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CDMOs CLEAN UP ACT:

Environmental Responsibility

"There are over 650 cell and gene therapy clinical trials underway in APAC region"
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Acknowledgement/ Feedback

The opinion piece on precision medicine by Terumo in BioSpectrum Asia's March edition looks nice!

- Charlene, Singapore

The features on Women's Day in the March issue have come out well.

- Julianna, USA

Thanks much for featuring the perspective by Orum Therapeutics on antibody-drug conjugates (ADCs). Looking forward for more collaboration.

- Michelle, Korea

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Letter from Publisher

Ravindra Boratkar
Publisher &
Managing Editor,
MD, MM Activ Sci-Tech
Communications Pvt. Ltd.

Dear Readers,

Sustainability is becoming a crucial emphasis for Contract Development and Manufacturing Organisations (CDMOs) as pharmaceutical firms prioritise eco-friendly practices and require their CDMO partners to implement sustainable methods, aligning with their corporate social responsibility objectives and sustainability goals. Sustainable methods can result in improved operations, waste reduction, and decreased expenses over time. CDMOs must strive to reduce their environmental footprint and promote a healthier planet. The cover story discusses how CDMOs are implementing various additional strategies to enhance sustainability, such as recycling industrial wastewater, minimising waste, and optimising heat and packaging usage. These initiatives support resource conservation, reduce environmental effects, and correspond with eco-friendly manufacturing methods.

According to a Japanese study, pharmaceuticals alone are responsible for an estimated 11.3 $MtCO_2$-e (27 per cent of healthcare emissions), and healthcare activities contribute roughly 5 per cent of the country's GHG emissions. The production of trash, effluent discharge, and different solvents can all contribute to air and water pollution in addition to greenhouse gas emissions from pharmaceutical manufacture. It is commonly known that the waste produced during the production of antibiotics has the potential to produce environmental hotspots of antimicrobial resistance, which is an alarming problem worldwide.

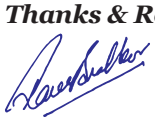
Concerns are also raised by APIs (active pharmaceutical ingredients) discharged into wastewater, which may result in drug-resistant bacteria and establish a direct link between environmental stewardship and medication effectiveness. An industry consultant explains how the goal of sustainable biomanufacturing, which aims to create pharmaceutical products using methods with minimal impact on the environment, has gained significant attention.

After pulling US funding from the World Health Organisation (WHO), US President Donald Trump has now announced a 25 per cent tariff on pharmaceutical imports. With countries like India and China being major suppliers to the US market, this move raises serious concerns about the future of drug prices, supply chains, etc. While it is still unclear whether these tariffs will achieve their goal of boosting US manufacturing, the next few months will be critical in assessing their full impact on the global pharmaceutical industry. Our correspondent has a piece that envisions the future of the pharmaceutical sector in a post-tariff world and how companies can effectively adapt to the rapidly changing geopolitical landscape.

A thriving medtech sector requires people with engineering, product development, and manufacturing skills. While advancements in robotic surgery and artificial intelligence are driving a significant transformation and opening up new opportunities, workers in the medtech industry frequently lack access to the training or educational resources needed to adopt new skills. This digital divide has led to an increasing demand for scalable and accessible upskilling initiatives. As a result, the Asia-Pacific region's sector must prepare its workforces for a technology-driven future to realise economic growth, social equity, and innovation. Our correspondent takes a closer look at these gaps and the most viable emerging solutions.

I am sure you will find this edition a great read.

Thanks & Regards,



Ravindra Boratkar
Publisher & Managing Editor

COVER 18

CDMOs Clean Up Act: Environmental Responsibility

Sustainability is no longer a buzzword in the background, but has become critical as the pharmaceutical industry faces evolving regulations and growing environmental concerns. Manufacturing, which accounts for approximately 80 per cent of a pharmaceutical company's indirect emissions, is now a key focus in the push toward more sustainable practices. With mounting pressure to reduce carbon footprint, contract development and manufacturing organisations (CDMOs) companies are ramping up the integration of green technologies into their manufacturing processes.

Tim Hansen,
Director, Environmental, Social & Governance (ESG), PCI Pharma Service

Green Pharma

Aarthi Janakiraman,
Research Director,
Advanced SciTech, Everest Group

Tariff War

MedTech

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THE DRAGON ATTRACTS BIG PHARMA, BIG BUCKS

Dr Milind Kokje
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Multi-national pharma giant AstraZeneca's recent announcement to set up a global strategic R&D centre in Beijing is significant in multiple ways. Making a wide range of investments through partnerships totaling $2.5 billion, of which this second R&D centre in the country is one part, the pharma giant is also planning to increase its headcount in the city to 1700. It will support early-stage research and clinical development through a state-of-the-art AI and data science laboratory.

AstraZeneca is not the only company investing in China. Many large pharma companies are licensing experimental drugs developed by small Chinese biotech companies. Venture capitalists are launching startups in the US using compounds sourced from China. This trend is surprising amidst the growing US-China biotech competition and conflicts. Billion-dollar licensing deals have been signed in the last two years, and the process is continuing. For instance, Merck has entered into an exclusive $1.9 billion global license agreement with Hansoh Pharma for an investigational oral GLP-1 receptor agonist.

In another instance, a little known 10-year-old Chinese company Akeso developed a new lung cancer drug. HSBC Quinhai Securities has revealed that the number of licensing deals jumped from a mere 46 in 2017 to over 200 in 2024, with the total amount of the deals going up from $4 billion to $57 billion. Large pharma transactions worth $50 million or more with Chinese firms grew 30 per cent from 2023 to 2024, as per Mergermarket. Of the total clinical pipeline, a minimum one-fifth of development programmes are from Chinese companies. Investment bank Stifel has reported that one-third of all major pharma licensing deals in 2024 involved Chinese companies, which grew from 12 per cent two years back.

This development is due to a decadal rise in medical breakthroughs, an indication that the hub of innovation is shifting from west to east. Investments into China are also significant, considering the tense US-China relations. Pharma giants licensing drugs developed by Chinese firms is proving to be a win-win situation for both as the startups are facing shrinking funding opportunities and multinationals are facing problems with higher R&D costs and reduced returns. For them, these small biotech startups are a cost-effective source of innovation. The Chinese Communist Party (CCP) considers technological innovation as the "main battlefield of the international strategic game." The current investments of multinationals in China, although significant, may be affected due to US President Donald Trump's investment policy. Experts feel that this may bring uncertainty to the US-China biotech dealmaking.

Industry analyst Yaron Weber had observed that while innovations in China are growing, the US can license those drugs, launch new companies and bring those IPs. However, experts feel that the new policy may affect the US pharma companies' ability to fulfil these conditions. Trump's first investment policy has emphasised national and economic security and is restricting inbound and outbound investments related to "foreign adversaries" in strategic industries. The memorandum lists China and identifies healthcare and biotech sectors to be regulated.

The US plans to use the required legal instruments to restrict Chinese organisations from investing in the US in sectors like healthcare and at the same time, new and expanded restrictions are being imposed on outbound US investments in various sectors, including biotech, with allegations that China has been mixing civilian enterprises with military R&D and production under its military-civil fusion strategy. AstraZeneca's investment in China has surprised some since Chinese authorities are already investigating the company and its executives for alleged irregularities in drug import and even detained its former head in China. Despite this, the company's new investment is, indeed, a significant development. However, how the US-China relations will shape up in the near future, given President Trump's surprising moves, will decide the fate of further investments and licensing of drugs from Chinese companies. BS

Australia approves first and only treatment for chronic hypoparathyroidism

Singapore-based biopharmaceutical company Specialised Therapeutics (ST) has received the registration of YORVIPATH (palopegteriparatide) by the Therapeutic Goods Administration (TGA), for the treatment of chronic hypoparathyroidism in adults.

YORVIPATH was granted an Orphan Drug Designation and assessed through the TGA's Priority Review pathway. It is the first and only medicine to be listed on the Australian Register of Therapeutic Goods (ARTG) for the treatment of chronic hypoparathyroidism.

YORVIPATH is a first-in-class PTH replacement therapy. A prodrug of parathyroid hormone (PTH [1-34]), YORVIPATH is administered subcutaneously once daily, with sustained release of active PTH designed to provide PTH levels in the physiological range for 24 hours/day. YORVIPATH is being made available in Australia by Specialised Therapeutics (ST), under an exclusive distribution agreement with global biopharmaceutical company Ascendis Pharma A/S that covers Australia, New Zealand, Singapore, Malaysia, Brunei, Thailand, and Vietnam.

India launches Patent Mitra to support medical innovations

At the third "International Symposium on Health Technology Assessment (ISHTA 2025)" at Bharat Mandapam, New Delhi, recently organised by the Department of Health Research (DHR), Ministry of Health and Family Welfare, Government of India, in collaboration with the World Health Organization (WHO) India Country Office and the Centre for Global Development (CGD), Union Minister of Health and Family Welfare, Jagat Prakash Nadda announced the launch of Patent Mitra initiative. Under the Guidance of NITI AAYOG, Indian Council of Medical Research (ICMR) in partnership with Department of Pharmaceuticals (DoP) and supported by Department for Promotion of Industry and Internal Trade (DPIIT), aims to build a robust and dynamic ecosystem that promotes innovation within biomedical research by providing comprehensive Patent and Technology Transfer (TT) support to innovators at every stage of the patent lifecycle, with a vision to translate innovative research in the biomedical domain to practical solutions driving meaningful advancements in public health across India.

New Zealand launches strategic approach to immunisation for next 5 years

The Health Ministry in New Zealand has launched a Strategic Approach to Immunisation 2025–2030, to provide a renewed vision and strategic direction for the immunisation system for the next five years. It incorporates key lessons learned from the experience during the COVID-19 pandemic, and sets out high-level objectives and goals for the immunisation system to better protect individuals against vaccine-preventable diseases. The strategic approach

outlines five key areas for focusing immunisation efforts to achieve the vision- Access; Trust & Confidence; Information for Action; Workforce; and System capability. The strategic approach draws on a wide range of resources that map out what is known about the system, including challenges and barriers, enablers and examples of best practice. It reflects the voices and aspirations of those impacted by, and working within, the immunisation system. Previous evidence and insights from individuals, communities, academics and providers have been invaluable in shaping the strategic approach.

Indonesia and Saudi Arabia sign MoU to strengthen human resources within healthcare sector

Indonesian Health Minister Budi Gunadi Sadikin and Saudi Arabian Health Minister Fahd Abdulrahman Al-Jalajel have formalised a Memorandum of Understanding (MoU) aimed at enhancing human resource (HR) capacity of the healthcare sector through exchanges and training, as well as facilitating the exchange of digital vaccine certificates. The initiative involves several Indonesian universities, including Gadjah Mada University (UGM), Muhammadiyah University of Yogyakarta (UMY), and Nahdlatul Ulama University of Surabaya (UNUSA), alongside Saudi Arabia's Health Holding Company. The programme is expected to support knowledge transfer, with Indonesian doctors and nurses receiving training in Saudi Arabia. In addition to HR development, the agreement includes the exchange of digital vaccine certificates to streamline the immigration process for Indonesian pilgrims undertaking Umrah and Hajj.

Singapore announces expansion of healthcare capacity

The Ministry of Health (MoH) in Singapore plans to continue to transform and strengthen its healthcare workforce, in tandem with capacity expansion. From 2025 to 2030, the government plans to add another 13,600 beds to the healthcare system. This includes adding about 2,800 public acute and community hospital beds to the over 12,000 public hospital beds. New Singapore General Hospital (SGH) Elective Care Centre will open by 2027, with 300 beds, while Changi General Hospital will be renovated and add 160 beds by 2027; and Sengkang General Hospital will add about 140 beds progressively from 2026. Alexandra Hospital will be redeveloped, and will progressively open from 2028, bringing its total capacity to 1,300 beds by the time it fully opens; and New Eastern General Hospital Campus at Bedok North, comprising a new integrated general and community hospital will progressively open from 2029, and add about 1,400 beds when fully opened.

Taiwan strengthens orphan drug access with policy reforms

Taiwan has been proactive in supporting rare disease patients through comprehensive policies. Since the 2000 passage of the Rare Disease Prevention and Drug Act, Taiwan has legally protected rare disease patients by integrating early diagnosis, treatment support, and orphan drug development. Orphan drugs are covered under Taiwan's National Health Insurance (NHI), reducing financial burdens and ensuring better access to critical treatments. To further improve accessibility, the Taiwan Food and Drug Administration (TFDA) has now introduced faster approval mechanisms, special importation programmes, and regulatory updates to help patients receive life-saving medications more efficiently. TFDA has expedited the approval of internationally recognised orphan drugs, reducing waiting times for patients, and continues to regularly refine orphan drug policies. TFDA has published orphan drug prescription guides and annual reports, offering essential data on drug use, safety monitoring, and treatment outcomes.

Formosa Group invests $12.5 M to establish biomedical research centre in Korea

Taiwan-based Formosa Group has announced the decision to establish a bio-medical research centre within Korea Advanced Institute of Science and Technology (KAIST) and invest approximately KRW 18 billion ($12.5 million) or more over five years. In addition, to commercialise the research results, KAIST and Formosa Group will establish a joint venture in Korea with KAIST Holdings, a KAIST-funded company. KAIST Holdings will invest KAIST's intellectual property rights, and Formosa Group will invest a corresponding amount of funds. The KAIST-Formosa joint venture will provide research funds to the KAIST-Formosa Bio-Medical Research Centre to be established in the future, secure the right to implement the intellectual property rights generated, and promote full-scale business. The KAIST-Formosa Bio-Medical Research Centre will establish a 'brain organoid bank' created by obtaining tissues from hundreds of patients with degenerative brain diseases, thereby securing high-dimensional data that will reveal the fundamental causes of ageing and disease.

FibroGen sells China biz to AstraZeneca for $160 M

FibroGen, Inc. has announced the sale of its China subsidiary to AstraZeneca for approximately $160 million. Under the terms of the agreement, FibroGen will receive an enterprise value of $85 million plus FibroGen net cash held in China at closing, currently estimated to be approximately $75 million, totaling approximately $160 million. The transaction is expected to close by mid-2025, pending customary closing conditions, including regulatory review in China. Following the close of the transaction, FibroGen will repay its term loan facility to investment funds managed by Morgan Stanley Tactical Value, further simplifying the company's capital structure. The combined transactions are expected to extend the company's cash runway into 2027. Upon closing, AstraZeneca will obtain all rights to roxadustat in China. Roxadustat is the category leader in brand value share for the treatment of anaemia in chronic kidney disease with a pending regulatory decision for chemotherapy-induced anaemia.

Avecho and Sandoz announce $16 M deal to commercialise CBD for insomnia treatment in Australia

Avecho Biotechnology has signed an exclusive ten-year development and licensing agreement with Sandoz Group AG for the commercial rights to Avecho's Phase III cannabidiol (CBD) capsule for insomnia in Australia. Avecho retains the rights to commercialise the product in all other territories, with Sandoz granted a first right of refusal for these markets. Avecho's CBD capsule aims to be the first pharmaceutical CBD product registered with the Therapeutic

Goods Administration (TGA) as an over-the-counter medicine, which market forecasts predict could generate sales surpassing $125 million per annum in Australia. Sandoz has agreed to an upfront licensing fee of $3 million (approx. A$4.8 million) for the exclusive commercial rights to the CBD product for insomnia in Australia. Avecho will continue to fund and oversee the ongoing Phase III clinical trial. Upon successful completion, Avecho and Sandoz will collaborate to secure TGA regulatory approval. Sandoz will purchase the finished product from Avecho and assume responsibility for the product's commercialisation, including marketing and distribution in Australia.

Sun Pharma buys Checkpoint Therapeutics for $355 M

India-based Sun Pharmaceutical Industries Limited and US-based Checkpoint Therapeutics, Inc. have entered into an agreement by which Sun Pharma will acquire Checkpoint, an immunotherapy and targeted oncology company. Checkpoint is a Nasdaq-listed commercial-stage company focused on developing novel treatments for patients with solid tumour cancers.

Checkpoint has received approval from the US Food & Drug Administration (FDA) for UNLOXCYT (cosibelimab-ipdl) for the treatment of adults with metastatic cutaneous squamous cell carcinoma (cSCC) or locally advanced cSCC who are not candidates for curative surgery or curative radiation. The transaction is expected to be completed in the second calendar quarter of 2025. The deal involves an upfront cash payment of $4.10 per share of common stock, representing aggregate upfront consideration of up to $355 million.

Samsung invests $10 M in US-based C2N Diagnostics to strengthen brain healthcare

US-based C2N Diagnostics, LLC, a specialty diagnostics company with a vision to bring Clarity Through Innovation, has announced a $10 million investment from Korea's Samsung C&T Corporation, Samsung Biologics, Samsung Bioepis, and Samsung Venture Investment Corporation. Samsung's decision bolsters C2N's ability to further scale its clinical laboratory services and advanced diagnostic solutions in the field of brain health. Through this strategic investment, C2N aims to continue accelerating organisational capabilities with unrelenting focus to ensure patients globally have access to C2N's best-in-class blood biomarker testing technologies for Alzheimer's disease and related dementias. Early and accurate diagnosis is of critical importance given personal, financial, and societal impacts of Alzheimer's disease and related dementias. With over 50,000 Precivity analytes reported and over 150 neuro academic, clinical, and research collaborations globally using Precivity biomarkers, C2N has significantly impacted Alzheimer's research. C2N is now expanding the biomarker pipeline by developing advanced assays targeting tau pathology, Parkinson's disease research, and developing technologies to decentralize mass spectrometry testing.

