

DMSC

DEPARTMENT OF EXPERIMENTAL AND CLINICAL MEDICINE



MAGAZINE

Promoting Research, Sharing Innovation

A space to highlight the scientific excellence of the Department of Experimental and Clinical Medicine and to showcase its research activities nationally and internationally

Neurons "built" in the laboratory reveal the first signs of PSP-RS: when axons are damaged even before cell death

Progressive supranuclear palsy, Richardson variant (PSP-RS), is a neurodegenerative disease caused by the abnormal accumulation of the Tau protein in neurons. It has long been suspected that damage to the components responsible for transmitting the electrical signal in neurons, the axons, is not just a late consequence of the disease, but may appear much earlier and perhaps help trigger it. In a study published in April 2026 in the journal *Cells* (<https://doi.org/10.3390/cells15090754>), researchers at the Stem Cell Biology Laboratory addressed this problem starting from a valuable source: blood cells from patients with sporadic PSP-RS reprogrammed to become induced pluripotent stem cells (iPSCs).

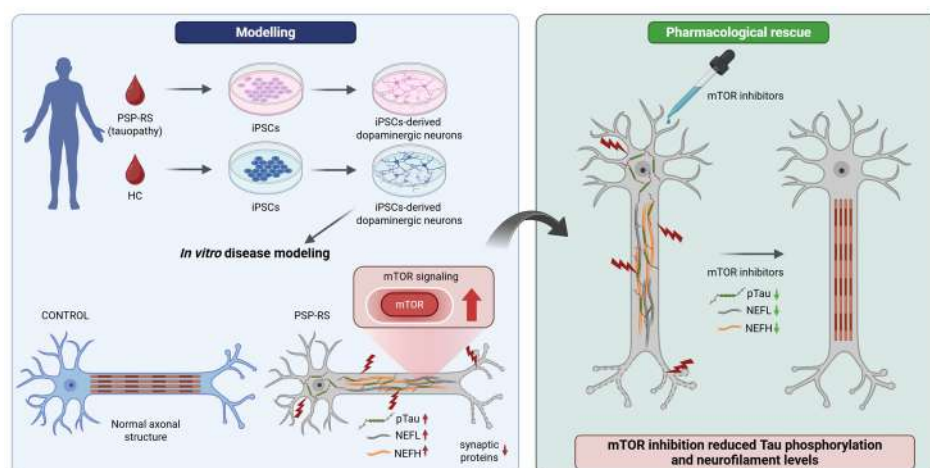


Gruppo di ricerca di Biologia delle Cellule Staminali

By differentiating these cells, the group "recreated in the laboratory" dopaminergic neurons, the same type of cells that degenerate into this disease, comparing them with neurons obtained from healthy people. By analyzing which genes and proteins were active in these cells, the researchers observed that neurons derived from PSP-RS patients progressively turn off the programs that make them dopaminergic and functional from a synaptic point of view, while turning on pathways related to cellular stress and the reorganization of their internal skeleton (the cytoskeleton).

In parallel, the Tau protein accumulates in hyperphosphorylated form, i.e. pathologically modified, and neurofilaments, structural proteins that alter their normal architecture, also accumulate inside the axons. The result is an axon that is damaged early, well before the neurons die. An important piece of the research concerns mTOR, a cell signaling pathway that regulates the growth and survival of neurons. In PSP-RS neurons, this pathway is overactive, and by blocking it pharmacologically, the researchers were able to reduce both the pathological phosphorylation of Tau and the accumulation of neurofilaments. This suggests that mTOR is not the trigger of the disease, but rather acts as an "amplifier" that feeds and maintains the axonal damage already underway. This work therefore provides an innovative human cellular model to study the earliest stages of PSP-RS, even before neurons die, and opens up new therapeutic perspectives aimed at protecting axon health. The study was coordinated by Profs. Giovanni Cuda (DMSC) and Elvira I. Parrotta (DSMC), and sees PhD students Raffaele Covello (DMSC) and Giorgia L. Benedetto (DSMC) as first authors. The corresponding author of the study is researcher Stefania Scalise (DMSC).

Stefania Scalise



Graphical abstract

Covello R, Benedetto GL, Scalise S, et al. Cytoskeletal Imbalance and Axonal Vulnerability in Sporadic PSP-RS: Early Changes in a Human iPSC-Derived Neuronal Model with Altered mTOR Signaling.

Breakthrough on Ménière's disease: more than 370 altered proteins discovered in the blood

The discovery opens the door to more precise diagnoses of Ménière's disease by blood sampling and personalized therapies

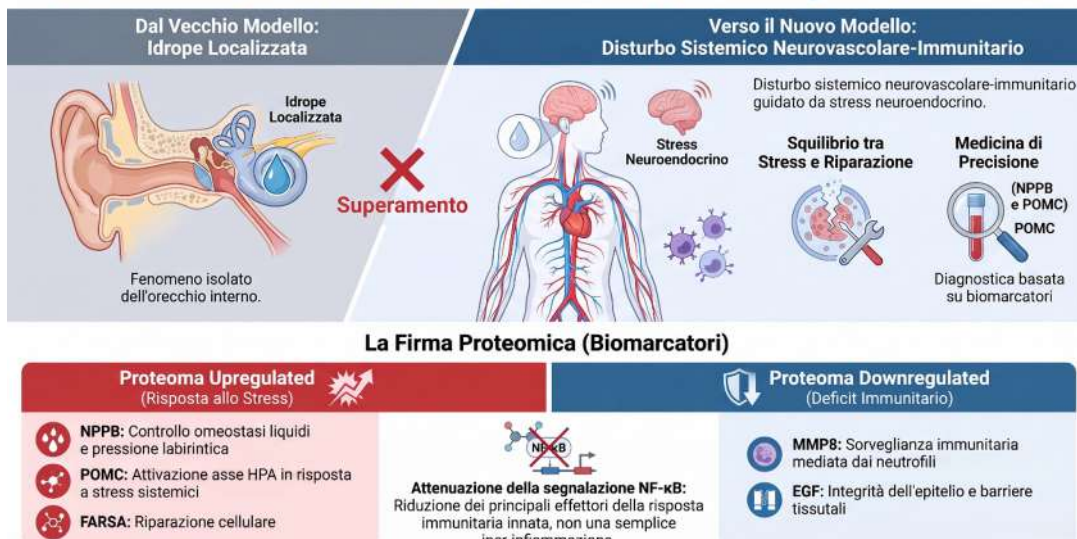
Those who suffer from Meniere's disease know all too well the disabling impact of this disease: sudden vertiginous crises, tormenting tinnitus, a feeling of full ear and progressive hearing loss. Until now, the main culprit of the disease has always been endolymphatic hydrops (an accumulation of fluid in the inner ear). However, this anatomical alteration alone has never been enough to explain why symptoms vary so much from person to person, nor why the disease evolves in such different ways. Today, scientific research promises to radically change the understanding and therapeutic approach to this condition. Technology at the service of medicine: the proteomic study. The paradigm shift comes from a study led by researchers Chiarella, Cuda, Parrotta and colleagues, published in the prestigious international journal *Otology & Neurotology*. The team analyzed the serum of 28 patients with a definite diagnosis of Meniere's disease, comparing it with that of 30 healthy subjects. To do this, the scientists used the latest technology for high-throughput analysis: the Olink Explore HT platform, capable of simultaneously sieving and quantifying more than 5,400 proteins in the blood. After strict quality controls on the samples, the researchers' attention focused on 1,037 proteins.

