XIX International Pharmacology
School “Teófilo Hernando”
Santander, Spain
(June 20-24, 2022; Palacio de La Magdalena, Santander, Spain)

ADVANCED THERAPIES FOR HUMAN DISEASE

Directors:  
Antonio G. García  
Universidad Autónoma de Madrid, Spain  
Michael Duchen  
University College London, UK

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Universidad Autónoma de Madrid, Spain

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Professor Teófilo Hernando was the pioneer of Spanish pharmacology. At the beginning of the XX Century, he introduced pharmacology as teaching and research subjects at the universities of Spain. To honor his memory we created the Instituto Fundación Teófilo Hernando for Drug Discovery, at Universidad Autónoma de Madrid, Madrid, Spain.
Central stage in the fascinating field of drug discovery and development is the identification of drugable targets implicated in the pathogenesis of a given human disease. Hence, in this School frontier knowledge in such endeavour will be analysed by worldwide renowned scientists in the field of neuroscience, mitochondria, the epilepsies, Alzheimer’s disease, cell therapies and other advanced therapies. This XIX edition of the International Teófilo Hernando’s Pharmacology School will enlighten young PhD and postdoctoral students, as well as graduate students in the area of biomedical sciences. Additionally, PhD and postdoctoral students will have the opportunity of presenting their work to the class and professors. It is a tradition in this School that professors and students read a poem to the class dealing with their own culture. In doing so, humanities and science walk hand in hand, as in renaissance times, 500 years ago. Hence, the School is a science and humanistic unique experience that reminds the foundation of UIMP by poets and scientists near 100 years ago.

**PROGRAMME**

**Monday, June 20:**

10:00  
*School inauguration by directors and UIMP academic authority*

10:30  
*Opening lecture. Telomers and telomerase in cancer and ageing*  
*Maria A. Blasco*  
*Centro Nacional de Investigaciones Oncológicas*

12:00  
*Senolytic therapies in cancer and other diseases*  
*Manuel Serrano*  
*Institute for Research in Biomedicine, Barcelona, Spain*

14:00  
*Lunch*

15:00  
*Young Researcher Presentations (YRP-1)*  
Coordinator: Luis Gandía (Universidad Autónoma de Madrid, Spain)

17:00  
*Free*

**Tuesday, June 21:**

10:00  
*Mitochondrial pathways as therapeutic targets for human disease*  
*Michael Duchen*  
*University College London, UK*

12:00  
*Mitochondrial cell therapy*  
*Natalie Yivgi-Ohama*  
*MINOVIA, Israel*

14:00  
*Lunch*

15:00  
*Young Researcher Presentations (YRP-2)*  
Coordinator: Luis Gandía

17:00  
*Free*
**Wednesday, June 22:**

10:00  *Reprogramming human skeletal muscle regeneration: new strategies for neuromuscular modelling and therapy*
Francesco Saverio Tedesco
University College London, UK

12:00  *Neurodegeneration, neuroprotection and drug repositioning*
Antonio G. García
Universidad Autónoma de Madrid, Spain

14:00  Lunch

15:00  *Young Researcher Presentations (YRP-3)*
Coordinator: Luis Gandía (IFTH/UAM, Spain)

17:00  Free

**Thursday, June 23:**

10:00  *Targeting mRNA polyadenylation as a novel therapeutic approach to treat drug refractory epilepsy*
Tobias Engel
Royal College of Surgeons in Ireland, Dublin, Ireland

12:00  *Epilepsy as a model for precision therapeutics*
Katherine Benson
Royal College of Surgeons in Ireland, Dublin, Ireland

14:00  Lunch

15:00  *Young Researcher Presentations (YRP-4)*
Coordinator: Luis Gandía

17:30  Free

20:30  Traditional informal dinner of professors and students at restaurant “La Nueva Gaviota”, at the fishermen neighbourhood of Santander

