BIOGRAPHICAL SKETCH

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NAME: Laura Bianchi

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POSITION TITLE: Professor

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
University of Milan, Italy	BS and MS	07/1992	Biology
University of Florence, Italy	PhD	05/1997	Physiology
Case Western Reserve University, Ohio, USA	postdoc	09/1998	Physiology
Vanderbilt University, Tennessee, USA	postdoc	10/2001	Physiology

A. Personal Statement

I have a long-standing interest in the pathophysiological role of ion channels and transporters. In the last 20 years, I have been using the model organism *C. elegans* to explicate the function of ion channels in the context of a living behaving animal. My **long-term goal** is to establish the role of ion channels and transporters expressed in glia in neuronal output, behavior, and aging. The strength of my laboratory is to study ion channels, transporters, and neuromodulators *from genes to behavior and organismal health* using a combinatorial approach including genetics and molecular manipulations, confocal microscopy, functional imaging, electrophysiology, pharmacological approaches, and behavioral assays. I was trained in electrophysiological techniques during my Master and PhD at the Universities of Milan and Florence (Italy), respectively. During my postdoctoral training at Case Western University and at Vanderbilt, I became an expert in manipulating DNA to clone genes and promoter regions, and to build reporter constructs. I began using *C. elegans* as a model organism during my postdoc at Vanderbilt and continued after joining the lab of *C. elegans* geneticist Monica Driscoll (Rutgers University). During this time, I learned how to build transgenic *C. elegans* strains, analyze expression patterns, identify cells and subcellular structures, apply standard genetics, and perform behavioral assays in *C. elegans*. In the Driscoll lab, I also began to use functional imaging techniques and electrophysiology on small *C. elegans* cells. I established my own laboratory 19 years ago. I have trained postdocs, graduate, and undergraduate students in the techniques in which I am an expert and established a well-funded research program.

B.

a. Graziano B., Wang L., White O. R., Kaplan D. H., Fernandez-Abascal J., and Bianchi L. Glial KCNQ K^+ channels control neuronal output by regulating GABA release from glia in *C. elegans*. ***Neuron,*** 112(11): 1832-1847, 2024.
b. Wang L., Graziano B., Encalada N., Fernandez-Abascal J., Kaplan D. H., and Bianchi L. Glial regulators of ions and solutes required for specific chemosensory functions in *C. elegans*. ***iScience,*** 25(12), 105684, 2022.
c. Fernandez-Abascal J., Johnson C. K., Graziano B., Wang, L., Encalada N. and Bianchi L. A glial ClC Cl^- channel mediates nose touch responses in *C. elegans*. ***Neuron,*** 110(3): 470-485, 2022.

B. Positions, Scientific Appointments, and Honors

Positions and Employment

2023-present	Director, Graduate Program in Cellular Physiology and Molecular Biophysics
2022-present	Longitudinal Director of Physiology, NextGen curriculum for MDs
2019-present	Professor, Physiology and Biophysics**,** University of Miami, Miami, FL
2013-2019	Associate Professor, Physiology and Biophysics**,** University of Miami, Miami, FL
2006-2012	Assistant Professor, Physiology and Biophysics**,** University of Miami, Miami, FL
2001-2006	Ass. Professor (research track), Molecular Biology and Biochemistry**,** Rutgers, Piscataway, NJ
1998-2001	Postdoctoral Fellow, Medicine**,** Vanderbilt University, Nashville, TN
1997-1998	Junior Researcher, Physiology and Biophysics, CWRU, OH

Other Experience and Professional Memberships

2012-	Member, Society for Neuroscience
2000-	Member, Biophysical Society
2014	Member, Genetics Society of America
2021	Frontiers in Neuroscience, guest associate editor
2020	International Journal of Molecular Sciences, guest editor on a special issue
2019-	Journal of Molecular Neuroscience, reviewing editor
2017	Plos Genetics, associate editor
2021-	NIH Neuronal Communication, member
2019-2021	NIH Neurotransporters, Receptors, Channels, and Calcium Signaling, member
2014-	NIH Sensory and Motor Neuroscience, Cognition and Perception Study Section F02B, member
2014	NIH ZRG1 MDCN Ion channels, ad hoc reviewer
2015	Deutsche Forschungsgemeinschaft (DFG), ad hoc reviewer
2013-	The Children Tumor Foundation, ad hoc reviewer
2012	NIH Somatosensory and Chemosensory Systems Study Section, ad hoc reviewer
2011	NSF, ad hoc reviewer
2010	Swiss National Science Foundation, ad hoc reviewer
2009-2010	American Cancer Society, ad hoc reviewer
2008-2009	NIH Biophysics of Neuronal Systems study section, ad hoc reviewer
2009, 2017	NIH Neurotransporters, Receptors and Ca^{2+} signaling, ad hoc reviewer
2009	NIH ZRG1 MDCN Ion channels, ad hoc reviewer

