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March - April 2026

Colon cancer

Landmark Swedish trial shows stool and colonoscopy screening increases early tumour detection

Colour ultrasound

Hybrid imaging technique captures tissue structure and blood flow in 3D colour

Nursing and AI

Moral zombies versus moral agents: Why AI should never replace the ethical heart of nursing

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- Aston University and NHMC Investments establish medical education franchise in Egypt
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- UAE national diabetes screening campaign surpasses targets and demonstrates preventive efficacy
- Gut bacteria found to invade the brain via the vagus nerve in mice fed a high-fat diet
- One jab to heal a broken heart: Single injection triggers weeks of cardiac repair



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¹WHO. Medication Without Harm. 2022.[cited 25th April 2024]. Available from: Medication Without Harm (who.int)

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PROJECTS 2026

Prognosis

Where science meets the bedside

It has been a quietly remarkable few months for medical technology, and this issue reflects some of the latest developments.

Start with imaging. Researchers at Caltech and USC have developed RUS-PAT, a hybrid system that marries rotational ultrasound tomography with photoacoustic imaging to produce rapid, radiation-free, 3D colour pictures of the body. The key insight was simple: mimic how photoacoustic systems detect light-generated sound waves, but do it ultrasonically. The result is a single platform that can visualise both tissue structure and vascular function simultaneously. Early human results across breast, head, hand and foot imaging are encouraging, and the clinical potential in oncology and diabetic foot care is hard to ignore.

On a more modest but no less practical note, a Japanese team has reworked something as unglamorous as ultrasound gel. Their tamarind seed gum-based solid pad matches conventional liquid gel for image quality while scoring dramatically better on patient comfort. Although it's a small study the concept is sound and its practical applicability and sustainability is hugely beneficial.

In oncology, two standout papers deserve attention. A team from Nagoya University has finally explained why ovarian cancer spreads so devastatingly fast: the tumour conscripts normal mesothelial cells into hybrid invasion clusters, leaving its own genome largely unchanged. It is a sobering and rather brilliant piece of biology. Meanwhile, Sweden's SCREESCO trial – 278,000 participants, three arms – confirms that both colonoscopy and faecal immunochemical testing shift colorectal cancer detection towards earlier, more treatable stages. The stool test, with its higher uptake, may well prove the more practical population-level tool.

Also in this issue, we look briefly at the recent WHX Dubai 2026 event which drew 235,000 visitors and set the tone clearly: prevention, AI governance, and capital that actually engages with clinical reality are the priorities.

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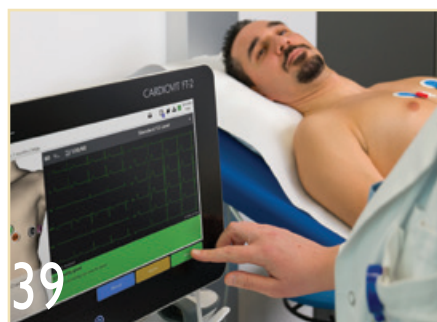
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middle east monitor

Update from around the region

Aston University and NHMC Investments establish medical education franchise in Egypt

Aston University has signed a formal agreement with NHMC Investments to deliver undergraduate and postgraduate medical education in Egypt through the newly established Anglo Egyptian University (AEU) in Cairo. The agreement, signed by Aston Vice-Chancellor Professor Aleks Subic and NHMC chairman and chief executive Dr Naser Fouad, represents the first franchise collaboration of its kind to offer UK-awarded medical degrees in Egypt.

Degrees in medicine, nursing and allied health sciences

The AEU will offer degrees in medicine, nursing and allied health sciences at both undergraduate and postgraduate level. Aston University will be responsible for course content and degree awarding, while academic staff at the AEU will deliver teaching on the ground. Additional support will be provided both virtually and in person by Aston faculty. Teaching is scheduled to commence in September 2027.

The agreement builds on a memorandum of understanding signed between the two institutions in March 2025.

Part of a wider medical complex

The AEU will form part of a broader development by NHMC Group – a provider of health, social care and medical services operating in the UK and internationally – that will encompass a hospital, a care village for older people, an international language school, a commercial hub and residential areas.

Professor Subic described the signing as “a historic moment in Aston’s drive to increase its international reach, in line with our 2030 strategy,” adding that the programme represents “a hugely



Professor Aleks Subic (left) and Dr Naser Fouad at the signing ceremony.

important opportunity for Aston to share its expertise in training the doctors of the future.”

Student exchange and research collaboration

Beyond degree delivery, the two institutions intend to establish a student exchange programme and pursue collaborative medical research. Dr Fouad noted that graduates holding degrees from both the AEU and Aston University “will make a valuable contribution to the development of quality health-care provision in Egypt and the MENA region,” describing the agreement as “the first step in what we expect to be a fruitful long-term relationship.”

Aston University, based in Birmingham, has a longstanding focus on applied research with measurable societal impact, including in medical sciences. It was named Daily Mail University of the Year for Student Success in 2025 and ranks second in England for social mobility. MEN

Zain KSA and Altibbi launch integrated telehealth service for Saudi subscribers

Altibbi, the Middle East’s largest digital-health platform, has entered a partnership with Zain Saudi Arabia to launch Zain Clinic, an in-app telehealth service providing Zain subscribers with direct, round-the-clock access to licensed physicians capable of diagnosing conditions and issuing prescriptions. The service went live in January 2026 and is accessible to all Zain KSA subscribers through the existing Zain mobile application.

Integration without additional downloads

A notable feature of the arrangement is that Altibbi’s network of more than 240 accredited physicians has been embedded directly within the Zain mobile app, removing the requirement

for users to install a separate application. Consultations are available by text, voice, or video, with an average physician response time of approximately two minutes. Where clinically appropriate, physicians may issue digital prescriptions redeemable at pharmacies across the Kingdom.

The service is licensed by the Saudi Ministry of Health and operates in compliance with national digital-health regulations. Since its inception, Altibbi has delivered more than six million consultations across Arab countries.

Alignment with Saudi Vision 2030

The launch is positioned within the broader framework of ►



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Saudi Arabia's Vision 2030 digital-health objectives, which seek to expand access to medical services and accelerate the country's digital transformation. Saudi Arabia's telehealth market was valued at US\$1.06 billion in 2024 and is projected to reach US\$3.92 billion by 2030, according to Grand View Research. By integrating directly into an established telecommunications platform, the service extends medical support to users in remote and rural regions where access to in-person care may be limited.

Jalil Alabadi, CEO of Altibbi, commented: "Partnering with Zain KSA allows us to extend complete medical care – from consultation to prescription – to millions of users through a platform they already trust and use daily. With an average wait time of just

two minutes and the ability to receive prescriptions digitally, Zain Clinic demonstrates that quality healthcare can be immediate, accessible, and seamlessly integrated into everyday life."

Regional expansion planned for 2026

Following the Saudi launch, Altibbi has announced plans to extend Zain Clinic to Kuwait, Bahrain, and the United Arab Emirates during 2026. The expansion reflects Altibbi's wider regional strategy to integrate its telehealth infrastructure into major digital platforms across the Gulf, with the stated aim of making licensed medical consultations and prescription services accessible to tens of millions of Arabic-speaking users.

- For more information, visit Altibbi: – <https://altibbi.com> 

Echelon Health expands preventive assessment model to Dubai

Echelon Health, the London-based preventive health assessment practice founded on Harley Street more than two decades ago, has opened a regional hub in Dubai, extending its Platinum Assessment Programme to clients across the Gulf Cooperation Council.

The organisation's clinical model is designed to identify up to 92 per cent of preventable causes of premature death in men and 95 per cent in women – figures derived from its integrated use of ultrasound, MRI and CT imaging, a comprehensive blood panel analysing more than 40 clinical parameters, cardiovascular risk profiling, cognitive screening using ACE methodology, and consultant-led skin cancer review.

A structurally independent diagnostic model

Central to Echelon Health's operating philosophy is its separation from treatment pathways and ongoing care frameworks. Ahmed Elbarkouki, Group CEO, noted that this structural independence is deliberate: "Our governance model ensures that assessment, analysis and reporting are conducted without commercial or procedural influence. That structural clarity safeguards the integrity of our clinical conclusions."

All imaging conducted in Dubai is re-



ported by Echelon Health's London-based consultant radiologists, with each case undergoing multi-consultant review before findings are presented to the patient in a one-hour consultation. The entire Platinum Programme is delivered within approximately five hours, replacing multi-department screening pathways with a single coordinated diagnostic review.

Clinical rigour at the core

Dr Paul Jenkins, Founder and Medical Director, articulated the practice's underlying clinical rationale: "Preventive medicine is not an accessory to healthcare. It is its foundation. When risk is identified early and analysed rigorously, outcomes change."

The model has been independently assessed by Dr David Wilson, former President of the British Institute of Radiology, who described it as representing "the high-

est level achievable in current practice with existing knowledge."

Dubai as a regional platform

The Dubai expansion was supported by Dubai International Chamber, whose UK representative office facilitated market entry, introductions to local partners, and guidance through mainland business registration.

Echelon Health's arrival aligns with broader trends in UAE healthcare policy, particularly the emphasis on prevention-led care highlighted during recent World Health Experience (WHX) discussions on early detection and long-term health planning.

The organisation conducts a defined number of assessments annually, a deliberately constrained volume intended to preserve the depth of consultant engagement on each case. 



Ikan Bakar Bujang Gadis by Daun Muda

THE MORE THE UNEXPECTED:

Jakarta, The Halal Capital of Flavour

The first thing you notice about Jakarta isn't the skyline, it's the food. Coconut rice steams in banana leaves, satay sizzles over charcoal, and long tables spill into the night as families gather past midnight. Wander a little further and chandeliers glow over plates where tradition is shaped into art.

For Muslim travelers, there is comfort in knowing that almost every taste is halal, whether found on sidewalks or behind velvet curtains.

Coffee that tells a story

And like any good story, it often begins with coffee. Jakarta's coffee culture is as layered as its food. In Glodok's Chinatown, Kopi Es Tak Kie has poured its no-frills brew since 1927. Some come for the sweet iced coffee mixed with condensed milk, but the regulars swear by its black coffee, strong and slightly bitter, the kind that lingers long after the glass is empty. The tiled floor and wooden chairs feel unchanged, and every sip carries the weight of old Jakarta.

Across town in Cipete, South Jakarta, Tuku Coffee sparked the city's modern caffeine wave. Its iced latte with palm sugar became a neighborhood hit that grew into

a national trend, a drink that balances the roast's depth with a subtle sweetness. From heritage brews to contemporary blends, coffee here is never just about caffeine, it is a window into the city's changing tastes.

Street legends that never fade

Every city has dishes that become part of its daily rhythm, and in Jakarta the streets tell that story best. On the crowded lanes of Pasar Baru in Central Jakarta, Bakmi Gang Kelinci has served its springy chicken noodles since 1957. The soy-rich aroma fills a dining room that feels frozen in time, and for many Jakartans it is the taste of homecoming.

A short ride away in Tanah Abang, the air is thick with the coconut fragrance of Nasi Uduk Kebon Kacang. Plates of rice cooked in santan arrive with crispy fried chicken and fiery sambal, best enjoyed shoulder to shoulder with locals in the late-night rush. Both spots prove that some of the city's greatest meals are still found where the streets hum the loudest.

Restaurants and refined tables

Jakarta's dining scene does not just preserve tradition, it reinvents it. Across the city, restaurants are shaping heritage dishes into experiences that feel fresh without losing their roots.

In Senopati, South Jakarta, Daun Muda Soulfood retells Indonesia's culinary stories with spice and fire. Dishes like Manado's rica-rica or Palembang's rusip come plated with a contemporary touch, but the soul remains deeply rooted in the archipelago. For something more elevated, 1945 Restaurant at the Fairmont Senayan reimagines rendang and satay as fine dining artistry. As Jakarta's first halal-certified luxury restaurant, it proves that heritage and refinement can sit comfortably at the same table.

Jakarta's halal dining culture is more than convenience. It is culture made accessible. From the chatter of Chinatown cafés to the hush of silver-spoon dinners, every sip and every dish offers not only sustenance but also a story, waiting to be tasted.

The more dishes you share, the more memories you create. Every flavour is an invitation to the city's soul.

enjoy
jakarta



Kopi Es TAK KIE



Tuku Coffee



Bakmi Gang Kelinci

The more meals you gather around, the more connections you make. Every plate brings you closer to the spirit of Jakarta.



Nasi Uduk Kebon Kacang

Sate Maranggi by 1945 Restaurant



KFSHRC marks two global milestones in robotic surgery and genomic medicine

King Faisal Specialist Hospital and Research Centre (KFSHRC) in Riyadh has reported two significant achievements: a world-first fully robotic living-donor liver transplant, and formal membership of the foremost international genomics consortium.

Robotic liver transplant sets new surgical benchmark

KFSHRC has become the first institution globally to perform a fully robotic liver transplant using organs from living donors, with robotic assistance applied across both donor hepatectomy and recipient implantation.

The procedure was notable for its additional complexity: the recipient required two left liver lobes sourced from two related living donors to achieve sufficient total liver volume, whilst preserving safe residual liver volume in each donor. The surgery was completed without complications. Both donors were discharged on postoperative day three, and the recipient was transferred out of intensive care after seven days.

The case forms part of KFSHRC's robotic liver transplant programme, which has now surpassed 100 procedures. Professor Dieter Broering, Executive Director of Organ Transplantation, described the outcome as reflecting "the gradual expansion

of robotic surgery in liver transplantation, supported by years of accumulated expertise," adding that advanced technologies are employed to enhance surgical safety, accelerate recovery, and improve long-term quality of life whilst ensuring strict donor protection at every stage.

The fully robotic pathway represents a meaningful extension of what can be safely achieved in living-donor transplantation, particularly in cases where anatomical or volumetric constraints would otherwise complicate surgical planning.

Genomic medicine centre joins GA4GH

In a separate development, KFSHRC's Genomic Medicine Centre of Excellence (GMCoe) has been accepted into the Global Alliance for Genomics and Health (GA4GH), the international standards body responsible for developing ethical, technical, and policy frameworks governing genomic data sharing.

Founded in 2013, GA4GH comprises more than 500 member organisations, including the Broad Institute, the National Institutes of Health, the Wellcome Sanger Institute, and the European Molecular Biology Laboratory. The alliance's work underpins interoperability across international research programmes in pre-

cision medicine, rare disease, and cancer genomics.

GMCoe's inclusion follows a period of considerable growth: genomic testing volumes at the centre have doubled since 2022. The centre holds international accreditation for metagenomics and has previously been highlighted in *Nature Genetics* for its integrated clinical-genomic model. Membership of GA4GH provides access to the alliance's technical work streams and collaborative networks, and positions KFSHRC to contribute directly to the shaping of global genomic standards – an area of particular relevance given the centre's research focus on consanguineous populations.

Institutional standing

Taken together, the two announcements reinforce KFSHRC's standing as a leading academic medical centre. The hospital is currently ranked first in the Middle East and Africa and fifteenth globally among the world's top 250 academic medical centres for 2025, and holds the highest-valued healthcare brand in Saudi Arabia and the region according to Brand Finance 2024. It appears in *Newsweek's* listings of the World's Best Hospitals 2025, World's Best Smart Hospitals 2026, and World's Best Specialized Hospitals 2026. 



