

CURRICULUM VITAE

Girolamo CALÒ

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Date of Birth: March 27th 1965

Nationality: Italian

Family status: Married, 3 childrens

Personal Statement

G. Calo' has a large experience in research with a broad background in the pharmacology of peptidergic systems. Since 1990 G. Calo' has published more than 240 papers (number of citations 6500, H number 43) focused on peptide receptor pharmacology in particular in the fields of kinins, tachykinins, endothelins, opioids, nociceptin/orphanin FQ, urotensin II and, more recently, neuropeptide S. Several of these papers, particularly in the field of nociceptin/orphanin FQ and neuropeptide S, have been highly quoted placing them in the top 1% within their field: according to essential science indicators this demonstrated that the work summarized in those papers was highly influential and made a significant impact among scientists working in the field. G. Calo' is also author of several patents on original ligands for GPCR and novel therapeutic indications for such ligands. Since 1999 G. Calo' received research grants from different institutions at local, national, european, and international levels, and performed a large number of projects in collaboration with pharma industries.

Education:

Laurea in Medicina e Chirurgia (MD), 30 Ottobre 1989, Università degli studi di Ferrara, Ferrara. (Equivalent of First Degree in Medicine and Surgery)

Dottore di Ricerca (Ph.D.). Dottorato di ricerca in Farmacologia Cellulare e Molecolare, Ottobre 1995, Università degli studi di Ferrara. Thesis: Release and metabotropic effects of glutamate on neuronal tissue in vitro. Tutor: Prof L Beani.

Employment:

Associate Professor of Pharmacology, Dept. Medical Sciences, Section of Pharmacology, University of Ferrara (Nov 2014 -).

Assistant Professor in Pharmacology, Dept. Medical Sciences, Section of Pharmacology, University of Ferrara (Sept 1995 – Oct 2014).

Society membership:

Società Italiana di Farmacologia (1995-); European Neuropeptide Club (1997-); European Opioid Conference (2000-); International Narcotics Research Conference (1999-), Society for Neuroscience (2006-); ASPET (2010-)

Committee membership

- IUPHAR Receptor Nomenclature Committee, Subcommittee Opioid Receptors (2004-), member.
- IUPHAR Receptor Nomenclature Committee, Subcommittee Neuropeptide S (2013-), Chair.
- Editorial Board of the journal Peptides (2009-)
- Member of the Associate Editorial Board of the British Journal of Anaesthesia (2011-2017)
- Review Editor of the section Frontiers in Psychopharmacology of the journal Frontiers in Psychiatry. (2016-)

Awards and Honors

Società Italiana di Farmacologia – Farindustria, Award for Pharmacological Research 2001, Genova June 1st, 2001.

Honorary Lecturer, Department of Anaesthesia, Critical Care and Pain Management, University of Leiceester, UK. (March 2003- Feb 2008).

Premio Alberigo Benedicenti 2004 – best scientific productivity 2002-03. Naples June 3rd 2005.

Honorary Senior Lecturer, Department of Anaesthesia, Critical Care and Pain Management, University of Leiceester, UK. (March 2008- Feb 2017).

Associate Professorship – in February 2014 Dr Calo has been qualified for associate professorship by the pharmacology national ASN committee (Bando 2012).

Full Professorship – in February 2014 Dr Calo has been qualified for full professorship by the pharmacology national ASN committee (Bando 2012).

Special Visiting Professorship – during the period 2015/17 in the frame of the program science without borders funded by the Brazilian government G Calo' will spend 3 months/year at the Dept of Biophysics and Pharmacology, Federal University of Rio grande du Noth in Natal as visiting professor to work on a research project in collaboration with Prof Elaine Gavioli.

Gayle A. Olson & Richard D. Olson Prize 2014/15. The winner was selected by the Peptides Olson Prize Committee: Illana Gozes (Israel), Marcello Villar (Argentina), and Tomas Hökfelt (Sweden).

Honorary Senior Lecturer, Department of Anaesthesia, Critical Care and Pain Management, University of Leiceester, UK. (March 2017- Feb 2022).

