

CURRICULUM VITAE

Elena Battaglioli

Associate Professor in Applied Biology, BIO/13
Department of Medical Biotechnology and Translational Medicine,
Università degli Studi di Milano, Via Fratelli Cervi, 93; 20090 Segrate MI, Milano, Italy
Phone: +39- 0250330469
Email: elena.battaglioli@unimi.it

Birthplace Milano, Italy
Birthdate September, 18th 1968
Nationality Italian

January 2011 Associate member of the CNR-Institute of Neuroscience
2010-2015 Adjunct Faculty to the Department of Integrative Biology at the University of Miami

Research ID/ORCID, orcid.org/0000-0001-9168-7212

EDUCATION AND TRAINING:

2018 Obtained Abilitazione Scientifica Nazionale (ASN) to Full Professor BIO/13
2015 Associate Professor of Applied Biology
2004-2014 Assistant Professor in the Dept. of Molecular Biotechnology and Translational Medicine
2002-2003 Research Scientist, The Research Foundation SUNY in Stony Brook, Dept. of Neurobiology and Behavior, SUNY in Stony Brook, NY
1998-2002 Post doc, Howard Hughes Medical Institute, Department of Neurobiology and Behavior, SUNY in Stony Brook, NY.
1997 PhD in Cellular and Molecular Biology, Dept. of Pharmacology and Medical Toxicology, University of Milan.
1993 Graduate School, University of Milan, Dept. of Genetics and Microbiology. 110/110 cum laude.
1987 BS, Maturità Scientifica

RESEARCH INTEREST

The main focus of my research is to unravel the molecular machinery regulating the epigenome of neuronal cells and understand how the environment and experiences shape our behavior. In line, most of my contributions to science filled some gaps in general mechanisms involving epigenetics in transcription regulation, tissue specification and differentiation especially related to the nervous system. During my career, I contributed to discover and characterize Lysine Specific Demethylase 1 (LSD1), the first annotated histone demethylase. Today LSD1 is highly studied in cancer biology but its role in the neuronal context is likewise essential. We indeed began understanding its prominent implication in neurodevelopmental pathologies and neuropsychiatric disorders. With my group, we identified a mammalian-restricted neuronal isoform of this enzyme, neuroLSD1 which, together with LSD1, enables a further layer of regulation proper of the most complex brain-related behaviors. Through transcriptional modulation of synaptic- and plasticity-related genes, the dual system LSD1-neuroLSD1 represents a unique tool able to modify the mammalian brain epigenome in response to neuronal activity. Thus, LSD1 and neuroLSD1 participate in the epigenetic mechanisms that translate the effect of several environmental factors among which stress and aging into an altered transcriptional physiology in the mammalian brain. In particular, we are now interested in understanding the epigenetic mechanisms of stress response in the hippocampus and how they foster the onset of Major Depression in those individuals that are vulnerable to stress.

As LSD1 expert, I also had the chance to be involved in the study of a recently discovered neurodevelopmental disorder, namely Cleft Palate, Psychomotor Retardation, and Distinctive Facial Features (CPRF) (OMIM: 616728), caused by LSD1 mutations, unraveling that the three patients so far identified display loss of function mutations. Extreme rarity of CPRF has to do with another peculiar feature

of *LSD1* gene, listed in the top 1% of evolutionarily constrained genes, i.e. those genes that are intolerant to functional variation, an aspect that further emphasizes its fundamental role in the brain.

