TWO PRODUCT APPROVALS: A MESENCHYMAL STROMAL CELL THERAPY AND A TISSUE ENGINEERED VASCULAR GRAFT

BIOMATERIALS FORUM

OFFICIAL NEWSLETTER OF THE SOCIETY FOR BIOMATERIALS

FOURTH QUARTER 2024 • VOLUME 46, ISSUE 4

ALSO INSIDE

INDUSTRY NEWS: UNITEDHEALTH GROUP FACES ANTITRUST LAWSUIT

Biomaterials Forum, the official news magazine of the Society For Biomaterials, is published quarterly to serve the biomaterials community. Society members receive *Biomaterials Forum* as a benefit of membership. Non-members may subscribe to the magazine at the annual rate of $48. For subscription information or membership inquiries, contact the Membership Department at the Society office (email: info@biomaterials.org) or visit the Society's website, biomaterials.org.

Editorial contributions to *Biomaterials Forum* are always welcome. Contributions should be sent to the Executive Editor and are subject to the terms and conditions of the Editorial and Publication Release. Authors should refer to the Author Guidelines, which are available on the Society's website, when writing submissions. The publisher accepts no responsibility for return or safety of artwork, photographs or manuscripts. Submission of editorial content does not guarantee acceptance or publication.

Address corrections should be sent to *Biomaterials Forum*, 1120 Route 73, Suite 200, Mt. Laurel, NJ 08054.

Requests for advertising information should be directed to Meg Ryan at mmryan@ahint.com or 856-380-6850. Information is also available on the Society's website, biomaterials.org.

Scientific photos may be submitted for cover consideration in future issues. Submit color photo, no larger than 4" x 6", along with credit information and scientific description, to the Executive Editor.

BIOMATERIALS FORUM

The official news magazine of the **SOCIETY FOR BIOMATERIALS** • Volume 46, Issue 4

SPECIAL INTEREST GROUP REPORTERS

BioInterfaces	TBD
Biomaterials & Medical Products Commercialization	Subramanian Gunasekaran • guna@encoll.com
Biomaterials Education	Jeremy Mercuri • jmercur@g.clemson.edu
Biomaterial-Tissue Interaction	Patrick L. McGee • patrickmcgee.dds@outlook.com
Cardiovascular Biomaterials	Astha Khanna • akhanna@gravertech.com
Dental/Craniofacial Biomaterials	TBD
Drug Delivery	Eun Ji Chung • eunchung@usc.edu
Engineering Cells & Their Microenvironments	Silviya Zustiak • silviya.zustiak@slu.edu
Immune Engineering	Yaoying Wu • yw195@duke.edu
Nanomaterials	Mahboubeh Nabavinia • NABAVINIAM20@ecu.edu
Ophthalmic Biomaterials	Frances Lasowski • lasowsfj@mcmaster.ca
Orthopaedic Biomaterials	Roche C. de Guzman • roche.c.deguzman@hosftra.edu
Surface Characterization & Modifications	TBD
Tissue Engineering	Jessica M. Gluck • jmgluck@ncsu.edu

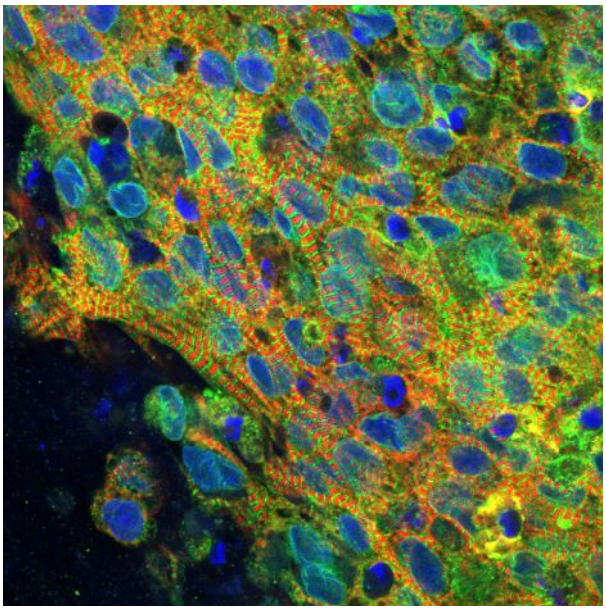
If interested in filling a vacancy above, please reach out to your SIG Chair.
Contact information can be found on individual SIG pages as found **here**.

