

Curriculum vitae (max. 4 pages)

PERSONAL DETAILS

Carrella Sabrina ORCID: 0000-0002-3302-1698 **Lab website:** <https://carrellalab.wordpress.com/>
SZN website: <https://www.szn.it/index.php/it/personale/staff/1015-carrella-sabrina/9467-carrella-sabrina>

• *Education and key qualifications*

2013 Ph.D. cum laude in Molecular Medicine (curriculum Human Genetics)

University of Naples Federico II (SEMM: European School of Molecular Medicine) (Italy)

2008 Master of Science summa cum laude in Biology (biomolecular curriculum) University of Naples Federico II (Italy)

2006 Bachelor of Science cum laude in Biology. University of Naples Federico II (Italy)

• *Current position(s)*

1/12/2021-present **Tenured Researcher**

Biology and Evolution of Marine Organisms Department, Stazione Zoologica Anton Dohrn (SZN), Napoli (Italy)

13/10/2023-present **Coordinator of the SZN PhD Program and Seminars Program**

• *Previous position(s)*

1/12/2020-30/11/2021 **Post-doctoral Fellow** at TIGEM (Telethon Institute of Genetics and Medicine)

01/11/2015–30/11/2020 **Post-doc Research Associate** University of Campania "Luigi Vanvitelli"/TIGEM

01/01/2015–31/10/2015 **Post-doctoral Fellow** TIGEM

01/01/2013–31/12/2014 **Post-doctoral Fellow** TIGEM and MIUR

RESEARCH ACHIEVEMENTS

Functional role of microRNAs in regulatory networks of eye development:

Undergraduate and PhD research activity: I focus my attention on the study of the functional role of microRNAs in vertebrates, contributing to the identification and characterization of the **roles of specific microRNAs in eye development and diseases**. We showed that miR-204 is essential for lens and retinal formation, and that it regulates broader gene networks involved in neurogenesis and axon guidance. Our works also provided one of the first demonstrations that a microRNA mutation can directly lead to human retinal disease. In my PhD project, I identified **miR-181a/b** as key regulators of retinal ganglion cell axon specification and growth, **ensuring proper visual circuitry formation**. Additionally, I described a signalling module in which TGF- β modulates the miR-181/ERK pathway, **linking extracellular cues to microRNA-driven control of axon development**.

1. Conte, **Carrella**, Avellino, Karali, Marco-Ferrerres, Bovolenta, Banfi. (2010) "miR-204 is required for lens and retinal development via Meis2 targeting." *Proc Natl Acad Sci U S A* 107: 15491-15496
2. Avellino, **Carrella**, Pirozzi, Risolino, Salierno, Franco, Stoppelli, Verde, Banfi, Conte (2013) "miR-204 targeting of Ankrd13A controls both mesenchymal neural crest and lens cell migration" *PLoS One* 8: e61099
3. Conte, Merella, Garcia Manteiga, Migliore, Lazarevic, **Carrella**, Marco-Ferrerres, Avellino, Davidson, Emmett, Sanges, Bockett, Van Heel, Meroni, Bovolenta, Banfi, Stupka. (2014) "The combination of transcriptomics and informatics identifies pathways targetted by miR-204 during neurogenesis and axon guidance". *Nucleic Acids Res* 42: 7793-7806. 15496
4. **Carrella**, D'Agostino, Barbato, Huber-Reggi, Salierno, Manfredi, Neuhaus, Banfi, Conte (2015). "miR-181a/b control the assembly of visual circuitry by regulating retinal axon specification and growth". *Dev Neurobiol* 75: 1252-1267.
5. Conte, Hadfield, Barbato, **Carrella**, Pizzo, Porter, Hateley, O'Sullivan, Manson, Neuhaus, Banfi, Black (2015). "MiR-204 is responsible for inherited retinal dystrophy associated with ocular coloboma". *Proc Natl Acad Sci U S A* 112: E3236-3245.
6. **Carrella**, Barbato, D'Agostino, Salierno, Manfredi, Banfi, Conte (2015). "TGF- β controls miR-181/ERK regulatory network during retinal axon specification and growth." *PlosOne* 10(12):e0144129.