PUBLICATIONS

1. Gerosa L, Grillo B, Forastieri C, Longaretti A, Toffolo E, Mallei A, Bassani S, Popoli M, **Battaglioli E**, Rusconi F. SRF and SRFΔ5 Splicing Isoform Recruit Corepressor LSD1/KDM1A Modifying Structural Neuroplasticity and Environmental Stress Response. *Mol Neurobiol*. 2019 Jul 30. doi: 10.1007/s12035-019-01720-8. [Epub ahead of print] PubMed PMID: 31364026.
2. Spreafico M, Grillo B, Rusconi F, **Battaglioli E**, Venturin M. Multiple Layers of CDK5R1 Regulation in Alzheimer's Disease Implicate Long Non-Coding RNAs. *Int J Mol Sci*. 2018 Jul 11;19(7). PMID: PMC6073344. **IF 3.68**
3. Rusconi F, **Battaglioli E**. Acute Stress-Induced Epigenetic Modulations and Their Potential Protective Role Toward Depression. *Front Mol Neurosci*. 2018 May 31;11:184. PMID: PMC5990609. **IF 4.34**
4. Prini P, Rusconi F, Zamberletti E, Gabaglio M, Penna F, Fasano M, **Battaglioli E**, Parolaro D, Rubino T. Adolescent THC exposure in female rats leads to cognitive deficits through a mechanism involving chromatin modifications in the prefrontal cortex. *J Psychiatry Neurosci*. 2017 Oct 12;42(6):170082. PMID: 29022873. **IF 5.18**
5. Iwase S, Bérubé NG, Zhou Z, Kasri NN, **Battaglioli E**, Scandaglia M, Barco A. Epigenetic Etiology of Intellectual Disability. *J Neurosci*. 2017 Nov 8;37(45):10773-10782. doi: 10.1523/JNEUROSCI.1840-17.2017. Review.: PMC5678009. **IF 5.98**
6. Ferrari L, Scuvera G, Tucci A, Bianchessi D, Rusconi F, Menni F, **Battaglioli E**, Milani D, Riva P. Identification of an atypical microdeletion generating the RNF135-SUZ12 chimeric gene and causing a position effect in an NF1 patient with overgrowth. *Hum Genet*. 2017 Aug 3. doi: 10.1007/s00439-017-1832-5. [Epub ahead of print] PubMed PMID: 28776093. **IF 2.94**
7. Rusconi F, Grillo B, Toffolo E, Mattevi A, **Battaglioli E**. NeuroLSD1: Splicing-Generated Epigenetic Enhancer of Neuroplasticity. *Trends Neurosci*. 2017 Jan;40(1):28-38. doi: 10.1016/j.tins.2016.11.002. Epub 2016 Dec 13. Review. PubMed PMID: 27986293. **IF 7.71**
8. Pilotto S, Speranzini V, Marabelli C, Rusconi F, Toffolo E, Grillo B, **Battaglioli E**, Mattevi A. LSD1/KDM1A mutations associated to a newly described form of intellectual disability impair demethylase activity and binding to transcription factors. *Hum Mol Genet*. 2016 Jun 15;25(12):2578-2587. Epub 2016 Apr 19. PubMed PMID: 27094131. **IF 4.9**
9. Rusconi F, Grillo B, Ponzoni L, Bassani S, Toffolo E, Paganini L, Mallei A, Braida D, Passafaro M, Popoli M, Sala M, **Battaglioli E**. LSD1 modulates stress-evoked transcription of immediate early genes and emotional behavior. *Proc Natl Acad Sci U S A*. 2016 Mar 29;113(13):3651-6. doi: 10.1073/pnas.1511974113. Epub 2016 Mar 14. PubMed PMID: 26976584; PubMed Central PMCID: PMC4822633. **IF 9.5**
10. Barrios AP, Gomez AV, Sez JE, Ciossani G, Toffolo E, **Battaglioli E**, Mattevi A, Andres ME. Differential properties of transcriptional complexes formed by the CoREST family. *Mol Cell Biol*. 2014 May 12. [Epub ahead of print] PubMed PMID:24820421.
11. Rusconi F, Paganini L, Braida D, Ponzoni L, Toffolo E, Maroli A, Landsberger N, Bedogni F, Turco E, Pattini L, Altruda F, De Biasi S, Sala M, **Battaglioli E**. LSD1 Neurospecific Alternative Splicing Controls Neuronal Excitability in Mouse Models of Epilepsy. *Cereb Cortex*. 2014 Apr 15. [Epub ahead of print] PubMed PMID: 24735673.
12. Toffolo E, Rusconi F, Paganini L, Tortorici M, Pilotto S, Heise C, Verpelli C, Tedeschi G, Maffioli E, Sala C, Mattevi A, **Battaglioli E**. Phosphorylation of neuronal Lysine-Specific Demethylase 1LSD1/KDM1A impairs transcriptional repression by regulating interaction with CoREST and histone deacetylases HDAC1/2. *J Neurochem*. 2014 Mar;128(5):603-16. doi: 10.1111/jnc.12457. Epub 2013 Oct 23. P
13. Verpelli C, Piccoli G, Zibetti C, Zanchi A, Gardoni F, Huang K, Brambilla D, Di Luca M, **Battaglioli E**, Sala C. Synaptic activity controls dendritic spine morphology by modulating eEF2-dependent BDNF synthesis. *J Neurosci*. 2010; 30(17):5830-42. PubMed PMID: 20427644.