The results revealed a complex systemic "molecular signature": as many as 376 proteins were altered in the patients with Ménière's compared to the control group.

Well, 92 proteins have increased: among these, biological mediators (such as NPPB, POMC, CCK, BMP6) directly involved in the regulation of body fluids, in the response of the neuroendocrine system to stress and in the control of blood vessels stand out. 284 reduced proteins: the deficiency of molecules such as MMP8, OLFM4 and EGF, on the other hand, indicates an alteration in immune surveillance, neutrophil function and the body's natural ability to repair tissues. This protein imbalance shows that Meniere's disease should no longer be considered exclusively as an isolated disease of the inner ear. On the contrary, it is a systemic disorder in which interactions between the nervous system, the vascular system, and the immune defenses play a key role. The proteins identified represent potential "biomarkers", i.e. indicators that in the future could allow doctors to diagnose the disease with a simple blood test, stratify patients according to their specific molecular profile and develop personalized treatments. The next step in the research involves initiating large-scale studies to monitor how these biomarkers fluctuate over time, particularly during the crucial transition between remission phases and acute attacks of vertigo.

Giuseppe Chiarella

La Malattia di Ménière: Verso un Nuovo Paradigma Sistemico



From Calabria to Philadelphia: UMG's research against aggressive lymphomas takes the stage at AACR 2026

There is a direct line that connects the 2018 Nobel Prize in Chemistry to the latest frontiers in the fight against blood cancers, and passes directly through the laboratories of the Magna Graecia University of Catanzaro (UMG). Within the Immunology Laboratory of the Department of Experimental and Clinical Medicine (DMSC), phage display technology is a well-established pillar dedicated to the discovery of selective ligands targeting the tumor. Conducted under the leadership of Professor Enrico Iaccino, it is tackling some of the most complex hematological malignancies. The study focuses on the identification of smart peptides capable of recognizing the BCMA receptor in aggressive lymphomas with plasmablastic differentiation, including plasmablastic lymphoma and specific variants of diffuse large B-cell lymphoma (DLBCL). Characterized by aggressive biological behavior and a poor prognosis, patients currently face severely limited treatment options.

While the BCMA receptor is frequently expressed on the surface of these cancer cells, strategies targeting it remain largely unexplored. Instead of screening "hunter" peptides against artificial recombinant proteins in test tubes, the Catanzaro research team uses a differential biopanning strategy directly on the conformation of the receptor as it is anchored to cell membranes. This overcomes the limitations of the soluble target and reduces the risk of the drug being "intercepted" by the BCMA circulating in the bloodstream. Computational analyses demonstrated stable interaction with an accessible region. In addition, flow cytometry data confirmed that the peptide scaffold binds precisely to BCMA+ cell models (including lymphomas and multiple myeloma), showing binding intensity that mirrors receptor surface expression levels.

The team's results were presented in poster form in Philadelphia, at the prestigious joint conference between the American Association for Cancer Research (AACR) and the International Conference on Malignant Lymphoma (ICML): "Advances in Malignant Lymphoma: From Discovery to Clinical Impact". The scientific program offered a comprehensive overview of cutting-edge research in lymphomas, with lectures by experts such as Prof. Margaret Shipp (Dana-Farber Cancer Institute) on genetic signatures in aggressive lymphomas, and conference co-chair Prof. Francesco Bertoni on the mechanisms of resistance to BTK degraders.

Elisabetta Pingitore



"Participating in these global spaces is how research really grows," the UMG team reflected on their return. "We return from Philadelphia with a deep awareness: the true value of science is multiplied when it is shared with the global community."

Ferroptosis in ovarian cancer: the role of cellular metabolism in modulating the immune response

In recent years, the study of the metabolic alterations that characterize cancer cells has opened up new therapeutic perspectives. Among the biological processes at the center of scientific interest today is ferroptosis, a form of regulated cell death dependent on iron and oxidative stress, considered a potential therapeutic target in several cancers. More and more evidence indicates that the induction of ferroptosis by specific ferroptosis inducers (FINs) can influence not only the survival of neoplastic cells, but also their interaction with the immune system. Understanding the mechanisms underlying this process is therefore a fundamental step for the development of new therapeutic strategies. The study, published in 2026 in the journal *Frontiers in Bioscience-Landmark*, was conducted by Dr. Cinzia Garofalo at the Laboratory of Biochemistry and Cell Biology of the Magna Græcia University of Catanzaro, coordinated by Prof. Concetta Maria Faniello. The results of the research were also presented during the Puglia-Basilicata-Calabria Section Meeting of the Italian Society of Biochemistry and Molecular Biology (SIB), held in Catanzaro on 28 and 29 November 2025.