Ono enters into license agreement worth $660 M with Ionis Pharma

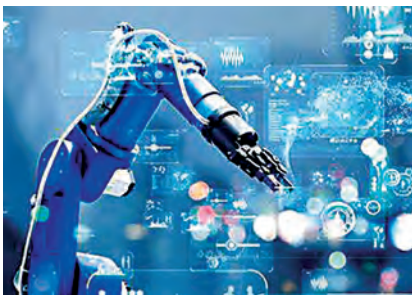
Ono Pharmaceutical, based in Japan; has entered into a license agreement with Ionis Pharmaceuticals, Inc. for sapablursen, an investigational RNA-targeted medicine for the treatment of polycythemia vera (PV). Sapablursen is currently being evaluated in adult patients with PV in the fully enrolled Phase 2 IMPRSSION study. Sapablursen was granted Fast Track designation in January 2024 and orphan drug designation in August 2024 by the US Food and Drug Administration (FDA). Under the agreement, Ono will obtain an exclusive license to develop and commercialise sapablursen worldwide. Ionis will remain responsible for the completion of the ongoing Phase 2 IMPRSSION study, while Ono will be solely responsible for subsequent development, regulatory filings and commercialisation. Ono will make an upfront payment of $280 million, with up to a maximum of $660 million in additional payments based on the achievement of development, regulatory and sales milestones.

SK Chemicals inks agreement with Viatris to expand pain management portfolio in Korea

SK Chemicals, which developed Korea's first herbal medicine product for osteoarthritis, Joins, has expanded its pain management portfolio. The company has signed a distribution and promotional service agreement with Viatris Korea for Celebrex, Lyrica, and Neurontin. Under the Agreement, SK Chemicals will manage distribution to all hospitals and to Viatris' full customer base for these three drugs. The company will also support marketing in hospitals and clinics with fewer than 300 hospital beds, while Viatris will manage marketing in hospitals with 300 or more beds. Celebrex, an anti-inflammatory analgesic drug, Lyrica, a treatment for peripheral and central neuropathic pain, and Neurontin, a neuropathic pain treatment, already have been validated for efficacy and safety through various clinical studies. As distribution and promotion of Viatris products begin in earnest, it will enhance the company's positioning in the pain management sector through synergies with existing products like Joins and Ultracet.

Astellas and Yaskawa to establish joint venture in Japan focused on cell therapy manufacturing

Japan-headquartered Astellas Pharma Inc. and Yaskawa Electric Corporation have signed a definitive agreement to establish a joint venture for the development of a cell therapy product manufacturing platform utilising the dual-arm robot 'Maholo'. In addition, the joint venture will offer platform access to startups and academic institutions, fostering collaboration and innovation in the field of cell therapy. In the pharmaceutical industry, the commercialisation of cell therapy faces many challenges stemming from the complex nature of the manufacturing process, in particular, related to the accuracy and reproducibility of cell manufacturing.



Furthermore, the need for a skilled workforce, coupled with the time and cost investments required for technology transfer to manufacturing facilities, presents additional hurdles. Based on the Memorandum of Agreement signed in May, 2024, Astellas and Yaskawa have been advancing discussions toward establishing a joint venture to leverage their mutual strengths and accelerate efforts to address these challenges.

Boehringer Ingelheim enhances biopharma contract manufacturing services in China

Boehringer Ingelheim's biopharmaceutical facility in Shanghai, China, meets the conditions to participate in a regulatory reform promoting segmented manufacturing of biological products by the local authorities. The reform, led by the Chinese medicine authority NMPA (National Medical Products Administration), aims at enhancing control, efficiency, and flexibility in the production process. As one of

the few contract manufacturing organisations qualified for the pilot period, Boehringer Ingelheim BioXcellence is expanding its service portfolio in China, offering distinct service packages for different segments in biopharmaceutical production and enabling the sustainable global supply of medications to patients. As a pilot site in the Chinese Market Authorisation Holder reform since 2016, the site has been working closely with the local government. It meets stringent regulatory standards and is characterised by a robust quality management system.

Coreline Soft enters Australian market for lung cancer screening

South Korea-based Coreline Soft, a global leader in artificial intelligence (AI)-based medical solutions, has announced its entry into Australia, one of the three major medical device markets in Asia and the Atlantic. It recently revealed a strategic partnership with ParagonCare, a leading Australian comprehensive healthcare company. This partnership focuses on accelerating lung cancer screening projects at major hospitals based on the Australian National Lung Cancer Screening Programme, which will be launched in July, and improving the quality of healthcare services in Australia through experience in operating AI-based workflows. The two companies plan to combine ParagonCare's extensive distribution network and Coreline Soft's technological innovation to set a new standard for the Australian healthcare system. The AVIEW LCS Plus is a product that has already been used for national lung cancer screening in several European countries. It has a track record of improving diagnostic accuracy and operational efficiency by being optimised for large-scale diagnostic programmes.

Indaptus Therapeutics extends patent portfolio in China, Japan, and Israel

US-based biotech firm Indaptus Therapeutics, Inc. has secured new patent approvals in China, Japan and Israel for its Decoy platform.

These patents cover the use of Decoy bacteria compositions for preventing or treating Hepatitis B virus (HBV) and human immunodeficiency virus (HIV) – two diseases that continue to pose major global health challenges. The patents also extend to combination therapies with a variety of both approved and investigational treatments. Preclinical studies demonstrated that Indaptus' Decoy bacteria, which are attenuated and killed bacteria designed to stimulate the immune system, produced significant single-agent activity in standard models of chronic HBV and HIV infections. Patented candidates from Indaptus' Decoy platform have also produced single agent activity and durable, combination-mediated tumour eradication in multiple pre-clinical cancer models and one candidate (Decoy20) is currently being evaluated in a Phase 1 clinical trial in the US for patients with advanced cancers.

Biocon Biologics and Civica collaborate to expand insulin Aspart access in US

Bengaluru-based Biocon Biologics Ltd (BBL), a fully integrated global biosimilars company and subsidiary of Biocon Ltd, and Civica, Inc., a not-for-profit generic drug and pharmaceutical company founded in 2018 to address and resolve life-saving drug shortages and affordability, have announced a strategic collaboration agreement to expand access and affordability of Insulin Aspart in the United States (US). Under the terms of the agreement, Biocon Biologics will supply Insulin Aspart drug substance to Civica, Inc., who will use the drug substance to produce Insulin Aspart drug product, a rapid-acting insulin analog, at its manufacturing facility in Petersburg, Virginia. Civica will commercialise the medicine for patients in the United States, after completion of development work and clinical trials. No technology transfer is involved in the agreement.

Lunit expands partnership with Saudi Arabia's largest medical group to deploy AI chest X-ray solution

South Korea-based startup Lunit, a leading provider of artificial intelligence (AI)-powered solutions for cancer diagnostics and therapeutics, has announced a second agreement with Cloud Solutions, a subsidiary of Dr. Sulaiman Al Habib Medical Group (HMG), Saudi Arabia's largest medical organisation. Building on the success of their 2023 collaboration, Lunit will now supply its AI-powered chest X-ray analysis solution, Lunit INSIGHT CXR, to the Kingdom of Saudi Arabia for the next three years, analysing approximately 1 million chest X-ray images. This latest contract expands on Lunit's initial partnership with HMG, which introduced Lunit INSIGHT MMG to support breast cancer screening across the Kingdom.

WuXi XDC and AbTis announce strategic partnership to advance next-generation ADCs

WuXi XDC Cayman Inc., a leading global CRDMO (Contract Research, Development, and Manufacturing Organisation) specialising in antibody-drug conjugates (ADCs) and other bioconjugates (XDCs), has announced the signing of a Memorandum of Understanding (MoU) with AbTis, a leading ADC biotechnology startup based in South Korea. This partnership brings together AbTis' proprietary site-selective conjugation platform AbClick and China-based WuXi XDC's integrated discovery services and all-in-one development & manufacturing platform. The collaboration aims to accelerate ADC therapeutic innovation by integrating AbTis' cutting-edge technology into WuXi XDC's toolbox, while fostering new opportunities for global clients. WuXi XDC will incorporate AbTis' advanced site-selective conjugation technologies including the AbClick Platform, which utilises affinity peptide-assisted linkers to enable precise and efficient antibody-drug conjugation. Additionally, WuXi XDC will facilitate potential collaborations between AbTis and its extensive client network, expanding the global reach of AbTis Technologies while unlocking synergistic market opportunities.

Docquity introduces AI-powered medical resource platform in Indonesia

Docquity, a leading healthtech company in Southeast Asia, and Rumah Sakit Umum Daerah (RSUD) Umar Wirahadikusumah Sumedang, a regional hospital in West Java, Indonesia, have announced a partnership to integrate Dx, Docquity's artificial intelligence (AI)-powered medical resource platform, into the hospital's medical reference system. The DX platform, currently in ongoing development, was last year implemented as a learning tool for Sumedang's public health staff. This marks Docquity's second partnership aimed at strengthening healthcare knowledge and patient care in the West Java region. Built upon Singapore-based startup Docquity's network insights as the largest healthcare professional (HCP) community in Southeast Asia that connects three out of every four doctors, Dx securely leverages compliant Generative AI to empower RSUD Umar Wirahadikusumah Sumedang's medical professionals with the latest healthcare knowledge from credible sources, for stronger treatment decisions. The Dx platform features an integration with PubMed, a globally recognised database of peer-reviewed medical research, enabling HCPs in Sumedang to seamlessly access scientifically-backed solutions to medical cases and ensure that regional patient care aligns with the latest international medical standards.

Insilico Medicine secures $110 M Series E financing to advance AI-driven drug discovery innovation

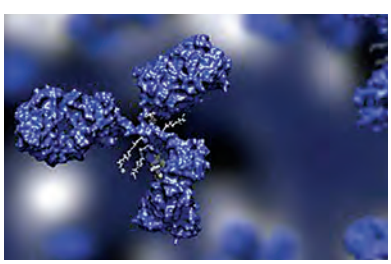
Insilico Medicine, a clinical-stage generative artificial intelligence (AI)-driven drug discovery startup headquartered in Hong Kong, has successfully secured a $110 million Series E financing led by a private equity fund of Value Partners Group, one of Asia's largest independent asset management firms, with strong participation from industry- and technology-focused new investors, as well as continued support from global existing backers. The funds raised in this round will be directed to advance Insilico's innovative drug pipeline and AI platform developments. On one side, resources will focus on refining AI models and algorithms, alongside updates and expansions to its state-of-the-art automatic lab to further automate and streamline R&D processes. On the other side, Insilico will focus on advancing the clinical validation of its flagship candidate for idiopathic pulmonary fibrosis treatment and accelerating the exploration of other independently developed and co-developed drug pipelines, driving impactful innovations in healthcare.

HaystackAnalytics secures patent for cutting-edge secure genomic analysis technology

In a country like India, with a rapidly advancing healthcare landscape and a growing focus on equitable access to enhance disease diagnosis and personalised treatment, Mumbai-based startup HaystackAnalytics, a pioneer in genomics-based diagnostic solutions, has secured a patent for its groundbreaking invention, “Systems and Methods for Secure Genomic Analysis Using a Specialised Edge Computing Device.” This patent marks a significant advance, enabling real-time genomic analysis at the point of use, reducing reliance on complex infrastructure and specialised personnel. It empowers laboratories and hospital labs with real time reporting capabilities with accurate, simplified and timely insights for enhanced patient diagnosis and treatment. HaystackAnalytics holds exclusive rights to this patent for the next 20 years and is committed to integrating it into all its solutions while making it widely accessible.

Callio Therapeutics launches with $187 M Series A round to advance multi-payload ADC platform

Callio Therapeutics, a Singapore and US-based biotechnology startup focused on realising the promise of multi-payload antibody-drug conjugates (ADCs) to improve cancer therapy, has announced its launch with the closing of a $187 million Series A financing round. This financing was led by Frazier Life Sciences with significant participation from Jeito Capital alongside other life sciences investors, including Novo Holdings A/S, Omega Funds, ClavystBio,



Platanus, Norwest, Pureos Bioventures, SEEDS Capital and EDBI. The newly formed company, with headquarters in Seattle and Singapore, intends to use the proceeds from the Series A financing to achieve clinical proof-of-concept for its HER2-targeted dual-payload ADC and a second undisclosed ADC programme. In conjunction with the financing, Callio Therapeutics has entered into an exclusive worldwide license agreement with Hummingbird Bioscience for its multi-payload ADC platform in oncology, and associated intellectual property and pipeline assets, in exchange for equity, potential milestone payments and royalties.

New African Epidemic Fund to strengthen health security

The African Epidemic Fund is now operational, providing the Africa Centres for Disease Control and Prevention (Africa CDC) with flexible funding to support countries across the continent in outbreak preparedness and response. This much-anticipated development is set to be a game-changer. No longer constrained by bureaucratic hurdles, Africa CDC now has the flexibility to rapidly deploy funds where they are needed most, allowing for faster and more efficient outbreak responses. The fund was formally established following the High-Level Meeting on Domestic Health Financing, a collaborative initiative between Africa CDC, the African Union Commission, and AUDA-NEPAD. It arrives at a crucial time as Africa grapples with multiple health crises, including a Marburg outbreak in Tanzania, Ebola in Uganda, and rising cases of cholera and febrile illnesses in the Democratic Republic of the Congo (DRC).

9 Latin American & Caribbean countries intensify efforts to curb obesity

The Pan American Health Organization (PAHO) is working on a project with nine countries of the Americas on an initiative to strengthen actions against obesity in the region, which has the highest prevalence of overweight and obesity in the world. In the Americas, 67.5 per cent of adults and 37.6 per cent of children and adolescents aged 5 to 19 are overweight or obese, increasing the risk of non-communicable diseases and highlighting the urgency of immediate action. In the Americas, nine countries are pioneering this initiative: Argentina, Barbados, Brazil, Chile, Mexico, Panama, Peru, Trinidad and Tobago, and Uruguay. The lessons learnt during the acceleration phase are expected to serve as a model for the future expansion of the Plan across the region. PAHO and the participating countries are implementing a series of measures based on the technical recommendations of the Acceleration Plan. These strategies include the application of front-of-package warning labels and the regulation of marketing for unhealthy food products, the promotion of breastfeeding, the regulation of foods offered in schools, and the adoption of fiscal policies that promote healthy diets. Additionally, efforts include the improvement of physical activity particularly in public and school settings and the strengthening of primary healthcare.

Call for collective action to address rising global burden of chronic diseases

The global pharmaceutical industry has issued a “Call to Action” urging collective action across the globe to tackle the rise of non-communicable diseases (NCDs) such as cancer, diabetes, cardiovascular disease, lung disease, mental health, and neurological disorders. The International Federation of Pharmaceutical Manufacturers & Associations (IFPMA) calls to foster a healthy innovation ecosystem, supported by robust IP protection, and improve awareness and uptake of medical innovation to address the global NCD and mental health burden. This should include essential and innovative NCD medicines, vaccines, diagnostics, and medical devices, supported by appropriate health service delivery models. Measures should be implemented to ensure accountability and high standards across all relevant sectors of government and key health stakeholders to accurately improve and report on delivery of NCDs and mental health prevention, treatment, and care. This includes a focus on monitoring the impact of vaccination, early screening, diagnosis, and treatment programmes.

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CDMOs Clean Up Act: Environmental Responsibility

Sustainability is no longer a buzzword in the background, but has become critical as the pharmaceutical industry faces evolving regulations and growing environmental concerns. Manufacturing, which accounts for approximately 80 per cent of a pharmaceutical company's indirect emissions, is now a key focus in the push toward more sustainable practices. With mounting pressure to reduce carbon footprint, contract development and manufacturing organisations (CDMOs) companies are ramping up the integration of green technologies into their manufacturing processes.

The pharmaceutical sector, which is one of the highest emitters of carbon, is no exception. According to Deloitte, more than 70 per cent of emissions produced by life sciences and healthcare companies come from their supply chains. In addition to emissions, the biopharma industry generates around 300 million metric tonnes (MMT) of plastic waste and 200 MMT of CO2 annually.

In response, many leading pharmaceutical manufacturers have committed to reducing their carbon footprint, minimising waste generation, and lowering water and energy consumption. A 2023 survey by CPHI found that 60 per cent of executives believe innovators will require CDMOs to implement sustainability metrics as part of their contracts within the next two years. Furthermore, 93 per cent of executives emphasised that visibility into supply chain partners' sustainability records is either 'extremely important' or 'important.'

In 2023, CEOs from several major pharmaceutical companies signed an Open Letter on Supplier Targets as part of the Sustainable Markets Initiative Health Systems Task Force. The letter calls on suppliers and CDMOs to assess their CO2 emissions, adapt their manufacturing processes to be more eco-friendly, and set clear sustainability targets.

Beyond the efforts of big pharma, larger industry-wide initiatives are also taking place. In 2024, AstraZeneca, Lonza, Novartis, Novo Nordisk, and Roche signed an agreement with Envision Energy in China, gaining access to renewable power. This initiative is expected to result in annual carbon dioxide equivalent savings of approximately 120,000 tonnes.

Similarly, in 2023, global healthcare leaders from the Sustainable Markets Initiative Health Systems Task Force began advanced discussions with energy providers in China and India to scale renewable power across their supply chains. This collaborative effort aims to drive sustainability in

these key markets, which together account for up to 50 per cent of pharmaceutical manufacturing materials. The power agreements in China aim to add 70 megawatts (MW) of renewable energy to the grid annually, saving an estimated 120,000 tonnes of CO2e annually, while the India initiative will support suppliers in several states.

