

# M. Chiara Perego

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## EDUCATION

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**Doctor of Philosophy, Biological Sciences** 2019 – 2022  
Clemson University, Clemson, SC

Dissertation “Developmental effects of chronic low-level arsenic exposure in mouse embryonic stem cells and in human induced pluripotent stem cells”

**Master of Science, Animal Science** 2016-2018  
Oklahoma State University, Stillwater, OK

Thesis “Developmental and hormonal regulation of *UHRF1* gene expression in ovarian granulosa and theca cells of cattle”

**Doctor of Veterinary Medicine (DVM)** 2010-2015  
Milan University, Milan, Italy

Thesis “Glyphosate and *in vitro* effects on bovine granulosa cells”

## RESEARCH EXPERIENCE

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**Intern, CMC Analytical Development** May 2022 – August 2022  
Aruvant Sciences, New York, NY  
Supervisor: Dr. Kristin Clement, Ph.D.

***Project 1: Evaluation of the innate immune response of hematopoietic stem cells to improve transduction of human CD34+ hematopoietic stem cells by lentiviral vectors***

- Literature review of peer review published manuscript describing the role of hematopoietic stem and progenitor cells in the innate immune response and their expression of pattern recognition receptors.
- Evaluate existing data to assess the expression of pathogen-associated molecular patterns (PAMPs) receptors, such as TLR and NLR, in CD34+ hematopoietic stem cells and to investigate the role of these receptors during lentiviral vector transduction.
- Design studies to determine if CD34+ hematopoietic stem cells’ immune response can be leveraged to improve transduction of human CD34+ hematopoietic stem cells by lentiviral vectors.

***Project 2: Consolidate and implement statistical analysis using analytical data derived from upstream and downstream processing of lentiviral vectors manufacturing***

- Compile and consolidate analytical data (e.g., bulk drug substance volume, viral load, VCN, p24,

host cell residual DNA, etc.) for implementation analyses using R and JMP.

- Participate in internal and external meeting and collaborate with quality assurance and regulatory affairs.

### **Intern, Toxicology and Regulatory Consulting**

May 2022 – Present

Toxicon, Pavia, Italy

Supervisor: Dr. Raffaella Butera, M.D., Ph.D.

***Project: Evaluation of European and American Regulations of chemicals, cosmetics, detergents, biocides, and medical devices.***

- Review European and American Regulations of chemicals, cosmetics, detergents, biocides, and medical devices with particular attention to regulatory requests, reference agencies and required actions.
- Compile differences and similarities between the European and American Regulations of chemicals, cosmetics, detergents, biocides, and medical devices.

### **Graduate Research Assistant**

Spring 2019-Fall 2022

Clemson University, Clemson, SC

Supervisor: Dr. Lisa Bain, Ph.D.

***Project 1: Chronic low level arsenic exposure during development impairs cellular differentiation via the Hippo signaling pathway.***

- Examined the effects of developmental exposure to an arsenic concentration below the current drinking water standard using P19 murine embryonic stem cells as *in vitro* model.
- Investigated the signaling pathways that might be disrupted following arsenic exposure and confirmed their involvement in arsenic-induced cellular differentiation impairment.

***Project 2: Low-level arsenic exposure alters cellular differentiation of human induced pluripotent stem cells during motor neuron differentiation***

- Examined the effects of developmental exposure to arsenic using human induced pluripotent stem cells exposed to environmentally relevant arsenic concentrations during their differentiation into motor neurons.
- Identified and investigated molecular pathways impaired following arsenic exposure.
- Performed RNA sequencing and pathway analyses and assessed transcript and protein expression and cellular localization to investigate disrupted molecular mechanisms responsible for cellular differentiation impairment and pluripotency maintenance observed following arsenic exposure.
- Trained on different laboratory techniques including cell culture, RNA extraction, cDNA synthesis, qPCR, PCR, protein extraction and quantification, western blot, immunohistochemistry (IHC), flow cytometry along with differentiation expression, GO and KEGG analyses of RNA sequencing data.

