

## **Annalisa Buffo**

Born in Turin on 25.12.1967. Italian.

1991. Doctor in Biological Sciences summa cum laude, University of Turin

1992-1993. Post-lauream apprenticeship at the II Neurological Clinic, Faculty of Medicine, University of Turin

1992-1998 Research fellow, University of Turin

1994. Professional certificate for Biologists, University of Turin

1998 Research Doctorate in Neurological Sciences, Ministry of Education and Science, Rome

1994-1999 Short research stays at the Rudolf Magnus Institute, University of Utrecht, Netherlands Institute for Brain Research, Amsterdam and University of Tuebingen

1998-2000 Postdoctoral fellow, Department of Physiology, University of Turin

2001-present Tenured Assistant Professor of Physiology (BIO/09), University of Turin

2004-2005 Visiting Researcher at the Helmholtz Zentrum (GSF, now Deutsches Forschungszentrum für Gesundheit und Umwelt, GmbH) and Ludwig Maximilians University, Munich, Germany

### **Scholarships:**

*European Science Foundation*, Short Term Fellowship, 1994, to study B-50/GAP-43 expression in collateral sprouting in the CNS, under the supervision of Prof. W.H. Gispen of the Rudolf Magnus Institute, University of Utrecht, The Netherlands.

*Fondazione Cavalieri Ottolenghi*, Turin, January 1998, awarded a one year Post-Doc Fellowship in Neurobiology

*CNR Short Term Mobility Fellowship*, September 1998, to generate a subtractive library from control and denervated adult rat Purkinje cells in the lab of Dr. Bähr, University of Tuebingen, Germany.

University of Turin, October 1999, awarded a 2 year Post-Doc Fellowship in the field of Neurobiology.

*COST Cooperation*, Short Term Scientific Mission Fellowship, January 1999, to characterise a subtractive library from control and denervated adult rat Purkinje cells in the lab of Dr. Bähr, University of Tuebingen, Germany.

*DAAD Short Term Fellowship*, 2004.

*Von Humboldt Fellowship* 2004-2005 to develop strategies to instruct glia cells to neurogenesis in collaboration with Prof. Goetz, Muenchen.

**Guest referee for international scientific journals:** Brain, Progress in Neurobiology, Journal of Neuroscience, Journal of Cerebral Blood Flow and Metabolism, Molecular and Cellular Neuroscience, Glia, Nature Communication, Journal of Neurochemistry, European Journal of Neuroscience, PlosOne, Neuroscience, Neurochemical Research, Neuroimmunology, BMC Development, Brain Research, Journal of Visualized Experiments, Archives Italiennes de Biologie

**Scientific Societies:** Società Italiana di Neuroscienze (S.I.N.S.); Society for Neurosciences (USA)

**Membership in research centers:** Neuroscience Institute Cavalieri Ottolenghi (NICO, Orbassano, Turin)

**Membership in research networks:** Neuroscience Institute Turin (NIT); Progetto NEUROTRANSPLANT; NEUROSTEMCELLREPAIR CONSORTIUM.

### **Reviewer in National and international agencies:**

Italian Telethon (since 2000); French National Research Agency (ANR, since 2010); MIUR (since 2013); Estonian Science Foundation (2012); Deutsche Forschungsgemeinschaft (German Research Foundation; since 2011); ARSEP

## **PhD program**

Since 2009, member of the Board of the "PhD course in Neuroscience", Doctoral School in Life and Health Sciences, University of Turin

*Former PhD students:*

Annarita De Luca, Chiara Rolando, Gianluca Menichetti, Vivien labat-gest, University of Turin  
Dilek Colak and Gwendolyn Behrendt : co-tutoring at the Ludwig Maximilians University (co-tutoring with Prof. Magdalena Goetz)

*Member in final PhD thesis evaluation committee:*

-Daniela Gavello, PhD in Neuroscience, University of Turin Leptin-mediated up-regulation of BK currents facilitates the recovery from hypoxia in hippocampal neurons and regulation of adrenal chromaffin cells' function (2014)

-Sara Gosso, PhD in Neuroscience, University of Turin Newly designed diamond-based microelectrode arrays (MEAs) for monitoring neurosecretion

