
BIOGRAPHICAL SKETCH

NAME: Alessia Grazia Dominga Remigante

eRA COMMONS USER NAME (credential, e.g., agency login): NOT AVAILABLE

POSITION TITLE: Researcher (assistant professor in tenure track, RTT)

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE	Completion Date	Field of Study
Department of Chemical, Biological, Pharmaceutical and Environmental Sciences, University of Messina, Messina (Italy).	BSc	10/2013	Physiopathology/ Molecular biology/ Biochemistry
Department of Chemical, Biological, Pharmaceutical and Environmental Sciences, University of Messina, Messina (Italy).	MD	10/2015	Physiology/ Cell biology/ Electrophysiology
Department of Chemical, Biological, Pharmaceutical and Environmental Sciences, University of Messina, Messina (Italy); Pharmacology and Toxicology Institute, Paracelsus Medical University, Salzburg (Austria).	PhD	11/2019	Physiology/ Molecular biology/ Cell biology/ Biochemistry/ Electrophysiology
Institute of Biophysics, National Research Council, Genoa (Italy).	Post-Doctoral	09/2021	Molecular biology/ Electrophysiology

A. Personal Statement

I am a Researcher in tenure track (RTT) at the Department of Biomedical and Dental Sciences and Morpho-functional Imaging at the University of Messina and my research focuses on the physiological and pathophysiological role of ion transport system in the context of oxidative stress and related human diseases. I investigate how oxidative stress affects the activity of ion channels and exchangers that are essential for maintaining cellular homeostasis. By combining approaches from cellular and molecular biology, electrophysiology and biochemistry, my research work helps to better understand how alterations in ion transport system activity contribute to progression of oxidative stress-associated diseases. Thus, such research could have the potential to identify ion transport systems as novel therapeutic targets. In this regard, I am very proud of the translational impact of my research work, which associates basic physiological research with potential clinical applications. Throughout the years, these scientific studies have resulted in several peer-reviewed publications, contributions to national and international conferences, and successful applications for national research funding. Also, I collaborate with colleagues across Italy and Europe, thus contributing to build a network of shared knowledge that strengthens both our research output and academic visibility. At the University of Messina, I have the privilege of teaching in both under-graduate and post-graduate courses. I try to integrate my research findings into my teaching practice, allowing students to engage with cutting-edge topics in physiology. In my role of academic mentor, I also assist students in developing their scientific thesis and conducting their research activities. My international teaching experience within the Erasmus+ program has also allowed me to engage with diverse academic environments and promote cross-cultural exchange. I have also taken part in the Erasmus+ program (twice) for training mobility, which has further enhanced my international experience and strengthened cross-institutional collaboration. In June 2023, I obtained the National Scientific Qualification for the role of Associate Professor in Physiology, in accordance with the regulations of the Italian Ministry of Education, University, and Research (MIUR). I actively contribute to the life of the university through service roles,

including participation in departmental meetings, exam committees, student mentorship programs and interdepartmental research initiatives. In my future academic career, I aim to deepen my research in physiology, expand both national and international collaborations, and contribute to the development of innovative teaching strategies within our department. In summary, I have the expertise, leadership, training, expertise, and motivation necessary to successfully carry out my research projects.

Ongoing and recently completed projects that I would like to highlight include:

- 10/2023-Present. Project code: 2022YRBE8B. Functional characterization of Kir4.1 and its involvement in age-related hearing loss, supported by the PRIN (Progetto di Rilevante Interesse Nazionale) grant. Role: Scientific team member, responsible for experimental planning, hands-on execution and data analysis. In such project, I am supervising a post-doctoral researcher.
- 04/2022-Present. Project approved by the Institutional Ethics Committee of the University of Messina (prot.52-22). Oxidative Stress-Related Morphological and Functional Changes in Human Erythrocytes: Focus on the Role of Anion Exchanger 1 (Band 3 Protein) Activity. Role: Scientific team member, responsible for experimental planning, hands-on execution, and data analysis. In such project, I am supervising students working on their master's theses.
- 12/2021-12/2024. Project code: CC12014IT16M2OP005. Molecular and Functional Characterization of the Kir2.1 Channel in Epileptic Pathogenesis, supported by PON -Piano Operativo Nazionale- Ricerca e Innovazione 2014-2020. Role: beneficiary of a PON-funded research contract, as Researcher RTD-A, with direct responsibility for the planning and execution of the scientific research activities. In such project, I have supervised a PhD student

B. Positions, Scientific Appointments, and Honors

2024-PRESENT

- Researcher (assistant professor in tenure track, RTT), Department of Biomedical and Dental Sciences and Morpho-functional Imaging, University of Messina, Messina (Italy).

2021-2024

- Researcher (RTD-A), Department of Chemical, Biological, Pharmaceutical and Environmental Sciences, University of Messina, University of Messina, Messina (Italy).