14. Zibetti C, Adamo A, Binda C, Forneris F, Toffolo E, Verpelli C, Ginelli E, Mattevi A, Sala C, **Battaglioli E**. Alternative splicing of the histone demethylase LSD1/KDM1 contributes to the modulation of neurite morphogenesis in the mammalian nervous system. *J Neurosci*. 2010; 30(7):2521-32.
15. Forneris F, **Battaglioli E**, Mattevi A, Binda C. New roles of flavoproteins in molecular cell biology: histone demethylase LSD1 and chromatin. *FEBS J*. 2009; 276(16):4304-12. Epub 2009 Jul 14. Review.
16. Bodega B, Ramirez GD, Grasser F, Cheli S, Brunelli S, Mora M, Meneveri R, Marozzi A, Mueller S, **Battaglioli E**, Ginelli E. Remodeling of the chromatin structure of the facioscapulohumeral muscular dystrophy (FSHD) locus and upregulation of FSHD-related gene 1 (FRG1) expression during human myogenic differentiation. *BMC Biol*. 2009; 7:41.
17. Karytinis A, Forneris F, Profumo A, Ciossani G, **Battaglioli E**, Binda C, Mattevi A. A novel mammalian flavin-dependent histone demethylase. *J Biol Chem*. 2009; 284(26):17775-82.
18. Gomez AV, Galleguillos D, Maass JC, **Battaglioli E**, Kukuljan M, Andres ME. CoREST represses the heat shock response mediated by HSF1. *Mol Cell*. 2008; 31(2):222-31.
19. Forneris F, Binda C, **Battaglioli E**, Mattevi A. LSD1: oxidative chemistry for multifaceted functions in chromatin regulation. *Trends Biochem Sci*. 2008; 33(4):181-9. Review.
20. Forneris F, Binda C, Adamo A, **Battaglioli E**, Mattevi A. Structural basis of LSD1-CoREST selectivity in histone H3 recognition. *J Biol Chem*. 2007; 282(28):20070-4.
21. Bodega B, Cardone MF, Muller S, Neusser M, Orzan F, Rossi E, **Battaglioli E**, Marozzi A, Riva P, Rocchi M, Meneveri R, Ginelli E. Evolutionary genomic remodelling of the human 4q subtelomere (4q35.2). *BMC Evol Biol*. 2007; 7:39.
22. Forneris F, Binda C, Dall'Aglio A, Fraaije MW, **Battaglioli E**, Mattevi A. A highly specific mechanism of histone H3-K4 recognition by histone demethylase LSD1. *J Biol Chem*. 2006; 281(46):35289-95.
23. Forneris F, Binda C, Vanoni MA, Mattevi A and **Battaglioli E**. "Demethylation pathways for histone methyllysine residues". 24th Volume of "The Enzymes"(Elsevier/ Academic Press) 229-242, 2006.
24. Forneris F, Binda C, Vanoni MA, **Battaglioli E**, Mattevi A. Human histone demethylase LSD1 reads the histone code. *J Biol Chem*. 2005; 280(50):41360-5.
25. Cargnin F, Flora A, Di Lascio S, **Battaglioli E**, Longhi R, Clementi F, Fornasari D. PHOX2B regulates its own expression by a transcriptional auto-regulatory mechanism. *J Biol Chem*. 2005; 280(45):37439-48.
26. Forneris F, Binda C, Vanoni MA, Mattevi A, **Battaglioli E**. Histone demethylation catalysed by LSD1 is a flavin-dependent oxidative process. *FEBS Lett*. 2005 Apr 11;579(10):2203-7.
27. **Battaglioli E**, Andres ME, Rose DW, Chenoweth JG, Rosenfeld MG, Anderson ME, Mandel G. REST repression of neuronal genes requires components of the hSWI.SNF complex. *J Biol Chem*. 2002; 277(43):41038-45.
28. Ballas N, **Battaglioli E**, Atouf F, Andres ME, Chenoweth J, Anderson ME, Burger C, Moniwa M, Davie JR, Bowers WJ, Federoff HJ, Rose DW, Rosenfeld MG, Brehm P, Mandel G. Regulation of neuronal traits by a novel transcriptional complex. *Neuron*. 2001; 31(3):353-65.
29. Flora A, Schulz R, Benfante R, **Battaglioli E**, Terzano S, Clementi F, Fornasari D. Neuronal and extraneuronal expression and regulation of the human alpha5 nicotinic receptor subunit gene. *J Neurochem*. 2000; 75(1):18-27.
30. Flora A, Schulz R, Benfante R, **Battaglioli E**, Terzano S, Clementi F, Fornasari D. Transcriptional regulation of the human alpha5 nicotinic receptor subunit gene in neuronal and non-neuronal tissues. *Eur J Pharmacol*. 2000; 393(1-3):85-95.
31. Grimes JA, Nielsen SJ, **Battaglioli E**, Miska EA, Speh JC, Berry DL, Atouf F, Holdener BC, Mandel G, Kouzarides T. The co-repressor mSin3A is a functional component of the REST-CoREST repressor complex. *J Biol Chem*. 2000; 275(13):9461-7.
32. Andres ME, Burger C, Peral-Rubio MJ, **Battaglioli E**, Anderson ME, Grimes J, Dallman J, Ballas N, Mandel G. CoREST: a functional corepressor required for regulation of neural-specific gene expression. *Proc Natl Acad Sci U S A*. 1999; 96(17):9873-8.

33. Fornasari D, **Battaglioli E**, Terzano S, Clementi F "Transcriptional Regulation of Neuronal Nicotinic Receptor Subunit Genes". In *Neuronal Nicotinic Receptors: Pharmacology and Therapeutic Opportunities*". Arneric and Brioni Eds. Wiley-Liss, NY (1997).
34. Battaglioli E, **Gotti C**, **Terzano S**, **Flora A**, **Clementi F**, **Fornasari D**. **Expression and transcriptional** regulation of the human alpha3 neuronal nicotinic receptor subunit in T lymphocyte cell lines. *J Neurochem*. 1998; 71(3):1261-70.
35. Fornasari D, **Battaglioli E**, Flora A, Terzano S, Clementi F. Structural and functional characterization of the human alpha3 nicotinic subunit gene promoter. *Mol Pharmacol*. 1997; 51(2):250-61.