Invited lectures

- Annual Meeting of the European Neuropeptide Club, Gent, Belgium, May 6-9, 1998.
Invited speaker & Chairman of the session Nociceptin and its Receptor
- Annual Meeting of International Narcotics Research Conference, 10-15 July 1999,
Saratoga Springs (NY), USA. Invited speaker.
- Seminar on Nociceptin Receptors – Douglas Hospital Reserch Centre, Montreal,
Quebec, Canada. 16 July 1999, invited by Prof. R. Quirion.
- Conference de Pharmacologie: Nociceptin receptor pharmacology – Dept of
Pharmacology, University of Sherbrooke, Quebec Canada. 19 July 1999,
invited by Prof. P. D’Orleans-Juste
- Annual Meeting of the European Society of Anaesthesiology, Vienna, April 1-4,
2000. Invited speaker and Chaiman of the session Orphan receptor and
nociception.
- Seminar “Nocicettina/orfanina FQ: farmacologia e neurobiologia”, Istituto Superiore
della Sanita’, Roma, 15 Settembre 2000. Invito del Prof. Massotti
(Laboratorio di Farmacologia).
- Experimental Biology 2001 March 31 – April 4, 2001, Orlando, US. Invited speaker
of the symposium: Autonomic and cardiovascular reggulation: focus on
nociceptin and opioid peptides.
- XXX Congresso Nazionale della Società Italiana di Farmacologia, Genova, 30
Maggio – 2 Giugno 2001, Invited speaker: profilo farmacologico di
[Nphe¹]NC(1-13)NH₂
- EPHAR 2001, III meeting of European Pharmacological Societies, 3-6 July 2001,
Lyon France. Invited speaker at the symposium: Pharmacology and
neurobiology of nociceptin / orphanin FQ.
- Peptide Receptors 2001, Montreal July 2001. Invited speaker at the symposium: Pain
related peptides.
- Japanese Narcotics Research Conference (JNRC) 24-25 August 2001, invited
speacker, antinociceptive properties of the OP4 receptor antagonist di
[Nphe¹]NC(1-13)NH₂
- Seminar on “nociceptin/orphanin FQ pharmacology and neurobiology Pain” Institute
of Molecular Pharmacology Berlin, Germany. 18 September 2001. Invited
by Dr Berger.
- XIVth Word Congress of Pharmacology, 7-12 July 2002, San Francisco (CA): invited
speaker.
- XXXIV annual meeting of the Brazilian Society of Experimental Pharmacology, 28-
31 Oct 2002, Aguas de Lindoia (SP), Brazil: invited speaker
- Seminar on N/OFQ involvement in pain transmission – Institute of Pharmacology,
University of Erlangen, Germany, Dec 2002, invited by Prof. Zeiholfer.
- Seminar on N/OFQ pharmacology – Centre for Auditory Research, University
College London, London, UK., Jan 2003, invited by Dr Stefano Casalotti.
- XXXI Congresso Nazionale della Società Italiana di Farmacologia, Trieste, 26-29
Giugno 2003, speacker: Blockade of nociceptin/orphanin FQ – NOP receptor
signaling produces antidepressant – like effects.
- European Opioid Conference, 4-7th April 2004, Visegrad, Hungary. Invited speaker:
A novel series of higly potent and selective ligands for the
nociceptin/orphanin FQ receptor

Annual Meeting of the European Neuropeptide Club, Alicante, Spain, 9th - 12th of May 2004, Invited speaker & Chairman della sessione “nociceptin/orphanin FQ and its receptors – novel ligands and therapeutic opportunities.

Seminar on “nociceptin/orphanin FQ receptor pharmacology” Institute of Physiology and Pharmacology, LSU, New Orleans, 5 July 2005. Invited by Prof D Kapusta.

National Congress of the Italian Society of Neuroscience and Joint Italian-Swedish Neuroscience Meeting, Ischia (Naples), 1-4 October 2005. invited speaker.

European Opioid Conference 2006 - Salamanca, Spain, April 19th-21st 2006. Organizer of the Symposium “*Therapeutic opportunities for NOP receptor ligands*”.

XXXIII Congresso Nazionale della Società Italiana di Farmacologia, Cagliari 6-9 Giugno 2007 “*Nuovi ligandi per il recettore di nocicettina/orfanina FQ*”. invited speaker

International Narcotics Research Conference 2007, Berlin July 8–13, 2007 “*Novel ligands selective for the nociceptin/orphanin FQ receptor*”. invited speaker

16th Camerino-Noordwijkerhout Symposium “an overview of receptor chemistry” 9-13 Settembre 2007 – “*Pharmacological and SAR studies on neuropeptide S*”. invited speaker

Meeting nazionale della società italiana per lo studio del dolore – 27 Ottobre 2007, Nocicettina/Orfanina FQ - Recettore NOP: Nuove Prospettive per la Terapia del Dolore. invited speaker

Seminar on “Pharmacology and neurobiology of neuropeptide S, 28 Febbraio 2008, RIKEN Brain Science Institute Tokyo, Japan. invited by Dr Niall Murphy.

Japan Society of Anaesthesiology, regional meeting. Nociceptin / Orphanin FQ and Nociception, 1st March 2008. Hirosaki, Japan. invited speaker.

Seminar on “Pharmacology and neurobiology of nociceptin/orphanin FQ receptor ligands, Febbraio 2009, Istituto di Farmacologia, Università di Catania, Italy. Invited by Prof Scotto.

Peptide Receptors 2009, Quebec June 2009. Invited speaker at the symposium: From peptide to a drug.

European Neuropeptide Club meeting 2010, Pecs, Hungary. Chairman and speaker of the symposium of novel ligands for nociceptin and opioid receptors.

Seminar on “nociceptin/orphanin FQ receptor agonists as spinal analgesics, Febbraio 2011, Istituto di Farmacologia, Università di Firenze, Italy. Invited by Prof Ghelardini.

Experimental Biology 2012, San Diego, US. Organizer and Chairman of the symposium “The nociceptin/orphanin FQ – NOP receptor system: neurobiology, pharmacology, and therapeutic opportunities”.

