

Università degli Studi di Siena
Dottorato di Ricerca in Medicina Molecolare

PhD Student Annual Report Form

Firenze, 02/10/2025

To the Academic Board of the PhD Program in Molecular Medicine

Dr. **Mariela Mejia Monroy** Cycle XL

Tutor Prof. Elizabetta Cerbai; Co-tutor Dr. Carlotta De Filippo,

Scientific activity carried out during the 1st year of the PhD program, Academic Year **2024/2025**

Briefly describe your research, dividing it into the following sections:

Introduction

Cardiovascular diseases (CVDs) are the leading cause of morbidity and mortality worldwide. Among their risk factors, hypertension plays a particular critical role. Oxidative stress represents a key mechanism in the pathogenesis of CVDs, making antioxidant compounds attractive candidates for complementary therapies. The aim of this project is to validate antioxidant molecules from sprout extracts as potential adjuvant treatments for hypertension. Three experimental models are being employed: human induced pluripotent stem cell-derived cardiomyocytes, zebrafish embryos, and Dahl salt-sensitive rats. During the first year, my activities focused on polyphenolic characterization and cardiovascular effects in the first two models, with particular attention to red radish (*Brassicaceae*), a species rich in the thiol glucosinolate sulforaphane, previously associated with cardiovascular protection.

Methods

Human induced pluripotent stem cells were differentiated into cardiomyocytes and used to test the effects of sprout extracts, with gallic acid quantification performed as a marker of polyphenolic content. Cardiac activity was assessed through high-throughput electrophysiological recordings.

Zebrafish embryos were maintained under standard conditions, exposed to the extracts, and their heart rate monitored using fluorescent microscopy.

Results The total polyphenol content of red radish aqueous extract was quantified, and the extract tested on hiPS-derived cardiomyocytes. These cells generate spontaneous action potentials, allowing functional assessment of cardiac electrophysiology. Seven concentrations (50–5000 µg/mL) were evaluated for their effects on frequency, amplitude, and duration of cardiac action potentials. Frequency was significantly inhibited in a concentration-dependent



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manner, with effects detectable from 50µg/mL and complete suppression at 5000µg/mL. Amplitude was also significantly reduced at all concentrations in a concentration-dependent fashion, while action potential duration was significantly shortened at lower doses.. In zebrafish embryos (3 days post-fertilization), three concentrations of aqueous red radish and red basil extract were tested after two hours of exposure. Red radish induced a significant reduction in heart rate at 0.5 and 1mg/mL, but no effect was observed at 2mg/mL. In contrast, red basil extract showed no significant effect at any concentration.

List any scientific publications: authors, title of the publication, name and number of the journal, year of publication

- Trezzi S, Scaccabarozzi G, Nossa R, Piazza C, Bianchi AR, Rosi E, Tizzoni F, Mauri M, Camillo L, Baragetti A, Molteni M, Campanella V, Mauro L, Cremonesi P, Severgnini M, Monroy M M, Castiglioni B, Sparvoli F, Pisano S, Pozzi M, ... Nobile M. Behavioural, cognitive, and neurophysiological effects of a synbiotic supplementation enriched with pigmented corn extract or cornstarch in drug-naïve children with attention-deficit hyperactivity disorder: a randomised, double-blind, comparison-controlled clinical trial. *Clinical Nutrition ESPEN*, S2405-4577(24)01561-4. 2025
- Arena S, De Pascale S, Ciaravolo V, Monroy MM, Gouw JW, Stahl B, Bäuerl C, Collado MC, De Filippo C, Scaloni A, Troise AD. Protein-bound and free glycation compounds in human milk: A comparative study with minimally processed infant formula and pasteurized bovine milk. *Food Chem.* 2025 Jan 15;463(Pt 2):141265. doi: 10.1016/j.foodchem.2024.141265. Epub 2024 Sep 12. PMID: 39293376.