GLIDE and UAE University sign MoU to strengthen infectious disease elimination research

The Global Institute for Disease Elimination (GLIDE) and United Arab Emirates University (UAEU) have signed a Memorandum of Understanding (MoU) to formalise collaboration in research, training, and knowledge exchange focused on infectious disease elimination.

Scope of the agreement

The MoU establishes a joint framework addressing infectious diseases, neglected tropical diseases, and other public health priorities of regional and international significance. The partnership is designed to strengthen the evidence base informing policy and clinical practice, whilst building scientific leadership within the UAE.

Capacity strengthening forms a central component of the collaboration, with

plans for joint training programmes, lectures, workshops, internships, and fellowship opportunities. A particular emphasis has been placed on developing local expertise and increasing the participation of Emirati researchers and trainees in global health science.

Research funding and academic collaboration

The two institutions will also pursue joint applications for competitive research funding, including the Falcon Awards for Disease Elimination. UAEU faculty and subject-matter experts may be engaged in grant review processes, reinforcing scientific rigour across both organisations.

“This MoU reflects our shared commitment to strengthening research and building local capacity. By combining academic excellence with applied research and pol-

icy engagement, we can accelerate the translation of scientific evidence into real-world impact,” said Dr Farida Al Hosani, CEO of GLIDE.

Knowledge exchange and dissemination

Additional areas of cooperation include mentorship, joint supervision, academic exchanges, data sharing, co-authored policy briefs, and participation in scientific convenings.

GLIDE, an affiliate of Erth Zayed Philanthropies, operates across three strategic pillars – operational research, capacity strengthening, and advocacy – with a stated aim of achieving sustainable elimination of eliminable infectious diseases by 2030.

• Further information: www.glideae.org 

NMC Healthcare deploys AI platform to optimise clinical and operational workflows

NMC Healthcare Group has announced a strategic partnership with Applied AI to implement the Opus artificial intelligence platform across its healthcare services in the United Arab Emirates, with the aim of improving operational efficiency and the patient journey.

Scope of the deployment

The Opus platform is designed to operationalise AI at scale within enterprise environments, offering capabilities spanning analytics, automation and intelligent decision support, whilst adhering to governance and security requirements. NMC intends to

use the platform to streamline clinical and administrative workflows and support data-informed decision-making across its integrated network of facilities.

David Hadley, Chief Executive Officer of NMC Healthcare, said: “By adopting Opus, we are strengthening our ability to ►



leverage data and AI responsibly to support clinicians, optimise operations and deliver high-quality care to our communities.”

Alignment with UAE health strategy

The agreement reflects broader national priorities. Applied AI holds UAE National Champion status, and the partnership is consistent with the country’s policy agenda to integrate emerging technologies into healthcare delivery and improve quality of life at a population level.

Arya Bolurfrushan, Founder and CEO of Applied AI, commented that the collaboration “reflects a shared commitment to applying AI in practical, impactful and responsible ways that create measurable value for healthcare providers and patients alike.” MENA



David Hadley, Chief Executive Officer of NMC Healthcare (left) and Arya Bolurfrushan, Founder and CEO of Applied AI, sign the partnership agreement .

UAE national diabetes screening campaign surpasses targets and demonstrates preventive efficacy

The Ministry of Health and Prevention (MoHAP) of the United Arab Emirates, in collaboration with Merck Gulf, has presented findings from its National Prediabetes and Diabetes Screening campaign at ISPOR Europe 2025. The results, released in January this year, demonstrate that a structured, population-level screening initiative can meaningfully reduce progression to type 2 diabetes when coupled with targeted lifestyle interventions.

Campaign scope and outcomes

Launched in October 2023 under the Government Accelerators Programme, the year-long campaign was designed to strengthen early detection efforts and contribute to national targets for reducing the prevalence of type 2 diabetes. The initiative exceeded its original objective of 100,000 screening tests, ultimately conducting more than 150,000 nationwide.

Among individuals identified as high-risk, 26.5% received a prediabetes diagnosis and 7.6% were found to have established type 2 diabetes. Notably, the data revealed age- and gender-related variations in prevalence, underscoring the value of risk-stratified screening approaches rather than uniform population testing.

Lifestyle intervention shows measurable impact

Of particular clinical interest are the outcomes observed among participants with prediabetes who engaged in lifestyle modification programmes. Within six months, 8.1% had returned to normal glycated haemoglobin (HbA1c) levels, while only 1% progressed to type 2 diabetes – a finding that supports the evidence base for structured preventive pathways in high-risk populations.

H.E. Dr Hussain Abdul Rahman Al Rand, Assistant Undersecretary for the Public Health Sector at MoHAP, noted that early detection “is not merely a preventive measure

but a strategic priority aligned with the vision of the UAE’s wise leadership to foster a proactive, resilient and health-aware community.”

Public-private collaboration and digital integration

Dr Buthaina Bin Belaila, Head of the Non-Communicable Disease and Mental Health Department at MoHAP, highlighted the role of digital transformation in reaching high-risk groups and integrating screening outcomes with follow-up and treatment pathways – a model she described as central to sustaining public health indicators.

Ahmed Abo El Fadl, General Manager of Merck Gulf, emphasised that combining scientific rigour with cross-sector collaboration helps develop data-driven solutions that can inform national health policy across the Gulf region. MENA

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PureHealth establishes Abu Dhabi Health Research Centre to consolidate clinical research operations

PureHealth has launched the Abu Dhabi Health Research Centre (ADHRC), an integrated clinical research division unifying research activities across its network of hospitals, primary care clinics and advanced laboratories in Abu Dhabi. The centre was formally announced at the inaugural ADHRC Research Conference 2025, held in Abu Dhabi with the support of the Department of Health – Abu Dhabi (DoH).

Scale and infrastructure

ADHRC consolidates clinical research operations spanning 16 hospitals and a broad network of primary health clinics and laboratories. The centre covers the full research lifecycle – from protocol design and patient recruitment through to regulatory coordination, data analytics and scientific publication. Its infrastructure includes inpatient Clinical Trial Units (CTUs) and the largest outpatient CTU in the Middle East, with capacity to manage more than 800 clinical trial participant visits daily.

The centre currently supports more than 100 active clinical research studies, with a scientific workforce exceeding 700 researchers and more than 300 principal investigators. It is further supported by over 2,500 specialists and consultants working across disciplines including oncology, neurology, precision medicine and artificial intelligence.

Research priorities and therapeutic focus

ADHRC is conducting clinical research across 22 therapeutic areas, contributing to over 400 publications annually. Key focus areas include personalised medicine, rare diseases, cell and gene therapy, and neuroscience. The centre employs artificial

intelligence and machine learning to process large datasets, identify new therapeutic targets and accelerate the translation of scientific findings into clinical practice.

Among its notable projects is the Longevity trial – the largest of its kind in the Middle East. Longevity 2.0, now in its second phase, enrolls over 3,000 participants and builds on Longevity 1.0, which demonstrated a 2.2-year increase in healthspan through structured interventions in exercise, nutrition and lifestyle modification.

Institutional backing and strategic positioning

The DoH has provided several grants in support of PureHealth's research activities, with the organisation also receiving awards from the UAE Ministry of Health and Prevention (MOHAP). ADHRC partners with government bodies, global biopharma companies and academic institutions to deliver research aligned with Abu Dhabi's public health priorities.

Her Excellency Dr Noura Khamis Al Ghaithi, Undersecretary of the DoH, said: "The establishment of the Abu Dhabi Research Centre marks an important milestone in consolidating our research capabilities and driving high-impact clinical studies that improve lives locally and globally. By empowering partners such as PureHealth to lead high-quality, ethically governed and impactful research, we are accelerating discovery and enhancing patient outcomes."

Shaista Asif, Group Chief Executive Officer at PureHealth, said: "By consolidating our research capabilities under one unified centre, we are building on PureHealth's longstanding legacy in medical research to accelerate the development of breakthrough therapies, improve patient outcomes, and reinforce Abu Dhabi's position as a global hub for healthcare innovation."

The ADHRC Research Conference

2025, which served as the centre's first major public initiative, convened more than 350 delegates from government, academia, healthcare and the life sciences sector.

PureHealth's network comprises:

- **SEHA** – One of the largest healthcare networks of hospitals and clinics in the UAE
- **SEHA CLINICS** – Delivering comprehensive community-based healthcare services
- **Daman (The National Insurance Company)** – The UAE's leading health insurer
- **The Medical Office** – Overseeing Sheikh Khalifa Hospitals and healthcare facilities established under the initiatives of H.H. The President of the UAE
- **Rafed** – The UAE's largest healthcare Group Purchasing Organisation
- **PureLab** – Managing and operating the largest network of laboratories in the region
- **One Health** – A network that provides end-to-end medical solutions to a base of over 300 healthcare service providers
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Medical Taiwan 2026 opened buyer registration on March 10, offering strategic access to Asia's smart healthcare ecosystem

Buyer registration for Medical Taiwan 2026 opened on March 10, inviting healthcare leaders, hospital decision-makers, distributors, and medical groups from the Middle East and around the world to attend one of Asia's most established medical and healthcare trade exhibitions. Organized by the Taiwan External Trade Development Council (TAITRA), the event will be held from June 25 to 27, 2026, at Taipei World Trade Center Hall 1.

As healthcare systems across the Middle East continue to accelerate investments in digital health, hospital modernization, and long-term care infrastructure, Medical Taiwan 2026 offers a focused platform for engaging with Asia's healthcare manufacturing and innovation ecosystem. The exhibition is structured around three core themes—Innovative Care, Smart Healthcare, and Medical Supplies Hub—addressing key priorities such as operational efficiency, clinical quality, and scalable healthcare delivery.

Designed for buyers

Designed for buyers seeking market-ready solutions, the exhibition showcases a wide range of offerings, including hospital equipment, smart healthcare systems, precision medicine technologies, and integrated care models. It provides direct access to experienced suppliers with proven capabilities in international markets and regulated healthcare environments.

Aligned with current healthcare investment trends, the exhibition will feature multiple exhibit areas covering hospital equipment and consumables, AI and smart healthcare, precision medicine, community and home care, assistive devices and orthotics, sports medicine, medical components and accessories, veterinary supplies



and equipment, as well as the M-novator startup zone. Together, these areas span applications from acute and specialty care to rehabilitation, preventive medicine, and long-term care services.

Themed pavilions highlight smart healthcare

Medical Taiwan 2026 will also present a series of themed pavilions highlighting Taiwan's coordinated approach to smart healthcare development. The AI Smart Healthcare Pavilion, organized by the Taiwan Medical and Biotech Industry Association (TMBIA) in collaboration with the Industrial Technology Research Institute (ITRI), will focus on AI-driven healthcare scenarios and the integration of AI big data platforms into clinical and care settings. In parallel, the Taiwan Federation of Medical Devices Commercial Associations (TFMDCA) will work with the Institute for Information Industry (III) to demonstrate digital healthcare applications across diverse medical environments. Additional association pavilions organized by the Taiwan Smart Textiles Association (TSTA) and the Tai-

wan Digital Health Industry Development Association (TAIDHA) will further showcase innovations in smart textiles and digital health technologies.

Complementing the exhibition, Medical Taiwan will collaborate with the Taiwan Society of Home Health Care to host an international forum on Hospital at Home (HaH). The forum will explore global developments in HaH, cross-disciplinary care models, and digital transformation in home-based acute care. Experts from the United States, Australia, Japan, and Israel will share clinical, operational, and policy perspectives, offering practical insights for healthcare systems seeking to expand home-based and community-centered care.

Buyer registration for Medical Taiwan 2026 opens on March 10. Healthcare organizations and procurement leaders looking for strategic partnerships, scalable solutions, and access to Asia's healthcare innovation ecosystem are encouraged to register early and plan their visit.

• Register here:

<https://www.medicaltaiwan.com.tw/>

the laboratory

Medical research news from around the world

Six questions could end the eight-year wait for endometriosis diagnosis

A deceptively simple questionnaire-based scoring tool, developed using data from more than 9,000 Australian women and published in *eClinicalMedicine* in March 2026, could transform how adolescents at risk of endometriosis are identified in primary care – potentially slashing one of medicine's most persistent diagnostic delays.

Endometriosis affects between 6 and 11 per cent of women of reproductive age, yet the path from first symptoms to confirmed diagnosis has stubbornly averaged six to eight years. That delay carries real clinical consequences: progression of disease, diminished quality of life, and – critically – disadvantage during fertility treatment. Now, researchers at the University of Queensland believe a brief, point-based risk score administered in a GP consultation could change that picture fundamentally.

The SAFE score: built from the ground up

The Simplified Adolescent Factors for Endometriosis (SAFE) score was developed using data from the Genetic Variants, Early Life Exposures and Longitudinal Endometriosis Symptoms (GELLES) study, itself a sub-study of the long-running Australian Longitudinal Study on Women's Health (ALSWH). The derivation sample comprised 5,340 women born between 1989 and 1995, with an independent external validation cohort of 4,077 women born between 1973 and 1978 providing a critical test of generalisability.

Using a bootstrapping procedure with multivariable logistic regression, the team – led by Professor Gita Mishra AO at UQ's Australian Women and Girls' Health Research Centre – identified six stable risk factors, all drawn from the adolescent years. Three relate to the severity of general pelvic pain: experiencing pelvic pain often or very often, having sought treatment for that pain, and having taken painkillers for it. Two further

factors capture menstrual disorders – heavy menstrual flow and painful periods – and the sixth is a family history of endometriosis, encompassing mothers, sisters, grandmothers, and aunts or cousins on either side of the family.

Each factor scores one point, producing a total SAFE score ranging from 0 to 6. The elegance lies in its simplicity: no imaging, no biomarkers, no specialist input required at the point of triage.

How well does it perform?

For the primary logistic regression model, areas under the receiver operating characteristic curve (AUC) were 0.81, 0.78, and 0.72 in the training, internal test, and external test samples respectively – solid performance for a tool of this brevity. The simplified SAFE score showed only marginally lower discrimination, with AUCs of 0.79, 0.79, and 0.71 across the same three samples.

Using a cut-point of 2 or more – identified as optimal by the Youden Index – the score achieved a negative predictive value (NPV) of 94.6% in the training sample and 89.7% in the external cohort. Crucially, each additional point on the scale roughly doubled the odds of having endometriosis, and among women scoring 4 or above, more than half had the condition.

The authors are clear-eyed about the tool's purpose. As they write in the paper, “the score should be regarded as a referral aid rather than a diagnostic test. The goal is to reduce diagnostic delay rather than to confirm the disease.”

Targeting adolescents – without excluding older women

Professor Mishra emphasised the impor-

tance of early intervention. “By detecting endometriosis earlier – ideally in adolescents as soon as they begin their periods – we hope the tool will reduce the average 6–8-year diagnostic delay so we can start treatment as early as possible,” she said.

The score was deliberately constructed from symptoms experienced between the ages of 16 and 19, the life stage that yielded the highest predictive AUC in the derivation analysis. Yet its applicability is broader. The external validation in women aged 45–51 demonstrated that these adolescent risk factors remain recallable and meaningful across the life course.

Limitations and next steps

The authors acknowledge important caveats. The ALSWH cohorts over-represent women with higher education levels and under-represent minority groups. Both derivation and external test samples were drawn from within the same national population-based study, meaning true external validation in geographically distinct populations is still needed.