Seminar on “Pharmacology and structural biology of the nociceptin/orphanin FQ receptor, November 2013, Dept of Pharmacology, University of Camerino, Italy. Invited by Prof Ciccocioppo.

Società Italiana di Farmacologia, Research Day, 27 May 2014, Stresa. Agonopain: NOP receptor agonists for pain. Invited speaker

Seminar on “the nociceptin/orphanin FQ – NOP receptor system – research milestones and novel ligands”, July 2014, Dept of Pharmacology, University of Sydney. Invited by Prof Christie.

Seminar on “the nociceptin/orphanin FQ – NOP receptor system – research milestones and novel ligands”, July 2014, Dept of Pharmacology, University of Melbourne. Invited by Prof Hoyer.

- Seminar on “biased agonism – focus on the nociceptin/orphanin FQ receptor system”, Feb 2015, Dept of Pharmacology, Federal University Rio Grande do Norte, Natal, Brazil. Invited by Prof Gavioli.
- Italian Pharmacological Society, Advances in pain research: pathophysiology and new therapeutic strategies, 18-19 June 2015, Naples. Pharmacological characterization of cebranopadol a novel analgesic acting as mixed nociceptin/orphanin FQ and opioid receptor agonist. Invited speaker.
- 47° Brazilian Congress of Pharmacology and Experimental Therapeutics, 28/09 – 01/10 2015, Aguas de Lindoia, SP, Brazil. In vitro and in vivo characterization of cebranopadol a novel mixed nociceptin/orphanin FQ and opioid receptor agonist. Invited speaker.
- 20th Annual International PhD Course, Translational neurobiology of the pain system. 27-28 Oct 2015, Aalborg University, Denmark. Targeting nociceptin/orphanin FQ receptors for the development of novel analgesics. Invited by prof. Lars Arendt-Nielsen.
- Seminar on Targeting nociceptin/orphanin FQ receptors for the development of novel analgesics, CIEnP, Florianopolis, Brazil. Invited by prof Calixto.
- II NOP advisory board, Grunenthal, Aachen, Germany, 25-26 02/2016. Pharmacological profile of nociceptin/orphanin FQ receptor interacting with G-proteins and β -arrestins. Invited speaker.
- Pain Mechanisms and Therapeutics Conference, Taormina, 6-10 June 2016. Pharmacology and neurobiology of the nociceptin/orphanin FQ – NOP receptor system, invited speaker.
- INN: prospettive in neuroscienze, 28/29 June 2016 Verona. Selettività funzionale e recettori per nociceptina / orfanina FQ. Invited speaker

Publication list

Books

- Special Issue on Nociceptin/orphanin FQ and its Receptor, Guest Editors: M. Massi, G. Calo', C. Polidori, D. Regoli, *Peptides* 2000, 21(7).

Book Chapters

- Regoli, D., Nguyen, Q.T. & Calo, G. (1996). Pharmacology of tachykinins. In *Neurogenic inflammation*. ed. Geppetti, P. & Holzer, P. pp. 91-99. Boca Raton: CRC Press.
- Regoli, D., Geppetti, P. & Calo', G. (1998). The tachykinin family of peptides and their receptors. In *Pro-inflammatory and anti-inflammatory peptides*. ed. Said, S.I. pp. 147-162. New York: Marcel Dekker.
- Regoli, D. & Calo', G. (1998). Peptides vasoactifs. In *Medications cardio-vasculaires et respiratoires*. ed. Giudicelli, J.F., Berdeaux, A. & Advenier, C. pp. 75-86. Paris: Hermann.
- Calo, G., Rizzi, A. & Regoli, D. (1999). Pharmacology of nociceptin receptors. In *Peptidergic G-protein coupled receptors: from basic research to clinical applications*. ed. Geppetti, P., Schwartz, T. & Muller-Estrel, W. pp. 127-136: IOS press.

- Calo, G. (2000) The orphan receptor and nociception. In *Refresher Course Lectures Book*, European Society of Anaesthesiologists, 8th Annual Meeting. Ed. G.B. Drummond, pp 197-201.
- Calo G, Lambert DG, Guerrini R. 2013. Nociceptin/orphanin FQ in Kastin AJ, ed. *Handbook of biologically active peptides*, Academic Press.
- Camarda, V. & Calo, G. (2013) Chimeric G proteins in fluorimetric calcium assays: experience with opioid receptors. *Methods Mol Biol.* **937**, 293-306.
- Calo G. and Guerrini, R. Medicinal chemistry, pharmacology, and biological actions of peptide ligands selective for the nociceptin/orphanin FQ receptor. In *Research and development of opioid-related ligands*, Ko, M. C.; Husbands, S. M., Eds. Oxford University Press: Washington, DC, 2013; Vol. 1131, pp 275-325.

Editorials

- F. Gobeil, G. Calo', D. Regoli (1999) Kinins and their receptors in Encyclopedia of Life Sciences published on line at www.els.net.
- G. Calo' is a contributing author of the Receptor and Ion Channel Nomenclature Supplement published as supplement of Trends in Pharmacol Sci in 1999, 2000, 2001 and of Br J Pharmacol in 2002, 2003, 2004, 2005, 2006, 2008, 2011, and 2013.
- G. Calo' is the author of the NOP receptor section of the Elsevier xPharm editorial project published on line in 2004.