Submitted for publication

- Meriggi N, Mejia Monroy M, Chioccioli S, De Filippo C. "Epigenetics and Microbiome" *Epigenetics and Rare Diseases*. Springer Nature, 2025 (in press)
- Chioccioli S, Meriggi N, Mejia Monroy M, Renzi S, Cerasuolo B, Caderni G, De Filippo C. Combination of a pesco-vegetarian diet with non-steroidal anti-inflammatory drugs for colorectal cancer prevention: tumour suppression and gut microbiota modulation in *Apc*-mutated PIRC rats. *Scientific Reports*, 2025 (under review)
- Coletta R, Meriggi N, Gigola F, Oreglio C, Lacava, E., Mejia Monroy M., Chioccioli S, Cerasuolo B, Cavalieri D, De Filippo C, Morabito A. Clinical and nutritional management in subjects with different intestinal failure types: characterization of intestinal bacterial communities in a case series. *Italian Journal of Pediatrics* (submitted)
- Calvo-Lerma J, Bäuerl C, Arena S, Ciaravolo V, De Pascale S, Ferracane R, Mejia Monroy M, Stahl B, Gouw JW, Scaloni A, De Filippo C, Troise AD, Collado MC. Comparative in vitro Digestibility of Human Milk and Infant Formula: In-Depth Simulation of

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Macronutrient Breakdown and Gut Microbiota Response. Food Research International
(submitted)

TOTAL ECTS credits earned for attendance of frontal teaching activities: 16.5

- Seminars (please indicate the speaker and date of the seminar(s)).
 1. *"Towards microRNA cancer medicine"*, Prof. Franck Slack 31/10/2024
 2. *"Effetto dei farmaci sul microbiota intestinale"*, Prof. Carmelo Scarpignato 06/12/2024
 3. *"Differenze di genere e di età nella risposta ai farmaci"*, Prof. A. Vannacci; Prof. G. Mannaioni; Prof. E. Cerbai 13/12/2024
 4. *"Trattamento farmacologico della depressione: stato dell'arte e prospettive future"*, Prof. Edoardo Spina 16/01/2025
 5. *"Un-Freezing Time: Electron Microscopy-Based Reconstructions of Cardiomyocyte Contraction Dynamics Enabled by Deep Learning"*, Dr. Joachim Greiner 04/03/2025
 6. *"Un-Freezing Time: Unlocking the power of Glycosilation "*, Dr. Martina Grabner 06/03/2025
 7. *"Immunità e Infiammazione: una metanarrazione della medicina contemporanea"*, Prof. Alberto Mantovani 01/04/2025
 8. *"The Evolution of Gender in the Labor Market"*, Prof. Claudia Olivetti 16/04/2025
 9. *"5D in-vitro models: a step closer to Humans"*, T. Sbrana, JJV Branca, A. Montalbano, S. Quaglio 26/09/2025
 10. *"Cryobiopsy in thoracic diseases: novel frontiers"*, Prof. Lauren Troy 02/10/2025

ECTS credits earned for this activity: 9.5 (indicate **total ECTS from November 2024 to October 2025**)

- Soft Skills (please indicate the name and date of the course(s)).
 1. *"Embase: l'alter ego di PubMed"* – 07/11/2024 – Biblioteca Biomedica (Università degli studi di Firenze)
 2. *"PubMed"* – 29/01/2025 – Biblioteca Biomedica (Università degli studi di Firenze)
 3. *"Writing, publishing, presenting and searching scientific literature, including journalology"* – 11, 17, 18, 24/03/2025 – Ufficio Dottorato (Università degli Studi di Firenze)
 4. *"Scientific writings tips and practices 2025"* – 29/04/2025 – Teaching and Learning Center TLC (Università degli Studi di Firenze)
 5. *"Europrogettazione"* – 13 e 15/05/2025 – Ricerca europea e internazionale (Università di Firenze)
 6. *"Rischi naturali: conoscere, prevenire, difendersi"* – 23/05/2025 – Centro per la Protezione Civile (Università di Firenze)
 7. *"European research council (ERC): come scrivere una proposta ERC starting grant"* – 11/06/2025 – Agenzia per la Promozione della Ricerca Europea



