



Curriculum Vitae

Personal information Antonella Ferrante

Work experience

03/2024-present: Senior Researcher at the National Center for drug Research and Evaluation, Italian National Institute of Health, Rome, Italy.

Main activity: Study of the effect of adenosine receptors manipulation in "in vivo" and "in vitro" models of neurodegenerative diseases. In particular, the role of A2A Niemann-Pick type C is under investigation. To this aim electrophysiological, molecular, biochemical and histological analyses are applied in both cellular and animal models of the disease. Behavioral analyses are also performed.

09/2007-03/2024: Researcher at the National Center for drug Research and Evaluation, Italian National Institute of Health, Rome, Italy

Main activity: Study of the effect of adenosine receptors manipulation in "in vivo" and "in vitro" models of neurodegenerative diseases. In particular, the role of A2A and A1 receptors in Huntington Disease, Niemann-Pick type C and Fragile-X are under investigation. To this aim electrophysiological, molecular, biochemical and histological analyses are applied in both cellular and animal models of the above-mentioned diseases. Behavioral analyses are also performed.

09/2001-08/2007: Contract Researcher at Italian National Institute of Health, Rome, Italy

Main activity: Study of tumor cell radioresistance: role of cell-cell communication in the resistance of three-dimensional tumor spheroids to gamma-ray irradiation. To this aim biochemical and biophysical techniques (1H-NMR) were applied.

Education and training

2007: PhD in Biophysics at University "La Sapienza" in Rome, Italy.

Skills: Application of NMR to the study of tumor cell response to radiotherapy

2001: Academic degree in Biology (*cum laude*) at University "La Sapienza" in Rome, Italy.

Skills: study of tumor cell radioresistance by using 3D cellular models and biochemical approaches.

Additional information

Publications

1. Rainaldi G., Filippini P., **Ferrante A.**, Indovina P.L. and Santini M.T. (2001) "Fibronectin facilitates adhesion of K562 leukemic cells, normally growing in suspension, to cationic surfaces". *Journal of Biomedical Materials Research*, 55: 104-113.
2. Filippini P., Rainaldi G., **Ferrante A.**, Mecheri B., Gabrielli G., Bombace M., Indovina P.L. and Santini M.T. (2001) "Modulation of osteosarcoma cell growth and differentiation by silane modified surfaces". *Journal of Biomedical Materials Research*, 55: 338-349.
3. Santini M.T., Rainaldi G., **Ferrante A.**, Indovina P.L., Vecchia P. and Donelli G. (2003) "Effects of a 50 Hz sinusoidal magnetic field on cell adhesion molecule expression in two human osteosarcoma cell lines (MG-63 and Saos-2)". *Bioelectromagnetics*, 24: 327-338.
4. Rainaldi G., **Ferrante A.**, Indovina P.L. and Santini M.T. (2003) "Induction of apoptosis or necrosis by ionizing radiation is dose-dependent in MG-63 osteosarcoma multicellular spheroids". *Anticancer research*, 23: 2505-2518.
5. Santini M.T., Napolitano M., **Ferrante A.**, Rainaldi G., Arancia G., Bravo E. (2003) "Differential control of cholesterol and fatty acids biosynthesis in sensitive and multidrug resistant LoVo tumor cells". *Anticancer research*, 23 (6): 4737-474
6. Santini M.T., Rainaldi G., Romano R., **Ferrante A.**, Clemente S., Motta A. and Indovina P.L. (2004) "MG-63 human osteosarcoma cells grown in monolayer and as three-dimensional tumor spheroids present a different metabolic profile: a 1H-NMR study." *FEBS letters*, 557: 148-15.
7. Santini M.T., Rainaldi G., **Ferrante A.**, Romano R., Clemente S., Motta A., De Berardis B., Balduzzi M., Paoletti L. and Indovina P. L. (2004) "Environmental fine particulate matter (PM 2.5) activates the RAW 264.7 macrophage cell line even at very low concentrations as revealed by 1H-NMR." *Chemical Research in Toxicology*, 17 (1): 63-74
8. M.T. Santini, **Ferrante A.**, G. Rainaldi, P. Indovina, P.L. Indovina (2005). "Extremely low frequency (ELF) magnetic fields and apoptosis: a review". *International Journal of Radiation Biology*, 81 (1): 1-11
9. M.T. Santini, **Ferrante A.**, R. Romano, G. Rainaldi, A. Motta, G. Donelli, P. Vecchia, and P.L. Indovina, (2005). "A 700 MHz 1H-NMR study reveals apoptosis-like behavior in human K562 erythroleukemic cells exposed to a 50 Hz sinusoidal magnetic field". *International Journal of Radiation Biology*, 82 (2): 97-113.
10. **Ferrante A.**, G. Rainaldi, P. Indovina, P.L. Indovina, and M.T. Santini (2006). "Increased cell compaction can augment the resistance of HT-29 human colon adenocarcinoma spheroids to ionizing radiation". *International Journal of Oncology*, 28 (1): 111-8.
11. M.T. Santini, G. Rainaldi, **Ferrante A.**, P. Indovina, G. Donelli, and P.L. Indovina, (2006). "A 50 Hz sinusoidal magnetic field does not damage MG-63 three-dimensional tumor spheroids but induces changes in their invasive properties". *Bioelectromagnetics* 27: 132-141.
12. Santini MT, Romano R, Rainaldi G, **Ferrante A.**, Indovina P, Motta A, Indovina PL (2006). "1H-NMR evidence for a different response to the same dose (2Gy) of ionizing radiation of MG-63 human osteosarcoma cells and three-dimensional spheroids. *Anticancer Research* 26: 267-282.