Full Papers

- Morari M., **Calo' G.**, Antonelli T., Gaist G., Acciarri N., Fabrizi A., Bianchi C. and Beani L. Inhibitory effect of NMDA receptor activation on quisqualate-stimulated phosphatidylinositol turnover in the human cerebral cortex. *Brain Res.* (1991) **553**, 14-17.
- Gallerani M., Manfredini R., Ricci L., Grandi E., Cappato R., **Calo' G.**, Pareschi P. L., Fersini C. Sudden death from pulmonary thromboembolism: chronobiologic aspects. *European Heart Journal.* (1992) **13**, 661-665.
- Beani L., Bianchi C., Antonelli T., **Calo' G.**, Morari M., Ferioli V., and Gaist G. Comparison of [³H]-Choline and [³H]-D-Aspartate efflux from guinea pig and human neocortex. *J. Neurochem.* (1992) **58**, 1454-1459.
- Bianchi C., Beani L., Antonelli T., Vedovato M., **Calo' G.** and Tomasini C. A Simple method for electrical field stimulation of cultured granule cells. *J Neurosci Methods.* (1992) **45**, 175-182.
- Ferraro L., Tanganelli S., **Calo' G.**, Antonelli T., Fabrizi A., Acciarri N., Bianchi C., Beani L. and Simonato M. Noradrenergic modulation of gamma-aminobutyric outflow from the human cerebral cortex. *Brain Res.* (1993) **629**, 103-108.
- Morari M., Menegale M., **Calo' G.**, Ferraro L., Tomasini C., Bianchi C. and Beani L. Excitatory amino acids (EAAs) stimulate phosphatidylinositol turnover in adult rat striatal slices: interaction between NMDA and EAA metabotropic receptors. *Neurochem Int.* (1994) **24**, 191-200.
- Manfredini R., Gallerani M., **Calo' G.**, Govoni M., Pasin M. and Fersini C. Emergency admission of opioid drug abusers for overdose: a chronobiological study of enhanced risk. *Annals of Emergency Medicine.* (1994) **24**, 615-8.
- Manfredini R., Gallerani M., Caracciolo S., Tomelli A., **Calo' G.**, and Fersini C. Circadian variation in attempted suicide by deliberate self-poisoning. *British Medical Journal.* (1994) **309**, 774-5.
- Morari M., **Calo' G.**, Ferraro L., Fabrizi A., Acciarri N., Piazza G., Bianchi C. and Beani L. Ampa receptor activation regulates the glutamate metabotropic receptor stimulated phosphatidylinositol turnover in human cerebral cortex slices. *Neurochem Int* (1995) **26**, 77-83.