microRNA-mediated Mutation-Independent Therapies for Retinal Diseases:

Post-doc years: I worked at the identification of strategies of miRNAs modulation as possible RNA-therapeutics. I demonstrated that **downregulation of miR-181a/b** exerts a protective effect in mitochondrial disease models, improving cellular resilience and mitochondrial function. Building on this, I showed that reducing miR-181a/b levels represents a **mutation-independent therapeutic approach for inherited retinal diseases**, restoring photoreceptor survival and function across genetically diverse models. These discoveries lay the foundation for translational applications, as reflected in the related **patent describing the use of miR-181 inhibitors** as therapeutic agents. Complementing this work, a high-content screening study identifies **miR-429 as another protective microRNA**, capable of mitigating photoreceptor degeneration in vitro. Altogether,

these findings position microRNA modulation as promising broad-spectrum strategies for treating retinal and mitochondrial neurodegenerative conditions.

7. Indrieri†, **Carrella**†, Romano, Spaziano, Marrocco, Fernandez-Vizarrá, Barbato, Pizzo, Ezhova, Golia, Ciampi, Tammaro, Henao-Mejia, Williams, Flavell, De Leonibus, Zeviani, Surace, Banfi*, Franco*. “miR-181a/b downregulation exerts a protective action on Mitochondrial Disease models”. *EMBO Molecular Medicine*, 2019 † **co-first authors contributed equally to this work**; *co-corresponding authors
8. Indrieri, **Carrella**, Carotenuto, Banfi and Franco. “The Pervasive Role of the miR-181 Family in Development, Neurodegeneration, and Cancer.” *Int J Mol Sci*. 2020
9. **Carrella***, Indrieri, Franco, Banfi*. “Mutation-Independent Therapies for Retinal Diseases: Focus on Gene-Based Approaches”. *Front Neurosci*. 2020 *co-corresponding authors
10. **Carrella***, Banfi*, Karali*. “Sophisticated gene regulation for a complex physiological system: the role of non-coding RNAs in photoreceptor cells”. *Front Cell Dev Biol*. 2021 *co-corresponding authors
11. **Carrella***, Massa, Indrieri*. “microRNAs in mitochondrial-related eye diseases” *Front Cell Dev Biol*. 2021 *co-corresponding authors
12. **Carrella** *, Di Guida, Brillante, Piccolo, Ciampi, Guadagnino, Garcia Piqueras, Pizzo, Marrocco, Molinari, Petrogiannakis, Barbato, Ezhova, Auricchio, Franco, De Leonibus, Surace, Indrieri, Banfi*. miR-181a/b downregulation: a mutation-independent therapeutic approach for inherited retinal diseases. *EMBO Mol Med*. 2022 Oct 4:e15941. doi: 10.15252/emmm.202215941. Epub ahead of print. PMID: 36194668. *co-corresponding authors
13. Petrogiannakis, Guadagnino, Negueruela, Di Guida, Marrocco, Pizzo, Torella, Zanobio, Karali, Medina, **Carrella**, Banfi. “In vitro high-content screening reveals miR-429 as a protective molecule in photoreceptor degeneration”. *Molecular Therapy Nucleic Acid* 2025
14. Brillante, Volpe, Diana, Negueruela, Molinari, Saurino, Cipollaro, Polishchuk, Tenderini, Damiano, Tornabene, Polishchuk, Parenti, Tarallo, Banfi, Trapani, **Carrella***, Indrieri*. “Uncovering mitochondrial defects in photoreceptors opens new therapeutic opportunities for Stargardt disease”. (*Under revision, PNAS*) *co-corresponding authors
15. **Patent**: "mir-181 inhibitors and uses thereof" (WO/2019/202162) 20th of April, 2018

MicroRNA-Mediated Responses: Adaptations to Marine Environments:

Group leader: In December 2021, I started my own independent position at SZN. My research group focus the attention on the characterization of **miRNA-mediated mechanisms of adaptation of marine organisms** to different environment conditions. The results obtained by De Falco, PhD student enrolled in my group, have been included in his thesis, submitted and successfully defended in November 2025. *Submission of the corresponding manuscript is pending.* In the projects “MITOXYMIR” and the “SEA SIGHT” we focused attention on oxygen-responsive microRNAs (**OxymiRs**) regulation, that rapidly modulate cellular metabolism and allow animals to tolerate and survive in reduced oxygen levels. We focus our attention on conserved OxymiRs and on the identification and characterization of novel miRNAs from a deep-sea cephalopod species, naturally adapted to **hypoxic environments**. Our work identified novel miRNA-mediated mechanisms that could contribute to the adaptation of neuronal metabolism to deep-sea extreme conditions. *Submission of the corresponding manuscript is pending.*

16. De Falco, Lauritano and **Carrella***. “MicroRNA-Mediated Responses: Adaptations to Marine Extreme Environments” *J. Mar. Sci. Eng.* 2023, 11(2), 361; <https://doi.org/10.3390/jmse11020361>
17. Selected communications: De Falco, Ambrosino, Miralto, Chiusano, Russo, **Carrella**. “Stress-Driven MicroRNA Dynamics in *Phaeodactylum tricorutum*: Unveiling the Molecular Mechanisms of Microalgal Plasticity”. European Congress of Marine Biotechnologies 2023, EvolMar 2023, SIBE 2024, Molecular Life of Diatoms 8, ESEB 2025, Maria Ciaramella Workshop 2025
18. Selected communications: van Gelderen, Pisano, De Vivo, Crocetta, D’Aniello, Indrieri, Mirra, **Carrella**. “OxymiRs modulation as gene-independent therapeutic approach in rare mitochondrial diseases” ESEB 2025; The Argonauts 2025; EMBO Workshop-Mitochondria in the Nervous System; RNA-based innovative therapies for neurological disorders 2025; Maria Ciaramella Workshop 2025; Neapolitan Brain Group (NBG) Meeting XIII

Collaborations:

My great attitude to collaborate and create a fruitful scientific network, led to contribute to several publications:

19. Poulter, Al-Araimi, Conte, van Genderen, Sheridan, Carr, Parry, Shires, **Carrella**, Bradbury, Khan, Lakeman, Sergouniotis, Webster, Moore, Pal, Mohamed, Venkataramana, Ramprasad, Shetty, Saktivel, Kumaramanickavel, Tan, Mackey, Hewitt, Banfi, Ali, Inglehearn, Toomes. (2013) “Recessive Mutations in SLC38A8 Cause Foveal Hypoplasia and Optic Nerve Misrouting without Albinism.” *Am J Hum Genet* 93: 1143-1150 15496

20. Barbato, Iuliano, Volpe, D'Alterio, Brillante, Massa, De Cegli, **Carrella**, Salati, Russo, Russo, Riccardo, Cacchiarelli, Capone, Madonna, Ascierio, Franco, Indrieri and Carotenuto. "Integrated Genomics Identifies miR-181/TFAM Pathway as a Critical Driver of Drug-resistance in Melanoma" *Int. J. Mol. Sci.* 2021
21. Brillante, Galasso, Lauritano, **Carrella**. From the Sea for the Sight: Marine Derived Products for Human Vision. *Front Aging Neurosci.* 2022 May 9;14:892764. doi: 10.3389/fnagi.2022.892764.
22. Ciampi, Mantica, López-Blanch, Permanyer, Rodriguez-Marín, Zang, Cianferoni, Jiménez-Delgado, Bonnal, Miravet-Verde, Ruprecht, Neuhauss, Banfi, **Carrella**, Serrano, Head, Irimia. Specialization of the photoreceptor transcriptome by Srrm3-dependent microexons is required for outer segment maintenance and vision. *Proc Natl Acad Sci U S A.* 2022 Jul 19;119(29):e2117090119. doi: 10.1073/pnas.2117090119. Epub 2022 Jul 12. PMID: 35858306; PMCID: PMC9303857.
23. Nocera, Viscido, Criscuolo, Brillante, Carbone, Staiano, **Carrella**, di Bernardo. The VersaLive platform enables microfluidic mammalian cell culture for versatile applications. *Commun Biol.* 2022 Sep 29;5(1):1034. doi: 10.1038/s42003-022-03976-8. Erratum in: *Commun Biol.* 2022 Oct 13;5(1):1090. PMID: 36175545; PMCID: PMC9522807.
24. Lauritano, Montuori, De Falco and **Carrella**. "In Silico Methodologies to Improve Antioxidants' Characterization from Marine Organisms". *Antioxidants* 2023, 12(3), 710; <https://doi.org/10.3390/antiox12030710>
25. Subba, Fasciolo, Geremia, Muscari Tomajoli, Petito, **Carrella**, Chandra Mondal, Napolitano, Venditti. "Simultaneous induction of systemic hyperglycaemia and stress impairs brain redox homeostasis in the adult zebrafish". *Arch Biochem Biophys* 2024 Jul 18;759:110101. doi: 10.1016/j.abb.2024.110101