Honors and awards

2025	Excellence in Curriculum Award
2023	Achievement Award LEAD Program
2023	The Neuroscience Graduate Program Faculty Mentor of the Year Award
2020	The Neuroscience Graduate Program Award for Excellence in Teaching
2010, 2019	University of Miami SEEDS You-Choose award
2004-2005	Rutgers University FASI Award

C. Contributions to Science

Glial ion channels in glia/neurons functional interaction. We showed that Na^+ channels of the DEG/ENaC family are expressed in glia and that their knock-out causes neuronal deficits. Our work supports that glial DEG/ENaC channels control the concentration of K^+ in the microenvironment between glia and neurons, thereby fine-tuning neuronal output. We also showed that the ClC Cl^- channel CLH-1 is expressed in glia and mediates HCO_3^- transport, which results in pH buffering. Further, we recently published that CLH-1 mediates nose touch avoidance in *C. elegans* by regulating Ca^{2+} and cAMP levels in touch neurons. Finally, we conducted a screen for regulators of chemosensory function in *C. elegans* and identified new players in glia/neuron cross talk, including genes involved in neurological disorders.

a. Wang Y., Apicella A. Jr, Lee S-K, Ezcurra M., Slone R. D., Goldmit M., Schafer W. R., Shaham S., Driscoll M., and Bianchi L. A glial DEG/ENaC channel functions with neuronal channel DEG-1 to mediate specific sensory functions in *C. elegans. **EMBO Journal***, 27(18): 2388-2399, 2008.
b. Han L., Wang Y., Sangaletti R., D'Urso G., Lu Y., Shaham S., and Bianchi L. Two novel DEG/ENaC

channel subunits expressed in glia are needed for nose-touch sensitivity in *Caenorhabditis elegans*. ***Journal of Neuroscience***, 33(3): 936-949, 2013.

c. Grant J., Matthewman C., and Bianchi L. A novel mechanism of pH buffering in C. elegans glia: bicarbonate transport via the voltage-gated ClC Cl- channel CLH-1. ***Journal of Neuroscience*** 35(50): 16377-97, 2015. PMID: 26674864, PMCID: PMC4679820, corresponding author.

d. Johnson K. C., Fernandez Abascal J., Wang Y., and Bianchi L. Requirement of glial Na^+/K^+-ATPase in touch sensation reveals ionic and metabolic link between glia and touch neurons in *C. elegans*. ***Journal of Neurophysiology,*** 2020, 123(5): 2064-2074. PMID:32292107, PMCID: PMC7444924, corresponding author.

Implicating a novel calcium conductance in neurotoxicity. Although MEC-4 was widely thought to be a sodium-selective channel, I challenged this presumption and demonstrated that the MEC-4(d) channel does in fact conduct calcium. My data suggest that this Ca^{2+} conductance initiates necrosis, a finding relevant to a physiologically important neuronal death mechanism mediated by mammalian MEC-4 homologs (the ASIC channels) during ischemia.

a. Bianchi L., Gerstbrein B., Frøkjær-Jensen C., Royal D. C., Mukherjee G., Royal M. A., Xue J., Schafer W. R., and Driscoll M. The Neurotoxic MEC-4(d) DEG/ENaC sodium channel conducts calcium: implications for necrosis initiation. ***Nature Neuroscience***, 7 (12): 1337-1344, 2004.

b. Royal D. C.*, Bianchi L.*, Royal M. A., Lizzio M. Jr., Mukherjee G., Nunez, Y. O., and Driscoll M. Temperature-sensitive mutant of the *Caenorhabditis elegans* neurotoxic MEC-4(d) DEG/ENaC channel identifies a site required for trafficking or surface maintenance. ***The Journal of Biological Chemistry,***280(51): 41976-41986, 2005. ****These two authors contributed equally to this work*.**

c. Zhang W.*, Bianchi L.*, Lee W.-H., Wang Y., Israel S., and Driscoll M. Intersubunit interactions between mutant DEG/ENaCs induce synthetic neurotoxicity. ***Cell Death and Differentiation***, 15(11): 1794-1803, 2008. PMID: 18670436 ****These two authors contributed equally to this work.*

d. Kamat S., Yeola S., Zhang W., Bianchi L.*, and Driscoll M*. NRA-2, a nicalin homolog, regulates neuronal death by controlling surface localization of toxic *C. elegans* DEG/ENaCs. ***Journal of Biological Chemistry,***289(17):11916-26.*co-corresponding authors, 2014.

