

CURRICULUM VITAE

Dr. Daniela Puzzo, MD PhD

INFORMATION

Name: Daniela Puzzo

Place and date of birth: Catania, 14th nov 1973

Work address: Department of Biomedical and Biotechnological Sciences, Section of Physiology, Via S. Sofia 89 – Torri Biologiche, 95123 Catania (ITALY)

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EDUCATION

- 1999: MD (110/110 cum laude), University of Catania, Catania (Italy)
- 2003: PhD Applied Biomedical Sciences, University of Catania, Catania (Italy)
- 2007: Med. Residency in Clinical Biochemistry (70/70 cum laude), University of Catania, Catania (Italy)

TRAINING AND RESEARCH POSITIONS

- 1998-1999: Internship in Psychiatry and Biophysics, University of Catania, Catania (Italy)
- 1999-2002: PhD student, Dept. Physiological Sciences, University of Catania, Catania (Italy)
- 2002-2003: Postdoctoral Research Fellow, Dept. Psychiatry, NYU & NKI for Psychiatric Research and Silberstein Institute for Aging and Dementia, Orangeburg, NY (USA)
- 2004-2005: Postdoctoral Research Fellow, Dept. Physiological Sciences, University of Catania, Catania (Italy)
- 2005: Postdoctoral Research Fellow, Taub Institute for Research on Alzheimer's Disease and the Aging Brain, Columbia University, New York, NY (USA)
- 2006: Fellowship at the Italian Academy for Advanced Studies in America at Columbia University, New York, NY (USA)
- 2007-2008: Associate researcher Taub Institute for Research on Alzheimer's Disease and the Aging Brain, Columbia University, New York, NY (USA)
- 2008-now: Assistant Professor of Physiology, Department of Biomedical and Biotechnological Sciences, Section of Physiology, University of Catania, Catania (Italy)

AWARDS AND HONORS

- 2004-2011: Travel Fellowships (Alzheimer's Association, EFNS)
- 2006: Fellowship Program (Neuroscience), Italian Academy for Advanced Studies in America at Columbia University, New York, NY (USA)
- 2007: Awarded for Associate Professor Position, Touro College of Pharmacy, New York, NY (USA)
- 2013: SIF Prize (Italian Society of Physiology) for excellent research in Physiology
- 2014: Member of the assessment committee for the PhD thesis defense of Eva Bollen, Maastricht, University, Maastricht (The Netherlands)
- 2014: Qualification Associate Professor national competition - ASN - (L.240/2010, art.16) 11/2014

TEACHING (University of Catania)

- 2009-now: Physiology (School of Medicine, School of Motor Sciences, Medical Specialization Schools)
- 2009-now: Degree and PhD Dissertations Supervisor
- 2011-2015: PhD in Neuroscience
- 2017-now: PhD in Applied Biomedical Sciences
- 2009-now: Tutor Neuroscience and laboratory methods for undergraduate, graduate and PhD students

REVIEWER

Alzheimer's Association grants, French National research Agency, International journals (ACS Chem Neurosci, Behav Brain Res, BBA– Molecular basis of disease, Brain Res, Br J Pharm, Curr Pharm Des, Dose-Response, Exp Brain Res, Front Integr Phys, Front Neurosci, Fut Med Chem, J Alz Dis, Nat Comm, Neurobiol Dis, Neuromol Med, Neuroscience, Neurosci Biobehav Rev, PlosOne, Progr Neurobiol, Reg Pept, Sci Rep, J Neuroscience)

PATENTS

(Filing at The Trustees Of Columbia University In The City Of New York)

1. Phosphodiesterase inhibitors and uses thereof
2. Tau protein screening assay
3. Methods and compositions for enhancing memory

GRANTS as PI

- 2007: Alzheimer's Association: NIRG-07-59597, PI
- 2009: Compagnia di San Paolo, Coordinator Catania
- 2010: Alzheimer's Association: IIRG-09-134220, PI

