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the business of Bio & Health Sciences

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India's Life Science Instrumentation Industry:

A Disruptor with Global Ambitions?

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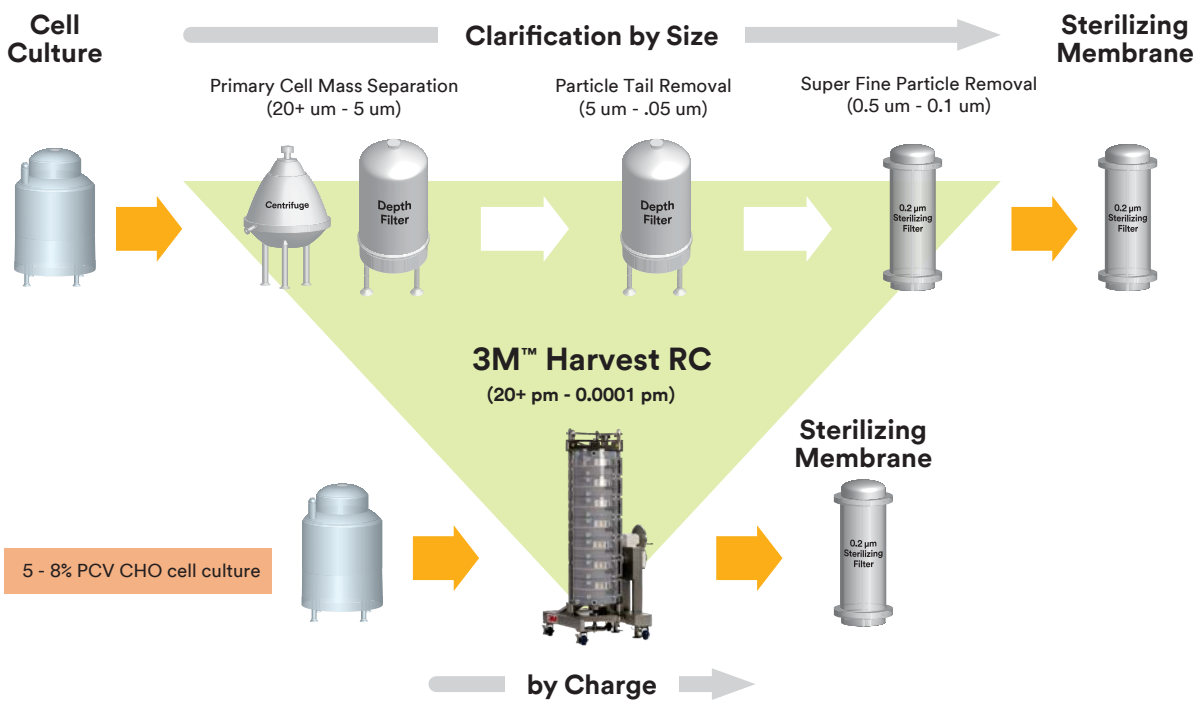

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Acknowledgement/ Feedback

The article 'How Telangana is Targeting Innovation Beyond Generics' is a good read on how the state is transitioning towards an innovative drug development centre rather than only be a generic power house.

- Jeyan Albert, Bengaluru

Thank you so much BioSpectrum for the story on Medtronic in the April edition.

- Anumita Tripathi, Hyderabad

Cultural attitudes towards technology in healthcare may differ, and public perception can influence the acceptance of medical cobots. Educating the public about the benefits and safety of these technologies is essential for widespread adoption.

- Dr Seema Singh, New Delhi

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Letter from Publisher

Ravindra Boratkar
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Managing Editor,
MD, MM Activ Sci-Tech
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Dear Readers,

India's leadership in the life sciences has led to strong growth in the country's laboratory and analytical equipment industry in recent years. However, despite this progress, a sizeable amount of sophisticated processing and analytical measuring equipment is imported. While the Indian market continues to import a significant portion of machinery, the analytical instrumentation industry remains optimistic about the possibility of increasing domestic manufacturing. It is anticipated that government programmes like Make in India and Production Linked Incentives (PLI) will support local manufacturing and open the door for a flourishing indigenous sector.

As India continues its journey towards self-sufficiency in laboratory and analytical instruments, our team has spoken to industry veterans as to how the industry is making concerted efforts to redefine its role on the global stage, contributing to the nation's economic prosperity and scientific advancement.

The cover story on the instrumentation industry talks about the future of the industry that is filled with promise and potential. By embracing innovation, fostering collaboration, and leveraging emerging technologies, Indian companies can position themselves as formidable contenders in the global marketplace. With the right support and conducive ecosystem, India's journey towards self-reliance in laboratory equipment manufacturing is well underway, heralding a new era of growth, prosperity, and innovation.

Cervical cancer is the fourth most common cancer worldwide, and the second most common cancer among females in India. It currently accounts for about 10 per cent of all female cancers, though the incidence is decreasing. In India, there are over 123,000 new cases and close to 77,000 deaths from cervical cancer annually. This translates to one woman dying of cervical cancer every eight minutes in India, even though it is an almost completely preventable cancer. Our team has covered a story as how India is making efforts along with various stakeholders namely pharma and biotech companies, NGOs, medical professionals etc. in bringing awareness about the disease and encouraging women to take up screening tests and join the immunisation campaign for which funds are earmarked in the Union Budget. All with a purpose to achieve comprehensive cervical cancer prevention.

The BioStartUps, a platform dedicated to supporting and empowering biotech startups from BioSpectrum India has hosted the first ever CEO and Founder Conclave on April 12 in Mumbai which attracted various stakeholders with the theme “Fueling innovation and growth in biotechnology.” The conclave witnessed the participation of over 100 key industry players from across the country wherein they debated, exchanged, shared views, experiences, and ideas, innovations to take the industry to the next level of growth. Our team has covered the conclave in detail for the benefit of the industry, policy makers, investors and entrepreneurs.

The clinical trials market in India was pegged at $2.07 billion in 2022, and is expected to expand at a compound annual growth rate (CAGR) of 8.2 per cent from 2022 to 2030, hitting $3.88 billion by 2030. This exponential growth not only reflects the country's evolving medical infrastructure but also underscores the pivotal role of innovative startups in redefining the healthcare landscape. Hence, we have an expert article which explains how startups have begun offering disruptive technologies and innovative approaches that revolutionise clinical trial practices, paving the way for a more inclusive and patient-centric research environment.

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

Thanks & Regards,

Ravindra Boratkar,
Publisher & Managing Editor

COVER 19

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India's Life Science Instrumentation Industry: A Disruptor with Global Ambitions?

The Indian laboratory and analytical instrument industry is on the brink of a transformative journey, propelled by rapid technological advancements and a growing emphasis on indigenous innovation. With the convergence of cutting-edge technologies such as Artificial Intelligence, Machine Learning, Big Data Analytics, Online and At-line testing, Cloud computing, and Process Analytical Technologies, the industry is poised for accelerated growth and expansion. Experts from different fields of the industry have highlighted the burgeoning opportunities for domestic players in the laboratory equipment and analytical instrument segment, exploring the evolving landscape, challenges, and strategies for fostering innovation and competitiveness. Let's explore further.

Cervical Cancer

Biostartup Event

CRISPR Diagnostics

Clinical Trials

Rehabilitation

Top Video

Harshal Kamalakar Sawant, Practice Head- Healthcare Software Services, Tata Elxsi throws some light on futuristic cases of Internet of Medical Things (IoMT).

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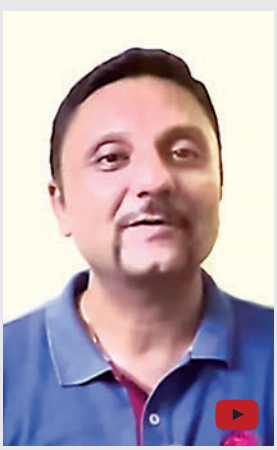

Falgun Jani, Business Head – India Region, Freudenberg Medical highlights the pivotal role of silicone in advancing digital health devices.

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Regulars

Regaining The Edge

Sanctions against Russia due to the Ukraine war have opened up new opportunities for Indian pharma companies to fill the void created by the withdrawal of Western pharma companies from the Russian market. Indian drugmakers have seized this opportunity as witnessed by a 3 per cent growth of India's drug exports to Russia, over the previous year. Indian companies delivered 294 million packages of medicines to Russia as per Russian media, claiming the number one spot from Germany. While Germany was the top drug supplier to Russia between 2011 and 2022, its exports plummeted by 20 per cent to 238.7 million packages last year.

In the fiscal year 2022-23, India's exports to Russia fell by 4.2 per cent to $573 million, reducing the country's share in Russian imports from 2.5 to 2.2 per cent and taking Russia to the seventh position from the fourth, among India's biggest pharma importers.

However, things took a turn for the worse when several Western companies stopped non-essential operations and investments, while some major multinational corporation (MNCs) stopped their clinical trials in Russia. Although there are no sanctions for pharma products, Western pharma firms and MNCs turned away from Russia due to uncertainties and may be due to dollar shortage. Indian companies seized the opportunity and started expanding business prospects including joint production ventures.

Russian pharma experts feel that if their country sources raw materials from India for its domestic pharma production, it would have a price benefit, reducing the prices of the medicines. This development came at a time when the image of Indian pharma was marred by allegations of spurious cough syrups produced by some Indian companies causing the deaths of children in some countries. Indian pharma has received another chance to prove its mettle and improve its image in the international market.

The Department of Pharmaceuticals (DoP), too, has initiated the process of improving the image of Indian pharma by introducing a new Uniform Code for Pharmaceuticals Marketing Practices (UCPMP), that is expected to prevent unethical marketing practices adopted by some pharma companies. Steps suggested in the new code include fixing the maximum value of 'brand reminders' given by the pharma companies to doctors for information and education and restrictions on giving the number of free samples of medicines to medical practitioners as well as restricting the number of patients to whom the free samples can be given.

A major step included in the code is banning conferences, seminars, & workshops for medical practitioners & education & professional development held in foreign countries. All such activities will have to be conducted at medical and pharma colleges, hospitals, academic institutions, research centres and professional associations of doctors. The expenditure incurred on such activities will be subject to independent, random auditing by the government. Pharma associations have also been directed to set up ethics committees to monitor marketing practices & disclose details of all complaints.

A common factor between earlier codes, issued since 2015, and the new code is that they are not mandatory. Till now the government has not compelled the companies to observe the code but requested companies and pharma associations to implement it. Going by the past, evidently, voluntary codes do not work to the expected level and are thus not very effective. DoP had earlier expressed the need for making such code mandatory, but hadn't followed through on that. The pharmaceutical companies, however, have some concerns regarding the code and need clarifications on certain points.

The silver lining is that implementing the code effectively may bring an overall culture of excellence, improving the overall image of Indian pharma abroad which in turn will help in boosting exports. Of course, merely a code on marketing, even if implemented effectively alone, may not improve the image unless supported with efforts for quality assurance and also the development of new, original drugs through research. The marketing code is just the first step in the right direction, though important, to be synergised with other steps. BS

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Centre launches National Action Plan for prevention and control of snakebite envenoming

Apurva Chandra, Union Health Secretary, has launched a National Action Plan for Prevention and Control of Snakebite Envenoming (NAPSE) in India. With a vision to reduce snakebite deaths by half by 2030, NAPSE provides a broad framework for states to develop their own action plan for management, prevention and control of snakebites through the 'One Health' approach. The activities envisaged under human, wildlife, tribal and animal health components will be undertaken by concerned stakeholders at

all levels. It was informed that a Snakebite Helpline number (15400), a vital resource that provides immediate assistance, guidance, and support to individuals and communities affected by snakebite incidents will be piloted in five States (Puducherry, Madhya Pradesh, Assam, Andhra Pradesh and Delhi). This initiative aims to ensure prompt access to medical care and information to the general public. A National Rabies Control Programme Website has also been launched. It is a comprehensive online platform dedicated to providing resources, updates, and insights on rabies. This website will serve as a digital platform for States/UT for entering information related to animal bite and rabies.

DBT introduces Common Fellowship Portal for various schemes

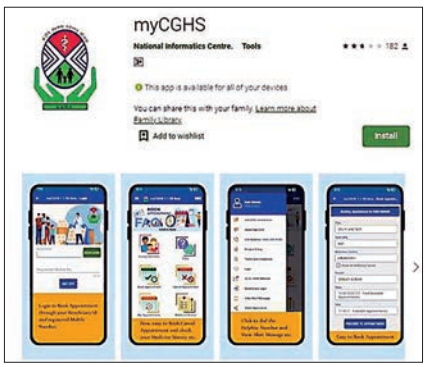
The Union Minister of Science and Technology Dr Jitendra Singh recently launched 'Common Fellowship Portal'- a single interface between applicants and various fellowship schemes by the Department of Biotechnology (DBT) at the National Media Centre, New Delhi. This portal will save the energy & time of aspiring students & startups, besides bringing ease of applying will enable a simplified & streamlined process from the submission of application form to the selection. The applicants can create their profile on the portal & use the same information to auto-fill different applications. This portal will help all applicants by reducing their time and energy by getting full information & submission of applications at a single place by click of a mouse. Dr Jitendra Singh, while addressing the ceremony, congratulated the team of the 'Department of Biotechnology' under guidance of Secretary Dr Rajesh Gokhale, for developing the Common Fellowship Portal for the benefit of PhD & Postdoctoral students of the country.

Centre revamps pharmaceuticals technology upgradation assistance scheme

The Department of Pharmaceuticals, Ministry of Chemicals and Fertilizers, Government of India, has announced the Revamped Pharmaceuticals Technology Upgradation Assistance (RPTUAS) Scheme. It is a significant step in the government's efforts to help upgrade the technological capabilities of the pharmaceutical industry and ensure its alignment with the global standards. The approval of the revised Scheme follows a comprehensive review by the Scheme Steering Committee in light of the requirements of the revised Schedule-M of the Drugs and Cosmetics Rule, 1945 as issued by the Department of Health & Family Welfare on December 28, 2023. The revised guideline aims to support the pharmaceutical industry's up-gradation to the Revised Schedule-M & WHO-GMP standards, enhancing the quality and safety of pharmaceutical products manufactured in the country.

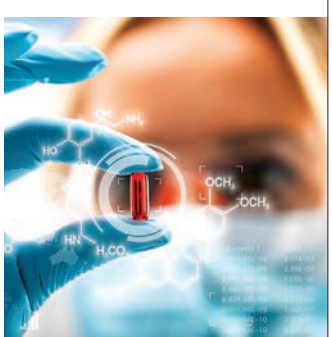
Health Ministry launches myCGHS iOS app

Apurva Chandra, Secretary, Ministry of Health and Family Welfare, government of India, has launched the myCGHS app for the iOS ecosystem of devices. The app is designed to enhance access to Electronic Health Records, information, and resources for Central Government Health Scheme (CGHS) beneficiaries. myCGHS iOS app is developed by the technical teams of the National Informatics Centre (NIC) Himachal Pradesh and NIC Health Team. It is a convenient mobile application offering features aimed at enhancing information and accessibility for CGHS beneficiaries. The myCGHS app facilitates a wide range of services, including booking and cancellation of online appointments, downloading CGHS card and index card, accessing lab reports from CGHS labs, checking medicine history, checking medical reimbursement claim status, accessing referral details, locating nearby wellness centres, staying updated with news and highlights, locating nearby empanelled hospitals, labs, and dental units and accessing contact details of wellness centres and offices.



DST provides grant for innovative antibiotic development project

The Technology Development Board (TDB) has penned an agreement with Peptris Technologies and the Foundation for Neglected Disease Research (FNDR), Bengaluru. Under the agreement, the Board has sanctioned a grant of Rs 75 lakh towards the project 'ANAGRANINF - Development of a Novel Class of Antibiotics Against Gram-Negative Bacterial-Infections', against the total project cost of Rs 1.5 crore. This collaborative endeavour is believed to foster innovation in the field of healthcare.



The project is a joint effort between Indian and Spanish companies, with ABAC Therapeutics Sl serving as the Spanish Project Lead. Led by the Department of Science & Technology (DST) and the Centre for the Development of Technology and Innovation, E.P.E. (CDTI), the bilateral programme aims to drive market-driven research and technology development while fostering partnerships and business-led collaborative projects between the two nations, thereby propelling innovation in healthcare forward. The project's primary objective is to develop a novel lead compound, particularly an antibiotic, adept at inhibiting the FabI enzyme and combatting critical gram-negative pathogens. The selected hit molecule MMV1578564 has exhibited promising activity against gram-negative pathogens, serving as a foundation for further research and development efforts.

India opens home-grown gene therapy for cancer at IIT Bombay

President of India, Droupadi Murmu recently launched India's first home-grown gene therapy for cancer at the Indian Institute of Technology (IIT) Bombay. The launch of India's first gene therapy is a major breakthrough in the battle against cancer. As this line of treatment, named 'CAR-T cell therapy', is accessible and affordable, it provides a new hope for the whole of humankind. CAR-T cell therapy is considered to be one of the most phenomenal advances in medical science. It has been available in the developed nations for some time, but it is extremely costly, and beyond the reach of most patients around the world. Droupadi Murmu was happy to note that the therapy being launched today is the world's most affordable CAR-T cell therapy. India's first CAR-T cell therapy is developed through collaboration between the Indian Institute of Technology, Bombay and Tata Memorial Hospital in association with industry partner ImmunoACT.