In 2021, the Energize supplier consortium was established to help suppliers, including CDMOs, reduce their carbon footprints through cleaner energy sources. The consortium, which includes major drug developers such as AstraZeneca, Boehringer Ingelheim, GSK, and Pfizer, now has 25 members, all working towards a common goal of sustainability. CDMOs are therefore adapting to the changing landscape. Majority of the CDMOs, have published sustainability reports and set targets aligned with net-zero goals. Most of the CDMOs have also joined initiatives such as The Science Based Targets initiative (SBTi) and CDP (formerly known as the Carbon Disclosure Project).

"There are several factors driving sustainability to become a central focus for the CDMO industry. With increasing regulations and guidelines from governments and international organisations, pharmaceutical service providers are feeling pressured to implement more sustainable practices to maintain compliance and effectively operate in the market. They are also driven by customers and patients who are becoming increasingly environmentally conscious and demanding of sustainable products and processes across the value chain. Therefore, CDMOs that prioritise sustainability and make intentional efforts to integrate it into their corporate strategy will likely attract more customers and foster long lasting partnerships," said ***Benjamin Walter, Senior Vice President Technical Services and Internal Project Management, Vetter Pharma-Fertigung GmbH & Co KG.*** Vetter is a global CDMO with an enduring commitment to sustainability.

Key Focus areas

CDMOs are adopting sustainable practices by utilising single-use bioreactors, continuous flow manufacturing, and biocatalysis to reduce waste and enhance efficiency.

Single-use bioreactors (SUB) may seem paradoxical, but they offer significant benefits in terms of reducing product and packaging waste when compared to traditional 2,000L workflows. Many CDMOs are increasingly adopting SUBs for their efficiency and sustainability. For instance, WuXi Biologics, a contract research, development, and manufacturing organisation (CRDMO), successfully installed three new 5,000L single-use bioreactors at its MFG20 drug substance manufacturing facility in Hangzhou, China. Similarly, AGC Biologics has begun operations at a new manufacturing facility in Copenhagen, which incorporates the latest mammalian systems and single-use technology, including a production line with eight 2,000L bioreactors.

Merck has launched the first single-use reactor specifically designed for manufacturing antibody-drug conjugates (ADCs), highlighting the growing trend toward adopting single-use systems for specialised drug production.

Continuous flow manufacturing and biocatalysis are driving key advancements in sustainability, through the concepts of reduce and replace. Biocatalysis plays an important role in enhancing the sustainability of active pharmaceutical ingredient (API) manufacturing.

China-based Asymchem has made significant strides in the areas of flow chemistry and biocatalysis. In collaboration with AbbVie, Asymchem implemented a large-scale photoredox trifluoromethylation process using continuous flow. This process leverages a more sustainable trifluoromethylating reagent, requires very little catalyst, and uses light as a favourable energy source to drive the reaction. Similarly, Asymchem's partnership with Amgen led to the development of another photochemical continuous flow process, which earned the CMO Excellence in Green Chemistry Award from the ACS GCI in recognition of their efforts in advancing pharmaceutical green chemistry technologies.

Similarly, enzyme engineering company Codexis has been instrumental in helping Pfizer develop a high-performance, sustainable manufacturing process for nirmatrelvir, the API in PAXLOVID. This innovation has significantly reduced reliance on traditional, resource-intensive chemical synthesis for the antiviral therapeutic, for treating mild-to-moderate COVID-19.

The UK-based biotech company Prozomix and Ginkgo Bioworks have partnered to advance the production of next-generation enzyme plates for API manufacturing. This collaboration combines Ginkgo's expertise in Enzyme Services and AI/ML models with Prozomix's enzyme libraries and deep manufacturing experience, driving further innovation in the field of sustainable pharmaceutical production.

CDMOs Leading the Sustainability Change

Samsung Biologics (South Korea) has been recognised for its commitment to sustainability, securing a spot on the Dow Jones Sustainability World Index (DJSI) for four consecutive years. The company focuses on carbon reduction and achieving net-zero emissions. As a champion of the Sustainable Markets Initiative (SMI) Health Systems Task Force, it engages global suppliers to decarbonise and build resilient value chains. Additionally, the company has transitioned to renewable energy and completed product carbon footprint measurements. It also received an EcoVadis platinum sustainability rating.

WuXi Biologics (China), has been named to the 2023 and 2024 Dow Jones Sustainability Indices (DJSI) for its outstanding sustainability performance. The company has earned an MSCI AAA Rating and EcoVadis Platinum Medal for two consecutive years. WuXi Biologics is a participant in the UN Global Compact and Pharmaceutical Supply Chain Initiative, advocating for sustainability across the industry. The company's facilities utilise next-generation biomanufacturing technologies and clean energy sources. It has also established an ESG committee led by its CEO to guide its sustainability efforts.

Bushu Pharmaceuticals (Japan), has been recognised by Frost & Sullivan for its environmental sustainability measures in the APAC CDMO industry. The company has implemented energy-efficient initiatives, such as LED lighting with motion sensors, solar panels, and renewable energy. It also focuses on sustainable packaging, transitioning to paper trays and biomass films, and monitors wastewater quality at its facilities.

SK pharmteco (South Korea), is pursuing the My Green Lab Certification, a globally recognised standard for laboratory sustainability. After completing its baseline assessment in late 2024, the company is targeting its first certification milestone by mid-2025, with the goal of achieving the highest certification level by 2030.

Technology

The CDMO partners are investing strategically in the expansion of technology and infrastructure in their business to incorporate additional sustainable practices. CDMOs are leveraging technologies such as AI, micellar technology, and energy-efficient photovoltaic (PV) technology to enhance sustainability and improve operational efficiency across their operations.

"We have entered into partnerships with solution providers like 'Elio'- where we co-designed an AI based tool to source the most sustainable consumable options- to push solutions that are beneficial for the whole industry. We can also use the tools to work with our customers to find solutions that will also reduce their value chain emissions including scope 3," said

Prof. Dr. Hanns-Christian Mahler, CEO, ten23 health, Switzerland. Ten23 Health is a sustainable CDMO and the first biotech and sterile drug product CDMO in the pharmaceutical sector to achieve B Corp certification.

Apart from AI, CDMOs are also partnering to develop micellar technology, Hovione, the specialist integrated CDMO, has signed an agreement with Dragonfly Technologies, Inc. to gain access to its micellar technology for chemistry-in-water processes, developed by Prof. Bruce Lipshutz of the University of California, Santa Barbara (UCSB). Hovione aims to further progress the technology to make it an integral part of its API manufacturing technology offering solutions.

And, of course, CDMOs are investing in energy-efficient technologies such as photovoltaic (PV) systems. Talking about the use of PV systems Walter said "Advancing technology will continue to offer service providers new opportunities to enhance their sustainable business practices. Installing energy-efficient technology, such as photovoltaic (PV) systems, can lower operational costs at manufacturing facilities, making sustainability economically viable for CDMOs and their customers. We have used 100 per cent green electricity since 2014, and implemented several sustainability optimisation projects in recent years that have contributed to energy and cost savings of about 25 million kilowatt hours. The PV roof systems alone generate 7.3 million kilowatt hours of electricity. These energy optimisation programmes will continue to improve as technological advancements progress, further making sustainability a more realistic focus."

Other measures

CDMOs are also taking various other measures to drive sustainability, including recycling industrial wastewater, reducing waste, and optimising packaging and heat usage. These efforts help conserve resources, minimise environmental impact, and align with green manufacturing practices.

Recycling industrial wastewater

Wastewater used in factories is generally treated by activated sludge treatment using microorganisms and sedimentation separation. "To reduce the burden on the environment, we have adopted a treatment method that combines the membrane treatment with microbial treatment at three factories (one of which is currently undergoing renovation work to further reduce the environmental impact), and this treatment method allows us to steadily discharge very clean wastewater with a very low environmental impact. At the Kawagoe factory, where our head office is located, we use membrane-treated effluent as make-up water for the cooling towers of the chillers in our air conditioning system, reducing the amount of city water we use and the burden on the environment," said Tadahiro Katayama, EHS Promotion Group Manager, Sustainability Promotion Department, Bushu Pharmaceuticals Ltd., Japan. Bushu Pharmaceuticals is a dedicated contract manufacturer of pharmaceutical products and clinical trial materials and medical devices.

Recycling waste

Throughout the pharmaceutical chain, a large amount of industrial waste is inevitably generated, such as plastic containers used to transport intermediate products, leftover packaging materials, unnecessary printing paper, etc.

"We are continuously promoting material recycling to reduce these industrial wastes and recycled approximately 430 tonnes of unneeded materials for material recycling at the Kawagoe Misato and Aizu factories in FY2023. This amount is equivalent to approximately 22 per cent of the total amount of unneeded materials which become industrial waste. We will actively promote these activities going forward continuously," said Katayama.

Ten23 health also takes initiatives to reduce waste. "We have internal targets to reduce the waste we send to incineration, and we offset plastic waste sent to incineration, through a

Driving sustainability in the CDMO industry

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Tim Hansen,
Director, Environmental, Social & Governance (ESG), PCI Pharma Service

Since sustainability strategies require a multifaceted approach – a house with several supporting beams, so to speak – the next five to ten years likely will see these individual pillars become sturdier. New regulatory pressures and increasing stakeholder expectations will drive more standardisation and innovation within the industry. As more companies set science-based targets, renewable energy and circularity will become more prevalent, and companies that prioritise sustainability will gain competitive advantages.

The coming years will also bring more industry collaboration to reduce the carbon footprint and overall resource consumption of manufacturing operations. CDMOs will invest in energy-efficient technologies, water recycling, and waste reduction initiatives. As energy consumption and sourcing goals become ever more lofty, renewable energy sources like solar and wind power may go from producing a fraction of this power to the lion's share of it.

Especially for pharma CDMOs, packaging and supply chain operations also will factor heavily to sustainable metrics. We anticipate a more forceful push for sustainable packaging – including not only biodegradable or recyclable materials but, increasingly, packaging that incorporates post-consumer recycled content – and reliance on low-emission logistics. Crucially for CDMOs catering to customers and patients around the globe, part and parcel to supply chain sustainability will mean increased efforts to ensure eco-friendly practices are adhered to throughout the entire production process, from initial raw materials sourcing through final delivery.

Fortunately for the planet, the coming decade will see such measures defined and accelerated by regulatory pressures and client demands. Per the former, governments and international bodies will introduce ever stricter environmental regulations and sustainability requirements, mandating CDMO alignment. Regarding the latter, many pharma companies – especially the larger players – are increasingly incorporating elevated ESG metrics into their sustainability strategies and prioritising CDMOs that share similar values. BS

What are Scope 1, 2 & 3 Carbon Emissions?

- **Scope 1:** Direct GHG emissions from the use of city gas, heavy oil, etc., and fluorocarbon gas leaks, etc.
- **Scope 2:** Indirect GHG emissions from energy sources, such as electricity use
- **Scope 3:** Indirect emissions other than Scope 1 (direct emissions by the company) and Scope 2 (indirect emissions associated with the use of purchased electricity and heat) that occur throughout a company's value chain (upstream emissions such as procurement of raw materials, transportation, and delivery, and downstream emissions such as the use and disposal of products by consumers).

partnership that removes plastic from the ocean environment," said Prof. Mahler.

Packaging

The pharma industry has made significant moves toward shifting to more environmentally friendly packaging. "For example, switching to environmentally friendly packaging materials (paper packaging containers, recycled plastic containers, biomass plastic containers, etc. with our customers," said Katayama.

"We are planning investments into new capacity and capabilities of sustainable packaging, such as all-paper packaging equipment. We are growing our focus on developing secondary packaging and process optimisations, including PVC-free internal transport trays, and plastic-free tamper-evident labels," said Walter.

Switching to sustainable packaging can help reduce company costs. For example, Novo Nordisk replaced the plastic trays in its insulin pens with paper-based alternatives, reducing the weight and volume of the packaging by 80 per cent and 50 per cent, respectively. These sustainability changes positively impact their total cost of goods, leading to reduced transportation costs.

Recycling waste heat

"Our company maintains the pharmaceutical manufacturing environment with a central air conditioning system that uses cold and hot water for cooling and heating. Cold water, produced by a refrigerator, cools the air conditioner and returns at 12°C, while hot water, heated by a boiler, warms the air conditioner and returns at 35°C. The refrigerator consumes significant electricity, and gas is used for heating. To optimise energy use, we installed a heat pump to exchange heat between the cold and hot water, reducing energy consumption by the refrigerator and boiler," said Katayama.

Taiwan-based Bora Pharmaceuticals has also implemented a waste heat recycling system at its Zhunan site (Taiwan) to improve energy efficiency and reduce environmental impact. The company focused on the steam system, where 1225 kg of steam per hour is generated by the boiler. Previously, some steam mixed with condensate was inefficiently released into the atmosphere. By modifying the exhaust pipe of the steam condensate system and connecting it to the heat exchanger of the process hot water system, Bora was able to recycle waste steam to preheat hot water. This initiative has led to significant benefits, including energy savings, reduced gas and water consumption, lower CO2 emissions, reduced pollution, and cost savings.

A more sustainable manufacturing future

Despite growing initiatives and a rising inclination to reduce carbon footprints, experts feel that the pharmaceutical industry is not doing enough. "The sector is responsible for 5 per cent of global greenhouse gas emissions and produces significant amounts of waste. Currently, companies in the pharma or CDMO sector seem focused on reporting and compliance to regulatory requirements related to sustainability reporting rather than focusing on initiatives and innovation needed to reduce their environmental footprint," said Prof. Mahler.

As indicated by the International Sustainability Standard rds Board (ISSB), the disclosure of corporate sustainability activities is becoming a mandatory requirement. In addition, initiatives

Stakeholder efforts

The Science Based Targets initiative (SBTi) is a corporate climate action organisation that enables companies and financial institutions worldwide to play their part in combating the climate crisis. We develop standards, tools and guidance which allow companies to set greenhouse gas (GHG) emissions reductions targets in line with what is needed to keep global heating below catastrophic levels and reach net-zero by 2050 at latest.

CDP (formerly known as the Carbon Disclosure Project) is a global non-profit that runs the world's only independent environmental disclosure system for companies, capital markets, cities, states, and regions to manage their environmental impacts and promote transparency.

such as the usage of renewable energy, investing in sustainable practices, and advancing technology will become the central focus of sustainability in the CDMO industry over the next 5-10 years. This systemic shift must happen across the entire value chain, addressing issues that require mass and simultaneous action.

"We believe that product design must include sustainability as a key consideration, because up to 80 per cent of the overall footprint of products is determined in the design stage. Furthermore, innovation is required to rethink products and processes- e.g. moving away from plastics or single-use primary packaging containers that solely create waste and creating circular solutions- and therefore we have initiatives with our scientific and innovation departments to drive sustainable innovation," added Prof. Mahler.

Many pharmaceutical companies have committed to sustainability goals, aiming for carbon neutrality. The primary initiative so far has been to switch to electricity derived from renewable energy sources, thus addressing Scope 2 emissions. However, many companies have yet to determine specific measures to reduce Scope 1 emissions.

"Going forward, we believe that promoting measures to reduce Scope 1 emissions will become one of the key focuses of sustainability, while also moving toward building initiatives across the entire industry value chain that include Scope 3 emissions. We believe that promoting measures to reduce Scope 1 emissions will become one of the central focuses of sustainability in the future," said Katayama.

Currently, each of the companies that commit to these initiatives is calling on its business partners in their value chain to commit to sustainability efforts and disclose information.

"However, for companies located downstream in the value chain, it is inefficient to respond individually to requests from many business partners. Therefore, we believe that one of the central focuses of sustainability should be to establish a value chain engagement mechanism that can be shared across the entire pharmaceutical industry including the investment burden for achieving sustainability," said Katayama.

"Investments into sustainable practices can be initially expensive, and although they can pay off in the end with production and energy efficiency cost savings, it's crucial for companies to be aware of how much they can reasonably invest into sustainability at this time to maintain a successful business now and in the future," said Walter.

By consolidating and outsourcing pharmaceutical manufacturing to CDMOs early in the formulation stage, the energy required to maintain pharmaceutical manufacturing environments—one of the largest energy consumers in the industry—can be significantly reduced, leading to a lower environmental impact.

"It's essential to have a forecast of the future to make sure the company knows what developments are feasible. Every CDMO must find its own path to sustainability within the framework of its corporate strategy," said Walter. Looking ahead, CDMOs need to strive for a future that is both profitable and sustainable. As they evaluate where to expand and evolve areas of business capacity and capabilities, manufacturing partners need to adjust their practices carefully and with conscious intention. BS

Ayesha Siddiqui

Advancing Green Pharmaceuticals: Sustainable Biomanufacturing Practices Across APAC

« **Aarthi Janakiraman,** Research Director, Advanced SciTech, Everest Group

The pharmaceutical industry is at a critical juncture, urgently needing to transform towards sustainability to reduce its environmental footprint. Sustainable biomanufacturing is a key focus within this context, primarily aiming to produce pharmaceutical products such as drugs, vaccines, and biologics using processes with minimal environmental impact. This includes resource conservation, waste reduction and greenhouse gas (GHG) emissions reduction, renewable materials and energy deployment, and greener operations throughout the sourcing, manufacturing, and distribution processes.

According to the World Health Organisation (WHO), modern health systems contribute around 5 per cent of global carbon emissions. Around half of these emissions originate in manufacturing supply chains, including from the Asian region, considering the high presence of pharmaceutical manufacturers.

