

UNIVERSITY OF MILAN

Public selection for recruiting No._1_ tenure track researcher(s) (RTT) for competition sector _ 05/E2 - Molecular Biology__, (scientific-disciplinary sector BIO/11 - Molecular Biology) at the Department of Medical Biotechnology and Translational Medicine__, (announcement published in Official Gazette No. 93 of __05-12-2023____) - Competition code 5437

Nicolò Caporale

CURRICULUM VITAE

PERSONAL DATA

SURNAME	CAPORALE
NAME	NICOLÒ
DATE OF BIRTH	13-04-1989
ORCHID	0000-0001-8097-4320

QUALIFICATIONS**DEGREE**

Medical Degree. 09/2008 - 07/2014
Alma Mater Studiorum University of Bologna, Italy

DOCTORAL DEGREE

PhD in Systems Medicine. 10/2015 - 01/2020
University of Milan, European School of Molecular Medicine

RESEARCH CONTRACTS, RESEARCH FELLOWSHIP CONTRACTS, POSTDOCTORAL SCHOLARSHIPS OR SIMILAR CONTRACTS

- 2023 – present Postdoctoral research fellowship type B
Department of Oncology and Hemato – Oncology. Univesrity of Milan, Italy.
Project: HE_GC23GTEST_01; RE-MEND. Building resilience against mental illness during endocrine-sensitive life stages
- 2020 – present Scientific Advisor for the Neurogenomics Research Center at Human Technopole
- 2021 – 2023 Postdoctoral research fellowship type B
Department of Oncology and Hemato – Oncology. Univesrity of Milan, Italy.
Project: CCE_FON_CRC_BIOLORG_GTESTA; Human Organoid Models Integrative Center
- 2020 – 2021 Postdoctoral research fellowship type B
Department of Oncology and Hemato – Oncology. Univesrity of Milan, Italy.
Project: Horizon 2020; H20_RIA19GTEST_01; ENDpoiNTs. Novel Testing Strategies for Endocrine Disruptors in the Context of Developmental NeuroToxicity

- 2015 – 2020 PhD student fellowship, School of European Molecular Medicine (SEMM)
 Thesis title: A unifying framework to study the genetic and environmental factors shaping human brain development
 Main Project: EDCMixRisk. <http://edcmixrisk.ki.se/>
 Supervisor: Prof. Giuseppe Testa, European Institute of Oncology, University of Milan. Internal co-supervisor: Francesco Nicassio, Center of Genomic Science, Istituto Italiano di Tecnologia. External co-supervisor: Nikolaus Rajewsky, Max-Delbrück-Center for Molecular Medicine
- 2008 – 2015 Medical school student, Emergency Department residency.
 Laboratory of Prof. Vincenzo Stanghellini. Department of Medical and Surgical Sciences, University of Bologna, Italy
 Thesis title: Acute abdominal pain in the emergency department of a university hospital in Italy

TEACHING ACTIVITIES AT ITALIAN OR FOREIGN UNIVERSITIES

University of Milan. Assistant in the courses of Prof. Giuseppe Testa: 2018-present

Pathogenetic bases of neurological and psychiatric disorders.

SSD BIO/11 MED/13 MED/25 MED/26

Genomics and epigenomics.

SSD BIO/11 MED/13 MED/25 MED/26

Neurogenomics and brain disease modelling

SSD BIO/11

Studio dell'impatto genetico e ambientale sui tratti del neurosviluppo attraverso organoidi cerebrali Guest teacher at "IX Corso di formazione permanente in Neuroscienze cognitive dello sviluppo" Fondazione Mariani, Milan, 2023

BRAINOMICS. Computational approaches to single-cell multi-omics in neuroscience. Human Technopole. 2022

<https://humantechnopole.it/en/trainings/brainomics/>

Experimental epidemiology: neurodevelopmental epigenetics across human genetic variability

Guest teacher at the "Corso di formazione avanzata: Epigenetica dall'eredità transgenerazionale alla malattia" Collegio Ghislieri, Pavia, Italy, 2018

Basic data analysis with R for clinicians. Online open course:

<https://github.com/Crockol/ClinicalDataAnalysis>

STUDENT TUTORING

2019 – present Co-supervisor. Marco Tullio Rigoli.

PhD student in the European School of Molecular Medicine (SEMM)

Thesis project: Novel screening platform to investigate neurodevelopment impact of endocrine disruptors

2021 – present Co-supervisor. Sarah Stucchi.