Pandorum secures $11M to advance regenerative therapy for corneal blindness to clinical phase

Bengaluru-based biotech firm Pandorum Technologies has announced the successful closure of a pre-Series B funding round, securing $11 million (Rs 88 crore) in investment. The funding was sourced from Ashish Kacholia, Everest Finance Investment, Acebright Pharma and Bandana Kankani's syndicate along with existing investors Sunil Kant Munjal and the Indian Angel Network. Founded by Arun Chandru & Dr Tuhin Bhowmick, the startup focuses on Tissue Engineering and Regenerative Medicine. With the current round of funding, Pandorum aims to progress towards the First-in-Human study of its flagship product Kuragenx- the 'Liquid Cornea', to treat corneal blindness. The funding will also allow the company to advance its tunable technology platform that has demonstrated regenerative potential beyond cornea, such as, for liver, lung and neuronal tissues. Corneal opacity is one of the major causes of blindness worldwide, with millions waiting for donor tissues against significant odds. Pandorum's Kuragenx promotes scarless regeneration of cornea tissue to restore vision, as demonstrated in extensive pre-clinical studies.

Toyota Tsusho & Secom to invest Rs 1000 Cr in new super specialty hospital in Bengaluru

Sakra World Hospital has announced its visionary plan for a new state-of-the-art facility in Bengaluru, India. Sakra is India's first 100 per cent FDI Multi-Super Specialty hospital powered by Japanese innovation and technology through a collaboration between healthcare major Secom Medical System and trading conglomerate Toyota Tsusho. Strategically located in Banaswadi, North Bengaluru, to be constructed at an estimated cost of Rs 1,000 crore, Sakra's new facility will boast a remarkable 500-bed capacity and a sprawling built-up area spanning 600,000 sq. ft (55,740 sq. m). This expansion signifies Sakra's commitment to providing unparalleled healthcare services to the local community and beyond. Also, the latest healthcare project brings forth an unparalleled synergy of medical advancements and technological innovations to the Indian shores.

Wipro GE Healthcare plans Rs 8000 Cr investment into manufacturing, R&D over next 5 yrs

Wipro GE Healthcare has announced an investment of over Rs 8000 crore in manufacturing output & local R&D over next 5 years. This strategic investment bolsters Wipro GE Healthcare's local manufacturing footprint to address the growing domestic and international market and will build supply chain resiliency for the organisation. As a part of this investment, the Wipro GE Healthcare 'Made in India' PET CT Discovery IQ will be exported to 15 countries. Additionally, the 'Made in India' Revolution Aspire CT, Revolution ACT and MR breast coils will be manufactured 'In India for the World'. Over the decades, the organisation has fostered a strong local supplier ecosystem of medtech component manufacturing, covering capabilities like plastics, machining, castings, 3D printing, contributing $1 million supplier labour hours. The investment will include creation of additional 400,000 labour hours. Currently, the organisation has four manufacturing plants in Bengaluru. All four manufacturing plants are export plants, the latest one established in March 2022 with an investment of a little over Rs 100 crore under the Indian government's PLI Scheme.

Biological E to manufacture oral cholera vaccine for India and global markets

South Korea-based International Vaccine Institute (IVI) has commenced a technology transfer of simplified Oral Cholera Vaccine (OCV-S) to Hyderabad-based Biological E. Limited (BE). Following the signing of a technology license agreement in November last year, IVI has begun providing the technical information, know-how, and materials to produce OCV-S at BE facilities and will continue to support necessary clinical development and regulatory approvals. IVI and BE entered this partnership during an unprecedented surge of cholera outbreaks worldwide and aim to increase the volume of low-cost cholera vaccine in India as well as the global public market. IVI will complete the technology transfer by 2025 and the oral cholera vaccine will be manufactured for India and international markets by BE. This technology transfer and licensing agreement is the sixth of its kind for IVI, transferring such technology to manufacturers in India, the Republic of Korea, Bangladesh, and South Africa. All these partnerships have led to or seek to achieve, pre-qualification (PQ) from the World Health Organization, a designation that enables global agencies such as UNICEF to procure the vaccine for the global market. BE already has 9 vaccines with WHO PQ in its portfolio, & IVI and BE will pursue WHO PQ for OCV-S as well, following national licensure in India.

Bharat Biotech and Serum Institute of India collaborate to supply OPV

Bharat Biotech, a global leader in vaccine and biotherapeutic innovation, also the largest manufacturer of oral polio vaccines, and Bilthoven Biologicals B.V., (BBio), a wholly owned subsidiary of Serum Institute of India, based in Netherlands, have announced a collaboration to further strengthen the production and supply security of Oral Polio Vaccines (OPV). A requisite agreement has been signed between Bharat Biotech and BBio wherein Bharat Biotech will procure drug substances for the production of oral polio vaccines to be supplied within India and globally. Through this collaboration, Bharat Biotech and BBio will jointly obtain the regulatory approvals and licenses required to commercially manufacture OPVs in India for global supplies from drug substances manufactured in the Netherlands at Bilthoven Biologicals.

Bayer and Dr. Reddy's ink distribution deal for second brand of Vericiguat in India

Dr. Reddy's Laboratories and Bayer have entered into a partnership to market and distribute a second brand of Vericiguat in India. Under the terms of this agreement, Bayer has granted non-exclusive rights to Dr. Reddy's under the brand name Gantra. Vericiguat, a soluble guanylate cyclase (sGC) stimulator, in India, is indicated, along with guideline-based medical therapy, in adults with symptomatic chronic heart failure with reduced ejection fraction (less than 45 per cent), following a recent event of worsening heart failure which required hospitalisation or outpatient intravenous (IV) diuretics. Vericiguat works on a pathway not currently targeted by existing heart failure treatments and can reduce the combined risk of cardiovascular death and heart failure hospitalisation in such patients. India has about 8-10 million people with heart failure, making it one of the largest populations with this condition.

Tata Elxsi and Dräger establish partnership to drive critical care innovation

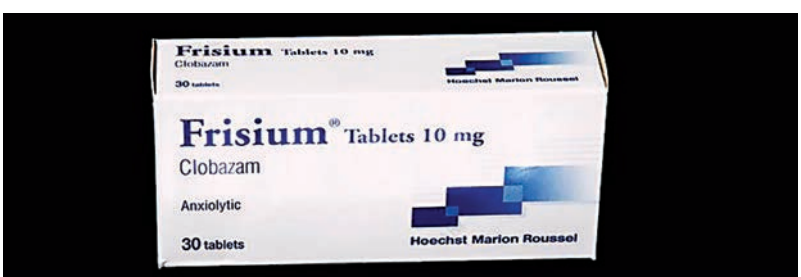
Tata Elxsi and Dräger, a global leader in medical and safety technology, have announced a collaboration to advance critical care innovation in India. As part of this collaboration, Dräger is expanding its research and development presence by establishing a new Offshore Development Centre (ODC) at Tata Elxsi's facility in Pune. The ODC will focus on developing innovative critical care medical devices for both local and international markets. This partnership combines Tata Elxsi's design and technology expertise along with Dräger's expertise in medical and safety technology. The development centre will unite talent from both organisations, dedicated to designing and developing innovative critical care medical devices for deployment in the Operation Theatre (OT) environment worldwide. This central hub will oversee all aspects of critical care product development, from conceptualisation to product design, prototyping, and testing.

SOPHiA GENETICS and Strand Life Sciences announce new strategic partnership

SOPHiA GENETICS, a US-based cloud-native software company in the healthcare space and a leader in data-driven medicine, has announced a strategic partnership with Bengaluru-based Strand Life Sciences, a pioneer in bioinformatics and diagnostics, to deliver innovative solutions that will fuel the use of precision medicine globally. The new collaboration will leverage the industry-leading strengths from both companies to provide access to advanced genomics technologies, cutting-edge bioinformatics services and innovative diagnostics solutions. Through the broad-ranging collaboration between SOPHiA GENETICS and Strand, the two companies will use their bioinformatics expertise to expand the ability to accurately analyse key healthcare data and facilitate the use of data-driven decision-making globally. SOPHiA GENETICS will provide support via the decentralised SOPHiA DDM Platform and Strand via its curated variant databases and bioinformatics solutions expertise, and the companies will collaborate on strategic test co-development, among other initiatives, that will look to improve health outcomes in India and globally.

Sanofi & Cipla partner to expand reach of CNS portfolio in India

Sanofi India and Sanofi Healthcare India, and Cipla have announced an exclusive partnership for distribution and promotion of Sanofi India's Central Nervous System (CNS) product range in India. As a part of this partnership, Cipla will be responsible for the distribution of Sanofi India's six CNS brands including Frisium, a leading brand in the anti-epileptic medication category. While Sanofi India will continue to own, import, and manufacture its complete range of CNS products across plants in India and internationally, Mumbai-based pharmaceutical company Cipla will leverage its capabilities and robust India-wide network of strong marketing and sales professionals, distributors, institutions, and market outreach programmes to expand access to these treatments for patients who need them. Sanofi India's CNS products are well-established brands already improving the lives of many patients across urban centres in the country. Cipla's wide presence will enable Sanofi to expand the reach of this portfolio to healthcare professionals and patients across all India.



Zeno Health acquires Kolkata-based startup Tablt Pharmacy

Zeno Health, one of India's leading omni-channel platforms for quality and affordable generic medicines, has announced the acquisition of Kolkata-based startup Tablt Pharmacy. As part of its expansion plans, Zeno Health along with Tablt will be strengthening its reach in the states of West Bengal, Odisha, Bihar and Jharkhand. Tablt, an online pharmacy startup, has been operating in Tier 2 to Tier 6 geographies in Eastern India. It operates through nearly 300 franchises across the Eastern Indian states of West Bengal, Bihar, Jharkhand, and Odisha and has served more than two lakh consumers so far. Zeno Health is on a mission to democratise healthcare across India and recently raised $25 million in a Series C fund round. As it aims to reach and serve more than one crore consumers every month, the startup is also aspiring to reduce healthcare expenditures by 50 per cent. Zeno Health operates an expansive network of 180 omni-channel stores spanning Mumbai and the entire expanse of Maharashtra.

IIMA Ventures-backed Curelo raises funding worth Rs 10 Cr

Gurugram-based Curelo, the innovative health-tech platform founded by Laparoscopic Surgeon Dr Arpit Jayswal, has secured a significant boost with a strategic investment from cricketer, Shreyas Iyer. The entire round consists of Rs 10 crore where apart from Shreyas Iyer, the team got investments from IIMA Ventures, renowned industry experts like Tarun Katial (Founder of Zee 5) and family offices in US. Curelo, founded in 2022, has rapidly emerged as a disruptive force in the healthcare sector. The aggregator platform connects patients with diagnostic labs, offering at-home blood sample collection and timely reports. With a fleet of phlebotomists ensuring samples are collected within 60 minutes of booking, Curelo's revenue has grown 25 times over the last year. The recent round of investment from IIMA Ventures, Shreyas Iyer and industry experts marks a significant milestone for Curelo, positioning the platform to continue its growth trajectory in the highly competitive Indian healthcare market. The funds will be instrumental in further expanding Curelo's footprint, standardising unorganised labs, and achieving exponential growth in acquiring 300 per cent more patients in the coming year.

T-Hub and Medtronic partner to drive health-tech innovation in Hyderabad

T-Hub, India's leading startup incubator, has announced its strategic partnership with Medtronic, global leader in healthcare technology. The collaboration marks a significant leap forward in fostering innovation and growth within India's dynamic health-tech startup ecosystem. This collaboration is anchored by Medtronic Engineering & Innovation Center (MEIC) in Hyderabad, which is also Medtronic's largest R&D centre outside of the US. With this partnership, MEIC will foster industry collaborations and participate in events like CXO roundtables and innovation workshops to build thought leadership in health-tech R&D, thus ensuring deep immersion into the dynamic landscape of health-tech innovation. T-Hub's startups will also receive invaluable mentorship, sponsorship, and expert guidance from MEIC, propelling their ventures towards success. In addition, MEIC employees will also have the opportunity to participate in tailored entrepreneurship workshops curated by T-Hub.

Mave Health raises Rs 6 Cr in Pre Seed round

Mave Health, a mental health-tech startup based in Bengaluru, has raised Rs 6 crore in pre-seed funding round. The funding round was led by All-In Capital and Utsav Somani's iSeed Fund, with participation from other marquee investors including Bharat Founders Fund, Deepinder Goyal (Zomato), Kunal Shah (CRED), Mohit Kumar and Vatsal Singhal (Ultrahuman). The round also saw angel investors like Gaurav Agarwal (TATA 1mg), Nandan Reddy (Swiggy), Rohan Verma (BreatheWellBeing), Nikhil Kant (Even), Harsh Shah (Fynd), Neel Mehta (Studio

Carbon), Nitin Mehrotra (Dressfolk), Himanshu Aggarwal (SHL), along with Vikrampati Singhania from JK Family Office, Gaurang Patel and Pradeep Patel from Amaanta Family office, and Rajan Dube. Representatives from the creator industry, such as Ganesh Prasad and Parsh Kothari (ThinkSchool), Shlok Srivastava (TechBurner), Neel Gogia and Naim Siddiqui, also participated in the pre-seed round. The newly raised investment will support Mave Health in launching Arc, India's first non-invasive brain stimulation wearable that treats depression. The device is developed in collaboration with a team of top experts, including neuroscientists, psychiatrists, and psychologists from Harvard Medical School, Maastricht University and other leading research institutes.

Eyestem to start human trials for pioneering dry AMD treatment

Eyestem, a Bengaluru-based cell therapy startup, has received approval from India's Central Drugs Standards Control Organisation (CDSCO) to commence human trials for Eyecyte RPE, aimed at combating geographic atrophy arising from dry age-related macular degeneration (AMD). Dry AMD, a leading cause of vision loss in the ageing population of people over 50, has long been a challenge due to the limited availability of effective treatments and the high costs associated with emerging therapeutic options.

However, Eyestem's Eyecyte RPE therapy, which aims to replace lost or damaged retinal pigment epithelium (RPE) cells, represents a transformational shift in aiming to tackle the disease. It aims to preserve and potentially improve sight for patients in the early stages of dry AMD and arrest vision loss for those in the later stages.

Gliders India to support medtech & health tech startups at IIT Kanpur

The Startup Incubation and Innovation Centre (SIIC), at the Indian Institute of Technology Kanpur (IIT-K), has signed a Corporate Social Responsibility (CSR) agreement with Gliders India, a leading defence Public Sector Undertaking (PSU), to drive innovation in the healthcare sector. Under this CSR collaboration, Gliders India will provide financial assistance and mentorship to startups incubated at SIIC working on advanced medical technologies, digital health solutions, telemedicine applications, and healthcare infrastructure innovations. The partnership aims to leverage IIT Kanpur's technological prowess combined with Gliders India Limited's industry expertise to develop impactful solutions addressing critical healthcare challenges in India. Gliders India will connect startups with domain experts, industry resources, and market networks, thereby accelerating their growth and commercialisation journeys. The PSU's strategic support will enable these startups to navigate the complex healthcare landscape effectively.

WHO unveils digital health promoter harnessing generative AI for public health

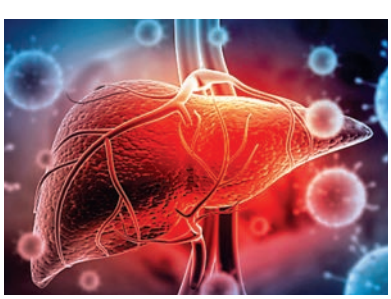
The World Health Organization (WHO) has announced the launch of S.A.R.A.H., a digital health promoter prototype with enhanced empathetic response powered by generative artificial intelligence (AI). S.A.R.A.H. is a Smart AI Resource Assistant for Health that represents an evolution of AI-powered health information avatars, using new language models and cutting-edge technology. It can engage users 24 hours a day in 8 languages on multiple health topics, on any device. WHO's digital health promoter is trained to provide information across major health topics, including healthy habits and mental health, to help people optimise their health and well-being journey. It aims to provide an additional tool for people to realise their health rights, wherever they are. S.A.R.A.H., also known as Sarah, can support people in developing a better understanding of risk factors for some of the leading causes of death in the world, including cancer, heart disease, lung disease, and diabetes.

WHO launches new guidance on use of targeted NGS tests for diagnosis of drug-resistant TB

The World Health Organization (WHO) has published recommendations on the use of targeted next-generation sequencing (NGS) tests for the diagnosis of drug-resistant tuberculosis (TB) in the third edition of the Consolidated Guidelines on tuberculosis. Module 3: Diagnosis-Rapid diagnostics for tuberculosis detection. The recommendations provide a novel approach for the rapid detection of drug resistance to new anti-TB drugs using the latest technologies. The guidelines are accompanied by a WHO operational handbook, which provides laboratory personnel, clinicians and other clinical staff, as well as ministries of health and technical partners, detailed guidance on implementing the evidence-based recommendations, including recent updates on targeted NGS tests. It describes the WHO-recommended tests for the rapid bacteriological diagnosis of TB disease, including procedures for the tests, model algorithms, and the steps and processes required to implement and scale up new tests to diagnose TB and detect resistance to anti-TB drugs. Along with the new guidance, the WHO has also launched a new TB sequencing portal with more than 56,000 sequences.

WHO publishes new guidelines on hepatitis B

The World Health Organization (WHO) has released new guidelines on the prevention, diagnosis and treatment of chronic hepatitis B (HBV) infection to provide a substantial simplification and expansion of eligibility for treatment to overcome barriers to access to HBV testing and treatment. More than 250 million people live with chronic hepatitis B infection, leading to increasing deaths each year. Most of the global burden of chronic hepatitis B (CHB) is due to mother-to-child transmission at or shortly after birth. WHO's

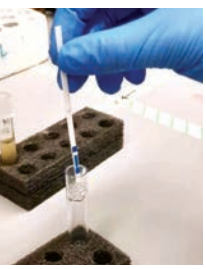


Global health sector strategy sets actions and targets to eliminate viral hepatitis by 2030 by driving new infections and deaths down to half a million each globally – a reduction of 90 per cent and 65 per cent, respectively.