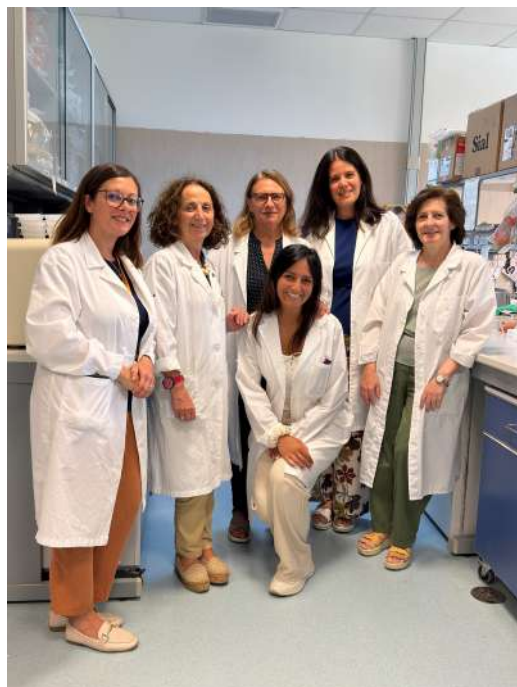
The research investigated the role of ferroptosis in the regulation of the immune response mediated by Natural Killer (NK) lymphocytes in High-Grade Serous Ovarian Cancer (HGSOC), one of the most aggressive forms of ovarian cancer and still associated with important therapeutic limitations in advanced stages.

To evaluate the role of ferroptosis as a possible mechanism capable of influencing the immune response in ovarian cancer, tumor cells were treated with RSL3, an inducer of ferroptosis, and its cellular and molecular effects were analyzed. Assays were then performed to confirm the activation of the ferroptotic process and to evaluate the phenotypic changes induced by the treatment, as well as their impact on recognition by NK lymphocytes.

The results showed that the induction of ferroptosis did not result in a uniform increase in the sensitivity of tumor cells to the action of NK lymphocytes. Some cell lines showed a greater susceptibility to immune recognition following treatment, while others showed smaller changes or a different response. These data underline the complexity of the relationship between cellular metabolism and immunity and confirm the high biological heterogeneity that characterizes ovarian cancer.

Overall, the work contributes to expanding knowledge on the mechanisms linking the metabolism of cancer cells to the immune response and provides new evidence on the role of ferroptosis in ovarian cancer. These results open up new perspectives for the study of the interactions between ferroptosis and immune response, with possible implications for the development of innovative therapeutic strategies in ovarian cancer.

Cinzia Garofalo



Surgery enters the Metaverse: the medicine of the future in an international study

The journal AME Surgical Journal publishes a review on the clinical applications of virtual and augmented reality. Among the authors, a NATO field medicine expert.

The future of medicine passes through digital worlds. The study "Applications of the metaverse in medicine and surgery: a mini-review" analyzes the use of the Metaverse in clinical settings between 2023 and 2025, demonstrating how virtual reality can break down distances to save lives.

A global team and the support of field medicine. The research, coordinated by Prof. Michele Ammendola of the University of Catanzaro "Magna Graecia", is the result of an international network. Among the co-authors is Prof. Mansoor Khan, Surgeon Commander of the Royal Navy and NATO expert with over 20 years of service in conflict zones (including Afghanistan and the Gulf). His presence highlights the value of these technologies in extreme and isolated emergency scenarios.

From tele-mentoring to satellite rescue. Using the SPATIAL VR platform, researchers recreated a digital hospital environment for clinicians from around the world to collaborate in real-time. Successful applications include: Remote surgery: Laparoscopic and robotic procedures remotely guided via tele-mentoring. Immersive consultations: Digital pathology case sharing and global interactive workshops. Extreme emergencies: In-flight medical consultations and SOS rescue simulations via satellite for ships or isolated areas.

Safety and efficacy. The clinical analysis did not record any adverse events for patients. Compared to traditional systems, the Metaverse allows multiple functions to be performed simultaneously, offering doctors a real perception of presence. Although further confirmation is needed, immersive virtual environments are confirmed as concrete tools for optimizing global surgery.

Ammendola M, Vescio F, Curcio S, De Luca GM, Luposella M, de'Angelis N, Bollino C, Rizzuto A, Mazzotta AD, Memeo R, Moazin M, Khan M, Anania G, Gumbs AA, Testini M, Walsh RM, Al Ansari M. Applications of the metaverse in medicine and surgery: a mini-review. AME Surg J 2026;6:24. doi: 10.21037/asj-25-82



The newly elected ISDS councilor and President of the Education Committee, Prof. Michele Ammendola, together with the delegation and members of the international board on the occasion of the 51st World Congress of Surgery held in Mexico City.

Prestigious international recognition for Italian surgery: Prof. Michele Ammendola elected to the top of the ISDS

Great success for medicine and medical research in our country on the occasion of the 51st World Congress of Surgery / International Surgery Week, held in Mexico City from 26 to 30 April 2026. The important scientific event on a global scale was jointly organized by the International Society of Surgery (ISS), the Mexican Association of Endoscopic Surgery (AMCE) and the International Society for Digestive Surgery (ISDS). During the congress, Professor Michele Ammendola, current Acting Director of the Digestive System Surgery Unit, obtained a double and prestigious international position. The professor was in fact officially appointed as the new advisor of the ISDS and, at the same time, assumed the position of President of the Education Committee of the same scientific society. This recognition rewards excellence and commitment in the field of surgery of the digestive system, bringing Italian clinical and teaching experience into the main decision-making and training tables of the international surgical community.

Michele Ammendola

Clinical research in cardiac surgery: new perspectives

In the contemporary medical research landscape, the increasing complexity of cardiovascular diseases requires a multidisciplinary approach capable of integrating basic research, translational research and clinical applications.

In this context, the research group led by Prof. Giuseppe Santarpino has developed over the years an articulated and innovative scientific program, aimed at understanding the pathophysiological mechanisms of cardiovascular diseases and identifying new diagnostic and therapeutic strategies. This article aims to offer an overview of the main lines of research developed by the group with the results obtained in the first 6 months of 2026.

