



TO MAGNIFICO RETTORE OF UNIVERSITA' DEGLI STUDI DI MILANO

ID CODE 4661

I the undersigned asks to participate in the public selection, for qualifications and examinations, for the awarding of a type B fellowship at **Dipartimento di Biotecnologie Mediche e Medicina Traslazionale**

Scientist- in - charge: Prof. Massimo Aureli

[Giulia Lunghi]

CURRICULUM VITAE

PERSONAL INFORMATION

Surname	Lunghi
Name	Giulia
Date of birth	07 January 1994

PRESENT OCCUPATION

Appointment	Structure
PhD student in Biochemical Sciences	Department of Medical Biotechnology and Translational Medicine, Università degli Studi di Milano

EDUCATION AND TRAINING

Degree	Course of studies	University	year of achievement of the degree
Master Degree	Medical Biotechnology and Molecular Medicine	Università degli studi di Milano	2017

FOREIGN LANGUAGES

Languages	level of knowledge
English	B2

AWARDS, ACKNOWLEDGEMENTS, SCHOLARSHIPS

Year	Description of award
2017-2020	PhD Fellowship, Department of Medical Biotechnology and Translational Medicine, University



	of Milano
2019	Travel award- ESN Biennial Conference, Molecular Mechanism of Regulation of the Nervous System, Milano, Italy, September 1-4, 2019
2019	Travel award- ISN-ASN Meeting, Montréal, 4-8 August 2019
2019	SIB award - Best Poster Presentation. 5th Meeting of Young Biochemists of Lombardia region, Gargnano, Italy June 23-25, 2019
2018	Travel award- 43rd FEBS Congress, Prague, 7-12 July 2018
2018	Travel award- Second ISN-JNC Flagship School, Alpbach, Austria, September 10th - 15th 2018

TRAINING OR RESEARCH ACTIVITY

October 2017-present

BioMeTra Department, University of Milano, Italy (PhD student)

GL research activity is now focusing on the neurotrophic and neuroprotective properties of ganglioside GM1 and its derivatives in the nervous system. Several data suggest a specific role of ganglioside GM1 in neuronal differentiation and development, but the molecular mechanisms behind these processes are largely unknown. Recently, her team found that only the GM1 oligosaccharide (OligoGM1), rather than the ceramide portion, was directly involved in these processes (Chiricozzi E. *et al* 2017 *J. Neurochem*). They pointed out in murine neuroblastoma cells and in mouse primary neurons that GM1 modulated TrkA activity by stabilizing the TrkA-NGF complex with its oligosaccharide portion. The OligoGM1-NGF-TrkA complex induced TrkA phosphorylation and MAPK-pathway activation triggering the differentiation signaling and the neuroprotective action against MPTP toxicity. Moreover *In vivo*, in a genetic mouse model recapitulating sporadic Parkinson's disease and in a neurotoxic model of Parkinson, the OligoGM1 was effective in restore neuron damage and behavioral symptoms (Chiricozzi E, Lunghi G. *et al* 2019 *Sci Rep*). Proved that the OligoGM1 has trophic and protective properties, it is necessary to investigate through which cellular pathways it exerts its action. About this GL is studying the modulation of calcium signaling in the neuronal functions mediated by the OligoGM1. Finally, GL research activity is also addressed to the study of neurotrophic effect of the Oligosaccharide of GM1 on the Dopaminergic neurons derived from human iPSCs.

November 2016-October 2017

BioMeTra Department, University of Milano, Italy (Undergraduate Student)

During her master internship, GL research activity has been focused on Gaucher disease (GD), a lysosomal storage disorder, caused by mutations in GBA1 gene coding for the lysosomal enzyme β -glucocerebrosidase (GCase). GCase is responsible for the degradation of glucosylceramide (GlcCer) and its deficiency determines the lysosomal accumulation of the undegraded GlcCer. Notably, the most severe form of GD is characterized by the impairment of the central nervous system, leading to neurodegeneration. To date, the most common genetic risk factor for Parkinson Disease (PD) is represented by GBA1 mutations. Recently a possible connection between Gaucher and Parkinson has been suggested, although the molecular link between the two diseases is still obscure. With the aim to investigate the possible role of GBA1 deficiency and the consequent lysosomal GlcCer storage in the onset of neurodegeneration, there were used two *in vitro* model suitable for the study of PD-GBA disease: i) murine cerebellar granular cells and ii) human dopaminergic neurons derived from iPS cells, both treated with conduritol-B-epoxide (CBE), in order to pharmacologically inhibit the enzyme β -glucocerebrosidase GBA1. CBE-treated cells showed a progressive time-dependent GlcCer accumulation as well as an augmented content of its deacetylated and toxic form glucosylsphingosine. Moreover, GL pointed out an increased lysosomal biogenesis, autophagy block and synaptic degeneration. These results suggest CBE-treated neurons as a new promising *in vitro* model of



