BIOGRAPHICAL SKETCH

NAME: Leonardo Ermini

eRA COMMONS USER NAME: LEOERM

POSITION TITLE: Senior Research Associate

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
University of Siena, Siena, Italy	MSc	03/2000	Biology
University of Siena, Siena, Italy	Ph.D.	12/2004	Molecular Medicine
University of Siena, Siena, Italy	Post-graduate degree / specialization	03/2012	Pharmacology

Employment

2004-2009 Cellular Biology Lecturer, University of Siena

2006-2010 Postdoctoral Fellow, Cellular Biology/Biochemistry, Department of Evolutionary Biology, University of Siena, Siena, Italy.

2010-2011 Cytochemistry and Histochemistry Lecturer, University of Siena, Siena, Italy.

2011-2012 Course Co-ordinator, Histology in Biological Science Degree, University of Siena, Italy.

2012-2018 Postdoctoral Fellow, Physiology/Mass Spectrometry, The Hospital for Sick Children and Lunenfeld-Tanenbaum Research Institute, Toronto, Canada.

2018-2019 Research Associate, Physiology, Lunenfeld-Tanenbaum Research Institute, Toronto, Canada.

2018-2019 Research Collaborator, Physiology/Mass Spectrometry, The Hospital for Sick Children, Toronto, Canada.

2019-present Senior Research Associate, Physiology, University of Siena, Siena, Italy.

Contribution to Science

Glycobiology of Reproduction

I have considerable experience in studying glycosylation. In fact, I have studied two glycoproteins involved in fertilization (gp273 and gp20) for 6 years. In particular, I have focused my study on gp20 also named CD52 or CAMPATH antigen. CD52 is a human glycosylphosphatidylinositol (GPI)-anchored antigen exclusively expressed in leukocytes and epididymal cells. It is inserted in the sperm plasma membrane during epididymal maturation. I have studied the association of this antigen with lipid microdomains in leukocytes and sperm membranes, its expression during embryo development and its role in clot formation and liquefaction of human semen.

Glycobiology of Proliferating Cells

I have studied the glycoconjugates of cultured trophoblast, endothelial and cancer cells. In particular, I contributed to investigations demonstrating the presence of fucosylated glycoforms of nucleolin on highly proliferating cancer cells and the role of fucosyl transferases in cell adhesion and proliferation. Furthermore, I have contributed to develop liposomes functionalized with LTL, a lectin that recognize fucose residue, to deliver doxorubicin to two cancer cell lines. Ultimately, I demonstrated that the expression of glycoconjugates bearing O-glycosylation is modulated by oxygen tension and that O-glycosylation has a functional role in determining trophoblast differentiation.

Mass Spectrometry Imaging

I have identified the distribution of metabolites and drugs in pathological and physiological tissues using MALDI IMS. Moreover, I have used this technique to investigate the distribution of gangliosides in brain tissue sections from healthy rat and mouse and to identify prognostic gangliosides in tissue sections of rat intracranial allografts of rat glioma and mouse intracranial xenografts of human medulloblastoma.

Role of Sphingolipids

Sphingolipids, a family of membrane lipids, are bioactive molecules that participate in diverse functions controlling fundamental cellular processes such as cell division, differentiation, and cell death. I have focused my study on bioactive sphingolipids, which are responsible for regulating cell death and survival. My main objective was to examine sphingolipid metabolism in healthy placentas and how the alteration of this important metabolic pathway could lead to preeclampsia, a serious placental disorder characterized by increased trophoblast cell turnover. Using tandem mass spectrometry (LC-MS/MS) and MALDI IMS, I examined the content and tissue localization of sphingolipids in pre-term control, preeclamptic and IUGR placentae. Moreover, I have developed assays to quantify the activities of various sphingolipid enzymes (eg. acid ceramidase, serine palmitoyl transferase, sphingosine kinase). Furthermore, I have contributed to studies investigating sphingolipid metabolism in lung development and how the sphingolipid pathway is involved in early childhood lung diseases.

Exosome Biology

Exosomes are a “mirror” of the physio/pathological status of the releasing cells because they incorporate specific molecules (lipids, miRNA and proteins) in response to the cell’s microenvironment. Exosomes are secreted into bodily fluids such as blood and urine indicating that they could be used as a specific biomedical tool. I have isolated and characterized exosomes from several biological fluids (milk, plasma, urine) as well as conditioned media. In particular, I have isolated and characterized placental derived exosomes from maternal blood of preeclamptic patients and healthy pregnancy. Although exosomes can be used as circulating placental “biopsies”, few studies have been performed to detect specific PE biomarkers in these nanovesicles early in gestation. I have discovered that early preeclamptic exosomes are enriched in a specific type of sphingolipid named sphingomyelin 18:0 and that they contained elements of TGFB receptor complex such as Endoglin and TGFB receptor 1 and 2.