A research study in Japan outlined that healthcare activities account for about 5 per cent of national GHG emissions, with pharmaceuticals alone contributing an estimated 11.3 $MtCO_2$-e (27 per cent of healthcare emissions). Besides GHG emissions, pharma manufacturing can also result in air and water pollution through various solvents, effluent discharge, and waste generation. It is well-known that waste generated by antibiotic manufacturing can potentially create environmental hotspots of antimicrobial resistance, a public health concern. APIs (active pharmaceutical ingredients) released in wastewater are also a cause of concern, potentially leading to drug-resistant microbes, directly linking environmental stewardship and drug efficacy.

Governments and international bodies are playing a pivotal role in promoting sustainability in the pharmaceutical industry. They are actively integrating sustainability targets in regulations and setting industry standards. Regulatory bodies in the Asia Pacific (APAC) region are aligning themselves with international climate change goals and agreements. Initiatives such as Japan's net-zero emission targets for 2050, China's "Blue Sky" initiatives, and India's draft rules to limit antibiotic discharge are spurring pharmaceutical companies to set their emission reduction targets. With US and European customers considering environmental criteria in procurement, sustainability efforts are becoming a pivotal requirement for market access for APAC API and generic drug manufacturers and suppliers.

Pharma and biotech companies are starting to respond to the expectations of their customers and investors, integrating carbon neutrality and eco-efficiency as part of their strategic goals. Stakeholder efforts such as the Carbon Disclosure Project (CDP) and Science Based Targets Initiative (SBTi) have gained significant traction in the industry. Japanese pharma companies are leading climate assessment efforts, especially in transparent sustainability reporting and goal setting. In APAC, there is a burgeoning interest in "green pharma" that can encourage manufacturers to adopt sustainable biomanufacturing as a means of competitive differentiation and innovation.

Sustainable biomanufacturing is not just about environmental benefits; it also offers significant economic advantages. Efficient bioprocesses can reduce waste and energy consumption, leading to lower operating costs in the long run. Companies are increasingly viewing sustainability and cost-efficiency as aligned goals, as resource optimisation and yield improvement are both economically and environmentally favourable. With emissions trading schemes gaining momentum, reducing GHG emissions can translate to direct cost savings and potentially reduce future carbon taxes. Implementing

greener biomanufacturing processes allows companies to gain an advantage over anticipated regulations and gain time to establish resilient operations. For Asian countries that still import high volumes of drugs and/ or raw materials, establishing resilient operations will boost local, sustainable production and improve self-sufficiency, making the transition to sustainable biomanufacturing advantageous from an environmental, regulatory, and business angle.

Technological advances enabling sustainable biomanufacturing

Green chemistry principles are being considered for manufacturing processes using safer solvents, fewer steps, and less waste. Biocatalysis and fermentation to manufacture generic APIs and enzymatic processes for synthesising drugs like statins and antibiotics are gaining momentum. Synthetic biology advances to produce pharmaceutical compounds from renewable feedstocks are being undertaken on a small scale. Technology such as that of ASTAR and MojiaBio, which uses engineered microbial pathways to convert low-cost renewable feedstocks to high-value molecules, can be used in the pharma industry. Biotechnological approaches that leverage algae or CO_2-utilising microbes and enzymatic synthesis to manufacture APIs are being investigated.

Biocon is utilising enzymatic processing for some of its biopharmaceutical production to improve yields and reduce chemical usage; pharma companies are also using enzymatic catalysis for drug synthesis. Dr. Reddy's Laboratories, India, has a dedicated Process Innovation group to re-engineer several of the company's bulk drug syntheses to reduce waste. The company implemented a catalytic route for an antiviral API that cut solvent usage by half and eliminated a toxic reagent, showcasing the company's commitment to green chemistry.

The use of single-use (disposable) bioreactor systems is a matter of debate; however, it must be accepted that they provide flexibility and eliminate energy-intensive cleaning and sterilisation.

Digital technologies, including sensors, automation, artificial intelligence (AI), and data analytics, have been established to play a vital role in ensuring sustainability in biomanufacturing processes. Biomanufacturing 4.0 and 5.0 leverage these technologies to monitor and control manufacturing processes in real-time and optimise to reduce waste and resources. Integrating Process Analytical Technology (PAT) and automation can reduce batch failures and improve yields. Consortiums, such as BioPIPS in Singapore, focus on leveraging data analytics, digital twins, and others to enhance productivity and sustainability in manufacturing.

It's well-known that manufacturing drugs and other pharmaceutical compounds generate a lot of waste streams; deploying advanced water and wastewater treatment technologies such as advanced oxidation and membrane bioreactors can drastically reduce the impact on local ecosystems. Integrating advanced catalysis, solvent recovery systems, and Zero Liquid Discharge (ZLD) are being considered to improve sustainability.

Governmental efforts to boost sustainability act as a growth lever

Japan's Ministry of Economy, Trade and Industry (METI) has established subsidies for energy-saving equipment in pharma factories. South Korea's Ministry of Trade, Industry and Energy (MOTIE) launched initiatives under its Bioeconomy blueprint, including green biomanufacturing. The government provides tax incentives for companies to reduce energy use or obtain EMS certifications. The New Energy and Industrial Technology Development Organization (NEDO) has funded biocatalyst projects for drug synthesis and energy-efficient biologics production methods.

South Korea is pushing for a hydrogen economy and fuel cells, which has implications for the pharma industry. In line with these efforts, SK Pharmteco, a CDMO, has announced plans to pilot fuel cells to reduce grid dependency. The Chinese government has enforced pollution control norms on API manufacturers. The country's Five-Year Plans have explicitly mentioned green development in the pharmaceutical and chemical sectors. The 14th Five-Year Plan (2021–2025) calls for cleaner production techniques and developing a green manufacturing system. The Chinese government also initiated grants for the adoption of green technology; a subsidy programme in Jiangsu province helps pharma factories install solvent recovery and VOC (volatile organic compound) emission controls.

Singapore Green Plan 2030 emphasizes sustainable industry as a key pillar with biopharmaceuticals as a key part of the effort. The government, through its Economic Development Board (EDB) and A*STAR, has launched various initiatives to infuse sustainability into biomanufacturing and has partnered with industrial players to establish the Sustainable Biomanufacturing Technology Platform (SBTP) to develop new bioconversion processes using renewable feedstocks.

The Indian government introduced a draft policy in 2019 to set limits on antibiotic concentrations in pharmaceutical effluent, one of the first in the world, and has also actively enforced existing environmental norms, emphasizing that companies must install ZLD (Zero Liquid Discharge) in sensitive zones. Its National Manufacturing Policy and Pharma Sector Vision include support for sustainability, which includes subsidies for common effluent plants in pharma clusters and funding for the development of greener processes through its Department of Biotechnology schemes.

Other Asian countries are engaged in promoting sustainable biomanufacturing in their ways. To establish itself in pharma manufacturing, Malaysia has been promoting bio-based manufacturing, such as encouraging the production of biologics (like insulin or vaccines) using modern, efficient technology. Under its National Investment Aspirations for the chemical and pharma industry, it aims to attract investments in high-tech, sustainable manufacturing. Thailand has explicitly included medical and wellness as one of four priority areas in its Bio-Circular-Green (BCG) Economy Model. Under the model (2021–2026 action plan), the country is investing in biotechnology for healthcare with a focus on vaccines and biopharmaceuticals. It emphasizes that facilities and processes should use resources efficiently and minimise waste.

Challenges in implementation

Despite the apparent benefits and growing interest, implementing sustainable biomanufacturing practices is difficult. Stakeholders face a variety of hurdles in making their biopharma industries greener. A key challenge is the investment cost of adopting new technology or upgrading facilities. Many biomanufacturing and sustainable solutions are cost-prohibitive compared to conventional approaches, and it is difficult for companies operating on thin margins to deploy them without external support. The payback period for some sustainable efforts, such as the use of advanced bioreactors and the shift to renewable energy, might be longer than what companies are usually accustomed to in a highly competitive and, to a certain extent, fragmented market.

Governments are offering subsidies, grants, or tax breaks for sustainability efforts. For example, Singapore's EDB offers co-funding for companies investing in energy-efficient equipment or renewable energy integration. The Indian government is considering offering low-interest "green loans" to pharma MSMEs (micro, small & medium enterprises) to encourage installing pollution control or energy-saving systems. Public-private partnerships (PPPs) are gaining traction to pool resources and establish technology transfer, licensing, or sharing to mitigate risks and share innovation costs. International cooperation, such as the Organization for Economic Co-operation and Development (OECD) and the United Nations Industrial Development Organization (UNIDO), which have knowledge-sharing and transfer programmes, can speed technology adoption.

Despite renewed interest in technology development and R&D efforts, a skill gap in many parts of APAC makes implementing advanced sustainable biomanufacturing challenging. Besides conducting regular training programmes and educational initiatives, bridging the skill and knowledge gap requires continuous and integrated efforts. Companies are establishing Centres of Excellence as internal training centers while fostering stakeholder collaborations. National labs such as South Korea's Korea Research Institute of Bioscience & Biotechnology (KRIBB) and others that pioneer research and developmental efforts to integrate sustainability in biotech processes by working with local companies can help in skill development and hands-on training.

It is established that a high percentage of the pharmaceutical industry's environmental footprint lies in its interlinked and complicated supply chain. This makes compliance with sustainability goals a significant challenge, considering the Scope 3 emissions. It also makes end-to-end trackability and traceability a concern.

Future Trajectory

Industrial stakeholders are converging with governments, associations, and trade organisations. Industry and society must establish sustainable biomanufacturing practices, and the momentum will likely grow. Following the path of Japanese and Korean companies, more companies from India, China, and others in the Asia Pacific are expected to commit to net-zero emissions targets in the coming years, in timelines around 2040–2050, as governments push for national decarbonisation goals such as that of China's 2060 neutrality goal and India's 2070 goal.

Continued focus on technology development and collaborations for R&D and knowledge transfer can improve adoption prospects, especially those related to Biomanufacturing 4.0 and 5.0 and biotechnological approaches such as cell-free expression systems and indigenous technologies leveraging regional and local feedstock for drug and API manufacture. BS

Trump's tariff war threatens to disrupt pharma supply chain

After pulling US funding from the World Health Organisation (WHO), the US President Donald Trump has now announced a 25 per cent tariff on pharmaceutical imports. With countries like India and China being major suppliers to the U.S. market, this move raises serious concerns about the future of drug prices, supply chains, etc. Let's analyse how this could impact the global pharmaceutical industry.

Import tariffs have emerged as a key trade issue since President Donald Trump took office on January 20, 2025. Among the many measures announced, Trump has pledged to impose a 25 per cent tariff on all imports, including pharmaceutical products. President Trump indicated that pharmaceutical-specific tariffs could be enforced as early as April 2, 2025.

Pharmaceutical supply chains are heavily reliant on international trade, with China and India providing more than 70 per cent of the active pharmaceutical ingredients (APIs) used in U.S. drug manufacturing. In 2023, the US spent more than $2.02 billion on pharma imports from China alone, according to the U.S. Trade Commission. India exports an approx. 47 per cent of the generic drugs to the US. This helps to bring the cost of drugs down for the US consumers. The US largely exports patented and innovative drugs to India that values around $800 million. The introduction of tariffs could disrupt these supply chains.

Rising production costs due to these tariffs are expected to lead to higher drug prices. Generic drug manufacturers, which often operate on slim profit margins, are likely to be hit hardest. While the 10 per cent tariff on Chinese goods may not have a major impact on branded drugs, generic companies are expected to face significant challenges. Increased API costs could force some manufacturers to reduce output or exit the market entirely, reducing competition and potentially driving up prices.

China's growing role in biopharma innovation is evident through numerous high-profile licensing deals. Major pharmaceutical companies announce deals with Chinese biotech firms practically every day. For example, Roche signed an $80 million upfront deal with Innovent, a Chinese biopharma company, in January 2025. Prior to that in December 2024, GSK struck two partnerships with Chinese companies, Hansoh Pharma and DualityBio, worth $1.7 billion and $1 billion, respectively. These tariffs could disrupt such collaborations and have significant ramifications for the biopharma sector, which has become increasingly reliant on China for promising drug candidates. This could alter the landscape of the global pharmaceutical industry.

"If the tariff is indeed imposed as expected it will impact all countries. To that extent, pharma exporters will not see a change in relative effectiveness compared to those based in other countries (as the tariff impacts the price of all pharma exports to the USA). It does make domestically produced pharma products more competitive in the USA, but unless the US can offset its current imports with increased domestic production, they are still going to need to import from somewhere," said ***Benjamin Udy, Lead Economist, Oxford Economics Australia.***

Reimagining the Supply Chain

The new tariffs are causing significant concern for generic drug companies. "The 25 per cent tariff on pharmaceutical imports will pose significant challenges for generic drugmakers, which already operate on low gross margins. This tariff will increase production costs, disrupt supply chains, and create financial pressures that may force some suppliers out of the market, further exacerbating drug shortages," said ***Ophelia Chan, Senior Business Fundamentals Analyst at GlobalData.***

Udy echoes similar sentiments and said, "Admittedly, the 25 per cent increase in price may be a bigger deal for generics that are being sold at near cost, to the extent that more expensive products also contain a larger mark-up, there may be more capacity for retailers or distributors in the USA to absorb some of the tariff."

Experts propose reshoring production to the US or nearshoring facilities to key regions where the drugs will be marketed or distributed. Sharing her views on this, Ophelia pointed out "To remain competitive, generic companies must reassess their manufacturing and supply chain strategies, including reshoring production to the US and/or nearshoring facilities to key regions where a drug will be marketed or distributed. While these strategies require substantial capital, they offer a long-term solution to mitigate supply chain risks and ensure access to high-priority generics. To offset the associated costs, generic companies should potentially explore partnerships with government agencies to secure financial incentives, facilitating a smoother transition while ensuring production capacity meets market demand and operational needs."

"Indian pharmaceutical companies may explore a shift towards localised production facilities in the USA or forming strategic partnerships with key distributors in the USA to offset the impacts of tariffs. However, there would be challenges around increased manufacturing costs (as against localised manufacturing in India), regulatory compliance, and supply-chain realignments which could further slow this transition," added ***Arvind Sharma, Partner, Shardul Amarchand Mangaldas & Co, India.***

However, reshoring/nearshoring production is a long-term strategy that requires significant investment in infrastructure, regulatory compliance, and workforce development, and it could take years, if not decades, to fully implement.

Therefore, diversifying export markets is key. "In order to cope, pharma generics companies may need to diversify their export markets which would include increased focus on regions such as Latin/South America, Europe, and Africa, thereby reducing their reliance on the USA," said Sharma.

As they say, every challenge also presents an opportunity. This situation provides generic companies with a chance to adapt and grow. "Indian pharma companies should invest in enhanced production efficiencies, supply chain optimisations, and strengthen their presence in alternative markets outside of the USA. While the proposed tariffs pose significant challenges, they could also prompt Indian pharmaceutical firms to diversify geographically and improve operational resilience," said Sharma.

"Finally it's important to remember that the tariff only applies to exports to the USA, other markets remain accessible, and to the extent that consumers in the USA favour domestically produced pharma products to avoid the tariff, the USA exports of pharma may actually fall, creating more opportunity for exporters in other country to capture more of the existing demand from other markets. The US currently exports more than 10 per cent of global pharma exports so a reduction in those exports to meet domestic demand could create significant opportunities for other exporting countries," said Udy.

While it is still unclear whether these tariffs will achieve their goal of boosting US manufacturing, the next few months will be critical in assessing their full impact on the global pharmaceutical industry. Although increased costs may lead to higher drug prices and strain international partnerships, this situation also creates opportunities for innovation and strategic realignment. The future of the pharmaceutical sector in a post-tariff world will hinge on how quickly and effectively companies can adapt to the rapidly changing geopolitical landscape. BS

Ayesha Siddiqui

Healing an Ailing MedTech Talent Ecosystem

The Asia-Pacific (APAC) region represents a critical landscape for the future of medical technology. However, a thriving medical technology sector needs people skilled in engineering, product development and manufacturing. With advances in artificial intelligence (AI) and robotic surgeries driving a big transformation and creating new opportunities, it is also deepening the skills gap many workers face. Let's take a closer look at these gaps and the solutions that are emerging to address those gaps.

The demand for personalised and efficient healthcare is on the rise and the medical technology (medtech) industry is booming within the APAC region. But at the same time, the region is faced with an ageing population and a growing burden of disease, exacerbated by limited healthcare infrastructure and manpower.

Further, the region is witnessing accelerated adoption of artificial intelligence (AI), robotics, 3D printing, and smart diagnostics, reshaping healthcare delivery and patient outcomes. Both the public and private sectors across APAC countries are investing in the growing adoption of new technologies to strengthen the medtech sector.

If we look closely, individual countries within the APAC region have distinct technological strengths and capabilities. For instance, China and India stand out for their vast technical talent pools, while Japan and South Korea are notable for having a large pool of users for AI-enabled solutions; and Singapore and Australia are recognised for their well-established healthcare data infrastructure and strong capabilities in AI development.

However, workers within the medtech often lack access to the necessary training or educational resources required to adopt the new skills. This digital divide has led to a growing demand for scalable and accessible upskilling initiatives. Thus, the medtech sector within the APAC region must prepare their workforces for a technology-driven future in order to realise economic growth, social equity and innovation, to avoid wage gaps, trade imbalances and security threats.

