UNIVERSITÀ DEGLI STUDI DI PALERMO

Dottorato di Ricerca in Biomedicina, Neuroscienze e Diagnostica avanzata

Convegno

# MICROAMBIENTE E ORGANOIDI TUMORALI: NUOVE FRONTIERE NELLA RICERCA MORFOLOGICA

**Palermo, venerdì 14 novembre 2025, ore 9:30-12:00**

***Aula "Enzo Nesci"***

***Istituto di Anatomia umana e Istologia, Dipartimento BIND***

## INVITED SPEAKERS:

**VIRGINIA TIRINO, FULL PROFESSOR OF HISTOLOGY AND HUMAN EMBRYOLOGY, UNIVERSITY OF CAMPANIA "L. VANVITELLI"**

**FEDERICA PAPACCIO, ASSOCIATE PROFESSOR OF HISTOLOGY AND HUMAN EMBRYOLOGY, UNIVERSITY OF SALERNO**

**CELESTE CARUSO BAVISOTTO, ASSOCIATE PROFESSOR OF HUMAN ANATOMY, UNIVERSITY OF PALERMO**

**IN COLLABORAZIONE CON:** SOCIETÀ ITALIANA DI BIOLOGIA SPERIMENTALE SIBS 1925

**Università degli Studi di Palermo**

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## *PROGRAMMA E ALTRE INFORMAZIONI UTILI*

Ore 9:30: Saluti e presentazione della giornata

*Fabio Bucchieri, Direttore Istituto di Anatomia umana e Istologia*

*Francesco Cappello, Presidente SIBS*

*Filippo Macaluso, Coordinatore Dottorato di Ricerca in BiND*

Ore 9:45: Prima lettura

**Tumour microenvironment: mitochondrial transfer in breast cancer**

*Virginia Tirino*

Full Professor of Histology and Human Embryology, University of Campania "L. Vanvitelli".

Ore 10:30: Seconda lettura

**Patient-derived organoids for precision oncology**

*Federica Papaccio*

Associate Professor of Histology and Human Embryology, University of Salerno

Ore 11:15: Terza lettura

**Glioblastoma organoid technology: decoding the c-kit/Hsp90 pathway and paving the way for targeted therapies**

*Celeste Caruso Bavisotto*

Associate Professor of Human Anatomy, University of Palermo

Ore 12:00: Discussione e conclusioni

## Tumour microenvironment: mitochondrial transfer in breast cancer


### Abstract

Breast cancer (BC) is a highly heterogeneous disease in which not only genetic and molecular features but also the surrounding tumor microenvironment (TME) critically influence tumor behavior and therapeutic response. Within the TME, adipose-derived stem cells (ASCs) establish a dynamic cross-talk with cancer cells, contributing to tumor progression and drug resistance. Emerging evidence indicates that mitochondrial transfer (MT) represents a fundamental mechanism of intercellular communication, through which ASCs can donate functional mitochondria to breast cancer cells. This exchange reprograms cancer cell metabolism toward oxidative phosphorylation, enhances ATP production, and promotes survival under stress conditions such as hypoxia or chemotherapy. The acquisition of ASC-derived mitochondria has been associated with reduced hypoxia-inducible signaling and increased expression of drug-efflux transporters, ultimately sustaining multidrug resistance. These findings highlight MT as a novel determinant of tumor metabolic plasticity and therapeutic escape. Understanding the biological significance of MT in the tumor microenvironment opens new perspectives for targeting metabolic cooperation between stromal and cancer cells. Inhibiting mitochondrial transfer from ASCs to breast cancer cells may thus represent a promising and previously unexplored strategy to counteract therapy resistance and improve clinical outcomes in breast cancer patients.


### Virginia Tirino Biosketch


Virginia Tirino, PhD, Full Professor of Human Histology and Embryology Department of Experimental Medicine, University of Campania “L. Vanvitelli” Senior Biologist, Unit of Cytometric and Mutational Diagnostics, University Hospital “L. Vanvitelli”


Education

PhD in Biomedical Technologies applied to Dental Sciences, University of Campania “L. Vanvitelli”, 2006–2009. Thesis: “Identification and characterization of cancer stem cells in solid mesenchymal tumors” (Excellent). Degree in Biological Sciences, University of Naples Federico II, 2004–2005.

Professional Experience

Research and teaching roles in Histology, Embryology, and Stem Cell Biology since 2005. Appointed Full Professor (2023), previously Associate Professor (2018) and Researcher (2014) at the University of Campania “L. Vanvitelli”. Senior Biologist (2015–present) at the University Hospital, managing immunophenotyping and mutational analysis of hematologic and solid tumors.