**Graduate Research Assistant**

August 2016 – December 2018

Oklahoma State University, Stillwater, OK

Supervisor: Dr. Leon Spicer, Ph.D.

***Project 1: Developmental and hormonal regulation of UHRF1 expression in ovarian granulosa and theca cells of cattle***

- Investigated the expression of *UHRF1* during ovarian follicular development in granulosa and theca cells using primary cell culture.
- Determined if changes of *UHRF1* expression are associated with changes in global DNA methylation.
- Assessed the effects of acute exposure to the mycotoxin beauvericin on *UHRF1* expression.

***Project 2: Effects of selected hormones on steroidogenesis and cellular proliferation of feline granulosa cells***

- Established a primary culture of granulosa cells collected from feline ovaries.
- Investigated the effects of selected hormones and their combination on cellular proliferation and on progesterone and estradiol production in feline granulosa cells.
- Trained on different laboratory techniques including cell culture techniques, establishment of *ex vivo* cell culture, RNA extraction, qPCR and radioimmunoassay (RIA).

**Graduate Research Assistant**

February 2016 – May 2016

University of Extremadura, Cáceres, Spain

Supervisor: Dr. Marco Pérez-López, DVM, Ph.D.

***Project: Determine enzymatic activities of B esterases in liver and muscle of L. Michahellis to monitor environmental pollution***

- Determined cholinesterase and carboxylesterase activities in liver and muscle samples collected from yellow-legged gulls (*L. Michahellis*) in Northwest Spain to monitor environmental pollution.
- Assessed basal level of B esterases activity to provide reference data for further biomonitoring studies.
- Trained on muscle and liver sample processing and assessment of enzymatic activity using different techniques (e.g., Ellman method).

**Undergraduate Research Assistant**

July 2015 – September 2015

Oklahoma State University, Stillwater, OK

Supervisor: Dr. Leon Spicer, Ph.D.

***Project: Determine the effects of glyphosate on steroidogenesis and cell proliferation of bovine ovarian cells in vitro***

- Determined the potential endocrine disruptor effects of glyphosate by investigating if exposure to glyphosate alone or in formulation impairs cellular proliferation, steroidogenesis (estradiol, progesterone and androstenedione production) and gene expression using bovine granulosa and theca cells as *in vitro* models.
- Trained on different laboratory techniques including cell culture techniques, establishment of *ex vivo* cell culture, RNA extraction, qPCR and radioimmunoassay (RIA).

### **Undergraduate Research Assistant**

September 2014 – July 2016

Milan University, Milan, Italy

Supervisor: Dr. Francesca Caloni, DVM, Ph.D.

#### ***Project: Investigate the effects of copper oxide and zinc oxide nanoparticles on the intestinal barrier***

- Investigated the cytotoxic and pro-inflammatory responses induced by apical and basolateral exposure of Caco-2 cells to copper oxide and zinc oxide nanoparticles.
- Determined the effects of acute nanoparticles exposure on the intestinal barrier by assessing the transepithelial electrical resistance (TEER) along with the analysis of cytokine release and biomarkers of oxidative damage.
- Trained on different laboratory techniques including cell culture using inserts, TEER measurement and enzyme-linked immunosorbent assay (ELISA).

### **Undergraduate Internship**

August 2012

Microbiology Department, Istituto Zooprofilattico Sperimentale

della Lombardia e dell'Emilia Romagna (IZSLER), Brescia, Italy

Supervisor: Dr. Paolo Daminelli, DVM.

#### ***Project: Monitoring and assessing food contamination by infectious organisms and their toxins***

- Assessed the presence of foodborne botulinum toxin through mouse bioassay and of foodborne bacteria. Used biochemical tests (e.g., API test) to classify the isolated bacteria.
- Trained on different laboratory techniques including microbiological culture, assessment of colony forming unit, antimicrobial susceptibility testing and analytical profile index test.