The possibility of causing unnecessary anxiety in adolescent girls – by introducing the label of endometriosis before formal diagnosis – is also flagged. “This highlights the importance of responsible communication and appropriate clinical counselling,” the authors note. “We will work closely with end-users to ensure that the tool and its messaging are implemented in a supportive manner.”

Next steps include prospective clinical validation in Brisbane GP and endometriosis clinics, with the prospect of an app-based implementation under active consideration. 

Reference:

Mishra, G. D., Baneshi, M. R., Mortlock, S., et al. (2026). Development of an early prediction model for endometriosis risk: the simplified adolescent factors for endometriosis (SAFE) score. *eClinicalMedicine*. <https://doi.org/10.1016/j.eclim.2026.103806>



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Gut bacteria found to invade the brain via the vagus nerve in mice fed a high-fat diet

A landmark study published in *PLOS Biology* has demonstrated for the first time that live gut bacteria can physically travel to the brain via the vagus nerve in mice, with bacterial loads in the brain rising significantly when animals consumed a high-fat diet – and, crucially, receding when normal diet was restored. The findings carry profound implications for our understanding of Alzheimer's, Parkinson's, and autism spectrum disorder.



Arash Grakoui, Ph.D., co-principal investigator of the study, and professor of medicine, microbiology and immunology at Emory University.



David Weiss, Ph.D., co-principal investigator of the study and professor at Emory University's School of Medicine.

Researchers at Emory University have established what may be one of the most consequential gut-brain connections yet identified: that live bacteria from a disrupted gut microbiome can translocate directly into brain tissue, bypassing the bloodstream entirely, by travelling along the vagus nerve. The study, published on 12 March 2026 in *PLOS Biology*, used multiple mouse models to trace this bacterial migration and rule out contamination as a confounding explanation.

Leaky gut, bacterial passengers

The researchers fed two strains of mice – Mdr2 / knockout mice and wild-type C57BL/6 mice – a high-fat atherogenic Paigen diet for nine to fourteen days. This diet, which contains 35% fat and 45% carbohydrate, is well established as a model of increased intestinal permeability, colloquially known as “leaky gut.” After just nine days on this diet, gut microbiome composition shifted markedly: bacteria such as *Staphylococcus*, *Bacteroides*, and *Akkermansia* became enriched, while commensal *Lactobacillus* populations declined sharply.

Crucially, bacteria were subsequently detected in brain tissue – but not in blood, lungs, heart, kidneys, spleen, meninges, or cerebrospinal fluid. This highly specific localisation pattern pointed away from haematogenous spread and towards a discrete anatomical route. The vagus nerve, the cranial nerve connecting the brainstem to the major abdominal organs, emerged as the primary conduit.

To confirm this, the team performed unilateral cervical vagotomy – surgically severing the right cervical branch of the vagus nerve – in Paigen diet-fed mice. Brain bacterial burdens fell approximately 20-fold in Mdr2 / mice and three- to four-fold in B6 mice compared with sham-operated controls, and around 35% fewer animals in both models harboured any detectable bacteria in the brain at all.

Tracking a barcoded bacterium

To definitively establish the gut as the source of the brain-resident bacteria, the team administered a genetically modified, DNA-barcoded strain of *Enterobacter cloacae* (JC96) – a sequence not naturally found in these animals – to antibiotic-pretreated mice, then fed them Paigen diet. The barcoded strain was subsequently recovered from brain tissue, and its identity was confirmed by droplet digital PCR (ddPCR), one of the most sensitive molecular detection methods available.

The authors were unequivocal in the discussion: “These data reveal a bacterial translocation axis from the gut to the brain, impacted by environmental (diet) and genetic factors, and warrant further investigation to determine if this phenomenon also occurs in humans.”

Diet reversal clears the brain

One of the most clinically encouraging findings was the reversibility of the phenomenon. When mice were returned to a normal diet after nine days on Paigen diet, intestinal permeability fell fourfold within

two weeks, and bacterial loads in the brain declined significantly, with the majority of animals showing no detectable bacteria by day 14 of diet reversal.

“This research highlights the need for further study into how dietary shifts have a huge influence on human behaviour and neurological health,” said co-principal investigator Arash Grakoui, Ph.D., professor of medicine, microbiology and immunology at Emory University.

Implications for neurological disease

The study also tested mouse models of Alzheimer's disease (APP/PS1), Parkinson's disease (LRRK2 knock-in), and autism spectrum disorder (BTBR), all fed a standard diet. Bacteria were detected in the brains and vagus nerves of all three models, correlating with increased gut permeability already characteristic of these conditions.

Co-investigator David Weiss, Ph.D., drew out the translational significance: “This may shift the focus of new interventions for brain conditions, with the gut as the new target of the therapy. That potential anatomical shift of the target could have an unbelievable impact on how people with neurological conditions benefit from therapies.”

The work remains in animal models, and it is not yet known whether the same pathway operates in humans. But the convergence of dietary, genetic, and microbiome factors in driving bacterial entry into the brain marks a significant conceptual shift in how neurological disease may begin – and potentially, how it might one day be prevented. MEN

Reference:

Thapa, M., Kumari, A., Chin, C-Y., et al. (2026). Translocation of bacteria from the gut to the brain in mice. *PLOS Biology*, 24(3), e3003652. <https://doi.org/10.1371/journal.pbio.3003652>

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One jab to heal a broken heart: Single injection triggers weeks of cardiac repair

A single intramuscular injection using self-amplifying RNA technology can prompt the body to produce a protective cardiac hormone for more than four weeks after a heart attack, researchers report in *Science*. The treatment, tested in mice and pigs, reduced scarring, improved heart function, and avoided the need for invasive cardiac surgery – raising hopes for a new era of post-infarction care.

Each year, millions of people survive a heart attack only to face a slow deterioration as scar tissue replaces healthy muscle. No current therapy can fully prevent this decline. Now, a team led by researchers at Columbia University, with collaborators at the University of Oxford and Texas A&M University, may have found a strikingly simple solution: a single jab in the arm.

Published on 5 March 2026 in *Science*, the study describes how one intramuscular injection of a self-amplifying RNA (saRNA) encapsulated in lipid nanoparticles (LNPs) can sustain production of atrial natriuretic peptide (ANP) – a natural cardiac hormone – for at least four weeks. In both mouse and swine models of myocardial infarction (MI), the treatment markedly reduced infarct size, attenuated fibrosis, and preserved left ventricular ejection fraction.

Why ANP – and why now?

ANP, encoded by the *Nppa* gene, is secreted predominantly by the atria and plays a central role in cardiovascular homeostasis. The heart does upregulate ANP expression after MI, but the response is insufficient. Crucially, the researchers observed that *Nppa* induction after MI is more than 2.5 times greater in regenerative neonatal hearts than in non-regenerative adult hearts – a disparity that suggested boosting ANP levels in adults could meaningfully shift recovery outcomes.

“This is about helping the heart tap into its own healing mechanisms,” said Dr Ke Huang, assistant professor at the Texas A&M Irma Lerma Rangel College of Pharmacy and co-author of the study. “We’re trying to give patients a

treatment that works with the body rather than against it.”

The team’s insight was to exploit a biological quirk: pro-ANP circulates systemically but is cleaved into active ANP only by corin, a protease expressed predominantly in cardiomyocytes. This means that even when pro-ANP is produced in skeletal muscle, the active hormone is generated selectively at the heart – a natural targeting mechanism that avoids systemic overstimulation.

The saRNA advantage

The delivery platform builds on the same lipid nanoparticle technology validated by the COVID-19 vaccine programme. Unlike conventional mRNA, saRNA encodes both the therapeutic protein and a viral replicase derived from alphaviruses, enabling intracellular self-replication. The result is sustained, high-level protein output from a substantially lower dose.

In mouse models, a single injection of saNppa-LNPs drove pro-ANP secretion for at least four weeks and clearly outperformed conventional mRNA at equivalent doses. A single injection of conventional non-replicating *Nppa* mRNA “failed to produce significant cardioprotective effects, whereas a single saNppa-LNP injection markedly improved both cardiac function and histological outcomes,” the authors report – underscoring that self-amplification is essential to achieving therapeutic benefit with one administration.

Reshaping the cardiac microenvironment

Using single-nucleus RNA sequencing of left ventricular tissue, the researchers found that saNppa-LNP treatment reshaped the paracrine profile of natriuretic peptide receptor 1-positive (NPR1+) en-

dothelial and epicardial cells, creating what the authors describe as “a proregenerative microenvironment that promoted cardiomyocyte cell-cycle reentry and suppressed the expansion of profibrotic periostin-positive fibroblasts.” The treatment reduced maladaptive extracellular matrix deposition (this forms the scar tissue, which stiffens the heart wall and impairs its ability to pump effectively), while nudging injured cardiomyocytes back towards healthier phenotypes.

The benefits held across clinically relevant comorbidity models – aged mice, atherosclerotic mice, and a type 2 diabetic MI model – as well as in a delayed-treatment paradigm where injection was given seven days post-infarction. In a swine ischaemia/reperfusion model, a single IM injection effectively preserved cardiac function and limited fibrosis at 28 days.

Safety and the road to the clinic

Longitudinal safety assessments revealed only transient local inflammation at the injection site, with no evidence of adaptive immune activation or systemic toxicity at day 28. “Going from something that required opening the chest to something that can be delivered with a standard injection is a huge leap forward,” said Dr Huang. “It brings this type of therapy into a space where it could truly be used in everyday clinical care.”

Human trials remain some way off. The team will continue to study safety, timing, and dosing. Nevertheless, the use of FDA-approved LNP formulations and demonstration of efficacy in large-animal models considerably strengthens the translational case. MEH

Reference:

Zhang, K., Tao, H., Zhu, D., et al. (2026). Single intramuscular injection of self-amplifying RNA of *Nppa* to treat myocardial infarction. *Science*, 391(6789), eadu9394. <https://doi.org/10.1126/science.adu9394>



M.G. Finn, a Regents' Professor in the School of Chemistry and Biochemistry and a frequent collaborator, is shown at left in the lab with Nick Housley, an assistant professor in Georgia Tech's School of Biological Sciences.

Smart nanoparticles hunt down tumours and spare healthy tissue – without needing a map

A Georgia Tech team has engineered microscopic gel particles that find and accumulate in tumours across multiple cancer types without requiring any tumour-specific targeting molecules. The system, published in *Nature Communications* in January 2026, delivers gene-silencing RNA payloads that suppress cancer-driving oncogenes and sensitise previously drug-resistant tumours – with minimal toxicity across three species.

Cancer treatment has long been defined by a brutal trade-off: the drugs powerful enough to kill tumours are often the same ones that ravage healthy tissue. The field of targeted drug delivery has spent decades trying to solve this problem, typically by attaching molecular “address labels” to nanoparticles so they can home in on specific tumour markers. But what if a delivery system could find tumours on its own – without needing to know anything about them in advance?

That is precisely what Nick Housley, an assistant professor in Georgia Tech's School of Biological Sciences, and his colleagues appear to have achieved. Their platform, called SANGs – self-agglomerating nanohydrogels – is described in a paper published in *Nature Communications* on 7 January 2026.

“The problem isn't that these drugs don't work,” said Housley. “It's that they affect far more of the body than they need to.”

An unexpected property hiding in plain sight

SANGs are core-shell polyacrylamide-based nanoparticles, roughly 110 nanometres in diameter, loaded with RNA interference molecules by swelling lyophilised particles in an RNA-containing buffer. Encapsulation efficiency is approximately 93%, and the particles remain stable for at least 60 days across a range of storage temperatures.

What makes SANGs unusual is a dynamic physical behaviour that emerges at higher concentrations: the particles spontaneously agglomerate. Under transmission electron microscopy, SANGs at low concentrations behave as expected – discrete, well-dispersed particles. Above

a threshold concentration, they begin to cluster into chains and islands of tightly associated nanogels.

The team proposes that this self-agglomeration is the key to preferential tumour accumulation. Tumour vasculature is characterised by sluggish blood flow and increased tortuosity compared with normal capillary beds. These conditions allow more time for SANGs to aggregate, entraining the particles within the tumour microenvironment. As agglomeration is a nucleated rather than a linear process, once aggregates begin to form, further accumulation accelerates.

“We don't need to know anything about the tumour ahead of time,” said Housley. “These particles circulate through the body, but they persist where tumours create those conditions.”

Tumour-agnostic delivery across species

The biodistribution results are striking. Following intravenous injection in murine ovarian and breast cancer models, SANGs began accumulating at tumour sites within 30 minutes and reached peak concentrations – approximately 200-fold above background – at 72 hours. Non-cancerous organs remained largely devoid of SANG signal for up to one week. Compared with LP01 lipid nanoparticles, a well-characterised liver-targeting vehicle, SANGs showed 10 to 30 times fewer labelled cells across all cell types in the liver and kidney.

The platform performed comparably in a genetically engineered rat model of colorectal cancer, and in a late-stage metastatic ovarian cancer model, co-localisation anal-

ysis showed a strong association between SANG fluorescence and tumour bioluminescence ($R = 0.84$, $p < 0.001$), with fewer than 0.1% of metastatic loci untargeted.

Silencing oncogenes and overcoming drug resistance

A single intravenous infusion of SANGs loaded with siRNA against EGFR or KRAS produced dose-dependent reductions in mRNA and protein expression in both ovarian and colorectal cancer models. In a cisplatin-resistance model, sequential SANG doses carrying miR-429 and anti-EGFR siRNA, followed by cisplatin, produced significant inhibition of tumour growth compared with chemotherapy alone. As the authors note, SANGs “sensitize previously resistant tumours while being safe and well tolerated in simulated clinical applications across three species.”

This addresses what Housley calls “a whack-a-mole problem” in oncology. “Tumours are constantly changing. You hit one thing with a targeted therapy, and that pressure causes the tumour to evolve. That's a big problem with classically targeted therapies.”

Toxicity studies across mice, rats, and a 73 kg Yucatan swine were reassuring, with no mortality or significant histopathological changes observed even at doses up to 96 times the anticipated starting human dose.

Housley and his team are now planning studies with additional drug payloads and a broader range of cancer types ahead of human clinical trials. “It has the potential to be a breakthrough at the clinic,” he said. “Patients in early trials could benefit directly; that's rare and exciting.” 

Reference:

Housley, S. N., Bourque, A. R., Matyunina, L. V., et al. (2026). Tumor agnostic drug delivery with dynamic nanohydrogels. *Nature Communications*, 17, 184. <https://doi.org/10.1038/s41467-025-66788-4>

Stool test beats scope: Landmark Swedish trial shows bowel cancer screening detects more early-stage tumours

A randomised controlled trial involving more than 278,000 individuals has found that both colonoscopy and faecal immunochemical testing significantly increase detection of early-stage colorectal cancer compared with no screening. Published in *Nature Medicine*, the SCREESCO trial provides the first direct comparison of these two modalities against a usual-care control arm, offering pivotal data to inform national screening policy.

Colorectal cancer (CRC) is one of the leading causes of cancer mortality worldwide, yet it remains uniquely amenable to prevention through the detection and removal of precancerous adenomas. Despite widespread clinical guidelines recommending screening in individuals aged 50–75 years, robust randomised evidence directly comparing colonoscopy and faecal immunochemical testing (FIT) against an unscreened control population has been strikingly limited – until now.