Considerable progress has been made towards eliminating mother-to-child transmission of HBV through universal infant HBV immunisation, including the timely hepatitis B birth dose. However, hepatitis B birth-dose coverage is only 45 per cent globally, with less than 20 per cent coverage in the WHO African Region. The 2024 guidelines prioritise simplified treatment criteria for adults and adolescents and expanded eligibility for antiviral prophylaxis for pregnant women to prevent mother-to-child transmission of HBV.

Global deployment of rapid diagnostic tests to boost fight against cholera

The recent arrival of rapid diagnostic test (RDT) kits for cholera in Malawi signals the start of a global programme that will see more than 1.2 million tests distributed to 14 countries at high risk for cholera over the next several months. Countries that will receive kits in the coming weeks in this largest-ever global deployment include those currently severely impacted by cholera outbreaks, such as Ethiopia, Somalia, Syria, and Zambia. This programme will improve the timeliness and accuracy of outbreak detection and response by boosting routine surveillance and testing capacity and helping rapidly identify probable cholera cases. Critically, it will also help countries monitor trends and build an evidence base for future preventive programmes, supporting the achievement of national cholera control and elimination targets. The global cholera diagnostics programme is funded and coordinated by Gavi, the Vaccine Alliance (Gavi), with procurement and delivery to countries led by UNICEF, and undertaken in collaboration with the Global Task Force on Cholera Control (GTFCC), and WHO.

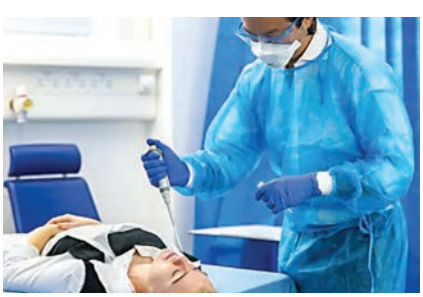


Gates MRI initiates Ph 3 trial of TB vaccine candidate

The Bill & Melinda Gates Medical Research Institute (Gates MRI) has announced that a Phase 3 clinical trial to assess the efficacy of the M72/AS01E tuberculosis (TB) vaccine candidate is now underway, with first doses given in South Africa, where TB takes a heavy toll. If shown to be well-tolerated and effective, M72/AS01E could become the first vaccine to help prevent pulmonary TB in adolescents and adults, the most common form of the disease, and the first new TB vaccine in over a century. The M72/AS01E vaccine candidate has been in development since the early 2000s. It was originally designed and clinically evaluated by the biopharma company GSK up to the proof-of-concept phase (Phase 2b), in partnership with Aeras and the International AIDS Vaccine Initiative (IAVI) and was funded by GSK and in part by the Gates Foundation. At full capacity, the trial will include up to 20,000 participants, including people living with HIV, at up to 60 trial sites in seven countries- South Africa, Zambia, Malawi, Mozambique, Kenya, Indonesia and Vietnam. It is anticipated that it will take up to five years to complete the trial, followed by data analysis and then preparation for submission of data to regulatory authorities.

International consortium embarks on $57M project to test nasal vaccines against viral infection

An international consortium of researchers specialising in human challenge studies is embarking on a $57 million project to develop advanced, virus-blocking coronavirus vaccines that could stop SARS-CoV-2 and other coronaviruses from infecting people in the first place. Led by Imperial College London and co-funded by the European Union's Horizon Europe Programme and the Coalition for Epidemic Preparedness Innovations (CEPI), the consortium of more than a dozen scientific teams and organisations will begin by running trials to select particular viruses and identify the best conditions under which to safely induce infection in healthy volunteers. Researchers at multiple clinical research facilities will use a selected virus to try to infect healthy volunteers who have received an experimental vaccine. Unlike traditional vaccines which are injected into muscle, these experimental vaccines will be inhaled into the lungs or sprayed in the nose and are designed to induce a type of protection known as mucosal immunity, which scientists believe could be the key to stopping onward transmission of coronaviruses. Using harmonised standard operating procedures, the trials will take place across several sites in the UK, Europe, the United States and Singapore and will each involve a small group of young, healthy volunteers.



India's Life Science Instrumentation Industry: A Disruptor with Global Ambitions?

The Indian laboratory and analytical instrument industry is on the brink of a transformative journey, propelled by rapid technological advancements and a growing emphasis on indigenous innovation. With the convergence of cutting-edge technologies such as Artificial Intelligence, Machine Learning, Big Data Analytics, Online and At-line testing, Cloud computing, and Process Analytical Technologies, the industry is poised for accelerated growth and expansion. Experts from different fields of the industry have highlighted the burgeoning opportunities for domestic players in the laboratory equipment and analytical instrument segment, exploring the evolving landscape, challenges, and strategies for fostering innovation and competitiveness. Let's explore further.

In recent years, India's laboratory and analytical instrument industry has witnessed robust growth, driven by the country's leadership in pharmaceuticals, biotechnology, and healthcare. However, despite this progress, a significant portion of high-end processing and analytical measurement equipment is imported from leading Western countries.

According to Chandrahas Shetty, President of the Indian Analytical Instruments Association (IAIA), over 80 per cent of such equipment is sourced from countries like the USA, Germany, France, Italy and others. This dependency underscores the urgent need for domestic players to capitalise on emerging opportunities and reduce reliance on imports.

Highlighting the dynamic nature of the industry, with emerging advancements leading to transformative changes, one notable trend identified by Shetty is the shift from traditional laboratory-based testing to online and at-line testing methodologies. This transition has significantly reduced testing time and costs associated with product wastage. The adoption of online analysis of raw materials allows for immediate identification of quality issues, enabling swift corrective action and minimising production delays.

Emerging Trends

While on one hand online and at-line testing is gaining prominence, still laboratory testing remains relevant, especially for comprehensive analysis, noted Shetty. The trend of inline and at-line testing during the manufacturing process further emphasises the importance of real-time data acquisition and analysis.

Another significant trend identified by Shetty in the laboratory equipment and analytical instruments sector is the increasing demand for cloud-based data management systems. Organisations are keen on storing their data on the cloud for easy accessibility across the organisation. This trend extends to Laboratory Information Management Systems (LIMS), which are now being migrated to cloud platforms for enhanced efficiency and collaboration.

Looking ahead, Shetty predicts a rapid integration of artificial intelligence (AI) in method generation and development processes. AI technologies, fueled by the availability of background data, are poised to revolutionise analytical methodologies and streamline workflows.

In addition to advancements in analytical instruments for traditional processes, Shetty highlighted innovations in bioprocess analytics. Instruments capable of measuring parameters such

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- Chandrahas Shetty,
President,
Indian Analytical Instruments Association (IAIA)

"With continuous advancements, we've seen improvements in sequencing speed, accuracy, and cost-effectiveness. These innovations have democratised access to genomic information, aiding in gene discovery, understanding genetic variation, & advancing personalised medicine initiatives."

- Vipul Chhatbar,
CEO, MEDISPEC

"There is a lot of appetite for GCCs in Hyderabad, which has become a mature GCC centre for many companies. Kolkata also has potential. It also boils down to the ecosystem and incentives that local governments can offer. Hyderabad has been leading in this regard."

- Arindam Sen,
Partner and GCC Sector Lead-Technology, Media and Telecommunications, EY India

"Initiatives like PLI and Make in India are commendable, but greater funding allocation for innovative research and development is essential to spur indigenous manufacturing of advanced laboratory and analytical instruments."

- Dr Rajnish Bharti,
Vice President and General Manager,
Promega Biotech India

as pH and CO_2 in bioreactors are gaining traction, particularly in the biopharmaceutical industry. Single-use technology is also emerging as a solution to streamline bioprocess cleaning procedures, with leading companies like Serum Institute of India adopting these technologies.

Giving his perspective about the role and objectives of IAIA, the President said that they have been involved in gathering the laboratory equipment and analytical instrument manufacturers, suppliers and customers at one platform for more than two decades now and arranging them a platform to delve and discuss on the challenges, opportunities and facilitating developing new business networking among the stakeholders and playing a key role in helping the industry grow to leaps and bounds.

"The IAIA, in collaboration with partners like Messe Muenchen India, plays a crucial role in facilitating industry dialogue and showcasing emerging trends. Events such as the Analytica Anacon provide a platform for stakeholders to exchange views and explore opportunities in the sector. Our Mumbai Laboratory Equipment and Analytica Anacon was confined to only the manufacturers, our next show is in Hyderabad in September this year, and we will rope in more customers, who are using the laboratory and analytical instruments and this event will be encompassing not just laboratory and analytical equipment providers but it will also have the customers from pharmaceutical, biotechnology, healthcare, diagnostic and research institutions," informed Shetty.

While the Indian market continues to import a significant portion of machinery, Shetty remains optimistic about the potential for domestic production growth. Government initiatives such as Production Linked Incentives (PLI) and Make in India are expected to bolster domestic manufacturing, paving the way for a thriving indigenous industry.

Challenges and Opportunities

The prevailing scenario of the laboratory equipment and analytical instruments industry presents both challenges and opportunities for Indian players. While the majority of domestic manufacturers engage in generic manufacturing, there's a dearth of specialised technologies and innovative manufacturing capabilities. Dr Rajnish Bharti, Vice President and General Manager, Promega Biotech India, emphasises the importance of government support in fostering domestic innovation. Initiatives like PLI and Make in India are commendable, but greater funding allocation for

innovative research and development is essential to spur indigenous manufacturing of advanced laboratory and analytical instruments.

Adding further, Dr Rajnish Bharti noted that the market for laboratory and analytical instruments is growing globally, driven by increasing investments in research and development, particularly in pharmaceuticals and biotechnology.

According to the Mordor Intelligence forecast study report, the global markets for laboratory and analytical instruments are expected to grow from $49.47 billion in 2023 to $66.27 billion by 2028, at a CAGR of 6.02 per cent. The study has also revealed that the Asia Pacific region including India, China, Japan, Korea and Australia are the fastest growing markets, while North America is the largest market catering to the sector.

In India, the expansion is similarly fueled by rising healthcare demands and a growing focus on regulatory compliance and quality assurance in manufacturing. The India analytical laboratory instruments market is set to record a CAGR of 6.33 per cent during 2024-2032, and is expected to reach revenue of $4142.85 million by 2032 from the current revenues of approximately $2000-2500 million.

The significant growth in the analytical laboratory instruments market is mainly attributed to the government's increased emphasis on expanding production activities. A major driving force behind this expansion is the thriving pharmaceutical industry, which plays a crucial role in India's analytical laboratory instrument markets.

Referring to new and innovative developments in the laboratory and analytical instrument sector, Dr Rajnish Bharti highlighted the development and adoption of high-throughput sequencing, CRISPR technology, and improved automation and robotics. "Promega has been at the forefront of many of these advancements, integrating new technologies into our offerings to enhance precision and efficiency. For example, advancements in automation have led to more streamlined workflows in laboratories, significantly reducing manual labour and increasing reproducibility and scalability," says Dr Rajnish Bharti.

Path to Progress

To compete effectively on the global stage, Indian companies must adopt a 'look global, act local' strategy, focusing on innovation, quality, and customer-centricity.

Leading global players such as Thermo Fisher Scientific, Waters, Agilent Technologies, Bio-Rad Laboratories, Roche, Shimadzu, Danaher, PerkinElmer and Bruker have all established their presence in India, leveraging local expertise and expanding their service offerings.

The emphasis on nurturing homegrown talent, investing in research and development, and fostering collaboration between industry and academia is critical to driving innovation and achieving self-reliance in laboratory equipment manufacturing.

Catching up further on this trend, many global players are setting their Global Capacity Centres (GCCs) in India. According to data from a Nasscom-Zinnov report, India had 1,580 GCCs with 1.66 million employees as of 2022-23. At least 20 per cent of the Forbes 2000 global companies have set up their GCCs in India till 2023. Of this, 8 per cent of GCCs are established by the biosupplier and life sciences companies including pharma, biotech and healthcare. Major among them include Legatos, BMS, AstraZeneca, Providence, Baxter, GSK, Optum, and Teva Pharma. This share is estimated to grow to up to 55 per cent by 2030. The expansion is also leading to GCCs in-sourcing a lot of their technology functions from IT companies.

Hyderabad, which has around 16 per cent of all GCC units in India, is flanked by research institutes in biotechnology and pharmaceuticals attracting companies like Novartis and AstraZeneca. "There is a lot of appetite for GCCs in Hyderabad, which has become a mature GCC centre for many companies. Kolkata also has potential. It also boils down to the ecosystem and incentives that local governments can offer. Hyderabad has been leading in this regard," opined Arindam Sen, Partner and GCC Sector Lead-Technology, Media and Telecommunications, EY India.

Segmentation of Industry

At present, the India analytical laboratory instruments market segmentation includes type and end-user or application. The type segment includes molecular analysis instruments, elemental analysis instruments, separation analysis instruments, centrifuges, chromatography, electrophoresis, microscopy, cell counting instruments, PCR (Polymerase Chain Reaction), spectroscopy and other types, while the segment by application includes research and diagnostic application among others.

Particularly analytical laboratory instruments play a crucial role in research and academic institutions, facilitating a wide range of scientific experiments and analyses. Commonly utilised instruments in these settings encompass pipettes, microscopes, balances and scales, spectrophotometers, as well as specialised equipment for electrophysiology, muscle physiology,

spectroscopy, tissue and cell biology, and biosensing free radical analysis.

These tools are indispensable for research endeavours, sample analysis, and data generation, contributing significantly to scientific discoveries and product development. Moreover, academic core labs offer a cost-effective means to access specialised equipment, receive training, and conduct impartial data analysis, thereby enhancing experimental quality and nurturing the development of future scientists.

Several examples of analytical laboratory instruments employed in research and academic institutions include mass spectrometers, utilised for the purification, quantification, identification, and determination of chemical compounds in various samples. Chromatography systems, such as High-Performance Liquid Chromatography (HPLC) and Flash Chromatography, are employed for the separation and analysis of compounds. Spectrophotometers play a role in the quantitative estimation of substances like blood sugar, creatinine, and haemoglobin.

Spectrometers, including AAS, X-ray, and fluorescence spectrometers, find applications for various analytical purposes. Titrators determine the concentration of acids, bases, or other substances by measuring the volume of added acid or base required to reach a specific pH or pOH, whereas autoclaves serve the purpose of sterilising laboratory equipment and materials to uphold strict standards of hygiene and sterility in research and academic institutes. Centrifuges are utilised to separate solids from liquids or concentrate and purify samples based on their density. pH Metres measure the acidity or alkalinity of a solution, a crucial aspect in various scientific experiments and analyses.

According to Vipul Chhatbar, CEO of MEDISPEC, there are various new developments and innovative advancements coming up in the laboratory and analytical instrument sector. For instance, the Next-generation sequencing technologies have revolutionised genomics and molecular biology research. “With continuous advancements, we've seen improvements in sequencing speed, accuracy, and cost-effectiveness. These innovations have democratised access to genomic information, aiding in gene discovery, understanding genetic variation, and advancing personalised medicine initiatives. Surface Plasmon Resonance (SPR) is another new technological innovation that is fast being adopted in the laboratory and analytical instrument sector. Our partnership with Nicoya Life Sciences has introduced cutting-edge SPR instruments, such as the OpenSPR and Nicoya Alto. These instruments facilitate real-time, label-free analysis of molecular interactions, revolutionising drug discovery, biochemistry, and molecular biology research,” highlights Vipul Chhatbar, while signifying how the collaborative and partnership initiatives can help deliver new technologies for the customers.

Towards a Brighter Future

As India continues its journey towards self-sufficiency in laboratory and analytical instruments, concerted efforts from industry stakeholders, government agencies, and academia are paramount. By harnessing the collective potential of innovation, entrepreneurship, and strategic partnerships, the Indian laboratory equipment industry can chart a path towards sustainable growth, export competitiveness, and global leadership. With a steadfast commitment to innovation and excellence, India's laboratory and analytical instrument industry is poised to redefine its role on the global stage, contributing to the nation's economic prosperity and scientific advancement.

The future of India's laboratory and analytical instrument industry is filled with promise and potential. By embracing innovation, fostering collaboration, and leveraging emerging technologies, Indian companies can position themselves as formidable contenders in the global marketplace. With the right support and conducive ecosystem, India's journey towards self-reliance in laboratory equipment manufacturing is well underway, heralding a new era of growth, prosperity, and innovation. BS

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"The government's push towards making India a hub for biotech through various schemes has positively impacted the sector"

With pharma, biotech, and healthcare on an ever-growing trajectory, the demand for medicines, diagnostic equipment, and sophisticated laboratory and analytical instruments has surged. In tandem, Bio Supplier Industry is experiencing remarkable growth with increased investment in Research and Development (R&D). Not just investments in R&D, emergence of new advancements like Artificial Intelligence, and adaptation of cloud computing are fast driving growth exponentially. In an exclusive interview with BioSpectrum India, Dr Rajnish Bharti, Vice President and General Manager of Promega Biotech India Pvt Ltd., shared his insights on the industry's forward movement, new trends, opportunities, and challenges. ***Edited excerpts:***

« **Dr Rajnish Bharti,** Vice President and General Manager, Promega Biotech India

How do you perceive the current market trends for laboratory and analytical instruments/equipment both in India and abroad? What are the major challenges you face in the industry, particularly regarding the production and distribution of laboratory and analytical instruments/equipment?