Research Interests

Stem cell biology: isolation and characterization of mesenchymal stem cells from adipose tissue, dental pulp, and follicle; differentiation into osteogenic, adipogenic, and angiogenic lineages. Cancer stem cells: identification, characterization, and functional studies in mesenchymal and epithelial tumors. Tumor microenvironment and intercellular interactions, including mitochondrial transfer between stem cells and cancer cells. Epigenetic modulation of osteogenic differentiation using histone deacetylase inhibitors. Over 50 peer-reviewed papers in journals including Cancers, iScience, Journal of Experimental & Clinical Cancer Research, and Cell Death & Disease. Recent works focus on mitochondrial transfer in cancer progression, cancer stem cell characterization, and innovative therapeutic approaches.

Academic and Teaching Activities

Lecturer in Histology, Embryology, and Cytometry for Medical, Dental, and Biomedical Laboratory programs. Member of PhD Board in Biochemical Sciences and Biotechnology since 2013, supervising doctoral research in stem cell biology and advanced molecular methods. Coordinator and invited speaker for multiple national and international conferences on cytometry and oncology.

## Patient-derived organoids for precision oncology.

### Abstract

Precision medicine approaches for solid tumors are mainly based on genomics. Its employment in clinical trials has led to somewhat underwhelming results, except for single responses. Moreover, several factors can influence the response, such as gene and protein expression, the coexistence of different genomic alterations or post-transcriptional/translational modifications, the impact of tumor microenvironment, etc., therefore making it insufficient to employ a genomics-only approach to predict response. Recently, the implementation of patient-derived organoids (PDOs) has shed light on the possibility to use them to predict patient response to drug treatment. This could offer for the first time the possibility to move precision medicine to a functional environment. PDOs are 3D primary cultures that were shown to reproduce patient's tumor characteristics. Several reports indicated that PDOs can replicate patient's response to a given drug; therefore, they are one of the most promising tools for functional precision medicine.

### Federica Papaccio Biosketch

Federica Papaccio graduated summa cum laude in Medicine and Surgery at the University of Campania "L. Vanvitelli" and specialized summa cum laude in Medical Oncology at the same University. After being awarded of the ESMO Translational Research Fellowship, she joined the research team of prof. Andres Cervantes at the INCLIVA Biomedical Research Institute in Valencia, Spain, where, together with Dr Josefa Castillo developed a platform for the generation, characterization and drug screening of patient-derived organoids from gastrointestinal cancer patients. In 2020 she took the position of associate professor of Histology and Human Embryology at the University of Salerno. Her main current research interest is the integration of PDOs with non-cancer cells for the study of tumor microenvironment, with a particular focus on mitochondrial transfer.

## Glioblastoma organoid technology: decoding the c-kit/Hsp90 pathway and paving the way for targeted therapies

### Abstract

Glioblastoma (GBM) represents one of the most lethal primary brain tumors, whose aggressiveness is sustained by the coexistence of distinct cellular subpopulations within specialized tumor niches. Understanding the morphological and molecular features of these microenvironments is essential to elucidate the mechanisms underlying tumor progression and therapeutic resistance. Patient-derived 3D organoid models have emerged as valuable tools to reproduce the structural complexity and heterogeneity of GBM more faithfully than conventional cultures. Current research activities are focused on dissecting the c-kit/Hsp90 signaling pathway as a potential driver of malignancy and a promising therapeutic target. In parallel, efforts are dedicated to the optimization of scaffold-based culture systems to enhance spatial organization and to the exploration of strategies for targeted therapy. Overall, these studies aim to establish reliable experimental models and contribute to the development of precision medicine approaches for glioblastoma.

### Celeste Caruso Bavisotto Biosketch

Celeste Caruso Bavisotto, Ph.D., serves as Associate Professor of Human Anatomy (BIO/16 – BIOS 12/A) at the Department of Biomedicine, Neurosciences and Advanced Diagnostics, University of Palermo, Italy.

Education. Obtained M.Sc. in Medical Biotechnology from Sapienza University of Rome (2012, cum laude) and completed a Ph.D. in Biomedicine and Neuroscience (Human Anatomy) at the University of Palermo in 2016, with research focused on the expression and localization of the molecular chaperone Hsp60 in bronchial culture models.

Professional Experience. Following postdoctoral research in human anatomy was appointed tenure-track researcher in 2022 and Associate Professor in 2025. International training includes research periods at the University of Valencia (Spain), specializing in extracellular vesicle isolation and electron microscopy, and at the Medical University of Gdańsk (Poland) for advanced anatomical dissection. Currently leads the PRIN PNRR “Exandroid” project, aimed at developing patient-derived 3D glioblastoma models for extracellular vesicle–based drug delivery applications.

Research Interests. Research activity focuses on the cellular and molecular anatomy of stress responses, with particular attention to heat shock proteins (HSPs) and extracellular vesicles (EVs) in cancer, neurodegenerative, and inflammatory diseases. Additional expertise includes the development of 3D and organ-on-chip glioblastoma models to investigate several pathways and novel therapeutic approaches based on vesicle-driven delivery systems.

Academic and Teaching Activities. Engaged in teaching Human Anatomy in Medicine, Biomedical Engineering, and Health Professions programs. Serves as member of the Ph.D. Board in Biomedicine and Neuroscience. Involved in editorial activities for international scientific journals and active member of several scientific societies.