EDITORIAL BOARD

- 2013-now: Associate Editor Journal of Alzheimer's Disease
- 2015-now: Editorial Board Trends in Clinical Research
- 2015-now: Editorial Board International Journal of Aging & Clinical Research
- 2016-now: Scientific Board pH
- 2017-now: Editorial Board Frontiers in Physiology - Integrative Physiology

PROFESSIONAL SOCIETIES: Society for Neuroscience, Italian Society for Neuroscience, Italian Society of Physiology, Medical Women's International Association

ACADEMIC ROLES at the University of Catania

- 2012-2014: Contact person for Internationalization and Erasmus, Dept. Bio-Medical Sciences
- 2013-2015: Contact person for disability, Dept. Bio-Medical Sciences
- 2013-now: Quality Assurance Commission for Education and Training, School of Medicine
- 2013-now: Pedagogical Board, School of Medicine
- 2016-now: Vice-Dean School of Medicine
- 2017-now: Member of the Gender Medicine Committee, Medical Board of Catania

MAIN RESEARCH LINES

Mechanisms underlying synaptic plasticity and memory in physiology and pathology

- Physiological role of Amyloid-beta peptide in synaptic plasticity and memory
- Physiological role of cyclic nucleotides in hippocampal synaptic plasticity and memory
- Mechanisms underlying synaptic and memory dysfunction in Alzheimer's disease and aging

KEYWORDS RELATED TO SCIENTIFIC COMPETENCIES

Synaptic plasticity, Memory, Electrophysiology, Behavioral studies, Transgenic animal models, Aging, Alzheimer's disease, Beta-Amyloid, Tau Protein, Cyclic nucleotides

ORAL COMMUNICATIONS and INVITED SPEAKER (in reverse chronological order)

- Invited speaker PhD Program Research Training group GRK1715 "Relevance of hormesis in learning and memory: from physiology to Alzheimer's disease". Friedrich Schiller University of Jena, Jena (Germany), 2017.
- Speaker for the Symposium: New insights on hippocampal plasticity: from development to age-related neurodegenerative diseases. "Amyloid- β peptide and cGMP crosstalk: relevance in hippocampal synaptic plasticity". 67^o Annual Meeting Italian Society of Physiology (SIF). Catania (Italy), 2016.
- Invited speaker PhD Schools (Dottorato in Scienze della Vita e della Salute e Dottorato in Neuroscienze, Scienze Psicologiche e Psichiatriche). "Dr. Jekyll or Mr. Hyde? The strange case of amyloid-beta peptide from physiology to Alzheimer's disease". Università di Verona, Verona (Italy), 2016.
- Invited speaker "Cognitive processing: the role of phosphodiesterase-5 as new target". 13th International Summer School of Neuroscience: Cognition the target. Catania (Italy), 2015.
- Invited speaker and chair for the Symposium: Hippocampal synaptic plasticity in physiological conditions and in cognitive dysfunction. "Amyloid-beta peptide between physiology and pathology". Spring Hippocampal Research Conference. Taormina (Italy), 2015.
- Invited speaker "Dr. Jekyll e Mr. Hyde: lo strano caso della proteina beta-amiloide, tra sinapsi, invecchiamento e Malattia di Alzheimer". INRCA Lecture on Brain Aging 2015. Ancona (Italy), 2015.
- Invited speaker PhD Schools in Biophysics and in Neuroscience "Role of cAMP/cGMP signaling in synaptic plasticity and memory: from physiology to Alzheimer's disease". Institute of Physiology, Università Cattolica del Sacro Cuore. Roma (Italy), 2015.
- Oral communication "Role of the cell adhesion molecule F3/contactin in synaptic plasticity and memory in aged mice." 65^o Annual Meeting Italian Society of Physiology (SIF). Anacapri (Italy), 2014.
- Speaker for the Symposium: Physiological role of amyloid-beta peptide. "Physiological and hormetic role of amyloid-beta peptide in synaptic plasticity and memory" and Chair for the Symposium: Mechanisms underlying synaptic dysfunction in Alzheimer's disease. XIV Congress of the Italian Society for Neuroscience (SINS). Catania (Italy), 2012.
- Oral communication "Amyloid-beta peptide has a hormetic effect in synaptic plasticity and memory". 62^o Annual Meeting Italian Society of Physiology (SIF). Sorrento (Italy), 2011.
- Invited speaker and Chair for the Symposium: Cyclic GMP-Phosphodiesterase Inhibitors as Therapeutic Agents in Nervous System Disorders. "Phosphodiesterase 5 inhibitors as