C. elegans neurogenetics. I studied ion channels and mechanisms of neuronal death in the model organism *C. elegans*. I applied molecular, genetic, electrophysiological, and imaging techniques, as well as behavioral approaches, to decipher the role of these channels in various pathophysiological functions in the context of a living animal.

a. Rutledge E., Bianchi L., Christensen M., Boehmer C., Morrison R., Broslat A., Beld A. M., George A. L. Jr., Greenstein D., and Strange K. CLH-3, a ClC-2 anion channel ortholog activated during meiotic maturation in *C. elegans* oocytes. ***Current Biology***, 11 (3): 161-170, 2001.

b. Suzuki H., Kerr R., Bianchi L., Frøkjær-Jensen C., Slone D., Xue J., Gerstbrein B., Driscoll M., and Schafer W. R. *In vivo* imaging of *C. elegans* mechanosensory neurons demonstrates a specific role for the MEC-4 channel in the process of gentle touch sensation. ***Neuron***, 39(6): 1005-1017, 2003.

c. Bianchi L., Kwok S. K., Driscoll M., and Sesti F. A potassium channel-MiRP complex controls neurosensory function in *Caenorhabditis elegans. **The Journal of Biological Chemistry***, 278: 12415-12424, 2003.

d. Sangaletti R., D'Amico M., Grant J., Della-Morte D., and Bianchi L. Knock-out of a mitochondrial sirtuin protects neurons from degeneration in *C. elegans. **Plos Genetics***, Aug 18; 13(8):e1006965, 2017.

Ion channel mutations in human diseases. I studied the functional and cellular consequences of ion channel mutations linked to human diseases, including LQT and Bartter's syndromes, multi-gene disorders in which cardiac excitability and ion transport in the kidney, respectively, are perturbed. I found that disease-linked mutations often result in misprocessing of the channel protein or accessory subunits.

a. Priori, S. G., Schwartz, P. J., Napolitano, C., Bianchi. L., Dennis, A., De Fusco M., Brown A. M., and Casari, G. A recessive variant of the Romano-Ward syndrome? ***Circulation,*** 97(24): 2420-2425, 1998.

b. Schwalbe R.A., Bianchi L., Accili E.A., and Brown A.M. Functional consequences of ROMK mutants linked to antenatal Bartter's syndrome and implications for treatment. ***Human Molecular Genetics***, 7 (6): 975-980, 1998.

c. Bianchi L., Priori S. G., Shen Z.-J., Dennis A. T., Napolitano C., Ronchetti E., Bryskin R., Schwartz P. J., and Brown A. M. Cellular dysfunction of LQT5-minK mutants: abnormalities of I_{Ks}, I_{Kr} and trafficking in LQT

syndrome. ***Human Molecular Genetics***,8 (8): 1499-1507, 1999.

d. Bianchi L., Priori S. G., Napolitano C., Surewicz, K. A., Dennis A. T., Memmi M., Schwartz P. J., and Brown A. M. Mechanisms of I_{Ks} suppression in LQT1 mutants. ***American Journal of Physiology***, 279: H3003-H3011, 2000.

Ion channels in cancer growth. For my Ph.D. work, I characterized the role of ion channels in normal and aberrant cell growth. Using a combination of electrophysiological and molecular techniques, I showed that the potassium channel encoded by the gene KCNH2 (also known as HERG) has a central role in controlling the resting potential of neuroblastoma cells. Moreover, I showed that HERG contributes to cell differentiation upon adhesion to the extracellular matrix and that it is over-expressed in most types of cancer cells where it may constitute a selective advantage for growth.

a. Bianchi L., Arcangeli A., Bartolini P., Mugnai G., Wanke E., and Olivotto M. An inward rectifier K^+ current modulates in neuroblastoma cells the tyrosine phosphorylation of the $pp125^{FAK}$ and associated proteins: role in neuritogenesis. ***Biochemical and Biophysical Research Communications***, 210(3): 823-829, 1995.

b. Arcangeli A., Bianchi L., Becchetti A., Faravelli L., Coronello M., Mini E., Olivotto M., and Wanke E. A novel inward-rectifying K^+ current with a cell-cycle dependence governs the resting potential of mammalian neuroblastoma cells. ***The Journal of Physiology***, 489: 455-471, 1996.

c. Arcangeli A., Faravelli L., Bianchi L., Rosati B., Gritti A., Vescovi A., Wanke E., and Olivotto M. Soluble or bound laminin elicits in human neuroblastoma cells short-or long-term potentiation of a K^+ inwardly rectifying current: relevance to neuritogenesis. ***Cell Adhesion and Communication***, 4(4-5): 369-385, 1996.

d. Bianchi L., Wible B., Arcangeli A., Taglialatela M., Morra F., Castaldo P., Crociani O., Rosati B., Faravelli L., Olivotto M., and Wanke E. *Herg* encodes a K^+ channel highly conserved in tumors of different histogenesis: a selective advantage for cancer cells? ***Cancer Research***, 58 (4): 815-822, 1998.

Complete List of Published Work in MyBibliography:
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