2019-PRESENT

- Review Editor in Redox Physiology and Red Blood Cell Physiology (Frontiers in Physiology); Cellular Biochemistry (Frontiers in Cell and Developmental); Cellular Biochemistry (Frontiers in Molecular Biosciences).
- Reviewer Board in International Journal of Molecular Science (MDPI) and Antioxidants (MDPI).
- Topical Advisory Panel Member in International Journal of Environmental Research and Public Health (MDPI) and Antioxidants (MDPI).
- Guest Editor for 12 Special Issues, focused on diverse topics (aging, oxidative stress, ion transport system). The purpose of these Research Topics is to collect and contribute to the dissemination of high-quality research articles.
- Peer Reviewer for scientific manuscripts. This activity can be verified through the following link: <https://www.webofscience.com/wos/author/record/AAA-1097-2019>

2017-PRESENT

- Member, American Physiological Society/Italian Society of Physiology/Italian Society of Experimental Biology.

2025. First Prize in Photography Contest for Best Scientific Image presented during the National Congress of the Italian Society of Experimental Biology (SIBS), titled "Cell Lifespan". The image acquired by Scanning Electron Microscopy highlights specific morphological changes in human red blood cells, providing insights into cellular responses to oxidative stress. In particular, the image showed a biconcave erythrocyte alongside an abnormal erythrocyte (acanthocyte).

2024. Best Oral Communication Award during the National Congress of the Italian Society of Experimental Biology (SIBS). Title: Exposure to Nano-Plastics Provokes Oxidative Stress after Internalization in Human Erythrocytes: Role of Estrogen Receptors. The Prize was awarded for outstanding scientific contribution and presentation quality. Top Cited Article. Role of SLC4 and SLC26

Solute Carriers During Oxidative Stress. This article was recognized as one of the most cited articles published in *Acta Physiologica* (Wiley) during the 2022–2023 period.

2021. Best Poster Prize. Italian Society of Physiology (SIF) Congress. Title: Kir2.1 Channels in an Oxidative Stress-Related Model of Aging Neuroglia. The Prize was awarded for excellence in poster presentation and scientific contribution.

2019. Outstanding Reviewer Award (Experimental Biology and Medicine, SAGE Journals) for efficient contribution to the peer-review process, demonstrating excellence in scientific evaluation, timeliness, and constructive feedback.

C. Contributions to Science

1. My early publication is based on data obtained during my Master thesis internship (2013-2015). Such project was carried out with the support of the Erasmus Placement program at the Institute of Pharmacology and Toxicology of the Paracelsus Medical University (Salzburg, Austria) from March 2014 to September 2014. During this period, I was supported by scholarship, granted by SMP -Mobility for students Erasmus Placement, Lifelong Learning Programme-2008-2013. The electrophysiological approach of the study provided crucial insights into the potential mechanisms underlying *Pelagia noctiluca* (Cnidaria:Scyphozoa) jellyfish crude venom-induced damage. Venom-induced NaCl influx, followed by water and consequent cell swelling, most likely underlies the hemolytic and cytolytic activity of *Pelagia noctiluca* venom. These results could contribute to understanding the molecular mechanisms underlying the jellyfish crude venom toxicity, and may support the development of treatments for jellyfish stings by targeting ion conductance pathways. The scientific contribution is reported below.

a) DOI: 10.1038/srep41065. *Scientific Reports (Nature)*, IF: 4.45.

2. During my PhD program, scholarship granted by PON - Piano Operativo Nazionale-Ricerca e Innovazione 2014-2020-Dottorati innovativi con caratterizzazione industriale (CCI 2014IT16M2OP005), I have been involved in research activities focusing on the elucidation of the possible role of post-translational modification (O-GlcNAcylation) of the protein ICln in the pathogenesis of diabetic complications, such as the diabetic nephropathy. The research project was mainly carried out at the Institute of Pharmacology and Toxicology of the Paracelsus Medical University (Salzburg, Austria) from 2017 to 2019. I applied a wide array of techniques ranging from electrophysiology, to molecular biology, protein biochemistry and cell biology. The results of my research are summarized in my PhD dissertation. The obtained findings underscore the essential role of O-GlcNAcylation modification in governing basic cell homeostatic functions by controlling protein–protein interactions, and further suggest that reducing ICln O-GlcNAcylation may represent a novel strategy in the prevention or treatment of diseases where a regulatory volume decrease derangement might be involved, including chronic complications of diabetes, such as diabetic nephropathy. The scientific contributions are listed below.

a) DOI: 10.1096/fasebj.2019.33.1_supplement.707.2. Conference proceedings. *The FASEB*, IF: 5.08;

b) DOI: 10.3389/fcell.2020.607080. *Frontiers in Cell and Developmental Biology*, IF: 6.08.