### **High school Internship**

July – August 2009

Biomedical Sciences and Biotechnology Research Center, Campobasso, Italy

Supervisors: Dr. Giovanni DeGaetano, MD, Ph.D. and Dr. Maria Benedetta Donati, MD, Ph.D.

#### ***Project: Tissue factor gene expression in tumor cells MCF7 and MDA treated with Betaine***

- Investigated the changes in *tissue factor (Tf)* gene expression in human cancer cell lines MCF7 and MDA acutely treated with betaine.
- Trained on different laboratory techniques including sterile techniques, cell culture techniques, RNA extraction, cDNA synthesis and qPCR analysis.

### **High school Internship**

August 2008

Clinical Toxicology Poison Control Center, Bergamo, Italy

Supervisor: Dr. Maria Luisa Farina, MD.

#### ***Project: Database organization and implementation of datasheet related to toxicity of commercial products***

- Data entry of commercial products (drugs, domestic, agricultural and industrial products) composition in the database of the Toxicology Poison Control Center.
- Trained on understanding and evaluating toxicological properties of commercially available products. Trained on database system.

## **PUBLICATIONS**

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Perego MC, McMichael BD, McMurry NR, Ventrello SW, Bain LJ. Arsenic impairs differentiation of human induced pluripotent stem cells into cholinergic motor neurons. *Under preparation*.

Perego MC, McMichael BD, Bain LJ. Arsenic impairs stem cell differentiation via the Hippo signaling pathway. *Submitted for review*.

Perego MC, Bellitto N, Maylem ERS, Caloni F, Spicer LJ. Effects of selected hormones and their combination on progesterone and estradiol production and proliferation of feline granulosa cells cultured *in vitro*. 2021. *Theriogenology*; 168:1-12.

McMichael B, Perego MC, Darling C, Perry R, Coleman S, Bain L. Long-term arsenic exposure impairs differentiation in mouse embryonal stem cells. 2020. *J Appl Toxicol.*;41(7):1089-1102.

Bertero A, Colombo G, Cortinovic C, Bassi V, Moschini E, Bellitto N, Perego MC, Albonico M, Astori E, Dalle-Donne I, Gedanken A, Perelshtein I, Mantecca P, Caloni F. 2021. In vitro copper oxide nanoparticle toxicity on intestinal barrier. *J Appl Toxicol.*; 41(2):291-302.

Perego MC, Morrell BC, Zhang L, Schütz LF, Spicer LJ. 2020. Developmental and hormonal regulation of ubiquitin-like with plant homeodomain and really interesting new gene finger domains 1 gene expression in ovarian granulosa and theca cells of cattle. *J Anim Sci.*; 98(7).

Morrell BC, Perego MC, Maylem ERS, Zhang L, Schütz LF, Spicer LJ. 2020. Regulation of the transcription factor E2F1 mRNA in ovarian granulosa cells of cattle. *J Anim Sci*; 98(1).

Morrell BC, Zhang L, Schütz LF, Perego MC, Maylem ERS, Spicer LJ. 2019. Regulation of the transcription factor E2F8 gene expression in bovine ovarian cells. *Mol Cell Endocrinol.*; 498:110572.

Feng T, DeVore AA, Perego MC, Morrell BC, Spicer LJ. 2019. Effects of N-carbamylglutamate and arginine on steroidogenesis and proliferation of pig granulosa cells in vitro. *Anim Reprod Sci.*; 209:106138.

Nichols JA, Perego MC, Schütz LF, Hemple AM, Spicer LJ. 2019. Hormonal regulation of vascular endothelial growth factor A (VEGFA) gene expression in granulosa and theca cells of cattle. *J Anim Sci.*; 97(7):3034-3045.