13. Santini MT, Romano R, Rainaldi G, **Ferrante A.**, Motta A, Indovina PL (2006). "Increases in 1H-NMR mobile lipids are not always associated with overt apoptosis: evidence from MG-63 human osteosarcoma three-dimensional spheroids exposed to a low dose (2 Gy) of ionizing radiation. *Radiation research* 165: 131-141.
14. Indovina P, **Ferrante A.**, Rainaldi G, Santini MT (2006). "Hypoxia and ionizing radiation: changes in adhesive properties and cell adhesion molecule expression in MG-63 three-dimensional tumor spheroids". *Cell communication and adhesion* 13: 185-198.
15. Santini M.T., Romano R., Rainaldi G., Indovina P., **Ferrante A.**, Motta A. and Indovina P.L. (2006) "Temporal dynamics of 1H-NMR-visible metabolites during radiation-induced apoptosis in MG-63 human osteosarcoma spheroids." *Radiation Research* 166: 734-745.
16. Rainaldi G., Romano R., Indovina P., **Ferrante A.**, Motta A., Indovina P.L. and Santini M.T. (2008) "Metabolomics using 1H-NMR of apoptosis and necrosis in HL60 leukemia cells: Differences between the two types of cell death and independence from the stimulus of apoptosis used". *Radiation Research* 169: 170-180.
17. Pepponi R., **Ferrante A.**, Ferretti R., Martire A., Popoli P., (2009). "Region-specific neuroprotective effect of ZM 241385 towards glutamate uptake inhibition in cultured neurons." *Eur. J. Pharmacol.* 617:28-32
18. Tebano M.T., Martire A., Chiodi V., Pepponi R., **Ferrante A.**, Domenici M.R., Frank C., Chen J.F., Ledent C. and Popoli P., (2009). "Adenosine A(2A) receptors enable the synaptic effects of cannabinoid CB(1) receptors in the rodent striatum". *J. Neurochem.* 110 (6):1921-30.
19. Martire A, **Ferrante A.**, Potenza RL, Armida M, Ferretti R, Pèzzola A, Domenici MR, Popoli P. (2010). "Remodeling of striatal NMDA receptors by chronic A2A receptor blockade in Huntington's disease mice. *Neurobiol. Dis.*, 37(1):99-105.
20. **Ferrante A.**, Martire A, Armida M, Chiodi V, Pèzzola A, Potenza RL, Domenici MR, Popoli P. (2010) "Influence of CGS 21680, a selective adenosine A(2A) receptor agonist, on NMDA receptor function and expression in the brain of Huntington's disease mice". *Brain Res.*, 1323:184-191.
21. Tebano MT, Martire A, Chiodi V, **Ferrante A.**, Popoli P (2010). "Role of adenosine A(2A) receptors in modulating synaptic functions and brain levels of BDNF: a possible key mechanism in the pathophysiology of Huntington's disease". *ScientificWorldJournal*,10:1768-82.
22. Venerosi A, Martire A, Rungi A, Pieri M, **Ferrante A.**, Zona C, Popoli P and Calamandrei G (2011) "Complex behavioral and Synaptic effects of dietary branched chain aminoacids in a mouse model of Amyotrophic Lateral Sclerosis". *Molecular Nutrition & Food Research*, 54:1-12
23. Piscopo P, Crestini A, Adduci A, **Ferrante A.**, Massari M, Popoli P, Vanacore N, Confaloni A (2011). "Altered oxidative stress profile in the cortex of mice fed by an enriched branched-chain amino acids diet: a possible link with Amyotrophic Lateral Sclerosis?" *J Neurosci Res*, 89:1276-1283.
