problems, not disciplines».* The conclusions of David Weatherall: «*The increasingly important role of science in the provision of health care, and the difficult social and ethical issue that will stem from our newfound ability to determine our futures, makes it essential transversal cooperation or knowledge convergence*». Joseph L. Goldstein y Michael S. Brown referred to the clinical investigator as a: «*bewitched, bothered, and bewildered – but still beloved*». In recent years , the concept «*creative destruction*», popularized by the

economist Joseph A. Schumpeter, has been recovered in the area of health in view of its invasión by ICTs. And the recomendation of Johann W. von Goethe: «*Knowing is not enough; we must apply. Willing is not enough; we must do*». All this gave rise to three principles: 1. reinvigorate the intelectual foundation of academic medicine by convergence of the different areas of knowledgew, 2. assimilating the mighty avalalanche of thechnologies, promote, and 3. facilitate partnerships and encourage innovation and transfer results.

Bioquímica: fosfolípidos. La formación en investigación en bioquímica se realizó en el Departamento de Bioquímica y Biología molecular de las Facultades de C.C. Químicas y Biológicas de la Universidad Complutense, bajo la dirección del Prof. Ángel Martín Municio, Jefe del Departamento. Tras el entrenamiento en las técnicas y aparataje específicos fui asignado al grupo cuyo trabajo se enfocaba en el estudio de fosfolípidos. Fruto de aquello surgió el interés por el abordaje interdisciplinar de problemas fisiopatológicos, en especial los estados de shock y, por la oportunidad, el síndrome tóxico por aceite desnaturalizado.

Physiopathological base of disease. Basis of doctoral thesis focused on septic and inflammatory variant clinical states of shock, which entail a mortality rate of over 50%. Manuscripts published during second half of 1970s and first have of 1980s shed light on understanding the difference amongst the two distinct nosological states, and led to novel therapeutic strategies: pharmacological administration of corticoids to high-risk patients. As of the early 1990s, inflammation was a central research focus, with special interest in researching the organism´s mechanisms to sense leukocytes and response mechanisms such as the heat shock proteins (HSPs), which would allow for an early diagnosis of lesions. Processes that were research included collateral effects of hyperthermia, onco-radiotherapy, and cardiovascular disease. Of primary importance was the genetic classification of individuals, according to genetic conditions of HSPs, and molecular epidemiology, in order to predict resistance or predisposition of suffering different pathologies.

Mechanical circulatory assistance. The second line started in 1982 as a support to the Cardiac Surgery Services at the Hospital. The objective was to provide patients with a circulatory assistance device, which entailed the design, prototyping, and commercialization of an artificial ventricle device. The objective is to guarantee cardiac function for over a month, which patients await transplant. The favorable results led to the further development of an artificial cardiac ventricle and its impulsion and electronic control systems, which required the alliance and collaboration from Biomed S.A., UNED, and the Institute of Plastic Materials (CSIC). The project entailed the development of a never seen before “false auricular”, required preclinical testing on over 100 sheep and approval from FDA, and eventually from the Spanish national Ministry of Health to approve clinical trials to test the implants on 10 patients. Clinical trials lasted from July of 1989 until December 1991 and obtained favorable results, which led to the products manufacturing and commercialization, which is still in use.

Medical Imaging. The third line of research focused medical imaging techniques, encompassing the development of new technologies and processing methodologies for practical application. Research commenced in 1994 and involved a pluridisciplary and multicentric team, which helped focus the clinical application of the project. Research collaborations were established with Philips and IBM: Computer Vision in Radiology (COVIRA, Commission of the European Communities – Philips Medizin Systeme – IBM United Kingdom Lab Ltd – Universita di Genova – Universität Hamburg – Hospital General Gregorio Marañón), and with SUINSA (Madrid). The key areas of interest were: **a**) MRI: technical definition of new reconstruction sequences, simulation programs, for clinical validation of results in biological effect studies magnetic resonance. **b**) Integration of multimodal imaging: in order to include different imaging techniques for complementary information by facilitating the compound interpretation of morphology, functional, and objective quantification of results. Several analytical tools have been developed for analyzing images from various sources. In addition to publications, this project led to the development of software that is still in clinical daily use, especially in radiology, and nuclear medicine, neurosurgery, and radiotherapy. **c)** Quantification of cardiac functional images via Doppler technique (DTI) and the use of intravascular contrasts. Such images require analytical programs. Our collaborative work led to the development of various algorithms and informatics tools, which were later licensed to Acuson (US) for manufacturing and commercialization. We later started the analysis of images from magnetic cardio-

resonance. **d)** Telemedicine. In 2002 the development began for the tele-radiology station – Telra – which was later licensed to Suinsa. **e)** High resolution image of laboratory animal models: Biomedical research continually intends to solve more complex issues with regards to biochemical processes which have an impact on live organisms, whereas medical imaging serves as an excellent tool for this purpose. One of the most prominent methods is molecular imaging which is best achieved using PET. This tomographic technique is capable of monitoring biochemical events at a molecular level in live species, and can be used for multiple applications. High resolution PET and TC imaging systems have been developed, licensed to industry (General Electric), and received in recognition received the 2004 Innovation Award from the Madrid Chamber of Commerce Union.

Epidemiological research.

1982. Chairman of the National Scientific Committee for the Toxic Oil Syndrome. New techniques were developed to try to determine the causative xenobiotic.

1985. Head of the "National Subnormality Prevention Plan". The Plan demanded technical for massive microanalytical screening that culminated with the coverage of 98 % of the newborns in Spain and allowed to expand from 2 to 19 the controlled diseases.

1989. On the grounds of the "V Centenary of the Discovery of America", an ambitious plan was developed for analysis of genetic polymorphism (HLA) in Spanish-American and indigenous populations (Colombia, Mexico, Venezuela), and to elaborate a quantitative susceptibility mapping.

Formation programs.

1993. Organization and co-manager of the 1st. Spanish Master in Minimally invasive surgery.

1997. President of the "Fundación Botín" entrusted a project for the translation of advanced biomedical research into innovation and business creation.

2009. The Rector of Universidad Carlos III, Madrid, commissioned the development of a Degree in Biomedical Sciences and Bioengineering in a Department of Aerospace and Biomedical Engineering which, currently, requires for joining one the highest mark cut-off.

2011. "Research and Surgery" (*Act Urol Esp* 2008; 32 (1): 3-23) was posted by *BioMedLib* ® as number one of the *Top 10* articles published in the same topic since its publication.

2015. Organization and co-leader of Science-Law Program supported by the Foundation for Research in Law and Bussiness & Garriges Foundation.

2016. The Rector of Universidad de Cantabria, at Santander, commissioned the development a Center of System Complexity (Letter of support by David Krakauer, President and William H. Miller Professor of Complex Systems of the Santa Fe Institute, NM, USA).