Through the study "Omega-3 PUFAs reduce inflammation by targeting NRF2 and NF- κ B activity in an ex vivo model of cardiac mature adipocytes and adipose derived stem cells from atherosclerotic patients" in collaboration with the CNR of Lecce published in February of this year, inflammation and oxidative stress in the cardiovascular microenvironment were evaluated with ex vivo models of mature adipocytes and stem cells derived from cardiac adipose tissue, and it was demonstrated that omega-3 polyunsaturated fatty acids are able to modulate NF- κ B and NRF2 signaling pathways, reducing the inflammatory response and enhancing antioxidant mechanisms. These results have helped to clarify the role of epicardial adipose tissue in the progression of atherosclerosis, identifying potential therapeutic targets for the prevention of cardiovascular complications.

At the same time, both the technological and clinical aspects of cardiac prostheses were addressed, with the article "Mechanical heart valves: an idea from the past looking to the future" published in the Journal of Thrombosis and Haemostasis in March 2026. The review dedicated to mechanical heart valves critically analyzed the evolution of materials, design and production methods, highlighting the prospects offered by innovative biomaterials, fluid dynamic modeling and additive manufacturing to improve biocompatibility, durability and safety of prostheses. It should be added that thanks to this article our team has made contacts for new projects with the cardiac surgeries in Stockholm and Zurich.

We were also the coordinating center/international research group leader of the study "Sex-Related Outcome After Sutureless Aortic Valve Replacement With Perceval Plus: Results From a Global Registry and Meta-Regression" (Interdiscip Cardiovasc Thorac Surg June 2026) obtaining results on the Perceval Plus sutureless valve that demonstrated how this technology guarantees favorable and comparable results in both men and women. The study also underlines the value of international registries as tools for identifying prognostic factors and guiding increasingly personalized therapeutic strategies, in line with the principles of precision medicine.

The group's interest also extends to the optimization of the perioperative pathway through multidisciplinary prehabilitation programs, which integrate functional assessment, physical and respiratory exercise, nutritional support, immunonutrition, and psychological support before cardiac surgery. This approach, conducted in the team's pilot study, in which Dr. Prencipe Chiara Maria and Dr. Veronica D'Anna and Dr. Giulia Palisi cooperated, with a protocol entitled "Prehabilitation clinic in cardiac surgery: multidisciplinary protocol for the improvement of postoperative outcomes" published in the Journal of Cardiothoracic Surgery in April 2026, the results of which will be presented at the 40th EACTS Annual Meeting in Barcelona, next October. The pilot study, the subject of Dr. Chiara Maria Prencipe's experimental thesis in medicine and surgery, demonstrated the potential to reduce postoperative complications, accelerate functional recovery, reduce the number of hours of intubation, decrease the length of stay in intensive care and improve the quality of life of patients, confirming how multidisciplinary preoperative preparation represents a fundamental element of modern cardiac surgical care.

This integration of experimental research, multicenter clinical trials and organizational innovation represents the distinctive feature of the group's activity, oriented towards the continuous improvement of the quality of care and the development of increasingly personalized, safe and effective cardiac surgery. The interest in the evaluation of long-term outcomes is the rationale of the LIMIT study, a randomized phase III multicenter trial conducted in patients with bileaflet mechanical aortic valve prosthesis.

The study protocol involves the comparison between a low-intensity anticoagulation strategy, defined by a therapeutic range of INR between 1.5 and 2.5, and conventional anticoagulant therapy, based on the INR targets recommended by current guidelines. The primary objective is to assess whether the reduction in anticoagulation intensity is associated with a decrease in the incidence of major bleeding events, without leading to an increased risk of thromboembolic complications. Our research group enrolled 16 patients in the first 6 months of 2026, becoming the first enrolling center in Italy and one of the first in Europe. On April 11, 2026, we organized a consensus conference that brought together a panel of twelve Italian cardiac surgery experts with the aim of developing a consensus statement on minimally invasive cardiac surgery (MICS). Despite the increasing diffusion of this approach in clinical practice, the definition of MICS remains heterogeneous and is applied unevenly in different care and research contexts. This lack of standardization limits the comparability of results reported in the literature and can influence clinical decision-making.

The aim of the initiative was to develop a shared and clinically relevant definition of MICS, based on expert consensus, as well as to identify the fundamental elements for its implementation in clinical practice and research. In addition to Professor Santarpino, Dr. Pierluigi Ronzulli took part in the work, contributing to the review of the scientific literature and the critical analysis of the available evidence, basing the work of his degree thesis in medicine and surgery on this line of research. The methodological basis for the formulation of the main consensus statements was formulated.

In addition, the team has outlined a research protocol for an innovative study, conceived by Dr. Giulia Palisi, which integrates personalized diet plans with a controlled amount of Vit. K in patients with unstable INR. The rationale for this study finds its origin in evidence where patients with unstable INR values had a variable intake of Vit. K.

In summary, the research methods developed, from preclinical to clinical, have borne fruit in these first six months of 2026, and have reseeded for future results to be harvested in the second half of the year.

Giuseppe Santarpino



Degree in Medicine and Surgery - 9 July 2026 - UMG, Catanzaro - Dr. Chiara Maria Principe, Prof. Giuseppe Santarpino, Dr. Maria Gallo, Dr. Pierluigi Ronzulli, Dr. Giuseppe Greni

Biocides, antimicrobial resistance and pesticides in the home: research lines of DMSC veterinary toxicology in a One Health perspective

In the first half of 2026, a series of scientific contributions in the field of veterinary toxicology consolidated a DMSC research line dedicated to chemical risk assessment from a One Health perspective. The common thread is the overcoming of a sectoral vision of risk, limited to a single molecule or species, in favor of an integrated model capable of reading the environment, animals and human health together.

A first axis concerns the relationship between biocides, pesticides and antimicrobial resistance (AMR). The study published in *Environmental Toxicology and Pharmacology* proposes the original concept of "molecular mimicry in the agroecosystem". This interpretative key suggests that some residues of pesticides and substances with biocidal action may interact with environmental microbial systems not only as chemical contaminants, but also as selective pressures capable of favoring the emergence or maintenance of antimicrobial resistance phenotypes. In this perspective, AMR is not considered exclusively as a consequence of the direct use of antibiotics, but also as a possible outcome of chronic, sublethal and multifactorial environmental exposures.