**Friday, June 24:**

10:00  *Targeting purinergic checkpoint in inflammation and cancer*
Francesco di Virgilio
University of Ferrara, Ferrara, Italy

11:30  *Closing lecture.*
The novel neurotechnologies: implication for science and medicine
Rafael Yuste
Columbia University, New York, USA

13:00  *Closing ceremony* by directors, professors and students
THE INTERNATIONAL PHARMACOLOGY SCHOOL “TEÓFILO HERNANDO”: ORIGIN, DEVELOPMENT AND ACTIVITIES

The International Pharmacology School “Teófilo Hernando” was initiated in 1996, in the frame of the summer courses of UIMP. At that time, Rector José Luis García Delgado invited professor Antonio G. García (Universidad Autónoma de Madrid) to organise this School.

The School was named after Teófilo Hernando, a Spanish MD/PhD pharmacologist who was trained under Oswald Schmiedeberg at Strassbourg, the first formal Pharmacology School where many pharmacologists throughout the world were trained at the end of the XIX century and the beginning of the XX century and then developed the subject of basic and clinical pharmacology in their own countries. Teófilo Hernando introduced pharmacology as an independent teaching and science subject at the Universidad Complutense de Madrid, along the first three decades of the XX century this academic matter soon spread out to several Spanish universities by pharmacologists trained under professor Hernando. He trained numerous other disciples that extended the subject to many other Spanish universities along the XX century.

The format of a UIMP’s School (“Escuela”) is based in the critical analysis in the frontier of knowledge of a given scientific topic, along a week (Monday to Friday) by scientists and students of all over the world. Two sessions are delivered in the morning by invited scientists, lasting each one two hours, with vivid discussions. In the afternoon, PhD students and postdocs present their ongoing scientific work as short oral communications. Emphasis is always made in the identification of new biological drug targets that illuminate the design, synthesis and development of new medicines to treat human diseases.

Since 1996, 18 editions of the School have been held. Over 100 internationally recognised scientists and over 500 students have since then attended the School. The subjects of the subsequent Schools were as follows:

1.-Drugs and their receptors (1996)
2.-Drugs for the brain (1997)
3.-Clinical trials in Spain (2000)
4.-Biotechnological drugs (2001)
5.-Alzheimer’s disease (2002)
6.-Drugs and cardiovascular risk (2003)
7.-Chronic inflammation and osteoarthritis (2008)
8.-Neurodegenerative diseases (2009)
9.-The language of neurons (2010)
10.-Neuroprotection and neuroreparation of the injured brain (2011)
11.-New concepts and strategies for neuroprotection (2012)
12.-Brain damage and repair (2013)
13.-Frontier drug discovery in brain disease (2014)
14.- New therapeutic targets in brain disease (2015)
15.- Alzheimer’s and other neurodegenerative diseases: Pharmaco-therapeutic advances (2016)
16.- Understanding the human brain (2017)
17.- Frontier therapies in brain diseases: focus on purinergic signalling (2018)
18.- Frontier biomarkers and drug discovery for the early diagnosis and treatment of Alzheimer’s disease (2019)

ACHIEVEMENTS

In these 25 years of the School, two are its main achievements: (i) the contribution to the multidisciplinary training of young PhD students and postdocs; (ii) the establishment of an international forum to analyse and discuss frontier basic knowledge with potential to serve as a platform for drug discovery and development to prevent, mitigate or cure human diseases. Of note is the fact the successive summer schools run in a friendly atmosphere with vivid discussions and good interaction among professors and students as well as among students themselves, from different countries. We believe that the School activities are contributing to reinforce the value of scientific collaboration, open exchange of ideas, friendship and respect for everyone throughout Europe.