- therapeutic agents in Alzheimer's disease". International Society of Neurochemistry and European Society of Neurochemistry (ISN-ESN) Meeting. Athens (Greece), 2011.
- Invited speaker "Amyloid-beta peptide in synaptic plasticity and memory: a bridge between physiology and pathology". First Workshop on synaptic plasticity: from bench to bed side. Giardini-Naxos (ME, Italy), 2010.
 - Organizer and speaker National Congress Is it just Water? "Hormetic effect of Amyloid-beta peptide in synaptic plasticity and memory". Catania (Italy), 2010
 - Speaker for the Symposium: Cellular and molecular mechanisms underlying synaptic plasticity and memory. "Physiological role of Amyloid-beta peptide in synaptic plasticity and memory" 60° Annual Meeting Italian Society of Physiology (SIF). Siena (Italy), 2009
 - Oral communication "Amyloid- beta peptide is required for synaptic plasticity and memory". International Conference on Alzheimer's Disease (ICAD). Vienna (Austria), 2009
 - Oral Communication "Amyloid-beta-peptide is critical for hippocampal LTP induction and memory acquisition". Neuroscience 2008. Washington DC (USA), 2008
 - Oral communication "Nitric oxide and cGMP analogs reverse amyloid- β -peptide impairment of long-term potentiation". International symposium on Nitric Oxide - cyclic GMP signal transduction in brain. Valencia (Spain), 2003
 - Oral communication "Nitric oxide and cGMP analogs reverse amyloid-beta-peptide impairment of hippocampal long-term potentiation". 8° Congress European Federation of Neurological Societies (EFNS). Paris (France), 2004
 - Oral communication "Functional role of Amyloid-beta peptide in synaptic plasticity and memory". 11° Congress European Federation of Neurological Societies (EFNS). Brussels (Belgium), 2007
 - Speaker Research Seminar Series Touro College of Pharmacy, Department of Pharmaceutical and Biomedical Sciences "Physiological aspects of memory and its impairment in Alzheimer's disease". New York (NY, USA), 2007
 - Oral Communication "Functional role of Amyloid-beta peptide in synaptic plasticity and memory". Neuroscience 2007. San Diego (USA), 2007
 - Oral Communication "Amyloid- beta peptide as a positive modulator of synaptic plasticity and memory". International Conference on Alzheimer's Disease (ICAD). Chicago (IL, USA), 2008
 - Oral communication, "cGMP analogs reverse amyloid- β -peptide-induced impairment of long-term potentiation in hippocampal slices". 54° Annual Meeting Italian Society of Physiology (SIF). Chieti (Italy), 2003

PUBLICATIONS in peer-reviewed international journals

1. **Puzzo D**, Piacentini R, Fá M, Gulisano W, Li Puma DD, Staniszewski A, Zhang H, Tropea MR, Cocco S, Palmeri A, Fraser P, D'Adamio L, Grassi C, Arancio O. LTP and memory impairment caused by extracellular A β and Tau oligomers is APP-dependent. *Elife*. 2017 Jul 11;6. pii: e26991.
2. Palmeri A, Ricciarelli R, Gulisano W, Rivera D, Rebosio C, Calcagno E, Tropea MR, Conti S, Das U, Roy S, Pronzato MA, Arancio O, Fedele E, **Puzzo D**. Amyloid- β Peptide Is Needed for cGMP-Induced Long-Term Potentiation and Memory. *J Neurosci*. 2017 Jul 19;37(29):6926-6937.
3. Prickaerts J, Van Goethem NP, Gulisano W, Argyrousi EK, Palmeri A, **Puzzo D**. Physiological and pathological processes of synaptic plasticity and memory in drug discovery: Do not forget the dose-response curve. *Eur J Pharmacol*. 2017 May 31. pii: S0014-2999(17)30390-4. *On invitation*.