"AI is set to revolutionise product differentiation and productivity across the medtech value chain. For instance, autonomous robotic surgeries, which are being developed and deployed in Japan, leverage AI and advanced robotics to perform precise and minimally invasive procedures. Another example is the use of AI-enhanced bio-devices in China, where bioelectronic medicine devices use electrical stimulation to treat chronic diseases. Challenges related to integrating AI in medical technologies can be addressed by establishing supportive policies such as building a robust AI talent ecosystem across APAC. For instance, Singapore's AI Apprenticeship Program (AIAP) focuses on enhancing engineering skills through deep-skilling training and industry projects. Additionally, similar programmes are being explored in countries like Australia and South Korea to address the talent gap", said ***Harjit Gill, Chief Executive Officer, Asia Pacific Medical Technology Association (APACMed).***

Addressing Digital Divide

APACMed and Bain & Company, with support from the Singapore Economic Development Board, recently undertook a study to identify the AI talent needs within the medtech industry across APAC. The report revealed that collaboration and early action on capability building can enable APAC countries to ride the waves of transformation in healthcare. In addition, the industry and the government need to strengthen 'bilingual talent' that has the necessary capacity and skills to traverse the medical and deep tech ecosystems.

Without regional alignment on skills requirements and a consistent approach, talent and capability are likely to be inconsistent across regions. Ensuring that stakeholders possess the necessary skills and capabilities is crucial for the successful integration of technology. Policymakers thus, must develop and promote initiatives aimed at supporting both current and future efforts to upskill and enhance technological capabilities.

Realising this as a need of the hour, Singapore's Prime Minister and Finance Minister Lawrence Wong introduced key initiatives in Budget 2025, presented on February 18, which include expanded training allowances, an enhanced SkillsFuture Workforce Development Grant, and a revamped SkillsFuture Enterprise Credit scheme.

Likewise, China Education Development Foundation (CEDF), Dell Technologies, and the National Center for Educational Technology (NCET) have recently launched the 2025 'Upskilling Future Workforce for the Digital Economy' project. Further, the Indian government has introduced major educational reforms in its Budget 2025-26 announcement, which include the establishment of National Centres of Excellence (CoEs) for Skilling and investment of Rs 500 crore into a CoE in AI for education, to enhance skill development and promote digital inclusivity. Citing another example, the Human Resources Ministry in Malaysia is allocating RM3 billion starting in 2025 to strengthen the local workforce and its adaptability in response to rapid technological advancements and changing industry demands. Further, the Department of Skill Development in Thailand aims to upskill and reskill over five million workers in 2025, emphasising digital technology to support industrial advancement.

On the other hand, South Korea's Ministry of Trade, Industry and Energy have announced the opening of a Global Talent Centre, which aims to attract more foreign talent to Korea's tech sector.

"A recent report forecasts that technological shifts will generate 2.7 to 3.5 million new jobs by 2027, even as they replace about 23 per cent of existing positions. So, the integration of advanced technologies requires professionals with robust digital literacy and problem-solving abilities. Many professionals lack hands-on experience with advanced medical technologies, and communication gaps hinder seamless interactions in global settings. Bridging this gap means focused efforts from all sides where collaboration is a key factor", said ***Munira Loliwala, VP- Strategy and Growth, TeamLease Digital.***

Value of Collaboration

Collaborative environments which include the participation of government bodies, big industry players, startups and academicians play a huge role in the process of learning, innovation and upskilling. Also, exploring strategies and channels that encourage early dialogue and engagement among stakeholders is equally necessary for talent development. According to reports, specialised workforce education programmes offer a potential opportunity for incentivising technological innovation. As a result, we need more education and training programmes to develop professionals with knowledge in both medical domains and technology.

In this regard, a new trend is being set by the global tech players that are developing new partnerships and collaborations with governments, academic institutes, and hospitals across the APAC region, to resolve the digital divide. For example, the Ministry of Communication and Digital Affairs in Indonesia and Microsoft have launched elevAIte Indonesia, a new AI skilling initiative to equip 1 million Indonesian talents with AI skills across sectors. Focusing particularly on the partnerships taking place within the medtech sector, Medtronic has recently partnered with UMC, Vietnam's largest university medical centre to enhance minimally invasive surgery education. Comprehensive continuing medical education programmes are being made available to accelerate the learning curve for surgeons. Another project has been signed recently with the Malaysian Society of Colorectal Surgeons, aimed at enhancing the skills of colorectal surgeons in Malaysia.

Sher-I-Kashmir Institute of Medical Sciences and India Medtronic Private Limited, a wholly owned subsidiary of the Irish firm Medtronic, have announced a partnership to establish new Surgical Skill Lab in India, to improve the skills of budding surgeons and provide an overall appreciation and understanding of minimally invasive surgery.

Similarly, All India Institute of Medical Sciences (AIIMS), and US-based medtech company Intuitive,

are establishing an innovative new training centre for robotic-assisted surgery, to focus on equipping surgeons and care teams with the skills and technology training necessary to perform robotic-assisted surgery across specialities including urology, gynaecology, general surgery and more.

Dr M Srinivas, Director, All India Institute of Medical Sciences Delhi, said, "With the rising disease burden in India-cancers, urologic, and gynecological conditions requiring soft tissue surgery, the demand for advanced technologies like robotic-assisted surgery is growing. The need for associated training is clear in India."

Further, Healthium Medtech, based in India, has collaborated with the Healthcare Sector Skill Council to enhance skill development in the Indian healthcare workforce by offering specialised training and certification programmes for skilling healthcare professionals across India.

Another recent notable collaboration between Medtronic and Philips is about training over 300 cardiologists and radiologists in advanced imaging techniques for structural heart diseases, with a focus on End-Stage Renal Disease (ESRD) patients in India. Royal Philips has also partnered with Singapore General Hospital (SGH) to advance medical imaging capabilities in Asia Pacific with a first-of-its-kind MRI training collaboration, to advance medical imaging education and capabilities. A magnetic resonance imaging (MRI) training centre is being set up in SGH as an educational hub for radiographers from across the APAC region, to facilitate the upskilling of radiographers with the latest MRI clinical applications and host educational workshops, seminars and trainings across the public or private sectors. A big medtech player in Japan, Olympus is also investing its time and resources to upskill the workforce aligning with the new age technologies. The company has recently opened a new centre in India, in partnership with HCL in this regard.

Sharing his perspective, ***Marc Radatt, Chief Executive Officer, Olympus Corporation Asia Pacific*** said, “The demand for skilled medtech professionals in the APAC region is growing rapidly, with some markets experiencing a more significant increase than others. To meet this demand, we must continue to invest in the development of medtech professionals to ensure a steady supply of qualified talent. We have observed that many medtech companies in the APAC region often fulfill the requirement for skilled workforces by hiring from other companies in the same industry. In this context, we have positioned our organisation as a destination for both existing employees seeking to enhance their skills and those transitioning from other industries, equipping them with the knowledge and tools to excel in the medtech sector.”

Terumo, another Japanese medtech company, has also recently revealed similar plans towards upskilling the healthcare workforce in India and Singapore with new initiatives. The company has launched its Terumo Asia Skill Lab in Singapore, to invite healthcare professionals, as well as biomedical students from across the region to participate in masterclasses and workshops and engage in collaborative research initiatives. Further, to enhance the clinical skills of healthcare professionals in India, Terumo has expanded its existing skill-based lab with new capabilities.

“We must not only ensure access to training but also ensure the training is relevant for years to come. Creating a skills-based society is key to building a more resilient and adaptive workforce, and partnerships are one of the most powerful tools at our disposal to drive this transformation”, said ***Guy Diedrich, Senior Vice President and Global Innovation Officer at Cisco.***

The shift from a job-based to a skills-based medtech ecosystem is very much in demand, and all stakeholders must continue to invest in skilling programmes, prioritising inclusivity. BS

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"AI will shift the focus of healthcare professionals toward higher-value tasks like clinical decision-making"

« **Dr Aengus Tran,** Co-Founder and CEO, Harrison.ai, Australia

Australian AI-powered medical imaging company, Harrison.ai, has secured $112 million in Series C funding to accelerate product development, expand clinical partnerships, and scale its global presence. In an interaction with BioSpectrum, Dr Aengus Tran, Co-Founder and CEO, shared insights into the role of AI in diagnostic imaging, the company's expansion plans, and addressed critical issues such as patient data security, privacy, and the potential impact of AI on jobs within the healthcare sector. ***Edited excerpts;***

Can you share more about Harrison.ai's mission and how your AI-powered medical imaging and diagnostic solutions are transforming on a global scale?

We are on a mission to urgently scale healthcare capacity through AI-powered medical imaging diagnostic support and workflow solutions. Our radiology (Annalise.ai) and pathology (Franklin.ai) solutions help clinicians deliver faster, more accurate diagnoses, aiding in the early detection of cancer and other medical conditions.

Harrison.ai has expanded its reach across multiple regions, including APAC, EMEA, the UK and the US. What challenges or opportunities have you faced as you scale your solutions internationally?

We have seen that the capacity issue is a universal problem—be it in Australia, the US, or South East Asia. We have also seen a growing appetite to adopt regulatory-cleared AI diagnostic support solutions.

The human aspect of technology adoption is crucial. Effective change management is essential to guide clinicians through new ways of working. Additionally, AI must be highly explainable to ensure trust and usability. When training AI on large datasets, we conduct extensive clinical validation to confirm safety and meet regulatory requirements. This process is necessary for the technology to gain approval for sale in specific markets and be used in clinical settings.

You've raised funding recently — what are the primary areas you plan to invest in a result of this funding? How will it accelerate Harrison.ai's growth?

We are grateful to have recently closed our $112 million Series C round. This funding will accelerate our product development in radiology and pathology, expand our clinical partnerships - in Australia, particularly with the public health system - and scale our global reach in key markets, including the US, as well as our continued growth in APAC, the UK and EMEA.

AI in healthcare is evolving rapidly. What are the most significant industry trends you're seeing right now in medical imaging and diagnostics, and how is Harrison.ai positioning to stay ahead of these trends?

As a clinician-focused company, we are deeply invested in staying at the forefront of innovations that positively impact our capacity and improve our way of working. Our team is continuously researching and applying the latest advancements to develop medical-grade AI-powered solutions tailored for radiology and pathology—helping to drive more accurate, efficient and scalable diagnostics.

How do you ensure that your AI-driven solutions are effectively integrated into existing healthcare systems? What feedback have you received from clinicians for your solutions?

We are focused on delivering clinically validated,

high-impact AI solutions that improve patient outcomes at scale. Our AI solutions are trusted, effective and seamlessly integrated into real-world diagnostic support workflows that are already in use by clinicians - they are designed by clinicians for clinicians. Our deep partnerships with leading healthcare providers, rigorous research and commitment to regulatory excellence set us apart.

What are the key hurdles to widespread adoption of AI in healthcare, and how is Harrison.ai working to overcome these barriers in terms of trust, compliance and clinical outcomes?

Harmonising regulatory frameworks is one of the key hurdles to widespread AI adoption in healthcare. At Harrison.ai, we are focused on ensuring our AI models meet the highest standards of trust, compliance and clinical efficacy across global markets. We work closely with regulators to navigate these complexities and advocate for frameworks that support the safe and efficient deployment of AI in healthcare. Looking ahead, a faster regulatory response to dynamic improvements in AI technology will be essential to unlocking the full potential of AI-driven clinical improvements.

How does Harrison.ai ensure the security and privacy of patient data, especially considering the sensitive nature of medical imaging and diagnostic information? What measures are in place to comply with global data protection regulations like GDPR and HIPAA?

We take patient data privacy and security extremely seriously, and we work closely with leading research institutions, regulators, and ethics bodies to ensure our AI solutions meet the highest standards for clinical use. Annalise.ai does not collect patient images or patient data, in fact, the data is encrypted and pseudo-anonymised.

With the rapid development of AI in healthcare, how do you foresee the role of AI in diagnostics evolving over the next 5 to 10 years? What advancements do you expect to see in both technology and clinical practice?

Global healthcare is currently facing several challenges, such as increasing imaging volumes, a shortage of medical professionals, and a high burden on existing staff. This is bound to increase in the coming years.

Peer-reviewed clinical research in relation to using AI to review chest X-rays has demonstrated that, in most cases, the radiologist's performance is improved with AI support. Clinicians need to adapt to this evolution, envisioning a future where AI tools become collaborators, not replacements. Radiology departments should prioritise AI integration as a matter of urgency to ensure the clinicians have the technology support they need, to address increasing workloads. Going forward we see more adoption of comprehensive AI rather than narrow AI solutions– helping clinicians to diagnose many potential diseases or medical conditions with one AI tool. A tool's comprehensiveness incorporates its breadth and depth of coverage, providing detailed insights into a range of modalities while reaching a broad sphere of patient demographics.

Peer-reviewed clinical research in relation to using AI to review chest X-rays has demonstrated that, in most cases, the radiologist's performance is improved with AI support. Clinicians need to adapt to this evolution, envisioning a future where AI tools become collaborators, not replacements. Radiology departments should prioritise AI integration as a matter of urgency to ensure the clinicians have the technology support they need, to address increasing workloads.

Any solution that looks for a comprehensive range of findings can more effectively triage and prioritise worklists, and help diagnose rare or unsuspected medical conditions.

As AI and automation continue to play an increasingly prominent role in healthcare, how do you address the concerns regarding the potential impact on jobs in the healthcare sector, particularly among radiologists and pathologists?

We believe that AI will transform—not replace—clinical roles in healthcare. While AI can automate certain tasks performed by radiologists and pathologists, we see it enhancing rather than eliminating these roles. AI will shift the focus of healthcare professionals toward higher-value tasks like clinical decision-making, patient care and complex case analysis. This evolution will ultimately improve efficiency and patient outcomes while ensuring that human expertise remains at the core of healthcare. BS

Ayesha Siddiqui

“There are over 650 cell and gene therapy clinical trials underway in APAC region”

« **Michael Culme-Seymour,** Regional Vice President - Asia Pacific, World Courier, Singapore

Catering to pharma companies globally and ensuring seamless transportation of critical healthcare products, World Courier, a global specialty logistics provider and a part of US-based contract research organisation Cencora, has recently appointed Michael Culme-Seymour as its new Regional Vice President for Asia Pacific (APAC). To understand more about the latest trends and challenges facing the pharma logistics sector in the APAC region, and how World Courier is addressing those, BioSpectrum Asia has a detailed conversation with Michael Culme-Seymour. ***Edited excerpts;***

What are the company’s major plans in store for 2025, particularly for the APAC region?

The pharmaceutical sector in the APAC region continues to experience tremendous growth. Over the last decade, the percentage of clinical trials that have started in Asia has significantly increased. China, in particular, accounts for a much larger share of total clinical trial starts than it did 10 years ago, jumping from 8 per cent in 2013 to 29 per cent in 2023. Research suggests this trend will continue, as the Asia Pacific region is expected to experience the fastest annual growth in the clinical trial market between 2025 and 2030. As more companies establish clinical trials or require storage and transport solutions to support the delivery of commercial products throughout the region, we continue to expand and strengthen our capabilities to meet the growing demand for premium specialty logistics services, specifically suited to the clinical trial supply chain.

As we look ahead, we anticipate the continued growth and emergence of high-value, highly complex biopharmaceutical products, like cell and gene therapies. In fact, there are more than 650 cell and gene therapy (CGT) clinical trials underway in the Asia Pacific region, including 200-plus in phase II or III studies. We’re able to leverage our network of GxP-compliant depots and portfolio of solutions, including temperature-controlled packaging, to support the unique requirements of these products, delivering them safely and efficiently to their destinations. As these studies continue to evolve into commercialisation, the requirement for specialty logistics to allow access for patients to CGT therapy is crucial, not only domestically in the country, but internationally.

Are you planning any new investments in new technology developments?

As part of our commitment to deliver high-quality, exceptional customer service, we’re continually focused on investing in and launching new technology solutions that would enable us to deliver enhanced support. One area, in particular, we view as critical is real-time monitoring, which continues to evolve. Our clients trust us to deliver highly sensitive and complex products, including life-saving medicines urgently needed by patients. There is no room for error. Real-time monitoring provides increased visibility across the shipment journey, for our operations team and our customers, minimising risk, improving the customer experience and, most importantly, helping to ensure shipments reach their destination on time and in the right condition. We’ve made significant investments in real-time monitoring solutions in recent years, including adding location monitoring on our multi-use packaging assets, and plan to continue to broaden our capabilities.

Separately, we continue to invest in digital platforms and technologies to further streamline our operations and improve communication across the supply chain. For example, we use digital twin technology to optimise packaging placement, depot operations and overall supply chain efficiency.

Lastly, but most importantly, we are committed

to ensuring that we can provide sustainable logistics solutions, including the increasing investment of e-vehicles and green packaging. In Singapore, our depot and logistics centre is now 90 per cent energy self-sufficient via solar panels that have been installed on the roof of the building.

Are you considering opening new facilities within the APAC region this year or beyond?

As the biopharmaceutical market in APAC grows, we continue to invest in infrastructure to support the increasing demand for clinical supply support and commercial drug storage and distribution. We recently opened a clinical depot in Beijing, China, which, at nearly three times larger than the previous facility, enables us to offer increased storage capacity as well as high-quality, customisable solutions to support our customers' evolving needs. In addition to the Beijing depot, we operate GxP-compliant depots in Australia, India, and Japan and have more than 25 facilities across the region. With increased demand for the expansion of clinical trials into new territories, particularly emerging markets such as Indonesia and Vietnam, we are continuously evaluating client needs and will ensure that our network is sufficiently ready to support their needs. In fact, we moved to larger facilities in Hyderabad, India, and Kuala Lumpur, Malaysia, further expanding our capacity and capabilities in the region. We plan to open a new facility in Adelaide, Australia, this year.

What are the current challenges facing the pharma logistics space in the APAC region?