Contents

THE TORCH

NEWS & UPDATES

FEATURES



ON THE COVER

Confocal cross section of micro-engineered heart tissue (μEHT) derived from human induced pluripotent stem cells. Heart muscle cells (cardiomyocytes) are stained for sarcomere proteins alpha-actinin-2 (in red) and myosin binding protein-C (in green). The nuclei (in blue) provide insight into cell distribution, highlighting the interconnection of cells within the aligned tissue. Image credit: Ghiska Ramahdita, PhD student and McDonnell International Scholars Academy Fellow, Huebsch Lab, Washington University in Saint Louis.

CORRECTION

The cover image of the Q3 2024 issue of the *Forum* was misidentified. The brightly colored palmlike image is of a Palmyra Palm Leaf-Inspired Multiphasic Fibrous Scaffold for Tissue Engineering: A biomimetic fibrous scaffold inspired by Palmyra palm leaves, designed to enhance cell migration and tissue regeneration through multiphasic architecture and tailored gradient properties. Thanks to Shatil Shahriar of University of Nebraska Medical Center for the submission.

From the Editor

By Roger Narayan, MD, PhD, Biomaterials Forum Executive Editor

Welcome to the fourth-quarter 2024 issue of Biomaterials Forum! This issue includes a letter from our president, Sarah E. Stabenfeldt, which highlights the celebration of the 50-year legacy of the Society at the upcoming 2025 Annual Meeting in Chicago. The letter highlights the role of the annual meeting for scientific exchange, collaboration and networking activities that maintain the vitality of the biomaterials community.

Carl Simon describes the recent U.S. Food and Drug Administration approval of two new medical therapies. A product called Ryoncil is the first mesenchymal stromal cell therapy for treating pediatric patients with a condition called steroid-refractory acute graft-versus-host disease, which can occur after allogeneic stem cell transplantation. In addition, a vascular graft containing organized extracellular matrix proteins called Symvess has been recently approved. The efficacy and safety of this product was demonstrated in recent clinical trials.

In Industry News, Subramanian Gunasekaran considers efforts by the U.S. Department of Justice and four state attorneys general to block UnitedHealth Group's proposed acquisition of Amedisys, a provider of home health and hospice services. The section also considers financial information related to the healthcare industry that is relevant to the biomaterials community.

I am truly grateful to all who contributed articles, images and other information to make this issue possible. We invite you to share your latest research findings, achievements and updates for inclusion in a future edition of the Forum. Your contributions help the Forum retain its role as a valuable resource for the biomaterials community.

I look forward to meeting many of you in person at the 2025 Annual Meeting in Chicago, where we can celebrate the 50-year milestone of the Society together.

Yours truly,
Roger Narayan
Editor, Biomaterials Forum

CALL FOR COVER ART

WE WANT TO FEATURE YOUR EXCITING BIOMATERIALS ARTWORK ON THE COVER OF *BIOMATERIALS FORUM!*

Deadline: Accepted on a rolling basis.

Instructions: Please email artwork (digital images, artistic creations, etc.) to info@biomaterials.org, to the attention of the Executive Editor of the *Biomaterials Forum*. All artwork with biomaterials relevance that have not appeared as a *Forum* cover are welcome. Multiple submissions are permissible.

Description: Selected artwork will appear as the cover of a future issue of *Biomaterials Forum* along with a brief "On the Cover" description of the subject and name/affiliation of the creator.

Format: High-resolution electronic version in .gif, .tiff or .jpeg file format.