PhD student in the European School of Molecular Medicine (SEMM)

Thesis project: Neurodevelopmental and intergenerational impact of endocrine-disrupting chemicals

- 2022 – present Co-supervisor. Alessia Valenti.
PhD student in the European School of Molecular Medicine (SEMM)
Thesis project: The pandemic within: tackling brain vulnerability in COVID-19 at high resolution
- 2022 – present Co-supervisor. Mazen Khaddour.
PhD student in the European School of Molecular Medicine (SEMM)
Thesis project: High throughput brain organoid longitudinal profiling from the Italian cohort of neurodevelopmental disorders
- 2023 – present Co-supervisor. Manuel Lessi.
PhD student in the European School of Molecular Medicine (SEMM)
Thesis project: Building resilience against mental illness during endocrine-sensitive life stages
- 2022 – present Co-supervisor. Benedetta Muda.
Master degree thesis in Medical Biotechnology and Molecular Medicine, University of Milan.
Thesis project: Human organoids modelling of neurodevelopmental and intergenerational impact of endocrine-disrupting chemicals
- 2021 – 2022 Co-supervisor. Alessia Valenti
Master degree thesis in Bioinformatic for Computational Genomics, University of Milan.
Thesis project: Single cell and spatial transcriptomics of human brain organoids: experimental data analysis and computational modelling
Graduation grade: 110/110 cum laude
- 2020 – 2021 Co-supervisor. Martina Ciprietti.
Master degree thesis in Biotechnologies of human reproduction, University of Siena.
Thesis title: The impact of endocrine-disrupting chemicals on germ cells and neurodevelopment
Graduation grade: 110/110 cum laude
- 2018 – 2019 Co-supervisor. Marco Tullio Rigoli.
Master degree thesis in Pharmaceutical Biotechnology, University of Milan.
Thesis title: Multiplexing brain organoids to study the neurodevelopmental impact of EDCs across genetic backgrounds
Graduation grade: 110/110 cum laude

ATTESTED TRAINING OR RESEARCH ACTIVITIES AT QUALIFIED ITALIAN OR FOREIGN INSTITUTIONS

FENS CAJAL Advanced Techniques for Synapse Biology. October 2019, Bordeaux Neurocampus, France;
Analysis of single cell RNA-seq data. February 2018, Physalia Course. Freie University, Berlin, Germany;
Chromatin and environment. August 2016, EMBO Summer School. Spetses, Greece;
The first systems biology and systems medicine summer school. September 2014 SysBio. Como, Italy;
School of European Molecular Medicine. Doctoral courses: Molecular oncology; Bioinformatics + Statistics; Biochemistry; Genomics and Proteomics; Imaging and Imaging Advanced; History of biomedicine; Logic and Network biology; Scientific writing; Cancer genetics.

- 2020 – present Postdoctoral research activity
 Laboratory of High Definition Disease Modelling. Stem Cell and Organoids Epigenetics. Prof. Giuseppe Testa. Milan, Italy
 Main Project: Human neurodevelopmental models to study the molecular effects and gene-vs-environment interactions of hormones and endocrine disruptions
 Scientific Advisor for the Neurogenomics Research Center at Human Technopole. Co-supervision of laboratory set up and workflows implementation. Steering board member of the Automated Stem Cells and Organoids Facility and the Flow cytometry Applications Resource (FLARE) Scientific Support Unit.
- 2015 – 2020 PhD student research activity
 Laboratory of High Definition Disease Modelling. Stem Cell and Organoids Epigenetics. Prof. Giuseppe Testa. Milan, Italy
 Main Project: EDCMixRisk. Investigating the effects of mixtures of endocrine disruptive chemicals on children by developing methods for risk assessment
- 2008 – 2015 Medical school research activity
 Laboratory of Prof. Vincenzo Stanghellini. Department of Medical and Surgical Sciences, University of Bologna, Italy
 Main project: Acute abdominal pain in the emergency department of a university hospital in Italy

IMPLEMENTATION OF PROJECTS

In the lab of Prof. Giuseppe Testa I have contributed to the writing of the proposals, co-supervision, and experimental work of the following international projects:

2019-2024: Horizon European Project: ENDpoiNTs. <https://endpoints.eu/>

2022-2027: Horizon European Project: NEUROCOV. <https://neurocov.eu/>

2022-2027: Horizon European Project: R2-D2. <https://www.r2d2-mh.eu/>

2023-2028: Horizon European Project: RE-MEND. <https://www.helsinki.fi/en/projects/re-mend>

09/2023 Application submitted as PI for the Joint Call for Applications Fondazione Cariplo e Fondazione Telethon 2023. Funding requested: 250 000 euro

