BIOGRAPHICAL SKETCH

NAME: **Marco Tigano**

eRA COMMONS USER NAME (credential, e.g., agency login): **tiganm01**

POSITION TITLE: **Assistant Professor**

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
University of Parma, Parma, Italy	BS	09/2006	Biotechnology
University of Parma, Parma, Italy	MS	11/2008	Molecular Biology
University of Parma, Parma, Italy	PHD	03/2012	Mitochondrial Biogenesis
University of Miami School of Medicine, Miami, USA	PHD Fellow	09/2011	Mitochondrial Biogenesis
IRCCS Santa Maria Nuova, Reggio Emilia, Italy	Postdoctoral	10/2014	Onco-hematology
NYU School of Medicine, New York, USA	Postdoctoral	04/2021	Mitochondria and Immunity

A. Personal Statement

I am a tenure-track Assistant Professor at the MitoCare Center for Mitochondrial Imaging Research and Medicine at Jefferson University. The study of mitochondria has been my focus since the beginning of my master's degree in 2008. *I am grateful for my more than 10 years of experience in several aspects of mitochondrial biology: from mitochondrial genetic diseases to mitochondrial stress signaling and mitochondrial driven innate immunity*. My masters and doctoral studies at University of Parma trained me to dissect mitochondrial genetics through the use of *S. cerevisiae*, the most widely used model in mitochondrial research. *I also collaborated with neurologists and medical doctors to generate tailored models to study pathological mutations causative of mitochondrial disorders included in several peer-reviewed manuscripts.* Central to my graduate work was a genome-wide screen aimed at identifying genetic mediators of mitochondrial stress responses that led me and my co-workers to characterize a mechanism responsible for the fine-tuning of cytosolic-translation to adapt mitochondrial function to heat stress.

My postdoctoral fellowship with Dr. A Sfeir at NYU Grossmann School of Medicine significantly shaped my expertise and knowledge base in mitochondrial research and their cellular communications. At NYU, *I translated my previous experience from yeast models to mammalian cell lines using cutting-edge technologies like mitochondrial TALE-nucleases targeting of mitochondrial DNA and CRISPR mediated nuclear genome targeting to study mitochondrial-nuclear communication.* My efforts culminated in the publication of a manuscript in Nature in 2021. This article describes a novel form of communication between the mitochondria and the nucleus – where mitochondria inform the cell about mitochondrial DNA stress through the activation of innate immunity, mediated by mitochondrial RNA. Besides this significant contribution to science, I participated in seminal studies regarding the *in vivo* mechanisms conducive to single large-scale mitochondrial deletions, one of the cruxes of my independent research efforts in Philadelphia. In this line of inquiry, I regularly use and modify mitochondrial localized restriction enzymes and TALENs, that can be efficiently directed to any sequence of choice and serve different purposes.

Throughout my early career, interdisciplinary collaborations with both physicians and academic researchers taught me the value and importance of establishing productive collaborations within an independent research

program. In addition, my passion for research extends to sharing my scientific knowledge and technical skills with students. During my graduate studies, I was fortunate to have an opportunity to mentor several new, incoming students, and during my postdoctoral fellowship, I supported and helped guide, in partnership with their primary mentor Dr. Sfeir, two Ph.D. students studying mitochondrial DNA replication and repair. The opportunity to work with academic researchers at multiple levels of education and experience, and with physicians, opens doors to productive, illuminating conversations and is central to why I chose to start my lab at Thomas Jefferson University.

My goal as a faculty member at Thomas Jefferson is to establish foundational studies centered on mitochondrial biology and address questions that have groundbreaking potential. I also plan to build a multidisciplinary team that uses translational research approaches to generate knowledge with significant and near-term implications in human health and disease. My research efforts will be continuously supported and greatly complemented by the scientific environment of the MitoCare Center, home to leading experts in mitochondrial signaling, metabolism, and imaging whose decades' worth of expertise will allow me to drive my research forward. I am eager, well-trained, and well-positioned to develop and grow my independent research program here at Jefferson, nurture a new generation of scientists, and strengthen the multi-disciplinary nature of biomedical research by connecting and collaborating with researchers of other institutions and walk of life.