PEER RECOGNITION

Awards:

3/2010: Graziella Persico Travel Award; Institute of Genetics and Biophysics–CNR

6/2010: ESHG Young Investigator Award; European Human Genetics Conference 2010

12/2023-12/2034: National scientific qualification as associate professor in Applied Biology

Awarded Grants:

Grant applications successfully funded (total amount: > 1M euros)

1. "miRStress: Unveiling the conserved role of stress-regulated miRNA-family on mitochondrial response in aquatic organisms" SZN-OU PhD Fellowship. 1/10/2025-30/9/2028 **(PI)**
2. Euro-BioImaging SEELIFE Open Call for User Access Funding 2025 "OxymiRs modulation as gene-independent therapeutic approach in primary mitochondrial diseases" (proposal ID: 4071) **(PI)**
3. Human Technopole National Facility Access 2024 - Project ID1822216 "OxymiRs modulation effect on in vitro model of Aged-macular degeneration (AMD)" **(PI)**
4. Italian MUR. Cascade call PNRR Spoke 1 National Center for RNA Technology". "From the sea for the sight: identification of novel RNA molecules to tackle retinal diseases (SEA SIGHT)" **(PI)** 1/8/2024-31/10/2025
5. Italian Ministry of University and Research (MUR). Projects of Relevant National Interest (PRIN)-PNRR 2022. "Development of an innovative combinatorial therapy to tackle age-related macular degeneration". **(Co- PI)** 1/12/2023-28/02/2026
6. Italian Ministry of University and Research (MUR). Projects of Relevant National Interest (PRIN) 2022. "Mitochondrial Dynamic Modulators from the Seas". **(PI)** 14/10/2023-28/02/2026
7. AFM-Telethon (Trampoline grant) 2023. "OxymiRs modulation as gene-independent therapeutic approach in rare mitochondrial diseases." **(PI)** 10/10/2023-30/9/2025
8. "MicroRNAs-mediated environmental adaptation in marine microalgae: from physiological responses to biotechnology applications". SZN-OU PhD Fellowship. 1/10/2022-30/9/2025 **(PI)**
9. "CRISPR/Cas9 microRNAs Editing as gene-independent therapeutic approach in Inherited Retinal Dystrophies (IRDs)" AFM-Telethon Trampoline grant. 1/12/20-30/11/21. **(PI)**
10. "miR-181a/b modulation as potential therapeutic approach for AMD treatment" BrightFocus Foundation. 1/11/20-31/10/22. **(PI)**
11. "MicroRNA expression modulation: a new therapeutic avenue for Inherited Retinal Diseases" Velux Stiftung Foundation. 1/11/20-31/10/23. **(Co-PI)**

Presentations at national and international meetings and invited lectures:

1. ESHG. Gothenburg, Sweden (June, 2010) **Oral presentation**
2. 8th European Zebrafish meeting, Barcelona (July, 2013). **Oral presentation**
3. British Society for Developmental Biology Autumn Meeting 2013_Axon guidance and Regeneration, University of Aberdeen, Aberdeen, Scotland, UK (August, 2013).
4. 1st Tri-Retreat meeting. May 2016, Rome, Italy **Oral presentation**