SCIENTISTS THAT PARTICIPATED IN PAST SCHOOLS

The following scientists from different countries participated as professors in the School:
- Francisco Abad Santos, Hospital Universitario de La Princesa; Madrid, Spain
- Andrey Abramov, University College London, UK
- José Enrique Alés, Hospital Ruber Internacional, Madrid, Spain
- Guillermo Alvarez de Toledo, Universidad de Sevilla, Spain
- Celso Arango, Universidad Complutense de Madrid, Spain
- Alfonso Araque, University of Minnesota, USA
- Jesús Avila, CBM/UAM/CSIC, Madrid, Spain
- Mariano Barbacid, Centro Nacional de Investigaciones Oncológicas, Instituto de Salud Carlos III, Madrid, Spain
- Josep Baselga, Hospital Vall d’Hebron, Barcelona, Spain
- Carlos Belmonte, Instituto de Neurociencias, Universidad Miguel Hernández, Alicante, Spain
- Félix Bermejo, Hospital Universitario 12 de Octubre, Madrid, Spain
- Jan G. Bjaalie, Institute of Basic Medical Sciences, Oslo, Norway
- Francisco J. Blanco García, Hospital Juan Canalejo; La Coruña, Spain
- Rafael Blesa, Hospital de la. Sta Creu i St. Pau, Barcelona, Spain
- Maria Laura Bolognesi, University of Bologna, Italy
- Ricardo Borges Jurado, Universidad de la Laguna; Tenerife, Spain
- Washington Buño, Instituto Cajal, CSIC, Madrid, Spain
- Fernando Cañas, Department of Psychiatry, Hospital Dr Rodriguez Lafora, Madrid, Spain
- Emilio Carbone, Universidad de Turín; Italy
- José Castillo, Hospital Clínico de Santiago de Compostela, Spain
- Marc Ceusters, Janssen Pharmaceutica, Beerse, Belgium
- Manuel Criado, Neuroscience Institute; Miguel Hernández University, Elche, Spain
- Antonio Cuadrado, Universidad Autónoma de Madrid /CSIC, Spain
- Valentin Cuervas-Mons, Clínica Puerta de Hierro; UAM, Madrid, Spain
- Jack C. de la Torre, Department of Neuropsychology, University of Texas at Austin, USA
- Francesco di Virgilio, University of Ferrara, Italy.
- Patrick du Souich, Universidad de Montreal; Canadá
- Javier DeFelipe, Instituto Cajal (CSIC) and Centro de Tecnología Biomédica (UPM), Madrid, Spain
- José Mª Delgado García, Universidad Pablo de Olavide; Sevilla, Spain
- Miguel Díaz Hernández, Universidad Complutense de Madrid, Spain.
- Michael Duchen, University College London, UK
- Jesús Egido, Fundación Jiménez Díaz; Universidad Autónoma de Madrid, Spain
- Tobias Engel, Royal College of Physicians of Ireland, Dublin, Ireland
- Juan V. Esplugues, Centro Nacional de Investigaciones Cardiovasculares; CNIC, Spain
- James W. Fawcett, Cambridge University Centre for Brain Repair; Cambridge, UK
- Javier Fernández Gadea, Janssen-Cilag, Toledo, Spain
- Alberto Fernández Soto, Instituto de Física de Cantabria, Santander, Spain
- Jesús Angel Fernández-Tregueres, Universidad Complutense de Madrid, Spain
- Juan Fortea, Hospital Santa Creu e Sant Pau, Barcelona, Spain
- Bruno Frenguelli, University of Warwick, Warwick, UK
- Enrique Gálvez, Universidad de Alcalá de Henares, Madrid, Spain
- Manuela García López, Instituto Fundación Teófilo Hernando, Universidad Autónoma de Madrid, Madrid, Spain
- Luis Gandía Juan, Instituto Fundación Teófilo Hernando, Universidad Autónoma de Madrid, Madrid, Spain
- Antonio G. García, Instituto Fundación Teófilo Hernando, Universidad Autónoma de Madrid, Madrid, Spain
- Justo García de Yébenes, Hospital Ramón y Cajal, Madrid, Spain
- Javier García-Sancho, Facultad de Medicina, Universidad de Valladolid, Spain
- Hugo Geerts, In-Silico Biosciences, Lexington, MA, USA
- Hélène Girouard, University of Montreal, Canada
- Linda Greensmith; Institute of Neurologyy, University College London; UK