While it's certainly not unique to the APAC region, the innovative products being developed today, like CGTs, introduce unique challenges and require specialised logistics support. These therapies often remain viable only within narrow ranges of temperature and time. For example, fresh cells have a shelf-life between 12 and 96 hours before they begin to degrade. Cryogenic logistics, a specialised process designed to safely store and transport materials that require extremely low temperatures, typically below -150°C, can enable long-term storage and preserve product integrity and viability across long-distance shipments. However, certain markets, including more remote locations, may not have the specialist facilities needed to support cryogenic storage. In a survey of leaders at companies developing CGTs, respondents predicted a 34 per cent growth in the need for cryogenic storage and transportation related to clinical trials in China over a three-year period, ending in 2024. Robust cryogenic logistics infrastructure is critical to support the scalability of and enable access to certain products, including allogenic cell therapies. World Courier, which delivers more than 12,000 cryogenic shipments around the world annually, has continued to expand its cryogenic storage capacity and network of liquid nitrogen charging centres and stations globally.

Could you please highlight new trends shaping the pharma logistics space in the years to come?

As specialty pharmaceuticals account for a growing percentage of the products being developed today, the demand for temperature-controlled storage and transport will continue to increase. For example, APAC is predicted to have the fastest growing market for pharmaceutical cold chain packaging, growing at a 17 per cent CAGR through 2034. Successful cold chain logistics requires highly choreographed shipping schedules, cold chain infrastructure, temperature-controlled packaging, tracking technology and adherence to strict regulatory guidelines. Continued investments in cold chain storage infrastructure, packaging solutions and advanced technologies, including real-time monitoring capabilities, are critical to protect product integrity and quality throughout transport. For example, World Courier leveraged its passive packaging solution, Cocoon, to deliver an urgent shipment of vaccines from Bangkok, Thailand to Singapore, ensuring the products remained within the specified temperature range despite the heat in Thailand. Aside from the physical logistical challenges in this region, we also work closely with the regulatory environment of each country to ensure that we can provide the most up-to-date professional advice and guidance to our clients to ensure the smooth delivery of clinical trial logistics.

How do you plan to strengthen your position as a logistics provider globally?

Our reputation as a premier specialty logistics provider is rooted in our unwavering commitment to quality, reliability and patient safety. Our clients trust us to provide the logistics expertise and solutions to ensure their products, including life-saving medicines, can reach their destinations safely and efficiently. Through continued investments in infrastructure and innovative solutions, we'll continue to deliver high-quality, specialised logistics services to support our customers' evolving needs and heightened expectations and ensure their products can reach the patients who need them, no matter where they are. BS

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“Affordability remains a big concern for Indian ophthalmology market”

«
Dipu Bose,
Head,
Medical Technology,
ZEISS India &
Neighbouring Markets,
India

Currently, India faces a growing eye-health concern with approximately 4.95 million blind persons and 70 million vision-impaired individuals, including 240,000 blind children. Thus, the early detection and treatment of leading causes of blindness, such as cataracts, diabetes retinopathy and retinopathy of pre-term babies are crucial in reducing the prevalence of blindness and vision impairment across the country. Addressing this major concern, Germany headquartered technology firm ZEISS is collaborating with the Indian Institute of Science (IISc) in Bengaluru to harness the transformative potential of artificial intelligence (AI) to enhance eye-care research and practices. To know more about the company’s plans towards strengthening eye care research in India, BioSpectrum connected with Dipu Bose - Head, Medical Technology, ZEISS India & Neighbouring Markets. ***Edited excerpts;***

What are the major in-store plans at ZEISS for the Indian ophthalmology market in 2025?

ZEISS India continues to deepen its presence in the existing Indian sub-continent, leveraging advanced technologies like AI, robotics, and digital solutions to enhance clinical procedures and deliver superior patient outcomes. For many people, health is the most valuable asset. In recent decades, advances in medicine and technology as well as growing prosperity have increased life expectancy and improved the health of people around the world and is no different in India and ZEISS is committed to support clinical community to improve eye care across India and focusing on improving our reach and distribution into smaller towns of the country.

In the future, a more holistic approach will be taken to health, focusing not only on the individual, but also on factors in a larger context that have an impact on health – including on a global level. Through its innovative technologies, ZEISS helps to improve the quality of life of patients around the world and provides more and more people with access to high-quality healthcare. Additionally, ZEISS is investing in research and development, with a strong focus on AI-driven applications for diagnostics and surgical procedures to further enhance patient outcomes.

What are your views on integrating new technologies like AI and robotics in the ophthalmology segment in India and globally?

The integration of cutting-edge technologies like AI and robotics in ophthalmology is revolutionising eye care both in India and globally. These advancements enable early and accurate diagnosis, personalised treatment plans, and improved surgical precision, ultimately enhancing patient outcomes. AI-powered diagnostics are playing a crucial role in detecting conditions like diabetic retinopathy and glaucoma at an early stage, while robotic-assisted surgeries are improving efficiency and reducing recovery times.

At ZEISS India, we are committed to driving innovation in ophthalmology by leveraging AI and robotics to support eye care professionals with advanced tools that enhance precision, efficiency, and accessibility. As the demand for eye care services continues to grow, especially in a country like India with a high burden of vision-related diseases, these technologies will be instrumental in making quality eye care more accessible and effective.

Please share more details about the recent partnerships in India. Are you also planning to launch new products in the Indian market this year?

At ZEISS, we continuously strive to innovate and expand our offerings to meet evolving market needs. We remain committed to introducing cutting-edge solutions and exploring strategic partnerships that enhance technology adoption and improve customer experiences across our focus areas.

Innovation and research are at the core of ZEISS's DNA, driving our commitment to shaping the future of technology. With a strong focus on R&D, we continuously push the boundaries of what's possible. ZEISS India's most recent collaboration with the Indian Institute of Science (IISc) for research on AI for eye-care is a testimony to our R&D focused efforts. ZEISS has established a sophisticated state-of-the-art research facility dedicated for developing high fidelity Artificial Intelligence (AI) solutions for the betterment of eye-care and to upskill students in AI technologies at IISc. The initiative, supported by the Spectrum Lab in the Department of Electrical Engineering at IISc, aims to harness the transformative potential of AI to enhance eye-care practices and improve patient outcomes.

This collaboration will propel improvements in eye care solutions from India for the world considering the rising prevalence of vision impairments worldwide. The facility will act as a centre for cutting-edge research, allowing IISc researchers to investigate how AI could transform early diagnosis in eye care by providing innovative solutions that streamline processes, increase accuracy, and improve patient outcomes.

In addition to the lab set-up, ZEISS India is also sponsoring 6 MTech students for the next three years through its CSR-sponsored 'MTech Fellowship Programme' at IISc for students pursuing master's degree in Signal Processing, Artificial Intelligence, Computer Science & Engineering/Computational and Data Science.

For ZEISS, innovation is not just about advancing technology - it is about creating meaningful impact, improving lives, and setting new standards for excellence.

What is ZEISS's current market share in India? How is the company planning to strengthen its presence?

ZEISS holds a dominant position in the Indian ophthalmology and microsurgery market. India is one of ZEISS Group's top medtech markets. To further strengthen its presence, ZEISS is expanding its digital footprint through ZEISS Digital Support, which enables seamless connectivity between medical devices. The company is also increasing R&D investments, expanding its distribution network, and setting up more service and stock points in smaller cities to cater to a larger audience.

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How much revenue was generated within the Indian market in 2024, and what are the growth expectations this year?

In the last financial year (German financial year- October 2023 – September 2024), ZEISS in India recorded approximately Rs 2,100+ crore turnover. We are quite optimistic about our strong growth prospects in India.

What are the current challenges facing the Indian ophthalmology market, and how is ZEISS addressing them?

The Indian ophthalmology market faces several challenges, primarily the limited access to healthcare, as advanced eyecare facilities are concentrated mainly in metro cities, making it difficult for rural populations to receive timely treatment.

Another challenge is the lack of awareness among people regarding the importance of regular eye checkups, leading to late diagnosis of conditions such as diabetic retinopathy, which could be prevented if detected early.

Affordability remains another big concern, as high-end ophthalmic technologies and surgical solutions are inaccessible to everyone. ZEISS is tackling these challenges by expanding into smaller cities and strengthening its distribution network to make advanced eye care more accessible. BS

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"Biggest challenge in running a chronic Hepatitis B trial is often patient recruitment"

« **Tom Hickey,** Director-Therapeutic Strategy, Novotech, Australia

Novotech, the global full-service clinical Contract Research Organization (CRO) that partners with biotech companies to accelerate the development of advanced and novel therapeutics, has released its latest disease report: Hepatitis B - Global Clinical Trial Landscape (2025) in March 2025. The report highlights a 31.95 per cent CAGR in Hepatitis B trials from 2020 to 2024, driven by advances in small molecules, siRNA therapies, and therapeutic vaccines. To know more about the clinical trials landscape of Hepatitis B, particularly the Asia Pacific region, BioSpectrum Asia interacted with Tom Hickey, Director-Therapeutic Strategy at Novotech. ***Edited excerpts;***

With over 25 years of experience and more than 90 Hepatitis B clinical projects completed, Novotech remains at the frontline of advancing innovative therapies. What key lessons has Novotech learnt from conducting these projects?

From decades of experience in Hepatitis B clinical trials, Novotech has identified key success factors namely- Site & Patient Selection Drives Success: Knowing the right patients for your study, and where to find them. Having a balance of high recruiters with the global Key Opinion Leaders that will guide the trial progress. Regulatory Planning Is Critical: Early engagement with regulatory agencies reduces approval delays and ensures trial designs align with evolving guidelines. Regulators in many of the key regions for chronic Hepatitis B (CHB) are very open to engagement and scientific merit, with many innovations in both therapy class and trial design being first used in this space.

Adaptability to New Science Is Essential: With the rapid emergence of new or improved assays and biomarkers Novotech remains agile and committed to integrating new therapeutic advancements into trial protocols. Retention Strategies Ensure Long-Term Study Viability: Patient adherence is crucial, given the extended duration of many Hepatitis B trials, while it's important to recruit patients quickly it is futile if they don't remain on the trial. Novotech employs digital engagement tools and patient support programmes to improve retention rates.

These insights have helped Novotech optimise Hepatitis B trial execution, ensuring higher efficiency, faster approvals, and improved trial outcomes for biotech sponsors.

What are the biggest challenges in running Hepatitis B trials, and how do you address them?

The biggest challenge in running a chronic Hepatitis B trial is often patient recruitment. Something that you wouldn't really expect for a disease with over 250 million people infected worldwide. However, the areas where prevalence of infection is higher are often the areas traditionally least well serviced by clinical research such as West Africa, Asia Pacific, Eastern Europe and Central Asia.

Novotech's origins are in Asia Pacific and Eastern Europe, so through our geographic footprint and close relationships with Key Opinion Leaders in locations like New Zealand, Hong Kong, South Korea, Thailand, Moldova and Ukraine we were uniquely positioned to support companies wishing to work in this space. Since those early days we have expanded our footprint to include CHB sites in Western Europe, the US and Canada, along with places like Pakistan and Uzbekistan in Central Asia, often with our Hepatitis trials allowing us to get an operational foothold in a location.

Another complexity is that often trials in CHB are focused on a particular sub-population; patients with a certain level of disease activity, or at a certain stage of the viral cycle, or specific HBV genotypes, or even HLA matching. Through our past work and knowledge of the space, we know where to go to find the patients that a trial needs. We have a network of over 350 investigators that we have worked in CHB globally that we can tap into.

Coupled with the difficulty in finding patients, CHB studies are often quite long in duration, particularly the later Phase II and Phase III studies we are doing, typically patients are involved for upwards of three years between treatment and then follow-up periods. For a condition that doesn't often have any tangible health impacts at the stage many of these patients are at, it can be difficult to keep them engaged and involved in the study as they don't feel that sick. We work to ensure that patients feel a sense of community around their study, that they understand the benefits of the treatment and what the potential risks are for them without treatment. Our Patient Engagement teams have different tools that can be deployed to assist with this from newsletters to AI.

The vast majority of endpoints in CHB research are related to changes in laboratory measurements, with a lot of innovation happening recently in developing assays targeted specifically to measure biomarkers to understand viral replication activity and viral levels. Given that we were supporting so many trials in this space we felt it imperative to have a reliable laboratory to do this analysis, so our team at Novotech Laboratories set out to ensure they had one of the most comprehensive sets of CHB and CHD assays in industry, acquiring numerous instruments specifically to run these assays.

How does Novotech navigate regulatory and operational challenges across global trial sites?

Novotech's deep expertise in global regulatory frameworks allows for efficient trial approvals across different regions. The company offers local regulatory expertise. Dedicated teams with in-depth knowledge of FDA, EMA, PMDA, and NMPA requirements, ensuring compliance across trial sites. This has been particularly important in navigating regulatory requirements for what are often first-in-class therapy types.

Novotech optimises approval timelines through strong relationships with ethics committees and regulatory agencies. With established trial infrastructure in Asia-Pacific, the US, and Europe, Novotech ensures seamless coordination between multi-regional sites. This expertise enables Novotech to overcome site activation delays, align trial execution with global standards, and accelerate study timelines.

Which emerging therapies in Hepatitis B show the most promise in clinical trials?

Since the arrival of the game changing nucleos(t)ide analogues, Entecavir and Tenofovir, in the mid-2000s, there hasn't really been any new weapons added to the arsenal. We are hopefully close to the approval of the first of those with GSK's Bepirovirsen and there are many other promising therapies coming hot on its heels like Arbutus' Imdusiran and AusperBio's AHB-137 along with other therapies targeting Hepatitis B patients co-infected with Hepatitis D like Bluejay Therapeutics' Brelovitug.

Looking earlier in development, there are some really interesting studies which have just entered the clinic using both gene therapy and epigenomic approaches from Precision Biosciences, Tune Therapeutics and Epigenic Therapeutics.

How is Novotech adapting to the rise of personalised medicine in Hepatitis B research?

The rise of personalised medicine in Hepatitis B treatment is transforming clinical trial designs, requiring precision-based patient selection and biomarker-driven approaches. As more knowledge becomes available on the Hepatitis B virus biology and as we better understand the human immune system, we are better understanding what treatments will work best for which patients and when. Novotech is adapting by incorporating the most modern Biomarkers, Genomic Screening and Analyses available- Supporting trials that utilise HBV activity profiling and immune response biomarkers to tailor treatments.

Leveraging Real-World Data (RWD) – Enhancing patient stratification and endpoint measurement through longitudinal patient data analysis. Flexible Trial Designs – Implementing adaptive clinical trial models that adjust protocols based on interim safety and efficacy results. Novotech's approach ensures personalised Hepatitis B therapies can be tested efficiently and brought to market faster. BS

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"ADCs have already become a mainstay treatment option across a variety of both hematologic and solid cancers"

« **Dr Rafael G. Amado,** President and Head, Global Research and Development, Zai Lab, USA

The resurgence of antibody-drug conjugates (ADCs) in cancer therapy signifies a shift towards targeted, highly effective treatments, leveraging the power of monoclonal antibodies to deliver potent cytotoxic payloads directly to cancer cells, minimising harm to healthy tissues. In an interaction with BioSpectrum, Dr Rafael G. Amado, President and Head of Global Research and Development at Zai Lab, discusses the resurgence of ADCs in cancer therapy and explains how ADCs differ from traditional treatments like chemotherapy and biologics. He also highlights the promising ADC candidates in development at Zai Lab and what distinguishes them from other ADCs. ***Edited excerpts;***

Can you provide an overview of the primary components of ADCs and how they work in general?

Antibody-drug conjugates (ADCs), combine monoclonal antibodies specifically targeted to antigens on the surface of tumour cells with powerful anti-cancer molecules joined by a chemical linker. With the perspective of someone who has worked in cancer research for more than 25 years and helped develop 15 oncology-specific drugs, I view ADCs as a very valuable class of therapeutics. By delivering higher concentrations of cytotoxic agents and reducing off-target side effects, they have potential to deliver a higher benefit to patients than chemotherapy alone with a more limited toxicity profile.

What differentiates ADCs from other categories of cancer therapies such as chemotherapy or biologics? Why would a physician use an ADC vs one of these other categories of therapies?

ADCs deliver chemotherapy in a targeted fashion: the toxic payload is liberated largely in the tumour cell and microenvironment (rather than elsewhere in the body) by taking advantage of a trafficking molecule, generally an antibody, that binds to a tumour-associated antigen. Other differentiators and advantages include the number of toxic molecules on an ADC can be tightly regulated; the pharmacokinetics of the chemotherapy payload on ADCs can be optimised by pairing it with those of the antibody; the nature of the payload on ADCs can be altered to include small molecules, biologically active peptides, protein toxins, enzymes or even radionuclides, to better target specific tumors cells.

Lastly, experimental antibodies can be bispecific or biparatopic, meaning they can bind more than one target in the same cell or in two different cells. This increases the potency of the ADC by heightening the probability that they will bind to and internalise in the cancer cell, even if one of the molecules is not expressed at sufficient levels in a given cell.

There has been a resurgence of ADCs in the past couple of years. Can you tell us more about this and why it's happening? Why is there so much interest and investment in this class of drugs?

It's true that ADCs have undergone a bit of a renaissance. Traditional ADCs had a very narrow therapeutic window. This means that the dose that was effective was very close to the dose that was toxic. This was largely due to lack of specificity of the delivering antibody, lack of ADC internalisation into the cancer cell and ineffective linkers that resulted in the release of a variable number of toxic molecules in the tumor periphery, causing off-target toxicity.