Results from the Swedish SCREESCO trial (Screening of Swedish Colons), published in *Nature Medicine* on 20 February 2026, confirm that population-level screening using either primary colonoscopy or two rounds of FIT meaningfully shifts the stage distribution of detected CRCs toward earlier, more treatable disease. The findings, drawn from over 278,000 60-year-olds across 18 of Sweden's 21 regions, represent one of the most comprehensive randomised datasets on CRC screening yet assembled.

A three-arm design with a critical control

The trial, which began recruitment in February 2014, assigned participants to one of three arms: a single once-only colonoscopy invitation; two rounds of a two-stool FIT conducted two years apart,



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Marcus Westerberg, docent at the Department of Surgical Sciences, Uppsala University

with colonoscopy triggered by a positive result; or a usual-care control group receiving no organised screening. The allocation ratio was 1:6 for colonoscopy versus control and 1:2 for FIT versus control, yielding a final analysed cohort of 31,113 in the primary colonoscopy arm, 60,267 in the FIT arm, and 186,671 controls. Participants were followed via Swedish national healthcare registers through to the end of 2020, a median follow-up of 4.8 years.

A distinctive feature of the SCREESCO design is its use of two stool samples rather than one, combined with an unusually low positivity threshold of 10 µg haemoglobin per gram of faeces – considerably more



© Judith Hambrey

Anna Forsberg, docent at the Department of Medicine Solna, Karolinska Institutet and responsible for the SCREESCO study.

sensitive than the 40–80 µg thresholds employed in Sweden's routine regional screening programmes.

“The results show that both types of screening lead to more cases of early-stage cancer being detected, especially in the first two years when most of the interventions were carried out,” said Marcus Westerberg, docent at the Department of Surgical Sciences, Uppsala University, and the study's corresponding author. “This is good news because, more often than not, cancer that is diagnosed early can be successfully treated. For many types of cancers, there is no preventive treatment option, but in this case, it is also possible to detect and remove adenoma – precur-

sors that might otherwise have developed into cancer.”

Early-stage detection rises across both screening arms

The headline finding concerns the incidence of stage I–II CRC. In the primary colonoscopy arm, the rate of early-stage disease was 58.7 per 100,000 person-years, compared with 42.5 per 100,000 in controls – an incidence rate ratio (IRR) of 1.38 (95% CI: 1.09–1.74). In the FIT arm, the corresponding rate was 52.7 versus 44.4 per 100,000 in controls (IRR: 1.19, 95% CI: 0.99–1.43). Cumulative incidence proportions were higher in both intervention arms throughout most of the follow-up period.

The authors note that this excess early-stage detection was most pronounced during the first year after randomisation, coinciding with the period of peak screening activity, before attenuating over time.

Regarding advanced disease, the rate of stage III–IV CRC was somewhat lower in the colonoscopy arm than in controls (IRR: 0.86, 95% CI: 0.67–1.11) and significantly lower in the FIT arm (IRR: 0.71, 95% CI: 0.58–0.86). Cumulative incidence proportions in the intervention arms tracked controls initially, before diverging to below-control levels after approximately four years, particularly in the FIT group – consistent with a preventive effect attributable to adenoma removal.

“We can show that cases of advanced cancer tend to decrease towards the end of the period in the group that was randomised to provide stool samples for FIT,” said Anna Forsberg, docent at Karolinska Institutet and last author responsible for SCREESCO. “This could be evidence of a preventive effect of the screening, through the removal of the precursors to cancer.”

Safety signals: Mostly transient, but warranting attention

The trial also systematically assessed potential harms associated with increased colonoscopy utilisation – an important

consideration given ongoing debate about the risk-benefit balance of population-wide endoscopic screening.

As the authors describe in the paper, “rates of cardiovascular and gastrointestinal events were slightly higher in the intervention arms during the first year and were subsequently more similar to controls.” At the end of follow-up, cardiovascular event rates were comparable across all arms, with the colonoscopy arm recording 1,475.8 per 100,000 person-years versus 1,475.8 in controls (IRR: 1.00). However, the rate of venous thromboembolism was elevated in the FIT arm compared with its controls (IRR: 1.39, 95% CI: 1.16–1.66), a finding the authors attribute speculatively to anticoagulant users pausing therapy during colonoscopy preparation. Gastrointestinal event rates were also somewhat higher in the FIT arm throughout follow-up, driven primarily by iatrogenic and unspecified gastrointestinal bleeding.

Critically, all-cause mortality was equivalent across all three arms. The rate was 554.6 per 100,000 person-years in the colonoscopy arm versus 579.0 in controls (IRR: 0.96, 95% CI: 0.89–1.03), and 577.1 in the FIT arm versus 601.8 in FIT controls (IRR: 0.96, 95% CI: 0.91–1.01). Serious adverse events directly linked to screening colonoscopies represented 0.2% of procedures, including two bowel perforations and 15 major bleedings across the diagnostic phase.

Participation rates and generalisability

One limitation of the trial bears direct relevance to screening policy: participation rates, particularly in the colonoscopy arm, were lower than anticipated. Only 35% of those invited to primary colonoscopy actually underwent the procedure, against an initial expectation of 50%. In the FIT arm, uptake was considerably more encouraging, with 55% participating in at least one round. This discrepancy underlines the logistical and acceptability advantages of a stool-based approach, particularly for population-scale implementation.

The investigators note that, as an intention-to-screen analysis, the observed increases in cancer detection would likely have been larger had participation rates been higher. The study was also restricted to individuals aged 60 years, precluding direct extrapolation to younger or older cohorts.

The SCREESCO trial does not yet report its primary endpoint: CRC-specific mortality at 15 years. That analysis will be presented with follow-up data through 31 December 2030. However, the authors are cautiously optimistic about the trajectory.

“This study gives us great hope that screening will also be shown to reduce mortality from colorectal cancer in both groups when the study is finally evaluated in about five years,” said Forsberg.

Implications for national screening programmes

In Sweden, a national FIT-based programme with biennial testing for individuals aged 60–74 years has been progressively rolling out since 2021, with full implementation planned for 2026. The SCREESCO data lend timely support to this approach, while also highlighting the potential value of a lower FIT positivity threshold and a two-sample protocol. As the authors conclude, “a programme of screening, by primary colonoscopy or two rounds of two-stool FIT using a low cutoff, detects more lower-stage CRCs than usual care... The increase in CRC detection implies a benefit of screening while the increase in adverse events suggests some initial harm.”

Whether the stage shift observed during the diagnostic phase will translate into the mortality reductions necessary to justify ongoing national investment remains to be confirmed. For now, SCREESCO offers the most rigorous randomised evidence to date that both modalities deliver measurable benefit over watchful waiting – and that the stool test, with its greater acceptability and lower procedural risk, may well prove the preferred instrument at scale. 

Reference:

Westerberg, M., Ludvigsson, J. F., Metcalfe, C., et al. (2026). Colonoscopy and fecal immunochemical testing versus usual care in diagnostic colorectal cancer screening: the SCREESCO randomized controlled trial. *Nature Medicine*. <https://doi.org/10.1038/s41591-026-04225-9>



The therapeutic challenge in paediatric oncology

Cancers in infants, children, teenagers and young adults present distinct therapeutic challenges. Treatment decisions must consider not only tumour control, but also the impact of therapy on growth, neurocognitive development, endocrine function and long-term survivorship.

Radiotherapy remains a key component of treatment for many paediatric malignancies. However, developing tissues are particularly sensitive to radiation injury, and late effects may manifest months or years after therapy. These may include neurocognitive impairment, growth disturbance, endocrine dysfunction, cardiopulmonary toxicity and secondary malignancies. Minimising unnecessary radiation exposure is therefore central to modern paediatric radiotherapy practice.

The dosimetric rationale for proton beam therapy

Proton beam therapy (PBT) offers a distinct physical advantage over conventional photon radiotherapy. Through the Bragg peak phenomenon, protons deposit the majority of their energy at a defined depth, with minimal exit dose beyond the target volume.

This enables highly conformal dose distribution and a reduction in integral dose to surrounding normal tissues. In paediatric patients, where long-term survivorship is a central consideration, reducing dose to developing organs and limiting low-dose exposure may help mitigate both acute toxicity and late effects.

By sparing healthy tissue beyond the tumour, proton therapy aims to balance effective tumour treatment with protection of critical structures that are essential for

a child's ongoing development and future quality of life.

Paediatric tumour types commonly considered for proton therapy

Proton therapy is most frequently considered for localised tumours, particularly those situated adjacent to critical structures. Indications commonly include:

- Central nervous system tumours (medulloblastoma, ependymoma, glioma, ATRT, craniopharyngioma, germ cell tumours)
- Sarcomas (rhabdomyosarcoma, Ewing's sarcoma, osteosarcoma, chordoma, chondrosarcoma)
- Neuroblastoma
- Wilms tumour
- Spinal cord tumours
- Hodgkin and non-Hodgkin lymphoma
- Head and neck malignancies
- Ocular tumours such as retinoblastoma

Tumours of the brain, spinal cord and head and neck are particularly strong candidates due to the opportunity to reduce dose to organs at risk, including the cochlea, optic pathways, hypothalamic-pituitary axis, heart and lungs.

Supporting referrals from the Middle East

Proton International London proudly supports paediatric referrals from across the Gulf region and wider Middle East. We recognise that overseas treatment requires structured coordination between referring oncologists, sponsoring authorities and families.

Our consultant-led team provides timely case review and defined treatment planning timelines, alongside comprehensive clinical documentation to support spon-

sor approval processes. Direct clinician-to-clinician communication is prioritised throughout the pathway.

A dedicated international patient team assists families with visa documentation, Arabic interpreter services, accommodation coordination and practical logistics during their stay in London.

Our focus is seamless integration with the child's primary oncology team, ensuring continuity of care before, during and after treatment.

A consultant-led multidisciplinary model

Delivered in partnership with University College London Hospitals NHS Foundation Trust (UCLH), Proton International London provides private proton beam therapy within a leading academic hospital environment.

All paediatric referrals are reviewed within a multidisciplinary framework to ensure appropriate patient selection and alignment with the child's overall treatment strategy. 

Referrals

For paediatric cases where proton beam therapy may be appropriate, our team welcomes early referral discussions and clinician-to-clinician case review. Further information about services at Proton International London can be found at www.protonintlondon.com, or you can contact the team directly by email at enquiries@protonintlondon.com or by telephone on +44 (0)20 4629 3598 to discuss a potential referral.



Private Proton Beam Therapy for Paediatric Patients

Proton International London delivers private proton beam therapy in partnership with University College London Hospitals NHS Foundation Trust (UCLH), within one of the UK's leading academic hospital environments.

As the only private proton beam therapy centre in the UK, we provide consultant-led treatment for children and young people with complex malignancies, supporting referrals from across the Middle East.

Precision in Paediatric Oncology

Proton beam therapy enables highly conformal dose delivery with no exit dose beyond the tumour. In selected paediatric cancers, particularly those near critical structures, this may help reduce radiation exposure to healthy tissue.

For younger patients, where long-term outcomes are central, minimising unnecessary radiation dose is an important consideration.

Supporting Middle East referrals

Our dedicated international team provides coordinated support for families travelling from the Middle East, including travel guidance, interpretation and accommodation assistance. We work closely with referring oncologists to ensure clear communication and continuity of care throughout treatment.

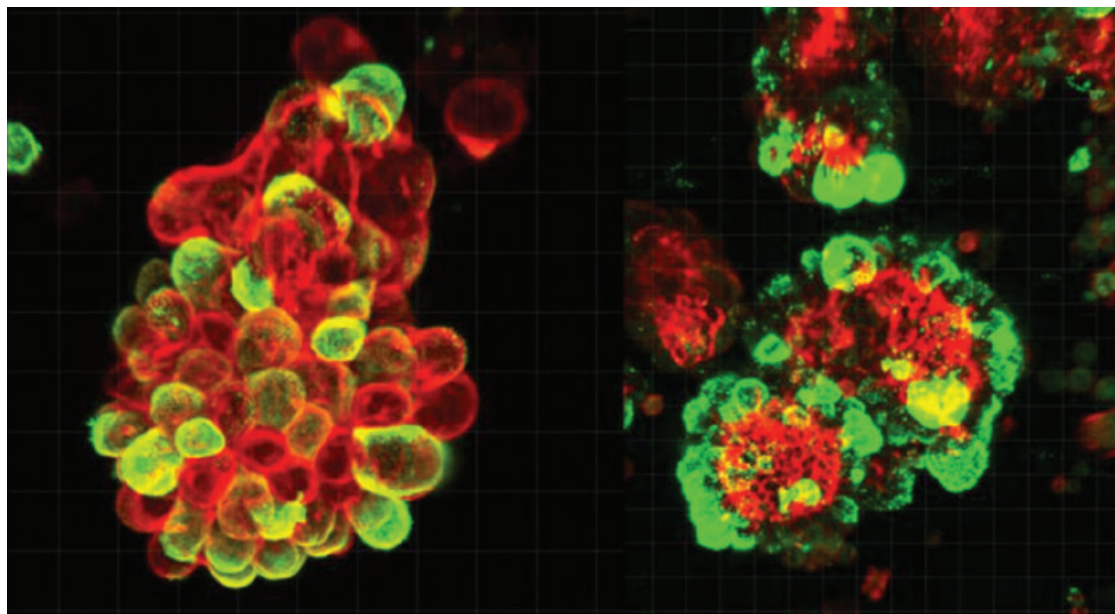
Treatment is available for government-sponsored, insured and self-funding paediatric patients. All referrals are reviewed by our consultant-led multidisciplinary team.

For referral discussions or case review, please contact Proton International London.

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Cancer cells (red) stick to mesothelial cell (green) and form hybrid spheres that cut into surrounding abdominal tissue.

Ovarian cancer hijacks the body's own protective cells to turbocharge its spread

A landmark study published in *Science Advances* has uncovered how epithelial ovarian cancer cells recruit the abdominal cavity's own mesothelial cells to form hybrid tumour clusters that invade tissue with alarming efficiency, resist chemotherapy, and metastasise at a pace that has long baffled clinicians. The findings explain a mechanism central to the disease's notoriously poor prognosis and point towards new therapeutic targets.

Ovarian cancer kills more women than any other gynaecological malignancy, and the reason for its devastating speed has never been fully understood – until now. A new study from Nagoya University, published on 6 February 2026 in *Science Advances*, reveals that epithelial ovarian cancer (EOC) cells do not spread alone. Instead, they conscript the mesothelial cells that line the abdominal cavity, forming hybrid spheroids that act as highly efficient invasion machines.

The research, led by Dr Kaname Uno and Professor Masato Yoshihara at Nagoya University's Graduate School of Medicine, draws on clinical ascites samples from 1,856 patients with ovarian cancer, advanced multiphoton microscopy, single-cell RNA sequencing (scRNA-seq), mouse models, and proteomic analysis to construct a detailed mechanistic picture of peritoneal metastasis – the process by which cancer disseminates across the abdominal cavity.

Cancer spheroids – not single cells – dominate the ascites

One of the study's most striking early findings concerns the physical form of cancer cells in ascitic fluid. Previous models frequently described EOC cells as travelling through the abdominal cavity as single entities. The Nagoya team found this to be the exception rather than the rule. Examining cytology slides from clinical ascites specimens, they found that 99.5% of EOC cells were present as spheroids – compact, multicellular clusters. Furthermore, morphological assessment, immunohistochemical staining, and scRNA-seq analysis consistently identified mesothelial cells as the predominant non-malignant cell type in ascites, accounting for approximately 30% of its cellular composition.