24. Chiodi V, Uchigashima M, Beggato S, **Ferrante A.**, Armida M, Martire A, Potenza RL, Ferraro L, Tanganelli S, Watanabe M, Domenici MR, Popoli P (2012). "Unbalance of CB1 receptors expressed in GABAergic and glutamatergic neurons in a transgenic mouse model of Huntington's disease". *Neurobiol Dis*, 45 (3):983-91.
25. Scattoni ML, Martire A, Cartocci G, **Ferrante A.**, Ricceri L (2013). "Reduced social interaction, behavioural flexibility and BDNF signalling in the BTBR T+tf/J strain, a mouse model of autism". *Behav Br Res* 251:35-40.
26. Potenza RL, Armida M, **Ferrante A.**, Pèzzola A, Matteucci A, Puopolo M, Popoli P. (2013) "Effects of chronic caffeine intake in a mice model of amyotrophic lateral sclerosis." *J Neurosci Res* 91 (4):585-92
27. Martire A, Pepponi R, Domenici MR, **Ferrante A.**, Chiodi V, Popoli P. (2013) "BDNF prevents NMDA-induced toxicity in models of Huntington's disease: the effects are genotype-specific and adenosine A2A receptor is involved". *J Neurochem* 125:225-35.
28. Visentin S, De Nuccio C, Bernardo A, Pepponi R, **Ferrante A.**, Minghetti L, Popoli P (2013). "The stimulation of adenosine A2A receptors ameliorates the pathological phenotype of fibroblasts from Niemann-Pick type C patients". *J Neurosci* 33(39):15388-93. doi: 10.1523/JNEUROSCI.0558-13.2013.
29. Chiodi V, Mallozzi C, **Ferrante A.**, Chen JF, Lombroso PJ, Di Stasi AM, Popoli P, Domenici MR (2014). "Cocaine-Induced Changes of Synaptic Transmission in the Striatum are Modulated by Adenosine A2A Receptors and Involve the Tyrosine Phosphatase STEP". *Neuropsychopharmacology*, 39(3):569-78.
30. **Ferrante A.**, Martire A, Pepponi R, Varani K, Vincenzi F, Ferraro L, Beggato S, Tebano MT, Popoli P (2014). "Expression, pharmacology and functional activity of adenosine A1 receptors in genetic models of Huntington's disease." *Neurobiol Dis.*, 71:193-204
31. De Filippis B, Valenti D, Chiodi V, **Ferrante A.**, de Bari L, Fiorentini C, Domenici MR, Ricceri L, Vacca RA, Fabbri A, Laviola G (2015). "Modulation of Rho GTPases rescues brain mitochondrial dysfunction, cognitive deficits and aberrant synaptic plasticity in female mice modeling Rett syndrome". *Eur Neuropsychopharmacol*, 25(6):889-901. DOI information: 10.1016/j.euroneuro.2015.03.012
32. Chiodi V, **Ferrante A.**, Ferraro L, Potenza RL, Armida M, Beggato S, Pèzzola A, Bader M, Fuxe K, Popoli P, Domenici MR (2016). Striatal adenosine-cannabinoid receptor interactions in rats overexpressing adenosine A2A receptors. *J Neurochem* 136:907-17.
33. **Ferrante A.**, De Nuccio C, Pepponi R, Visentin S, Martire A, Bernardo A, Minghetti L, Popoli P (2016) Stimulation of adenosine A2A receptors reduces intracellular cholesterol accumulation and rescues mitochondrial abnormalities in human neural cell models of Niemann-Pick C1. *Neuropharm* 103:155-62.