- Cecilia Laterza. SCUOLA INTERNAZIONALE DI DOTTORATO DI RICERCA IN MEDICINA MOLECOLARE Università Vita-Salute San Raffele *Induced pluripotent stem cells as a potential autologous source of neural stem cells for multiple sclerosis therapy* (2013)

- Member of the Thesis Committee of the Doctorate in Psychobiology and Psychopharmacology, Università la Sapienza, Roma (February 2008)

**Main invited conferences**

"Glial cells generate neurons: new approaches for neuronal reconstitution in the mammalian brain" Euresco Conference on Cellular and Molecular Basis for Regeneration, San Feliu 2004, Invited Speaker

"Instructing neurogenesis in glia cells: reparative potential in neurodegenerative lesions" Meeting of the German Society for Cell Biology, Braunschweig 2006, Invited Speaker

"Olig2 induction in reactive gliosis - glial lineage analysis and neuronal regeneration", Spring School for Regenerative Medicine "Isolation and induction of neuronal progenitor cells" Rostock 2006, Invited Speaker

"Olig2 induction in cerebral amyloidosis: a novel oligodendrocyte reactivity." Glia cells in health and disease, Cold Spring Harbour, 2006, Selected Speaker

"Olig2 induction upon brain lesion - implications for neuronal repair", Annual Meeting of the Federazione Italiana Scienze della Vita, Riva del Garda 2006, Invited Speaker

"Lineage analysis of reactive gliosis – glial diversity and neuronal regeneration", Conference on Brain Disease & Molecular Machines, Paris, 2008, Invited Speaker

"Intrinsic growth potential, regulatory molecules and experience: the complex interplay regulating neuronal plasticity", Meeting of the German Society of Neuroscience, Goettingen, 2009, Invited Speaker

"Astroglial: origin, progeny and reparative potential", Symposium on Reactive gliosis: molecular and cellular mechanisms to limit neural degeneration and promote repair, Congresso della Società Italiana di Neuroscienze, Milan, 2009, Speaker and organizer

"Nicchie staminali nel sistema nervoso centrale adulto: fisiopatologia della neurogenesi ippocampale e potenzialità riparative della glia reattiva" Corso di Aggiornamento in Neuroscienze Città di Catania su "Invecchiamento cerebrale e demenza", 2010, 2011, 2012, Invited Lecturer

"Cellule gliali: attori importanti nella neurogenesi adulta e nella riparazione cerebrale", AINO and AIRC joint Congress, Squillace, 2010, Invited Speaker

"Isolation of astrocytes and neural progenitors to understand adult CNS germinal niche functioning" Satellite Symposium on "Rapid isolation of neural cell populations", 41st annual meeting of the Society for Neuroscience, Washington, 2011, Invited Speaker

"Basi biologiche della neuroriparazione: il ruolo degli astrociti" Congresso della Società Italiana di Neurologia, Workshop su "Basi Biologiche della Neuroriparazione"2012. Invited Speaker (organizers: Prof. Antonio Uccelli, University of Genova, Dott. Dario Centonze, Università di Roma Tor Vergata)

"Plasticity of the germinal niche: roles of Nogo-A and Nogo Receptor 1 in the homeostatic regulation of adult neurogenesis" Symposium Beyond cell replacement: functional plasticity and homeostatic

activities of adult stem and progenitor cells Congresso della Società Italiana di Neuroscienze, Rome, 2013, Speaker and organizer

#### **Main invited seminars and lectures:**

-“Meccanismi di regolazione della crescita assonale nei neuroni di Purkinje”, Dipartimento di Psicologia, Sezione di Neuroscienze, Università La Sapienza, Roma, Italy, 2009, Invited Seminar (Host: Prof. Maria Teresa Fiorenza)

-“Glial diversity – lineage and reparative responses”, Center for Neurogenomics and Cognitive Research, VU University Medical Center, Amsterdam, 2009, Invited Seminar (Hosts: Prof. Marjo van der Knaap and Dr. Elly Hol, team leaders)

-“Origin, progeny and reparative potential of glial progenitor cells”, PhD Course in Neuroregeneration, International PhD Program in Molecular Medicine, Sections of Neuroscience, Neuroscience Technology and Experimental Neurology at the San Raffaele Scientific Institute, Milan, Italy, 2009, Invited Lecturer