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8. “Come scrivere una proposta Marie-Sklodowska Curie Actions Doctoral Networks” – 26/06/2025 – Agenzia per la Promozione della Ricerca Europea
9. “Ricerche bibliografiche, bibliometria e open access & science” – 09/07/2025 – Soft & Digital Skills for PhD UNISI
10. “The story of the European Union and how it funds research” – 09/07/2025 – Soft & Digital Skills for PhD UNISI
11. “Lezioni per l’Europa” – 02, 03, 04/2025 – Europe Direct Siena (in attesa di rilascio open badge)
12. “Open Science and data Management” – 11/09/2025 – Agenzia per la Promozione della Ricerca Europea
13. “Consortium Agreement e focus su IPR in Horizon Europe” – 14/10/2025 – Agenzia per la Promozione della Ricerca Europea

ECTS credits earned for this activity: 13 (indicate **total ECTS from November 2024 to October 2025**)

- Conference participation (please indicate the name and date of the conference(s), title of the presentation(s)/poster(s)/abstract(s), and authors)

1. Chioccioli Sofia, **Mariela Mejia Monroy**, François Pierre, Philippe Gérard, Jildau Bouwman, Serdar Özsezen, Françoise Gueraud, Carlotta De Filippo, Giovanna Caderni. *Il microbiota intestinale modulato dalla dieta è in grado di trasferire i fattori di rischio di cancro del colonretto in un modello sperimentale germ-free*. 22° Congresso SITOX (Società Italiana di Tossicologia – Bologna (10-12 Febbraio 2025). Oral presentation
2. **Mariela Mejia Monroy**, Niccolò Meriggi, Antonio Dario Troise, Simona Arena, Paola Cremonesi, Bianca Castiglioni, Sofia Chioccioli, Giovanna Caderni, Maria Carmen Collado, Andrea Scalonì, Carlotta De Filippo. *Modified amino acids in minimally processed infant formulas: impact on gut microbiota and metabolite profile*. 23° IUNS-ICN - International Congress of Nutrition of the International Union of Nutritional Sciences, Paris. (August 24-29, 2025). Oral presentation
3. Niccolò Meriggi, Sofia Chioccioli, **Mariela Mejia Monroy**, Antonio Dario Troise, Andrea Scalonì, Bouwman Jildau, Françoise Guéraud, Philippe Gérard, Sofi Francesco, Giovannelli Lisa, Giovanna Caderni2; Carlotta De Filippo. *Fecal Microbiota Transplantation (FMT) of human feces associated with different dietary integration modulates the colorectal cancer (CRC) risk in germ-free rats*. 23° IUNS-ICN - International Congress of Nutrition of the International Union of Nutritional Sciences, Paris. (August 24-29, 2025). Poster presentation.

ECTS credits earned for this activity: 1 (indicate **total ECTS from November 2024 to October 2025**)



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- Any stays in other Italian or foreign laboratories

CFU totali acquisiti

Nome e Cognome: Mariela MEJIA MONROY

Numero di Matricola: 152046

Dottorato in Medicina Molecolare Ciclo XL

Tutor: Prof.ssa Elisabetta Cerbai

Co-Tutor: Dott.ssa Carlotta De Filippo

Attività scientifica svolta nel 1° anno di Dottorato, Anno Accademico 2024/2025

Mese	Webinar - Seminari	Didattica	PhD Day / Graduation day	Congressi	Soft Skills
Novembre	1				0,5
Dicembre	1+1				
Gennaio	1				0,5
Febbraio			1		
Marzo	1 + 0,5				2,5
Aprile	1+1	3+3+3			1+4
Maggio					1+ 0,5
Giugno		3+1,5			0,5 + 0,5
Luglio					0,5 + 0,5
Agosto				1	
Settembre	1				0,5
Ottobre	1	3			0,5
	Totale: 9,5	Totale:16,5	Totale:1	Totale:1	Totale:13