34. **Ferrante A.**, Tebano MT, Martire A, Domenici MR, Popoli P (2017) Neuronal vs glial cell contribution to adenosine A2A receptor-induced neurodegeneration. Book chapter in "Adenosine receptors in neurodegenerative diseases", pp131-150.
35. **Ferrante A.**, Pezzola A, Matteucci A, Di Biase A, Attorri L, Armida M, Martire A, Chern Y, Popoli P (2018). The adenosine A2A receptor agonist T1-11 ameliorates neurovisceral symptoms and extends the lifespan of a mouse model of Niemann-Pick type C disease. *Neurobiol Dis.*;110:1-11. doi: 10.1016/j.nbd.2017.10.013.
36. Domenici MR, Chiodi V, Averna M, Armida M, Pèzzola A, Pepponi R, **Ferrante A.**, Bader M, Fuxe K, Popoli P. (2018) Neuronal adenosine A2A receptor overexpression is neuroprotective towards 3-nitropropionic acid-induced striatal toxicity: a rat model of Huntington's disease. *Purinergic Signal*;14(3):235-243. doi: 10.1007/s11302-018-9609-4.
37. **Ferrante A.**, De Simone R., Ajmone-Cat M.A., Minghetti L., Popoli P. (2018) Adenosine receptors and neuroinflammation, Book Chapter in "Receptors", 34, pp. 217-237.
38. Martire A, Lambertucci C, Pepponi R, **Ferrante A.**, Benati N, Buccioni M, Dal Ben D, Marucci G, Klotz KN, Volpini R, Popoli P (2019). Neuroprotective potential of adenosine A1 receptor partial agonists in experimental models of cerebral ischemia. *J Neurochem*;149(2):211-230. doi: 10.1111/jnc.14660
39. **Ferrante A.**, Visentin S., De Nuccio C., Martire A., and Popoli P. (2019) Adenosine and Adenosine A2A Receptors as Targets for the Treatment of Niemann Pick Type C Disease. *J Caffeine Adenosine Res*; 9 (3):98-103. <https://doi.org/10.1089/caff.2019.0014>
40. Domenici MR, **Ferrante A.**, Martire A, Chiodi V, Pepponi R, Tebano MT, Popoli P (2019). Adenosine A2A receptor as potential therapeutic target in neuropsychiatric disorders. *Pharmacol Res*;147:104338. doi: 10.1016/j.phrs.2019.104338.
41. De Nuccio C, Bernardo A, **Ferrante A.**, Pepponi R, Martire A, Falchi M, Visentin S, Popoli P, Minghetti L (2019). Adenosine A2A receptor stimulation restores cell functions and differentiation in Niemann-Pick type C-like oligodendrocytes. *Sci Rep*;9(1):9782. doi: 10.1038/s41598-019-46268-8
42. **Ferrante A.**, Boussadia Z, Borreca A, Mallozzi C, Pedini G, Pacini L, Pezzola A, Armida M, Vincenzi F, Varani K, Bagni C, Popoli P, Martire A (2021). Adenosine A2A receptor inhibition reduces synaptic and cognitive hippocampal alterations in Fmr1 KO mice. *Transl Psychiatry*;11(1):112. doi: 10.1038/s41398-021-01238-5.
43. Domenici MR, Mallozzi C, Pepponi R, Casella I, Chiodi V, **Ferrante A.**, Popoli P. Insight into the role of the striatal-enriched protein tyrosine phosphatase (STEP) in A2A receptor-mediated effects in the central nervous system (2021). *Frontiers Pharmacol*; 12:647742. doi: 10.3389/fphar.2021.647742.
44. Bernardo A, De Nuccio C, Visentin S, Martire A, Minghetti L, Popoli P, **Ferrante A.** Myelin Defects in

