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Conference Report

A Comprehensive Summary of the Third International StemNet Meeting 2026

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Abstract

The Third International StemNet Meeting, held on March 12–13, 2026, served as a landmark event uniting Italy's four major stem cell research associations: FIRST, GISM, IPLASS, and SCRI. By integrating the unique expertise of these organizations, the meeting aimed to enhance the quality and clinical impact of regenerative medicine through proactive synergy and knowledge exchange. The scientific program, organized into six comprehensive sessions, highlighted recent advances in basic and translational research, specifically focusing on the evolution of advanced therapies such as Extracellular Vesicles and Advanced Therapy Medicinal Products (ATMPs). Beyond scientific findings, the proceedings also addressed biomedical communication and research translation, ensuring that scientific discoveries translate effectively into social and economic benefits. A significant highlight was the "Next Generation Session", organized by early-career scientists to foster the development of the field's future leaders. With a faculty of renowned national and international experts, the meeting facilitated rigorous debate and established a collaborative roadmap for addressing the current challenges in stem cell science and its therapeutic applications.

Keywords: mesenchymal stem/stromal cells; extracellular vesicles; regenerative medicine; nanomedicine; cell therapy; therapeutic priming; clinical translation; drug delivery systems

1. Introduction

StemNet (https://stemnet.webnode.it/) is a strategic federation of Italy's four leading scientific associations: FIRST (https://www.assofirst.com/), GISM (https://www.gismonline.it/index.php?lang=en), IPLASS (https://www.iplassociety.org/), and SCRI (https://www.stemcellitaly.it/). The federation aims to unify Italian regenerative medicine research, enhancing its global visibility and providing a national benchmark for regulatory and institutional dialogue.

The Third International StemNet Meeting (Fig. 1; https://stemnet2026.azuleon.org/welcome, full program available at https://stemnet2026.azuleon.org/programme), held March 12–13, 2026, in Bologna, Italy, focused on bridging the gap between discovery and clinical application. The program highlighted breakthroughs in extracellular vesicles (EVs), Advanced Therapy Medicinal Products (ATMPs), biofabrication, and omics sciences. By featuring a "Next Generation Session" and Young Investigator Awards, the congress emphasized the valorization of research and the vital role of collaborative networks in overcoming modern clinical challenges.

2. Proceedings

2.1 DAY ONE

2.1.1 Morning — Opening Session: "Innovative Trends in Science Communication"

Chairs: Augusto Pessina (Milan, Italy), Umberto Galderisi (Naples, Italy)

The first morning of the congress was dedicated to a critical yet often overlooked pillar of scientific advancement: the methodology and impact of dissemination. This session moved beyond traditional data presentation to explore how modern digital tools and narrative strategies can bridge the gap between complex biotechnological research and public understanding.

The scientific proceedings commenced with a keynote by **Emanuele Frontoni (Macerata, Italy)**, who discussed artificial intelligence (AI)'s role in scientific storytelling, emphasizing that while AI can automate data synthesis and enhance engagement, the "human perspective" is vi-

Fig. 1. StemNet 2026 logo. Logo of the Third International StemNet Meeting 2026.

tal for ethical integrity in regenerative medicine. The focus then shifted from technological frameworks to practical, individual-led dissemination. **Samuele Negro (Padua, Italy)** presented his research on nerve regeneration via the CXCL12/CXCR4 axis, demonstrating a novel communication approach using social media. By creating engaging short-form videos, he showed that humanizing a researcher's daily challenges fosters public transparency without sacrificing scientific quality.

The session concluded with a roundtable on balancing "infotainment" with scientific precision, aligning with StemNet's goal of increasing the global visibility of Italian research, and set a collaborative and forward-thinking tone for the subsequent technical sessions on tissue engineering and biofabrication.

2.1.2 Afternoon — Session 1: "StemNet Next Generation"

Chairs: Pasquale Marrazzo (Urbino, Italy), Federico Divincenzo (Turin, Italy)

The afternoon session transitioned from broad communication strategies to the professional and technical empowerment of the next generation of researchers. This segment of the program was specifically designed to provide early-career scientists with the transversal skills necessary to navigate the modern academic and industrial landscape.