From the President

By Sarah Stabenfeldt, SFB President

Dear SFB Members,

As we continue our journey in advancing biomaterials science, I want to take a moment to reemphasize what makes SFB so special — our commitment to scientific excellence, community, education and training. These pillars have defined us for more than 50 years, and they remain just as critical today as we look toward the future.

Our strength lies in our collective engagement. Each of us plays a role in fostering innovation, mentoring the next generation and building an inclusive and supportive network. Whether it's through collaborations, mentorship or simply reaching out to a colleague, your involvement makes a difference.

One of the best ways to engage with our community is by attending the 2025 Annual SFB Meeting in Chicago, April 9–12, 2025. This landmark 50th-anniversary celebration will honor our Society's incredible history while shaping the future under the theme *Half a Century of Progress: Crafting Resilience in Mind & Matter.*

Under the leadership of Drs. Natalie Artzi and Kaitlyn Sadtler, this year's program will be dynamic, impactful and filled with opportunities for scientific exchange and networking. I encourage you to join us — not only to share your research, but to reconnect with colleagues, build new collaborations and strengthen our community.

Let's continue to make SFB a place where knowledge thrives, where mentorship flourishes and where every member feels valued. I look forward to seeing you in Chicago as we celebrate this milestone together!

All the best,

Sarah E. Stabenfeldt, PhD
Professor of Biomedical Engineering, Arizona State University
President of Society For Biomaterials

Two Product Approvals: A Mesenchymal Stromal Cell Therapy and a Tissue Engineered Vascular Graft

By Carl Simon

Ryoncil (Mesoblast, Inc.) was approved by the U.S. Food and Drug Administration (FDA) in December 2024, making it the first mesenchymal stromal cell therapy approved in the U.S.[1-3] Ryoncil is allogeneic culture-expanded mesenchymal stromal cells (MSCs) isolated from the bone marrow of healthy human adult donors[2] and is indicated for the treatment of steroid-refractory acute graft-versus-host disease (GvHD) in pediatric patients 2 months of age and older. GvHD is a life-threatening complication that may occur after allogeneic stem cell transplantation where donor cells may attack the organs or tissues of the patient. GvHD symptoms include skin irritation, liver disorders and distress of the gastrointestinal tract.

Ryoncil's mechanism of action may be related to immunomodulatory effects, where the product inhibits T cell activation. The safety and efficacy of Ryoncil was assessed in a single-arm trial to assess patient response as compared to historical patient data.[3] In 54 children who received treatment, 38 (70%) had a positive response at day 28. Of the 38 responders, the median time to either death or need for additional GvHD therapy was 112 days (range 9, 182). Patient response was evaluated using the International Bone Marrow Transplant Registry (IBMTR) Severity Index, which grades the degree of skin (extent of rash), liver (bilirubin concentration in blood) and gastrointestinal involvement (volume of diarrhea)[4].

Symvess (Humacyte Global Inc.) was also approved by the FDA in December 2024.[5-7] Symvess is an acellular tissue-engineered vessel composed of organized extracellular matrix (SCM) proteins generated from allogeneic smooth muscle cells in culture. The product is approximately 6 mm in inner diameter and 42 cm in length. Human vascular smooth muscle cells derived from human aortic tissue are expanded and seeded onto tubular mesh scaffolds and cultured in a bioreactor to create a tubular construct containing the cells and the ECM deposited by the cells. The construct is decellularized to remove human cellular and genetic material while maintaining the ECM structure and mechanical properties. The product ships in sterile phosphate buffered saline solution in sterile plastic packaging.

The mechanism of action is based on observations that the product can withstand the forces associated with the arterial blood flow and suturing during implantation. Two clinical trials, one civilian (trauma centers in the U.S. and Israel) and one military (in Ukraine frontline hospitals), were conducted to assess safety and efficacy. The primary efficacy outcome measure was the rate of primary vascular graft patency at day 30 as assessed by duplex ultrasound or equivalent (i.e., computed tomography angiography, magnetic resonance imaging). Primary patency is the time a vessel remains patent (unobstructed) after a procedure and without intervention. For the civilian trial, the primary patency rate at day 30 was 67% (36 of 54 patients). For the military trial, the primary patency rate at day 30 was 94% (15 of 16 patients).