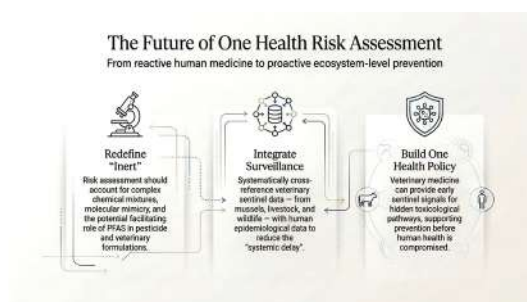
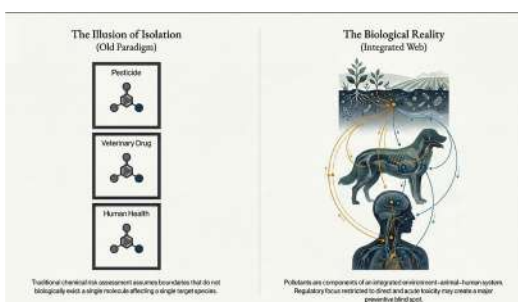
A second axis concerns the role of animals as sentinels of environmental risk. The work published in *Veterinaria Italiana* analyzes the evidence on the contribution of domestic, farm and wild animals in the early detection of contamination, bioaccumulation and ecotoxicological alterations.

Animals can show signs of exposure and damage before these phenomena become fully evident in the human population, thus helping to reduce the systemic delay in health prevention.

A third area of research concerns pesticides and pesticides used in the home on companion animals. The article published in the *Journal of Toxicology* proposes centripetal axonal transport as a potential access route to the central nervous system (CNS) for some molecules for veterinary use. This approach frames possible neuroanatomical pathways of penetration and distribution from the periphery to the CNS, complementary to the evaluation of the blood-brain barrier alone, with particular attention to the most vulnerable age groups and the possible facilitating role of PFAS. Finally, the article published in *Toxicology Letters* explores the use of permethrin in companion animals, integrating mechanistic neurotoxicity, skin pharmacokinetics and secondary exposure pathways.

Overall, these studies outline a common trajectory: redefining chemical risk as an integrated process, capable of considering complex mixtures, emerging contaminants, domestic exposures and sentinel signals in animals. Veterinary toxicology is confirmed as a tool for anticipating risks, linking environmental and health data, and contributing to the construction of prevention-oriented One Health policies.

Domenico Britti



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European Speech Therapy Day 2026

Speech therapy and Artificial Intelligence: more accessible, continuous and personalized care

Between the natural history of the voice and Artificial Intelligence: at the Magna Graecia University an interdisciplinary discussion on speech therapy that puts technological innovation at the service of human relationships and therapeutic alliances.

On the occasion of the European Day of Speech Therapy 2026, the "Salvatore Venuta" University Campus in Catanzaro hosted the study day entitled "Speech therapy and Artificial Intelligence: more accessible, continuous and personalized care". The meeting, strongly desired by the new President of the Degree Course in Speech Therapy, Prof. Pasquale Viola, took place on March 6 and recorded an important participation of the student community and professionals in the sector, confirming itself as a fundamental moment of interdisciplinary comparison between research, health professions and technological innovation.

The initiative was held under the patronage of the Italian Federation of Speech Therapists (FLI), the TSRM-PSTRP Order of Catanzaro, Crotone and Vibo Valentia, and the Italian section of the International Society for Augmentative and Alternative Communication (ISAAC Italy), also seeing the direct involvement of the Audiology, Phoniatics and Vestibology Unit of the "Renato Dulbecco" University Hospital.

Complementary perspectives: technology, philosophy and ethics

The day's speakers explored the relationship between artificial intelligence and speech therapy, integrating complementary and multidisciplinary perspectives:

- Voice, anthropogenesis and AI: Prof. Donata Chiricò, professor of Philosophy of Language at the Department of Experimental and Clinical Medicine, analyzed the complex philosophical and evolutionary relationship between the human voice, the birth of language (anthropogenesis) and the development of artificial intelligence technologies.
- Bioengineering potential: Prof. Paolo Zaffino, a bioengineer also a professor at the Department of Experimental and Clinical Medicine, illustrated the practical applications of AI algorithms in rehabilitation pathways and clinical support for communication pathologies.
- Ethics and Deontology: Dr. Fernanda Molinaro, FLI Calabria contact person, addressed the ethical aspects related to the use of AI in speech therapy practice, emphasizing the need to preserve the principle of the therapeutic alliance and the centrality of the person.
- Augmentative and Alternative Communication (AAC): Dr. Francesca Cirillo, ISAAC Italy regional representative, presented clinical cases and concrete examples of the use of new technologies applied to AAC.
- Institutional contribution: Dr. Vincenza Piraino, President of the TSRM-PSTRP Order of the provinces of CZ-KR-VV, completed the parterre, who reiterated the centrality of professional protection and continuous training.

A choral opening between academic and clinical vision

The proceedings were opened by Prof. Giuseppe Chiarella, Director of the Department of Experimental and Clinical Medicine of the Magna Graecia University and Director of the Audiology, Phoniatics and Vestibology Unit, Prof. Pasquale Viola, President of the Degree Course in Speech Therapy, and Dr. Melania Mercurio, Director of the internship of the same degree course. Their opening speeches underlined the importance of preparing future health professionals for a conscious and scientifically guided integration of advanced technologies in rehabilitation practice.



A new frontier for rehabilitation

During the study day, it became clear that the integration between speech therapy and artificial intelligence does not aim at all to replace the figure of the professional, but to enhance their analytical and intervention skills. The guided adoption of these new technologies will make it possible to create increasingly accessible, continuous and personalized therapeutic pathways, reaffirming the role of the UMG and DMSC as centers of excellence in the health research and training of the future.