GlcCer accumulation, useful to investigate the possible correlation of lysosomal impairment in the molecular mechanisms underlying PD-GBA (Samarani M, Lunghi G *et al* 2018 *FASEB J*).

March 2015-July 2015

BioMeTra Department, University of Milano, Italy (Undergraduate Student)

GL research activity has been started on the study of Niemann Pick Disease, a sphingolipidosis characterized by an accumulation of undegraded sphingomyelin (SM) in lysosomes, due to the deficiency of acid sphingomyelinase. To study the correlation between this accumulation and the onset of lysosomal dysfunction, there were used fibroblasts derived from Niemann-Pick type A patients. In particular, GL focused her attention on the effect of SM accumulation on the expression of the transcription factor EB (TFEB), a master regulator of lysosomal functions and the related autophagy. She found that the SM accumulation induces a nuclear translocation of TFEB, followed by an increased lysosomal biogenesis and by a deregulation of autophagic processes. Moreover, she showed an increased expression of the main acid glycohydrolases with the consequent alteration of lipid metabolism due to the lysosomal impairment in Niemann-Pick fibroblasts.

Technical skills and competences

During her scientific training, GL acquired a great experience in the field of biochemistry and molecular/cellular biology including: cell lines culture; primary neurons culture; induced pluripotent stem cells culture; differentiation of induced pluripotent stem cells in dopaminergic neurons; stable and transient cellular transfection; labeling of cells with radioactive and photoactivable compounds; determination of enzyme activities with natural, fluorogenic and radiolabeled substrates; tissue and cell lipid analysis; protein immunoprecipitation; western blotting analysis; immunofluorescence; PCR; qPCR; calcium imaging.

CONGRESSES AND SEMINARS

Date	Title	Place
September 23, 2019	4th Workshop of the Department of Medical Biotechnologies and Translational Medicine (BIOMETRA)	University of Milano, Milano, Italy
September 1-4, 2019	ESN Biennial Conference	Milano, Italy
August 25-31, 2019	25th International Symposium on Glycoconjugates	Milano, Italy
August 4-8, 2019	ISN-ASN Meeting	Montréal, Canada
June 23-25, 2019	5th Meeting of Young Biochemistry from the Lombardy Area,	Gargnano, Garda, Italy
June 3-7, 2019	31th National Meeting "A. Castellani" of Biochemistry Ph. D. student	Brallo di Pregola, Pavia, Italy
March 26-31, 2019	AD/PD 14th Conference	Lisbon, Portugal
September 24, 2018	3rd Workshop of Department of Medical Biotechnology and Translational Medicine	University of Milano, Milano, Italy



	(BIOMETRA)	
September 10-15, 2018	Second ISN-JNC Flagship School	Alpbach, Austria
July 7-12, 2018	43rd FEBS Congress	Prague, Czech Republic
April 15-17, 2018	4th Meeting of Young Biochemistry of Milano Area	Gargnano, Garda, Italy
June 4-8, 2018	30th National Meeting "A. Castellani" of Biochemistry Ph. D. student	Brallo di Pregola, Pavia, Italy
September 26, 2017	2nd Workshop of Department of Medical Biotechnology and Molecular Medicine (BIOMETRA)	University of Milano, Milano, Italy
June 25-27, 2017	V3th Meeting of Young Biochemistry of Milano Area	Gargnano, Garda, Italy
February 2, 2017	Neuroscience network at La Statale, NEURO-NEST	University of Milano, Milano, Italy

