

**CURRICULUM VITAE, 2014**  
**Emilio Carbone**

**Born:** 12 January 1948, in Alassio (SV), Italy

**Family:** Married, one son

**Home Address:** Torino (Italy)

**Nationality:** Italian

**Current Appointment:** Full Professor of Physiology  
Department of Drug Science  
University of Turin, Italy

**Lab Address:** Lab of Cellular Physiology & Molecular Neuroscience  
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**Instruction and job career**

1971 Degree on Physics with full marks at Genoa University, Italy.

1971-73 PhD at the National Institute of Mental Health, Laboratory of Neurobiology, Bethesda, MD, USA.

1974 Research collaborator at the Department of Physics, University of Genoa, Italy.

1974-75 Compulsive military service.

1976-83 Associate researcher at the Institute of Cybernetics and Biophysics, C.N.R., Camogli, Italy.

1983-85 Associate researcher at the Max-Planck-Institut für Psychiatrie, Abteilung Neurophysiologie, München, Germany.

1986-2013 Full professor of General Physiology at the Faculty of Pharmacy, University of Torino, Italy.

1986-93 Visiting Professor at the M.P.I. für Psychiatrie, Abteilung Neurophysiologie, München, Germany.

1994 Visiting Professor at the Pacific Biomedical Research Center, Békesy Laboratory of Neurobiology, University of Hawaii, Honolulu, HI, USA.

1994-01 Visiting Professor at the Department of Pharmacology & Therapeutics, Universidad Autónoma de Madrid, Madrid, Spain.

2000-13 Member of the Doctorate School of Neuroscience, University of Torino, Italy.

2001-06 Director of the Research Unit of the National Institute of Physics Matter of the University of Torino.

2005-13 Professor of Physiology at the School of Hospital Pharmacy, Faculty of Pharmacy, University of Torino.

2006-13 Member elected of the Academia Europaea. Section of "Physiology & Medicine".

2009 Visiting Professor at the Department of Biophysics, Institute of Cellular Physiology, UNAM, México City, México.

2010-11 Member of the Editorial Board of the *Pflügers Archiv European Journal of Physiology*, Springer Verlag, Berlin

2009-12 Director of the Physiology Section at the Department of Neuroscience, Torino

2011-13 Executive Editor of the *Pflügers Archiv European Journal of Physiology*, Springer Verlag, Berlin

### *Professional experience in the last 10 years*

- 2001 Scientific consultant and collaborator at the Ely Lilly Research Centre, Surrey, UK.
- 2001 Research collaboration with the Department of Pharmacology and Toxicology Institute of Pharmacy University of Innsbruck, Austria.
- 2001 Joint INTAS research project in cooperation with the University of Kiev (Ukraine), and Manchester (UK).
- 2001 Research group leader at the Department of Neuroscience, University of Turin, Italy.
- 2001 Group leader at the I.N.F.M. Research Unit of Turin University.
- 2002 Research Collaboration with the Universidad Autonoma de Madrid, Department of Pharmacology and Therapeutics, Madrid, Spain
- 2003 Research Collaboration with the Universidad de la Laguna de Madrid, Department of Physical Medicine & Pharmacology, Tenerife (Spain) for a project on amperometric measurements of
- 2004 Responsible of the research line: "Cell-adhesion on nanostructured surfaces" at the Centre of Excellence N.I.S., Turin.
- 2006 Italian partner of the Marie Curie Research Training Network "CavNET"
- 2006 Local coordinator of a INTAS research project in cooperation with the University of Kiev (Ukraine), and Manchester (UK).
- 2007 Research collaboration with the University of Ulm (Germany), Dept of Electronic Devices and Circuits for a project on neuro-biochips based on diamond-doped surfaces
- 2007 Project Steering Committee member of the European CavNET RT Network
- 2008 Italian partner of a Vigoni project between Italian and German Universities
- 2009 Research Collaboration with the University of Innsbruck (Austria), Dept of Pharmacology & Therapeutics for a project on L-type calcium channels as pacemakers in central neurons and chromaffin cells.
- 2010 Research Collaboration with the Dept. Molecular Physiology of Hearing, University of Tübingen (Germany), for a project on L-type and BK channels co-localization in chromaffin cells and hippocampal neurons.
- 2011 Research Collaboration with the Institute of Functional Genomics (CNRS UMR 5203) and the University of Montpellier (France) for a project on the role of L-type calcium channels in pacemaking central neurons and chromaffin cells.
- 2011 Responsible of the FENS-POR project "MicroDiBi" funded by the Regione Piemonte with EU funds for the design of new diamond microchips for recording action potential activity and amperometric signaling from neuronal networks and neuroendocrine tissues.
- 2012 Responsible of the Torino-University project "Novel diamond-based MEA microchips for recordings action potential and amperometric signals from neuronal networks" funded by Intesa-SanPaolo.
- 2012 Co-responsible of the FENS-POR project "Be-Free" funded with EU funds for the design of an assay to detect illegal usage of beta-agonists on bovine cardiac pacemaker cells and in the urine of athletes.
- 2013 PRIN-MIUR (local coordinator) project on: "*Excitatory/inhibitory balance in the central nervous system: synaptic transmission, plasticity and synaptopathies*".