When mature muscle can no longer recover: a post-mitotic model to study sarcopenia

Sarcopenia, i.e. the progressive loss of muscle mass, strength and function, is one of the main consequences of aging and numerous chronic diseases. The loss of muscle mass is also a particularly relevant problem in cancer patients with cachexia, in whom it can compromise tolerance to treatments, functional capacity and clinical prognosis. This condition increases the risk of falls, fractures and loss of autonomy, with a significant impact on quality of life and healthcare costs. Understanding not only how the damage develops, but above all whether the muscle is still able to recover, is essential to develop new nutritional and therapeutic strategies. However, many cellular models used to study sarcopenia are based on immature cells that do not reproduce the behavior of adult muscle fibers.

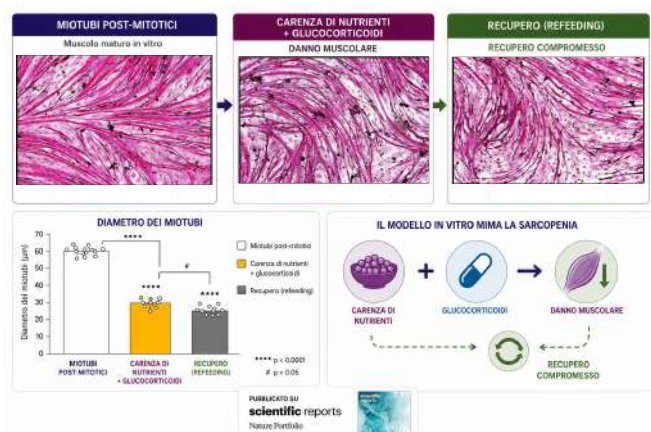
The study, coordinated by Prof. Tiziana Montalcini and Dr. Samantha Maurotti, belonging to the Department of Experimental and Clinical Medicine (DMSC) of the Magna Graecia University of Catanzaro, was conducted at the University's Nutraceutical Laboratory. The work, published in the international journal *Scientific Reports*, developed and characterized an in vitro model of post-mitotic myotubes, i.e. mature, multinucleated muscle cells no longer capable of dividing.

This aspect represents one of the main innovative elements of the study. In a still proliferating cell, in fact, recovery can also depend on the formation of new cells. In post-mitotic myotubes, on the other hand, recovery depends exclusively on the ability of the muscle cells themselves to repair and reorganize themselves, without being able to count on the formation of new cells. The model therefore makes it possible to study in a more realistic way what happens in adult muscle when it is subjected to catabolic stress.

To obtain this model, the researchers differentiated muscle cells to obtain mature, contractile myotubes, characterized by the expression of the main markers of differentiated muscle. Comparison with primary human myotubes also showed the preservation of the main biological programs involved in muscle maturation, supporting the relevance of the experimental model.

A severe condition associated with sarcopenia was then reproduced on these post-mitotic cells, combining nutrient deprivation and exposure to glucocorticoids. The treatment resulted in a marked reduction in myotube diameter, loss of contractile capacity and alterations in the anabolic, energy and lipid processes involved in the maintenance of muscle function.

The study also evaluated the effects of refeeding, i.e. the restoration of normal nutritional conditions after the removal of the harmful stimulus. This approach made it possible to analyze the recovery capacity of muscle cells that were already mature and no longer proliferating. The results showed that the restoration of nutritional conditions was not sufficient to determine a complete recovery: in fact, the myotubes continued to show structural, metabolic and functional alterations, including an impairment of contractile capacity (Figure 1).



The post-mitotic model therefore allows to study not only the processes that determine muscle damage, but also those that regulate its persistence and recovery. This experimental system represents a promising tool to investigate the mechanisms involved in the loss of skeletal muscle function and to evaluate nutraceuticals, bioactive molecules and therapeutic strategies aimed at preserving or promoting their recovery.

Samantha Maurotti

Magna Græcia University of Catanzaro at the "A. Castellani" National Meeting of PhD Students

The Department of Experimental and Clinical Medicine of the Magna Græcia University of Catanzaro took part with great success in the historic "A. Castellani" National Meeting of PhD students in Biochemical Disciplines. This historic educational and scientific retreat, organized by the Italian Society of Biochemistry and Molecular Biology (SIB) in collaboration with the FEBS (Federation of European Biochemical Societies), took place in the evocative setting of Brallo di Pregola (PV).

For almost 40 years, the event has been an authentic point of reference of excellence for the scientific community: a prestigious event that, over time, has seen entire generations of biochemists confront and train on the national and international scene.

This year's edition saw Prof. Scumaci as invited speaker, while Dr. Aftab was selected among the PhD students admitted to present their research. A synergy that concretely testifies to the constant growth and strong recognition of the scientific value of the Calabrian institution at a national level.

Alongside Prof. Scumaci, the program of works hosted interventions of the highest scientific profile, thanks to the participation of authoritative speakers including Prof. Mauro Magnani, Prof. Luigi Palmieri, Prof. Massimo Donadelli, Prof. Valentina Audrito, Prof. Ruggero De Maria and Prof. Irene Diaz Moreno.

The contribution of the Catanzaro delegation received great interest from the participants and was divided into two main moments:

- Prof. Domenica Scumaci gave a scientific report entitled "Epigenetics and Metabolism: Novel Vulnerabilities in the Fight Against Cancer", illustrating the most recent advances and the methodological skills of her research group. The focus of the speech concerned the molecular characterization of the cross-talk between metabolic reprogramming and epigenome modifications in the context of triple-negative breast cancer (TNBC). It was widely highlighted that the elucidation of the cellular metabolic profile and the examination of aberrant metabolic pathways in tumors constitute a key approach for the identification of new pharmacological targets and for the subsequent development of targeted therapies.

- Dr. Anam Aftab brilliantly presented her PhD project, actively comparing herself with the leading experts in the field. In addition to the value of the debate, for the PhD student this experience represented an important networking opportunity to exchange stimulating ideas and forge lasting relationships with young colleagues working in the field of biochemistry.

This participation not only further consolidates the prestige of UMG's research in the scientific landscape, but also reaffirms the institution's deep commitment to supporting and enhancing the growth of its young talents within such prestigious networks.