PUBLICATIONS

Books
Loberto N, Lunghi G , Schiumarini D, Samarani M, Chiricozzi E, Aureli M (2018) Methods for Assay of Ganglioside Catabolic Enzymes. <i>Methods Mol Biol.</i> 1804:383-400. doi: 10.1007/978-1-4939-8552-4_18
Articles in reviews
Di Biase E, Lunghi G , Maggioni M, Fazzari M, Pomè DY, Loberto N, Ciampa MG, Fato P, Mauri L, Sevin E, Gosselet F, Sonnino S, Chiricozzi E (2020) GM1 Oligosaccharide Crosses the Human Blood-Brain Barrier In Vitro by a Paracellular Route. <i>Int J Mol Sci.</i> 2020 Apr 19;21(8):2858. doi: 10.3390/ijms21082858.
Di Biase E, Lunghi G , Fazzari M, Maggioni M, Pomè DY, Valsecchi M, Samarani M, Fato P, Ciampa MG, Prioni S, Mauri L, Sonnino S, Chiricozzi E (2020) Gangliosides in the differentiation process of primary neurons: the specific role of GM1-oligosaccharide. <i>Glycoconj J.</i> 2020 Jun;37(3):329-343. doi: 10.1007/s10719-020-09919-x
Fazzari M, Audano M, Lunghi G , Di Biase E, Loberto N, Mauri L, Mitro N, Sonnino S and Chiricozzi E (2020) The oligosaccharide portion of ganglioside GM1 regulates mitochondrial function in neuroblastoma cells. <i>Glycoconj J.</i> 2020 Jun;37(3):293-306. doi: 10.1007/s10719-020-09920-4
Chiricozzi E, Lunghi G , Di Biase E, Fazzari M, Sonnino S, Mauri L (2020) GM1 ganglioside is a key factor in maintaining the mammalian neuronal functions avoiding neurodegeneration. <i>Int J Mol Sci.</i> 2020 Jan 29;21(3):868. doi: 10.3390/ijms21030868.
Chiricozzi E, Mauri L, Lunghi G , Di Biase E, Fazzari M, Maggioni M, Valsecchi M, Prioni S, Loberto N, Pomè DY, Ciampa MG, Fato P, Verlengia G, Cattaneo S, Assini R, Wu G, Alselehdar S, Ledeen RW, Sonnino S (2019) Parkinson's disease recovery by GM1 oligosaccharide treatment in the B4galnt1 ^{+/-} mouse model. <i>Sci Rep.</i> 18;9(1):19330. doi: 10.1038/s41598-019-55885-2.
E. Chiricozzi, M. Maggioni, E Di Biase, G. Lunghi , M. Fazzari, N. Loberto, E. Maffioli, F. Grassi Scalvini, G. Tedeschi, S. Sonnino (2019) The neuroprotective role of the GM1 oligosaccharide, I13Neu5Ac-Gg4, in neuroblastoma cells. <i>Molecular Neurobiology</i> 56(10):6673-6702.



Roig-Puiggros S, Vigouroux RJ, Beckman D, Bocai NI, Chiou B, Davimes J, Gomez G, Grassi S, Hoque A, Karikari TK, Kiffer F, Lopez M, **Lunghi G**, Mazengenya P, Meier S, Olguín-Albuerne M, Oliveira MM, Paraíso-Luna J, Pradhan J, Radiske A, Ramos-Hryb AB, Ribeiro MC, Schellino R, Selles MC, Singh S, Theotokis P, Chédotal A (2019) Construction and reconstruction of brain circuits: normal and pathological axon guidance. *J Neurochem* 2020 Apr;153(1):10-32. doi: 10.1111/jnc.14900

Chiricozzi E, Di Biase E, Maggioni M, **Lunghi G**, Fazzari M, Pomè DY, Casellato R, Loberto N, Mauri L, Sonnino S (2019) GM1 promotes TrkA-mediated neuroblastoma cell differentiation by occupying a plasma membrane domain different from TrkA. *J. Neurochem* Feb 18, 2019 doi: 10.1111/jnc.14685

Samarani M, Loberto N, Soldà G, Straniero L, Asselta R, Duga S, **Lunghi G**, Zucca FA, Mauri L, Ciampa MG, Schiumarini D, Bassi R, Giussani P, Chiricozzi E, Prinetti A, Aureli M, Sonnino S (2018). A lysosome-plasma membrane-sphingolipid axis linking lysosomal storage to cell growth arrest. *FASEB J.* 325685-5802 doi: 10.1096/fj.20170512RR.