-“Nogo-A/Nogo receptor functions in the homeostasis of the adult SVZ”, Brain Research Institute, University of Zurich, Zurich, Switzerland, 2012, Invited Seminar (Host: Prof. Martin E. Schwab, Director)

#### **Major ongoing scientific collaborations:**

Prof. Martin E. Schwab, Brain Research Institute, University of Zurich: Nogo/NgR1 signalling in axon growth and astroglial functions; prof. Magdalena Goetz and dr Leda Dimou, Ludwig Maximilians University, Muenchen: mechanisms of gliotic reaction and promotion of neurogenesis; prof. Ferdinando Rossi, University of Turin: interplay between neuronal intrinsic determinants and extrinsic signals in axon growth control; prof. Maria Pia Abbracchio, University of Milano: Purinergic signalling in glial cells; Prof. Patrizia Rosa, CNR, Milan; prof. Verdon Taylor, University of Basel: heterogeneity of oligodendrocyte progenitors.

## **PUBLICATIONS**

### **Articles on peer reviewed journals**

1. Verzè L., Buffo A., Rossi F., Oestreicher A.B., Gispen W.H. and Strata P. (1996) **Increase of B-50/GAP-43 immunoreactivity in injured muscle nerves of the mdx mice.** *Neuroscience*, 70: 807-815.
2. Buffo A., Holtmaat A.J.G.D., Savio T., Verbeek J.S., Oberdick J., Oestreicher A.B., Gispen W.H., Verhaagen J., Rossi F. and Strata P. (1997) **Targeted overexpression of the neurite growth associated protein B-50/GAP-43 in cerebellar Purkinje cells induces sprouting following axotomy, but not axon regeneration into growth-permissive transplants.** *Journal of Neuroscience* 17: 8778-8791.
3. Buffo A., Fronte M., Oestreicher A.B. and Rossi F. (1998) **Degenerative phenomena and reactive modifications of the adult rat inferior olivary neurons following axotomy and disconnection from their targets.** *Neuroscience* 85:587-604.
4. Zagrebelsky M., Buffo A., Skerra A., Schwab M.E., Strata P. and Rossi F. (1998) **Retrograde regulation of growth-associated gene expression in adult rat Purkinje cells by myelin-associated neurite growth inhibitory proteins.** *Journal of Neuroscience* 18: 7912-7929. (Zagrebelsky and Buffo co-first authors)
5. Strata P., Buffo A., Rossi F. (1999) **Mechanisms of axonal plasticity.** *Arch. Ital. Biol.* 137:181-192.