## Technical, managing and social competence

### Technical competence

E. Carbone is group leader at the Department of Drug Science of Torino. He is presently coordinator of the CNISM Research Unit and belongs to the Scientific Council of the Center of Excellence N.I.S. (Nanostructured Interfaces and Surfaces) and to the Scientific Council of the Neuroscience Institute (N.I.T.) in Torino. He has consolidated experience in the physiology and biophysics of cell excitability, voltage-gated  $\text{Ca}^{2+}$  channels,  $\text{Ca}^{2+}$  channel-secretion coupling and central neurons synaptic activity with particular interest in: i)  $\text{Ca}^{2+}$  channel permeability and gating, ii) expression, distribution and role of voltage-gated  $\text{Ca}^{2+}$  channels at the somatic and presynaptic terminals, iii) role of neurotrophic factors on synaptic plasticity through the recruitment of voltage-gated  $\text{Ca}^{2+}$  channels, iv) role of  $\text{Ca}^{2+}$  channels in the regulation of  $\text{Ca}^{2+}$ -secretion coupling in neuroendocrine cells.

Most of the studies are pursued by means of the patch-clamp technique in all its configurations (whole-cell, cell-attached, perforated-patch, membrane capacitance) combined with amperometric recordings. In the specific field of  $\text{Ca}^{2+}$  channel function and neuronal excitability, EC has made important contributions concerning: i) the gating properties of low-threshold T-type  $\text{Ca}^{2+}$  channels, ii) the molecular basis of single  $\text{Ca}^{2+}$  channel inhibition by membrane receptors, iii) the direct and remote modulation of neuroendocrine L-type channels, iv) the effects of  $\text{Ca}^{2+}$  channel modulation, up-regulation and recruitment during stress conditions on neurotransmitter release and cell exocytosis, v) the role of L-type channels as pacemaker channels in chromaffin cells and central neurons.

EC is author of **150 full papers** on international journals and books with ***h-index* 39** and about **5400 quotations** in *Web of Science* and/or *Scopus*. He is invited speaker in national and international congresses, workshops, PhD courses, advanced schools and seminars.

A list of recent invited lectures is given:

- 2001 Advanced Course on: *Cellular  $\text{Ca}^{2+}$  signalling*, Molina de Segura, Murcia (Spain)
- 2001 3rd Meeting of the *Federation of the European Pharmacological Soc., EPHAR 2001*. Symposium on:  *$\text{Ca}^{2+}$  control of exocytosis: pharmacological implications*. Lyon (France)
- 2002 British Physiological Society, Symposium on: *Molecular Physiology of calcium signalling*. Liverpool (UK)
- 2002 International Workshop on: *Calcium, calcium channels and synaptic transmission*. Torino (Italy)
- 2003 12th International Symposium on: *Chromaffin Cell Biology*, La Palma, Canary Island (Spain)
- 2005 International Workshop on:  *$\text{Ca}^{2+}$  channels in health and disease*, Tübingen (Germany)
- 2005 Biennial meeting of the MIUR-PRIN projects. GlaxoSmithKline Center, Verona (Italy)
- 2005 Physiological Society International Workshop on: *Ion channel: from Physiology to Pathology*, Sevilla (Spain)
- 2005 1st International Neuroscience Meeting, Timisoara (Romania)
- 2005 MMD Meeting, workshop on: *Biophysics of excitable cells*, Genova (Italy)
- 2006 13th International Symposium on: *Chromaffin Cell Biology*, Puchón (Chile)
- 2006 Symposium on: *"25 years of giga-seal patch clamping"*, Heidelberg (Germany)
- 2006 Fronteras en Terapeutica IV. Course on: *Comunicacion neuronal*, Molina de Segura, Murcia (Spain)
- 2006 International workshop on: *L-type Calcium channels in health and disease*, Tübingen (Germany)
- 2007 NIS Colloquium on: *"Carbon nanotubes and carbon hybrid/composites"*, NIS Centre of Excellence, Torino (Italy)
- 2007 Segnali di  $\text{Ca}^{2+}$  in Piemonte, DISCAF, Novara (Italy)
- 2007 1<sup>st</sup> International Conference on: *Calcium channels*, Moorea Pearl Resort, Tahiti (France Polinesia)