The session opened with **Valentina Bugani (Meldola, Italy)**, who advocated for competency-oriented training in healthcare research to foster resilience and interdisciplinary collaboration. Continuing the theme of professional optimization, **Filippo Piccinini (Bologna, Italy)** demonstrated using AI in medical writing to streamline literature reviews while maintaining ethical standards for authorship and reproducibility.

The technical discussion then shifted toward the commercialization of research. **Ákos Diósdi (Szeged, Hungary)** presented a case study on patenting microscopy technologies, stressing the importance of securing intellectual property (IP) before publication to unlock industrial partnerships.

The session concluded with the highly anticipated presentation of the award-winning research from the **StemNet Next Generation - Contest 2026**, highlighting the excellence of emerging Italian scientists in the field of stem cells and regenerative medicine:

- 1st Place: Domenico Aprile (Naples, Italy): Lineage specification into GABAergic, glutamatergic, dopaminergic, and astrocytic phenotypes using MUSE stem cells: a novel approach for modeling neurodegenerative and psychiatric disorders.

- 2nd Place: Angelo Canciello (Teramo, Italy): Graphene oxide accelerates TGFβ-mediated epithelial-mesenchymal transition and stimulates pro-inflammatory immune response in amniotic epithelial cells.

- 3rd Place: Domitilla Mandatori (Chieti, Italy): Effects of mesenchymal stromal cells and human recombinant Nerve Growth Factor delivered by bioengineered human corneal lenticule on an innovative model of diabetic retinopathy.

2.1.3 Afternoon — Session 2: "Innovation, Sustainability and Market Access for ATMPs"

Chairs: Laura Calzà (Bologna, Italy), Lorenza Lazzari (Milan, Italy)

The final session of the first day shifted the focus toward the industrial and economic hurdles of regenerative medicine. As ATMPs move from clinical trials toward standard care, the discussion highlighted the urgent need for new manufacturing paradigms and sustainable reimbursement models.

Focusing on industrial hurdles, **Simona Guidi (Leiden, Netherlands)** compared centralized versus decentralized "bedside" manufacturing for ATMPs, noting that decentralized models may improve patient access. Complementing this technical perspective, **Claudio Jommi (Novara, Italy)** addressed economic sustainability across the "Big Five" European markets, emphasizing that outcome-based payment models are essential for managing high-cost therapies. A practical application of sustainable manufacturing was presented by **Cristina Zanini (Varese, Italy)** and **Ludovica Filippini (Rome, Italy)**, who introduced a closed-system good manufacturing practice (GMP) bioreactor for bone tissue production, which reduces contamination risks and operational costs by functioning in a lower-grade cleanroom environment. Finally, **Vincenzo Raffo (Bari, Italy)** presented a study on priming Adipose-derived Stem Cells with IL-1β to activate their healing potential for Osteoarthritis.

The session concluded with an intensive discussion on the intersection of biology and industry. Participants debated the feasibility of transitioning from open-system laboratory protocols to the closed-circuit GMP systems, and how such transitions might alleviate the market access barriers. This session underscored that the future of ATMPs depends on a holistic integration of biological priming, innovative manufacturing, and robust economic strategy.

2.1.4 Afternoon – General Assembly

The four federated associations (**FIRST, GISM, IPLASS, SCRI**) convened to plan future strategic activities. Key priorities included consolidating the national network as a benchmark for regulatory institutions and identifying joint themes for scientific reviews. The Assembly reaffirmed StemNet's role as a unified, influential leader in the international regenerative medicine landscape.

2.2 DAY TWO

2.2.1 Morning — Session 1: "Biofabrication and Bioengineering Tools for Tissue Repair"

Chairs: Maria Letizia Focarete (Bologna, Italy), Laura Mercatali (Bologna, Italy)

The second day of the meeting opened with a focus on the convergence of engineering and biology. The session highlighted how advanced manufacturing and physical stimuli are moving beyond the limitations of current clinical practice to provide personalized, high-resolution solutions for skeletal and tissue regeneration.