REFERENCES

1. Package Insert, Ryoncil, FDA, 2024. Accessed February 10, 2025: https://www.fda.gov/vaccines-blood-biologics/cellular-gene-therapy-products/ryoncil
2. Summary Basis for Regulatory Action, Ryoncil, FDA, 2024. Accessed January 15, 2025: https://www.fda.gov/vaccines-blood-biologics/cellular-gene-therapy-products/ryoncil
3. Kurtzberg J, Abdel-Azim H, Carpenter P, Chaudhury S, Horn B, Mahadeo K, Nemecek E, Neudorf S, Prasad V, Prockop S, Quigg T, Satwani P, Cheng A, Burke E, Hayes J, Skerrett D; MSB-GVHD001/002 Study Group. A Phase 3, Single-Arm, Prospective Study of Remestemcel-L, Ex Vivo Culture-Expanded Adult Human Mesenchymal Stromal Cells for the Treatment of Pediatric Patients Who Failed to Respond to Steroid Treatment for Acute Graft-versus-Host Disease. Biol Blood Marrow Transplant. 2020 May;26(5):845-854. https://doi.org/10.1016/j.bbmt.2020.01.018
4. Rowlings PA, Przepiorka D, Klein JP, Gale RP, Passweg JR, Henslee-Downey PJ, Cahn JY, Calderwood S, Gratwohl A, Socié G, Abecasis MM, Sobocinski KA, Zhang MJ, Horowitz MM. IBMTR Severity Index for grading acute graft-versus-host disease: retrospective comparison with Glucksberg grade. Br J Haematol. 1997 Jun;97(4):855-64. https://doi.org/10.1046/j.1365-2141.1997.1112925.x
5. Package Insert, Symvess, FDA, 2024. Accessed February 10, 2025: https://www.fda.gov/vaccines-blood-biologics/symvess
6. Summary Basis for Regulatory Action, Symvess, FDA, 2024. Accessed February 10, 2025: https://www.fda.gov/vaccines-blood-biologics/symvess
7. Moore EE, Curi M, Namias N, Kundi R, Lum YW, Fox CJ, Rajani RR, Rasmussen TE, Sokolov O, Niklason LE, Khondker Z, Parikh SJ; CLN-PRO-V005 Investigators and the CLN-PRO-V017 Investigators. Bioengineered Human Arteries for the Repair of Vascular Injuries. JAMA Surg 2024, 20:e244893. https://doi.org/10.1001/jamasurg.2024.4893

The acellular tissue engineered vessel taken by Carl Simon during happy hour at the Gordon Research Conference on Advanced Cell & Tissue Biomanufacturing in June 2023 in Newry ME. The vessel is the opaque tubular structure in the middle of the image with plastic wrapping behind it. The graft feels like calamari when grasped: slippery, moist and soft.

Industry News

By Subramanian Gunasekaran, PhD

UNITEDHEALTH GROUP'S AMEDISYS ACQUISITION FACES DOJ BLOCK

The U.S. Department of Justice (DOJ) and four state attorneys general filed an antitrust lawsuit in October 2024 to block UnitedHealth Group's proposed $3.3 billion acquisition of Amedisys, a major home health and hospice provider.[1, 2] The DOJ argued that the deal would eliminate competition between Amedisys and UnitedHealth's Optum subsidiary, which acquired LHC Group for $5.4 billion in 2023.