- 2007 Martin Morad's 70<sup>th</sup> Anniversary Symposium on: *Calcium signaling*, Mount Desert Island, Main (USA)
- 2007 International Symposium on: *Calcium Channels and Transporters*, Conference Centre, Manchester (UK)
- 2007 14<sup>th</sup> International Symposium on Chromaffin Cells Biology, Sestri Levante (Italy)
- 2007 Invited lecture on: *Ca<sup>2+</sup> channels and exocytosis in neurosecretory cells*. IZN, Heidelberg University, Heidelberg (Germany)
- 2007 Invited lecture on: *T-type and L-type channels in chromaffin cells: role in pace-making and secretion*. Technische Universität, München (Germany)
- 2007 1<sup>st</sup> Annual CavNET meeting on: *Ion channels*, Montpellier (France)
- 2008 Conferenza su: Segnali di calcio, sinapsi neuronali nanotecnologie: nuovi approcci e future convergenze. *Istituto Nazionale di Ricerca Metrologica (I.N.R.I.M.)*, Torino (Italy)
- 2008 Advanced Workshop *T-type calcium channels: from discovery to channelopathies, 25 years of research*. Kyiv (Ukraine)
- 2008 2<sup>nd</sup> Annual CavNET meeting on: *Ion channels*, University Center Obergurgl, Obergurgl (Austria)
- 2008 Invited lecture on: *Ca<sup>2+</sup> signaling by L-type channels in chromaffin cells*. Instituto de Fisiología Celular, UNAM, Ciudad de México (México)
- 2008 Invited lecture on: *Calcium channels at work in chromaffin cells: modulation and recruitment during stress-mimicking stimuli*. LI Congreso Nacional de Ciencias Fisiológicas, Merida, Yucatan (México)
- 2009 Le meraviglie dei nanomateriali, Circolo dei Lettori, Torino (Italy)
- 2009 Workshop on: *Ca<sub>v</sub>1.3 Selective Ca<sup>2+</sup> channel blockers*, Innsbruck, (Austria)
- 2009 International Conference on: Molecular mechanisms of intracellular calcium signalling, Kiev (Ukraine)
- 2009 15<sup>th</sup> International Symposium on Chromaffin Cells Biology, Mérida, Yucatan (México)
- 2009 3<sup>rd</sup> Annual CavNET meeting on: *Ion channels*, Sestri Levante (Italy)
- 2010 2<sup>nd</sup> International Conference on: *Calcium channels*, The Inn at Robert's Grove, Placencia (Belize)
- 2010 *Settimana del Cervello 2010*, Circolo dei Lettori, Torino (Italy)
- 2010 4<sup>th</sup> Annual CavNET meeting on: *Ion channels*. UCL, London (UK)
- 2010 Invited lecture on: Canales de calcio L y T: marcapasos de la neurona. *IX Escuela de Farmacología "Teofilo Hernando"*, Santander (Spain)
- 2011 1<sup>st</sup> CavNET follow-up meeting on: *L-type channels in Health & Disease*. Hearing Research Center Tübingen, Tübingen (Germany)
- 2011 16<sup>th</sup> International Symposium on Chromaffin Cell Biology, Beijing (China)
- 2011 62<sup>o</sup> Congresso Società Italiana di Fisiologia, Sorrento (Italy)
- 2012 1<sup>st</sup> European Calcium Channel Conference, Alpbach (Austria)
- 2012 2<sup>nd</sup> CavNET follow-up meeting on: *L-type channels in Health & Disease*. Department of Drug Science, Torino (Italy)
- 2012 Workshop on Biosensors & correlated devices: XCVIII Congress of the Italian Physics Society, Napoli (Italy)
- 2013 3<sup>rd</sup> International Conference on: *Calcium channels*, Koh Lanta (Southern Thailand)
- 2013 Invited lecture on: *L-type calcium channels as controllers of pace-making, secretion and endocytosis in chromaffin cells*. Medical University of Vienna, Center of Physiology and Pharmacology, Wien (Austria)
- 2013 Invited lecture on: *Recording of pacemaker currents and secretion in neurons and chromaffin cells*, Innsbruck Univ, Center for Chemistry & Biomedicine, Innsbruck (Austria)
- 2013 17<sup>th</sup> International Symposium on Chromaffin Cell Biology, Rouen, (Normandy, France)
- 2013 3<sup>rd</sup> CavNET follow-up meeting on: *L-type channels in Health & Disease*. Slovak Cultural Institute, Jilská 450/16, Prague (Slovakia)
- 2014 Symposium on: *Dagli atomi al Cervello: Le Scienze di Base per la comprensione delle funzioni del cervello*. Politecnico di Milano, Milano (Italy)
- 2014 Special Guest Lecturer at the VI Congress of Ukrainian Society for Neuroscience. June 2014, Kiev Ukraine