Using the marker HBME1 – identified as the most reliable tool for distinguishing mesothelial from cancer cells – the investigators examined 383 EOC spher-

oids from 28 patients with high-grade serous ovarian carcinoma (HGSOC). More than 60% contained mesothelial cells. Strikingly, in patients who had received chemotherapy prior to surgery, the proportion of HBME1-positive mesothelial cells within spheroids was significantly higher than in treatment-naïve patients (29.8% versus 13.8%, $P < 0.001$), suggesting that mesothelial-enriched clusters confer chemotherapy resistance.

ACMSs: A partnership that weaponises normal cells

The researchers termed these hybrid structures aggregated cancer-mesothelial spheroids (ACMSs). Their key discovery was that when EOC cells form spheroids with mesothelial cells, it is the mesothelial cells – not the cancer cells – that lead the invasion. Using real-time time-lapse imaging and collagen invasion assays, they observed a clear four-phase sequence: the initial mixing of cell types within the

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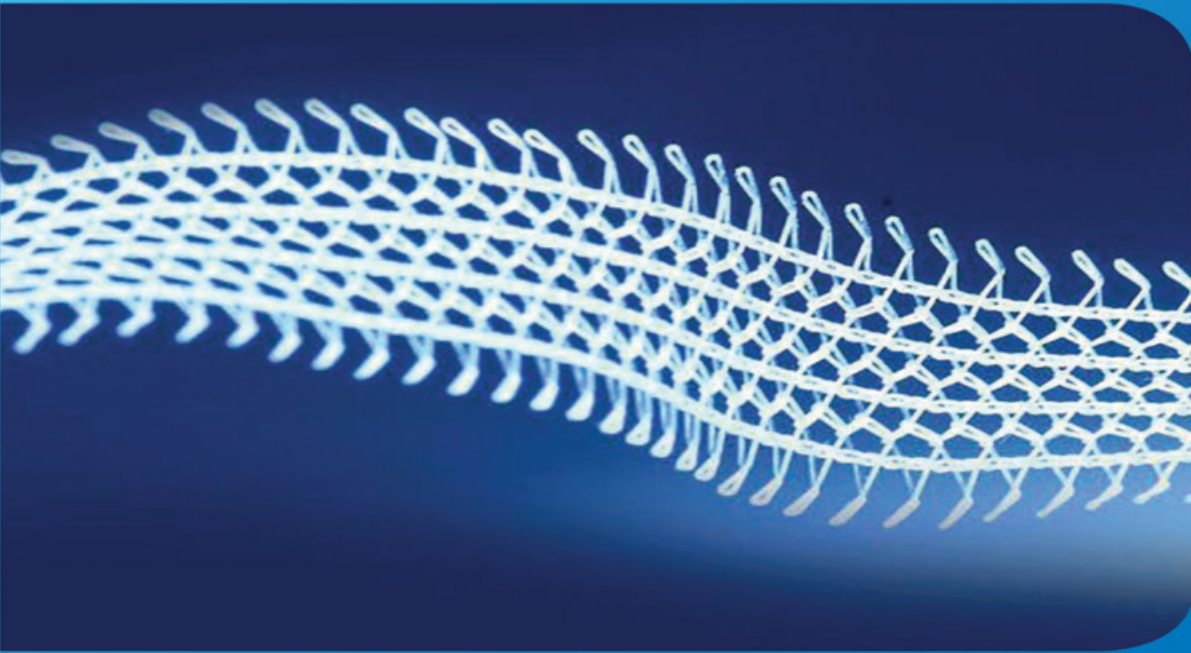
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ACMS; attachment to the mesothelial layer; aggressive invasion by mesothelial cells; and finally the migration of EOC cells through the pathways created.

In quantitative terms, the invasive area of ACMSs extended to more than 400% of the original spheroid area within 48 hours, compared with just 125% for spheroids composed solely of EOC cells. Mesothelial cells from ACMSs invaded collagen to a depth exceeding 300 μm , while homotypic EOC spheroids penetrated less than 100 μm . As the authors note, “EOC cells alter mesothelial cell characteristics through spheroid formation to acquire invasion capabilities into the mesothelial layer.”

The TGF- β 1 signal: cancer as puppet master

To understand why mesothelial cells become so aggressive within ACMSs, the team performed RNA sequencing on both cell types before and after spheroid formation. The results were striking in their asymmetry. RNA expression changes in EOC cells were relatively minor – only 70 genes were up-regulated – whilst mesothelial cells showed profound transcriptional reprogramming, with 455 genes up-regulated. The authors conclude that “EOC cells can induce peritoneal metastasis without direct dynamic RNA expression changes.”

The principal driver of mesothelial cell transformation was identified as transforming growth factor- β 1 (TGF- β 1), secreted in high concentrations by EOC cells. TGF- β 1 stimulation activated the Notch, PI3K-Akt, MAPK, and TGF- β pathways in mesothelial cells and up-regulated genes associated with epithelial-to-mesenchymal transition. This molecular reprogramming induced the formation of invadopodia – actin-based spike-like protrusions essential for degrading the extracellular matrix (ECM). TGF- β 1-stimulated mesothelial cells developed more than 30 invadopodia per cell, compared with approximately 5 in unstimulated cells.

The key molecular effector downstream of TGF- β 1 was identified as fascin-1, en-

coded by FSCN1, an actin-bundling protein critical to invadopodium maturation. Western blotting confirmed up-regulation of fascin-1, Tks5, integrin β 1, and myosin X in TGF- β 1-stimulated mesothelial cells. Matrix metalloproteinase MMP14, which activates MMP2 to degrade collagen, was also elevated and localised at invadopodia. When EOC cells were treated with siRNA targeting TGF- β 1, or when mesothelial cells were pre-treated with a TGF- β 1 receptor blocker, the invasive capacity of ACMSs was significantly curtailed in both in vitro and in vivo models.

Fascin-1: A prognostic marker and treatment target

Fascin-1 expression in stromal cells – predominantly mesothelial cells at metastatic sites – was significantly associated with worse progression-free survival in patients with HGSOE (P = 0.030, hazard ratio 2.15). By contrast, fascin-1 expression in cancer cells themselves showed no such prognostic correlation (P = 0.739). The fascin inhibitor NP-G2-044, currently in phase 2 clinical trials with a focus on ovarian cancer, significantly reduced collagen degradation by TGF- β 1-stimulated mesothelial cells in vitro, suggesting a plausible therapeutic avenue.

A personal motivation behind the research

The study was in part driven by a clinician’s direct experience of the disease’s ferocity. Dr Uno, who practised as a gynaecologist for eight years before pursuing research, described the case that redirected his career: “She had clear screening results just three months before doctors found advanced ovarian cancer. Current medical tools failed to detect the cancer early enough to save her life.” That experience motivated him to investigate why ovarian cancer spreads so rapidly.

The clinical data underpinning this work are substantial. Among 983 patients with HGSOE or endometrioid carcinoma drawn from the Tokai Ovarian Cancer Group, positive cytology – indicating the

presence of EOC cells in ascitic fluid – was independently associated with significantly shorter progression-free survival at all disease stages (hazard ratio 1.430; 95% CI: 1.157–1.766, multivariate analysis).

Reframing the tumour microenvironment in ascites

The study also corrects an important analytical blind spot in earlier scRNA-seq datasets. Several published analyses had failed to identify mesothelial cells as a distinct population in ascites, instead misclassifying them as fibroblasts. The Nagoya team re-analysed three separate datasets and confirmed that cells previously annotated as fibroblasts in ascites samples robustly expressed mesothelial-specific markers including LRRN4, KRT8, KRT18, MSLN, UPK3B, and WT1. More than 90% of stromal cells in ascites were, in fact, mesothelial cells.

Because ACMSs are detectable in ascitic fluid, monitoring the composition of these clusters could also offer a non-invasive means of tracking disease progression and predicting chemotherapy response. In their conclusion, the authors are direct: “These findings represent a unique characteristic of ovarian cancer in that it rapidly induces numerous peritoneal metastases within a few months of acquiring malignant characteristics... This indicates that targeting ACMSs may be a suitable treatment strategy to reduce EOC cell survival in ascites, invasion of the peritoneal cavity, and resistance to chemotherapy.”

By demonstrating that ovarian cancer effectively outsources its most destructive work to co-opted normal cells – leaving its own genome relatively unchanged – this study reframes how researchers and clinicians must think about EOC progression. The cancer’s apparent lack of aggressive genetic evolution is not a limitation; it is a strategy. Blocking the TGF- β 1/fascin-1 axis, or disrupting ACMS formation itself, may represent the most rational approach yet to slowing one of gynaecological oncology’s most lethal diseases. 

Reference:

Uno, K., Yoshihara, M., Yamakita, Y., et al. (2026). Mesothelial cells promote peritoneal invasion and metastasis of ascites-derived ovarian cancer cells through spheroid formation. *Science Advances*, 12, eadu5944. <https://doi.org/10.1126/sciadv.adu5944>

Innovating care. Transforming lives.



Moral zombies and moral agents: Why AI can never replace the ethical heart of nursing

As artificial intelligence surges into clinical settings – from algorithmic staffing tools to humanoid robotic nurses – a landmark paper in the *Hastings Center Report* is sounding a clear warning: no matter how convincingly a machine simulates empathy or generates context-aware responses, the moral soul of nursing must remain irreducibly human. The stakes, the authors argue, could not be higher.

The scene is already familiar in forward-looking hospitals: AI tools summarising patient records, predicting deterioration, drafting clinical messages, and passively capturing conversations during care encounters. Administratively, algorithms are forecasting staffing needs, flagging fraud, and fielding patient queries. In research, machine learning and natural-language processing are reshaping how evidence is synthesised and clinical trials optimised. Yet, for all this capability, a nine-author team led by Connie M. Ulrich of the University of Pennsylvania School of Nursing is asking a question the industry has been reluctant to confront head-on: what happens to the nurse as a moral agent when AI starts doing more and more of the thinking?

Their paper, published in the *Hastings Center Report* in January–February 2026, argues that the answer to that question will define not just the future of nursing, but the integrity of healthcare itself.

What it means to be a moral agent

The paper opens with a deceptively simple definition. A moral agent, the authors write, is “a person who has the ability to discern right from wrong and to be held accountable for their actions.” In nursing, that definition carries extraordinary weight. With more than five million licensed registered nurses in the United States alone – the largest single group of healthcare professionals – nurses are, collectively, one of the most consequential moral forces in modern medicine.

Ulrich and colleagues trace the philosophical lineage of moral agency from Aristotle’s virtue ethics through Kant’s deontological autonomy to Hume’s sentimentalism, before arriving at the practical frameworks adopted by nursing’s own professional bodies. The American Association of Colleges of Nurses identifies three essentials for moral agency to occur: awareness of an ethical issue, making a moral choice, and acting on that choice. The American Nurses Association equates moral agency with moral autonomy – the freedom from internal and external constraints that might otherwise suppress ethical responsibility.

What makes the nursing context particularly demanding, the authors note, is that clinical workdays are routinely characterised by urgency, uncertainty, and vulnerability. Nurses frequently make decisions without clear rules, balancing scientific evidence with the values of individual patients and families, institutional expectations, and their own ethical judgement. This irreducible complexity, Ulrich and colleagues argue, is precisely what distinguishes a nurse from an algorithm.

The problem with ‘moral zombies’

Perhaps the most striking conceptual contribution of the paper is its engagement with the question of whether AI systems can themselves be considered moral agents. The short answer, the authors contend, is no – at least not in any morally meaningful sense.

They draw on the work of philosopher Carissa Véliz, who has termed algorithms

“moral zombies”: entities that cannot be held morally accountable because they lack sentience. Catrin Misselhorn has similarly argued that artificial systems are moral agents “only in a functional sense,” their apparent moral reasoning being nothing more than an artefact of information processing. Mario Verdicchio and Andrea Perin put it plainly: human moral agency is a combination of autonomy and sentience, and currently no AI system can be regarded as sentient.

The authors are unequivocal on this point. “We believe that nurses and healthcare professionals should not confer moral agency on AI-powered systems,” they write. The concern is not merely philosophical. As humanoid robots increasingly serve as home companions and assist with tasks once performed by human carers – furrowing their brows, holding conversations, even appearing to wince in pain – the language of “agentic AI” and “autonomous agents” risks blurring a boundary that matters enormously in practice.

Daniel Tigard’s concept of “artificial moral responsibility” adds an important nuance: even where an AI system behaves as if it were morally responsible, ultimate accountability lies with the humans associated with it – its programmers, its deployers, its users. In a clinical setting, that means the nurse.

Where AI must not be allowed to tread

The paper is careful to acknowledge the genuine benefits AI can bring: reducing



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University of Pennsylvania School of Nursing's Connie M. Ulrich, PhD, RN, FAAN, the Lillian S. Brunner Chair in Medical and Surgical Nursing, Professor of Nursing, and Professor of Medical Ethics and Health Policy.

cognitive burden, improving access to data, offering probabilistic insights. But Ulrich and colleagues are equally clear about where the technology should not go.

End-of-life and palliative care discussions are cited as a domain where “clear limitations on AI should be instituted.” These encounters involve grief, moral anguish, and deeply personal value systems. “Even with the sophistication of algorithmic responses,” the authors observe, “AI will do little to comprehend the grief and moral angst that often accompany these personal patient care decisions.” An intake assessment – where a nurse reads a patient’s eye gaze, verbal responses, and gestures to gauge mental state and capacity for self-efficacy – is another example of an intuitive exchange that cannot be delegated to a machine.

The authors make two especially firm recommendations. First, AI should never be used in nursing care without the nurse being fully aware of its implementation and retaining their moral agency in decision-making. Second, and more provocatively, AI should never be used to determine whether to hire someone as a nurse. Algorithms, they argue, “cannot predict or identify how one might respond in high-pressure critical patient-care situations,” nor can they assess empathy, moral judgement, or emotional intelligence –

qualities that patients and families value most deeply.

Nurses must lead, not follow

The paper’s recommendations extend well beyond what AI should not do. The authors are insistent that nurses must be active architects of the AI systems that will shape their practice, not passive recipients.

“Nurses must be part of the design teams for AI systems, and they must be trained not simply to use AI tools but also to evaluate and interpret their recommendations within a broader ethical framework,” the authors state directly. This includes understanding the limitations of data-driven algorithms, recognising the risks of bias, and communicating AI-supported decisions in ways that reflect patients’ values and lived experiences.

Transparency is also central to their recommendations. Healthcare systems and electronic health record vendors should clearly disclose when AI is generating summaries or treatment suggestions. This allows clinicians, patients, and carers to understand the provenance of information and judge how to act on it. On the broader question of informed consent – whether patients should be explicitly told when AI determined their treatment plan – the authors call for disclosure to remain “the default starting point in clinical practice and research” while urging

further normative and empirical work to clarify the issues.

A \$2.7 billion question

The commercial backdrop to all of this is considerable. The global robotic nurse industry is projected to grow at 17.07% annually, reaching \$2,777.61 million by 2031. That trajectory gives the paper’s arguments a sharp urgency. As Geoffrey Hinton – widely regarded as the “Godfather of AI” – has warned, 99% of investment has focused on developing AI’s capabilities while only 1% has gone towards understanding and mitigating its risks. His recommendation that the ratio should be closer to 50-50 resonates strongly with the paper’s call for nursing to exercise its professional authority over the technology entering its domain.