10. Fabbian F., Squerzanti R., **Calo' G.**, De Paoli Vitali E. and Gilli P. Twenty-four-hour blood pressure profile in polycystic kidney disease. *Clinical Nephrology*. (1995) **44**, 343-345.
11. **Calo' G.**, Gratton J.P., Telemaque S., D'Orleans-Juste P. and Regoli D. Pharmacology of endothelins: vascular preparations for studying ETA and ETB receptors. *Mol Cell Biochem*. (1996) **154**, 31-37.
12. Regoli D., **Calo' G.**, Rizzi A., Bogoni G., Gobeil F., Campobasso C., Mollica G., and Beani L. Bradykinin receptors and receptor ligands (with special emphasis on vascular receptors). *Regulatory Peptides*. (1996) **65**, 83-89.
13. **Calo' G.**, Rizzi A., Bogoni G., Neugebauer V., Salvadori S., Guerrini R., Bianchi C. and Regoli D. (1996) The mouse vas deferens: a pharmacological preparation sensitive to nociceptine. *Eur J Pharmacol*. (1996) **311** R3-R5.
14. Bogoni G., Rizzi A., **Calo' G.**, Campobasso C., D'Orleans-Juste P. and Regoli D. Characterization of endothelin receptors in the human umbilical artery and vein. *Br J Pharmacol* (1996) **119**, 1600-1604.
15. **Calo' G.**, Rizzi A., Traina L. & Regoli D. Pharmacological characterization of a vasopressin VI receptor in the isolated human gastric artery. *Life Sci*. (1997) **60**, PL63-68.
16. **Calo' G.**, Rizzi A., Bodin M., Neugebauer W., Salvadori S., Guerrini R., Bianchi C. & Regoli D. Pharmacological characterization of nociceptin receptor: an in vitro study. *Can J Physiol Pharmacol*. (1997) **75**, 713-8.
17. Guerrini R., **Calo' G.**, Rizzi A., Bianchi C., Lazarus L.H., Salvadori S., Temussi P.A. & Regoli D. Address and message sequences for the nociceptin receptor: a structure- activity study of nociceptin-(1-13)-peptide amide. *J Med Chem*. (1997). **40**, 1789-93.
18. Regoli D., Rizzi A., **Calo' G.**, Nsa Allogho S. & Gobeil F. B1 and B2 kinin receptors in various species. *Immunopharmacol*. (1997) **36**, 143-147.
19. Fabbian F., Cavallini A.R., **Calo' G.**, Bagni B., Gilli P. & Squerzanti R. Target organ damage and renin-angiotensin-aldosterone system in essential hypertensives with and without metabolic risk factors. *Clinical Nephrology* (1997) **47**, 137-138.
20. Regoli D., Nguyen K. & **Calo' G.** Neurokinin receptors: comparison of data from classical pharmacology, binding, and molecular biology. *Ann NY Acad Sci* (1997) **812**, 144-146.
21. Rizzi A., Gobeil F., Bogoni G., **Calo' G.**, Campobasso C., Inamura N. and Regoli D. Antagonistic effect of FR 173657 on human, pig, rabbit and guinea pig kinin receptors: and in vitro study. *Can J Physiol Pharmacol* (1997) **75**, 601-608.
22. **Calo' G.**, Sbrenna S., Bianchi C. & Beani L. Immediate and delayed effects of in vitro ischemia on glutamate efflux from guinea pig cerebral cortex slices. *Brain Res*. (1997). **751**, 300-306.
23. Rizzi A., Gobeil F., **Calo' G.**, Inamura N. & Regoli D. FR 173657, a new potent and selective non peptide kinin B2 receptor antagonist: an in vitro study. *Hypertension* (1997). **29**, 951-956.
24. Rizzi A., **Calo' G.**, Amadesi S. & Regoli D. Kinin B1 and B2 receptors in pig vessels: characterization of two monoreceptor systems. *Naunyn Schmiedebergs Arch Pharmacol*. (1997). **356**, 662-670.
25. Gessi S., Rizzi A., **Calo' G.**, Agnello G., Jorizzo G., Mollica G., Borea P.A. & Regoli D. Human vascular kinin receptors of the B2 type characterized by radioligand binding. *Br J Pharmacol*. (1997) **122**, 1450-4.
26. Guerrini R., **Calo' G. (CA)**, Rizzi A., Bigoni R., Bianchi C., Salvadori S. & Regoli D. A new selective antagonist of the nociceptin receptor. *Br J Pharmacol*. (1998). **123**, 163-5.
27. Rizzi A., **Calo' G.**, Battistini B. & Regoli D. Contractile activity of endothelins and their precursors in human umbilical artery and vein: identification of distinct endothelin- converting enzyme activities. *J Cardiovasc Pharmacol*. (1998). **31**, S58-61.
28. **Calo' G.**, Guerrini R., Bigoni R., Rizzi A., Bianchi C., Regoli D. & Salvadori S. Structure-activity study of the nociceptin(1-13)-NH₂ N-terminal tetrapeptide and discovery of a nociceptin receptor antagonist. *J Med Chem*. (1998). **41**, 3360-6.
29. Rizzi A., Quaglio D., Vasquez G., Mascoli F., Amadesi S., **Calo' G.**, Regoli D. & Zamboni P. Effects of vasoactive agents in healthy and diseased saphenous veins. *J Vasc Surgery* (1998) **28**, 855-861.
30. **Calo' G.**, Rizzi A., Marzola G., Guerrini R., Salvadori S., Beani L., Regoli D. & Bianchi C. Pharmacological characterization of the nociceptin receptor mediating hyperalgesia in the mouse tail withdrawal assay. *Br J Pharmacol*. (1998). **125**, 373-8.
31. Varani K., **Calo' G. (CA)**, Rizzi A., Merighi S., Toth G., Guerrini R., Salvadori S., Borea P.A. & Regoli D. Nociceptin receptor binding in mouse forebrain membranes: thermodynamic characteristics and structure activity relationships. *Br J Pharmacol*. (1998) **125**, 1485-90.