2014 4<sup>th</sup> CavNET follow-up meeting on: *L-type channels in Health & Disease*. Technische Universität Kaiserslautern Kaiserslautern (Germany)

EC is active reviewer of papers submitted to biophysical, physiology, pharmacology and neuroscience international journals, including: *The Biophysical Journal, European Biophysics Journal, Cell Calcium, Journal of Physiology, Journal of General Physiology; European Journal of Physiology, Physiological Reviews, Journal of Cellular Physiology, American Journal of Physiology, Journal of Biological Chemistry, Brain Research, Journal of Neurophysiology, Journal of Neuroscience, European Journal of Neuroscience, Neuroscience, Journal of Neuroscience Methods, Journal of Neurochemistry, Journal of Neuropharmacology, Molecular Pharmacology, Journal of Pharmacology and Experimental Therapeutics, FASEB Journal, Journal of Clinical Investigation, Plos One, Cell Death & Diseases, Biochimica Biophysica Acta Biomembranes, Biosensors & Bioelectronics*.

EC is elected Executive Editor of *Pflügers Archiv European Journal of Physiology*.

EC has reviewed also grant applications for national and international organisations (Human Frontier (UE), Wellcome Trust (UK), FECYT (Spain), National Science Foundation (USA), Slovak Research and Development Agency, Israel Science Foundation (Israel), BBSRC funds (UK), Creative Research Initiative Program (North Korea), AFM-Téléthon (France), Slovakian Agency of Research (Slovakia), FWF der Wissenschaftsfonds (Austria), Agence Nationale de la Recherche (France), Italian Telethon (Italy), Ministero dell'Istruzione, Università e Ricerca (Italy), Ministero delle Attività Produttive (Italy).

### *Orgazining and social competence*

In the period 2001-2005 EC is Director of the Research Unit at the "Istituto Nazionale di Fisica della Materia" (I.N.F.M.) of Torino University. In 2002 he has been appointed member of the Evaluation Committee of the Ramon y Cajal Programme organised by the Spanish Foundation for Science and Technology (FECYT) for recruiting new investigators of quality in the area of Physiology and Pharmacology. In 2003 he was consultant of the Ministry of Industry to evaluate two projects concerning two industrial research projects of the II Bando PIA INNOVAZIONE. Since 2004 he is member of the Scientific Council of Centre of Excellence N.I.S. (Torino) and representative of the University Rector of Torino at the C.N.I.S.M (Rome). In 2004 he was also member of the CIVR Committee of the University of Torino for the area of Nanotechnology. Since 2005 he is member of the Scientific Council of the Neuroscience Institute of Turin.