“Patients come to health care settings to be heard, seen, and valued by skilled professionals, not to seek care from machines,” the authors conclude. “While AI may simulate empathy or generate context-aware responses, it lacks intentionality, character, and the ability to be held accountable.” The alliance between nurses and AI may be an uneasy one, as they acknowledge – but it is, undeniably, already here.

The meaning of moral agency, Ulrich and colleagues insist, should not change as AI advances. What must change is how vigorously nurses and healthcare professionals assert and protect it. MEH

Reference:

Ulrich, C. M., Oh, O., You, S. B., et al. (2026). What does moral agency mean for nurses in the era of artificial intelligence? *Hastings Center Report*, 56(1), 18–23. <https://onlinelibrary.wiley.com/doi/epdf/10.1002/hast.70030>

Dubai's mega healthcare showcase rewrites the record books

The 2026 edition of World Health Expo (WHX) – formerly Arab Health – concluded on 12 February at the Dubai Exhibition Centre, marking the largest gathering in the event's 50-year history. Held from 9–12 February under the theme *Where the World of Healthcare Meets*, the four-day showcase drew over 235,000 professional visits from more than 180 countries, with upwards of 4,300 exhibitors presenting advances across medical devices, diagnostics, digital health, biotechnology, and life sciences. Six CME-accredited conferences, led by more than 300 regional and international experts, anchored a clinical programme spanning surgery, radiology, obstetrics, urology, and patient safety.

Future X Stage brings clinicians, investors and startups together to translate pilot programmes to clinical practice

The curtain has come down on World Health Expo (WHX) in Dubai, and if the inaugural Future X Stage is any indication, the global healthcare community is in no mood for incremental change. Running across all four days of the event, the new dedicated stage brought together clinicians, investors, startups and industry leaders to confront a single pressing question: how do you move promising healthcare technologies from pilot programmes into system-wide practice?

The Future X Stage sat alongside the Visionary and Frontiers Stages, with all three delivering Continuing Medical Education (CME)-accredited sessions covering surgery, obstetrics and gynaecology, urology, radiology, public health, and quality management.

Augmented reality finds its moment in the operating theatre

Opening day made a compelling case for augmented and mixed reality as a counterpoint to the robot-assisted surgery narrative that dominates headlines. Habel Gazi,

Founder and US Operations Director at HHG Healthcare & Life Sciences Consulting and MedApp S.A., argued that navigation technologies incorporating AI may ultimately have broader clinical reach than robotic platforms. “Though robot-assisted surgery tends to get the media buzz, in our view, there is an equally important market for augmented reality and mixed reality surgical navigation solutions incorporating AI for enhanced surgical outcomes,” he said. “While robot solutions tend to be quite expensive and geared toward complex surgeries, navigation technologies are more likely to be widely adopted and gain share more quickly across a much larger pool of surgeries.”

Digital operating rooms: the data is in

A follow-on session examined how centralised digital platforms are connecting surgical teams, medical devices and clinical data in real time. Andreas Hoefler, Senior Director at RIWOlink GmbH – a Richard Wolf Company – put con-

crete numbers to what integrated operating room infrastructure can achieve. “By working closely with our partners, we are boosting surgical time efficiency by 20%, creating 15% faster operating room turnover, and 20% more on-time first cases as well as delivering reliable, consistent data at all times,” he commented. For hospital administrators and surgical leads, those figures are difficult to dismiss.

Beyond the theatre

The stage also tackled broader systemic pressures. Michelle Ossmann of MillerKnoll and Deborah Wingler of HKS explored the evidence base linking healthcare environment design to nurse burnout, whilst Tomas Kolar, Chief Executive Officer of LINET, addressed how smart hospital infrastructure can support patient-centred care amid ageing populations and rising demand. Dr Farida Al Hossany, Deputy CEO of GLIDE, presented on the application of AI and digital tools to disease surveillance at population scale.

Dubai Healthcare City unveils AI pharmacy platform and longevity programme

Dubai Healthcare City (DHCC) used its platform at the World Health Expo (WHX) Dubai 2026 to announce two significant additions to its clinical portfolio: a science-led longevity programme and the Middle East's first AI-driven tele-compounding pharmacy platform. The announcements signal a deliberate shift in how precision medicine is being structured and delivered within one of the region's most mature healthcare free zones.

Longevity medicine gets a clinical home

Proto Clinic is leading DHCC's push into preventive, personalised care with a longevity programme that integrates advanced diagnostics, genomics, lifestyle medicine, and continuous monitoring.

Dr Wissam Adada, Founder and Chairman of Proto Clinic, said: "Longevity medicine requires a shift from reactive treatment to a clinically grounded, preventive approach tailored to each individual. Operating within DHCC's ecosystem allows us to deliver the programme within a regulated, innovation-ready environment that supports high standards of clinical care."

The programme reflects broader global trends, as ageing populations drive demand for individualised, evidence-based strategies in long-term health management.



The Formula was introduced at WHX Dubai as the Middle East's first AI-driven tele-compounding pharmacy platform

'The Formula' redefines compounding pharmacy

Perhaps the more striking announcement is 'The Formula', a first-of-its-kind AI-driven tele-compounding pharmacy platform launched within the DHCC ecosystem. The platform integrates clinical intelligence, pharmaceutical-grade compounding, and AI decision-support into a single secure digital workflow – allowing patients to access custom-compounded medications with personalised dosages through an end-to-end pathway covering digital consultation, AI-augmented clinical assessment, bespoke formulation, and regulated fulfilment.

Crucially, the platform is designed to augment rather than replace clinical judgement. Ameera Youssef, CEO of Acorn Research and Co-founder of The Formula, commented: "By combining AI-supported clinical insight with regulated compound-

ing pharmacy workflows, we are redefining how customised medicines are prescribed, prepared and monitored, while ensuring patient safety and clinical governance remain central."

Infrastructure built for precision medicine

Rashed Ahmed Alawadhi, Director of Property Management at Dubai Healthcare City Authority, said: "By providing fit-for-purpose facilities and integrated developments, we enable healthcare providers to operate efficiently, scale responsibly, and deliver high-quality outcomes within the DHCC ecosystem."

Established in 2002, DHCC is the largest healthcare ecosystem in the region, operating across medical care, wellness, academic research, and pharmaceutical services. MEH

AI predicts anaesthesia risk – and wins the startup crown

The Xcelerate competition gave early-stage companies the chance to pitch scalable solutions to a panel of investors and industry experts, and produced a worthy champion in Predictheon. The company's flagship product, the Predictheon PDA (Predictive Decision Assistant), is a Class IIb medical device that uses proprietary AI models to individualise anaesthesia administration and predict potential adverse events up to ten minutes before they occur – a clinically significant capa-

bility in any perioperative setting.

Judged by a panel including Connecting Giants and Unicorns (CGU), Deloitte, 10FT Ventures, In5 and Venture Hive, Predictheon was named the 2026 Champion of Innovation, receiving US\$12,000, exhibition space at WHX 2027, and strategic access to international investors and healthcare leaders. MeNOW Health claimed first runner-up with a US\$8,000 prize, whilst BiPER Therapeutics received US\$5,000. Both runners-up secured a startup pod at next year's event, and all three will participate in a Deloitte mentor-

ship programme. The geographic spread of finalists – from the UAE, UK and US to Rwanda, Estonia and Singapore – underlined Dubai's role as a genuine cross-continental connector for healthcare innovation.

Ross Williams, Commercial Director at Informa Markets Healthcare, said: "There is real momentum around the launch of the Future X Stage. It brings together innovators, investors, and healthcare leaders at a time when the sector is actively seeking scalable, implementable solutions." MEH



Prevention, AI, and governance tops the agenda at inaugural WHX Leaders' summit

Global healthcare leaders descended on Dubai's Expo City on 8 February 2026 for the inaugural WHX Leaders' summit – an invitation-only event uniting senior policymakers, health system executives, and innovators to set the agenda for the next phase of worldwide healthcare reform. Held under the patronage of the UAE Ministry of Health and Prevention and aligned with UAE Vision 2031, the closed-door summit arrived at a clear consensus: prevention-led care, responsible AI adoption, and robust governance must form the backbone of future health systems.

Opening proceedings, His Excellency Dr Amin Hussain Al Amiri, Assistant Undersecretary of the Health Regulations Sector at the Ministry of Health and Prevention, set an ambitious tone, outlining the UAE's intention to shift from reactive treatment towards personalised, preventive care. Central to this vision are AI, genomics, and unified national health data – tools the Ministry believes will enable more predictive and equitable healthcare models, positioning the UAE as a living laboratory for health innovation.

AI is the enabler – but humanity remains the purpose

Shaista Asif, Group Chief Executive Officer of Pure Health, challenged delegates to rethink the economic framing of healthcare altogether. "We're taking healthcare from being an economic burden to an economic catalyst. And this is the most important point, that this transformation is not about technology. Technology is just the enabler. Humanity is the purpose," she said.

Addressing the summit via video link, Dr Tedros Adhanom Ghebreyesus, Director-General of the World Health Organisation, acknowledged AI's considerable promise whilst sounding a note of caution. "AI holds huge potential to transform systems and expand access to essential health services, but it also carries risks that countries must understand and navigate," he said. He stressed that strong governance, trusted data, and sustained cross-border cooperation are non-negotiable prerequisites for safe implementation.

A market demanding more than treatment

Lord Stephen Carter, Group Chief Execu-

tive Officer of Informa, framed the current moment as both the most demanding and most consequential era for healthcare leadership, citing growing patient populations, rising numbers of older adults, and increasingly informed patients who expect personalised, preventive care rather than episodic treatment. WHX Leaders, he said, exists to turn that expectation into reality at a global scale.

The speaker roster was notably high-calibre, including health ministers from Iraq and the Kurdistan Regional Government, alongside senior figures from Mayo Clinic, Gavi the Vaccine Alliance, M42, NextMed Health, and AstraZeneca – reflecting the genuinely cross-sector nature of the challenges under discussion.

Looking ahead to 2027

The February summit served as a preview of the full WHX Leaders programme, which launches in 2027 alongside World Health Expo and WHX Labs. Together, the three events are intended to reinforce the UAE's standing as a global hub for healthcare leadership and investment. M&P



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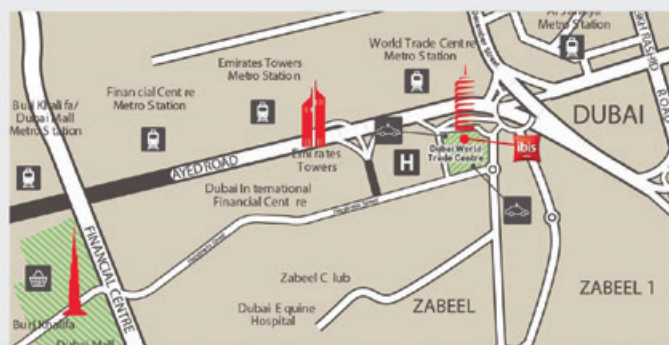


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Mecomed and MedTech Europe forge global alliance

Mecomed and MedTech Europe brought together senior industry figures, policy-makers, and trade association representatives in Dubai for a high-profile exchange during WHX Dubai. Held under the theme “The Power of MedTech: Driving Innovation Through Collaboration,” the event underscored growing momentum behind cross-regional regulatory alignment and patient access initiatives.

The joint session featured panel discussions and leadership dialogues covering several pressing issues, including the future trajectory of the MedTech sector, the downstream implications of MDR and IVDR revisions for the Middle East and Africa (MEA) region, and the regulatory frameworks governing artificial intelligence in clinical and diagnostic applications.

Policy alignment takes centre stage

A central thread running through proceedings was how coordinated policy engagement between global and regional bodies can accelerate the translation of innovation into patient benefit. Rami Rajab, Chief Executive Officer of Mecomed, commented: “The MedTech sector is at a pivotal moment, and



the policies we help shape today will determine how quickly patients can benefit from transformative technologies. Our role is to ensure that collaboration across the MedTech ecosystem translates into tangible impact for patients and healthcare systems across the Middle East and Africa.”

Diana Kanecka, Director of International Affairs at MedTech Europe, echoed this, said: “International collaboration is essential to ensuring that regulatory frameworks enable access to innovation so that medical technologies can reach patients around the world. By working closely with regional partners such as Mecomed, we can promote greater alignment, share best practices, and support policies that enable safe, responsible in-

novation while strengthening patient access to medical technologies.”

A market poised for significant growth

The timing of this collaboration is notable. The MEA medical devices market is projected to reach nearly US\$35 billion by 2032, making coherent regulatory frameworks and industry-policymaker dialogue not merely desirable but clinically and economically essential.

What comes next

Both associations confirmed they will sustain and build upon this partnership through joint roundtables, capacity-building sessions, and events designed to inform forward-looking healthcare policy across the region. MEH

Capital alignment takes centre stage at investment forum

The global healthcare investment community descended on Dubai for the World Health Expo (WHX), with a clear message emerging from the floor: capital decisions divorced from clinical reality are failing health systems worldwide.

Value over velocity: the shift to long-term thinking

The dominant theme of this year’s WHX Healthcare Investment Forum was the misalignment between capital deployment and genuine health system need. Investors, operators, and policymakers reached broad consensus that short-term return metrics are increasingly inadequate for evaluating healthcare assets, and that measurable patient outcomes must anchor investment strategy.

Dr Mussaad Al Razouki, Operating Partner at Deerfield Management, said: “The ultimate goal is, what can be the next golden standard of care. How can we improve access, how can we reduce cost, and how can we improve quality? The govern-

ments in this region are very encouraging of private sector involvement, and they want the private sector to have a bigger role in how healthcare is delivered and how healthcare is financed.”

The GCC region, in particular, is positioning itself as a testbed for value-based care models, with governments actively courting private sector participation to relieve pressure on public health infrastructure strained by demographic growth and workforce shortages.

The problem with desktop planning

A recurring criticism from clinicians and operators at the forum concerned what speakers described as “desktop” investment planning – the tendency of capital allocators to commission consultancy gap analyses without engaging directly with frontline operators or patients. The result, delegates heard, is investment that misses the mark clinically and commercially.

Joseph Hazel, Group Chief Executive Of-



Joseph Hazel, Group Chief Executive Officer of Apex Health, Qatar

ficer of Apex Health, Qatar, commented: “Quite often you will find that [investors] will do a desktop exercise. They bring in the consultants, review the gaps, and then set out their plans. But what they don’t do is go through, test it on the ground, deal with the operators, and find out what the competition in the marketplace is.”



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From dialogue to deals

WHX's Commercial Director at Informa Markets, Ross Williams, said the forum's value lies

precisely in collapsing the distance between strategic conversation and tangible action. "These discussions go beyond capital: they focus

on how investment can build stronger health systems, foster large-scale innovation, and drive meaningful impact," he commented. ■



UAE Integrative Medicine Council unveils strategic vision

The UAE Integrative Medicine Council used the World Health Expo in Dubai to unveil an ambitious strategic vision – and two genuinely novel AI-powered platforms – that could reshape how traditional medicine is practised, researched, and regulated across the region.

The event provided the backdrop for the UAE Integrative Medicine Council (UAEIMC) to go public with its strategic direction for the first time since formally adopting its roadmap in January 2026. Participating as part of 'Emirates Health' – a national consortium of UAE health authorities – the Council aims contribute to the UAE's ambition to become a global hub for Traditional, Complementary and Integrative Medicine (TCIM).