Both companies are critical players in home health services, with Amedisys generating $2.2 billion in revenue in 2023 and serving patients in 37 states.[2] Key concerns include:

- **Market Consolidation**: The DOJ emphasized that Amedisys and UnitedHealth's "pure competition" drives quality improvements and cost containment, which would diminish post-acquisition.[1]
- **Regulatory Scrutiny**: Amedisys faces civil penalties up to $51,744 per day for violating the Hart-Scott-Rodino Act by failing to disclose document deletions during the antitrust review.[2]
- **Strategic Implications**: UnitedHealth defended the deal as "pro-competitive," claiming it would enhance innovation and patient access.[1]

HEALTHCARE M&A ACTIVITY DECLINES

Hospital and healthcare services M&A activity declined sharply in Q4 2024, with only 15 transactions announced -- a 29 percent drop from Q3 2024 and the lowest since Q3 2020.[3] Factors include inflation, cybersecurity risks and labor shortages, which forced health systems to pause expansion strategies. Full-year 2024 saw 69 hospital deals, down from 76 in 2023, reflecting broader economic headwinds.[3]

AMN HEALTHCARE EXCEEDS Q4 EXPECTATIONS

AMN Healthcare reported Q4 2024 revenue of $734.7 million, surpassing forecasts despite a 10.2 percent year-over-year decline.[4] Key segment performance:

- **Nurse and Allied Staffing**: Revenue fell 15.4 percent to $454.7 million but benefited from reduced labor disruption costs.
- **Guidance**: Q1 2025 revenue is projected to drop by 17 to 20 percent, with nurse staffing expected to decline by 22 to 25 percent.[4]

COMMUNITY HEALTH SYSTEMS SEE $70M Q4 LOSS

Community Health Systems (CHS) reported a $70 million net loss in Q4 2024, missing Wall Street forecasts, despite revenue rising to $3.26 billion (up 1.2 percent year-over-year).[5] Challenges include:

- **Admissions Decline**: A 5.6 percent drop in admissions strained profitability
- **Specialist Costs**: Medical specialist fees rose 12 percent year-over-year to $170 million in Q4, driven by anesthesia services.[5]
- **2025 Outlook**: CHS forecasts revenue of $12.2–$12.6 billion and adjusted EBITDA of $1.45–$1.6 billion, focusing on cost containment.[5]

HEALTHCARE COSTS RISING IN 2025

Healthcare costs are projected to increase by 7 to 9 percent in 2025, driven by:

- **GLP-1 Drugs**: Demand for weight-loss drugs like Ozempic and Mounjaro (costing ~$1,000/month) could lead 9 percent of Americans to use them by 2030.[6]
- **Specialty Medications**: Price hikes for drugs such as dupilumab (4–10 percent increase) and cell/gene therapies (costing up to millions per dose) will strain budgets.[6]

TECHNOLOGY DRIVES EFFICIENCY GAINS IN HEALTHCARE

AI and digital tools are reshaping care delivery:

- **Remote Monitoring**: Wearables and smart implants enable real-time tracking of chronic conditions such as diabetes and heart failure.[7]
- **Generative AI**: Automating administrative workflows and supporting clinical decision-making to reduce provider burnout.[7]
- **Femtech Innovations**: Addressing gaps in women's healthcare through redesigned medical devices and interoperable data platforms.[7]

REFERENCES:

1. https://homehealthcarenews.com/2024/11/evaluating-the-dojs-arguments-against-the-unitedhealth-group-amedisys-deal/
2. https://www.linkedin.com/pulse/doj-sues-block-unitedhealths-33b-amedisys-acquisition-dana-r--gb4mc
3. https://www.prweb.com/releases/hospital-ma-activity-declines-in-q42024-according-to-acquisition-data-from-levinpro-hc-302348183.html
4. https://www.staffingindustry.com/news/global-daily-news/amn-healthcare-sees-revenue-down-but-cites-more-normalized-operating-environment
5. https://www.fiercehealthcare.com/hospitals/community-health-systems-falls-short-wall-streets-expectations-70m-q4-loss
6. https://blog.nisbenefits.com/2025-health-cost-drivers
7. https://www.bcg.com/publications/2025/digital-ai-solutions-reshape-health-care-2025

Society For Biomaterials

50TH

Half a Century of Progress

ANNUAL MEETING & EXPOSITION

APRIL 9-12, 2025 • HILTON CHICAGO

CRAFTING RESILIENCE IN MIND & MATTER