Juan Lerma, Brief CV

Present and Previous positions

- 2014-. Secretary General-elect of the Federation of European Neuroscience Societies (FENS)
- 2013-present: Chairman of the PanEuropean Regional Committee of the International Brain Research organization (IBRO)
- 2007-present: Director, Instituto Neurociencias de Alicante (CSIC-UMH)
- 2005-2007. Vicedirector, Instituto Neurociencias de Alicante (CSIC-UMH)
- 2000- 03. Head of Department of Neural Plasticity. Instituto Cajal, CSIC
- 2000. Profesor de Investigación CSIC
- 1995: Acting Director. Instituto Cajal, CSIC
- 1993-96: Vicedirector. Instituto Cajal, CSIC

Fields of Scholarship

- Neuroscience
- Synaptic Transmission and Plasticity
- Glutamate receptors

Awards and Distinctions

- 2013- Distinction to the Scientific Merit. Government of Valencia Community.
- 2011-13 President of Spanish Neuroscience Society (SENC)
- 2010-13. Chairman of the Western European Regional Committee of IBRO
- 2010."Highest distinction to the investigative career". Universidad Nacional Mayor de San Marcos. Peru
- 2005- Member of European Dana Alliance for the Brain (EDAB)
- 2000- Member of European Molecular Biology Organization (EMBO)
- 2005. XI Award “Alberto Sols” to the Best Research Activity
- 2004. CEOE Foundation Award to the Sciences
- 2002. Award to the Scientific Excellence “Alonso Gabriel de Herrera”
- 2002. Santiago Grisolía Chair Award
- 1998. Distinction Award by the Health Science Foundation

Summary of Scientific Achievements

Juan Lerma (JL) initiated his career in 1979 at the **"RAMON Y CAJAL" HOSPITAL** in Madrid, studying the neural circuits and cellular activities that process sensory-motor integration during Paradoxical Sleep (REM sleep). After obtaining his Ph.D degree in 1983, he established an independent laboratory in the same department where he **CONTRIBUTED TO THE DEVELOPMENT OF BRAIN MICRODIALYSIS** until he **MOVED (1987) TO THE ALBERT EINSTEIN COLLEGE OF MEDICINE, IN NEW YORK**. In 1990, he returned to Madrid as Group Leader at the Cajal Institute (CSIC) where he continued to make key contributions in the field of glutamate receptors in neuronal physiopathology. In 2004, JL **MOVED WITH HIS GROUP TO THE INSTITUTO DE NEUROCIENCIAS** de Alicante, where he was appointed **VICEDIRECTOR IN 2005 AND DIRECTOR IN 2007.**

Upon returning to Spain, JL’s group has been working on the structure and the function of glutamate receptors, the most important signaling system in the brain, as it mediates more than 90% of the excitatory neurotransmission. To this end, JL implemented molecular and electrophysiological approaches. Through the generation and analyses of chimeric constructions, JL’s group **ANALYZED ONE IMPORTANT CHARACTERISTIC OF NEUROTRANSMITTER**

RECEPTORS: desensitization (Neuron 1992); defined its structural determinants (Neuron, 1998a) and the allosteric mechanism involved (Neuron, 2001), intrinsic to the NMDA type of glutamate receptors. In the frame of defining the molecular structures mediating neuronal communication, JL was **FIRST TO DESCRIBE THE EXISTENCE IN CENTRAL NEURONS OF ANOTHER TYPE OF FUNCTIONAL GLUTAMATE RECEPTORS, THE KAINATE RECEPTOR**. JL demonstrated that kainate receptor proteins form functional receptor channels in hippocampal neurons (PNAS 1993) and also provided the tool by which these receptors could be further studied, the drug 2-3-benzodiazepine, GYKI 53655, which allowed its pharmacological isolation (Neuron 1995a). Indeed, this finding **PAVED THE WAY FOR PROGRESS IN THE FIELD**. Since then, JL's and other groups have addressed specific questions on the functional role of these receptors. JL has characterized these receptors in cultured neurons (where they were among the pioneers in applying single-cell RT-PCR; Neuron, 1995b) and in brain slices and **DESCRIBED THEIR FUNDAMENTAL ROLE IN CONTROLLING NEURONAL TISSUE EXCITABILITY AND EPILEPTOGENESIS** (Neuron, 1997). Among other achievements, JL has demonstrated that these receptors have a dual mechanism for signaling. In addition to their expected ability to act as ion channels, JL and associates have shown that they trigger a second messenger-mediated cascade, involving a G-protein (Neuron, 1998b**;** PNAS 2000). This and subsequent work (Neuron, 2003**;** EMBO J., 2007**) PUT FORWARD THE NEW CONCEPT THAT ION CHANNEL-FORMING RECEPTORS ARE ALSO ABLE TO SIGNAL THROUGH A G-PROTEIN,** opening new vistas on the mechanisms by which glutamate receptors of the ionotropic type work. Taken together, JL's contributions have **HELPED TO UNDERSTAND WHY KAINATE RECEPTOR ACTIVATION IS PROCONVULSIVE** and identified kainate receptors as targets for **NEW TREATMENTS OF EPILEPTIC DISEASE**.