4. Gulisano W, Bizzoca A, Gennarini G, Palmeri A, **Puzzo D**. Role of the adhesion molecule F3/Contactin in synaptic plasticity and memory. *Mol Cell Neurosci*. 2016 Dec 28. pii: S1044-7431(16)30276-7. On invitation.
5. **Puzzo D**, Raiteri R, Castaldo C, Capasso R, Pagano E, Tedesco M, Gulisano W, Drozd L, Lippiello P, Palmeri A, Scotto P, Miniaci MC. CL316,243, a β 3-adrenergic receptor agonist, induces muscle hypertrophy and increased strength. *Sci Rep*. 2016 Nov 22;5:37504.
6. Gennarini G, Bizzoca A, Picocci S, **Puzzo D**, Corsi P, Furley AJ. The role of Gpi-anchored axonal glycoproteins in neural development and neurological disorders. *Mol Cell Neurosci*. 2016 Nov 18. pii: S1044-7431(16)30240-8.
7. Koppensteiner P, Trinchese F, Fà M, **Puzzo D**, Gulisano W, Yan S, Poussin A, Liu S, Orozco I, Dale E, Teich AF, Palmeri A, Ninan I, Boehm S, Arancio O. Time-dependent reversal of synaptic plasticity induced by physiological concentrations of oligomeric A β 42: an early index of Alzheimer's disease. *Sci Rep*. 2016 Sep 1;6:32553.
8. Palmeri A, Mammanna L, Tropea MR, Gulisano W, **Puzzo D**. Salidroside, a Bioactive Compound of Rhodiola Rosea, Ameliorates Memory and Emotional Behavior in Adult Mice. *J Alzheimers Dis*. 2016 Feb 26;52(1):65-75.
9. Leggio GM, Catania MV, **Puzzo D**, Spatuzza M, Pellitteri R, Gulisano W, Torrisi SA, Giurdanella G, Piazza C, Impellizzeri AR, Gozzo L, Navarria A, Bucolo C, Nicoletti F, Palmeri A, Salomone S, Copani A, Caraci F, Drago F. The antineoplastic drug flavopiridol reverses memory impairment induced by Amyloid- β 1-42 oligomers in mice. *Pharmacol Res*. 2016 Apr;106:10-20.
10. Fa M*, **Puzzo D***, Piacentini R, Staniszewski A, Zhang H, Baltrons MA, Li Puma DD, Chatterjee I, Li J, Saeed F, Berman HL, Ripoli C, Gulisano W, Gonzalez J, Tian H, Costa JA, Lopez P, Davidowitz E, Yu WH, Haroutunian V, Brown LM, Palmeri A, Sigurdsson EM, Duff KE, Teich AF, Honig LS, Sierks M, Moe JG, D'Adamio L, Grassi C, Kanaan NM, Fraser PE, Arancio O. Extracellular Tau oligomers produce an immediate impairment of LTP and memory. *Sci Rep*. 2016 Jan 20;6:19393.
11. **Puzzo D**, Fiorito J, Purgatorio R, Gulisano W, Palmeri A, Arancio O, Nicholls R. Molecular Mechanisms of Learning and Memory. Chapter I in "Genes, Environment and Alzheimer's disease" by Lazarov O and Tesco G. Elsevier Inc. 8th Apr 2016. On invitation.
12. **Puzzo D**, Gulisano W, Palmeri A, Arancio O. The keystone of Alzheimer pathogenesis might be sought in A β physiology. *Neuroscience*. 2015 Oct 29;307:26-36. On invitation.
13. Caraci F, Gulisano W, Guida CA, Impellizzeri AA, Drago F, **Puzzo D**, Palmeri A. A key role for TGF- β 1 in hippocampal synaptic plasticity and memory. *Sci Rep*. 2015 Jun 10;5:11252.
14. **Puzzo D**, Gulisano W, Palmeri A, Arancio O. Rodent models for Alzheimer's disease drug discovery. *Expert Opin Drug Discov*. 2015 Apr 30;1-9. On invitation.
15. Bollen E, Akkerman S, **Puzzo D**, Gulisano W, Palmeri A, D'Hooge R, Balschun D, Steinbusch HW, Blokland A, Prickaerts J. Object memory enhancement by combining sub-effficacious doses of specific phosphodiesterase inhibitors. *Neuropharmacology*. 2015 Aug;95:361-6.
16. **Puzzo D**, Bizzoca A, Loreto C, Guida CA, Gulisano W, Frasca G, Bellomo M, Castorina S, Gennarini G, Palmeri A. Role of F3/contactin expression profile in synaptic plasticity and memory in aged mice. *Neurobiol Aging*. 2015 Apr;36(4):1702-15.
17. Teich AF, Nicholls RE, **Puzzo D**, Fiorito J, Purgatorio R, Fa' M, Arancio O. Synaptic therapy in Alzheimer's disease: a CREB-centric approach. *Neurotherapeutics*. 2015 Jan;12(1):29-41. On invitation.
18. Cantarella G, Di Benedetto G, **Puzzo D**, Privitera L, Loreto C, Saccone S, Giunta S, Palmeri A, Bernardini R. Neutralization of TNFSF10 ameliorates functional outcome in a murine model of Alzheimer's disease. *Brain*. 2015 Jan;138(Pt 1):203-16.
19. Ripoli C, Cocco S, Li Puma DD, Piacentini R, Mastrodonato A, Scala F, **Puzzo D**, D'Ascenzo M, Grassi C. Intracellular accumulation of amyloid- β (A β) protein plays a major