32. Bigoni R., Giuliani S., **Calo' G.(CA)**, Rizzi A., Guerrini R., Salvadori S., Regoli D. & Maggi C.A. Characterization of nociceptin receptors in the periphery: in vitro and in vivo studies. *Naunyn Schmiedebergs Arch Pharmacol.* (1999) **359**, 160-7.
33. Madeddu P., Salis M.B., Milia A.F., Emanuelli C., Guerrini R., Regoli D. & **Calo' G.** Cardiovascular effects of nociceptin in unanesthetized mice. *Hypertension* (1999) **33**, 914-9.
34. Rizzi A., **Calo' G. (CA)**, Trevisani M., Tognetto M., Fabbri L., Mapp C., Guerrini R., Salvadori S., Regoli D. & Geppetti P. Nociceptin receptor activation inhibits tachykinergic non adrenergic non cholinergic contraction of guinea pig isolated bronchus. *Life Sci.* (1999) **64**, L157-63.
35. Meini S., Quartara L., Rizzi A., Patacchini R., Cucchi P., Giolitti A., **Calo' G.**, Regoli D., Criscuoli M. & Maggi C.A. MEN 11270, A novel selective constrained peptide antagonist with high affinity at the human B2 kinin receptor. *J Pharmacol Exp Ther.* (1999) **289**, 1250-6.
36. Okawa H., Nicol B., Bigoni R., Hirst R.A., **Calo' G.**, Guerrini R., Rowbotham D.J., Smart D., McKnight A.T. & Lambert D.G. Comparison of the effects of [Phe1psi(CH2-NH)Gly2]Nociceptin (1-13)NH2 in rat brain, rat vas deferens and CHO cells expressing recombinant human nociceptin receptors. *Br J Pharmacol.* (1999) **127**, 123-30.
37. Colamussi P., **Calo' G.**, Sbrenna S., Uccelli L., Bianchi C., Cittanti C., Siniscalchi A., Giganti M., Roveri R. & Piffanelli A. New insights on flow-independent mechanisms of 99mTc-HMPAO retention in nervous tissue: in vitro study. *J Nucl Med.* (1999) **40**, 1556-62.
38. Bertorelli R., Corradini L., Rafiq K., Tupper J., **Calo' G.** & Ongini E. Nociceptin and the putative ORL-1 ligand [Phe1psi(CH2-NH)Gly2]nociceptin(1-13)NH2 exert anti-opioid effects in the Freund's adjuvant-induced arthritis rat model of chronic pain. *Br J Pharmacol.* (1999) **128**, 1252-1258.
39. Varani K., Rizzi A., **Calo' G. (CA)**, Bigoni R., Toth G., Guerrini R., Gessi S., Salvadori S., Borea P.A. & Regoli D. Pharmacology of [Tyr1]nociceptin analogs: receptor binding and bioassay studies. *Naunyn Schmiedebergs Arch Pharmacol.* (1999) **360**, 270-7.
40. Rizzi A., Rizzi C., Amadesi S., **Calo' G.**, Varani K., Inamura N., and Regoli D. Pharmacological characterisation of the first non-peptide bradykinin B2 receptor agonist FR 190997: an in vitro study on human, rabbit and pig vascular B2 receptors. *Naunyn Schmiedebergs Arch Pharmacol.* (1999) **360**, 361-367.
41. Rizzi C., Rizzi A., **Calo' G.**, Jorizzo G., Agnello G., Mollica G., Inamura N., and Regoli D. Characterization of FR 172357, a new non-peptide bradykinin B(2) receptor antagonist, in human, pig and rabbit preparations. *Eur J Pharmacol.* (1999) **386**, 25-31.
42. Salvadori S., Guerrini R., **Calo' G.**, Regoli D. Structure-activity studies on nociceptin/orphanin FQ; from full agonist, to partial agonist, to pure antagonist. *Il Farmaco* (1999) **54**, 810-25.
43. Xu I.S., Hashemi M., **Calo' G.**, Regoli D., Wiesenfeld-Hallin Z. & Xu X.J. Effects of intrathecal nocistatin on the flexor reflex and its interaction with orphanin FQ nociceptin. *Neuroreport* (1999) **10**, 3681-4.
44. Rizzi A., Bigoni R., **Calo' G. (CA)**, Guerrini R., Salvadori S. & Regoli D. [Nphe1]nociceptin(1-13)NH2 antagonizes nociceptin effects in the mouse colon. *Eur J Pharmacol.* (1999) **385**, R3-R5.
45. Sbrenna S., Marti M., Morari M., **Calo' G.**, Guerrini R., Beani L. & Bianchi C. L-Glutamate and gamma-Aminobutyric Acid Efflux from Rat Cerebrocortical Synaptosomes: Modulation by kappa- and mu- but Not delta- and Opioid Receptor Like-1 Receptors. *J Pharmacol Exp Ther.* (1999) **291**, 1365-1371.
46. Sbrenna S., Marti M., Morari M., **Calo' G.**, Guerrini R., Beani L. and Bianchi C. Modulation of 5-hydroxytryptamine efflux from rat cortical synaptosomes by opioids and nociceptin. *Br J Pharmacol.* (2000) **130**, 425-433.
47. **Calo' G.**, Guerrini R., Bigoni R., Rizzi A., Marzola G., Okawa H., Bianchi C., Lambert D.G., Salvadori S and Regoli D. Characterization of [Nphe(1)]nociceptin(1-13)NH(2), a new selective nociceptin receptor antagonist. *Br J Pharmacol* (2000) **129**, 1183-1193.
48. Polidori C., **Calo' G.**, Ciccocioppo R., Guerrini R., Regoli D. and Massi M. Pharmacological characterization of the nociceptin receptor mediating hyperphagia: identification of a selective antagonist. *Psychopharmacology* (2000) **148**, 430-437.
49. Hashimoto Y., **Calo' G.**, Guerrini R., Smith G. & Lambert D.G. Antagonistic effects of [Nphe1]nociceptin(1-13)NH2 on nociceptin receptor mediated inhibition of cAMP formation in Chinese ovary cells stably expressing the recombinant human nociceptin receptor. *Neurosci Lett.* (2000) **278**, 109-112.
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- peptide analogs with antinociceptive activity after systemic administration. *European journal of medicinal chemistry* 109:276-286.
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Research grants