The market for laboratory and analytical instruments is growing globally, driven by increasing investments in research and development, particularly in pharmaceuticals and biotechnology. In India, the expansion is similarly fueled by rising healthcare demands and a growing focus on regulatory compliance and quality assurance in manufacturing. Challenges include supply chain disruptions, which affect the production and distribution of instruments. Additionally, the high cost of advanced technology and the need for skilled personnel to operate new instruments are significant hurdles.

What recent technological advancements have you witnessed in laboratory and analytical instruments/equipment? Could you highlight some of the new technological developments that have significantly impacted your sector recently?

Recent years have seen significant technological advancements in the field, such as the development of high-throughput sequencing, CRISPR technology, and improved automation and robotics. Promega has been at the forefront of many of these advancements, integrating new technologies into our offerings to enhance precision and efficiency. For example, advancements in automation have led to more streamlined workflows in laboratories, significantly reducing manual labour and increasing reproducibility and scalability.

How do you evaluate the growth scenario of the Indian market specifically for laboratory and analytical instruments/equipment?

The Indian market for laboratory and analytical instruments is experiencing significant growth, driven by an expanding healthcare sector, increased pharmaceutical and biotech research, and government initiatives to boost the biotech sector. With rising investments in healthcare and a growing emphasis on research and development, the demand for advanced diagnostic and research tools is rapidly increasing. Additionally, the Indian government's push towards making India a hub for biotechnology through various schemes like 'Make in India' has positively impacted the sector. The market is further supported by the growing focus on environmental testing and food safety, which require sophisticated testing and analytical solutions. This burgeoning environment suggests a promising growth trajectory for laboratory and analytical instruments in India.

Are there any regulatory challenges hindering the growth of your company or the industry as a whole?

While regulatory challenges are a reality in the highly regulated biotechnology and life sciences

industry, They also present opportunities for growth and improvement. Navigating complex regulatory landscapes requires diligence and adaptation, but it ensures that our products meet the highest standards of safety and efficacy. Promega is committed to maintaining compliance and leveraging regulatory frameworks to innovate and enhance product offerings. This proactive approach not only minimises potential hindrances but also positions us as a leader in developing trustworthy cutting-edge solutions for our customers globally.

What are your company revenues, how much was the growth last year, and how much are you expecting in the coming year?

For the calendar year 2023, Promega Biotech India reported revenues of approximately $8.00 million, marking more than a 15 per cent increase from the previous year. The outlook for the calendar year 2024 looks to be positive and we anticipate a similar kind of achievement, reflecting our ongoing growth and expansion in the market.

What kind of support do you receive or expect to receive from the government, if any, to foster the growth of the industry?

The laboratory and analytical instruments industry often benefits from government support in various forms, such as subsidies for research and development, grants for technology innovation etc. Governments do provide funding for academic and research institutions to purchase advanced equipment as well.

Could you share any outstanding new products or innovations your company has introduced to the laboratory sector recently?

Promega has consistently introduced innovative products that enhance the efficiency and capabilities of laboratory research. Recent introductions include genetic/ capillary sequencers, enhanced reagents for molecular biology, cell therapy and bioassays. Each of these innovations typically aims to reduce operational costs, enhance scalability, and improve user-friendliness, thereby boosting efficiency and functionality in laboratory research. In the last year, Promega technologies fulfilled customer needs through:

• First-of-its-kind chemistry that enables forensic labs to get more information out of their most challenging DNA samples (PowerPlex 35GY System)

• Luminescent tools enabling whole-animal imaging to study viral infections, gene therapy and immunotherapies (Nano-Glo Fluorofurimazine In Vivo Substrate)

• Methods for accelerating drug discovery efforts using libraries containing billions of novel compounds (DNA-Encoded Libraries (DELs) research)

Are there any expansion plans or initiatives in place for setting up new centres of excellence or exploring new markets? Can provide inputs regarding any new launches, MoUs or partnerships signed in the recent past by your company?

Promega is actively pursuing expansion through strategic initiatives, including establishing a new centre of excellence and entering new markets. Recent efforts include launching innovative products like advanced genetic analysers and sequencers. These moves are part of our broader strategy to leverage cutting-edge technology and collaborative opportunities to drive growth and innovation in the life sciences sector. For example: Promega and INOVIQ Ltd (Australia) recently announced a partnership to enhance exosome research, focusing on cancer biomarkers to provide researchers worldwide with easy access to cutting-edge exosome research tools and solutions. The agreement builds on a previous Co-Marketing Agreement and combines INOVIQ's EXO-NET pan-exosome capture tool with Promega's expertise in nucleic acid purification, offering advanced solutions for exosome isolation and analysis.

In your opinion, what future trends do you foresee in the laboratory and analytical instruments/equipment industry, both in terms of technology and market demand? Can you provide insights into the current market size for laboratory and analytical instruments/equipment in India and globally?

The laboratory and analytical instruments industry in India is poised for significant growth, driven by increased automation, expansion in point-of-care testing, and advancements in molecular diagnostics. Integration of AI and big data analytics is also enhancing efficiency and predictive capabilities. The sector is also influenced by the rising focus on precision medicine and molecular diagnostics, alongside a shift towards sustainable practices. These trends indicate a dynamic future for the industry, emphasising technological innovation and market expansion, particularly in emerging economies like India. BS

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"The competitive landscape is evolving rapidly that drives innovation, with companies constantly striving to offer tailored solutions"

The Indian market for laboratory and analytical instruments/equipment has been experiencing steady growth, driven by various factors. Firstly, there's a notable increase in investment in research and development across industries like pharmaceuticals, biotechnology, healthcare, and academia. This heightened activity spurs demand for cutting-edge instruments and equipment to support experimentation and analysis. Additionally, the expanding healthcare infrastructure in India is a significant contributor. In an interaction with BioSpectrum India Vipul Chhatbar, the CEO of MEDISPEC and Vice President of Indian Analytical Instruments Association (IAIA) shared his insights on market trends, challenges, and opportunities shaping the sector. ***Edited excerpts:***

« **Vipul Chhatbar,** CEO, MEDISPEC and Vice President, Indian Analytical Instruments Association (IAIA)

How do you evaluate the growth scenario of the Indian market specifically for laboratory and analytical instruments?

Technological advancements play a pivotal role in shaping the laboratory and analytical instruments/equipment market. Automation, artificial intelligence, and data analytics are revolutionising laboratory workflows and enhancing analytical capabilities. Companies that leverage these innovations to develop solutions specifically suited to the Indian market stand to gain a competitive edge. The competitive landscape is also evolving rapidly. We see a mix of domestic and international manufacturers and suppliers vying for market share. This competition drives innovation, with companies constantly striving to offer tailored solutions and superior products to meet diverse customer demands.

Of course, there are challenges to navigate as well. Infrastructure limitations, regulatory complexities, and price sensitivity among end-users pose hurdles. Additionally, ensuring an adequately skilled workforce to operate advanced instruments remains a priority. Overcoming these challenges requires strategic planning, investment in infrastructure and training, and a deep understanding of regulatory requirements.

Overall, the growth scenario for laboratory and analytical instruments/equipment in India is promising. With increasing research activities, technological advancements, and supportive regulatory frameworks, there are ample opportunities for stakeholders. However, staying abreast of market dynamics, fostering innovation, and addressing challenges will be crucial for sustained growth and success. In recent years, there have been remarkable advancements in laboratory and analytical instruments/equipment, particularly in two key areas: Next-Generation Sequencing (NGS) and Surface Plasmon Resonance (SPR) technology.

Could you highlight some of the new technological developments that have significantly impacted your sector recently?

Let's start with Next-Generation Sequencing (NGS). This technology has revolutionised genomics and molecular biology research by significantly improving sequencing speed, accuracy, and cost-effectiveness. With the continuous advancement of NGS platforms, researchers now have unprecedented access to genomic information, enabling large-scale sequencing projects with remarkable depth and breadth. NGS has accelerated gene discovery, enhanced our understanding of genetic variation, and helped unravel complex biological systems.

Moving on to Surface Plasmon Resonance (SPR) technology, Nicoya Lifesciences has introduced two cutting-edge instruments: OpenSPR and Nicoya Alto. These instruments cater to different needs and applications within the study of molecular interactions. OpenSPR, for instance, is a compact and user-friendly SPR instrument designed to make SPR technology accessible to individual laboratories. Its affordability and real-time data acquisition capabilities simplify studying various molecular interactions, including protein-protein and protein-small molecule interactions.

On the other hand, Nicoya Alto represents the

pinnacle of SPR innovation as the world's first digital high-throughput benchtop SPR system. This maintenance-free instrument offers a label-free analysis of molecular interactions, enabling researchers to visualise and study multiple interactions simultaneously. Nicoya Alto is ideal for applications requiring high-throughput analysis and advanced imaging, such as drug discovery, biochemistry, and molecular biology research.

Could you provide a brief overview of MEDISPEC's portfolio and its specialisation in laboratory and analytical instruments?

MEDISPEC has been a pioneering force in biotechnology, life sciences, analytical, diagnostics, and food technology for over 25 years. Our extensive range of state-of-the-art products covers a wide spectrum of scientific needs, including imaging & microscopy, microplate instrumentation, flow cytometers, seahorse real-time cell metabolic analyzers, surface plasmon resonance, gel documentation systems, freezers, incubators, biosafety cabinets, thermal cyclers, liquid handling, and other diagnostic solutions. These products are meticulously crafted to expedite scientific breakthroughs across various research endeavours & routine testing applications.

What advancements have been made through your collaboration with Agilent?

Through our partnership with Agilent's Cell Analysis division, we've introduced a range of advanced instruments tailored to diverse research needs. This includes the BioTek product line, renowned for its state-of-the-art solutions in cell imaging, multimode detection, and automated microplate readers. Additionally, we've introduced Seahorse analyzers for real-time cellular metabolic analysis, Flow Cytometers for high-throughput cell analysis, and Xcelligence Real-Time Cell Analyzers for monitoring cell behaviour in real-time.

How has your partnership with Nicoya contributed to innovation?

Our collaboration with Nicoya Life Sciences has resulted in groundbreaking SPR instruments, namely the OpenSPR and Alto systems. The OpenSPR is the first SPR instrument designed for academic purposes, offering affordable and accessible label-free biomolecular interaction analysis. Conversely, the Alto system caters to the high-throughput needs of the biopharmaceutical industry, providing rapid and accurate characterisation of molecular interactions.

How do these new products and technologies enhance research capabilities?

These innovative products and technologies significantly enhance research capabilities across various fields, including drug discovery, biomedical research, and biotechnology. They empower researchers with the tools they need to make impactful contributions to science and society by advancing scientific knowledge and accelerating discoveries. We remain committed to continually bringing pioneering solutions to the laboratory sector to support researchers in their quest for innovation and discovery.

What are your company's revenues, and what are you expecting in the coming year?

With good demand for highly advanced and quality laboratory products in the market, our company's revenues for the past three fiscal years have witnessed a positive growth. For the year 2022-23, we had a turnover of Rs 52 crore and this has increased to Rs 65 crore in 2023-24. We are anticipating a similar growth for 2024-25, and expect to touch the Rs 85 crore mark.

Are there any expansion plans or initiatives in place for setting up new centres of excellence or exploring new markets?

Yes, we are continually exploring opportunities for expansion and growth through strategic initiatives, partnerships, and market exploration. One recent significant partnership we're proud to announce is with Nicoya Life Sciences, enabling us to offer cutting-edge SPR instruments to our customers. Additionally, we've established our own Center of Excellence (CoE) at our head office in Mumbai to showcase our latest products and provide hands-on experience to customers. While specific expansion plans are in progress, we are committed to identifying strategic partnerships, launching new initiatives, and exploring emerging markets to strengthen our position in the laboratory and analytical instruments sector.

What kind of support do you receive or expect to receive from the government, if any, to foster the growth of your industry?

Currently, we are keen on receiving support from the government, particularly in ensuring the due diligence of Indian manufacturers. Many customers face issues where claimed specifications are not met, and most products are imported from other nations, falsely labelled as "Made in India." We believe government support in implementing stringent regulations and quality control measures will foster the growth of our industry and ensure fair competition in the market. BS

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India Ramps Up HPV Vax Efforts

Cervical cancer is the fourth most common cancer worldwide, and the second most common cancer among females in India. It is associated with the prevalence of human papillomavirus and lower socioeconomic status. According to the factsheet published by the ICO/IARC Information Centre on HPV and Cancer in 2023, India has a population of 511.4 million women aged 15 years and older who are at risk of developing cervical cancer. About 5 per cent of women in the general population are estimated to harbour cervical HPV-16/18 infection at a given time, and 83.2 per cent of invasive cervical cancers are attributed to HPVs 16 or 18. The published report also highlights that in India, there are over 123,000 new cases and close to 77,000 deaths from cervical cancer annually. This translates to one woman dying of cervical cancer every eight minutes in India, even though cervical cancer is an almost completely preventable cancer. Let's explore how the country is poised to tackle HPV head on.

As characterised and defined by the World Health Organisation (WHO), Human papillomavirus (HPV) is a common sexually transmitted infection that can affect the skin, genital area, and throat. Almost all cervical cancer cases (99 per cent) are linked to infection with high-risk HPV, an extremely common virus transmitted through sexual contact. Although most infections with HPV resolve spontaneously and cause no symptoms, persistent infection can cause cervical cancer in women. Furthermore, experts worldwide gauge that typically, it takes 15–20 years for abnormal cells to become cancer, but in women with weakened immune systems, such as untreated HIV, this process can be faster and take 5–10 years. Risk factors for cancer progression include the grade of oncogenicity of the HPV type, immune status, the presence of other sexually transmitted infections, number of births, young age at first pregnancy, hormonal contraceptive use, and smoking.

According to WHO guidelines for the initiative of elimination of cervical cancer, all countries should reach and maintain an incidence rate of below 4 per 100,000 women. Achieving that goal rests on three key pillars and their corresponding targets: vaccination: 90 per cent of girls fully vaccinated with the HPV vaccine by the age of 15; screening: 70 per cent of women screened using a high-performance test by the age of 35, and again by the age of 45 and treatment: 90 per cent of women with pre-cancer treated and 90 per cent of women with invasive cancer managed. Only 1 per cent of women are screened for cervical cancer in India, as per a recent report. The rate of HPV vaccination in the country is suboptimal at present, due to several factors.

With the Indian government announcing the inclusion of the HPV vaccine in the national immunisation programme and the breakthrough development by Serum Institute of India (SII) in manufacturing India's own HPV vaccine 'Cervavac', India can boost its efforts in achieving this 90-70-90 target and thereby blaze a brighter path for cervical cancer elimination.

As a priority, HPV vaccines should be given to all girls aged 9–14 years, before they become sexually active. The vaccine may be given as 1 or 2 doses. People with reduced immune systems should ideally receive 2 or 3 doses. Some countries have also chosen to vaccinate boys to further reduce the prevalence of HPV in the community and to prevent cancers in men caused by HPV.

Reducing healthcare burden

Vaccination is considered a cost-effective preventive measure compared to treating established cancers, saving healthcare systems significant resources.

The costs of cervical cancer treatment and management can vary significantly, influenced by factors such as the stage of cancer, geographical location, and healthcare infrastructure. Experts say that the treatment options for cervical cancer in India primarily include surgery, radiotherapy, chemotherapy, and palliative care, in addition to

Health outcomes and incremental cost-effectiveness ratio of introducing HPV vaccination alone and along with VIA every 5 years

Scenarios	Cancer cases averted*	Deaths averted*	QALYs gained#	Incremental cost in US$ million#	Incremental cost (US$) per QALY gained#		
					Compared to no vaccination	Compared to vaccination alone	Compared to vaccination plus screening with VIA 10 yearly
HPV Vaccination only	1,239 (60)	979 (59.8)	5,693 (3,340-9,741)	0.48 (-0.35 to 1.20)	86 (-44 to 311)	-	-
HPV vaccination along with screening with VIA 10 yearly	1,419 (69)	1,167 (71.3)	6,793 (3,941-11,518)	2.25 (1.07 to 3.36)	402 (128 to 856)	1,641 (711-3,462)	-
HPV vaccination along with screening with VIA 5 yearly	1,577 (76)	1,331 (81.3)	7,424 (4,266-12,758)	3.52 (2.14 to 5.05)	476 (193 to 979)	1,754 (826-3,823)	1,986 (956-4,417)

*The value indicate comparison as to the scenario of no screening and no vaccination in a cohort of 100,000 population girls aged 11 year;
*Values in parenthesis indicate percentage decrease in cancer cases and deaths;
#Values in parenthesis represent 2.5th and 97.5th percentile; US$: Unites States Dollar

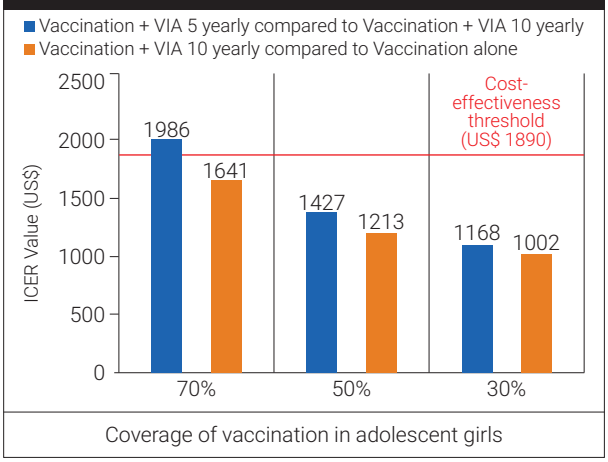
Source: https://doi.org/10.1371/journal.pone.0238291.t005

newly added technologically advanced treatment options. Screening leads to a reduction in the occurrence of cervical cancer cases with a decrease in cancer deaths, and the Visual Inspection with Acetic acid (VIA) every 5 years is the most cost-effective screening method in the context of India. Preventive intervention by HPV vaccination, especially at the right age, can contribute to reducing disease severity.