- role in A β -induced alterations of glutamatergic synaptic transmission and plasticity. *J Neurosci*. 2014 Sep 17;34(38):12893-903.
20. Bollen E*, **Puzzo D***, Rutten K, Privitera L, De Vry J, Vanmierlo T, Kenis G, Palmeri A, D'Hooge R, Balschun D, Steinbusch HM, Blokland A, Prickaerts J. Improved long-term memory via enhancing cGMP-PKG signaling requires cAMP-PKA signaling. *Neuropsychopharmacology*. 2014 Oct;39(11):2497-505.
 21. Ricciarelli R*, **Puzzo D***, Bruno O, Canepa E, Gardella E, Rivera D, Privitera L, Domenicotti C, Marengo B, Marinari UM, Palmeri A, Pronzato MA, Arancio O, Fedele E. A novel mechanism for cyclic adenosine monophosphate-mediated memory formation: Role of amyloid beta. *Ann Neurol*. 2014 Apr;75(4):602-7.
 22. **Puzzo D**, Lee L, Palmeri A, Calabrese G, Arancio O. Behavioral assays with mouse models of Alzheimer's disease: practical considerations and guidelines. *Biochem Pharmacol*. 2014 Apr 15;88(4):450-67. *On invitation*.
 23. **Puzzo D**, Loreto C, Giunta S, Musumeci G, Frasca G, Podda MV, Arancio O, Palmeri A. Effect of phosphodiesterase-5 inhibition on apoptosis and beta amyloid load in aged mice. *Neurobiol Aging*. 2014 Mar;35(3):520-31.
 24. Podda MV, Piacentini R, Barbati SA, Mastrodonato A, **Puzzo D**, D'Ascenzo M, Leone L, Grassi C. Role of cyclic nucleotide-gated channels in the modulation of mouse hippocampal neurogenesis. *PLoS One*. 2013 Aug 22;8(8):e73246.
 25. **Puzzo D**, Bizzoca A, Privitera L, Furnari D, Giunta S, Girolamo F, Pinto M, Gennarini G, Palmeri A. F3/Contactin promotes hippocampal neurogenesis, synaptic plasticity, and memory in adult mice. *Hippocampus*. 2013 Dec;23(12):1367-82.
 26. Palmeri A, Privitera L, Giunta S, Loreto C, **Puzzo D**. Inhibition of phosphodiesterase-5 rescues age-related impairment of synaptic plasticity and memory. *Behav Brain Res*. 2013 Mar 1;240:11-20.
 27. **Puzzo D**, Arancio O. Amyloid- β peptide: Dr. Jekyll or Mr. Hyde? *J Alzh Dis*. 2013;33 Suppl 1:S111-20. *On invitation*.
 28. **Puzzo D**, Privitera L, Palmeri A. Hormetic effect of amyloid- β peptide in synaptic plasticity and memory. *Neurobiol Aging*. 2012 Jul;33(7):1484.e15-24.
 29. **Puzzo D**, Privitera L, Fa' M, Staniszewski A, Hashimoto G, Aziz F, Sakurai M, Ribe EM, Troy CM, Mercken M, Jung SS, Palmeri A, Arancio O. Endogenous amyloid- β is necessary for hippocampal synaptic plasticity and memory. *Ann Neurol*. 2011 May;69(5):819-30.
 30. **Puzzo D**, Staniszewski A, Deng SX, Privitera L, Leznik E, Liu S, Zhang H, Feng Y, Palmeri A, Landry DW, Arancio O. Phosphodiesterase 5 inhibition improves synaptic function, memory, and amyloid-beta load in an Alzheimer's disease mouse model. *J Neurosci*. 2009 Jun 24;29(25):8075-86.
 31. **Puzzo D**, Privitera L, Leznik E, Fà M, Staniszewski A, Palmeri A, Arancio O. Picomolar amyloid-beta positively modulates synaptic plasticity and memory in hippocampus. *J Neurosci*. 2008 Dec 31;28(53):14537-45.
 32. **Puzzo D**, Sapienza S, Arancio O, Palmeri A. Role of phosphodiesterase 5 in synaptic plasticity and memory. *Neuropsychiatr Dis Treat*. 2008 Apr;4(2):371-87. *On invitation*.
 33. Serulle Y, Zhang S, Ninan I, **Puzzo D**, McCarthy M, Khatri L, Arancio O, Ziff EB. A GluR1-cGKII interaction regulates AMPA receptor trafficking. *Neuron*. 2007 Nov 21;56(4):670-88.
 34. **Puzzo D**, Palmeri A, Arancio O. Involvement of the nitric oxide pathway in synaptic dysfunction following amyloid elevation in Alzheimer's disease. *Rev Neurosci*. 2006;17(5):497-523. *On invitation*.
 35. **Puzzo D**, Arancio O. Fibrillar beta-amyloid impairs the late phase of long term potentiation. *Curr Alzheimer Res*. 2006 Jul;3(3):179-83.
 36. **Puzzo D**, Vitolo O, Trinchese F, Jacob JP, Palmeri A, Arancio O. Amyloid-beta peptide inhibits activation of the nitric oxide/cGMP/cAMP-responsive element-binding protein pathway during hippocampal synaptic plasticity. *J Neurosci*. 2005 Jul 20;25(29):6887-97.