6. Buffo A., Zagrebelsky M., Huber A., Skerra A., Schwab M.E., Strata P., Rossi F. (2000) **Application of neutralizing antibodies against NI-35/250 myelin-associated neurite growth inhibitory proteins to the adult rat cerebellum induces sprouting of uninjured Purkinje cell axons.** Journal of Neuroscience 20: 2275-2286.
7. Strata P., Buffo A., Rossi F. (2001) **Regenerative events in the olivocerebellar pathway.** Restorative Neurology and Neuroscience 19:95-106.
8. Rossi F., Buffo A., Strata P. (2001) **Regulation of intrinsic regenerative properties and axon plasticity in cerebellar Purkinje cells** Restorative Neurology and Neuroscience 19: 85-94.
9. Carulli D., Buffo A., Botta C., Altruda F., Strata P. (2002) **Regenerative and survival capabilities of Purkinje cells overexpressing c-Jun.** European Journal of Neuroscience. 16:105-18.
10. Buffo A., Carulli D., Rossi F. and Strata P. (2003) **Extrinsic regulation of injury/growth-related gene expression in the inferior olive.** European Journal of Neuroscience 18, 2146-58.
11. Carulli D., Buffo A., Strata P. (2004) **Reparative mechanisms in the cerebellar cortex.** Prog Neurobiol. 72:373-98.
12. Milasin J, Buffo A., Carulli D, Andjus P, Strata P. (2005) **MAPK activation in cerebellar basket cell terminals after harmaline treatment.** Ann N Y Acad Sci. 1048: 411-7.
13. Mori T., Buffo A., Gotz M. (2005) **The novel roles of glial cells revisited: the contribution of radial glia and astrocytes to neurogenesis.** Curr Top Dev Biol. 69: 67-99.
14. Buffo A., Vosko MR, Erturk D, Hamann GF, Jucker M, Rowitch D, Gotz M. (2005) **Expression pattern of the transcription factor Olig2 in response to brain injuries: implications for neuronal repair.** Proc Natl Acad Sci U S A. 102:18183-8.
15. Mori T, Tanaka K, Buffo A., Wurst W, Kuhn R, Gotz M. (2006) **Inducible gene deletion in astroglia and radial glia-A valuable tool for functional and lineage analysis.** Glia. 54:21-34.
16. Buffo A. (2007) **Fate determinant expression in the lesioned brain: Olig2 induction and its implications for neuronal repair.** Neurodegenerative Diseases 4:328-32.
17. Milasin JM, Buffo A, Carulli D, Strata P. (2007) **Intensive remodeling of Purkinje cell spines after climbing fibers deafferentation does not involve MAPK and Akt activation.** Ann N Y Acad Sci.
18. Buffo A., Rite I, Tripathi P, Lepier A, Colak D, Horn AP, Mori T, Götz M. (2008) **Origin and progeny of reactive gliosis: A source of multipotent cells in the injured brain.** Proc Natl Acad Sci U S A. 105:3581-6.
19. Lecca D, Trincavelli ML, Gelosa P, Sironi L, Ciana P, Fumagalli M, Villa G, Verderio C, Grumelli C, Guerrini U, Tremoli E, Rosa P, Cubani S, Martini C, Buffo A., Cimino M and Abbracchio MP (2008) **The Recently Identified P2Y-like Receptor GPR17 Is a Sensor of**

**Brain Damage and a New Target for Brain Repair.** PLoS ONE 3:e3579.

20. de Luca A, Vassallo S, Benitez-Temino B, Menichetti G, Rossi F, Buffo A. (2009) **Distinct modes of neuritic growth in purkinje neurons at different developmental stages: axonal morphogenesis and cellular regulatory mechanisms.** PLoS One. 4:e6848.
21. Buffo A., Rolando C., Ceruti S. (2010) **Astrocytes in the damaged brain: molecular and cellular insights into their reactive response and healing potential.** Biochem Pharmacol.79:77-89.
22. Boda E., Buffo A. (2010) **Glial cells in non-germinal territories: insights into their stem/progenitor properties in the intact and injured nervous tissue.** Arch Ital Biol. 148, 119-36.
23. Kronenberg G., Gertz K., Cheung G., Buffo A., Kettemann H., Götz M., Endres M. (2010) **Modulation of fate determinants Olig2 and Pax6 in resident glia evokes spiking neuroblasts in a model of mild brain ischemia.** Stroke, 41-2944-9.
24. Ceruti S., Viganò F., Boda E., Ferrario S., Magni G., Rosa P., Buffo A., Abbracchio M.P. (2011) **The newly identified P2Y-like GPR17 receptor during oligodendrocyte cell maturation regulates sensitivity to ATP induced death.** Glia 2011, 59: 363-78.
25. Boda E., Viganò F., Rosa P., Fumagalli M., Labat-gest V., Tempia F., Abbracchio M.P, Dimou L., Buffo A. (2011) **The GPR17 receptor in NG2 expressing cells: focus on in vivo cell maturation and participation in acute trauma and chronic damage** Glia, 59:1958-73.
26. Rolando C., Parolisi R., Boda E., Schwab M.E., Rossi F. and Buffo A. (2012) **Distinct roles of Nogo-A and Nogo receptor 1 in the homeostatic regulation of adult Neural Stem Cell function and neuroblast migration.** J Neurosci 32:17788-99.
27. Behrendt G., Baer K., Buffo A., Curtis M.A., Faull R.L., Rees M.I., Götz M. and Dimou L. (2013) **Dynamic changes in myelin aberrations and oligodendrocyte generation in chronic amyloidosis in mice and men.** Glia 61:273-86
28. Fratangeli A, Parmigiani E, Fumagalli M, Lecca D, Benfante R, Passafaro M, Buffo A, Abbracchio MP, Rosa P. (2013) **The regulated expression, intracellular trafficking, and membrane recycling of the P2Y-like receptor GPR17 in Oli-neu oligodendroglial cells.** J Biol Chem. 288:5241-56.
29. Buffo A, Rossi F. (2013) **Origin, lineage and function of cerebellar glia.** Prog Neurobiol. 109:42-63.
30. Boccazzi M, Rolando C, Abbracchio MP, Buffo A\*, Ceruti S.\* (2014) **Purines regulate adult brain subventricular zone cell functions: contribution of reactive astrocytes.** Glia. 62:428-39. (\*, co-last author)
31. Boda E, Buffo A. **Beyond cell replacement: unresolved roles of NG2-expressing progenitors.** (2014) Front Neurosci. 2014 May 23;8:122. doi: 10.3389/fnins.2014.00122.
32. De Luca A, Parmigiani E, Tosatto G, Martire S, Hoshino M, Buffo A, Leto K, Rossi F. **Exogenous Sonic Hedgehog Modulates the Pool of GABAergic Interneurons During Cerebellar Development.** (2014) Cerebellum. 2014 Sep 23. [Epub ahead of print] PubMed