- Niemann-Pick Type C Disease: Mechanisms and Possible Therapeutic Perspectives (2021). *Int J Mol Sci.* 22(16):8858. doi: 10.3390/ijms22168858
45. Peponi, R.; De Simone, R.; De Nuccio, C.; Visentin, S.; Matteucci, A.; Bernardo, A.; Popoli, P.; **Ferrante, A.** Repurposing Dipyridamole in Niemann Pick Type C Disease: a Proof of Concept Study. (2022) *Int. J. Mol. Sci.*, 23, 3456. <https://doi.org/10.3390/ijms23073456>
 46. Borreca A, De Luca M, **Ferrante A**, Boussadia Z, Pignataro A, Martire A, Ammassari-Teule M. Fmr1-KO mice failure to detect object novelty associates with a post-test decrease of structural and synaptic plasticity upstream of the hippocampus.(2023) *Sci Rep.* Jan 14;13(1):755. doi: 10.1038/s41598-023-27991-9. PMID: 36641518; PMCID: PMC9840621.
 47. Gaddini L, Chiodi V, Matteucci A, Boussadia Z, Buée L, Eddarkaoui S, Blum D, Di Carlo N, Raggi C, Di Benedetto R, Popoli P, **Ferrante A.** Dipyridamole Ameliorates Memory Impairment and Increases Hippocampal Calbindin Expression in Niemann Pick C1 Mice (2024). *J Neurosci Res.* Dec;102(12):e70011. doi: 10.1002/jnr.70011. PMID: 39716810.
 48. Montalesi E, Caissutti D, Moliterni C, **Ferrante A**, Peponi R, Garofalo R, Sorice M, Misasi R, Candelise N. Proteostasis network response to environmental chronic stress: linking survival to protein aggregation in a human neuroblastoma cellular model (2025). *Cellular and Molecular Life Sciences*, 82(1): 430. doi: 10.1007/s00018-025-05884-6
 49. Venturini G, **Ferrante A**, Di Carlo N, Bertuccini L, Iosi F, Condello M, Martire A, Fratini F, Boussadia Z. Improvement of small extracellular vesicle isolation from mouse model blood (2025). *Extracell Vesicles Circ Nucl Acids.* 6(4):1034-1053. doi: 10.20517/evcna.2025.90
 50. Tait S, Fratini F, Boussadia Z, Gaddini L, Marra M, Le Pera L, Venturini G, **Ferrante A.** Investigation of dipyridamole-elicited signaling in the brain of Niemann Pick type C mice: A multi-omic study (2026). *Brain Res Bull.* 234:111708. doi: 10.1016/j.brainresbull.2025.111708.