Congress proceedings

E. Di Biase, M. Maggioni, **G. Lunghi**, E. Chiricozzi and S. Sonino “Effects of GM1 Oligosaccharide on differentiation of mouse primary neurons” Gordon Research Conference - Glycolipid and Sphingolipid Biology on the Biochemistry, Biophysics and Physiology of Glycolipid and Sphingolipid Biology, Galveston, TX, USA, February 11-16, 2018

G. Lunghi, M. Maggioni, E. Di Biase, G. Tedeschi, E. Maffioli, F. Grassi Scalvini, E. Chiricozzi, S. Sonnino “GM1 neuroprotective properties are related to GM1 oligosaccharide” 43rd FEBS Congress, Prague, 7-12 July 2018 **Published** in a special issue of *FEBS Open Bio*, 8:14-018 doi:10.1002/2211-5463.12453

M. Maggioni, E. Di Biase, **G. Lunghi**, E. Sevin, F. Gosselet, E. Chiricozzi, S. Sonnino “Characterization of GM1 oligosaccharide transport across the blood-brain-barrier” 43rd FEBS Congress, Prague, 7-12 July 2018 **Published** in a special issue of *FEBS Open Bio*, 8:14-017 doi:10.1002/2211-5463.12453

E. Di Biase, M. Maggioni, **G. Lunghi**, S. Prioni, M. Samarani, E. Chiricozzi and S. Sonnino. “The Oligosaccharide of GM1 ganglioside as a new neurotrophic agent: evidence on the development of primary neurons in culture”. 11th FENS Forum of Neuroscience, Berlin, Germany 7-11 July 2018

E. Di Biase, M. Maggioni, **G. Lunghi**, S. Prioni, M. Samarani, E. Chiricozzi and S. Sonnino. “The Oligosaccharide of GM1 ganglioside as a new neurotrophic agent: evidence on the development of primary neurons in culture”. 3rd Workshop of Department of Medical Biotechnology and Molecular Medicine (BIOMETRA), University of Milano, Milano, Italy September 24th September 2018

E. Chiricozzi, E Di Biase, **G Lunghi**, M Fazzari, S Prioni, E Sevin, F Gosselet, R Ledeen and S Sonnino “GM1 oligosaccharide as a new therapeutic player for sporadic Parkinson’s disease” PD/AD 14th conference, Lisbon, Portugal, March 26-31, 2019

E. Di Biase, **G. Lunghi**, M. Fazzari, M. Maggioni, S. Prioni, D.Y. Pomè, L. Mauri, M. Valsecchi, N. Loberto, E. Chiricozzi and S. Sonnino “The OligoGM1 story: from the bench to the bed-side”. Riunione dei Giovani Biochimici dell’area Lombarda, Gargnano, Garda, Italy, 23-25 June 2019

E. Di Biase, M. Maggioni, **G. Lunghi**, M. Fazzari, S. Prioni, E. Chiricozzi and S. Sonnino “The Oligosaccharide of GM1 ganglioside acts as a neurotrophic agent for neuronal development”. 31a Riunione Nazionale “A. Castellani” dei Dottorandi di Ricerca in Discipline Biochimiche, Brallo di Pregola, Pavia, Italy, 4-7 June 2019.

M. Fazzari, **G. Lunghi**, E. Di Biase, M. Audano, N. Mitro, S. Sonnino and E. Chiricozzi “The GM1 oligosaccharide stimulates mitochondriogenesis and enhances mitochondrial activity in neuroblastoma cells” 2019 ISN-ASN Meeting, Montreal, Canada August 4-8, 2019 **Published** in a special issue of *J. Neurochemistry* 150(Suppl. 1), 73-161doi: 10.1111/jnc.14776

G. Lunghi, M. Maggioni, E. Di Biase, M. Fazzari, G. Tedeschi, E. Maffioli, F. Grassi-Scalvini, S. Sonnino and E. Chiricozzi “GM1 oligosaccharide is the active portion responsible for GM1 neuroprotective properties” 2019 ISN-ASN Meeting, Montreal, Canada August 4-8, 2019 **Published** in a special issue of *J. Neurochemistry* 150(Suppl. 1), 73-161doi: 10.1111/jnc.14776