Title: SP5 as novel mediator of CAH multi-organ pathogenesis: from functional elucidation to therapeutic repurposing

11/2023 Application submitted as PI for the Fall Seed Grant 2023 in partnership with Patients Associations. Funding requested: 50 000 euro

Title: Brain organoids modelling of SLC6A1-related neurodevelopmental disorder

SPEAKING AT NATIONAL AND INTERNATIONAL CONFERENCES AND CONVENTIONS

CONFERENCE PRESENTATIONS

“Acute abdominal pain in the Emergency Department of a university hospital in Italy”

Oral presentation, SIMEU Congress, Turin, Italy, 2014

Poster, GREAT Network Congress, Rome, Italy, 2014

“Human neurodevelopmental systems to study the molecular effects of endocrine disruptions”

Poster, ABCD Annual PhD meeting, Salerno, Italy, 2016

Poster, Chromatin and environment Summer School, Spetses, Greece, 2016

“From Cohorts to Molecules: Adverse Impacts of Endocrine Disrupting Mixtures”

Oral presentation, ENABLE 1st European PhD and Postdoc Symposium, Barcelona, Spain, 2017

Poster, EMBO conf. Gene regulatory mechanisms in neural fate decisions, Alicante, Spain, 2017

Flash talk, EMBO Symposium Organoids: Modelling Organ Development and Disease in 3D, Heidelberg, 2018

Poster, 10th International Meeting STEROIDS and NERVOUS SYSTEM, Turin, Italy, 2019

Oral presentation, 17th meeting of the International Neurotoxicology Association. Dusseldorf, Germany, 2019

“Frontiers within. Avataring human lineages for transgenerational epigenomics”

Selected invitation for the Spineto Epigenetics Meeting 22nd-25th March 2018

“Multiplexing induced pluripotent stem cells into chimeric brain organoids to study neurodevelopment”

Oral presentation, Stem cell methods and cell phenotyping approaches for study of neurodevelopmental disorders, MINDDS COST Action Meeting Malta, 2019

Poster, LifeTime Launch Event. Berlin, Germany, 2019

“The transforming impact of human brain organoids for regulatory toxicology: a systematic analysis across mixtures, genetic backgrounds and exposures”

Oral presentation, EDC-MixRisk Conference at European Commission, Brussels, March 2019

Oral presentation, Endpoints Annual Meeting. Paris, February 2020

“De Humani Corporis Fabrica: organoid-based deconvolution of neuropsychiatric disorders at single cell resolution”

Oral presentation as **invited speaker**, 1st Stem Cells and Brain Organoids Training Course and Symposium, University of Lausanne, Switzerland, 2019

Oral presentation, 19a Giornata di Studio sulle Cellule Staminali: in vivo single cell analysis dalla tecnologia alla biologia e medicina, Milan, 2019

“Capturing susceptible windows of transcriptional dysregulation during human cortical development”

Poster, Single Cell Genomics Conference in Djurönäset, Stockholm, Sweden, 2019

“Brain organoids modelling of genetic and environmental impact on neurodevelopmental traits”

Oral Presentation as **invited speaker**, Sex, Gender and Epigenetics: From Molecule to Bedside, Italy, Florence, 2022

Oral Presentation, EpiSyStem: Stem Cell Epigenetics International Conference, Italy, Milan, 2022

Oral Presentation as **invited speaker**, European Congress of Endocrinology, Istanbul, Turkey, 2023

“Infiammazione inquinamento e psicopatologie”

Oral Presentation as **invited speaker**, IV Congresso Internazionale Il Neo-Funzionalismo XX

Convegno Nazionale, Scuola Europea di formazione in Psicoterapia Funzionale. Naples, Italy, 202

ORGANISATION OF SCIENTIFIC MEETINGS

Chief coordinator of the local organising committee for the Enable Scientific Symposium: “EXPLORING LIFE DYNAMICS: In and out of equilibrium” Milan, 2021, Italy.

Youtube video: https://www.youtube.com/watch?v=BArPe_Is5Kc

OUTREACH ACTIVITY

Divulgative video for illustrating patient-derived experimental disease models. 2020

Youtube video: https://www.youtube.com/watch?v=xEChL_xt1aU

Divulgative video for illustrating the main messages of the Science paper: More chemicals, fewer words. 2022

Youtube video: <https://www.youtube.com/watch?v=bJh9c-pyeYo>

Podcast on brain organoids for Darwin Radio

<https://www.radio24.ilsole24ore.com/podcast-originali/darwin/podcast/organoidi-cerebrali--microsatelliti-italiani-160528-2419319459719171>

Video on the research we carry out in the Neurogenomics Research Centre, Human Technophole:

<https://www.raiplay.it/video/2022/06/Via-delle-Storie-3d410b5e-13e5-474b-b959-0aec57b1957e.html>

NATIONAL AND INTERNATIONAL AWARDS AND ACCOLADES FOR RESEARCH ACTIVITY

October 2017: travel grant and short talk award for the 1st European PhD and Postdoc Symposium, ENABLE, Barcelona, Spain.