A seven-pillar framework takes shape

The Council's strategic roadmap rests on seven pillars: robust governance, integrated service delivery, comprehensive insurance coverage, education and capability building, advanced research and innovation, growth through local and international collaboration, and community engagement and awareness. Taken together, these form a coherent architecture for embedding TCIM within a regulated, evidence-based healthcare system – one that seeks to complement, rather than circumvent, conventional medical practice.

Sheikha Salama bint Tahnoon bin Mohammed Al Nahyan, Chair of the Council, said: "Today marks a strategic milestone in our journey to empower the Council's national mandate. We are developing an integrated healthcare model that prioritises

patient safety and elevates service quality, ultimately shaping the future of healthcare across the UAE and extending its impact far beyond our borders to the world."

She added that the Council's presence at WHX reflected a broader global shift: "As we witness a global shift from curative care toward resilient, holistic, and preventive health models, science-based integrative approaches are emerging as fundamental pathways for the evolution of healthcare systems."

'Dr Layla' enters the clinic – virtually

Among the key announcements was the introduction of 'Dr Layla', an AI-enabled research and educational platform developed by Dubai Medical University. Described as the world's first AI doctor specialising in traditional medicine and medicinal plants, the platform takes the form of a virtual faculty member and consolidates knowledge from disciplines – including Traditional Chinese Medicine, African Traditional Medicine, and Emirati Traditional Medicine – that have historically been transmitted orally, with little formal documentation.

The clinical and educational implications are significant. By standardising this knowledge base and making it accessible to healthcare professionals in a structured digital format, 'Dr Layla' addresses a long-standing gap between heritage medical practice and evidence-based clinical application. For practitioners dealing with patient queries about herbal or traditional therapies, this kind of validated reference system has real practical value.

Automating TCM drug development

The Council also showcased two platforms

focused on Traditional Chinese Medicine research. In collaboration with Emirates Drug Establishment, an automated TCM drug development system powered by Xtal-Pi – a Chinese intelligent laboratory specialist – was demonstrated. The platform claims to be the first of its kind globally, offering next-generation pharmacological evaluation with regulatory-aligned safety assessment built in.

Alongside this, the 'I-D-E-A Platform' from Jingtai Technology enables end-to-end separation, analysis, and evaluation of active TCM ingredients, supporting chemical library creation, active-ingredient screening, and unmanned monitoring via advanced data analytics. For researchers working on phytochemical standardisation and drug safety, this represents a meaningful step toward reproducibility and traceability in TCM.

Al Shifaa summit reinforces the conversation

Complementing the technology showcases, the Council convened the Al Shifaa Summit for Integrative Medicine at WHX. First held in 2025 as part of the Future Health Summit, this gathering brought together policymakers, clinicians, academics, researchers, and innovators to examine where integrative healthcare is heading and how the UAE can lead that conversation internationally.

The UAEIMC was established in September 2025 by HH Sheikh Mohammed bin Rashid Al Maktoum and the UAE Cabinet, with a mandate to govern the integrative medicine ecosystem and expand patient choice – prioritising prevention as firmly as cure. ■

Meets the highest hospital demands: CARDIOVIT FT-2



CARDIOVIT FT-2 fulfils the highest hospital demands thanks to its highly hygienic 15" multi-touch display, advanced cybersecurity and extensive connectivity features.

CARDIOVIT FT-2, SCHILLER's mobile 12-lead electrocardiograph with an optional thermal printer, is designed for the hospital environment. The device has a highly hygienic 15" multi-touch display, advanced cybersecurity and extensive connectivity features.

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Advanced cybersecurity features

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High-end diagnostic tools

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The CARDIOVIT FT-2 provides an optional thermal printer, allowing to choose the best configuration for paper-based or paperless hospital workflow.

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With the SpiroScout SP plus (optional), the CARDIOVIT FT-2 also becomes a spirometer. Thanks to GANSHORN's ultrasound technology, spirometry recordings are highly accurate, and the sensor is maintenance- and calibration-free.

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CARDIOVIT FT-2 with optional thermal printer and SpiroScout SP plus.

Tamarind on the table: A natural gel pad set to shake up diagnostic ultrasound

A Japanese research team has developed a solid ultrasound gel pad made from tamarind seed gum that matches conventional liquid gel for diagnostic image quality while significantly improving patient comfort. The feasibility study, published in *Scientific Reports* on 12 January 2026, points to a potential shift in how acoustic coupling media are designed, stored, and used across a wide range of clinical settings.

Ultrasound gel is, in many ways, the unsung consumable of diagnostic imaging. Without it, the air gap between the transducer probe and the skin surface causes acoustic impedance mismatches that degrade image resolution and confound anatomical interpretation. Yet despite its central importance, conventional commercial liquid gel has remained largely unchanged for decades – cold, messy, prone to drying out, variably applied, and consistently a source of patient dissatisfaction.

Now, researchers from Kindai University and Watanabe Kosei Clinic in Japan have reported the first clinical evaluation of a novel solid gel pad incorporating tamarind seed gum, a natural polysaccharide extracted from the endosperm of the tamarind seed (*Tamarindus indica*). The results of this early-stage feasibility study suggest that the material can perform comparably to the conventional liquid standard across multiple probe types and anatomical sites – while substantially outscoring it on patient satisfaction.

From a perceived drawback to a clinical asset

The innovation arose from an unexpected observation. “Initially, I encountered a gel made only from water and tamarind,” recounted Professor Hajime Monzen of the Department of Medical Physics at Kindai University, the study’s corresponding author. “The developer explained that the continuous release of moisture was considered a drawback. However, I realised that this property could help prevent drying during ultrasound examinations, reduce the formation of air gaps between the probe and the skin, and thereby maintain stable image quality.”



© Professor Hajime Monzen, Kindai University, Japan

Conventional liquid gel used in ultrasonography is often associated with patient discomfort and increased procedural costs. Recently, researchers from Japan have developed a reusable, solid ultrasound gel pad composed of tamarind seed gum. This gel pad demonstrated improved patient satisfaction compared to conventional gel and the imaging quality is comparable to conventional liquid gel. This gel pad can contribute to more accessible, patient-friendly, and sustainable ultrasound diagnostics in the coming years.

That property – known as syneresis, the controlled weeping of fluid from a gel matrix – forms the functional core of the new product. As described in the paper, the solid gel pad is composed of tamarind seed gum (0.1–5.0 wt%), polyhydric alcohol (25.0–70.0 wt%), and water (30.0–70.0 wt%), with preservatives included to inhibit microbial growth. Each pad is moulded to a standardised 50×50×5 mm format. The tamarind seed gum itself, a high-molecular-weight polysaccharide (50,000–1,000,000 Da) with a glucose backbone and β -1,4 linkages, provides

the structural matrix; glycerine and ancillary polyols constitute the primary polyhydric alcohol components.

Physical characterisation: Flexibility, stability, and self-recovery

Dynamic viscoelastic measurements across the range of 10°C to 50°C confirmed that the gel’s storage modulus (G') consistently exceeded its loss modulus (G'') at all frequencies tested – behaviour indicative of a stable, cohesive gel structure. This thermal stability is clinically relevant: it ensures consistent acoustic transmission properties regardless of

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The gel's compressive elastic modulus was measured at 0.0062 ± 0.0008 MPa at 25% compression, substantially lower than both commercially available comparator gel pads tested in the study. This softer mechanical profile facilitates conformity to irregular skin contours, particularly in areas with surface topology challenges such as the intercostal spaces used for cardiac imaging.

The syneresis rate of approximately 25% fluid release over one hour ensures a self-sustaining film of glycerine-containing fluid at the probe-skin interface. Critically, upon resealing the gel pad after surface desiccation, continued syneresis re-moistened the surface within 24 hours – a self-recovery capability not demonstrated by either of the two comparator commercial solid gel pads evaluated. The investigators also confirmed that accelerated stability testing at room temperature over three months produced no significant changes in rheological properties, syneresis behaviour, or acoustic coupling performance.

Image quality and patient satisfaction: the clinical trial

The feasibility study enrolled four healthy male volunteers, each undergoing paired imaging with the new solid gel and the conventional liquid gel (Aquasonic 100, Parker Laboratories). Three anatomical sites were evaluated using three different probe configurations: the common carotid artery and thyroid gland with a high-frequency linear probe (8–13 MHz); the liver using a convex probe (3–5 MHz); and the parasternal four-chamber cardiac view using a sector probe (1.8–4.2 MHz). Image quality was assessed in real-time by one radiologist and two radiologic technologists using a 5-point Likert scale.

For all four anatomical sites, there were no statistically significant differences in image quality scores between the new solid gel and the conventional liquid gel (all $p > 0.05$). The carotid artery and thyroid gland achieved ceiling scores (5.0 ± 0) with both gel types; liver scores were 4.8 ± 0.3 versus 4.7 ± 0.5 ; and the parasternal four-chamber view, arguably the most technically demanding site, scored 3.7 ± 0.3 with the solid gel

compared to 3.5 ± 0.3 with the liquid gel.

The patient satisfaction picture was starkly different. Across all four sites, mean satisfaction scores were significantly higher with the solid gel ($p = 0.02$ for all comparisons). For the carotid artery and thyroid gland, the solid gel achieved a maximal score of 5.0 ± 0 compared with a mean of just 1.9 ± 0.8 for the conventional liquid gel; the parasternal view recorded 4.7 ± 0.5 versus 1.2 ± 0.5 . The authors attributed this difference in large part to the gel's non-adherence to body hair and its ease of removal – a noted practical limitation of conventional liquid gel, particularly in chest imaging.

Longitudinal imaging in one volunteer over 60 minutes showed no deterioration in image quality or evidence of surface drying, suggesting extended usability beyond the 15-minute lifespan of unassisted conventional gel.

A natural polymer with sustainability potential

The authors highlight the broader materials-science significance of tamarind seed gum as the novel functional ingredient. As they note in their Discussion, the new gel's key innovative component is “tamarind seed gum, a natural polysaccharide extracted from tamarind seeds,” which “provides the unique self-moisturising function” and “may be less expensive and easier to obtain than synthetic alternatives.” The polysaccharide is both biocompatible and biodegradable, and tamarind-derived materials have established applications in pharmaceutical controlled-release formulations.

From a cost perspective, the paper provides a preliminary economic assessment suggesting the solid gel pad can be manufactured and marketed at approximately 1,000 yen (roughly US\$7) per single-use $50 \times 50 \times 5$ mm pad. Whilst higher than the direct per-use cost of conventional liquid gel – estimated at 200 mL for approximately 300 yen – the authors note that total procedural costs for liquid gel include pre-warming, post-examination cleaning, and variable usage volumes, factors not captured in simple unit-cost comparisons. The gel's room-temperature

storage stability and self-moisturising properties would also eliminate refrigeration requirements that apply to some existing solid gel alternatives.

Limitations and the road ahead

The investigators are candid about the study's limitations. The sample size of four participants fundamentally constrains statistical power and generalisability, and all subjects were male volunteers within a healthy body mass index range. The study lacked objective quantitative image quality metrics – contrast resolution, signal-to-noise ratio, lateral resolution, and penetration depth – and no phantom-based acoustic impedance characterisation was performed. Inter-rater reliability was not formally assessed, and the absence of blinded image evaluation creates potential for observer bias.

Further limitations include the absence of data on repeat use after disinfection, inapplicability to specialised procedures such as extracorporeal shockwave lithotripsy or high-intensity focused ultrasound, and no assessment in paediatric, obstetric, or other specialist imaging contexts.

Looking ahead, the authors advocate for “further research with a larger sample size” to build on this preliminary evidence, specifically calling for “standardised phantoms and quantitative analysis software” and “formal inter-rater reliability analyses and randomised crossover design with blinded image evaluation.” Prof. Monzen concludes with a broader vision: “From an academic perspective, this study helps clarify how the properties of tamarind seed gum relate to the way ultrasound waves travel. It presents a new approach to designing materials used in ultrasound examinations. In the future, this work may support ultrasound diagnostics that are easier to use, more patient-friendly, and more sustainable.”

Comprehensive shelf-life validation studies are ongoing in accordance with International Council for Harmonisation Q1A(R2) stability testing guidelines, and the research team notes that biocompatibility profiling under ISO 10993 endpoints will be required before any pathway to clinical market adoption. 

Reference:

Uehara, T., Monzen, H., Ujifuku, M., et al. (2026). Feasibility study of a newly developed solid gel pad containing tamarind seed gum for diagnostic ultrasonography in human subjects. *Scientific Reports*, 16, 104. <https://doi.org/10.1038/s41598-025-33208-y>



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Colour comes to ultrasound: New hybrid imaging technique captures tissue structure and blood flow in 3D

Researchers at Caltech and the University of Southern California have combined rotational ultrasound tomography with photoacoustic imaging to produce rapid, radiation-free, 3D colour images of the human body. Published in *Nature Biomedical Engineering* in January 2026, the technique images both soft-tissue morphology and vascular function simultaneously – opening new clinical possibilities in oncology, neurology, and diabetes care.

Standard ultrasound has long been the workhorse of bedside diagnostics: cheap, portable, and free of ionising radiation. Yet for all its utility, conventional ultrasonography has fundamental constraints – a limited field of view, two-dimensional output, and no ability to reveal the biochemical character of the tissue it images. Photoacoustic tomography (PAT), by contrast, can visualise blood vessels in vivid optical colour by detecting sound waves generated when pulsed laser light strikes light-absorbing molecules such as haemoglobin. Its weakness is a relative lack of structural detail. Now, a research team from the California Institute of Technology (Caltech) and the University of Southern California (USC) has found an elegant way to combine both modalities into a single platform – with results that could accelerate clinical imaging in fields ranging from breast oncology to diabetic foot care.

The new system, dubbed RUS-PAT (rotational ultrasound and photoacoustic tomography), was described in a paper published on 16 January 2026 in *Nature Biomedical Engineering*. It integrates fast panoramic rotational ultrasound tomography (RUST) with PAT to obtain three-dimensional ultrasound structural and angiographic images of the human body quasi-simultaneously, with a 10-cm-diameter field of view (FOV), submillimetre isotropic resolution of approximately 400 μm , and an imaging time of just 10 seconds per modality.

An unexpected design insight

The conceptual breakthrough underpinning the system came from Lihong Wang, the Bren Professor of Medical Engineering and Electrical Engineering at Caltech, who originally developed PAT more than two decades ago. The challenge of combining PAT with ultrasound lay in the hardware: conventional ultrasound requires large arrays of transducers both to generate and receive sound waves, which would add significant cost and complexity to a PAT system whose detection circuitry is passive by design.

Wang's solution was to reframe the problem. "I thought, 'Wait, can we just mimic light excitation of ultrasound waves in photoacoustic tomography, but do it ultrasonically?'" he said. The result was RUST: a mode in which a single-element ultrasonic transducer broadcasts a wide-field spherical wave into the tissue, while a small number of arc-shaped detector arrays, rotated around a central axis, capture the scattered signals panoramically. By co-axially mounting the source transducer with a stepper motor at the intersection of the arc-shaped arrays, the system achieves the equivalent of a full hemispherical detector array at a fraction of the cost and mechanical complexity.