This session highlighted how engineering-biology convergence provides personalized solutions for tissue regeneration. **Gianluca Cidonio (Rome, Italy)** presented microfluidic-assisted 3D bioprinting to create hierarchical bone-like constructs, while **Dario Carugo (Oxford, UK)** discussed how ultrasound-mediated stimulation and microbubbles enhance drug delivery and cell membrane permeability. The biological timing of bone repair was the focus of **Andrea Lolli (Rotterdam, Netherlands)**, who shared groundbreaking data showing that "shortened chondrogenic priming" (as little as one day) is sufficient for *in vivo* bone formation, significantly reducing cell manipulation time. Finally, **Mattia Dessena (Parma, Italy)** used single-cell RNA sequencing and 3D bioprinting to model the bone microenvironment in Multiple Myeloma, identifying a depletion of pro-osteogenic pre-osteoblasts as a key disease marker.

The ensuing discussion emphasized that the future of tissue repair lies in the integration of these diverse tools. The faculty and participants debated how microfluidic bioprinting could be combined with ultrasound-mediated stimulation to further enhance cell differentiation, or how shortened priming protocols could be modeled more accurately using the 3D niche platforms.

2.2.2 Morning — Session 2: "Stem Cells in Cartilage (Tissue) Repair"

Chairs: Gina Lisignoli (Bologna, Italy), Eleonora Iacono (Bologna, Italy)

This session focused on the persistent challenge of articular cartilage regeneration, exploring how precision medicine and advanced physical stimulation can overcome the biological variability and poor self-healing capacity of chondral tissue.

Focusing on articular cartilage, **Serena Duchi (Melbourne, Australia)** presented a precision medicine framework for post-traumatic osteoarthritis using stem cells from fat pads, utilizing proteomics to screen patient cells for chondrogenic potential. **Leonardo Ricotti (Pisa, Italy)** introduced "wireless" stimulation using ultrasound and piezoelectric nanomaterials to enhance cartilage healing and reduce inflammation. Then, the session transitioned to surgical and technical applications with a presentation by **Nicola Mondanelli (Siena, Italy)**, who detailed the surgical management of complex femoral pseudoarthrosis, and **Maira Bacchiega (Schaefer SEE Srl)**, who emphasized that standardized Extracellular Vesicle (EVs) purification is essential for safe "cell-free" regenerative therapies.

The concluding discussion highlighted a common thread: the shift toward standardization. Whether through biomarker-driven patient selection, precisely calibrated acoustic energy, or standardized EV isolation, the faculty agreed that the future of cartilage repair depends on reducing the "noise" inherent in biological systems.

2.2.3 Afternoon — Poster Session

The poster session served as a dynamic centerpiece of the meeting, providing a vibrant forum for the direct exchange of ideas between researchers and the international faculty. Spanning a wide array of topics, from fundamental stem cell biology to innovative clinical applications, the session allowed participants to present preliminary findings and novel methodologies in an informal yet academically rigorous setting (**Supplementary Table 1**).

2.2.4 Afternoon — Session 1: "Omic Studies for Stem Cell Biology"

Chairs: Krisztina Buzas (Szeged, Hungary), Roberta Piva (Ferrara, Italy)

The session highlighted how high-throughput molecular profiling and advanced modeling are redefining our understanding of stem cell states, from their role in treating infectious complications to their contribution to tumor resistance and rare genetic disorders.

Giada Pietrosi (Palermo, Italy) demonstrated how perinatal stem cells could combat antibiotic-resistant infections in liver disease, while **Nereo Kalebic (Milan, Italy)** introduced "CellShape-seq" to link glioblastoma stem cell shapes to specific chemoresistance states. The session also showcased the power of induced pluripotent stem cells (iPSCs) and EVs in disease modeling and therapy. **Arianna Minoia (Verona, Italy)** showcased iPSC-based models for rare osteopetrosis, and **Alice Zaramella (Padua, Italy)** discussed engineering EVs with miR-31 to promote mucosal healing in Inflammatory Bowel Disease. These talks reinforced that "omics" are now essential for functional discovery and precision cell therapy.