Colombo G, Cortinovic C, Moschini E, Bellitto N, Perego MC, Albonico M, et al. 2019. Cytotoxic and proinflammatory responses induced by ZnO nanoparticles in in vitro intestinal barrier. *J Appl Toxicol.*; 39(8):1155-1163.

Nagy AL, Cortinovic C, Spicer LJ, Perego MC, Caloni F. Long-established and emerging pesticide poisoning in horses. *Equine Veterinary Education*; 31(9):496-500.

Morcillo SM, Perego MC, Vizuete J, Caloni F, et al. 2018. Reference intervals for B-esterases in gull, *Larus michahellis* (Nauman, 1840) from Northwest Spain: influence of age, gender, and tissue. *Environ Sci Pollut Res Int*; 25(2):1533-1542.

Feng T, Schutz LF, Morrell BC, Perego MC, Spicer LJ. 2018. Effects of N-carbamylglutamate and L-arginine on steroidogenesis and gene expression in bovine granulosa cells. *Anim Reprod Sci*; 188:85-92.

Prosperini A, Berrada H, Ruiz MJ, Caloni F, Coccini T, Spicer L, Perego MC, Lafranconi A. 2017. A review of the mycotoxin Enniantin B. *Front Public Health*; 5:304.

Feng T, Schutz LF, Morrell BC, Perego MC, Spicer LJ. 2018. Effect of melatonin on bovine theca cells in vitro. *Reprod. Fertil. Develop.*; 30(4):643-650

Cortinovis C, Spicer LJ, Perego MC, Coccini T, Caloni F. 2018. Chapter 96 – Domoic Acid. Handbook of Foodborne Diseases. CRC Press.

Perego MC, Caloni F, Cortinovis C, Schutz LF, Albonico M, Tsuzukibashi D, Spicer LJ. 2017. Influence of a Roundup formulation on glyphosate effects on steroidogenesis and proliferation of bovine granulosa cells in vitro. *Chemosphere*; 188:274-279.

Perego MC, Schutz LF, Caloni F, Cortinovis C, Albonico M, Spicer LJ. 2017. Evidence for direct effects of glyphosate on ovarian function: glyphosate influences steroidogenesis and proliferation of bovine granulosa but not theca cells in vitro. *J Appl Toxicol.*; 37(6):692-698.

## **POSTER PRESENTATIONS**

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Perego MC, McMichael BD, Bain LJ. 2022. Arsenic Impairs the Hippo Signaling Pathway and the Expression of its Downstream Target Genes. Society of Toxicology Annual Meeting.

Perego MC, McMichael, BD, Bain LJ. 2021. Arsenic impairs stem cell differentiation via the Hippo signaling pathway. Society of Toxicology Virtual Annual Meeting.

McMichael BD, Perego MC, Darling CL, Perry RM, Bain LJ. 2019. Chronic Low-Level Arsenic Exposure Induces Fibrogenesis in Mouse Embryonic Stem Cells. CBASS, Clemson, SC.

Caloni F, Perego MC, Cortinovis C, Bertero A, Spicer LJ. 2018. *In vitro* effects of two environmental toxicants, beauvericin and glyphosate in Roundup, on cell proliferation and steroidogenesis using a novel bovine whole ovarian cell culture system. EAVPT, Wroclaw, Poland.

Perego MC, Morrell BC, Schutz LF, Spicer LJ. 2018. Endogenous production of UHRF1 and effects of E2F transcription factors and FGF9 on UHRF1 mRNA abundance in ovarian cells. Annual Cancer Research Symposium, Oklahoma City, OK.

Caloni F, Perego MC, Schutz LF, Cortinovis C, Spicer LJ. 2017. *In vitro* effects of glyphosate alone or in formulation with Roundup on cell proliferation and steroid production by bovine granulosa cells. Society of Toxicology Annual Meeting, Baltimore, MD.

Caloni F, Albonico M, Mantecca P, Gedanken A, Bellitto N, Perego MC, Cortinovis C. 2015. Toxicological effects of copper oxide nanoparticles on Caco-2 intestinal cells. European Congress on Alternatives to Animal Testing (EUSAAT), Linz, Austria.