A 2020 study published in Lancet Oncology evaluating the potential survival effect of scaling up treatment showed that the cumulative effect of scaling up all imaging modalities together with expanded treatment and quality of care could improve 5-year net survival for cervical cancer to 62·5 per cent (globally). Investments in imaging equipment, personnel, and quality of care will be needed to scale up cervical cancer treatment successfully.

Additionally, according to a 2020 PLOS One study assessing the cost-effectiveness of various screening strategies for cervical cancer and HPV vaccination in India, immunising adolescent girls for HPV along with screening women using VIA appears to be a cost-effective strategy at both 5 yearly and 10 yearly frequencies of VIA screening, as compared to no vaccination and no screening. This indicates that successful vaccination may hold grand potential in the economical management of disease burden and this factor will be especially relevant in a country where cervical cancer burden is high. The inclusion of the cervical cancer vaccine in the national immunisation programme is a highly welcome move from the Government.

Incremental cost-effectiveness ratios of combination of vaccination and screening at different levels of coverage of HPV vaccination



Source: https://doi.org/10.1371/journal.pone.0238291.g003

Barriers and challenges

The most significant barriers being gauged by experts in achieving this large-scale vaccination will be the huge population to cover, lack of awareness combined with an overall vaccine hesitancy due

to myths regarding vaccine safety, social/religious stigma, and vaccination costs.

Commenting on the cost factor for the vaccine candidates, Dr Smita Joshi, preventive oncologist and programme director at Jehangir Clinical Development Center, Pune, mentions, "Quadrivalent and nine-valent vaccine Gardasil by Merck and Cervavac by SII are the 3 vaccines available in India currently. Cervarix (bivalent HPV vaccine by GSK) has not been available in the Indian market for one year. SII's HPV vaccine is slightly cheaper than Gardasil for the private market. It is supposed to be given to the government for Rs 300-500 per dose. However, it costs about Rs 1200 -1400 per dose in the private market."

Furthermore, building the optimal infrastructure to execute the required scale and magnitude of HPV vaccination in the country and developing strategies for the sustenance of the vaccination programme are going to be additional key players in overcoming logistical hiccups. Reaching out-of-school girls to complete the vaccine regimens, poor tracking systems, and overall low rate of candidate adherence to vaccine regimen due to multiple doses (two to three doses may be recommended for Cervavac) can pose additional challenges in streamlining and monitoring the vaccination programme performance.

Dr Smita Joshi, preventive oncologist and programme director at Jehangir Clinical Development Center, Pune, stated, "Government will need proper implementation plan, powerful messaging, and communication strategy, ensure sustained funding and continuation of the programme, in addition to baseline political commitment. Monitoring screening and vaccination of out-of-school girls will be an important factor requiring adherence in ensuring maximal coverage for the vaccination drive." She also added that with the current health infrastructure being overburdened, vertical investment is essential not only for vaccination but also for cervical cancer screening and management of precancers in adult women.

Estimating target populations and validating the availability of the necessary health infrastructure in the various parts of the country are important factors to consider when implementing a nationwide HPV vaccination initiative. Because of this, developing an evidence-based vaccination policy and guidelines for the new Cervavac HPV vaccine may prove crucial.

Reports indicate that in India, a significant proportion of cervical cancer cases come from rural areas. As compared to urban areas, access to facilities like regular screening, testing as well as general awareness regarding sexual health and sexually transmitted infections is considerably lower in India's rural population. In the absence of these critical factors, covering the rural population optimally in implementing the nationwide vaccination programme might prove significant.

"The government has a plan in place and a budget ready to begin the roll out for vaccination of girls aged between 9-14 years. The government might start the rollout in the third or fourth quarter of 2024. For that, Serum has got the back end covered and is poised to ensure efficient supply for this pilot phase of Cervavac mass vaccination."

- Dr Umesh Shaligram,
Executive Director of R&D, Serum Institute of India

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"More than 5 million women are at risk of developing cervical cancer. The age-adjusted incidence rate of HPV-related cancers is high in areas of Meghalaya and Assam. Delhi is also not far behind."

- Dr Priya Kapoor,
Consultant - Surgical Oncology (Gynaecology), Apollo Proton Cancer Centre Chennai

In this regard, experts presume that the role of ASHA and Anganwadi workers in boosting HPV vaccination and fostering the right direction towards preventive healthcare (especially in rural areas) may be significant.

Additionally, given that developing evidence-based policies and guidelines will have benefits, consideration of the state-wise distribution of cervical cancer burden may become a significant factor for effective strategising. According to Dr Priya Kapoor, Consultant - Surgical Oncology (Gynaecology), Apollo Proton Cancer Centre Chennai, "More than 5 million women are at risk of developing cervical cancer. The age-adjusted incidence rate of HPV-related cancers is high in areas of Meghalaya and Assam. Delhi is also not far behind."

Enabling equitable access to all socioeconomic groups to execute maximal vaccine coverage can drive India in the direction of truly reducing the disease burden resulting from HPV infections, which, although majorly includes cervical cancer caused by HPV subtypes 16 & 18, also comprises of conditions like anogenital warts, vaginal cancer, anal cancer, oropharyngeal cancer, etc.

All in all, collaborative efforts involving healthcare professionals, policymakers, and the public are crucial in raising awareness about the importance of HPV vaccination. Dispelling misconceptions, promoting accurate information, and ensuring widespread access to vaccination will lead to significant strides in preventing cervical cancer and enhancing women's health in India.

Cervavac by SII

Although Serum Institute of India (SII)'s Cervavac was officially launched in 2022 and has been available in the market in private hospitals for nearly two years now, HPV vaccination has not gained the necessary momentum yet. High cost per dose and a probable limited community-wide reach of the private healthcare sector can be gauged as primary reasons. With the announcement of HPV vaccination to be rolled out for all girls aged 9-14 years and the government also planning to include the HPV vaccine in the national immunisation programme, the picture would change dramatically in the positive direction.

Remarking on the upcoming country-wide vaccination phase, Dr Umesh Shaligram, Executive Director of R&D, Serum Institute of India, said, "The government has a plan in place and a budget ready to begin the roll out for vaccination of girls aged between 9 and 14 years. The government might start the rollout in the third or fourth quarter of 2024. For that, Serum has got the back end covered and is poised to ensure efficient supply for this pilot phase of Cervavac mass vaccination."

Elaborating on the timeline of upscaling Cervavac production to align with the government's plans and goals, Dr Shaligram touched upon the role of COVID-19 on the supply chain logistics for large-scale HPV production, which was originally planned by SII to take off around 2019-2020. The pandemic not only disrupted the supply chain resulting in delayed deliveries of the required equipment from the West but it also raised constraints concerning space and resource allocation, as the need of the hour demanded a high priority to the manufacturing of COVID-19 vaccines. The post-pandemic recovery allowed us to reset the momentum and focus on the HPV vaccine, where SII focussed on building up the necessary infrastructure for Cervavac manufacturing from scratch. "It took almost a couple of years for us to get the infrastructure ready. Production set-up for scale-up of the Cervavac vaccine kickstarted in 2023, and now SII is all set to cater to the needs of the upcoming country-wide HPV vaccination", added Dr Shaligram.

For the Indian market, available HPV vaccine candidates include the Merck vaccine Gardasil, the GSK vaccine Cervarix, and the indigenous Cervavac vaccine by Serum Institute of India. With some reports citing a potential discontinuation of the Cervarix vaccine from the Indian market, Gradasil and Cervavac would be the available choices in the long run.

Cervavac is very close in design and efficacy to the Merck vaccine, with both quadrivalent vaccines targeting the major HPV subtypes 16 & 18. Cervavac has also demonstrated protection against HPV 6 & 11 subtypes, which cause health conditions other than cervical cancer such as genital warts and cancerous lesions in other organs. In addition to the broad-spectrum efficacy of Cervavac, the advantages it incurs include the cost-effectiveness and the scale of vaccine availability for extended distribution owing to the strategic efficiency and manufacturing prowess of the Serum Institute of India.

According to the data provided by the Central Drugs Standard Control Organisation(CDSCO), the safety profile of Cervavac is based on data from clinical trial (SII-qHPV/IN-02) conducted in India where Cervavac was administered to 1530 study participants aged 9 through 26 years. The most common events occurring after Cervavac administration were injection site pain, and headache. The majority of adverse events were mild to moderate in severity and usually resolved within a few days of vaccination. Adverse events are organised by MedDRA System Organ Class (SOC).

Adverse reactions reported in clinical trial with CERVAVAC

System Organ Class	Frequency	Adverse Reactions
Nervous system disorders	Very Common	Headache
	Common	Dizziness
Gastrointestinal disorders	Common	Nausea
Skin and subcutaneous tissue disorders	Common	Injection Site Pruritus
Musculoskeletal and connective tissue disorders	Common	Pain in Extremity
General disorders and administration site conditions	Common	Injection site erythema
	Very Common	Injection site pain
	Common	Injection site swelling
	Common	Pyrexia

Source: CDSCO

Commenting on the rollout of Cervavac doses, Dr Shaligram added, "Considering the Indian birth cohort, which is up to 25 to 26 million per year, the number of doses recommended per individual and the estimated size of the target population of girls aged between 9 & 14 years, Serum Institute is looking at catching up to approximately 300 million vaccinations overall." In addition to the cohort of girls aged between 9 & 14 years, the Cervavac vaccine can also be recommended for adolescent boys, as well as older men and women beyond 14 years of age up to 26 years of age. He also added that as vaccine advocacy and awareness improve, the government will shift focus to the older age groups and aim to cover that large cohort as well in the coming few years.

In view of the incorporation of the vaccine's rollout schedule and the government's plans for implementing the vaccination programme, Dr Shaligram said that although a high demand for Cervavac is certainly expected, the government would look to implement the vaccination programme in phases and open up the country to HPV vaccination in parts. He added that Serum Institute is all set up to meet the increasing demands for Cervavac in India, and after covering the needs of India, Serum Institute will then look to go global with the Cervavac vaccine after some years.

Managing cervical cancer burden

The objectives of the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS), being implemented by the Central Government under the National Health Mission (NHM) for interventions up to the district level, include awareness generation for cancer prevention, screening, early detection and referral to an appropriate level institution for treatment, including cervical cancer. Screening of common NCDs including three common cancers i.e. oral, breast, and cervical is also an integral part of service delivery under Ayushman Bharat - Health and Wellness Centres.

Experts add that the path ahead to managing the cervical cancer burden also requires sustained collaboration between the government, healthcare organisations, NGOs, and communities to achieve comprehensive cervical cancer prevention.

Dr Smita Joshi, preventive oncologist leading the cervical cancer management operations at the NGO 'Prayas' in Pune shared, "Prayas has screened over 35,000 women and treated screen-positive women according to the WHO guidelines till date. However, our programme depends upon the donations that we receive. There are very few NGOs working in the field and everyone is doing their own small thing however a coordinated effort will help. However, for programme sustenance, better government policies are necessary."

Under the NCD control plan, the PHCs are supposed to offer cervical cancer screening using VIA (whereas the WHO has suggested an HPV test). Treatment of cancers is also available under the Ayushman Bharat - Pradhan Mantri Jan Arogya Yojana (PMJAY). Under the umbrella scheme of Rashtriya Arogya Nidhi, financial assistance is provided to families living below the threshold poverty line for their treatment, including treatment of cancer, in government hospitals.

The ICMR-National Institute of Cancer Prevention and Research (NICPR) has made important strides in cervical cancer prevention. NICPR-ECHO training courses are continuing efficiently to train in-service healthcare providers in cancer screening and for capacity building of pathologists, especially in remote areas. The government is also collaborating with national and international healthcare organisations like WHO and UNICEF for technical assistance in planning, implementing, and monitoring the HPV vaccination programme.

However, it's good to know that a study published in 2022 in 'BMC Cancer sheds light on the trends in the incidence and mortality of cervical cancer in India and its states between 1990 and 2019. The study is based on the data collected from various sources like the Global Burden of Disease study and the Bombay Cancer Registry and highlights that the incidence and mortality of cervical cancer declined over the past three decades, but also talks about how it is still a major public health problem in India. BS

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Dr Jitendra Kumar, Managing Director, BIRAC giving the keynote address, with other key dignitaries present during the inaugural session- (L-R) Sanjay Saxena, Head of Investment, BIRAC; Ravindra Boratkar, Publisher and Managing Editor, BioSpectrum; and Dr Satya Dash, President Strategy, Partnerships & Acceleration, Bigtec.

Bio Startups CEO and Founder Conclave '24

"We are moving towards an 'innovation ecosystem' from the 'startup ecosystem"

thebiostartups.com, a platform dedicated to supporting and empowering biotech startups with resources, funding opportunities, and industry connections from BioSpectrum India has hosted the first ever CEO and Founder conclave in Mumbai on April 12 which attracted all stakeholders namely policy makers, investors, academia, industry organisations, entrepreneurs on the theme "Fueling innovation and growth in biotechnology." The conclave witnessed the participation of over 100 key players from the industry from across the country wherein they debated, exchanged, shared views, experiences, and ideas, innovations to take the industry to the next level of growth.

Ravindra Boratkar, Publisher and Managing Editor, BioSpectrum India and Managing Director, MM Activ Sci-Tech Communication in his introductory note said that the conclave aims to provide a platform for networking, knowledge sharing, and collaboration within the thriving biotech startup community.

Lauding the rise of the biotechnology sector in the country, he stressed on the role of India's vaccine industry and added that being a leading manufacturer of vaccines and a destination for contract manufacturing of generic drugs has contributed largely to the success of the biotech sector till now. Furthermore, he elaborated that to move in the direction of implementing the make-in-India 'Atmanirbhar Bharat' initiative, furthering the initiative of boosting the startup ecosystem will be important.

"There is a gap between the industry, academia, and the government. We also need to overcome issues of funding, IPR, and risk capital", he added. Stressing that platforms like the BioConclave event can be a step in the right direction to facilitate this, he welcomed the dignitaries for the conclave.

In her keynote address, given virtually, ***Dr Renu Swarup, Former Secretary, the Department of Biotechnology (DBT), Government of India*** shared her insights on the story and journey of the Indian life sciences startup industry. She noted that a sector that started with a mere 50-60 startups, is now home to over 6000 startups.

The sector now has been exhibiting commendable outputs for society as well as in fuelling innovation and growth in the startup ecosystem. She mentioned that India's startup sector has not only enabled the introduction of numerous innovative products in the markets but has also paved the path for rising investments in the sector. Adding that India's 'science & technology innovation' ecosystem, especially in the DeepTech-Biotech sector has provided a good head start for the sector to foster further innovation, we are moving towards an 'innovation ecosystem' from the 'startup ecosystem'. "India is a key innovator in Indian as well as global scenario.", she added.

Speaking of how the growth trajectory needs to move to foster and sustain this ecosystem and aim for incremental exponential growth, Dr Renu Swarup emphasised the role of the ecosystem enablers in taking forward innovative ideas. Highlighting this, she stressed that a 'technology and research connect', as well as a continued strong connection between industry-academia, and between high-risk innovation and investment will be of utmost importance. She added that initiatives like the establishment of knowledge clusters can translate to the active inclusion of 'more academia' into the ecosystem.

"Seamless flow of knowledge will be important for translation and bringing market relevant products of the industry. The appetite to increase and partake in investment risk needs to increase", she added. Further sharing her views on the importance, of a streamlined regulatory landscape in making this transition from a 'Startup Ecosystem' to an 'Innovation Ecosystem', she accentuated that financial regulations for achieving huge competitive landscapes will prove to be crucial. "It cannot be business as usual", appended Dr Renu Swarup, emphasising that investors and business pipeline developers must adopt and operate on very different models now to achieve the goal of transforming into an innovation hub.

Complimenting on Dr Renu Swarup's insights, ***Dr Jitendra Kumar, Managing Director (MD) of the Biotechnology Industry Research Assistance Council (BIRAC),*** explained the contributions of BIRAC to the startup ecosystem in the past few years, mentioning that the groundwork is done by DBT and BIRAC has worked to strengthen this groundwork. BIRAC has set up incubation centers across the country, especially the north and northeast to boost the overall innovation ecosystem. Adding a recent endeavour to their basket, he additionally mentioned the newly set-up incubation centre at IIT Patna facilitated by BIRAC efforts towards strengthening the innovation ecosystem.

Underlining the challenges in progressing toward this initiative, he shared that the upgradation of existing talent and technologies is currently the biggest bottleneck in this startup/innovation ecosystem, emphasising that BIRAC is focussing on creating facilities and infrastructure for a funding boost for this upscaling. "We do consultations for stakeholders, we are making efforts to boost financing", added Dr Jitendra Kumar, particularly mentioning the new 'Big Biotech Ignition' grant by BIRAC. He also touched upon other initiatives – such as the BIPP & AcE funds – that BIRAC has been advancing to effectively implement the journey from 'ideation to commercialisation'.

