Sonia Gasparini, PhD
Research Assistant Professor of Cell Biology & Anatomy, and Neuroscience

Education

2001-2004	Post-Doc, LSUHSC, New Orleans, LA
1998-2000	Post-Doc, SISSA-ISAS, Trieste, Italy
1994-1998	PhD, University of Milano, Italy
1989-1994	BSc, University of Milano, Italy

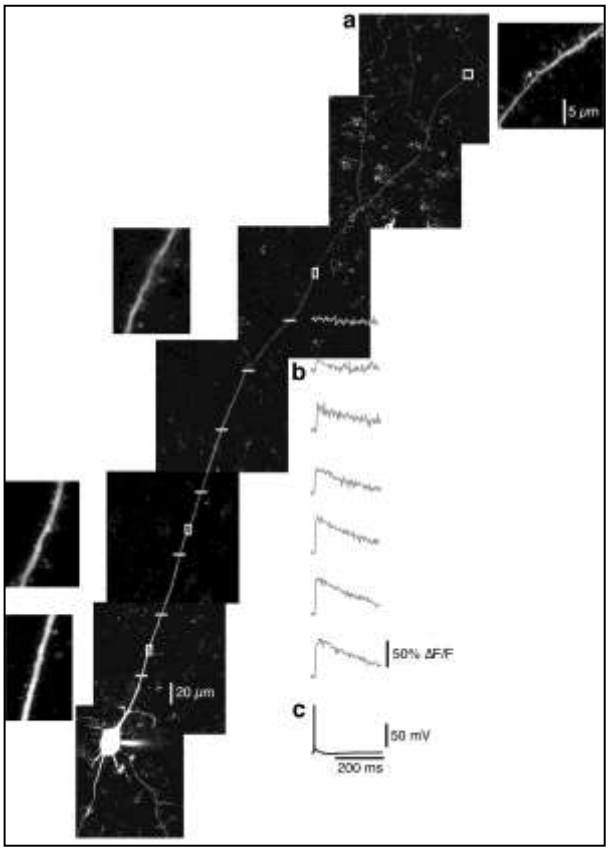
Positions

2005-pres:	Research Assistant Professor, Neuroscience Center, LSUHSC
2001-2004:	Postdoctoral fellow, Neuroscience Center, LSUHSC, New Orleans, LA
1998-2000:	Postdoctoral fellow, Biophysics Sector, SISSA-ISAS, Trieste, Italy

Current Research

Dendritic integration in the entorhinal cortex (EC)

The enthorhinal cortex is a key relay structure for the flow of information between the hippocampus and the neocortex. Not only does it act as a primary interface, it also plays a critical role in the computation of multi-sensory and cognitive modalities. The latter function is clearly supported by the direct involvement of the entorhinal cortex in neurodegenerative and psychiatric disorders such as Alzheimer's disease, epilepsy and schizophrenia. In particular, layer V neurons, being the main target of processed outputs leaving the hippocampal formation and sending their axons to cortical regions, play an important role in the consolidation and replay of memories, which involve hippocampal-neocortical communications.



To understand the function of EC layer V neurons, it is essential to understand how they integrate the inputs they receive to generate the output that is transferred to the neocortex; this complex process depends on the neuronal morphology and the density and properties of dendritic voltage-dependent channels. Despite their fundamental role in the consolidation and replay of memories, very little is known about the integrative features of these neurons.

In my lab, we employ optical imaging of calcium fluxes coupled to electrophysiological recordings, multi-photon uncaging and extracellular electrical stimulation in slices from the entorhinal cortex "in vitro" to investigate the synaptic and intrinsic properties of EC layer V neurons, the initiation of active processes in the dendrites (i.e. dendritic spikes) and their impact on the somatic output. The ultimate goal is to relate the input-output features of these neurons to the different

behavioral states and memory formation.
By elucidating the mechanisms of dendritic integration in the entorhinal cortes, these studies will increase our knowledge of memory processing. In addition, relating pathological effects to electrophysiological properties of neuronal compartments that have not been fully explored, such as dendrites, may shed light on basic neuronal properties and provide insights for novel points of therapeutic intervention and disease prevention.

Research Interests and Goals
Information processing and memory formation. Dendritic excitability and plasticity: synaptic transmission and voltage-dependent channel activity.

Awards/Recognitions/Lectures
2008: Dart Neuroscience Scholars Program in Learning and Memory Award (PI)
2007: Albert and Ellen Grass Faculty Program Award (PI)
2005: Albert and Ellen Grass Faculty Program Award (PI)
2002-2004: NARSAD Young Investigator Award
2002: Ochsner Clinic Foundation Research Award
2000: SINS (Italian Society for Neuroscience) Travel Fellowship
1997: Federation of Biochemical Societies Youth Travel Fund

Key Recent Papers
Gasparini, S., Losonczy, A., Chen, X., Johnston, D. & Magee J. C. (2007). Associative pairing enhances action potential back-propagation in radial oblique branches of CA1 pyramidal neurons. J Physiol. 580: 787-800

Gasparini S. & Magee, J. C. (2006). State-dependent dendritic computation in hippocampal CA1 pyramidal neurons. *J. Neurosci.* 26: 2088-2100

Gasparini, S., Migliore, M. & Magee, J. C. (2004). On the initiation and propagation of dendritic spikes in CA1 pyramidal neurons. *J. Neurosci.* 24: 11046-11056.

Gasparini, S. & Magee, J. C. (2002). Phosphorylation-dependent differences in the activation properties of distal and proximal dendritic Na^+ channels in rat CA1 hippocampal neurons. *J. Physiol.* 541: 665-672

Gasparini, S., Kasyanov, A. M., Pietrobon, D., Voronin, L. L. & Cherubini E. (2001). Presynaptic R-type calcium channels contribute to fast excitatory synaptic transmission in the rat hippocampus. *J. Neurosci*. 21: 8715-8721

Gasparini,S., Saviane, C., Voronin, L. L. & Cherubini, E. (2000) Silent synapses in the developing hippocampus: lack of functional AMPA receptors or low probability of glutamate release? *Proc Natl Acad Sci U S A* 97: 9741-9746

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"Synaptic Integration in Radial Oblique Dendrites"
Principal Investigator: Sonia Gasparini, PhD
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