Juan Lerma has organized and chaired symposia for the Society for Neuroscience (SfN) and the FENS meetings and gave several plenary lectures in national and international congresses. JL has written a number of reviews in journals such as **Neuron**, **Physiological Reviews**, **Current Opinion** and **Nature Reviews** as well as in a number of monographic books, including the **Encyclopedia of Neurosciences** (L. Squire, ed).

Selected Publications (Total Citations >5700; Hirsch Index=40; Google scholar @ Jul 2014)

- **Lerma, J.** (1992) Spermine regulates N-methyl-D-aspartate receptor desensitization, **Neuron**, 8:343-352.

- **Lerma, J.**, Paternain, A.V., Naranjo, J.R. and Mellström, B. (1993) Functional kainate-selective glutamate receptors in cultured hippocampal cells, **Proc. Natl. Acad. Sci. USA**, 90, 11688-11692.

- Paternain, A.V., Morales, M. and **Lerma, J.** (1995) Selective antagonism of AMPA receptors unmasks kainate receptor-mediated responses in hippocampal neurons, **Neuron**, 14, 185-189.

- Ruano, D., Lambolez, B., Rossier, J., Paternain, A.V. and **Lerma, J.** (1995) Kainate receptor subunits expressed in single cultured hippocampal neurons: molecular and functional variants by RNA editing, **Neuron**, 14, 1009-1017.

- Rodríguez-Moreno, A., Herreras, O. and **Lerma, J.** (1997) Kainate Receptors Presynaptically Downregulate GABAergic Inhibition in the Rat Hippocampus. **Neuron**, 19, 893-901.

- Villarroel, A., Regalado, M.P. and **Lerma, J.,** (1998) Glycine-independent NMDA receptor desensitization: Localization of structural determinants. **Neuron**, 20, 329-339.

- Rodríguez-Moreno, A., and **Lerma, J**. (1998) Kainate receptor modulation of GABA release involves a metabotropic function. **Neuron**, 20, 1211-1218. (*Cover Caption*)

- Rodríguez-Moreno, A., López-García, J.C. and **Lerma, J**. (2000) Two populations of kainate receptors with separate signaling mechanisms in hippocampal interneurons. **Proc. Natl. Acad. Sci** USA. 97, 1293-1298.

- **Lerma, J.,** Paternain, A.V., Rodríguez-Moreno, A., and López-García, J.C (2001) Molecular Physiology of Kainate Receptors. **Physiologial Reviews**. 81, 971-998 (Invited review).

- Regalado, M. P., Villarroel, A. and **Lerma, J**. (2001) Inter-subunit cooperativity in the NMDA receptor. **Neuron**. 32, 1085-1096.

- **Lerma, J.** (2003). Roles and rules of kainate receptors in synaptic transmission. **Nature Rev Neurosci** 4, 481-95.

- Frankle, G., **Lerma, J.,** and Laruelle, M. (2003) The synaptic hypothesis of schizophrenia. **Neuron** 39, 205-16

- Rozas, J.L., Paternain A.V. and **Lerma J.** (2003) Non-canonical signaling by ionotropic kainate receptors. **Neuron** 39, 543–553

- Paternain, A.V., Cohen, A., Stern-Bach, Y. and **Lerma, J**. (2003) A role for extracellular Na^+ in the channel gating of native and recombinant kainate receptors. **J Neuroscience** 23, 8641-8648.

- Christensen, JK, Paternain, AV, Selak, S, Ahring PK and **Lerma, J.** (2004) A mosaic of functional kainate receptors in hippocampal interneurons. **J Neuroscience** 24, 8986-93.

- Rivera R, Rozas JL and **Lerma J** (2007) PKC-dependent Autoregulation of Membrane Kainate Receptors. **EMBO Journal**, 26, 4359-67

- Selak S, Paternain AV, Aller IM, Picó E, Rivera R, **Lerma J.** (2009) A role for SNAP25 in internalization of kainate receptors and synaptic plasticity. **Neuron** 63, 357-71.

- Fazzari F., Paternain A.V., Valiente M., Pla R., Luján R., Lloyd K., **Lerma J.**, Marín O. and Rico B. (2010) Control of cortical GABA circuitry development by Nrg1/ErbB4 signalling. **Nature** 464,1376-80.

- **Lerma J.** (2011) Net(o) excitement for Kainate receptors. **Nature Neuroscience**. 14: 808-810

- Mire E, Mezzera C, Leyva-Díaz E, Paternain AV, Squarzoni P, Bluy E, Castillo-Paterna M, López MJ, Peregrín S, Tessier-Lavigne M, Garel S, Galcerán J, **Lerma J** & López-Bendito G (2012) Spontaneous activity mediates a developmental switch in thalamocortical axon growth by regulating Robo1 transcription, **Nature Neuroscience**. 15, 1134–1143

- **Lerma J**., and Marques JM (2013) Kainate Receptors in Health and Disease, **Neuron**, 80, 292-311

- Marques JM, Rodrigues RJ, Valbuena S, Rozas JL, Selak S, Marin P, Aller MI, and **Lerma J** (2013). CRMP2 Tethers Kainate Receptor Activity to Cytoskeleton Dynamics During Neuronal Maturation, **J. Neurosci**. 33,18298 –18310.