Adding to the tone and pace of an interesting discussion set by the insights from Dr Renu Swarup, Dr Jitendra Kumar said, "Now we have to focus more on deep tech technologies. The laboratory research is well established. Academic research institutions are where deep tech research is happening, and government and private investors must turn focus on spinning it out to market levels." Commenting on the investment landscape for the deep tech sector, he shared, "Only 0.7-0.8 per cent of GDP is being spent on the deep tech sector and related innovation research. Institutionalise and keep efforts on the track to boost such deep tech innovation research." He mentioned that the funding and consultation/ guidance spectrum of BIRAC is huge and inclusive and BIRAC is looking to keep taking advantage of this and keep growing it. Concluding his talk by sharing interesting future perspectives and BIRAC's upcoming goals, Dr Jitendra Kumar elaborated that BIRAC plans to focus on the 'biomanufacturing' vertical.

In his talk ***Dr Satya Dash, President, Strategy, Partnerships & Acceleration, Bigtec, and the Former Head of Strategy, BIRAC*** shared interesting views and insights into the evolving landscape of the Indian MedTech ecosystem. Diving into a unique perspective of the Indian MedTech system's analogy

(Right to left)- GS Krishnan, President, Association of Biotechnology Led Enterprises (ABLE) moderating a panel discussion 'Engaging with India's biotech startup ecosystem leaders: Fireside perspectives', with Raghavendra Goud, Executive Director, PharmNXT; Dr Manisha Premnath, Chief Operating Officer, Venture Center; Dr Mohamed Adil A.A, Managing Director, Bangalore Bioinnovation Centre; Dr Vadiraja Bhat, Biopharma Business Development Manager, Agilent Technologies; and Shivakumar Natarajan, Commercial and Business Development Director, Miltenyi Biotec, while Dr Taslimarif Saiyed, CEO and Director, C-CAMP joined virtually.

to a 'Graveyard of prototypes', he focused on the question - "Have we lost sight of new prototypes or are we unable to achieve scale-up and product development?" Emphasising an exponential scale of growth for this sector, he ventured into the success story of the popular startup 'Molbio Diagnostics'- India's first uniocon in life sciences sector when Singapore-based investment firm Temasek has invested $85 million (around Rs 680 crore) in 2022 highlighting its impact, development, and product portfolio.

Stressing upon the credibility of the startup in the context of its successful expansion into the Indian market, which especially houses an inherently high level of diversity, even within individual states of the country. He added that India should now focus on becoming a 'product nation', following the trajectory that if one new or novel product is ready and, in the market, then companies should look for developing and having a product portfolio. He added that Bigtec is next looking to build partnerships and collaborations in boosting the biomedical sector, with incubators and ecosystems like C-CAMP, IKP, Venture Centre, and IIT-Bombay, in the context of boosting funding and guiding regarding the complexities of scale for the growth of younger startups.

Delivering a special talk on the biotech startup ecosystem, ***N Suresh, Chief Operating Officer (COO), the Association of Biotechnology Led Enterprises (ABLE),*** said that the cumulative growth of startups experienced a consistent upward trajectory between 2015 and 2022. The cumulative count of startups continued to increase, reaching 6755 by the end of 2022, reflecting an overall growth rate of 26 per cent. In 2015, there were 732 startups. By 2016, the number crossed the 1000 milestone. The startups grew by approximately 9.22 times since 2015. So, the Compound Annual Growth Rate (CAGR) since 2015 was approximately 37 per cent.

He further noted that noteworthy accelerations were observed in 2016- 2017 (69.61 per cent) and 2017-2018 (54 per cent). This is clearly an outcome of the establishment of BIRAC in 2012 to promote the biotech startup ecosystem in the country. BIRAC's relentless efforts have significantly contributed to the growth and development of the biotech innovation ecosystem in India. Despite economic challenges, the startup ecosystem displayed resilience, maintaining positive growth rates.

Dr Milind Kokje, Chief Editor, BioSpectrum India, who presided over the session, informed the gathering about MMA Spectrum Foundation and its objectives to promote startup culture in Bio & Health Sciences and requested every participant to become a partner in the progress of the Bio & Health Sciences startups ecosystem.

Panel discussions

Chairing a panel discussion on 'Engaging with India's Biotech Startup Ecosystem Leaders: Fireside Perspectives!' GS Krishnan, President, Association

(Right to left) Dr Parul Ganju, Founder, Ahammune Biosciences; Dr Divya Sriram, Co-Founder, D-Nome; Hasmukh Rawal, Managing Director, Mylab Discovery Solutions; Deepanwita Chattopadhyay, Vice President, ABLE and Chairman & CEO, IKP Knowledge Park (Moderating a panel discussion on 'Innovations in Biotechnology'); Dr Sachin Dubey, CEO and Co-Founder, Module Innovations; Dr Prabhakar Kulkarni, CEO & Co-Founder, NeoDx Biotech Labs and Kumar Sankaran, CEO, Leucine Rich Bio; with Ankit Kankar, GM-Digital Strategy & Programmes, BioSpectrum.

of Biotechnology Led Enterprises (ABLE), said that understanding the sustainability and scalability of startups will be crucial for shaping future policies. The sentiment is positive and with the support from the government and participation of all the stakeholders the industry is expected to have nearly 31000 startups by 2030, provided the economic conditions, government policies, technological advancements, and global events stay tuned as predicted.

Shivakumar Natarajan, Commercial and BD Director, Miltenyi Biotec, shed his insights into the future of cell and gene therapies from a commercial perspective. He focussed on the key line of thought – "Can it be done - can it be done safely, effectively, at scale". Adding that due to the long period required for regulatory approvals for cell and gene therapies, factors such as harmonising of manufacturing processes/protocols and automation of manufacturing processes will be important for the successful commercialisation of these therapies.

Talking about India's position in the global scenario for cell & gene therapies, he said, "In terms of the talent pool required to drive innovation in this field, India ranks fourth, a mere three ranks below the USA, which is host to 48 per cent of talent in this field. The topmost countries in this list have had a head-start of nearly 20 years in the cell & gene therapy sector as compared to India. In relation to this, India is progressing well in this field." Miltenyi Biotec is now setting up a new innovation and training centre at Hyderabad's Genome Valley."

He added that startups in the cell & gene therapy space, wanting to train or become incubatees in this incubator will benefit from the initiative.

Dr Vadiraja Bhatt, Biopharma Business Development Manager, Agilent Technologies spoke about leveraging Agilent positions across the drug modalities and pharma enterprise. Sharing Agilent's spectrum of biotechnology research and products, Dr Bhatt touched upon the verticals the company is now covering. He especially stressed that the segments of focus for Agilent currently include protein-based therapeutics, peptide-based therapeutics, synthetic oligonucleotides, and mRNA vaccines, adding that a particular focus has been on covering the companion diagnostics area. He also added that Agilent is heavily invested in, and is leveraging numerous support resources, for boosting the 'Cell and gene therapy' vertical. With an overview of Agilent's position in the biotechnology sector in general, he mentioned, "Essentially, we cover all these segments that are required for extending support to start-ups and bio incubations, relevant research areas involved in the biotechnology sector, as well as the support required for biopharmaceutical companies". Emphasising the importance of the ability for scale-up, Dr. Bhatt added, "Agilent is involved in driving initiatives from BIRAC, DBT, DST and involved in partnerships with IITs, ICT, and C-CAMP to support these biotech start-ups. We believe in these partnerships to help grow the biotechnology and biopharmaceutical segments in India, and support the bio-economy."

Dr Taslimarif Saiyed, Director & CEO, C-CAMP

(Right to left) Dr Abdur Rub, CEO of Wadhwani Research Centre for Bioengineering, IIT Bombay, moderated a discussion on 'Funding the future: Investment strategies for biotech startups' with panelists Rupinder Singh, Chief Operating Officer, UnivLabs Technologies; Dr Vishal Gandhi, Founder & CEO, BioRx Venture Advisors; Dhiraj Rajendran, Partner, Kotak Private Equity; and Rema Subramanian, Co-Founder & Managing Partner, Ankur Capital.

spoke about the large shifts that have taken place in the country's biotech startup ecosystem in the last 15 years. He added that many interesting collaborations have been built in the last few years in the domain of risk investments. He added that the way forward would be to focus on building centres of excellence.

"We have a good base now, but focus now needs to shift to world-class expertise and to building centres of excellence; and also, on enhancing globally recognised bio innovations." He emphasised that in the past few years, commendable progress strides have been made in the area of diagnostics, citing the importance of this achievement in the context of tackling the COVID-19 pandemic.

"We could supply to the world the most cost-effective RT-PCR tests in the times of the pandemic." Adding that cost-effective cell therapies and digital health will be the upcoming dominating trends, Dr Saiyed elaborated that fostering innovations to compete with the global best and boosting the scale-up capabilities are the areas of growth the start-up ecosystem should focus on. In this view, he said that C-CAMP has been a proud incubator, especially for deep tech startups, with 8-10 of those startups now valuing over $100 million. "Now, our focus will be to enable their scale-up capacities", he added.

Dr Mohamed Adil A., Managing Director, Bangalore Bioinnovation Centre, spoke about the importance of fostering experienced scientists to develop novel molecules in particular. He added that addressing the issue of enabling efficient sustainability of innovative bio startups, especially within India, will be important to encourage the emergence of new ideas, as startups look to establish themselves outside India, once they go beyond a certain growth threshold point.

Dr Manisha Premnath, COO, Venture Center, Pune shared her ideas on how the biotech startup ecosystem can be given the required boost. Speaking about translating ideas to products, she emphasised that the main gaps lie in various arenas like funding, and ideation, and mentioned that early market testing and technology validation of new products will also prove significant. "Venture Center focuses on guiding its incubatee startups to avoid or overcome the 'Valley of Death' in their entrepreneurship journey", she added.

Raghavendra Goud Vaggu, founding promoter for startups in new age technologies, and Executive Director, PharmNXT stated that startups need to focus more on building relevant products. Additionally, he mentioned, "Acceptance of new age deep tech technologies and processes will be important going forward. For example, for immunogenicity experiments, the SPR technique has still been used for decades, but acceptance and incorporation of AI in this pipeline will be advantageous."

Deepanwita Chattopadhyay, Vice President, ABLE and Chairman & CEO, IKP Knowledge Park, chaired a panel discussion on 'Innovations in Biotechnology'. Dr Parul Ganju, Founder, Ahammune Biosciences; Dr Divya Sriram, Co-Founder, D-Nome; Hasmukh Rawal, Managing Director, Mylab Discovery

Solutions; Dr Sachin Dubey, CEO and Co-Founder, Module Innovations; Dr Prabhakar Kulkarni, CEO & Co-Founder, NeoDx Biotech Labs and Kumar Sankaran, CEO, Leucine Rich Bio all founders of upcoming startups from diverse fields of research shared their definitions of 'success' in their startup endeavours and the challenges they have encountered in their innovation journeys. Furthermore, they also shared their views and strategies on manoeuvring the necessary or inevitable 'pivots' in their startup journeys.

The final panel discussion for the day, moderated by Dr Abdur Rub, CEO of Wadhwani Research Centre for Bioengineering, IIT Bombay, covered the lengths & breadths of "Funding the future: Investment strategies for biotech startups". Panellists comprising of Rema Subramanian, Co-Founder & Managing Partner, Ankur Capital; Dhiraj Rajendran, Partner, Kotak Private Equity; Rupinder Singh, COO, UnivLabs Technologies and Dr Vishal Gandhi, Founder & CEO, BioRx Venture Advisors shared their views on the topic.

Dr Abdur Rub set the context for the session with his insights into the various stages of the investment journey of a biotech startup. "The earliest investor, the biggest risk-taker in the entire journey of a startup is the taxpayer. It is the organisations like DBT, BIRAC, DST", he said. Elaborating on the consequent stages a startup goes through to become a successful endeavour, he added that there lies a significant gap between the early funding stages and the larger investment stages. "A widely recognised gap between the one and five million dollars, particularly in the Indian ecosystem, in the investment systems", he added.

Dr Vishal Gandhi shared his views on how the financing ecosystem works in the new-age biotech sector. "The future of the biotech sector is partnerships", he said. Startups should think of leveraging partnerships right from the beginning of their journeys, in order to effectively scale-up. "Today, we should be talking about 'bio-scale-up'", he added, emphasising that entrepreneurs and investors need to work on tackling the challenges in the path from bio-start-up to bio-scale-up and move towards a stronger bio-economy.

Rema Subramanian spoke about being an early-stage investor in the biotech sector, and Ankur Capital's plans to expand to other areas of the startup landscape. "A large part of our focus has been on verticals of agriculture and deep science. We are looking to add other verticals in the areas of biomanufacturing from the point of view of sustainable manufacturing practices like synthetic biology", she added. Furthermore, she added that there is a need to address a gap that lies between entrepreneurs and investors at the product's scale-up stage.

The biotechnology industry in the country is growing mainly due to vaccine players, contract manufacturing organisations and a flourishing Bio Startup Ecosystem. To support the growing startup ecosystem which requires deep insight into the latest biotech trends and innovations; exploring strategies for funding, scaling, and global expansion; enhancing knowledge of regulatory compliance and intellectual property; networking with industry leaders, investors, and potential collaborators, we at BioSpectrum have started a new dedicated platform called The BioStartUps, to support and empower Biotech Startups and organised this maiden Bio Startups CEO and Founder Conclave '24.

Manasee Kurlekar, CEO, MM Activ Sci-Tech Communications, in her closing remarks, thanked participants, speakers, industry partners namely Agilent Technologies, Merck Group, Thermo Fisher Scientific, Eppendorf, Lonza and HiMedia, investment partner- Standard Chartered, Innovation partner- Bangalore Bioinnovation Centre and Ecosystem partners- Venture Center, Biotechnology Industry Research Assistance Council (BIRAC), Centre for Cellular and Molecular Platforms (C-CAMP), Federation of Asian Biotech Associations (FABA), Association of Biotechnology Led Enterprises (ABLE), Kotak, Indian Healthcare Angels, BioRx Venture Advisors, Wadhwani Research Centre for Bioengineering (WRCB), Ankur Capital and sponsors for their support for the success of the conclave. BS

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Enhancing Acceptance of Versatile CRISPR Diagnostics

« **Ruplekha Choudhurie,** Team Lead (Health & Wellness), TechVision, Frost & Sullivan

CRISPR/Cas system, a popular gene editing system known for its targeted genomic cleaving capabilities, is being widely used for the development of gene edited therapies. Since 2016, CRISPR/Cas has also been extensively used for the development of molecular diagnostics and other biosensing applications. Due to targeted biosensing, CRISPR-based diagnostics can be developed as highly specific, rapid, simple, and cost-efficient tests that can be used at scale and in point-of-care (POC) settings. CRISPR-based molecular diagnostics are not only highly accurate for nucleic acid testing, but also ideal for use for POC testing as it does not require expensive and complex instrumentation or thermocycling, like PCR-based technologies. They have broad applicability, being able to detect DNA, RNA, proteins, and small molecules, making them useful in the diagnosis of infectious diseases, both viral and bacterial, and non-infectious diseases such as cancer and genetic disease via SNP and mutation detection.

While the CRISPR toolbox has been extensively researched for more than a decade, it was only in 2020 that the first CRISPR test received EUA (emergency use authorisation) from the Food and Drug Administration (FDA) for SARS-CoV-2 diagnosis. This was a landmark year for CRISPR-based molecular diagnostics, which has since then witnessed tremendous interest due to their applicability for large-scale testing for infectious diseases and beyond in resource limited settings. DETECTR and SHERLOCK platforms, developed by Sherlock Biosciences and Mammoth Biosciences respectively, are the core platforms that were further enhanced to develop breakthrough POC SARS-CoV-2 diagnostics, which could provide results in approximately an hour. Both these platforms are versatile and can be adapted to multiple pathogens, such as Zika, Dengue, West Nile, and yellow fever virus.

CRISPR Toolbox for Diagnostics Development Beyond Infectious Disease Testing

CRISPR-based tests overcome several challenges of RT-PCR such as high costs, need for expensive reagents and sophisticated equipment, and other alternative isothermal amplification methods such as nucleic acid sequence-based amplification (NASBA), isothermal exponential amplification reaction (EXPAR), strand displacement amplification (SDA), loop-mediated isothermal amplification (LAMP) which are susceptible to false-positive results due to amplification artifacts. Adding a layer of specificity with a CRISPR/Cas system would improve the accuracy of these tests, which is key for SNP and minute levels of nucleic acid detection.

CRISPR diagnostics have been extensively developed for the detection of infectious diseases over the past decade, with application in cancer diagnosis and disease monitoring pickup as attractive applications. CRISPR diagnostic tests have also been developed for the detection of several viruses, bacteria, fungi, short microRNAs, and pathogenic proteins as an alternative to molecular diagnostics and culturing. The initial development of CRISPR-diagnostics made use of the CRISPR -Cas9 system, and the toolbox has been further improved with the discovery of effector molecules like Cas12a (targets DNA) and Cas13a (targets RNA) which expanded the applications. These enzymes have demonstrated site specific cleaving of double -stranded DNA and can cause non- specific collateral cleavage capabilities, giving them an edge over Cas9 enzymes. Apart from infectious diseases, Cas13 effectors are also being explored to detect non-infectious diseases like graft-versus-host diseases and cancer.

The highly specific and sensitive nature of CRISPR-based tests makes it a highly valuable tool for the detection of mutations and SNPs in cell-free DNA and circulating tumour cells, which are present in very small amounts in serum, necessitating a highly sensitive test. Such liquid biopsies using CRISPR would be useful to detect even minimal residual disease, and for early diagnosis using liquid biopsies.