- Santiago Grisolia, Presidente del Consejo Valenciano de Cultura, Expresidente del Comité de Coordinación Científica de la UNESCO para el proyecto Genoma Humano, Valencia, Spain
- Pedro Guillén García, Clínica CEMTRO; Madrid, Spain
- José Antonio Gutiérrez, Fundación Lilly, Madrid, Spain
- John Hardy, Institute of Neurology, University College London, UK.
- Ricardo Henriques, University College London, UK
- Peter St. George Hyslop, University of Cambridge, UK
- Allen Kaasik, University of Tartu, Estonia
- John Kemp, Janssen-Cilag; Beerse, Belgium
- Arthur Konnerth, Technique Universitat Munchen, Germany
- Samir Kumar-Singh, University of Antwerp, Belgium
- Juan Lerma, Instituto de Neurociencias, UMH-CSIC, Elche, Spain
- David R. Lester, The University of Manchester, Manchester, UK.
- Filip Lim, Centro de Biología Molecular “Severo Ochoa”, CSIC-UAM, Spain.
- Juan Linera, Hospital Ruber Internacional, Madrid, Spain
- David Lodge, Lilly; UK
- José López Barneo, Hospital Virgen del Rocio; Universidad de Sevilla, Spain
- José Javier Lucas, Centro de Biología Molecular “Severo Ochoa”; CSIC-UAM, Madrid, Spain
- María Isabel Lucena González, Hospital Universitario “Virgen de la Victoria, Universidad de Málaga, Spain
- José Luis Marco, CSIC, Madrid, Spain
- Fionna Martin, Eli Lilly and Company Limited, UK
- Carlos Martínez-Alonso, Centro Nacional de Biotecnología, UAM-CSIC, Madrid
- Fernando Martínez Brotons, Hospital de Bellvitge, Barcelona, Spain
- José Manuel Martínez Lage, Universidad de Navarra, Spain
- Jorge Matías-Guiu, Hospital Clínico San Carlos, Univ. Complutense de Madrid, Spain
- Carlos Matute, Universidad del País Vasco, Leioa, Spain
- Tristan McKay, St. George University of London, London, UK
- Miguel Medina, CIBERNED, Spain
- María Teresa Miras Portugal, Universidad Complutense de Madrid, Madrid, Spain
- Ingrid Möller Parera, Instituto Poal de Reumatología; Barcelona, Spain
- Salvador Moncada Wolfson Institute for Biomedical Research, University College London, UK
- Joan Montaner Villalonga, Hospital Vall de’Herbron, Barcelona, Spain
- Ricardo Moreno, Hospital de La Princesa, UAM, Madrid, Spain
- Annette Nicke, Ludwig-Maximilians-Universität München, Germany
- Baldomero Olivera, University of Utah, USA
- Manuel Ortiz de Landázuri, Hospital de la Princesa, Madrid, Spain
- Angel Pazos, Facultad de Medicina, Universidad de Cantabria, Spain
- Pablo Pelegrín, Hospital Universitario Virgen de la Arrixaca, Murcia, Spain
- James Putney, National Institute of Environmental Health Sciences-NIH, North Carolina, USA
- Fernando Rodríguez Artalejo, Universidad Autónoma de Madrid, Madrid, Spain
- Francisco Sala Merchán, Instituto de Neurociencias, Universidad Miguel Hernandez-CSIC; Elche, Alicante, Spain
- Paul Schumacker, Northwestern University, Chicago, USA
- Kenneth Smith, Institute of Neurology, London, UK
- Bernat Soria, Centro Andaluz de Biología Molecular y Medicina Regenerativa, Sevilla, Spain
- Peter Stadler, Exelixis Inc/Artemis Pharmaceutical; Germany
- Bryan Strange, Centro de Tecnología Biomédica (UPM), Madrid, Spain
- James Surmeier, Northwestern University, Chicago, IL, USA
- Gyorgy Szabókay, University College London, UK
- Juan Tamargo Menéndez, Universidad Complutense de Madrid, Spain
- Fernando Valdivieso, CBM/UAM/CSIC, Madrid, Spain
- Jesús Vaquero, Hospital Puerta de Hierro, Universidad Autónoma de Madrid, Spain
- Josep Vergés Milanó, Bioibérica Farmà; Barcelona, Spain
- José María Villalón Alonso, Servicios Médicos; Club Atlético de Madrid; Madrid, Spain
- Manfred Windisch, JSW Lifesciences GmbH, Austria