PMID: 25245619.

33. Leto K, Carulli D, Buffo A. (2014) **Symposium in honor of Ferdinando Rossi: a passionate journey through the cerebellar mysteries.** *Cerebellum*. 2014;13:791-4. PubMed PMID: 25562085.
34. Nato G, Caramello A, Trova S, Avataneo V, Rolando C, Taylor V, Buffo A, Peretto P, Luzzati F. (2015) **Striatal astrocytes produce neuroblasts in an excitotoxic model of Huntington's disease.** *Development* 142:840-845 PMID: 25655705.
35. Boda E, Di Maria S, Rosa P, Taylor V, Abbracchio MP, Buffo A. (2015) **Early phenotypic asymmetry of sister oligodendrocyte progenitor cells after mitosis and its modulation by aging and extrinsic factors.** *Glia*. 63:271-86.
36. Parmigiani E, Leto K, Rolando C, Figueres-Oñate M, López-Mascaraque L, Buffo A\*, Rossi F (2015) **Heterogeneity and Bipotency of Astroglial-Like Cerebellar Progenitors along the Interneuron and Glial Lineages.** *J Neurosci* 35:7388-7402. (\* corresponding author)
37. Leto K, Arancillo M, Becker EBE, Buffo A, Chiang C, Ding B, Dobyns WB, Dusart I, Haldipur P, Hatten ME, Hoshino M, Joyner AL, Kano M, Kilpatrick DL, Koibuchi N, Marino S, Martinez S, Millen KJ, Millner TO, Miyata T, Parmigiani E, Schilling K, Sekerková G, Sillitoe RV, Sotelo S, Uesaka N, Wefers A, Wingate RJT, Hawkes R (2015) **Consensus Paper: Cerebellar Development.** *Cerebellum*. PMID: 26439486
38. De Luca A, Cerrato V, Fucà E, Parmigiani E, Buffo A, Leto K (2015) **Sonic hedgehog patterning during cerebellar development.** *Cellular and Molecular Life Sciences* DOI: 10.1007/s00018-015-2065-1 (in press)

### Book chapters

Rossi F., Bravin M., Buffo A., Fronte M., Savio T. and Strata P. (1997) **Intrinsic properties and environmental factors in the regeneration of adult cerebellar axons.** In: de Zeeuw C., Voog J., Strata P. (eds) *The Cerebellum: from structure to control*, Elsevier, Amsterdam, pp. 283-296.

Rolando C., Boda E., Buffo A. (2012) **Immune system modulation of parenchymal and germinal neural progenitor cells in physiological and pathological conditions** in: *Neural Stem Cells and Therapy*, Sun T. Ed., InTech pp. 413-440.

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### Bibliometry

H index: 17; number of citations: 1529 (on 37 full papers); average number of citations/paper: 41,32; total IF: 180,07 (relative to the year of publication); average IF: 5. Source: Scopus