FAR (Research Funds of the University of Ferrara) 1996: pharmacology of vasoactive peptides, 1y, collaborator (PI D Regoli)
FAR 1997: pharmacology of vasoactive peptides 1y collaborator (PI D Regoli).
FAR 1998: pharmacology of vasoactive peptides 1y collaborator (PI D Regoli)
FAR 1999: pharmacology of N/OFQ 1y PI
PRIN 1999 9905091432_001: pharmacology of the N/OFQ - NOP receptor system 2y collaborator (PI D Regoli)
FAR 2000: pharmacology of N/OFQ 1y PI
FAR 2001: pharmacology of N/OFQ 1y PI
CRUI/British Council IT/UK 2001: cellular actions of NOP ligands (partner DG Lambert, Leicester, UK) 2y PI
FP6-2002-MOBILITY-7: Nociceptin/orphanin FQ-NOP receptor signalling and mood regulation: behavioural, pharmacological and neurochemical studies (MOODNOP) 2y PI of the host institution.
FAR 2002: pharmacology of N/OFQ 1y PI
PRIN 2002 2002058325_001: pharmacology and neurobiology of NOP ligands, 2y collaborator (PI D Regoli)
Galileo IT/FR 2002: N/OFQ and brain development (partner P Gressens, Paris, France) 2y PI
IASP 2003: N/OFQ and pain transmission (partner DG Lambert, Leicester,UK) 3y PI
FIRB 2001 RBAU01CCSE_001: novel ligands for the NOP receptor, 3y collaborator (PI D Regoli)
CRUI/DAAD IT/D 2003: N/OFQ and nociception (partner HU Zeilhofer, Erlangen, D) 2y PI
NIH grant 2003 RO1HL71212: cardiovascular and renal effects of NOP ligands, 5y collaborator (partner and PI D Kapusta, New Orleans, US)
FAR 2003: pharmacology of N/OFQ, 1y PI
FAR 2004: pharmacology of N/OFQ and NPS, 1y PI
PRIN 2004 2004055475_001: pharmacology and biological actions of NOP ligands, 2y collaborator (PI D Regoli)
FAR 2005: pharmacology of N/OFQ and NPS 1y PI
FAR 2006: pharmacology of N/OFQ and NPS 1y PI
PRIN 2006: Il sistema neuropeptide S - recettore NPSR: identificazione di nuovi ligandi e studio delle attivita' biologiche in vitro ed in vivo, 2 y, PI.
FAR 2007: pharmacology of N/OFQ and NPS 1y PI
IT/HU 2007: novel ligands for opioid and NOP receptors (partner S Behnje, Szeged, HU) 3y PI.
FAR 2008: pharmacology of N/OFQ and NPS 1y PI.
FAR 2009: pharmacology of N/OFQ and NPS 1y PI
Neuroscience grant (Fondazione Compagnia S. Paolo) 2009: pharmacology and neurobiology of NPS 3y PI of the UniFE research unit.
FAR 2010: pharmacology of N/OFQ and NPS 1y PI
FIRB 2010 RBF109SBM_001: mixed MOP/NOP agonists as innovative analgesics 3y collaborator (PI C Trapella)
FAR 2011: pharmacology of N/OFQ and NPS 1y PI
FAR 2012: pharmacology of N/OFQ and NPS 1y PI
FAR 2013: pharmacology of N/OFQ and NPS 1y PI
FAR 2014: pharmacology of N/OFQ / opioid receptor mixed agonists, 1y PI

PRIN 2015 2015WX8Y5B - NOP receptor biased agonists as innovative drugs, 3y, PI
FAR 2015/16: functional selectivity and NOP receptors, 1y PI

Technology transfer and patents

During the period 1995-2000 G. Calo' contributed, as D Regoli collaborator, to the development of several industrial research projects in collaborations with the following companies: Italfarmaco (1994/95) novel antagonists of Y1 and B1 receptors, Hoest (1996) novel KATP blockers, Menarini (1997/98) B2 receptor antagonists, Schering-plough (1999/2000) NOP receptor agonists, Aventis (2000)UT receptor ligands.

Since 2001, G. Calo' acted as PI of the following industrial collaborations: Zealand Pharma (2001) pharmacological characterization of ZP120, GSK (2006) central effects of U-II, Allergan (2007-09) peripheral actions of NOP ligands, Helsinn (2009) pharmacological characterization of Netupitant, Allergan (2010/11) studies on retargeted toxins. Helsinn (2012-13) pharmacological characterization of proNetupitant. Allergan (2014/15) studies on AGN-001. Chiesi (2016) studies on PWT-N/OFQ. Grunenthal (2016) in vitro studies on GRT compounds. Chiesi (2017) DMR studies on lung cells.

In December 2002 together with medicinal chemistry colleagues G Calo' submitted a project to the Spinner organization (FSE funds) for the feasibility study of an academic spinoff. This project has been funded and in June 2003 the University of Ferrara spinoff company UFPeptides s.r.l. was constituted with G. Calo acting as Chairman. UFPeptides provides products and services to pharma companies. UFPeptides activities are focused to the identification and development of molecules interacting with G-protein coupled receptors; these proteins regulate several important biological functions and are implicated in a large variety of human diseases. UFPeptides collaborated with pharma companies for the development of research projects (2004-09), performed a proprietary research project partially funded by a PRRIIT grant (FSE funds, 2006-07), and made an agreement for the preclinical development of the agonopin (NOP agonists for urinary incontinence) project (2006). For this project an exclusive option license agreement has been signed by UFPeptides and Recordati in 2009 and a license agreement in 2011. The Phase I study of the agonopin project started in May 2014. Moreover, in 2015 an exclusive option license agreement has been signed by UFPeptides and Chiesi for the development of innovative antitussive drugs based on the PWT technology.