B. Positions, Scientific Appointments, and Honors

Positions and Scientific Appointments

2021 — Present	Tenure Track Assistant Professor, Department of Pathology and Cell Biology MitoCare Center, Thomas Jefferson University, Philadelphia, PA
2014 — 2021	Postdoctoral Fellow, NYU School of Medicine - Memorial Sloan Kettering Cancer Institute, Sfeir Lab, New York, NY
2014 — 2020	Member, New York Academy of Sciences
2013 — 2014	Postdoctoral Fellow, IRCCS Arcispedale Santa Maria Nuova, Reggio Emilia, Italy
2011	Non-Enrolled Fellow, University of Miami Miller School of Medicine, Miami, FL
2010	Lecturer, University of Parma, Parma, Italy

Honors

2018	"Outstanding Poster Presentation Award", Skirball Institute of Biomolecular Medicine
2008	MS degree, *summa cum laude*
2007	"STSBC Roche Diagnostics 2007 Prize"
2006	BS degree, *summa cum laude*
2004	"Best Student, Freshman Year BS, Biotechnologies major"

C. Contributions to Science

1. Innate Immunity Driven by mtDNA Damage

1. **Tigano M**, Vargas DC, Tremblay-Belzile S, Fu Y, Sfeir A. Nuclear sensing of breaks in mitochondrial DNA enhances immune surveillance. Nature. 2021 Mar;591(7850):477-481. doi: 10.1038/s41586-021-03269-w. Epub 2021 Feb 24. PMID: 33627873.
2. Fu Y, **Tigano M**, Sfeir A. Safeguarding mitochondrial genomes in higher eukaryotes. Nat Struct Mol Biol. 2020 Aug;27(8):687-695. doi: 10.1038/s41594-020-0474-9. Epub 2020 Aug 6. PMID: 32764737.
3. Naresh NU, Haynes CM. Breaks in mitochondrial DNA rig the immune response. Nature. 2021 Mar;591(7850):372-373. doi: 10.1038/d41586-021-00429-w. PMID: 33627860.
4. Rigon M, Townley AR, Campanella M. Mitochondria ensure immune surveillance by retro-communication with the nucleus. Cell Metab. 2021 May 4;33(5):853-855. doi: 10.1016/j.cmet.2021.04.013. PMID: 33951470.

2. Mitochondrial DNA Replication, Stress and Repair

1. Phillips AF, Millet AR, **Tigano M**, Dubois SM, Crimmins H, Babin L, Charpentier M, Piganeau M, Brunet E, Sfeir A. Single-Molecule Analysis of mtDNA Replication Uncovers the Basis of the Common Deletion. Mol Cell. 2017 Feb 2;65(3):527-538.e6. doi: 10.1016/j.molcel.2016.12.014. Epub 2017 Jan 19. PMID: 28111015.
2. **Tigano M**, Phillips AF, Sfeir A. Single-molecule analysis of mtDNA replication with high resolution. Methods Cell Biol. 2020;155:401-414. doi: 10.1016/bs.mcb.2019.10.005. Epub 2019 Nov 20. PMID: 32183970.
3. **Tigano M**, Phillips AF, Sfeir A. In Vivo Analysis of mtDNA Replication at the Single Molecule Level and with High Resolution. Methods Mol Biol. 2021;2192:21-34. doi: 10.1007/978-1-0716-0834-0_2. PMID: 33230762.

3. Mitochondrial Genetics and Mitochondrial Disease Modeling

1. Di Fonzo A, Ronchi D, Lodi T, Fassone E, **Tigano M**, Lamperti C, Corti S, Bordoni A, Fortunato F, Nizzardo M, Napoli L, Donadoni C, Salani S, Saladino F, Moggio M, Bresolin N, Ferrero I, Comi GP. "The mitochondrial disulfide relay system protein GFER is mutated in autosomal-recessive myopathy with cataract and combined respiratory-chain deficiency". Am J Hum Genet. 2009 May PMCID: PMC2681006

2. Invernizzi F, **Tigano M (Co-authorship)**, Dallabona C, Donnini C, Ferrero I, Cremonte M, Ghezzi D, Lamperti C, Zeviani M. "A Homozygous Mutation in LYRM7/MZM1L Associated with Early Onset Encephalopathy, Lactic Acidosis, and Severe Reduction of Mitochondrial Complex III Activity". Hum Mutat. 2013 Sep 6 PMCID: PMC4028993

3. Dusi S, Valletta L, Haack TB, Tsuchiya Y, Venco P, Pasqualato S, Goffrini P, **Tigano M**, Demchenko N, Wieland T, Schwarzmayr T, Strom TM, Invernizzi F, Garavaglia B, Gregory A, Sanford L, Hamada J, Bettencourt C, Houlden H, Chiapparini L, Zorzi G, Kurian MA, Nardocci N, Prokisch H, Hayflick S, Gout I, Tiranti V. "Exome sequence reveals mutations in CoA synthase as a cause of neurodegeneration with brain iron accumulation." Am J Hum Genet. 2014 Jan 2;94(1):11-22. PMCID: PMC3882905

4. **Tigano M**, Ruotolo R, Dallabona C, Fontanesi F, Barrientos A, Donnini C, Ottonello S. Elongator-dependent modification of cytoplasmic tRNALysUUU is required for mitochondrial function under stress conditions. Nucleic Acids Res. 2015 Sep 30;43(17):8368-80. doi: 10.1093/nar/gkv765. Epub 2015 Aug 3. PMID: 26240381; PMCID: PMC4787798.

Complete List of Published Work in My Bibliography
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