ABOUT THE INTERNATIONAL MENÉNDEZ PELAYO'S UNIVERSITY (UIMP)

UIMP (“Universidad Internacional Menéndez Pelayo”) was created on August 23, 1932 as a result of the approval of a foundational decree proposed by the Minister for Public Education and Arts, Fernando de los Rios. Courses started in 1933 under the leadership of Ramón
Menéndez Pidal and Blas Cabrera from 1934 to 1936 and the poet Pedro Salinas as Secretary General. This could explain the strong emphasis in humanities and Spanish language courses as well as in political, economical and social sciences of UIMP. However, the summer programme has also traditionally hosted advanced courses in physics, chemistry, mathematics, medical and other sciences.

In the 1940s the University adopted its current name after Marcelino Menéndez Pelayo, a Spanish historian born in Santander, where the most traditional and famous campus of this University is located. The “Universidad Internacional Menéndez Pelayo” (UIMP) was created to foster a better relationship between professors and doctoral and postdoctoral students, during summer courses that lasted several weeks and at its earlier time, during the whole summer. The idea was to create an informal atmosphere for discussion and analysis of different topics in the frontier of knowledge. This strongly contributed to the intellectual maturation of young students as well as to the development of a critical and liberal attitude toward problems and people, in an atmosphere of open spirit and intellectual relevance.

During the last decades UIMP has diversified the type of courses and activities, of short (few days, one week) and longer duration (weeks to months) and has recently established PhD programmes in collaboration with the National Research Council (CSIC) and other private and public institutions. Near a century after its foundation, the UIMP is still a benchmark in the Spanish educational arena.

UIMP has different campuses throughout Spain and courses are held along the year. UIMP directly depends on the Spanish Ministry of Education that elects its Rector among renowned University Professors (For more information visit UIMP site at http://www.uimp.es).

SUMMER COURSES IN LA MAGDALENA PALACE

The most famous campus of UIMP is La Magdalena Palace, located in Santander, North of Spain.

![Map of Spain showing Santander](image1)
![La Magdalena Palace](image2)
This palace was built at the beginning of the XX century and was gifted by the city of Santander to the Royal Family (Alfonso the XIIIth), for summer vacations. This helped to develop Santander and its beaches and mountains surroundings, as one of the most beautiful tourist sites of Spain. In fact, Santander is actually considered as one of the most attractive cities of Spain due to the extraordinary combination of mountains, the Atlantic Ocean, the green and colourful gardens and the forests of Cantabria, the Autonomous Spanish Community having as capital Santander. Professors and students coming from abroad get unanimously astonished with the beauty of the Magdalena Palace, surrounded by forest, beaches (i.e. the famous “El Sardinero” beach) and beautiful and well kept colourful gardens where professors and students can gather together, in the lecture hall, at the restaurants or walking in the surroundings of the palace and the Caballerizas, the place where the horses were kept at the time of the Royal family vacations, and now a residency and some lecture halls.