Patents

Guerrini Remo, Calo' Girolamo, Salvadori Severo, Regoli Domenico. Analoghi di nocicettina. 24/09/02; MI2002A 002022.

Guerrini Remo, Salvadori Severo, Calo' Girolamo, Regoli Domenico. Agonisti pieni e parziali ed antagonisti del recettore per nocicettina/orfanina FQ ad elevata potenza. 15/02/2005; FE2005A000003.

Guerrini Remo, Salvadori Severo, Calo' Girolamo, Regoli Domenico. Highly potent full and partial agonists and antagonists of the nociceptin/orphanine FQ receptor. 5/02/2006; PCT/EP2006/050958.

Trapella Claudio, Guerrini Remo, Calo' Girolamo, Regoli Domenico, Salvadori Severo. Identificazione di un antagonista del recettore NOP a struttura 1,2,3,6-tetraidro-piridinica. 22/07/2004; FE2004A000013.

Guerrini Remo, Salvadori Severo, Calo' Girolamo, Regoli Domenico, Lambert David. Identificazione di un antagonista del recettore UT. 26/07/2004; FE2004A000014.

Guerrini Remo, Calo' Girolamo, Regoli Domenico, Salvadori Severo, Marzola Erika, Dianella Savoia. Analoghi dermaseptinici ad attività antimicrobica. 21/06/2006; FE2006A000014.

Gavioli Elaine Cristina, Guerrini Remo, Calo' Girolamo, Regoli Domenico, Salvadori Severo. Antagonisti del recettore UT e loro usi terapeutici. 20/04/2006; FE2006A000007.

Guerrini Remo, Calo' Girolamo, Regoli Domenico, Salvadori Severo. Identificazione di un agonista parziale del recettore per il neuropeptide S. 27/02/2006; FE2006A000003.

Guerrini Remo, Salvadori Severo, Calo' Girolamo. Supramolecular aggregates comprising maleimido cores, European patent application N.13162532.9. 2013.

Teaching Activities

Relatore di tesi di laurea. Corsi di Laurea in Farmacia, Chimica e Tecnologie Farmaceutiche, Medicina e Chirurgia, Scienze Biologiche. Università di Ferrara, Ferrara. About 30 thesis.

Collegio dei Docenti del Dottorato di Ricerca in Farmacologia Cellulare e Molecolare (1995-2002), in Farmacologia e Oncologia Molecolare (2003-2012), in Medicina Molecolare e Farmacologia (2013-).

Incarichi ufficiali di insegnamento.

Corso di Biotecnologie Farmacologiche, Corso di Laurea in Chimica e Tecnologie Farmaceutiche, Facoltà di Farmacia. Università di Ferrara, Ferrara. Anno accademico 1999/2000 e 2000/01.

Corso di Farmacologia Clinica, Corso di Laurea in Odontoiatria. Facoltà di Medicina e Chirurgia, Università di Ferrara, Ferrara. Dal 2002/03 - 2010/11.

Corso di Farmacologia e Chemioterapia, Corso di Laurea in Odontoiatria, Facoltà di Medicina e Chirurgia, Università di Ferrara, Ferrara. dal 2008/09 ad oggi.

Corso di Farmacologia, Corso di Laurea per Dietista, Facoltà di Medicina e Chirurgia, Università di Ferrara, Ferrara. Dal 2002/03 al 2011/12.

Corso di Farmacologia, Corso di Laurea per Igenista Dentale, Facoltà di Medicina e Chirurgia, Università di Ferrara. Dal 2003/04 al 2011/12.

Corso di Farmacologia per la Scuola di Specializzazione in Reumatologia, Facoltà di Medicina e Chirurgia, Università di Ferrara, Ferrara. dal 2000/01 al 2011/12.

Corso di Farmacologia per la Scuola di Specializzazione in Gastroenterologia, Facoltà di Medicina e Chirurgia, Università di Ferrara, Ferrara. dal 2001/02 al 2011/12.

Corso di Farmacologia per la Scuola di Specializzazione in Medicina Interna, Facoltà di Medicina e Chirurgia, Università di Ferrara, Ferrara. dal 2002/03 ad oggi.

Corso di Farmacologia per la Scuola di Specializzazione in Ortognatodonzia, Facoltà di Medicina e Chirurgia, Università di Ferrara, Ferrara. dal 2003/04 ad oggi.

Corso di Farmacologia per la Scuola di Specializzazione in Medicina dello Sport, Facoltà di Medicina e Chirurgia, Università di Ferrara, Ferrara. dal 2003/04 ad oggi.

Corso di Farmacologia per la Scuola di Specializzazione in Pediatria, Facoltà di Medicina e Chirurgia, Università di Ferrara, Ferrara. dal 2011/12 ad oggi.

Ferrara, 28/12/2016