Switching between RUST and PAT modes requires only the substitution of the ultrasound source transducer for an engineered optical diffuser – no significant hardware modification is needed. Both modes share the same arc-shaped detection

arrays, pre-amplifiers, and data acquisition system. As the authors note, this approach "does not require significant hardware modification. By contrast, adding conventional ultrasound tomography to a PAT system requires adding many pulsers and switches because of PAT's detection-only front-end circuit."

From phantoms to patients

The team validated the system first in phantom experiments, achieving an FOV of approximately 10 cm and isotropic spatial resolution of around 400 μm in both RUST and PAT modes. Total scanning time for each volumetric image was 10 seconds. They then applied the system to seven human subjects across four anatomical sites: the head, breast, hand, and foot.

For head imaging, the researchers imaged the skull-less hemisphere of a hemi-craniectomy patient – chosen because the intact skull presents a major obstacle for transcranial ultrasound and photoacoustic imaging at the 2.25 MHz centre frequency used in the current system. RUST images revealed scalp boundaries and muscular structures, while PAT provided a vascular network map of the cortical region. Crucially, a surgical suture area was independently resolved by both modalities and co-registered accurately, illustrating the complementary nature of the dual-contrast approach.

Breast imaging was performed in healthy subjects in the prone position, with PAT and RUST data each acquired within a

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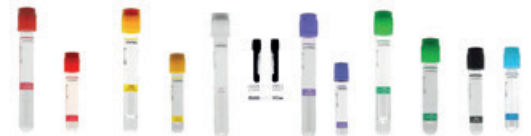
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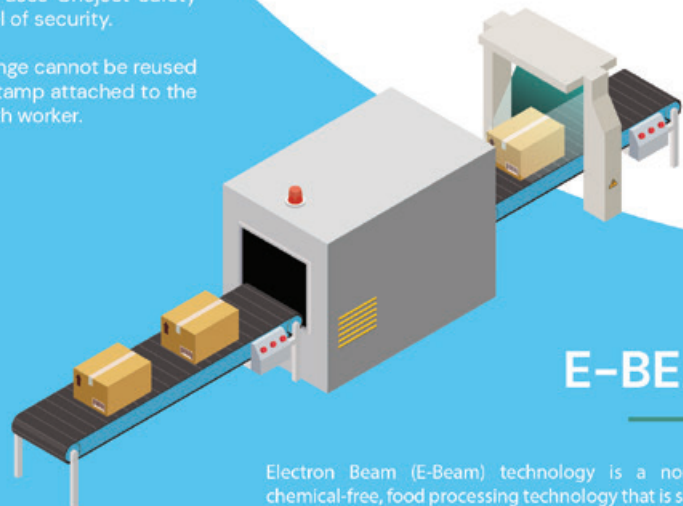
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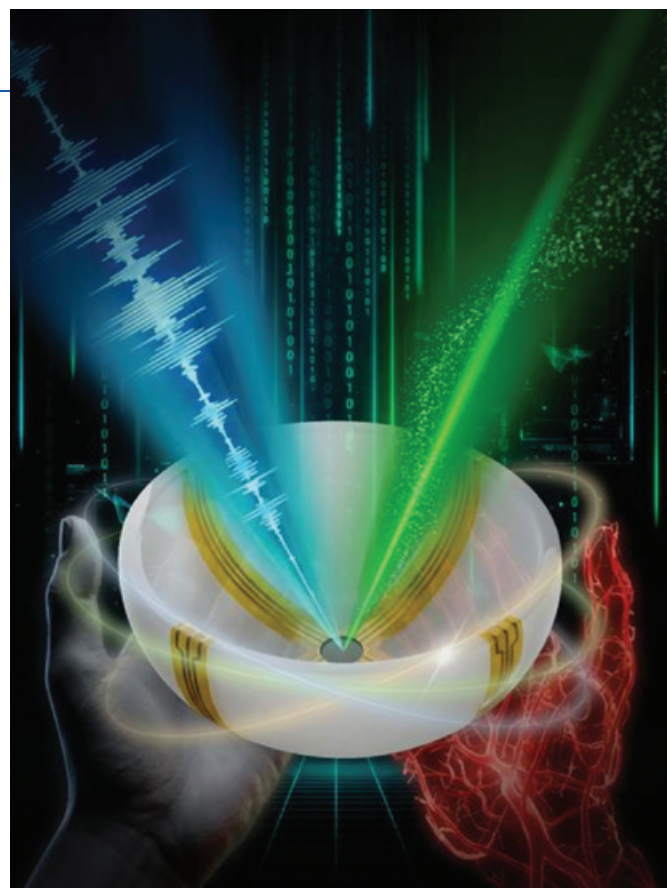
single breath-hold of 10 seconds. RUST visualised the three-dimensional structure of both breasts from the skin surface to internal features at depths of approximately 5 cm, while PAT resolved superficial and deep blood vessels within the breast parenchyma to a depth of around 3.2 cm. The authors note that “the dual-modality RUS-PAT images have the potential to measure the volume of the tumour using RUST and visualise the vasculature inside and close to the tumour through PAT in patients with breast cancer.”

Imaging of the extremities demonstrated the system’s sensitivity to both normal and pathological anatomy. In healthy hand subjects, RUST captured muscular boundaries and tissue planes while PAT tracked the vascular network through the palm. In foot imaging, the system was tested in a patient with diabetic foot ulcers – a population with significant unmet diagnostic need. RUS-PAT successfully identified both the tissue abnormalities associated with the ulcer through RUST and the corresponding vascular disruption through PAT. “By providing detailed visualisation of vascular abnormalities and tissue structures,” the authors write, “RUS-PAT offers valuable insights into the underlying pathophysiology of diabetic foot ulcers, paving the way for more effective management strategies and personalised care for patients with diabetes.”

Safety, cost, and clinical potential

A notable feature of RUS-PAT is its safety profile. The technique requires neither exogenous contrast agents nor ionising radiation – a meaningful advantage over CT angiography and MRI with gadolinium enhancement. Laser exposure in the current implementation remains within ANSI safety limits, and the mechanical and acoustic indices are well within FDA and IEC thresholds.

The system’s cost-effectiveness also distinguishes it from competing approaches. Dense hemispherical detector arrays, as used in some PAT systems, carry considerable expense. The rotating arc-array architecture of RUST synthesises equivalent



Yang Zhang

The RUS-PAT (rotational ultrasound tomography, RUST, combined with photoacoustic tomography, PAT) technique combines the benefits of ultrasound imaging for seeing tissue structure with those of photoacoustic tomography for revealing function of the vasculature.

hemispherical coverage using a fraction of the hardware. Co-lead author Dr Charles Y. Liu, a professor at the Keck School of Medicine of USC and director of USC’s Neurorestoration Center, described the broader significance: “The novel combination of acoustic and photoacoustic techniques addresses many of the key limitations of widely used medical-imaging techniques in current clinical practice, and, importantly, the feasibility for human application has been demonstrated here in multiple contexts.”

The current system achieves a penetration depth of 5 cm with RUST and approximately 3.2 cm with PAT for breast imaging – sufficient for cortical brain imaging in the post-craniectomy context, a substantial portion of the breast, and the full cross-section of the hand and foot. Deeper access may be achievable through lower-frequency transducer arrays and optimised laser wavelengths. The team also notes that a version of the system capable of simultaneous rather than sequential RUST and PAT acquisition has been demonstrated, with comparable image quality.

Outlook and limitations

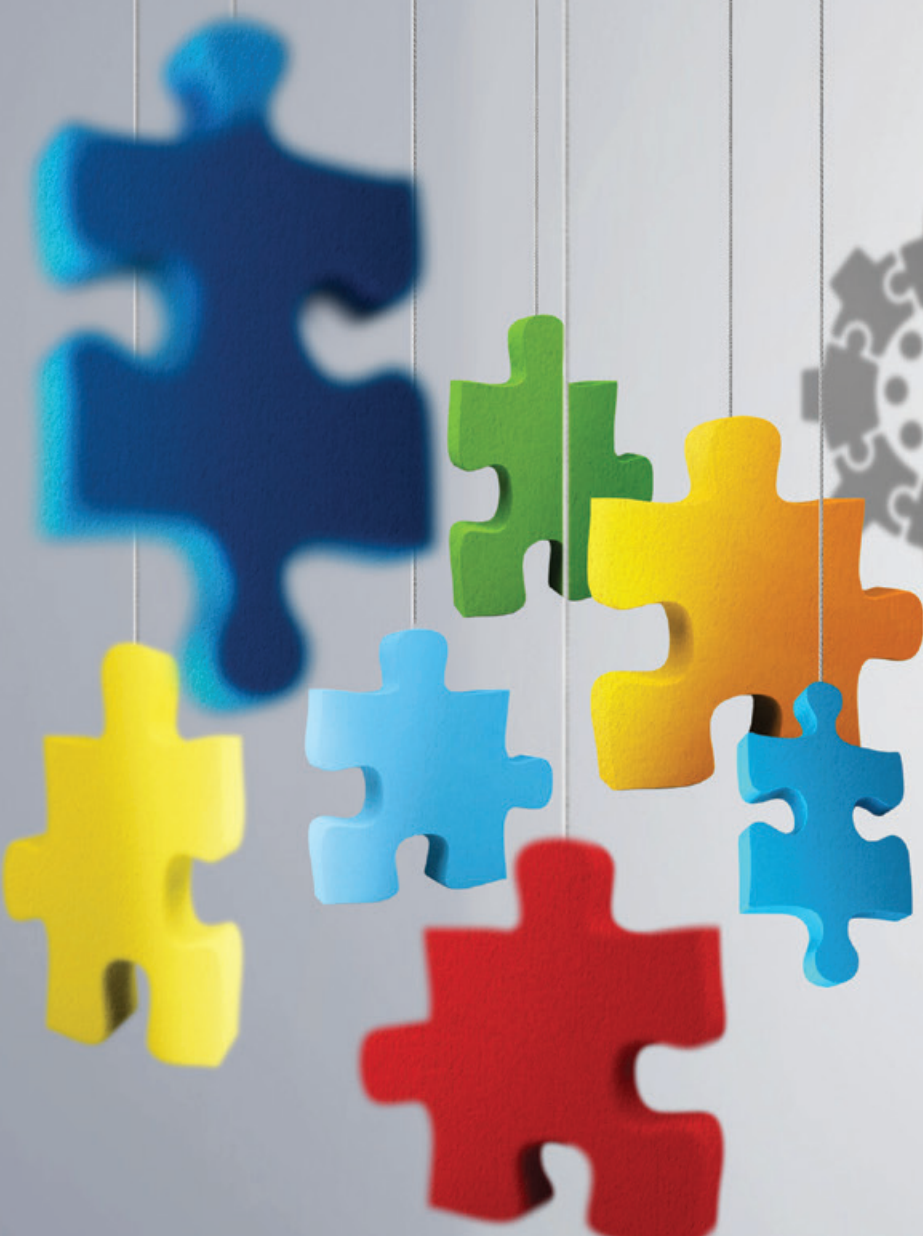
The authors are candid about current limi-

tations. Small vessel sensitivity, while sufficient to resolve structures below 1 mm in diameter, could be extended further using wider ultrasound bandwidths or signal-to-noise boosting strategies. The current prototype operates at 2.25 MHz, whereas clinical breast ultrasound commonly employs 8–15 MHz probes; higher-frequency versions of RUST could improve spatial resolution at the cost of reduced penetration depth. The overall cost of the system remains largely determined by the PAT component, and future iterations may benefit from lower-cost illumination strategies such as LED arrays.

Nevertheless, the paper concludes that “3D RUS-PAT is a powerful tool for high-speed, dual-contrast imaging of the human body with potential for rapid clinical translation.” The system is already in the early stages of translational development, having been demonstrated on both healthy volunteers and patients. With further refinement and validation in larger cohorts, RUS-PAT may offer clinicians a single-acquisition platform capable of answering both the structural and physiological questions that currently require separate, more taxing imaging investigations. MEH

Reference:

Zhang, Y., Na, S., Russin, J. J., et al. (2026). Rotational ultrasound and photoacoustic tomography of the human body. *Nature Biomedical Engineering*. <https://doi.org/10.1038/s41551-025-01603-5>



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This tiny hip exoskeleton could transform life after stroke



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Kai Pruyn, University of Utah graduate student, adjusts the exoskeleton on a study participant.

A battery-powered hip exoskeleton weighing just 2.6kg has achieved what ankle-based wearable devices have repeatedly failed to do – meaningfully reduce the metabolic burden of walking in stroke survivors with hemiparesis. Researchers at the University of Utah report an 18% reduction in the energy cost of walking in seven patients. Their findings were published in February 2026 in *Nature Communications*.

Stroke is the leading cause of long-term disability in the United States, with hemiparesis – weakness and impaired motor control on one side of the body – affecting around 80% of survivors. The consequence for walking is profound: individuals with hemiparesis expend roughly 60% more energy per stride than healthy walkers, leading to slower speeds, reduced endurance, increased fall risk, and a markedly diminished quality of life.

Previous attempts to address this using powered ankle exoskeletons or exosuits have, despite considerable research investment, consistently failed to reduce the metabolic cost of walking in portable form. The ankle's distance from the body's centre of mass makes it biomechanically and energetically costly to assist – mass at the ankle carries four times the metabolic penalty of equivalent mass at the trunk.

A different approach: Target the hip

The University of Utah team, led by senior author Tommaso Lenzi, associate professor of Mechanical Engineering, chose a different anatomical target. Their portable bilateral hip exoskeleton, weighing 2.63kg in to-

tal, straps around the pelvis and thighs and uses battery-powered motors to assist both flexion and extension at each hip joint, independently tuned for each participant.

The rationale is mechanistically sound. Individuals with hemiparesis typically compensate for impaired ankle push-off by recruiting their hip joints to generate additional propulsive energy – a strategy that is metabolically costly. By offloading the hips, the device targets the compensatory mechanism directly.

“Portable ankle exoskeletons have failed to reduce the energy required for stroke patients to walk, so we proposed a different approach,” said lead author Kai Pruyn, a graduate student in Lenzi's HGN Lab for Bionic Engineering. “Patients with ankle weakness often compensate with their hip joints, which requires extra energy. Our goal was to develop a powerful and fully portable hip exoskeleton. We found that the hip assistance effectively compensated for reduced ankle propulsion.”

Like removing a 13.5kg backpack

Seven participants with chronic post-stroke hemiparesis completed treadmill

walking trials with and without the powered exoskeleton. The average net metabolic rate fell an average of 18% when comparing walking without the device to walking with it. The reduction was consistent across all participants. The authors noted that this result is “equivalent to removing a 13.5kg backpack from a healthy individual. For someone with hemiparesis, that's a life-changing difference.”

As the authors note, this “provides important mechanistic insight into how hip assistance influences walking energetics post-stroke, demonstrating effective offloading of the user's joints.”

“Improving quality of life after a stroke is one of the biggest unmet challenges in healthcare today,” said Lenzi. “We're now showing that robotics can make a measurable impact here.”

The team is now working with partners in prosthetics and orthotics to develop a version suitable for home and community use, with the aim of supporting activities beyond level treadmill walking.

The authors noted that future work should explore human-in-the-loop optimisation and AI-based adaptive controllers. 

Reference:

Pruyn, K., Murray, R., Gabert, L., et al. (2026). Portable hip exoskeleton improves walking economy for stroke survivors. *Nature Communications*. <https://doi.org/10.1038/s41467-026-69580-0>



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