In the past, EC has been the local coordinator of two projects funded by the CNR and two project FIRB funded by MIUR in the field of Neuroscience and Nanobiotechnologies. He has been for a decade local coordinator in Torino of national PRIN-MIUR projects focused on the biophysics and physiology of ion channels. Since 2005 is national coordinator of the PRIN-MIUR project: "Neuronal sodium, calcium and potassium channels: physiological role and channelopathies". He is also principal investigator of the 2004-CIPE project funded by Regione Piemonte: "Biosensors and interaction between neurons and nanostructured surfaces". Recently (2006) he became partner of the European Marie-Curie Research Training Network "CavNET" that joins university laboratories from all Europe interested on the function and pathological diseases associated to L-type calcium channels. He is also western member of an INTAS project in collaboration with research groups of Kiev University and Manchester Biological School. He is presently responsible of the EU-POR project MicroDiBi funded by the Regione Piemonte for the design of new diamond microchips for recording action potential activity and amperometric signaling from neuronal networks.

EC has organized and is organizing several local and international meetings:

- 2001 A two days workshop on: *Structure and function of membrane channels*. INFM UdR-University, Torino (Italy)
- 2002 Workshop of the INFM Research Unit Torino University, Physics Department, Torino (Italy)
- 2005 Joint Symposium SIF - Physiological Society on: *Calcium signaling: from Physiology to Pathology*, Palermo (Italy)
- 2005 NIS Colloquia on: "*Cells and biomolecules on nanostructured surfaces*". Torino (Italy)
- 2007 *Segnali di Calcio* in Piemonte, Novara (Italy)
- 2007 14<sup>th</sup> International Symposium on Chromaffin Cells Biology, Fondazione Mediaterraneo, Sestri Levante (Italy)
- 2009 Symposium on: *Ion channels and secretion in chromaffin cells*. 15<sup>th</sup> International Symposium on Chromaffin Cells Biology, Mérida, Yucatan (México)
- 2009 Summer School and 3<sup>rd</sup> Annual Meeting of Cavnet, Fondazione Mediaterraneo, Sestri Levante (Italy)
- 2011 Symposium on: *Voltage-gated calcium channels and cell function*. 16<sup>th</sup> International Symposium on Chromaffin Cells Biology, Beijing (China)
- 2011 Symposium Voltage-gated L-type (Cav1) calcium channels in health and diseases at the 62<sup>o</sup> Congresso Società Italiana di Fisiologia, Sorrento (Italy)
- 2012 NIS Colloquia on: *Structure and function of Cav1.2 and Cav1.3 L-type channels*. Torino-Esposizioni, Torino (Italy)
- 2013 Symposium on: *Calcium and ion channels*. 17<sup>th</sup> International Symposium on Chromaffin Cells Biology, Rouen (France)
- 2013 Symposium on: *New and classical biosensors for recording cellular and neuronal signaling*, FisMat13, Milano (Italy)

### *Qualifications to collaborate with foreign laboratories and industrial partners*

The Lab directed by E. Carbone is fully equipped for running experiments on the electrophysiology, biophysics and pharmacology of central and peripheral neurons, chromaffin cells,  $\beta$ -pancreatic cells, clonal cell lines and stem cells that could be interesting for industrial partners such as pharmaceutical companies or industries who are interested in the health hazard of nanostructured and ultrafine particles on neurons and excitable biological tissues. In general, the Lab can undertake any kind of collaborative research activity with neuroscience groups and any type of industries that are interested to the acute and chronic effects of most organic and inorganic chemical substances, physical treatment or biological assay on the functioning and survival of excitable cells.

In the past E. Carbone has been consultant at the Bayern AEG (Wuppertal, Germany) and is presently collaborating with the Eli Lilly Company (Surrey, UK) on a project based on the effects of drugs on  $Ca^{2+}$  channel gating. The Lab has received grants from industries for carrying out preliminary screening tests of various  $Ca^{2+}$ -antagonists for developing antiarrhythmic and antihypertensive drugs. The Lab has also been funded for several years with grants from Telethon for studies on the role of voltage-gated  $Ca^{2+}$  channels in motoneurones degeneration as a possible cause of Amyotrophic Lateral Sclerosis.

The lab-team presently includes post-doc fellows, PhD students, graduate students and technicians who are trained to prepare cell cultures, undertake complex electrophysiological recordings (intracellular and extracellular action potentials, membrane currents, synaptic signals) and analyze most of the data with up-to-date computer programs. The Lab includes: 1 associate professor, 1 researcher, 2 foreign post-docs 3 Italian PhD students, 4 undergraduate students and 2 technicians. PhD and post-docs are supported by the European Community, MIUR (FIRB giovani), Regione Piemonte to work on scientific projects related the physiology and pathology of voltage-gated  $Ca^{2+}$  channels and development of new diamond micro-chips for recording neuronal excitability.

