PHYSICIAN SCIENTIST
LA MEDICINA INCONTRA LA RICERCA
promosso da: AIRC Fondazione CARIPLO | con il supporto di: IEMM Istituto Europeo di Oncologia Università degli Studi di Milano

2026 Physician Scientist Call

AVAILABLE POSITIONS

Principal Investigator	CONDORELLI GEROLAMA
Institute of Affiliation	Università degli Studi di Napoli "Federico II"
Title of the proposed project:	Aptamer-based liquid biospy on EVs from breast cancer
Short description of the project	Breast cancer progression and therapeutic resistance are strongly influenced by interactions between tumor cells and the surrounding microenvironment. Extracellular vesicles (EVs) are emerging as key mediators of this communication, carrying proteins, nucleic acids, and signaling molecules that promote stromal activation, angiogenesis, immune modulation, and metastatic dissemination. At the same time, EVs released by cancer cells can be detected in body fluids, making them attractive candidates for liquid biopsy applications. This PhD project aims to investigate the biological role of EV-mediated communication in breast cancer and to develop innovative aptamer-based approaches for their detection and therapeutic targeting. The candidate will characterize tumor-derived EVs from breast cancer cell lines and patient samples, identify molecular determinants involved in tumor-stroma crosstalk, and evaluate their functional impact on fibroblasts, endothelial cells, and other components of the tumor microenvironment. A major translational focus of the project will be the development of liquid biopsy strategies based on RNA aptamers capable of selectively recognizing breast cancer-derived EVs in blood samples. By integrating aptamer technology with advanced biosensing platforms, the project aims to establish minimally invasive tools for early cancer detection, molecular stratification of patients, monitoring of treatment response, and identification of disease recurrence. The performance of aptamer-based EV detection will be evaluated in relation to clinical and pathological features and compared with established circulating biomarkers. The project will combine molecular biology, extracellular vesicle profiling, transcriptomic analyses, organoid models, and patient-derived samples to bridge fundamental cancer biology and translational medicine. The expected outcome is the identification of novel EV-associated biomarkers and the development of innovative diagnostic and therapeutic strategies for precision oncology.
Main research area for the project	Cancer biology
5 key words for the project	Tumor-stroma interaction, Breast ca., Exosomes and/or endogenous microvescicles, Cancer-associated fibroblasts

LAB INFO	
Main topic/s of the lab	Molecular mechanisms of breast cancer progression, extracellular vesicle-mediated tumor microenvironment communication, liquid biopsy, and RNA aptamer-based precision oncology.

Short description of the lab activity	The PhD student will join a multidisciplinary research team investigating the molecular mechanisms underlying breast cancer progression and therapeutic resistance, with a particular focus on extracellular vesicle (EV)-mediated communication within the tumor microenvironment. The project aims to understand how tumor-derived EVs influence stromal and endothelial cells and how these interactions contribute to cancer progression, metastatic dissemination, and response to therapy. The student will be trained in a broad range of experimental techniques commonly used in molecular and translational oncology. Laboratory activities will include mammalian cell culture, generation and characterization of extracellular vesicles, EV isolation from biological fluids, RNA and protein analyses, quantitative PCR, Western blotting, flow cytometry, fluorescence and confocal microscopy, functional assays, and molecular biology approaches for the study of cancer-related signaling pathways. Training will also include the use of advanced technologies for EV profiling and characterization. A major component of the project will focus on the development of RNA aptamer-based strategies for both cancer diagnosis and targeted therapy. The student will investigate the use of aptamers as highly selective molecular probes capable of recognizing breast cancer-derived EVs and interfering with tumor-promoting signaling pathways. Particular attention will be devoted to the development of innovative liquid biopsy approaches aimed at improving cancer detection, patient stratification, treatment monitoring, and early identification of disease recurrence. The project has a strong translational component based on the analysis of clinical samples obtained through collaborations with breast cancer and oncology units. Longitudinal serum samples collected from breast cancer patients undergoing chemotherapy and targeted treatments will be analyzed to monitor dynamic changes in circulating extracellular vesicles over time. The student will evaluate whether EV-associated biomarkers and aptamer-based detection strategies correlate with treatment response, minimal residual disease, disease progression, and recurrence. These studies may contribute to the identification of novel biomarkers of therapeutic efficacy and resistance and support the development of personalized medicine approaches. Depending on project progression, the student may also be involved in transcriptomic analyses, bioinformatic interpretation of omics datasets, three-dimensional organoid cultures, patient-derived models, and preclinical in vivo studies. The laboratory offers a highly collaborative and international environment with expertise in cancer biology, extracellular vesicle research, aptamer development, and translational oncology. The student will actively participate in experimental design, data analysis, manuscript preparation, and presentation of results at national and international scientific meetings.
Recent bibliography	- Identification of a novel RNA aptamer that selectively targets breast cancer exosomes. MOL THER-NUCL ACIDS 2021 Mar; 23: 982

	- MCT4-driven CAF-mediated metabolic reprogramming in breast cancer microenvironment is a vulnerability targetable by miR-425-5p. CELL DEATH DISCOV 2024 Mar; 10: 140 - Extracellular vesicles and microRNAs in cancer progression. ADV CLIN CHEM 2025; 125: 23 - Ex.50.T aptamer impairs tumor-stroma cross-talk in breast cancer by targeting gremlin-1. CELL DEATH DISCOV 2025 Mar; 11: 94 - Fibroblasts activated by miRs-185-5p, miR-652-5p, and miR-1246 shape the tumor microenvironment in triple-negative breast cancer via PATZ1 downregulation. CELL MOL LIFE SCI 2025 Jul; 82: 287
Group composition	Full professor: PI Senior scientist - PA CNR reserach associate 1 post - doct 2 Phd students (3th year) 1 PhD student (2 year) 1 PhD student (1 year)
Institutional page link	https://www.mmbm.unina.it/