Curriculum Vitae

Emilio Carbone



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*Position:* Former Full Professor of Physiology

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*Education and training* ***1971*** Degree on Physics with full marks at Genoa University (Italy) with a master thesis with Drs. Franco Conti ed Enzo Wanke on the “1/f noise” properties of solid-state devices for applications to studies on ion current fluctuations in excitable membranes.

***1971-73***Two years N.I.H. fellowship at the National Institute of Mental Health in the Laboratory of Neurobiology of Dr. Ichiji Tasaki in Bethesda (MD, USA) to study the molecular properties of squid giant axon excitability using classical electrophysiological recordings and newly developing optical techniques using voltage-dependent fluorescent dyes and aequorin bioluminescence.

***1973-74*** Research collaborator at the Department of Physics, University of Genoa, Italy, with a research contract for studying under the supervision of Dr. Franco Conti the signalling properties of voltage-dependent dye molecules on artificial bilayer membranes and stimulated squid giant axons.

***1974-75*** Compulsive military service.

***1975*** Six months contract at the Institute of Cybernetics and Biophysics, National Research Council in Camogli (Genoa, Italy) to collaborate with Dr. E. Wanke on a project on the gating properties of neuronal voltage-gated Na+ and K+ channels and their modulation by intracellular and extracellular pH changes.

***1976*** Researcher at the Institute of Cybernetics and Biophysics, National Research Council in Camogli (Genoa, Italy).

*Research experience* ***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*** Research Leader at the Department of Neuroscience, 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, HW, USA.

 ***1994-2001*** Visiting Professor at the Department of Pharmacology & Terapeutics, Universidad Autonoma de Madrid, Madrid, Spain.

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

***2006-23*** 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

***2011-23*** Executive Editor of the *Pflügers Archiv European Journal of Physiology*, Springer Verlag, Berlin

***2013-18*** Research Leader at the Department of Drug Science, University of Torino, Italy.

***2014-18***Vice-Director of the Nanostructured Surfaces and Interfaces (NIS) Center of Excellence, University of Torino

***2015-18*** Vice-Director of Research at the Department of Drug Science, University of Torino, Italy

***2018-21*** President of the Nanostructured Surfaces and Interfaces (NIS) Center of Excellence, University of Torino

***2019*** Guest Professor at the *Leopold‐Franzens‐University of Innsbruck t*o promote top‐level international scientific and didactic exchange with the *Center of Chemistry and Biomedicine of the University of Innsbruck* and at supporting internationalization on site. (May-June 2019).

 ***2019-23*** External advisor of the *CavX - Calcium channels in excitable cells* PhD Neuroscience program with active groups operating in Innsbruck and Krems (Austria).

*Teaching experience* ***1986-2018*** Full professor of *Physiology* at the Department of Drug Science, University of Torino, Italy. Teaching courses of *General Physiology* at the Faculty of Pharmacy (2nd year of Pharmacy and CTF) in Torino.

 ***1989-1996*** Professor of *Physiology* at the Faculty of Pharmacy, University of Novara, Italy. Teaching courses of *General Physiology* (2nd year of Pharmacy).

***2000-18*** Member of the Doctorate School of Neuroscience, University of Torino, Italy. Teaching courses on *Molecular and Cellular Neuroscience*, *Biophysics and Physiology of Ion Channels* for PhD students.

***2005-18*** Professor of Physiology at the School of Hospital Pharmacy, Faculty of Pharmacy, University of Torino. Teaching courses on *The Physiology of Nutrition* (1 CFU, 2nd year), *The Physiology of Pain* (1 CFU, 3rd year), *The Neurophysiology of Central Nervous System* (1 CFU, 3rd, year).

***2009-18*** Main coordinator of the textbook: *Fisiologia: dalle molecole ai sistemi integrati*. **E. Carbone**, F. Cicirata, G. Aicardi. Ia Edizione, EdiSES S.r.l., Napoli.

 ***2010-2014*** Professor of *Physiology* at the Courses of Herbal Medicine in Savigliano (CN), University of Torino, Italy. Teaching course on *Organ* *Physiology* (2nd year of TE).

***2018-23*** Main coordinator of the textbook: *Fisiologia: dalle molecole ai sistemi integrati*. **E. Carbone**, G. Aicardi, R. Maggi. IIa Edizione, EdiSES S.r.l., Napoli.

***2018-23***Adjunct professor of *Physiology* at the Department of Drug Science, University of Torino, Italy. Teaching courses on: *Physiology of Nutrition* (3 CFU, Pharmacy, 3rd year) and the module of *Channelopathies* (1 CFU) in the course of *Molecular and Genetic Basis of Diseases* (CTF, 4th year).

*Main research topics*

*and achievements* E. Carbone is presently an active researcher at the Department of Drug Science of Torino. He has consolidated experience in the physiology and biophysics of neuronal excitability, voltage-gated Ca2+ channels, Ca2+signalling, Ca2+ channel-secretion coupling and central neurons synaptic plasticity.

 EC has specific interest on: i) Ca2+ channel permeability and gating, ii) expression, distribution and role of voltage-gated Ca2+ channels at the somatic and presynaptic terminals, iii) role of neurotrophic factors on synaptic plasticity through the recruitment of voltage-gated Ca2+ channels, iv) role of Ca2+ channels in the regulation of Ca2+-secretion coupling in neuroendocrine cells and hippocampal neurons, v) Ca2+ channelopathies causing neurological disfunctions, autism and mental retardation in humans.

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 of secretory events.