September 2018: short talk award for the EMBO|EMBL Symposium: Organoids: Modelling Organ Development and Disease in 3D Culture, Heidelberg, Germany.

October-November 2019: selected for the Cajal Advanced Techniques for Synapse Biology course 2019, CAJAL Advanced Neuroscience Training Programme, at the Bordeaux School of Neuroscience in Bordeaux, France.

February 2022: dedicated perspective article on Science about our manuscript on neurodevelopmental impact of endocrine disruptors (Caporale et al., 2022): Liew, Z., & Guo, P. (2022). Human health effects of chemical mixtures. *Science*, 375(6582), 720–721.

May 2022: dedicated article about our manuscript on neurodevelopmental impact of endocrine disruptors (Caporale et al., 2022) on the “Science for Environment Policy” issue 579, 11th May, by European Commission DG. Environment News Alert Service, edited by SCU, The University of the West of England, Bristol.

SCIENTIFIC PRODUCTION

SCIENTIFIC PUBLICATIONS

Research articles:

Caporale, N., Leemans, M., Birgersson, L., Germain, P.-L., Cheroni, C., Borbély, G., Engdahl, E., Lindh, C., Bressan, R. B., Cavallo, F., Chorev, N. E., D'Agostino, G. A., Pollard, S. M., Rigoli, M. T., Tenderini, E., Tobon, A. L., Trattaro, S., Troglia, F., Zanella, M., ... Testa, G. (2022). From cohorts to molecules: Adverse impacts of endocrine disrupting mixtures. **Science**, 375(6582), eabe8244.

Co-first author

Angioni, R., Bonfanti, M., **Caporale**, N., Sánchez-Rodríguez, R., Munari, F., Savino, A., Pasqualato, S., Buratto, D., Pagani, I., Bertoldi, N., Zanon, C., Ferrari, P., Ricciardelli, E., Putaggio, C., Ghezzi, S., Elli, F., Rotta, L., Scardua, A., Weber, J., ... Testa, G. (2023). RAGE engagement by SARS-CoV-2 enables monocyte infection and underlies COVID-19 severity. **Cell Reports. Medicine**, 4(11), 101266.

Co-first author

López-Tobón, A., Shyti, R., Villa, C. E., Cheroni, C., Fuentes-Bravo, P., Trattaro, S., **Caporale**, N., Troglia, F., Tenderini, E., Mihailovich, M., Skaros, A., Gibson, W. T., Cuomo, A., Bonaldi, T., Mercurio, C., Varasi, M., Osborne, L., & Testa, G. (2023). GTF2I dosage regulates neuronal differentiation and social behavior in 7q11.23 neurodevelopmental disorders. **Science Advances**, 9(48), eadh2726.

Cheroni, C., Trattaro, S., **Caporale**, N., López-Tobón, A., Tenderini, E., Sebastiani, S., Troglia, F., Gabriele, M., Bressan, R. B., Pollard, S. M., Gibson, W. T., & Testa, G. (2022). Benchmarking brain organoid recapitulation of fetal corticogenesis. **Translational Psychiatry**, 12(1), 520.

López-Tobón, A., Villa, C. E., Cheroni, C., Trattaro, S., **Caporale**, N., Conforti, P., Iennaco, R., Lachgar, M., Rigoli, M. T., Marcó de la Cruz, B., Lo Riso, P., Tenderini, E., Troglia, F., De Simone, M., Liste-Noya, I., Macino, G., Pagani, M., Cattaneo, E., & Testa, G. (2019). Human Cortical Organoids Expose a Differential Function of GSK3 on Cortical Neurogenesis. **Stem Cell Reports**, 13(5), 847–861.

Caporale, N., Morselli-Labate, A. M., Nardi, E., Cogliandro, R., Cavazza, M., & Stanghellini, V. (2016). Acute abdominal pain in the emergency department of a university hospital in Italy. **United European Gastroenterology Journal**, 4(2), 297–304.