E. Chiricozzi, **G. Lunghi**, E. Di Biase, M. Fazzari, M. Valsecchi, L. Mauri, S. Alselehdar, R.W. Ledeen and S. Sonnino “The GM1 ganglioside oligosaccharide-TrkA interaction as starting biochemical information for the



developing of a new therapy for the treatment of Parkinson's disease" 25th International Symposium on Glycoconjugates, Milano, Italy, August 25-31, 2019 Published in a special issue of Glycoconj J 36:267 http://doi.org/10.1007s10719-019-09880-4
G. Lunghi , M. Fazzari, E. Di Biase, L. Mauri, E. Maffioli, F. Grassi Scalvini, G. Tedeschi, E. Chiricozzi and S. Sonnino "GM1 oligosaccharide modulation of calcium signaling in neuronal functions" 25th International Symposium on Glycoconjugates, Milano, Italy, August 25-31, 2019 Published in a special issue of Glycoconj J 36:267 http://doi.org/10.1007s10719-019-09880-4
M. Fazzari, G. Lunghi , E. Di Biase, M. Audano, E. Maffioli, F. Grassi Scalvini, G. Tedeschi, N. Mitro, E. Chiricozzi and S. Sonnino "Mitochondrial modulation: a novel role for GM1 oligosaccharide" 25th International Symposium on Glycoconjugates, Milano, Italy, August 25-31, 2019 Published in a special issue of Glycoconj J 36:267 http://doi.org/10.1007s10719-019-09880-4
E. Di Biase, G. Lunghi , M. Fazzari, S. Prioni, E. Chiricozzi and S. Sonnino "Neurotrophic properties of GM1 oligosaccharide: evidence on the development of primary neurons in culture" 25th International Symposium on Glycoconjugates, Milano, Italy, August 25-31, 2019 Published in a special issue of Glycoconj J 36:267 http://doi.org/10.1007s10719-019-09880-4
M. Fazzari, G. Lunghi , E. Di Biase, M. Audano, E. Maffioli, F. Grassi Scalvini, G. Tedeschi, N. Mitro, S. Sonnino and E. Chiricozzi "GM1 oligosaccharide as mitochondrial regulator in neuronal cells" ESN Biennial Conference, Molecular Mechanism of Regulation of the Nervous System, Milano, Italy, September 1-4, 2019
G. Lunghi , M. Fazzari, E. Di Biase, M. Maggioni, G. Tedeschi, E. Maffioli, F. Grassi Scalvini, S. Sonnino and E. Chiricozzi "GM1 oligosaccharide modulation of calcium signaling in neuronal functions" ESN Biennial Conference, Molecular Mechanism of Regulation of the Nervous System, Milano, Italy, September 1-4, 2019
E. Di Biase, G. Lunghi , M. Fazzari, S. Prioni, S. Sonnino and E. Chiricozzi "The oligosaccharide chain of GM1 ganglioside acts as a neurotrophic agent for neuronal development" ESN Biennial Conference, Molecular Mechanism of Regulation of the Nervous System, Milano, Italy, September 1-4, 2019

OTHER INFORMATION

COURSES

September 2019

Introductory course in animal experimentation

University of Milano

November 2018

XL ALEMBIC Theoretical and Practical Course of Optical and Electron Microscopy

Advanced Light and Electron Microscopy Center (ALEMBIC), IRCCS San Raffaele Hospital, Milano, Italy

TEACHING EXPERIENCE

November 2018/ November 2019

Assistant for laboratory training of Cellular and Molecular Methodologies Course, Bachelor's Degree of Medical Biotechnology, University of Milano

March 2018/ March 2019

Assistant for laboratory training of the Human Biochemistry Course, Master's Degree of Medical Biotechnology and Molecular Medicine, University of Milano

May 2019

Assistant for laboratory training of the Biochemistry Course, Degree of International Medical School, University of Milano



DISSEMINATION ACTIVITIES

- Third mission for University of Milano: activities in primary schools in Milano and neighbouring municipalities to describe with a lay language the principle of biochemistry, 2017-present
- MeetMeTonight, “Run into the cell” - September 28-29, 2018
- MeetMeTonight “Viaggio al centro della cellula” - September 29-30, 2017
- MeetMeTonight, “Viaggio al centro della cellula” - September 25-26, 2015

Declarations given in the present curriculum must be considered released according to art. 46 and 47 of DPR n. 445/2000.

The present curriculum does not contain confidential and legal information according to art. 4, paragraph 1, points d) and e) of D.Lgs. 30.06.2003 n. 196.

Place and date: Milano, 24/08/2020

SIGNATURE