37. Arancio O, Zhang HP, Chen X, Lin C, Trinchese F, **Puzzo D**, Liu S, Hegde A, Yan SF, Stern A, Luddy JS, Lue LF, Walker DG, Roher A, Buttini M, Mucke L, Li W, Schmidt AM, Kindy M, Hyslop PA, Stern DM, Du Yan SS. RAGE potentiates Abeta-induced perturbation of neuronal function in transgenic mice. *EMBO J*. 2004 Oct 13;23(20):4096-105.
38. Trinchese F, Liu S, Ninan I, **Puzzo D**, Jacob JP, Arancio O. Cell cultures from animal models of Alzheimer's disease as a tool for faster screening and testing of drug efficacy. *J Mol Neurosci*. 2004;24(1):15-21.
39. Restivo DA, Lanza S, Giuffrida S, Le Pira F, Drago MT, Di Mauro R, Palmeri A, **Puzzo D**, Di Bella P, Sessa E, Rifici C, D'Aleo G, Muscarà N, Bramanti P. Cortical silent period prolongation in spinocerebellar ataxia type 2 (SCA2). *Funct Neurol*. 2004 Jan-Mar;19(1):37-41.
40. Di Rosa G, **Puzzo D**, Sant'Angelo A, Trinchese F, Arancio O. Alpha-synuclein: between synaptic function and dysfunction. *Histol Histopathol*. 2003 Oct;18(4):1257-66.