Perego MC, Martinez Morcillo S, Neila Ibáñez CM, Díez Hernández A, González Mateos A, Pérez López M. 2016. Identification of organophosphate biomarkers and current methodologies: a review. Oral Communication at Complutenses' days. National congress of investigation in health science for undergraduated students, Madrid, Spain.

Martinez Morcillo S, Perego MC, Neila Ibáñez CM, Díez Hernández A, Soler Rodriguez F, Pérez López M. 2016. Use of earthworm species for toxicological assays and pesticides screening. Complutenses' days. National congress of investigation in health science for undergraduated students, Madrid, Spain.

Neila Ibáñez CM, Perego MC, Martinez Morcillo S, Díez Hernández A, Pérez López M, Soler Rodríguez F. 2016. Wildlife species as bioindicator of environmental contamination. Complutenses' days. National congress of investigation in health science for undergraduated students, Madrid, Spain.

Díez Hernández A, Martínez Morcillo S, Perego MC, Neila Ibáñez CM, Pérez López M, Soler Rodríguez F. 2016. Justice tribunals verdicts for Veterinary profession responsibility. Complutenses' days. National congress of investigation in health science for undergraduated students, Madrid, Spain.

Albonico M, Cortinovis C, Colombo G, Dalle-Donne I, Mantecca P, Gedanken A, Perelshtein I, Bellitto N, Perego MC, Caloni F. 2016. Effects of CuO nanoparticles on an *in vitro* model of intestinal barrier. Eurotox, Sevilla, Spain.

Caloni F, Cortinovis C, Colombo G, Dalle-Donne I, Mantecca P, Gedanken A, Perelshtein I, Perego MC, Bellitto N, Albonico M. 2016. Toxic effects of Zn-doped CuO nanoparticles on human intestinal Caco-2 cells. Eurotox Sevilla, Spain.

Albonico M, Perego MC, Schutz LF, Cortinovis C, Caloni F, Spicer LJ. 2016. Glyphosate toxicity on ovarian function: in vitro effects on bovine theca cell proliferation and steroidogenesis. Eurotox, Sevilla, Spain.

## **PROFESSIONAL TRAINING**

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“2022 Complete Python Bootcamp” – Udemy, Inc. *in progress*

“Gene Therapy: Nonclinical and Regulatory Strategy” – Module 1-4  
American College of Toxicology (ACT) – eLearning seminars June 2022

“Toxicology in Drug Development” December 7 2021  
International Union of Toxicology (IUTOX) – online course

“Alternative methods in science: towards model complexity” June 7-8 2021  
Lake Como School of Advanced Studies – online course

“29th Annual Short Course on Experimental Models of Human Cancer” August – September 2020  
Jackson Laboratories - online course

“Alternative methods and models in science: a multidisciplinary *in vitro* approach” June 3-4 2020  
Lake Como School of Advanced Studies - online course

“RNA-Seq with Bioconductor in R” May 2020  
DataCamp – online course

“The addicted brain” December 2019  
Emory University –online course

“Fundamentals of Neuroscience, Part 2: Neurons and Networks” March 2019  
HarvardX – online course

“Fundamentals of Neuroscience, Part 1: The Electrical Properties of the Neuron” February 2019  
HarvardX – online course

“Introduction to Electron Microscopy” Workshop July 17-19 2017  
Oklahoma State University, Stillwater, OK

“The human hepatic stem/progenitor HepaRG cell line – a valuable alternative to primary hepatocytes” Training Course July 17-19 2017  
Mario Negri Pharmacological Research Institute – Milan, Italy

“Toxicology is IN: *in silico*, *in vitro*, integrated testing strategy” Training Course” December 4 2015  
Mario Negri Pharmacological Research Institute – Milan, Italy