Domenica Scumaci



Clinical education, holistic health and digital innovation: the scientific contributions of the SSD MEDS-24/C research group in the first half of 2026

In the first semester of 2026, the SSD MEDS-24/C research group, led by Prof. Doldo and Prof. Simeone, published important scientific contributions in international journals with a high Impact Factor for the reference sector. The works address complementary thematic areas: the preparation of university students for cardiopulmonary resuscitation (CPR) maneuvers and the use of the Automated External Defibrillator (AED); the experiences lived by patients with inflammatory bowel disease (IBD) regarding sexuality and intimacy; the use of digital tools in Intensive Care Units (ICUs) for informational, communicative and psychological support to the families of critically ill patients. Despite their clinical and methodological heterogeneity, the contributions share a common vision: the centrality of the assisted person and the enhancement of nursing competence as a lever for improving the quality of care.

1. Introduction

The scientific activity of the research group is characterized by an integrated approach to care, which focuses on the person as a whole, biological, psychological, relational and social, embracing both the educational dimension and the care and technological dimension. In continuity with the path already started in previous years, the first half of 2026 saw the publication of three scientific contributions which, although concerning different clinical areas, share a common thread: the enhancement of nursing skills, the centrality of the assisted person and attention to aspects that are often invisible but decisive for the safety of care and the quality of life of patients and their families [1-3].

The first study is part of university health education and addresses the issue of preparing students for out-of-hospital cardiac emergencies. The second explores the intimate and relational dimension of patients with IBD, expanding the strand already started in previous years on the quality of life in this population [4]. The third, a scoping review, maps the available evidence on the use of digital tools in the ICU to support family members of critically ill patients.

2. Objectives and Methods

2.1 Knowledge, attitudes, and perceived preparation about CPR/AED among university students

Cross-sectional observational study conducted between December 2025 and January 2026 on 604 university students in the health area (Medicine and Surgery, Nursing and other related courses) of the Magna Graecia University of Catanzaro (mean age 24.4 ± 6.7 years; 69.9% females). Data collection took place through a self-administered structured questionnaire, developed ad hoc on the basis of the literature and the main international guidelines on Basic Life Support with Defibrillation (BLS-D) [5-7]. Statistical analysis included the chi-square test, Cramér's V and Spearman's correlation [1]. The work of Professor Nobile Carmelo, Professor of Hygiene, and part of his research group, was fundamental.

2.2 Sexuality and intimacy in inflammatory bowel disease: phenomenological study

Qualitative phenomenological study conducted on 19 adults with a confirmed diagnosis of Crohn's disease or ulcerative colitis [8,9] (10 women, 9 men; mean age ~41 years; 84% married), recruited at the Gastroenterology and Operative Endoscopy Unit, Renato Dulbecco University Hospital. Data were collected by audio-recorded interviews and analyzed with Cohen's phenomenological method. Methodological rigor was ensured through bracketing, triangulation of the investigators and application of the Lincoln and Gub criteria.

2.3 Digital tools in adult ICUs: scoping review

Scoping review conducted between January and March 2026 according to the guidelines of the Joanna Briggs Institute (PRISMA-ScR), with the aim of mapping the available evidence on digital tools used in ICUs to inform, communicate, support or involve family members of critically ill patients [10,11]. The research involved three electronic databases (PubMed/MEDLINE, Scopus, CINAHL), identifying 5,104 records; after selection by relevance, 32 studies were included in the qualitative synthesis [3].



3. Results

3.1 CPR and AED among university students in the health area

46.4% of students had attended at least one BLS or BLS-D course. Although 81.1% recognized myocardial infarction as a cause of cardiac arrest and 73.3% demonstrated correct knowledge of the chain of survival [5-7], recognition of non-shockable rhythms (asystole and pulseless electrical activity) remained below 25%. Perceived confidence in performing CPR was low: only 36.8% of students said they were very or fairly confident, with further reduction in scenarios with elderly or traumatized victims. On the aptitude side, 93.5% expressed interest in further training and over 80% supported the introduction of mandatory BLS-D training in health curricula [1,12,13].

3.2 Sexuality and intimacy in IBD

The phenomenological analysis led to the identification of five main themes: (1) impact of the disease on sexuality, with stigmatization of physical symptoms and tendency to avoidance; (2) alteration of body image linked to weight fluctuations, scars and fear of a possible ostomy; (3) experience of sexuality as "automatism", described as mechanical and devoid of spontaneity; (4) uncertainty about the relational future; (5) total absence of communication with health professionals on the subject of sexual health, perceived not as a simple lack of information, but as an additional emotional barrier [14,15]. Alongside the difficulties, some participants described a process of reconnection with the partner, in which the disease becomes an opportunity to develop new forms of intimacy based on understanding and empathy [2,16-18].

3.3 Digital tools in ICU to support family members

Digital information and educational tools have been shown to be generally associated with a better understanding of procedures and the care pathway by family members. Communication platforms (videoconferences, dedicated portals) have favored the maintenance of the family-patient connection during critical hospitalization. Psychological support apps and digital diaries have shown promising results for caregivers' well-being (reduction of anxiety, depression and PICS-F-related symptoms) [19,20], although the evidence remains preliminary and not homogeneous.

The overall effectiveness of each tool is highly dependent on user-centered design, integration into clinical workflows, and staff training [3,20,21].

4. Discussion

The works, although heterogeneous in terms of clinical area and methodology, converge in indicating the need for care and training models that are more attentive to the person in his or her complexity. The study on CPR/AED highlights a gap in the university curricula of the health professions which, in a geographical context such as Calabria, where out-of-hospital cardiac arrest still represents an unresolved challenge, assumes particular relevance [5,22,23]. The phenomenological study on IBD brings to light a dimension of patients' experience chronically neglected in clinical interactions: sexuality and intimacy are not marginal issues, but essential components of quality of life that require dedicated space in routine care [15-18]. Finally, the scoping review of digital tools in ICU suggests that technology alone is not enough: its value emerges only when it is designed to respond to real needs, integrated into care pathways and mediated by adequately trained professionals [11,19-21].

Transversal to the contributions is the recognition that the quality of care passes through the quality of relationships, between professionals and patients, between institutions and communities, between research and clinical practice, and that the nursing figure occupies a central role in each of these dimensions [24-26].