Garnering Traction

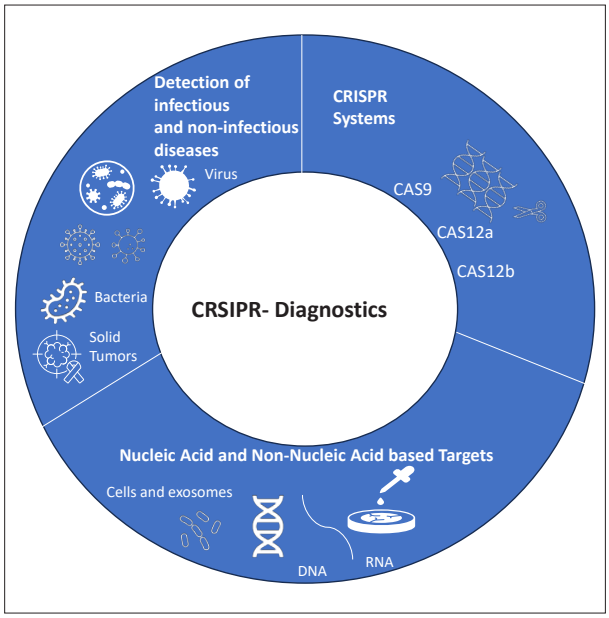
Apart from notable names such as Sherlock Biosciences & Mammoth Biosciences which have FDA approved diagnostics for COVID-19, other companies like VedaBio, Scope Biosciences, and Crisprbits have also forayed into this space of developing robust CRISPR based diagnostic platforms. Despite its potential, CRISPR diagnostics have not taken off as expected which could be due to some of the technical and developmental challenges. Most of the R&D activity for CRISPR-based diagnostics is observed in the USA, where academia has been actively pursuing translational research. The FDA approvals for emergency use of the diagnostics also fostered a conducive environment for further development of CRISPR tests for other applications. There is also a growing interest in this space, indicated by the funding and acquisitions observed in the last year.

Massachusetts-based Proof Diagnostics, developing POC CRISPR diagnostics was acquired by Ginkgo Bioworks in early 2024, while the Netherland-based Scope Biosciences received €2.5 million EIC Transition grant for its POC CRISPR diagnostics in 2024, exhibiting rising interest in CRISPR diagnostics in Europe. Recent research activities at the academic R&D labs in the USA that significantly boosts the use of CRISPR based applications include the development of a new search algorithm that has led to the identification of 188 kinds of new rare CRISPR systems which can be used in CRISPR diagnostics, CRISPR test for detection of monkeypox, and CRISPR test for oral bacterial pathogen detection.

Improving Adoption

Although CRISPR- based diagnostics are promising and are being increasingly researched for its utility in both infectious and chronic disease diagnosis, there are several challenges that limit the wide scale adoption of CRISPR diagnostics globally. Challenges associated with sample preparation, sensitivity, and the lack of streamlined regulatory frameworks lead the concerns.

Research community is focused on developing approaches to reduce the need for amplification and have developed preamplification free CRISPR diagnostics which are more sensitive, cost-effective and can be carried out in visual detection like colorimetric or luminescence detection methods. Strategies such as droplet based digital platforms using CRISPR for ultra-sensitive detection, cascade signal amplification and use of signal transducers have been used for amplification free CRISPR diagnostics. Optimisation of the enzymes is another area of research to improve the sensitivity of these tests.



The ease with which CRISPR can be used in rapid nucleic acid detection (POC) demonstrates a promising potential for its use in regular clinical diagnostics and at home testing. Achieving CRISPR based POC diagnostics that provides quantifiable results will be the aim of scientists in CRISPR diagnostics. In bacterial and fungal infections, where culture is still the gold standard, diagnosis, and subsequent treatment is often delayed due to the long turnaround times. CRISPR assays have shown promise in this area and can change the paradigm of tuberculosis and nontuberculous mycobacterium infections with its rapid and accurate testing protocols. It could also be a useful tool that can be used in a potential infectious disease outbreak for large scale, inexpensive testing. CRISPR diagnostics embedded with gene circuits are also being developed to make them more sensitive. miRNA detection using CRISPR diagnostics is another area of research, which would find applications in cancer testing.

The next phases of development would be around multiplexed CRISPR-diagnostics that can detect multiple targets in a single assay. Optimised assay development, along with enzyme optimisation and adoption of digital microfluidics platforms can help develop tests with high clinical utility. Its adoption could be further enhanced with the development of pre-amplification-free, POC tests. With integration into paper based and lateral flow strips, CRISPR based diagnostics can eventually be used as a simple at-home test that provides results instantly and could be even used for infection testing, pregnancy testing, urine testing and other applications. BS

(Neeraja Vettekudath, Research Analyst, TechVision, Frost & Sullivan also contributed to this article)

Impact of Startups on Transforming Clinical Research Practices

« **Dr Sanish Davis,** President, Indian Society for Clinical Research

In the dynamic landscape of healthcare, where clinical trials represent the cornerstone of medical progress, startups have emerged as key drivers of change. The clinical trials market in India was estimated to be valued at $2.07 billion in 2022, and it is expected to expand at a compound annual growth rate (CAGR) of 8.2 per cent from 2022 to 2030, reaching $3.88 billion by 2030. This exponential growth not only reflects the country's evolving medical infrastructure but also underscores the pivotal role of innovative startups in redefining the healthcare landscape.

Despite India's status as Asia's fourth-largest medical equipment manufacturer and its 8 per cent share in the global medtech research and development workforce, the country accounts for only 1.5 per cent of the global medical devices market. In response to these challenges, startups have begun offering disruptive technologies and innovative approaches that revolutionise clinical trial practices, paving the way for a more inclusive and patient-centric research environment.

India: A Global Hub for Clinical Trials

India is poised to re-emerge as a global hub for clinical trials in years to come, underpinned by a confluence of compelling factors. With a diverse patient population, a wealth of experienced investigators, cost-efficient research infrastructure, and forward-thinking regulatory reforms, India offers a promising environment for conducting clinical research. Despite having upwards of 15 per cent of the most high-prevalence diseases globally, (e.g. cardiovascular diseases, diabetes, respiratory infections, cervical cancer) India contributes to a meagre 3 per cent of the overall global clinical trials.

Challenges in Clinical Trials

At the heart of successful clinical trial programmes lies the imperative to achieve patient enrolment within budget, uphold data quality standards, and adhere to stringent timelines. Yet, these goals have become increasingly elusive in the face of mounting complexities and evolving regulatory requirements. The pressure to expedite therapy development and commercialisation underscores the urgent need for strategies and technologies that streamline the process while ensuring patient safety and determination of unequivocal efficacy of the new medicine/device/vaccine/diagnostic.

Patient-Centric Innovations

Central to the success of clinical trials is the participation of patients, whose engagement and involvement are crucial for the timely completion of studies and the validation of therapeutic interventions. However, traditional recruitment methods often fall short in attracting diverse patient populations, particularly those from underserved communities or geographically remote areas. The concentration of trial sites in urban centres exacerbates this challenge, as patients from peripheral regions face barriers like travel distance, transportation costs, arranging for a caregiver to travel and/or stay with them and other logistical constraints.

Startups are slowly emerging as champions of patient-centricity, pioneering decentralised trial solutions that transcend geographic boundaries and empower patients to participate in research. Direct-to-patient shipment of investigational products, remote monitoring through wearable devices, and virtual consultations with healthcare providers are just a few examples of the innovative approaches that startups have accelerated to enhance patient access and engagement in clinical trials.

Democratising Access to Clinical Research

Startups have been instrumental in democratising access to clinical research by leveraging digital health technologies to reach populations traditionally

excluded from traditional trial sites. By harnessing the power of telemedicine, mobile health apps, and electronic informed consent platforms, startups are breaking down barriers to entry and expanding the pool of eligible participants, thereby ensuring greater diversity and representation in clinical trials.

Regulatory Support and Collaboration

However, startups' success hinges on a supportive regulatory environment that fosters innovation and facilitates rapid novel technology deployment. Regulatory bodies play a critical role in ensuring patient safety and data integrity while fostering an environment conducive to innovation and experimentation.

Collaboration between startups, industry stakeholders, and regulatory agencies is essential for addressing emerging technology's unique challenges and opportunities. By fostering a culture of collaboration and knowledge sharing, regulatory bodies can help startups navigate the complex regulatory landscape and accelerate the development and adoption of innovative solutions that transform clinical research practices.

Tech Advancements and Data Management

Startups prioritise patient-centricity, embrace and leverage decentralised trial methodologies, breaking down barriers to participation and democratising access to clinical research. One area where startups have demonstrated remarkable prowess is in leveraging artificial intelligence (AI) and machine learning (ML) to streamline various aspects of clinical trials. From optimising patient recruitment through predictive analytics to automating data collection and analysis, AI/ML solutions offer unprecedented opportunities to enhance efficiency, reduce costs, and improve data quality. By harnessing the power of these cutting-edge technologies, startups are at the forefront of transforming the clinical trial landscape, enabling faster and more accurate decision-making while minimising human error and bias.

Furthermore, startups are pioneering innovative approaches to data management and security, addressing the critical challenges of ensuring patient privacy and data integrity in an increasingly digitised research environment. By employing advanced encryption techniques, blockchain technologies, and secure cloud-based platforms, startups are paving the way for robust and compliant data management solutions that instill confidence in stakeholders and facilitate seamless collaboration across diverse research networks.

Cultural Shift and Patient Engagement

The impact of startups in the clinical trial space extends beyond technological innovations. These agile organisations are also challenging conventional wisdom and fostering a culture of continuous learning and improvement. Through their willingness to embrace unconventional methodologies, startups are driving a mindset shift within the industry, encouraging stakeholders to question long-held assumptions and embrace novel approaches that prioritise patient needs and accelerate the pace of scientific discovery.

Moreover, startups are actively engaging with patient advocacy groups and community organisations, fostering a collaborative ecosystem that empowers patients and amplifies their voices in the research process. By involving patients as active participants rather than mere subjects, startups are reshaping the clinical trial landscape, ensuring that research efforts are aligned with the needs and preferences of those they ultimately serve.

As the healthcare industry continues to evolve, the role of startups in transforming clinical research practices will become increasingly pivotal due to their agility, innovative mindset, and unwavering commitment to patient-centricity. These disruptive forces are poised to catalyse a paradigm shift that will redefine the boundaries of what is possible in the realm of clinical trials, ultimately paving the way for more efficient, inclusive, and impactful medical breakthroughs. BS

How Virtual Reality is Revolutionising Rehabilitation

« **Rajinish Menon,** CEO & Founder, Sukino Healthcare Solutions

Virtual Reality stands as a beacon of innovation in rehabilitation as its applications extend from neurological to addressing upper-extremity injuries and diseases. Future developments in this area suggest that virtual reality may play a significant role in rehabilitation therapy,

In 2018, diseases affecting the musculoskeletal system became the leading cause of outpatient rehabilitation forcing 74 per cent of women and 67 per cent of men in Germany to seek rehabilitation for upper extremity issues. This statistic underscores the critical role of rehabilitation in restoring the quality of life for individuals facing injuries and diseases in this domain.

Rehabilitation includes inpatient or outpatient interventions and subsequent services, making it a nuanced and long-term process. While, traditional rehabilitation includes physical therapy, psychological support, and activities like swimming or yoga; a new horizon has opened up for reshaping rehabilitation services, thanks to technology! At the forefront of this revolution is virtual reality (VR).

Virtual Reality in Rehabilitation

VR technologies create safe, interactive environments for human exploration and understanding. These environments prove especially beneficial for individuals with cognitive, behavioural, or motor disabilities. As a result, therapists, researchers, and engineers are collectively exploring the possibilities of virtual reality in the creation of rehabilitation tools and systems.

VR interventions go beyond the traditional bounds of rehabilitation, enabling patients to engage in goal-oriented activities within virtual environments. This becomes particularly crucial when dealing with upper-extremity dysfunctions resulting from injuries or diseases. Thus, the effectiveness of VR in neurorehabilitation has been extensively studied in conditions like cerebral palsy, stroke, etc.

Transforming Rehabilitation Landscape

VR offers a cost-effective alternative, allowing personalised treatment, fostering patient motivation, and improving compliance and functional recovery. Moreover, VR is commercially available and can be utilised for home-based rehabilitation, reducing the burden on healthcare professionals and providing patients with a tool for self-care.

As we delve into the possibilities, an exciting aspect emerges – integrating playful concepts with VR technologies. This entails presenting virtual environments on screens or through VR glasses, accompanied by auditory elements, mimicking the complexity of the real world. Combined with three-dimensional motion analysis, VR becomes a potent rehabilitation tool for the upper-extremity functions.

Rise of VR in Healthcare

The VR market in healthcare was valued at $628 million in 2022 and is projected to reach $6.2 billion by 2029, growing at a CAGR of 38.7 per cent. VR has become a key player in rehabilitation, offering advanced progress monitoring, controlled remote rehabilitation, and heightened patient motivation. Evidence supports the positive impact of VR-based programs like VirtualRehab, showing improvements in dynamic balance, static balance, fatigue scores, and anxiety levels.

Usability and Adoption

While VR programmes for rehabilitation show immense promise, challenges exist, especially concerning usability and adoption among elderly users. Addressing these issues, investments in usability testing methods such as cognitive walkthroughs and heuristic evaluations become crucial. Ensuring that VR programmes are user-friendly and cater to the specific needs of the elderly population will enhance their effectiveness and acceptance. BS

Merck Life Science enters into MoU with Amity University, Noida

Merck Life Science has announced the signing of a Memorandum of Understanding (MoU) with Amity University, Uttar Pradesh, Noida campus, envisioning significant collaborations between the organisation in Academics and Research. Under this MoU, 'Practical & Industry Oriented Certificate Courses' focusing on advanced instrumentation will be offered to the students with hands-on training opportunities. The objective behind this collaboration is to ensure that the students are industry-ready. The MoU was signed by Dhananjay Singh, Head, Science and Lab Solutions, India Commercials from Merck Life Science, and Prof. (Dr) R.K. Kapur and Dr W. Sevamurthy from the Amity University, Noida Campus, Uttar Pradesh.

Medisim VR and SRIHER ink MoU to establish cutting-edge VR skill training lab in Chennai

Medisim VR, a Chennai-based healthcare simulation startup, and Sri Ramachandra Institute of Higher Education and Research (SRIHER), have announced the signing of a Memorandum of Understanding (MoU) to establish a state-of-the-art virtual reality (VR) Skill Training Lab – Centre of Excellence on SRIHER's campus in Chennai. As a part of the collaboration, Medisim VR will establish an immersive and realistic skill training lab for medical students, nursing students, faculty, and allied healthcare professionals. The lab will offer advanced VR medical simulations, allowing users to practise medical procedures and develop critical clinical skills in a safe and controlled setting. The new lab is set to benefit students' career development and placement opportunities, as it equips them with hands-on experience, boosting their confidence and expertise in medical procedures. As a Centre of Excellence (CoE), the simulation lab will play a pivotal role in upskilling medical students, nursing students and healthcare professionals, as well as professionals from other medical colleges across Chennai.

UNICEF India, IIHMR Delhi & IIT-B jointly launch digital health course

United Nations International Children's Emergency Fund (UNICEF) India, the International Institute of Health Management Research (IIHMR) Delhi, and the Indian Institute of Technology Bombay (IIT-B) have jointly launched a comprehensive health course. The 'Digital Health Enterprise Planning Course' will equip healthcare professionals, including doctors, nurses, pharmacists, healthcare administrators, and allied health professionals with the skills to support the digital transformation of the healthcare sector. Policymakers, IT professionals, and individuals involved in healthcare technology implementation too can take the course. The course is a major step toward fulfilling UNICEF India's commitment to the Global Initiative on Digital Health (GIDH), launched during India's G20 Presidency in 2023. It aims to improve healthcare delivery by using digital technologies effectively, in line with the Sustainable Development Goals (SDGs) and the GIDH. The course is designed to address the growing demand for digital health education and to bridge the gap in training among healthcare professionals. The 10-week course includes nine modules and covers a range of topics crucial to digital health implementation.

Abhay Soi steps in as new President of NATHEALTH

NATHEALTH, the apex body representing the Indian healthcare industry, has announced Abhay Soi as its new President for FY24-25. Soi is the Promoter, Chairman and Managing Director of Max Healthcare Institute Limited (MHIL). Prior to the acquisition and merger with MHIL, Soi was the Promoter, Chairman and Managing Director of Radiant Life Care. Before Radiant, Soi co-founded Special Situations Private Equity Fund, where he made investments across sectors such as Mining, Financial Services, Agri-processing, Retail, Paper & Paperboards manufacturing, Textiles and Specialty Chemicals.

Soi takes charge from Dr Ashutosh Raghuvanshi, erstwhile President of NATHEALTH during FY23-24, and assumes responsibility for steering the organisation towards new horizons. This was announced in the recent Annual General Meeting post the 10th NATHEALTH Arogya Bharat Summit 2024.

Apollo Hospitals names Vishal Lathwal as CEO for homecare business

Apollo Hospitals, India's leading private hospital network with 71 owned and managed hospitals, has recently onboarded Vishal Lathwal as the Chief Executive Officer (CEO) for its homecare business. In his new role, Lathwal will be responsible for driving the company towards the next phase of growth, backed by his visionary approach to business, and an in-depth understanding of the home healthcare space. With over 15 years of professional experience spanning consulting, automobile, and healthcare sectors, Lathwal brings invaluable expertise in building and expanding direct-to-consumer (D2C) offerings. As a founding member of Max@Home, the homecare division of Max Healthcare, he played a pivotal role in establishing and elevating the brand to become one of the nation's largest providers. Drawing from this wealth of experience, he will play a crucial role in formulating and executing core business strategies at Apollo Home Healthcare. Being the youngest executive at this role in the company and a proven track record of strengthening market position and growth, Lathwal will cultivate relationships with key stakeholders, identify growth opportunities, and manage financial performance, whilst also ensuring the delivery of high-quality home healthcare services akin to the Apollo's ethos.

