


CAREER DEVELOPMENT AWARDEES

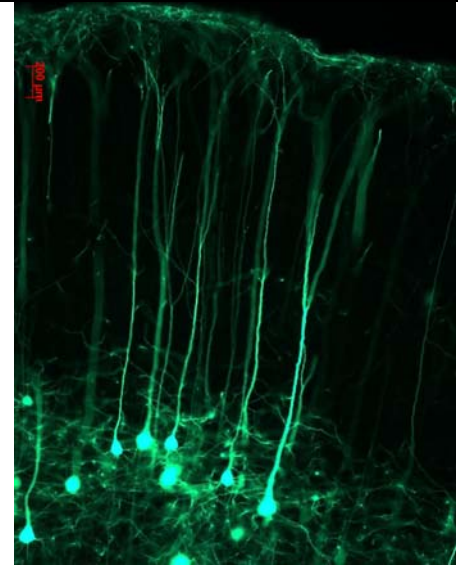
	<p>Alberto Bacci</p>
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Title	Giovanni Armenise-Harvard Career Development Awardee
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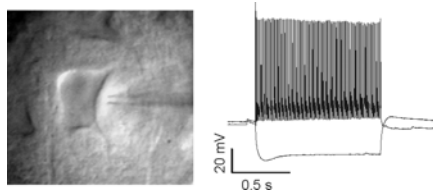
Laurea	Università degli Studi di Milano, Italy; Feb. 28 th 1994
Ph.D	Università degli Studi di Milano, Italy; Jan. 14 th 2000
Postdoc	1999-2005 Dept. Neurology, Stanford University, Stanford, CA, USA
Previous work experience	<p>1999-2005: Department of Neurology and Neurological Sciences, Stanford University Medical Center, Stanford, CA, USA. Identification of functional self-innervation in a subset of cortical interneurons. Identification of an endocannabinoid receptor-mediated slow-self inhibition in another cortical interneuron subclass. Studies of the physiological relevance of autaptic GABAergic neurotransmission in spike precision and synchrony of firing between cortical interneurons. Studies of evoked and spontaneous neurotransmission between cortical neurons in slice. Studies of differential inhibition characteristics on different classes of neocortical interneurons. Neuropeptide modulation of GABAergic and glutamatergic neurotransmission in rat neocortical slices on either pyramidal cells or GABAergic interneurons.</p> <p>1995-1999: C.N.R. - Cellular and Molecular Pharmacology Center - Department of Medical Pharmacology - University of Milano - Italy. Studies of synaptogenesis in hippocampal neurons developing in primary cultures. Study of synaptic vesicle recycling and glutamate release before and after synaptogenesis. Analysis of the structural and functional maturation of pre- and post-synaptic compartments during the establishment of synaptic contacts. Studies on glia-neuron interactions during synaptogenesis and at mature synapses. Studies of glia-neuron interactions during epileptiform activity in hippocampal neurons in culture and in slice.</p> <p>1992-1995: Department of General Physiology and Biochemistry - Laboratory of Electrophysiology - University of Milano - Italy. Characterization of burst firing in acutely isolated cells from rat neocortex. Patch-clamp current-clamp recordings identifying different firing in different cell populations and voltage-clamp experiments to determine the ionic conductances underlying burst firing.</p>
Association memberships	Society for Neuroscience

Research Interests

In the mammalian brain, the neocortex is the final destination and site of storage and processing of all sensory information. The anatomical organization of the neocortex is stereotypical among different species and consists of six layers in which specific subtypes of excitatory and inhibitory neurons generate complex intertwined networks, whose rhythmic activities are responsible for complex behavioral functions, such as cognition, movement initiation and memory. The major interest of our laboratory is the study of the cellular physiology of various elements of cortical microcircuits, the properties of their connections and their contribution to various network activities. Cortical neurons represent one of the most heterogeneous cell populations in the central nervous system. In particular, our laboratory focuses on locally projecting inhibitory GABAergic neurons (interneurons), whose activity is crucial, as they represent the basic elements that provide cortical feedforward and feedback inhibition and prevent development of epilepsy. Moreover, neocortical inhibitory interneurons generate, pace and modulate the oscillatory activity of large neuronal populations.

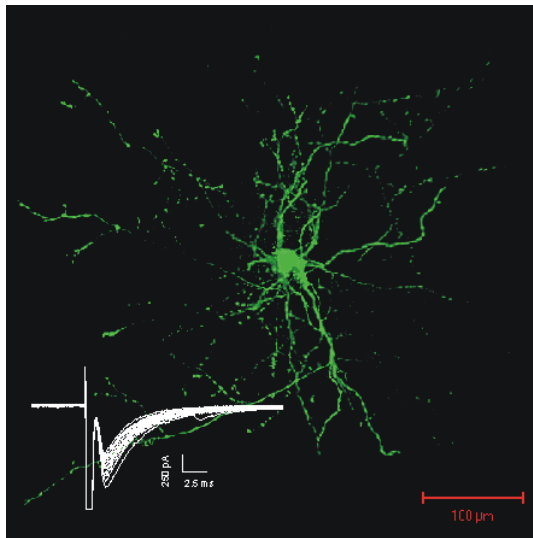


Pyramidal neurons in the neocortex of a genetically modified mouse, engineered to express a fluorescent protein selectively in projecting principal neurons.