3. I held a postdoctoral fellowship, funded by Associazione Italiana per la Ricerca sul Cancro (AIRC), within the project titled: "Volume-regulated Cl⁻ and oxidation-activated K⁺ channels in invasiveness and immunotherapy efficiency in human melanoma". Such project was carried out at the Institute of Biophysics, National Research Council, Genoa (Italy) from 2020 to 2021. The goal of the project was to investigate the role of volume-regulated chloride (VRAC) and oxidation-activated potassium (KROS) channels in melanoma cells by developing synthetic peptides, designed through computational studies, to specifically target the channel protein subunits, aiming to impair the cell ability to spread and invade surrounding tissues. A selection of the most significant publications is listed below.

a) DOI: 10.3390/cancers13236144. *Cancers (MDPI)*, IF: 6.57.

b) DOI: 10.1111/bph.15810. *British Journal of Pharmacology (Wiley)*, IF: 9.47.

c) DOI: 10.3390/ijms22168359. *International Journal of Molecular Science (MDPI)*, IF: 6.20. I was also invited to contribute with a book chapter to the volume Human Physiology, Annual Volume 2023, published by *IntechOpen* (DOI: 10.5772/intechopen.109563).

4. As a researcher (RTD-A), I actively participated in the research project, titled: "Molecular and functional characterization of the Kir2.1 channel in epileptogenic pathogenesis" (CC12014IT16M2OP005) from December 2021 to December 2024, collaborating with two additional research groups. I played a crucial role to promote coordination and communication among research groups involved, ensuring the integration of different expertise and methodological approaches. This role was instrumental in advancing the project objectives. In addition to leading the experimental design and data interpretation, I also collaborated to coordinate the experimental activities of a PhD student, providing guidance and scientific input. This experience allowed me to further develop my leadership and teamwork skills within a collaborative and dynamic research environment. Overall, the findings provide mechanistic insight into how oxidative stress alters ion channel activity (Kir2.1 and Kv3.1) in oxidative stress-related aging and support the therapeutic potential of melatonin in counteracting functional decline in cellular aging. The publications and conference contributions are listed below. I mainly served as the primary investigator or co-investigator in this study.

a) DOI: 10.1002/biof.2024. BIOFACTORS (Wiley), IF: 5;
b) DOI: 10.1111/acef.14185. Aging Cell (Wiley), IF: 8;
c) DOI: 10.1096/fasebj.2022.36.S1.R3337. Conference proceedings, The FASEB, IF: 4.4; d) Remigante A., et al. Oral Presentation. European Physiology Day, organized by Federation of European Physiological Societies (FEPS).

5. From my early academic years as a master degree student to my current position as a researcher (RTT), I have addressed my scientific research to the study of cellular and molecular mechanisms by which oxidative stress is able to disrupt erythrocyte homeostasis. My research work has given special attention to the Anion Exchanger 1 (AE1, or Band 3 protein, SLC4A1), a pivotal membrane protein of human erythrocytes that not only mediates chloride-bicarbonate exchange but also acts a crucial role in anchoring the cytoskeleton-associated proteins to the plasma membrane and, consequently, in maintaining membrane asymmetric structure. In my scientific work, AE1 has identified as a redox-sensitive molecular target, whose structural and functional integrity could be affected by oxidative alterations. These oxidative insults can initiate a cascade of modifications, resulting in compromised erythrocyte deformability, membrane stability and overall functionality. By using erythrocytes as a cellular model, I have been able to investigate how oxidative stress-induced changes to AE1 can contribute not only to localized membrane dysfunction but also to systemic imbalances, as human erythrocytes play an important role in oxygen delivery, nitric oxide metabolism, and vascular homeostasis. These latter functions are also closely linked to the correct functioning of ion transport system, which is crucial for maintaining cellular and systemic homeostasis in the body. In this context, natural compounds to counteract the increased oxidative stress levels, thereby restoring the physiological function of human erythrocytes, have been tested. This research has also enabled me to identify AE1 dysfunction as a promising biomarker and therapeutic target for diseases associated with oxidative stress. A selection of the most significant publications is listed below. I mainly served as the primary investigator or corresponding author in this project.

a) DOI: 10.1016/j.freeradbiomed.2025.01.052. *Free Radical Biology and Medicine* (ELSEVIER). IF:7.1;
b) DOI: 10.1016/j.freeradbiomed.2024.07.017. *Free Radical Biology and Medicine* (ELSEVIER). IF: 7.1;
c) DOI: 10.3389/fphys.2023.1303815. *Frontiers in Physiology*. IF:4.5; d) DOI: 10.1002/jcp.30632. *Journal of Cellular Physiology* (Wiley), IF: 6.51.

COMPLETE LIST OF PUBLISHED WORKS

<https://www.scopus.com/autid/detail.uri?authorId=57190047944>