The evolution toward next-generation ADCs has been made possible – in part – by the development

of technologies that lead to stronger stabilisation of the ADC's linker and the antibody. These technologies rely primarily on specific methodology for conjugating the linker to specific amino acids in the antibody molecule. These methods generate linkers that release the payload at the target cell or tumor microenvironment under specific conditions (known as cleavable linkers) rather than – as with earlier generation ADCs – releasing linker-payload outside of the tumor and its microenvironment and creating off-target toxicities. Additionally, by enabling targeted release of the payload in the tumor microenvironment, cleavable linkers can create what's known as a bystander effect, delivering toxic payload to neighboring cancer cells even if they do not express the target tumor-associated agent. All but one of the U.S. Food and Drug Administration (FDA) approved ADCs have cleavable linkers.

Zai Lab's investigational compound ZL-1310 is an example of this next generation, because it was intentionally designed to improve upon the earlier ADC compounds. It has a specific linker generated by a technology termed TMALIN (Tumor Microenvironment Activable Linker). This technology binds the linker to three aminoacids in the antibody. It relies on both internalisation into the cancer cell and on the extracellular cleavage via enzymes in the tumor microenvironment. Due to the stability of the linker, ADCs are enriched in the tumour microenvironment, allowing for the incorporation of a high drug-to-antibody ratio (DAR) of payload molecules per ADC. This makes it possible to achieve a strong antitumor effect. ZL-1310 is stable in circulation and its peak concentration is significantly higher than that of the payload, thereby reducing systemic exposure to chemotherapy.

What tumour types seem to be particularly good targets for ADCs?

ADCs have already become a mainstay treatment option across a variety of both hematologic and solid cancers. Zai Lab's pipeline has compounds targeting a wide range of cancers, including many that have proven difficult to treat with standard-of-care therapies. Differential expression of the target in tumour versus normal tissue is critical to achieving selectivity and increasing the therapeutic index.

Can you provide an overview of the promising ADC candidates in development at Zai? What differentiates them from other ADCs and from each other?

Zai Lab is building a portfolio of potential first- and/or best-in-class ADCs to help patients around the world.

ZL-1310 is our investigational, potential first-in-class delta-like ligand 3 (DLL3) ADC. ZL-1310 utilises the TMALIN platform, which enables us to apply more targeted doses of chemotherapy to fight cancer activity. Another key point of differentiation for ZL-1310 is how it's administered. T-cell engagers must be administered in a hospital setting because of immunological toxicities that are mostly due to interferon release upon T-cell activation. The design of ZL-1310 allows for more flexible administration given its high affinity and half-life. We have seen promising early data utilising ZL-1310 as, for example, a potential treatment for small cell lung cancer (SCLC). We feel this compound could present therapeutic benefits across other neuroendocrine tumours with overactive DLL3-expression such as gastrointestinal tract, prostate, bladder and thyroid cancers.

ZL-6201 is an innovative, potential first-in-class ADC we are developing that targets leucine-rich repeat-containing protein 15 (LRRC15), an appealing target for cancer therapy due to its overexpression in multiple solid tumour types such as sarcoma, glioblastoma and melanoma. ZL-6201 also has potential to target the tumour microenvironment given that the LRRC15 antigen is also expressed in the fibroblasts of the tumour microenvironment, potentially creating a bystander effect even if the antigen is not present in the cancer cells.

What indications is Zai Lab prioritising in its ADC programme and why?

In January 2025, our DLL3-targeted ADC ZL-1310 received an Orphan Drug Designation from the FDA, recognising its potential to treat patients with SCLC. We know SCLC patients urgently need innovative treatment options with improved efficacy, safety and ready access in tertiary care and community settings. As we continue our clinical development and ongoing studies of ZL-1310, we see potential for multiple lines of therapy with indications across a variety of neuroendocrine tumour types.

We are also working to advance ZL-6201 into Investigational New Drug-enabling studies as a potential treatment for patients with sarcoma and other LRRC15-positive solid tumours such as breast cancer and other malignancies where this antigen is enriched in the tumor stroma. BS

Ayesha Siddiqui

"Encephalitis is associated with significant costs to individuals and society, due to its high morbidity and mortality"

« **Dr Ava Easton,** Chief Executive, Encephalitis International, United Kingdom

World Health Organization (WHO) and United Kingdom-headquartered Encephalitis International launched a critical Technical Brief on Encephalitis in London on February 20 as World Encephalitis Day celebrated on February 22 every year. In this regard BioSpectrum spoke to Dr Ava Easton, Chief Executive, Encephalitis International, about the current mortality status and economic burden for Japanese encephalitis (JE) and how pharma industry can play role in controlling JE with appropriate diagnostic tests and treatment options. ***Edited excerpts;***

What is the current mortality status and economic burden for JE in Asia Pacific?

Encephalitis is associated with high mortality on a global scale. Japanese encephalitis (JE) mortality can be as high as 30 per cent. Due to its high morbidity and mortality, encephalitis is associated with significant costs to individuals and society. Economic information is limited in low-to-middle income countries (LMICs), but encephalitis is likely to incur a substantial financial drain on families, as seen in studies on JE in Bangladesh, China and Nepal. In these countries, out-of-pocket costs for long-term care and rehabilitation can be devastating to individuals and their families.

How should JE be managed?

To control JE, surveillance, prevention and vector control are important public health measures, especially as there isn't a virus-specific treatment. Surveillance is necessary to be able to understand the disease (epidemiology, burden), but also to guide the preventive measures and monitor their effectiveness. People can take precautions such as wearing mosquito repellent, wearing long sleeves and trousers to avoid being bitten and ensuring their homes and communities are free from stagnant water when mosquitoes gather and lay their eggs. Safe and effective vaccines are available to prevent JE. The WHO recommends that JE vaccination be integrated into national immunisation schedules in all areas where JE disease is recognised as a public health issue. In addition, all travellers to areas where JE is endemic should seek travel health advice including the need for vaccination.

What diagnostic tests and treatment options do you recommend and what is the current status in APAC as treatment is considered?

Numerous diagnostic tests are available for the aetiological diagnosis of encephalitis such as cerebrospinal fluid polymerase chain reaction (CSF PCR) as the gold standard, magnetic resonance imaging (MRI) and antibody testing. Treatment varies depending on the cause- antivirals (e.g. aciclovir intravenous) or antibacterial for infectious causes, although for most viral causes there is no treatment aimed at the cause; immunotherapies for autoimmune causes; supportive or symptomatic treatment. In Asia, data suggests aciclovir availability is variable. Some studies from India, Pakistan, Japan, and Sri Lanka report treatment of encephalitis with aciclovir. However, these studies are often conducted in larger tertiary referral centres, so aciclovir is perhaps less available in smaller rural hospitals and within-country variation likely exists. In the APAC region, diagnostic capabilities vary depending on level of urbanisation. Advanced diagnostic tools such as MRI (magnetic resonance imaging) and PCR (polymerase chain reaction) are often only available in major hospitals. Data are scarce but autoantibody testing is likely limited in these parts of the world.

How is JE controlled by the pharma industry?

The major contribution by the pharmaceutical industry in controlling JE is the development and availability of affordable vaccines. Other roles played by this industry include manufacturing of therapeutics (such as anticonvulsants and analgesics) that make the supportive treatment. The work of pharma can also be enhanced by working in collaboration with local agencies and patients and promoting public awareness and education. BS

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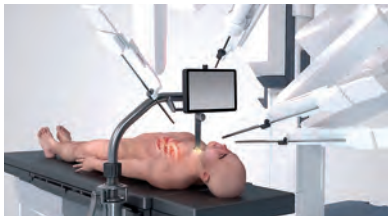
Vydehi Institute of Medical Sciences and Research Centre in India to expand access to robotic-assisted surgery

Vydehi Institute of Medical Sciences and Research Centre, Bengaluru, a leading institution in multi-specialty tertiary care in India, has joined hands with Intuitive, a global technology leader in minimally invasive care and the pioneer of robotic-assisted surgery (RAS), to introduce resident surgeons to robotic-assisted surgical technology through the Intuitive Robotic Onboarding Programme and Education (I-ROPE). This initiative marks the introduction



of I-ROPE in a private hospital in India, providing surgical oncology postgraduate trainees with exposure to robotic-assisted surgery and its clinical applications. The I-ROPE programme is designed to introduce early-career surgeons to robotic-assisted surgery through structured sessions that cover the technology, its applications across various surgical disciplines, and its potential role in modern clinical practice. At Vydehi Institute of Medical Sciences and Research Centre, the programme is being conducted using the state-of-the-art da Vinci surgical system, providing residents hands-on familiarity with one of the most advanced robotic-assisted surgical platforms available today.

PolyU and Peking University explore collaboration in medical technology in China

The Hong Kong Polytechnic University (PolyU) and Peking University Health Science Center (Peking University) have signed a Memorandum of Understanding (MoU) to explore collaboration in the field of medical technology, including joint research and faculty and student exchanges. The collaboration will combine the research capabilities and teaching resources of PolyU's School of Health and Social Sciences and the Institute of Medical Technology of Beijing Medical University to jointly promote the development of interdisciplinary medical disciplines and medical technology. After the signing ceremony, the PolyU delegation and the scholars of Beijing Medical University had an in-depth discussion on the potential of cooperation between the two sides in medical education, research collaboration and student training, and introduced the teaching and research development and discipline development of their respective faculties.

Australia to open health leadership academy to address critical workforce challenges

A $7.5 million philanthropic donation from Dennis Bastas, CEO of DBG Health, will establish a new Health Leadership academy in Australia to address critical leadership and workforce challenges facing the global health sector. The Bastas Academy for Health Leadership, an innovative cross-disciplinary partnership between the University of Melbourne's Faculty of Medicine, Dentistry and Health Sciences and Melbourne Business School, will provide world-class leadership development programmes to upskill and empower health professionals to drive innovation, collaboration and excellence across the industry. In addition to the educational pathways, the Bastas Academy for Health Leadership will foster an ecosystem for health sector innovation, ensuring that Australia remains actively engaged in better outcomes for all. Three flagship pathways will be offered to healthcare professionals: Leading in Health, Leading Complex Health Systems, and Innovating for the Future of Health. These will equip participants with core leadership skills, the ability to navigate complex health environments, cultivate innovative solutions, and implement systemic change.

SuperFreeze appoints Troy Shortell as Co-CEO to drive innovation across Asia

SuperFreeze, an operator, developer, and owner of advanced cold storage facilities in Asia, has announced the appointment of Troy Shortell as Co-CEO. Shortell, who has served as Managing Director for Operations at SuperFreeze for the past three years, will now oversee all existing and future facilities across the region, bringing his extensive expertise to elevate the company's operational excellence and growth strategy. With over 30 years of experience in the cold storage and logistics industry, Shortell has held leadership roles at global firms DHL, CEVA, and Havi Logistics. He also previously led the Supply Chain Advisory practice in Asia at CBRE. His appointment to Co-CEO marks a significant milestone for SuperFreeze as it expands its footprint and reinforces its commitment to innovation and sustainability in cold chain solutions, serving the pharmaceutical sector and others. A key highlight of Shortell's tenure at SuperFreeze has been his instrumental role in opening the company's first facility outside South Korea, located in Tuas, Singapore.

Aragen makes new appointments for advancing scientific innovations

Aragen, a leading global Contract Research, Development and Manufacturing Organisation (CRDMO) in India, has announced two senior level appointments. Dr Manjunath Ramarao has been appointed as the Chief Scientific Officer (CSO) and Executive Vice President, Integrated Drug Discovery (IDD) and will be based in the USA. Jayadeva Sajankila has been appointed as the Vice President and Head, Chemical Development Solutions and will be based in Hyderabad. Dr Ramarao comes with over 25 years of multidisciplinary experience in the global biopharmaceutical research and development. Prior to joining Aragen, he was the CSO at Atomic AI & Ribometrix Inc in the US. He has also held various leadership positions at Bristol Myers Squibb and Wyeth (Pfizer). On the other hand, Sajankila joins as the Vice President and Head of Chemical Development Solutions (CDS), one of the largest & critical businesses of Aragen. Sajankila comes with over 26 years of industry experience in Process R&D, Process Safety, Technology Transfer & Commercialization. Prior to joining Aragen, he was the Head of Project & Portfolio Management, Chemical Development at Syngene International Ltd., Bengaluru.

Michael D. Patten steps in as Chief Strategy Officer of Harbour BioMed

Harbour BioMed, a US and China-based biopharmaceutical company, has announced the appointment of Michael D. Patten as Chief Strategy Officer. Patten will be based in the United States and report directly to Dr Jingsong Wang, Founder, Chairman, and CEO of Harbour BioMed. In this role, Patten will be responsible for formulating and overseeing the global corporate development and growth strategy for Harbour BioMed. In addition, as the Head of Global Alliance, he will lead efforts to manage and strengthen Harbour BioMed's global strategic partner network and ecosystem, with a particular focus on high-potential markets outside of China, further enhancing Harbour BioMed's global branding and presence. Patten brings extensive experience and a strong track record in the biopharmaceutical industry. During his tenure at Bristol Myers Squibb, he held several key leadership roles. Most recently, as Head of Equity & Venture Capital, he led and managed significant numbers of strategic equity investments and LP commitments across the life science ecosystem.

GE HealthCare names new president and CEO for China biz

GE HealthCare (GEHC), a leading global healthcare solutions provider, has announced that Yihao Zhang, president and Chief Executive Officer (CEO), China, will retire from the company effective July 1, 2025. Will Song, a Johnson & Johnson veteran for over 20 years, has been named GE HealthCare's new president and CEO, China, is joining the company on April 1, 2025, ahead of leading the region starting July 1 following Yihao's departure. Song joins GE HealthCare from Johnson & Johnson, where he served as global senior vice president and China chairman. He led the China Presidents' Council to advance Johnson & Johnson's journey of innovation in China across MedTech and Innovative Medicine businesses.

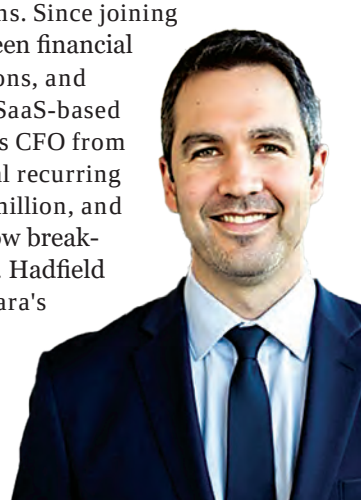
He joined Johnson & Johnson in 2003 and held various global positions with increasing responsibilities. Well respected in the China market, over the past decade, Song has served as vice chairman of the China Association of Medical Devices Industry, vice president of the China Association of Enterprises with Foreign Investment, and vice chairman, Shanghai Enterprises Directors Association. He has been recognised with multiple external honours for his accomplishments, impact on the healthcare industry and broader economic development.

BluMaiden Biosciences appoints new leadership in US to accelerate global expansion

BluMaiden Biosciences, a Singapore-based biotech firm, has announced the appointment of Dr Terence Kelly as interim Chief Executive Officer and Prof. Damian O'Connell as Chair of the Science Advisory Board and member of the Board of Directors. Dr Damien Keogh, founder of BluMaiden, will assume the role of Chief Operations Officer, focused on driving the company's scientific, technical, business development, and corporate functions. Dr Kelly brings 35 years of drug discovery and development experience. He previously led Boehringer Ingelheim's US medicinal chemistry department and was chief executive officer of CoMentis and Perception Neuroscience, US-based clinical-stage biotech companies focused on neurodegeneration and psychiatric disease. Dr Kelly joined the Board of BluMaiden as a non-executive director in 2021. Throughout his career, he has led teams in medicinal chemistry, high throughput screening, computational chemistry, structural biology, and combinatorial chemistry. Dr Kelly is based in the US and will support the company to build commercial and scientific teams there.

Lunit announces leadership transition at Volpara, Craig Hadfield steps in as CEO

South Korea-based startup Lunit, a leading provider of artificial intelligence (AI)-powered solutions for cancer diagnostics and therapeutics, has announced the appointment of Craig Hadfield as the new Chief Executive Officer (CEO) of its subsidiary, Volpara Health Technologies. Hadfield, who currently serves as Volpara's Chief Customer and Financial Officer, has assumed the role effective April 1, 2025. He brings nearly nine years of leadership experience to Volpara, where he has played a pivotal role in scaling the company from a startup to an industry leader in breast health solutions. Since joining Volpara in 2016, he has overseen financial operations, strategic acquisitions, and the company's transition to a SaaS-based model. Under his leadership as CFO from 2017 to 2024, Volpara's annual recurring revenue grew up to over $34 million, and the company achieved cash flow break-even for the first time in 2023. Hadfield was also instrumental in Volpara's acquisition by Lunit in 2023 and has since led its customer success and implementation teams.



CEPI funds Nagasaki University's 'Nanoball' technology to help defeat Disease X

A new 'nanoball' vaccine platform developed by experts in Japan will be tested as part of new research, supported by Norway-based Coalition for Epidemic Preparedness Innovations (CEPI), looking for promising tools that could help fight an infectious disease outbreak with pandemic potential. Researchers at Nagasaki University have developed the pioneering innovation as a novel approach to aid the delivery of messenger RNA (mRNA) vaccines in the body. With up to $5 million

in new funding from CEPI, the Nagasaki team will conduct preclinical studies to investigate whether their next-generation technology, where the mRNA is instead encased in nano-sized, negatively-charged particles, could overcome challenges and confront the next worrisome threat. With support from NEC Oncoimmunity (NOI), the new research will focus on testing an AI-enabled nanoball mRNA vaccine to protect against severe fever with thrombocytopenia syndrome virus (SFTSV). The emerging tick-borne virus, a member of the Phenuivirus family, poses a serious public health threat in Japan and wider East Asia.