“Models on liver: alternative models of hepatotoxicity” May 19 2015  
IZSLER Institute – Brescia, Italy

“Reality of alternative methods: benefits and limits” September 30 2014  
SITOX – Milan, Italy

## **AWARDS and HONORS**

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Fall 2021	Biological Sciences Professional Development Course Grant in Aid of Research
Fall 2021	SOT Graduate Student Travel Support Award
Fall 2021	Graduate Travel Grants – Clemson University
Fall 2020	Biological Sciences Professional Development Course Grant in Aid of Research
Fall 2019	College of Sciences Student Advisory Board Grant in Aid of Research – Clemson University
Fall 2015	European Post Graduate Fellowship Erasmus+
Spring 2013	European Undergraduate Fellowship Erasmus

## **PROFESSIONALS AFFILIATIONS**

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2022 – present	Member of American College of Toxicology (ACT)
2021 - present	Member of Society of Toxicology (SOT)
2015 - present	Member of Sitox (Italian Society of Toxicology)
2015 - present	Member of CellTox (Italian Association of <i>in vitro</i> Toxicology)

## **PROFESSIONALS SERVICES**

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2022	Volunteer for Graduate School Fair at Men of Color National Summit – Greenville, SC – April 21 <sup>st</sup> , 2022
2022	Judge for 2022 Clemson Biological Sciences Annual Student Symposium (CBASS) - Lighting talk section.
2022	Reporter for 2022 Society of Toxicology (SOT) Annual Meeting
2022	Member of the Search Committee for the position of Assistant/Associate Professor in Toxicology at Clemson University
2021-2022	Peer reviewer for Journal <i>Frontiers Endocrinology</i> and <i>Frontiers in Veterinary Science</i>

## **MENTORSHIP**

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2022	Nick McMurry (undergraduate, Clemson University)
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- 2018 Mary Birdsong Gabriel (undergraduate honors thesis, Oklahoma State University)
- 2017-2018 Alicia DeVore (undergraduate honors thesis, Oklahoma State University)
- 2016-2018 Jacqueline Nichols and Amber Hemple (undergraduate, Oklahoma State University)

## **LANGUAGES**

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Italian: Native language

English: Advanced in listening, speaking, reading and writing

2016 – TOEFL iBT, Test of English as Foreign Language

2009 – FCE, First Certificate in English (level B2)

Spanish: Advanced in listening, speaking, reading and writing

2009 – DELE, Diploma de Español como Lengua Extranjera (level B2)

## **TEACHING EXPERIENCE**

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### **Graduate Teaching Assistant**

Fall 2019 - Spring 2022

Clemson University, Clemson, SC

- Instructed several introductory biology laboratory courses covering various topics including cell division, molarity, osmosis, enzymatic reactions, and evolution.
- Instructed a cell biology laboratory course covering several topics including cell culture techniques, principles of fluorescence microscopy, assessment of cellular proliferation and apoptosis, mechanisms of endocytosis.
- Taught laboratory techniques such as pipetting, use of pH meter, spectrophotometer, respirometer, and microscopes as well as cell culturing techniques, DNA extraction, gel electrophoresis and fluorescent staining.
- Evaluated student performance by grading quizzes, assignments, and reports, held weekly office hours and proctored exams.
- Assessed Cell Biology Lab reports using a rubric based on the Association of American Colleges and Universities Critical Thinking VALUE rubric and Clemson University's General Education Rubrics.

### **Graduate Teaching Assistant**

Fall 2017 - Fall 2018

Oklahoma State University, Stillwater, OK

- Prepared and assisted laboratory sessions of an animal reproduction course covering various topics including anatomy, physiology and histology of the female and male reproductive system, placenta anatomy and functions, semen collection and artificial insemination techniques and use of hormonal treatments to improve reproductive performance.
- Instructed several lecture sessions of an animal reproduction course.
- Evaluated student performance by grading quizzes and exams, held weekly office hours and proctored exams.