Projects

Project ID: GR-2011-02348150

Funding period: 11/2014-11/2018

Role: Key Personnel

Total amount: Eur 342,087

Title: "Adenosine A2A receptors as a possible therapeutic target in Niemann Pick type C disease". *Overall Summary:* The objective of the project is to verify if adenosine A2A receptors (A2ARs) may represent a potential therapeutic target for Niemann Pick C (NPC) disease. NPC disease is a rare genetic disorder characterized by altered intracellular cholesterol trafficking and homeostasis that mainly leads to liver disease and progressive neurodegeneration. So far, current therapeutic approaches for NPC are very limited. Our hypothesis that A2ARs may play a therapeutic role in NPC is based first on the many evidences of their ability to control lysosomal function, cholesterol metabolism, neuronal survival, oligodendroglial differentiation and astroglial reactivity; second, on our preliminary observations which strongly support the efficacy of selective A2AR ligands to modulate impaired functions in human NPC fibroblasts. In this project we will use in vitro and in vivo experimental NPC models in order to evaluate if the genetic and pharmacological manipulations of A2ARs change the NPC1 phenotype.

Project ID: ISS20-5cf22604a04d funded by the Italian National Institute of Health

Funding period: July 2021-January 2024

Role: Principal Investigator

Total amount: Eur 60,000

Title: "Evaluation of Dipyridamole effect in an in vivo model of Niemann Pick type C disease." *Overall Summary:* The overall objective of this project is to verify if repurposing of dipyridamole (DIP), an anti-thrombotic drug able to inhibit the nucleoside transmembrane transporter 1 (ENT1), could represent a new therapeutic approach for NPC. DIP is administered to a mouse model of NPC (NPC1-/-) and its effect is evaluated on (a) overall survival (b) motor and cognitive deficits (c) lipid accumulation, and (d) neuropathological alterations of NPC1-/- mice.

Memberships

Memberships:

2013, Member, Italian Society of Pharmacology

2014, Member, Italian Purine Club

2024 Member, Society for Neuroscience

Scientific Awards:

2002: Award for the best degree thesis from the Italian Society for Radiation Research (Società Italiana per le Ricerche sulle Radiazioni)

2004: Award for young researcher from the Italian Association for Cell Culture (ONLUS-Associazione Italiana Culture Cellulari)

Presentation at scientific conferences

1. 5th Multinational Congress on Electron Microscopy. Lecce, 09/20-25/2001, title: "Effects of ionizing radiation on human colon adenocarcinoma HT-29 multicellular tumor spheroids".
2. National School of biophysics, Radiation Biophysics, X Cycle. Bressanone (BZ), 09/10-13/ 2002, title: "Il grado di interazione cellula-cellula influenza la risposta degli sferoidi tumorali tridimensionali (HT-29) alle radiazioni ionizzanti".
3. XI National Congress of the Italian Society of Radiation Research, Piano di Sorrento, 09/15-17/2002, title: "La risposta di sferoidi tumorali (HT-29) alle radiazioni ionizzanti dipende dal grado di interazione cellula-cellula (compattazione)."
4. International Congress on the "Advances in the use of multicellular spheroids in cancer biology and therapy." Rome, Italian Institute of Health, 10/9-10/2002, title: "Cell-cell contact influences the response of HT-29 multicellular tumor spheroids to ionizing radiation."
5. LXXXIX National Congress of the Italian Society of Physics, Parma, 09/17-22/2003, title: "The three-dimensional architecture of adenocarcinoma HT-29 cells organized in spheroids plays a pivotal role in the response to ionizing radiation".
6. Third National Congress of the Project MIUR/CNR-ENEA "Interazione tra campi elettromagnetici e soggetti esposti", Rome, Centro ricerche ENEA Casaccia, 04/1-2/2004, title: "Effetti dei campi magnetici sinusoidali a 50 Hz sull'espressione delle molecole di adesione su due linee cellulari umane di osteosarcoma (MG-63 e Saos-2)".
7. Annual Meeting of the Italian Purine Club Italiano, 01/15/2016, Rome; title: "Effect of A2A receptor stimulation in human genetic models of Niemann Pick C Disease"
8. 7° meeting of the Italian-German Purine Club, Rome, University "La Sapienza", 20-22 luglio 2017, title:

*Adenosine A2A receptor stimulation enhances survival of a murine model of Niemann Pick Disease Type C"

9. 40° Congress of the Italian Society of Pharmacology, digital edition, 03/9-13 2020, title: "Targeting adenosine tone in Niemann Pick type C Disease"
10. 2° European Purine Club, Ferrara, 4-6 settembre 2024, title: "Dipyridamole rescued cognitive deficits in a mouse model of Niemann Pick type C1 disease (NPC1) by increasing hippocampal calbindin levels."

Other Relevant Information

Assessment of preclinical aspects required for Phase I clinical trial authorization of chemical and biotechnology Investigational Medicinal Products

Assessment of experimental animal procedures for the Italian Ministry of Health by the local Institutional Animal Care and Use Committee (IACUC) at Istituto Superiore di Sanità