5. TIGEM Retreat 2019, Paestum. **Oral presentation**
6. IX Neapolitan Brain Group Meeting, December 2019, Naples, Italy. **Oral presentation**
7. ARVO 2020 meeting in Baltimore ARVOLearn platform (due to COVID-19). Invest. Ophthalmol. Vis. Sci. 2020; 61(7):2750. **Oral presentation**
8. 2nd Genetics of Ocular Development meeting 2020, On-line (COVID-19) **Oral presentation**
9. EMBO workshop- Mitochondrial homeostasis and human disease 2021
10. European Society of Gene and Cell Therapy (ESGCT) 2021
11. Società Italiana Genetica Umana (SIGU) 2021. **Oral presentation**
12. **Invited Lecturer** for the specialistic course “miRNAs in mitochondrial diseases” in the PhD program at TIGEM (2020, 2021)
13. **Invited Lecturer** in the Research Training workshop as part of an “Innovative Training Network” grant. Title of the course: “Implementation of Novel Therapies for IRD” (2021)
14. **Invited Lecturer** in the course “Marine Genomics – Module of Marine Genomics” at Federico II University. Title of the lesson: “non-coding RNAs in marine organisms” (2022, 2023)
15. European Society for Evolutionary Biology (ESEB) 2025. Barcelona
16. The Argonautes meeting 2025. Prague
17. EMBO workshop-Mitochondria in the Nervous System 2025 Switzerland
18. RNA-based innovative therapies for neurological disorders 2025, Naples
19. Maria Ciaramella Workshop 2025, Naples
20. Neapolitan Brain Group (NBG) Meeting XIII, Naples

ADDITIONAL INFORMATION

Contributions to the research community:

Over the last years, I have been invited to take over several **additional responsibilities and leadership roles**, including organisation of meetings and coordination of institutional activities, as follows:

2012-present training/supervision activity for: 6 post-doc, 4 PhD students, 3 pre-doc fellows, 5 master theses

2020-2023 External member of the thesis committee in the PhD program at CRG in Barcelona

2021-2026 Member/President of several Committee for the selection of research fellows (SZN and CNR) and for the selection of PhD candidates (Open University-SZN XXIV; XXV; XXVI; XXVIII cycles)

2022 Scientific Member of OPBA, TIGEM for the retrospective evaluation of the research project 7B56B.0

2022 Topic Editor: “Rare and common neurodegenerative retinal diseases: from molecular mechanisms to the identification of novel mutation-independent therapeutic strategies”. Frontiers In Aging Neuroscience

2022,2023 Member of the Technical-Scientific Committee of the Marine Library of SZN

2023 Organizer of the SZN Department Retreat, Italy

2023-present **Coordinator of the SZN PhD Program**

2023-present **Coordinator of the SZN Seminars Program**

2024 Internal examiner member of Open University research degree student Miss Martina Blasio

2024-present Member of the steering committee of the PhD in Sciences and Technologies for the Environment and Health of the University of Sannio

2025 Organizing committee member of the V Memorial Workshop Maria Ciaramella, Italy

2026 Organizing committee member of the VI Memorial Workshop Maria Ciaramella, Italy

Additionally, I have acted as reviewer of:

Articles in: Molecular Therapy, Frontiers in Marine Science, Biotechnology Advances, Inflammation Research, European Journal of Neuroscience, Scientific Reports

2023 Member of the Commission for the evaluation of SZN PhD **grant** projects XXV cycle

2024 Reviewer of the **PhD thesis** of the PhD candidate Alessandro Formaggioni (University of Bologna).

2024 President of the Commission for the evaluation of SZN PhD **grant** projects XXVI cycle

2025 **Grant** applications for AFM-Telethon

2026 Member of the Commission for the evaluation of SZN PhD **grant** projects XXVIII cycle

Disseminations activities:

2014-2019 Scientific dissemination at TIGEM laboratories to schools and/or to civil society

5/12/2015 Participation at “Il non vedente del terzo millennio” Convention, Naples, Italy

21/12/2018 Scientific dissemination about Retinitis Pigmentosa at “Uno Mattina”, Studi Rai, Rome, Italy

2022-2025 Scientific dissemination at SZN laboratories to schools

2023 Futuro Remoto, Città della Scienza, days of dissemination to schools and to civil society