5. Conclusions

The results of the first half of 2026 confirm the vitality and plurality of the group's research lines, ranging from university education to critical care, from holistic health of the chronic patient to digital innovation. The continuity of this scientific path reinforces the vision of modern, integrated and person-centered care, contributing significantly to the national and international scientific debate in the field of nursing and health sciences.

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Young researchers discovering the mechanobiology of ovarian cancer

The Department of Experimental and Clinical Medicine (DMSC) is actively engaged in multidisciplinary research aimed at understanding the molecular mechanisms underlying tumor progression and identifying new therapeutic strategies.

In this context, as a biomedical engineer, I am carrying out, together with Dr. Martina Pallone, a research project dedicated to the study of the role of heparan sulfate proteoglycans (HSPGs) in the mechanobiology of ovarian cancer, at the Molecular Oncology Laboratory of Prof. Giuseppe Viglietto, under the scientific supervision of Prof. Carmela De Marco. In collaboration with Prof. Francesco Gentile's research group, we integrate molecular oncology and bioengineering skills to study how the mechanical properties of the tumor microenvironment influence the progression of ovarian cancer.

The preliminary results of our work were presented during the 5th International Electronic Conference on Cancer (10–12 June 2026), where I had the opportunity to give my first oral communication at an international congress.

Ovarian cancer is still one of the most deadly gynaecological cancers in the world. In recent years, it has become increasingly evident that, in addition to genetic alterations, the tumor microenvironment plays a fundamental role in the progression of the disease.

Cancer cells not only respond to biochemical signals, but are also able to sense the physical properties of their surroundings, including the stiffness of the extracellular matrix (ECM). This process, known as mechanotransduction, allows cells to convert mechanical stimuli into intracellular signals that regulate proliferation, migration, invasion, and response to therapies.

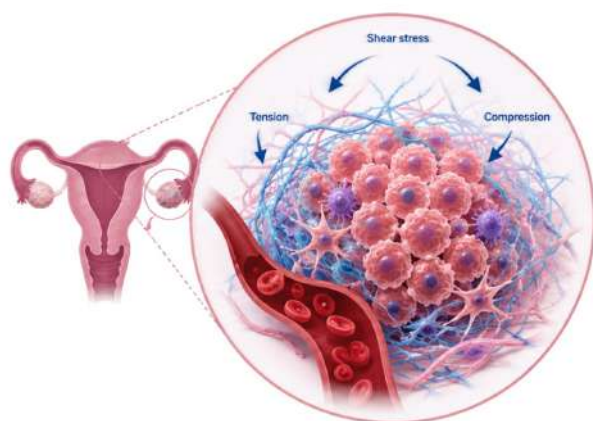
A central element of this mechanical dialogue is represented by heparan sulfate proteoglycans, important components of the extracellular matrix and cellular glycocalyx. Thanks to their ability to bind growth factors, cytokines and extracellular ligands, heparan sulfates coordinate cell-matrix communication and modulate numerous signaling pathways. Although their role in tumor biology has been known for some time, the contribution of heparan sulfates to the cellular response to mechanical stimuli is still poorly explored in ovarian cancer.

To address this issue, molecular oncology and bioengineering skills have been integrated. In collaboration with Prof. Francesco Gentile, a bioengineer engaged in research in the field of biomedical nanotechnologies at the Nanotechnology Research Center of the Magna Graecia University, polydimethylsiloxane (PDMS) substrates with tunable stiffness have been developed, capable of reproducing the different mechanical properties of the tumor microenvironment.



These biomimetic platforms have made it possible to cultivate ovarian cancer cells with experimentally modulated heparan sulfate biosynthesis under controlled mechanical conditions, offering an innovative model to study how extracellular mechanical properties influence the behavior of cancer cells (Coluccio M.L. et al, Micro and Nano Engineering 2025).

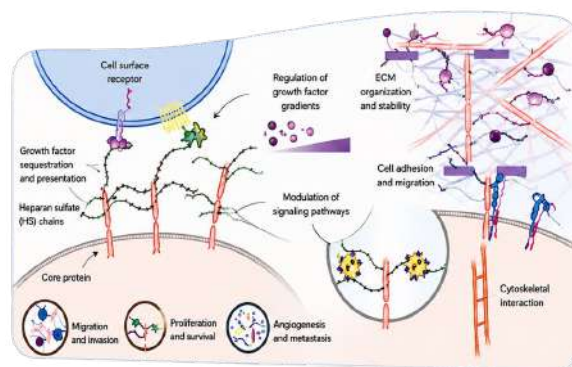
Preliminary results indicate that alterations in the organization of heparan sulfates profoundly affect the ability of ovarian cancer cells to perceive and respond to mechanical stimuli. Modulation of heparan sulfate biosynthesis promotes the activation of major mechanotransduction pathways, including FAK, RhoA-Rac1, and TGF- β , promoting increased migration capacity, acquisition of epithelial-mesenchymal transition (EMT) characteristics, and the development of a more aggressive cellular phenotype.



Tumor cells are exposed to tension, compression, and shear stress, which, together with the biomechanical properties of the extracellular matrix and the surrounding stroma, regulate mechanosensor activation, cytoskeletal remodeling, cell plasticity, and tumor progression.

In addition, heparan sulfates act as local reservoirs of pro-angiogenic molecules, spatially regulating the availability of growth factors and promoting endothelial cell organization through cell contact-dependent signaling mechanisms.

Although further studies are needed to confirm these observations, they strengthen the concept that the extracellular matrix is not only a structural support, but constitutes an active regulator of communication between cancer cells and the stromal compartment, which is crucial for the progression of ovarian cancer and response to treatments.



Schematic representation of the multifunctional role of heparan sulfate proteoglycans (HSPGs) in the tumor microenvironment.

The presentation of these studies at the 5th International Electronic Conference on Cancer represented an important recognition of the research carried out within the Department of Experimental and Clinical Medicine. Beyond the scientific result, this experience highlighted the value of a multidisciplinary environment, in which different skills converge towards a common goal. The collaboration between oncologists, molecular biologists and bioengineers not only favors the development of innovative projects, but also represents an important opportunity for growth for young researchers. Presenting our work in an international scientific context was a significant step in our training, strengthening the motivation to continue research and to engage with the international scientific community.

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