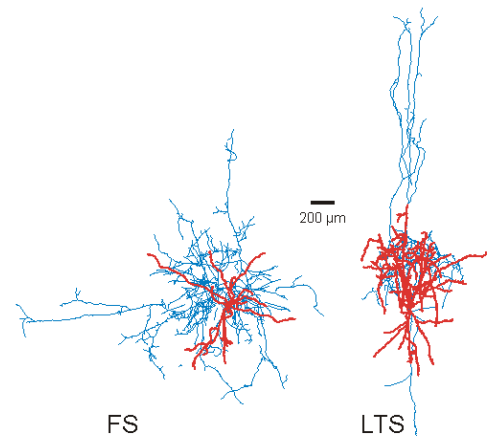


Infrared image of an interneuron (left) and its electrical activity (right).

Using a combination of electrophysiological, cellular, biochemical and morphological techniques, we aim at gaining more detailed information on properties of neocortical interneurons. The ultimate goal of our research is to understand the functional relevance of these different neuron subtypes within cortical circuits.



Left: A cortical inhibitory interneuron filled with a dye and reconstructed. This neuron made massive inhibitory contacts with itself, known as autapses, whose activation generates the electrical responses shown in white. Right: Two interneuron subtypes (FS and LTS) filled with biocytin and reconstructed to show different axonal (blue) and dendritic (red) patterns.



Selected Publications

- Bacci A, Huguenard JR. Enhancement of spike precision by autaptic transmission in neocortical inhibitory interneurons. (2006) *Neuron* 49:119-30.
- Bacci A, Huguenard JR, Prince DA. (2005) Modulation of neocortical interneurons: extrinsic influences and exercises in self-control. *Trends in Neurosci.* 28:602-611.
- Bacci A, Huguenard JR, Prince DA. (2004) Long-lasting self-inhibition of neocortical interneurons mediated by endocannabinoids. *Nature* 431:312-316.
- Bacci A, Rudolph U, Huguenard JR, Prince DA. (2003) Major differences in inhibitory synaptic transmission onto two neocortical interneuron subclasses. *J. Neurosci.* 23:9664-9674.

	<p>Bacci A, Huguenard JR, Prince DA (2003) Functional autaptic neurotransmission in fast-spiking interneurons: a novel form of feedback inhibition in the neocortex. <i>J. Neurosci.</i> 23: 859-66.</p> <p>Bacci A, Huguenard JR, Prince DA (2002) Differential modulation of synaptic transmission by neuropeptide Y in rat neocortical neurons. <i>Proc. Natl. Acad. Sci. (U.S.A.)</i> 99: 17125-30.</p> <p>Bacci A, Verderio C, Sancini G, Fesce R, Franceschetti S, Matteoli M (2002) Block of glutamate-glutamine cycle between astrocytes and neurons inhibits epileptiform activity in hippocampus <i>J. Neurophysiol.</i> 88: 2302-10.</p> <p>Kumar SS, Bacci A, Kharazia V, Huguenard JR. (2002) A developmental switch of AMPA receptor subunits in neocortical pyramidal neurons. <i>J Neurosci.</i> 22:3005-15.</p> <p>Armano S, Coco S, Bacci A, Pravettoni E, Schenk U, Verderio C, Varoqui H, Erickson JD, Matteoli M. (2002) Localization and functional relevance of system a neutral amino acid transporters in cultured hippocampal neurons. <i>J Biol Chem.</i> 277:10467-73.</p> <p>Bacci A, Coco S, Pravettoni E, Schenk U, Armano S, Frassoni C, Verderio C, De Camilli P, Matteoli M. (2001) Chronic blockade of glutamate receptors enhances presynaptic release and downregulates the interaction between synaptophysin-synaptobrevin-vesicle-associated membrane protein 2. <i>J Neurosci.</i> 21:6588-96.</p> <p>Pravettoni E, Bacci A, Coco S, Forbicini P, Matteoli M, Verderio C. (2000) Different localizations and functions of L-type and N-type calcium channels during development of hippocampal neurons. <i>Dev. Biol.</i> 227:581-94.</p> <p>Verderio C, Coco S, Pravettoni E, Bacci A, Matteoli M. (1999) Synaptogenesis in hippocampal cultures. <i>Cell Mol Life Sci.</i> 55:1448-62.</p> <p>Verderio C, Bacci A, Coco S, Pravettoni E, Fumagalli G, Matteoli M. (1999) Astrocytes are required for the oscillatory activity in cultured hippocampal neurons. <i>Eur J Neurosci.</i> 11:2793-800.</p> <p>Verderio C, Coco S, Bacci A, Rossetto O, De Camilli P, Montecucco C, Matteoli M. (1999) Tetanus toxin blocks the exocytosis of synaptic vesicles clustered at synapses but not of synaptic vesicles in isolated axons. <i>J Neurosci.</i> 19:6723-32.</p> <p>Bacci A, Verderio C, Pravettoni E, Matteoli M. (1999) The role of glial cells in synaptic function. <i>Philos Trans R Soc Lond B Biol Sci.</i> 354:403-9.</p> <p>Bacci A, Verderio C, Pravettoni E, Matteoli M. (1999) Synaptic and intrinsic mechanisms shape synchronous oscillations in hippocampal neurons in culture. <i>Eur J Neurosci.</i> 11:389-97.</p> <p>Guatteo E, Franceschetti S, Bacci A, Avanzini G, Wanke E. (1996) A TTX-sensitive conductance underlying burst firing in isolated pyramidal neurons from rat neocortex. <i>Brain Res.</i> 741:1-12.</p> <p>Guatteo E, Bacci A, Franceschetti S, Avanzini G, Wanke E. (1994) Neurons dissociated from neocortex fire with 'burst' and 'regular' trains of spikes. <i>Neurosci Lett.</i> 175:117-20.</p>
Laboratory Members	<p>Silvia Marinelli, Ph.D.: Research Scientist Simone Pacioni, M.S.: Research Assistant <i>Postdoctoral Fellow to Be Hired</i></p>