First author

Preprint - Research articles:

Mihailovich, M., Germain, P.-L., Shyti, R., Pozzi, D., Noberini, R., Liu, Y., Aprile, D., Tenderini, E., Troglio, F., Trattaro, S., Fabris, S., Ciptasari, U., Rigoli, M. T., **Caporale**, N., D'Agostino, G., Vitriolo, A., Capocefalo, D., Skaros, A., Franchini, A., ... Testa, G. (2022). 7q11.23 CNV alters protein synthesis and REST-mediated neuronal intrinsic excitability. In **bioRxiv** (p. 2022.10.10.511483). <https://doi.org/10.1101/2022.10.10.511483>

Caporale, N., Castaldi, D., Rigoli, M. T., Cheroni, C., Trattaro, S., Valenti, A., Bonfanti, M., Stucchi, S., Tobon, A. L., Ricca, D., Lessi, M., Pezzali, M., Vitriolo, A., Schmid, K. T., Heinig, M., Theis, F. J., Villa, C. E., & Testa, G. (2023). Multiplexing cortical brain organoids for the longitudinal dissection of developmental traits at single cell resolution. In **bioRxiv** (p. 2023.08.21.553507). <https://doi.org/10.1101/2023.08.21.553507>

Co-first author; Senior author

Review articles:

Cheroni, C., **Caporale**, N., & Testa, G. (2020). Autism spectrum disorder at the crossroad between genes and environment: contributions, convergences, and interactions in ASD developmental pathophysiology. **Molecular Autism**, 11(1), 69.

Co-first author; Co-corresponding author

Drakulic, D., Djurovic, S., Syed, Y. A., Trattaro, S., **Caporale**, N., Falk, A., Ofir, R., Heine, V. M., Chawner, S. J. R. A., Rodriguez-Moreno, A., van den Bree, M. B. M., Testa, G., Petrakis, S., & Harwood, A. J. (2020). Copy number variants (CNVs): a powerful tool for iPSC-based modelling of ASD. **Molecular Autism**, 11(1), 42.

Marangon, D., **Caporale**, N., Boccazzi, M., Abbracchio, M. P., Testa, G., & Lecca, D. (2021). Novel in vitro Experimental Approaches to Study Myelination and Remyelination in the Central Nervous System. **Frontiers in Cellular Neuroscience**, 15, 748849.

News & Views:

Caporale, N., & Testa, G. (2020). COVID-19 lessons from the dish: Dissecting CNS manifestations through brain organoids. **The EMBO Journal**, e107213.

Co-corresponding author

Perspective article:

Rajewsky, N., Almouzni, G., Gorski, S. A., Aerts, S., Amit, I., Bertero, M. G., Bock, C., Bredenoord, A. L., Cavalli, G., Chiocca, S., Clevers, H., De Strooper, B., Eggert, A., Ellenberg, J., Fernández, X. M., Figlerowicz, M., Gasser, S. M., Hubner, N., Kjems, J., ... LifeTime Community Working Groups. (2020). LifeTime and improving European healthcare through cell-based interceptive medicine. **Nature**, 587(7834), 377–386.

BOOK CHAPTERS

Caporale, N., Stucchi, S., Cheroni, C., & Testa, G. (2023). Chapter 23 - Brain organoids modeling of genetic and environmental impact on neurodevelopmental traits. In M. J. Legato, D. Feldberg, & M. Glezerman (Eds.), **Sex, Gender, and Epigenetics** (pp. 281–290). Academic Press.

Co-first author

Lopez-Tobon, A., **Caporale, N.**, Trattaro, S., & Testa, G. (2020). Chapter 11 - Three-dimensional models of human brain development. In E. Meshorer & G. Testa (Eds.), **Stem Cell Epigenetics** (Vol. 17, pp. 257–278). Academic Press.

Caporale, N., & Testa, G. (2019). At the Intersection of Epigenetics and Regeneration: An Analysis of the Experimental Outlook of Organoid Technology. **Epigenetics and Regeneration**. <https://www.sciencedirect.com/science/article/pii/B9780128148792000170>

Co-corresponding author

PEER REVIEW ACTIVITIES

Reviewer for the following peer-reviewed journals and funding agency:

Cell Stem Cells, 2017.

Neuron, 2018.

Translational Psychiatry, 2020.

Stem Cell Report, 2020.

Science, 2021

PNAS, 2022

eLife, 2022

Nature, 2022, 2023

Frontier in Neuroscience, 2023

Cell Reports Medicine, 2023

French National Research Agency. Collaborative Research Projects, 2022

Date

03/01/2024

Place

Milan

Nicola Caporale