In the field of Ca2+ channel function, neuronal excitability and channelopathies, EC has made important contributions concerning:

1. the gating properties of low-threshold T-type Ca2+ channels (*Carbone & Lux, Nature, 1984*)
2. the molecular basis of single Ca2+ channel inhibition by membrane receptors and G proteins (*Carabelli et al. Neuron, 1998*)
3. the direct and remote modulation of neuroendocrine L-type channels (*Cesetti et al., J. Neuroscience, 2003*)
4. the effects of BDNF on N- and P/Q Ca2+ channel expression, neuronal excitability and synaptic plasticity (Baldelli et al., *J. Neuroscience*, *2005*)
5. the effects of Ca2+ channel modulation, up-regulation and recruitment during stress conditions on neurotransmitter release and cell exocytosis (*Carabelli et al., J. Physiology, 2007*)
6. the role of L-type channels as pacemaker channels in chromaffin cells and central neurons (*Marcantoni et al., J. Neuroscience, 2010*)
7. Cav1.2 and Cav1.3 L-type channelopathies causing autism in humans (*Calorio et al., J. Physiology, 2019*).

 In collaboration with the Physics Department in Torino and with the Institute of Electron Devices and Circuits of Ulm University, Ulm (Germany), EC has contributed in the last fifteen years (*2008-23*) to the development of new diamond-based biosensors able to detect amperometric, potentiometric and optical signals to be used for the simultaneous detection of quantal release of neurotransmitter molecules (adrenaline, noradrenaline, dopamine and serotonin), action potential waveforms and fluorescence Ca2+ signals from neuroendocrine cells and neurons. More than twenty full papers have been published on this argument (see full list of publications)

 EC is author of ***180*** full papers on international journals and books with ***h-index 55***, ***h10-index 147*** and ***10101 quotations*** (taken from ***Google Scholar***). EC is invited speaker in national and international congresses, workshops, PhD courses, advanced schools, and seminars.

 A list of very recent invited lectures (***years 2018-2023***) is given:

***2018***3rd European Calcium Channel Conference*, Chairman and speaker on: Cav1.2 and Cav1.3 channel gating mutations inducing autism in humans and mouse models.* Alpbach (Austria). May 2018.

**2018** Minisymposium on Physiology and Pathophysiology of Voltage-Gated Ca2+ Channels: Recent Insight: *Chasing calcium channel function in adrenal chromaffin cells using mouse models.* Innsbruch (Austria). June 2018

***2018***Invited lecture on: *“L-type calcium channels in pacemaking, secretion and autism viewed through mice models” at the Institut de Génomique Fonctionnelle (IGF), CNRS UMR 5203, Inserm U1191 34094 (Montpellier), November 28 2018.*

***2019*** *5th International Congress on Voltage-gated Calcium Channels. George Town (Penang, Malaysia), March 31- April 5 2019.*

***2019***Invited presentation on*: “Ca2+-signaling dysfunctions of L-type Cav1 channel missense mutations causing ASD: gating defects and therapeutic action”* at the EJP meeting on Rare Diseases Info Day and Brokerage Event. TÜBITAK & Sabancı University, İstanbul. November 7 2019.

***2020*** Invited lecture on: “*The role of calcium channels in adrenal chromaffin cells*” at the Symposium on *“Ion channels in brain diseases: causes, mediators and drug targets”* at Karl Landsteiner University of Health Sciences, Krems an der Donau, February 27 2020.

***2021*** Invited virtual lecture on: *“Cav1.2 channelopathies causing autism: new molecular and cellular hallmarks on Timothy syndrome”* for the Neuroscience Seminar Series at University of Massachusetts, Medical School, Worcester (MA, USA), February 11, 2021

***2022***Invited presentation on*: “L-type channelopathies causing autism: common gating changes identified in autistic mouse models”* at the *European Calcium Channel Conference Satellite Symposium “Calcium channels in excitable cells” Innsbruck*, May 20-21, 2022.

***2022***Invited presentation on*: “L-type channelopathies causing autism: new identified molecular hallmarks using autistic mouse models”* at theIon Channel Modulation Symposium (ICMS), Clare College Cambridge (UK), June 22-23, 2022.

***2022***Invited presentation: *New firing modes and well-resolved ion currents at the cell-MEAs interface of rat chromaffin cells,* at the17th International Symposium on Chromaffin Cell Biology, Hamburg (Germany), July 7-12 2022.

**2023** Invited lecture on: *Highlights on common channel gating changes in Cav1.2 and Cav1.3 channelopathies associated with autism*” at the 32nd Ion Channel Meeting in Le Lazaret, Sète (France). September 17-20, 2023.

**2024** Invited presentation: *Muscarine stimulates chromaffin cell firing by blocking Kv7 and activating TRPC5 channels*, at the 6th International Calcium Channel Conference, Boracay (Philippines) February 25th, March 1st, 2024.

*Peer-review activity on*

*grants & publications* EC is active reviewer of papers submitted to biophysical, physiology, pharmacology and neuroscience international journals, including: *The Biophysical Journal, Biosensors, European Biophysics Journal, Biosensors & Bioelectronics, Scientific Reports, Nature Communications, 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*, and *Biochimica Biophysica Acta Biomembranes*.

Since 2011 EC is elected Executive Editor of *Pflügers Archiv European Journal of Physiology:* the official journal of the *Deutsche Physiologische Gesellschaft (DPG).*

EC has peer-reviewed grant applications for national and international organizations (Human Frontier (UE), Wellcome Trust (UK), FECYT (Spain), National Science Foundation (USA), Slovak Research and Development Agency, Israel Science Foundation (Israele), 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). Recently he reviewed also ERC consolidator, Europ. Science Found. (ESF), and Czech Science Found. (GAČR) grants

*Final notes* The list of scientific publications (*last 10 years*) and research grants (*last 20 years*) are available on separate files.

Torino, 11.6.2023



Prof. Emilio Carbone