The final discussion emphasized that "omics" are no longer just descriptive tools but are essential for functional discovery. Whether identifying predictive biomarkers for liver disease, mapping the physical-transcriptomic link in cancer, or engineering precision EVs, the integration of deep molecular profiling with sophisticated *in vitro* models is essential for the next generation of advanced cell therapies.

2.2.5 Afternoon — Session 2: "Cancer Stem Cells"

Chairs: Francesco Alviano (Bologna, Italy), Gianandrea Pasquinelli (Bologna, Italy)

The final session of the congress focused on the role of cancer stem cells (CSCs) as the primary drivers of tumor progression, therapy resistance, and immune evasion. The presentations bridged molecular immunology with advanced biofabrication and genetic engineering to identify novel therapeutic vulnerabilities in some of the most aggressive malignancies.

Ilio Vitale (Turin, Italy) explained how CSCs evade the immune system through "antigenic camouflage" and suggested targeting BCL-2 proteins to sensitize them to elimination. The session then highlighted the development of sophisticated *in vitro* models to study tumor-stroma interactions and uncover new drug targets. **Silvia Pontara (Genoa, Italy)** presented a humanized 3D bioprinted model to study breast cancer bone metastasis, reducing reliance on animal testing. Finally, **Annalisa Astolfi (Bologna, Italy)** introduced a CRISPR-engineered iPSC model for leiomyosarcoma, identifying Tigecycline as a potential therapeutic avenue.

The final discussion focused on the necessity of "humanized" models to capture the complexity of the tumor microenvironment and the importance of identifying specific metabolic or apoptotic dependencies in CSCs. The Chairs concluded the session by noting that the integration of iPSC technology, 3D bioprinting, and deep genomic profiling has moved the field closer to precision oncology.

2.2.6 Afternoon — Poster Awards

The meeting reached its ceremonial peak with the presentation of the prestigious poster awards, designed to recognize excellence in research among the younger members of the scientific community. Three distinguished "**Young Investigator Awards**" were conferred to the most impactful contributions. These honors were made possible through the generous backing of key scientific institutions: two awards were supported by the IPLASS society, while one was partially supported by the journal Extracellular Vesicles and Circulating Nucleic Acids (EVCNA). The recipients of these prestigious awards were: **Camilla Bruna Cerchier (Bologna, Italy)**, **Showmeya Mallavarapu (Padua, Italy)** and **Raquel Moll Diaz (Padua, Italy)**. These awards not only provided financial support to the winners but also served as a testament to the high caliber of scientific inquiry presented throughout the congress.

2.2.7 Afternoon — Conclusions

Following the scientific debate, the meeting concluded with a summary of the two days of work, celebrating the constructive relationship between FIRST, GISM, IPLASS, and SCRI.

3. Conclusions

The success of the Third International StemNet Meeting reaffirmed the federation's role as a vital network for fostering interdisciplinary synergy and driving the next generation of advancements in stem cell research and advanced cell therapies.

Abbreviations

FIRST, Forum of Italian Researchers on Mesenchymal Stromal Stem Cells; GISM, Gruppo Italiano Staminali Mesenchimali; IPLASS, International Placenta Stem Cell Society; SCRI, Stem Cell Research Italy.

Availability of Data and Materials

Raw data are available at OSF repository and are publicly available: https://osf.io/du6cv/overview?view_only=468d837ec2b94988ae6545e4e7a00807. All data reported in this Report will also be shared by the lead contact upon request.

Author Contributions

ER, NE, UG, MCI, LL, PM, ARS, MMT and EL made substantial contributions to conception and design of the re-

port. ER drafted the original manuscript. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

Not applicable.

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Conflicts of Interest

The authors declare no conflicts of interest. Given his role as the Guest Editor, Enrico Ragni had no involvement in the peer review of this article and has no access to information regarding its peer review. Full responsibility for the editorial process for this article was delegated to Graham Pawelec.

Declaration of AI and AI-Assisted Technologies in the Writing Process

During the preparation of this work, the authors used Gemini 3 Flash in order to check spelling and grammar. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

Supplementary Material

Supplementary material associated with this article can be found, in the online version, at https://doi.org/10.31083/FBL53791.