## Research funding in the last 10 years

2001-03	PRIN-MIUR (local coordinator) "Calcium channels channelopathies"
2001-03	Marie Curie post-doc position for a project on the "Modulation of single Ca <sup>2+</sup> channels in chromaffin cells"
2001-03	INTAS Project " <i>Intracellular Calcium signaling</i> "
2001-03	Cavalieri Ottolenghi Foundation grant for a project on the " <i>Properties of inhibitory hippocampal neurons</i> "
2001-03	CNR strategic project on "Neuroscience"
2002-05	FIRB MIUR (local coordinator) project on "Nanobiotechnologies"
2003-05	PRIN-MIUR (local coordinator) "Calcium channels channelopathies"
2003-05	FIRB MIUR project on "Neuroscience"
2001-05	Grants from the University of Torino (ex 60%). Projects on "Calcium channel functioning and modulation"
2001-05	INFM grant on the " <i>Biophysics of voltage-gated Ca<sup>2+</sup> channels</i> "
2004-05	MIUR funds to the NIS Center of Excellence for a project on " <i>Cellular adhesion and biosensors</i> "
2004-06	SanPaolo Imi Foundation funds to the NIS for a project on " <i>Neuronal extracellular recordings using multi-electrode arrays</i> "
2005-07	PRIN-MIUR (national coordinator), project on: " <i>Neuronal sodium, calcium and potassium channels: physiological role and channelopathies</i> "
2005-08	CIPE-Regione Piemonte (principal investigator), project on " <i>Biosensors and interaction between neurons and nanostructured surfaces</i> "
2006-10	1 <sup>st</sup> European grant for a Marie-Curie Research Training Network "CavNET" (1 PhD, 1 post-doc position) on " <i>L-type channels in health and diseases</i> "
2007-09	INTAS project between the University of Manchester-Kiev and Torino
2007	IBRO, Int. Neurochemistry Society, Compagnia di SanPaolo grants for the organization of the 14 <sup>th</sup> International Symposium on Chromaffin Cells Biology, Sestri Levante, Italy
2007-10	CIPE-Regione Piemonte (co-presenter), project " <i>Nanoparticles: from their impact on the environment and human health to safer production and usage</i> " (acronym: NANOSAFE)
2007-10	2 <sup>nd</sup> European grant for a Marie-Curie Research Training Network "CavNET" (1 PhD, 1 post-doc position) on " <i>L-type channels in health and diseases</i> "
2007-10	Compagnia di SanPaolo: grant to the NIS Center of Excellence for a project on " <i>Neurons-on-chips and biosensors</i> "
2007-09	IMAGEEN project between Torino and Teotuan (Morocco) University on the: " <i>Action of cannabinoids on calcium channels and neurosecretion in central neurons and chromaffin cells</i> "
2007-09	PRIN-MIUR (national coordinator) " <i>Neuronal sodium, calcium and potassium channels: physiological role and channelopathies</i> "
2007-09	Project Alfieri on the nanotechnologies " <i>Nanoparticles and potential toxicity at the nervous system: an approach integrated to the definition of relevant parameters</i> "
2008-09	Cavalieri-Ottolenghi Foundation: grant for the acquisition of a fluorescence microscope for calcium imaging on neuronal networks
2008-10	Vigoni project funded by the Italian-German University: " <i>Planar microelectrodes for amperometric and potentiometric registrations from secretory cells</i> "
2011-13	POR FESR project <i>MicroDiBi</i> funded by the Regione Piemonte for the design an test of: " <i>Diamond microchips for "drug-screening" and biomedical applications</i> "
2011-13	Compagnia di SanPaolo grant to the NIS Center of Excellence for a project on " <i>Diamond biosensors for recording neuronal activity</i> "
2012-14	<i>EU-POR project BE-FREE</i> funded by the Regione Piemonte for the use of multielectrode devices to detect illegal usage of beta-agonists on bovine cardiac pacemaker cells and in the urine of athletes.



2013-15

PRIN-MIUR (local coordinator) project on: *"Excitatory/inhibitory balance in the central nervous system: synaptic transmission, plasticity and synaptopathies"*.