Korea develops advanced AI model for accelerating therapeutic gene target discovery

Identifying therapeutic gene targets is essential for advancing personalised medicine and addressing the genetic basis of diseases. However, traditional experimental methods for discovering these targets are costly and time-consuming. While deep learning has shown promise in identifying biomarker genes, it has struggled to identify therapeutic genes. To address this challenge, researchers from Pusan National University, South Korea have developed an innovative method, the Hypergraph Interactive Transformer (HIT), which accurately and quickly identifies therapeutic gene targets using hypergraphs and attention-based learning. The HIT model utilises hypergraphs, which, unlike traditional graphs, can connect multiple nodes with a single hyperedge. This allows HIT to effectively model complex biological relationships by constructing gene and disease hypergraphs from multiple biological datasets, capturing connections between genes, diseases, and various ontologies like gene, disease, and human phenotype ontologies.

Australia designs new rapid sensor to detect pregnancy complications

Australia's University of Queensland (UQ) researchers have developed a new rapid sensor that can detect pregnancy complications, such as gestational diabetes, preterm birth risks and hypertension, as early as 11 weeks, with a simple blood test. The 'nanoflower sensor' which works by screening blood samples for cell biomarkers could help reduce neonatal hospital admissions and save the healthcare system millions each year. The sensor is able to detect health complications that usually aren't picked up until the second or third trimesters. The technology analyses extracellular vesicles, known as the 'body's text messages', which carry critical signals between maternal and foetal cells during pregnancy. Statistics from Australian Institute of Health and Welfare show about 30,000 babies born in Australia each year experience growth and developmental impairments due to pregnancy complications. The technology could save the healthcare system millions annually by reducing neonatal intensive care unit admissions, which cost about $5000-$10,000 per day, and prevent emergency interventions, including caesarean sections which cost about $10,000-$20,000 each.

Scientists in Singapore open door to new medicines for drug discovery applications

Researchers from the National University of Singapore (NUS) have pioneered a new catalytic transformation that converts epoxides into fluorinated oxetanes, a coveted but difficult-to-make class of drug molecules that escaped synthetic preparation for years. By unlocking a pathway to these valuable drug scaffolds, this discovery potentially opens the door to new medicines for drug discovery applications. The researchers deviated from the standard logic of synthesis by designing a new strategy that inserts a difluorocarbene species selectively into the structure of readily available three-membered epoxides. This process is facilitated by an inexpensive copper catalyst, which stabilises the difluorocarbene generated from a commercially available organofluorine precursor. The resulting copper difluorocarbenoid complex coordinates with the epoxide and triggers site-selective ring cleavage and cyclisation, to yield the desired α,α-difluoro-oxetane product via a metallacycle intermediate. Computational studies further provided insight into the new reactivity mode and its underlying mechanism.

Thailand designs exoskeleton wheelchair to aid mobility

Thailand's Chulalongkorn University has introduced the Exoskeleton Wheelchair, an innovative robotic suit designed to help people with disabilities stand, walk, and move more independently. The breakthrough was developed by Assoc. Prof. Dr Ronnapee Chaichaowarat from the Faculty of Engineering, aiming to improve mobility beyond traditional wheelchairs. Nicknamed Thai Iron Man, this innovation is the first exoskeleton wheelchair built by Thai researchers. Unlike conventional wheelchairs, it can transform to help users stand and walk, making it easier to navigate stairs or public transport. The project received funding from Thailand's National Research Council (NRCT) in 2021–2022 and was a finalist in the 2024 Young Technologists Award. The Exoskeleton Wheelchair is a wearable robotic device that supports users by combining a wheelchair and exoskeleton into a hybrid system. Made with lightweight carbon fibre, and equipped with foldable wheels, the robot allows users to switch between sitting and walking modes with ease. A motorised system controls hip and knee joints, while the ankle joint remains flexible to ensure natural motion.

India builds AI-powered model to improve blood sugar predictions for diabetes management

A research team at National Institute of Technology (NIT) Rourkela, India has developed a new artificial intelligence (AI)-driven approach to improve blood sugar predictions for people with diabetes. The research presents a machine-learning model that enhances the accuracy of blood glucose level prediction, helping individuals and healthcare providers make better and personalised treatment decisions. The researchers at NIT Rourkela focused on improving glucose forecasting using deep learning techniques. Their approach incorporates a specialised AI model that learns from past blood sugar trends and predicts future levels more accurately than existing methods. Unlike traditional forecasting models, which often struggle with long-term trends and require manual adjustments, this model processes glucose data automatically, identifying key patterns and making precise predictions. In the long run, this AI-driven approach has the potential to enhance diabetes care through various applications.

Parse Biosciences plans to release single cell chromatin accessibility products

The US-based Parse Biosciences, the leader in accessible and scalable single cell sequencing, has affirmed plans to proceed with development and future release of their Evercode single cell chromatin products. This comes on the heels of Parse invalidating the patents that 10x Genomics had asserted against Parse's Evercode Whole Transcriptome products and the subsequent cancellation of a trial on those patents. Parse's chromatin accessibility technology leverages a novel approach with advantages over existing methods such as ATAC-seq and will deliver higher quality, more uniform data. Parse plans to make their new solutions available for early access in late 2025. Parse's latest innovations include the recent launch of their Evercode Penta kit, the largest ever single cell sequencing kit that allows researchers to look at up to 5 million cells in a single experiment.

Thermo Fisher Scientific buys Solventum's purification and filtration biz for $4.1 B

American firm Thermo Fisher Scientific Inc. has entered into a definitive agreement with Solventum to acquire its Purification & Filtration business for approximately $4.1 billion in cash. Solventum's Purification & Filtration business is a leading provider of purification and filtration technologies used in the production of biologics as well as in medical technologies and industrial applications. The Solventum business operates globally with sites across the Americas, Europe, the Middle East, Africa, and the Asia-Pacific region, and has approximately 2,500 colleagues. In 2024, Solventum's Purification & Filtration business generated approximately $1 billion of revenue. Solventum's Purification & Filtration business is highly complementary to Thermo Fisher's bioproduction business. Thermo Fisher has a leading portfolio of offerings in cell culture media and single-use technologies. Solventum's innovative filtration portfolio broadens Thermo Fisher's capabilities in the development and manufacturing of biologics, spanning upstream and downstream workflows.

Bruker introduces X4 POSEIDON advanced X-ray microscope for scientific applications

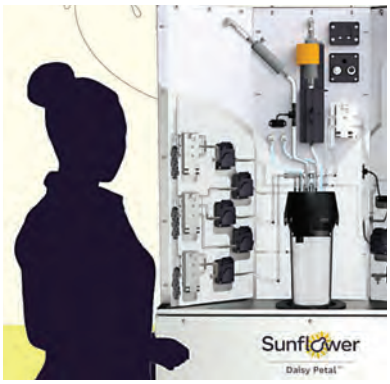
American manufacturer of scientific instruments Bruker Corporation has announced the launch of the new X4 POSEIDON, a high-performance 3D X-ray microscope (XRM) using micro-Computed Tomography (microCT). This innovative benchtop XRM system offers advanced capabilities comparable to larger, floor-standing systems to make high-resolution 3D X-ray microscopy accessible for demanding XRM applications in industrial applications and scientific research.

The X4 POSEIDON features a high-end X-ray source that improves 3D resolution more than an order of magnitude compared to similar instruments. The system offers a large field-of-view high-efficiency detector, which optionally can be combined with a high-resolution scientific CMOS detector for multi-vision analytical flexibility.

It is powered by 3DxSUITE software, with automated protocols, an intuitive and customisable user interface, integrated database and user management, and multi-language support. Designed for low maintenance, the system enhances uptime and reduces cost of ownership.

Sunflower Therapeutics announces commercial launch of Daisy Petal Perfusion Bioreactor System in Asia

US-based Sunflower Therapeutics has announced its first distribution agreement with PharmNXT Biotech, an Indian bioprocessing company. Through this agreement, Sunflower will commercially launch its Daisy Petal Perfusion Bioreactor System in Asia, a significant step in the company's ongoing product commercialisation. Sunflower's innovative Daisy Petal perfusion fermentation system uses a single-use assembly designed specifically for intuitive



installation and a simple user experience. The system's hardware and controls are engineered and optimised for in-vessel perfusion utilising a custom disposable stirred tank reactor outfitted with a unique in-vessel perfusion device that enables greater volumetric productivity from the bench through scale-up manufacturing. With this approach, the system boasts space-time yield benefits five-to-ten times greater compared to traditional fed-batch methods for the production of diverse proteins.

Shimadzu and DxD Hub establish joint lab to advance diagnostics innovation in Singapore

Shimadzu Corporation, a global leader in the precision instrumentation industry, and Diagnostics Development Hub (DxD Hub), a national platform hosted by Singapore's Agency for Science, Technology and Research (A*STAR), have entered a strategic collaboration to establish the Shimadzu – DxD Hub Diagnomics Centre (SDDC) at Biopolis, Singapore. The SDDC will drive innovation and accelerate the development of diagnostic products by integrating Shimadzu's technological expertise with DxD Hub's productisation platforms. Developing diagnostic products is a complex process that requires extensive validation, clinical studies, and regulatory approvals, leading to long development times and high costs. Through this collaboration, SDDC aims to accelerate the development of high-quality, cost-effective diagnostic solutions. This includes the productisation of advanced multiplexed polymerase chain reaction (PCR) kits for faster and more accurate disease detection, as well as the use of Shimadzu's cutting-edge MALDI1 and FTIR2 platforms.

PerkinElmer acquires Project Farma to expand services for life sciences industry

PerkinElmer, a global leader in analytical solutions and specialised services for biopharma, applied and food markets, has announced the acquisition of Project Farma, a subsidiary of Precision for Medicine. Project Farma is a leading life sciences consultancy focused on advancing technical operations from ideation through commercialisation, offering project management, project controls, commissioning, qualification and validation, quality compliance and engineering consulting services. Established in 2016, Project Farma is a patient-focused, global consultancy with a proven track record of planning, building, maintaining and retrofitting manufacturing facilities, capital expansions and technical operations in the life sciences industry. The company is involved in complex biologics, cell and gene therapies, radioligand and other novel modalities and in driving innovation and efficiency across the industry, helping clients bring groundbreaking therapies to market.

Clamping Down on Illicit Psychotropic Drug Trafficking

On February 25, the Centers for Disease Control and Prevention (CDC), the national public health agency of the United States released new provisional data saying that its National Vital Statistics System predicted a nearly 24 per cent decline in drug overdose deaths in the United States for the 12 months ending in September 2024, compared to the previous year. This is the most recent national data available and shows a continued steep decline in overdose deaths. Provisional data shows about 87,000 drug overdose deaths from October 2023 to September 2024, down from around 114,000 the previous year. This is the fewest overdose deaths in any 12 months since June 2020. That's more than 70 lives saved every day.

While this national decline is encouraging news, overdose remains the leading cause of death for Americans aged 18-44, highlighting the importance of sustained efforts to ensure this progress continues. In this regard, President Trump first declared opioid overdose to be a public health emergency in 2017, a designation that remains in place, and the subsequent public health investments to CDC from Congress have transformed the nation's ability to use data to save lives.

Continuing his crusade against drug overdose, President Donald Trump on February 1, imposed a 10 per cent additional tariff on imports from China and implemented a 25 per cent additional tariff on imports from Canada and Mexico. The Executive Order noted that the flow of contraband drugs like fentanyl to the United States, through illicit distribution networks, has created a national emergency, including a public health crisis. Chinese officials have failed to take the actions necessary to stem the flow of precursor chemicals to known criminal cartels and shut down money laundering by transnational criminal organisations.

Last fiscal year, Customs and Border Protection (CBP) apprehended more than 21,000 pounds of fentanyl at its borders, enough fentanyl to kill more than 4 billion people. It is estimated that federal officials are only able to seize a fraction of the fentanyl smuggled across the southern border. These drugs kill tens of thousands of Americans each year, including 75,000 deaths per year attributed to fentanyl alone.

According to an unclassified DEA Intelligence Report published in January 2020, the flow of fentanyl into the United States in 2019 is more diverse compared to the start of the fentanyl crisis in 2014, with new source countries and new transit countries emerging as significant trafficking nodes. This is exacerbating the already multi-faceted fentanyl crisis by introducing additional source countries into the global supply chain of fentanyl, fentanyl-related substances, and fentanyl precursors. Further, this complicates law enforcement operations and policy efforts to stem the flow of fentanyl into the United States. While Mexico and China are the primary source countries for fentanyl and fentanyl-related substances trafficked directly into the United States, India is emerging as a source for finished fentanyl powder and fentanyl precursor chemicals.

Reacting to the developments, the Chinese commerce ministry on March 7 said that the US's decision to impose an additional 20-per cent tariff on imports from China under the pretext of the fentanyl issue is groundless. China released the white paper on March 4 that introduces its commitment, work and progress in controlling fentanyl-related substances, urging the United States to correct its wrongdoings and to address its fentanyl issue in an objective and rational way, instead of scapegoating others.

China noted that to intensify the oversight of fentanyl-related substances exports, the Ministry of Commerce, in collaboration with the Ministry of Public Security, has enforced stringent export licensing requirements and international verification protocols for precursor chemicals, including five types of precursors of fentanyl-related substances. China will earnestly fulfill its international obligations in drug control, firmly safeguard the existing international drug control system, and comprehensively promote global drug control.

On the prevention front, on March 13, the United Nations Commission on Narcotic Drugs (CND) placed five new psychoactive substances and one medicine under international control so that countries and communities will increase vigilance and take necessary actions to protect vulnerable groups, particularly youth from these substances. BS

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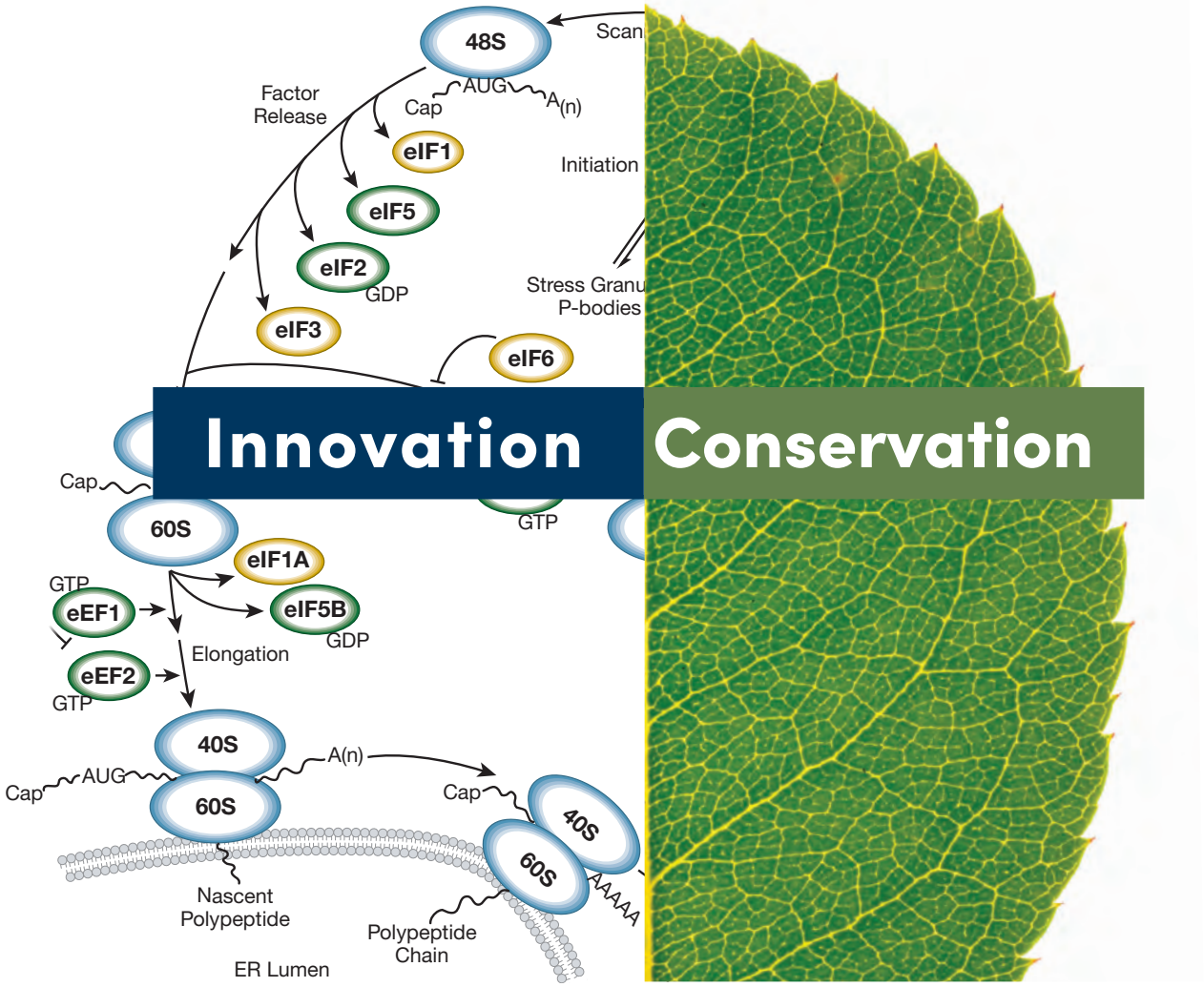

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