Lupin appoints Dr Ranjana Pathak as Chief Quality Officer

Global pharma major Lupin has announced the appointment of Dr Ranjana Pathak as Chief Quality Officer, succeeding Johnny Mikell who will be retiring from the services of the company. With over three decades of industry experience, Dr Ranjana brings a wealth of expertise and leadership and will oversee all aspects of quality and regulatory compliance for Lupin's global operations. Dr Ranjana's career includes serving as the Global Head for Quality and Pharmacovigilance at Dr. Reddy's.

Prior to this, she served as the President & Global Head of Quality, Medical Affairs and Pharmacovigilance at Cipla and has also held Global Quality and Compliance leadership positions at Watson/Actavis and Endo Pharmaceuticals in the US. Dr Ranjana has strong experience across generic and brand medicines across dosage platforms including injectables, inhalation products and biologics.

ABLE re-elects G S Krishnan as President for 2024-26

G S Krishnan, President of the Association of Biotechnology Led Enterprises (ABLE) has been re-elected for another two-year term from April 2024 - 2026, as the head of India's leading biotech industry organisation. Krishnan, with three decades of experience in the Bio Industrial sector, currently - Director, external stakeholder relations at Danish biotech company, Novonesis and Independent Consultant/ Advisor to various biotech

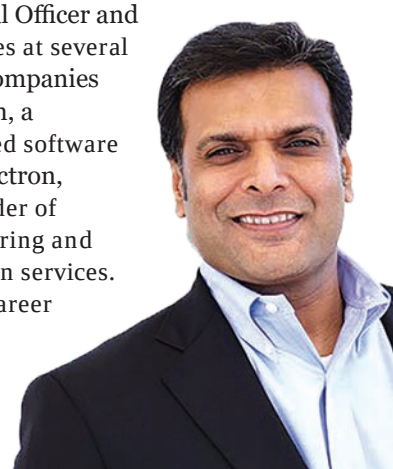
companies, assumed ABLE president's role in April 2021. Krishnan will head a 14-member governing body that is elected for a two -year term, during the recently held elections. The other office bearers will be: Vice President- Dr Deepanwita Chattopadhyay, Chairperson of IKP, Hyderabad; General Secretary- Dr Ezhil Subbian, co-founder and CEO, String Bio, Bengaluru and Treasurer- Ravi Bhola, senior Partner, K&S Partners, Bengaluru. Dr Kiran Mazumdar-Shaw, will continue as the association's honorary non-executive chairperson.

Alembic Pharma on boards Manish Kejriwal as Independent Director

Vadodara-based Alembic Pharmaceuticals has appointed Manish Kejriwal as an Independent Director of the company for the period of five consecutive years effective from March 31, 2024. Kejriwal brings over 30 years of experience in private equity investments and is currently the founder and Managing Partner of Kedaara Capital. Prior to founding Kedaara Capital, Kejriwal served as the head of the India office of Temasek Holdings, managing all investments and activities. He also held a prominent role as a Partner at McKinsey & Company, Inc., where he co-founded 'The Private Equity Practice' and authored influential reports such as the 'NASSCOM McKinsey reports'. Kejriwal currently serves on the boards of Bajaj Finserv, Bajaj Holdings Investment, various Kedaara investee companies, and K Raheja Corp Investment Managers. An active member of the Young Presidents' Organization (YPO) and a Young Global Leader (YGL) recognised by the World Economic Forum, Kejriwal is deeply involved in education initiatives, including the United World College movement and Ashoka University. He has authored articles on private equity in India, featured in leading publications, and is a sought-after speaker at conferences worldwide.

Bio-Rad appoints Roop K Lakkaraju as Executive Vice President & Chief Financial Officer

US-based Bio-Rad Laboratories, Inc., a global leader in life science research and clinical diagnostics products, has announced that Roop K. Lakkaraju will join the company as its new Executive Vice President and Chief Financial Officer, effective April 15, 2024. Lakkaraju joins Bio-Rad from Benchmark Electronics, a multi-national leader in electronics manufacturing services, where he served as Executive Vice President and Chief Financial Officer responsible for all finance-related functions supporting the company's global operations since 2018. Prior to Benchmark, he held Chief Financial Officer and senior operational roles at several large, multinational companies including Support.com, a provider of cloud-based software and services, and Solectron, a leading global provider of electronics manufacturing and integrated supply chain services. Lakkaraju began his career as an auditor with Grant Thornton and PricewaterhouseCoopers.



IIT-G & BioMed to roll out first recombinant vaccine for Swine Fever Virus

The Indian Institute of Technology Guwahati (IIT-G) has successfully transferred a pioneering vaccine technology to BioMed, a Ghaziabad-based manufacturing company specialising in high-quality vaccines. This technology entails a recombinant vector vaccine designed specifically for combating the classical swine fever virus in pigs and wild boars, filling a significant gap in India's vaccine landscape. This first recombinant virus-based vaccine for pigs harnesses a reverse genetic platform pioneered and refined at IIT-G. Swine fever, a highly contagious disease among pigs, poses a severe threat with a very high mortality rate, although it does not affect humans. In India, instances of this disease have been frequently observed in northeastern states, as well as in Bihar, Kerala, Punjab, Haryana, and Gujarat, among others. The vaccine work was started in 2018-2019 through collaborative efforts between researchers from the Department of Biosciences and Bioengineering at IIT Guwahati, and Assam Agricultural University in Guwahati. In an intriguing approach, researchers have utilised the Newcastle disease virus (NDV), traditionally studied for its pathogenicity in chickens, as a carrier for the essential proteins of the classical swine fever virus. This innovative method facilitates the development of immunity in the body and is characterised by its speed and cost-effectiveness.

Tailored solutions based on regenerative therapies to treat knee meniscus tears

Researchers from the Indian Institute of Technology Guwahati (IIT-G) in collaboration with the University of Animal and Fishery Sciences, Kolkata have formulated three ingenious treatment solutions for a certain type of knee injury that has historically proven difficult to treat. By developing these key regenerative therapies, the researchers have provided possible alternative solutions to manage the problem of a knee meniscus tear, an injury to tissue in one's knee joints. Out of the three, one is an injectable hydrogel, which can be injected in a minimally invasive manner directly into the meniscus site to expedite the healing of smaller injuries. When it comes to treating larger full thickness complex meniscus tissue injuries, the researchers have additionally created two 3D bio-printable inks that can be 3D printed into implants. In the two bioink formulations, one carries commercially available growth factor loaded microspheres while the second bioink carries patient derived factors which are released in a sustained manner aiding faster meniscus healing.

IIT Jodhpur develops framework for smartphones-assisted glucose testing device

A team of researchers at the Indian Institute of Technology (IIT) Jodhpur has created a unique system, where smartphones can be used to test glucose levels in patients to provide quick, and easy-to-access testing results. The entire system connects a paper-based analytical device to any smartphone using an Android app, which allows for the detection of the sample for glucose (with a concentration range of 10–40 mM). Paper-based analytical devices (PADs) are portable devices that have revolutionised point-of-need testing and can quickly assess biochemical samples. The device comes with a lab based functionalised biodegradable paper that alters its hue based on the level and amount of glucose present. By connecting it to a smartphone, the researchers have made the entire process of tracking glucose levels even faster and more personalised. This device is aimed to be developed for the personal use of the public. It can provide on-the-spot glucose testing results without requiring technical or sophisticated laboratory settings.

IISc designs tunable coloured films for use in smart sensors for healthcare

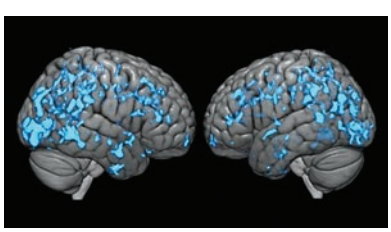
Researchers at the Indian Institute of Science (IISc), Bengaluru have developed flexible films that exhibit bright colours purely by virtue of their physical structure, without the need for any pigment. When stretched, the films exhibit a change in colour as a response to the mechanical deformation. To design these films, the team devised a novel cost-effective and scalable single-step technique that involves evaporating gallium metal to form nano-sized particles on a flexible substrate. Their method allows the simultaneous fabrication of multiple structural colours responsive to mechanical stimuli. The team has also shown how these films can be used for a variety of applications, from smart bandages and movement sensors to reflective displays. The team demonstrated one major application: a body movement sensor. A strip of the film, when attached to the finger, changed colour when the finger was bent, helping to sense movement in real time. Nature-inspired structurally coloured materials have found broad applications in displays, wearable electronics, visual sensors, and anti-counterfeiting tags. In recent years, scientists have been trying to design materials which can change colour in response to an external mechanical stimulus.

IIT-M brings India's most customisable, electric standing wheelchair

The Indian Institute of Technology Madras (IIT-M) has developed India's most customisable Electric Standing Wheelchair, which has been developed indigenously for the benefit of wheelchair users. NeoStand is a compact standing wheelchair with easy-to-use navigation for its motorised standing mechanism. At the touch of a button, wheelchair users can effortlessly transition from sitting to standing, opening a world of possibilities, be it engaging in eye-level conversations, reaching for a book, or simply enjoying a cup of coffee standing by a counter. The project development was led by Prof. Sujatha Srinivasan, Head, TTK Center for Rehabilitation Research and Device Development (R2D2), IIT-M, who also led the development of 'Arise,' India's first manual standing wheelchair, and NeoBolt, the country's first motorised add-on for wheelchairs. This device has been commercialised and is being taken to the market through NeoMotion, an IIT-M incubated startup.

Algorithm to encode brains of healthy humans and Parkinson's patients

Researchers at Indian Institute of Technology, Guwahati (IIT-G) have developed a novel algorithm, Unique Brain Network Identification Number (UBNIN), designed to encode the intricate brain networks of healthy humans and patients with Parkinson's disease (PD). This study involved analysis of structural brain MRI scans of 180 PD patients and 70 healthy individuals from National Institute of Mental Health and Neurosciences (NIMHANS), India. The researchers adopted a



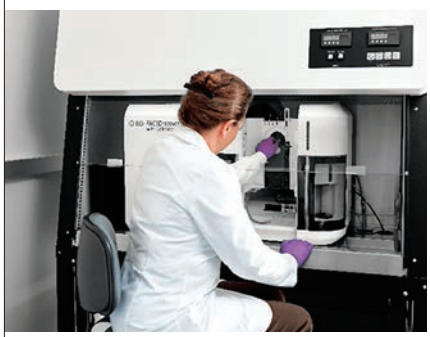
network perspective, representing different brain regions as nodes and establishing connection values of the network based on regional grey matter volume. Further, connection values for every node were weighted to capture the significance of each link by following a series of algorithmic steps. The hence obtained numerical representation (UBNIN) was observed to be distinct for each individual brain network, also applicable to other neuroimaging brain modalities. This innovative research holds immense potential in the realm of brain printing and emerges as a promising biomarker with numerical value for tracking mental illness progression over time.

Agilent launches new advanced dilution system to increase lab efficiency

US-based Agilent Technologies Inc. has announced the launch of the Advanced Dilution System, the ADS 2, a new automation workflow solution that will increase productivity, lower cost of ownership, and improve the overall efficiency within the laboratory. The Agilent ADS 2 is an intelligent autodilutor designed to enhance laboratory workflows. Designed to integrate seamlessly with Agilent autosamplers, ICP-OES and ICP-MS instruments and software, it offers a fully integrated, single-supplier automated solution. As one of the most trusted brands in the analytical instrumentation market, Agilent worked with a wide range of customers to address key barriers to autodilution adoption. The result is an easy to install, highly efficient and robust solution for production environments, utilising unique flow path technology to optimise the speed of analysis for both diluted and undiluted samples, and the same software as the instrument to ensure consistency and traceability in data handling and reporting.

BD increases access to cutting-edge image-enabled, spectral cell sorters

American firm BD (Becton, Dickinson and Company), a leading global medical technology company, has announced the global commercial release of new cell sorters that will enable more researchers in a broader range of fields, including cell biology, cancer research and immunology, to reveal insights that were previously invisible in traditional flow cytometry experiments. The new BD FACSDiscover S8 Cell Sorters feature BD CellView Image Technology, and BD SpectralFX Technology, bringing to market breakthrough innovations in real-time imaging and spectral flow cytometry. The three- and four-laser additions to the BD FACSDiscover S8 Cell Sorter family complement the five-laser instrument launched last year and provide scientists greater access, options, and flexibility to incorporate real-time imaging and spectral cell sorting technology in their labs. Using the FACSDiscover S8 Cell Sorters, researchers can confirm complex biological and spatial insights in real time, obtain individual cell images and isolate desired cells based on visual characteristics at high speeds, all within a simplified and easy to use workflow.

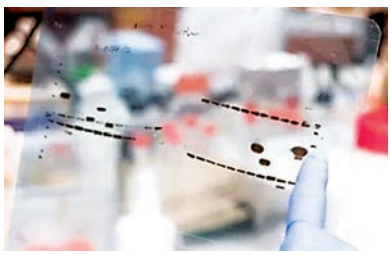


Takara Bio unveils NGS profiling system for oncology biomarker discovery

Takara Bio USA, Inc., a wholly owned subsidiary of Japan headquartered Takara Bio Inc., has announced the launch of the Shasta Single-Cell System, an automated, high-throughput next-generation sequencing (NGS) solution with well-validated chemistries and intuitive bioinformatics tools that enables novel biomarker discovery for oncology research. This complete system allows researchers to mine more genomic and transcriptomic information from many more cells than possible with current technologies, while saving time and costs for research groups. Existing whole-genome amplification (WGA) technologies currently process 96–384 single cells per plate; the Shasta system increases WGA throughput to 1,500 cells per run. With its total RNA-seq application, the Shasta system detects more RNA biotypes with high sensitivity at high throughput, up to 100,000 cells per run which is an improvement over both plate-based full-length RNA-seq and high-throughput mRNA-seq methods.

VFL Sciences offers chemiluminescent substrate GreatPrep EasyECL

Chennai-based VFL Sciences has announced the launch of GreatPrep EasyECL chemiluminescent substrate. This is the first reagent / kit for the Western Blotting applications from VFL Sciences. The company will be offering a range of products for Western Blotting under the brand name of "Great Prep". GreatPrep EasyECL is a one component kit for error free results. There are four



different variants- Basic, Ultra, Premium and Supreme, based on signal duration and signal intensity. These kits are custom manufactured in Italy for VFL Sciences. The kits offer detection level from mid picogram to low femtograms. VFL Sciences are focusing on becoming the experts in Western Blot applications. With the existing cooperation with UVITEC, the company offers chemiluminescence imaging systems and now with the GreatPrep range, it will offer the reagents and consumables needed for western blotting.

Waters streamlines and expedites PFAS testing with innovative Oasis Dual-Phase Cartridges

American firm Waters Corporation has announced new Oasis WAX/GCB and GCB/WAX for PFAS Analysis Cartridges with new design features that significantly streamline and expedite sample preparation and analysis of per- and polyfluoroalkyl substances (PFAS). To help ensure accuracy and further confidence in test results, Oasis WAX/GCB and GCB/WAX Cartridges are QC-tested by an accredited laboratory for low residual PFAS, to reduce or eliminate any time spent troubleshooting potential assay contamination. The cartridges combine the two clean-up steps required under the US Environmental Protection Agency's (EPA) Method 1633 for PFAS analysis – a Weak Anion-Exchange (WAX) cartridge and dispersive solid phase extraction (dSPE) graphitised carbon black (GCB). The cartridges are faster and easier to use than the traditional method of using WAX and loose GCB, reducing the preparation process by approximately 30 minutes per sample batch. This allows customers to eliminate additional manual steps in their workflow, including weighing out loose GCB, shaking, centrifugation, and filtration. Oasis WAX/GCB and GCB/WAX Cartridges are the latest products within a comprehensive portfolio of PFAS Testing Solutions offered by Waters to support the surging demand for PFAS environmental testing.

German firm Qiagen strengthens portfolio for cancer research

German firm Qiagen has announced a series of new products to further enhance cancer research as well as to enable urine collection and stabilisation as a new approach for liquid biopsy. These three new products, along with the IVD version of Qiagen's digital PCR platform QIAcuity, are set for launch in mid-2024. The QIAcuity dPCR PanCancer Kits will allow researchers using Qiagen's QIAcuity dPCR system to detect multiple EGFR and BRAF hallmark mutations at the same time and with high sensitivity. EGFR and BRAF are genes essential for normal cell growth and function, but mutations in these genes can result in cancer development. To advance research on how the immune system interacts with cancer, Qiagen has introduced the QIAseq Targeted RNA-seq Panel for T-cell receptors. T-cell receptors play a crucial role in the adaptive immune system, which is responsible for recognising and eliminating abnormal cells, such as cancer cells. Further, The PAXgene Urine Liquid Biopsy Set currently being developed by PreAnalytiX, a Qiagen and BD joint venture, will provide an easy-to-use, non-invasive sampling approach to liquid biopsy and address current preanalytical workflow gaps for cell-free DNA in urine (ucfDNA).

How Pharma's Leveraging AI-driven GCCs

Global capability centres, also known as GCCs, which are offshore units of multinational corporations that operate across the globe, are currently playing a crucial role in driving global business growth across industries. According to reports, India is home to more than 1,800 GCCs which employ over 1.3 million people. By 2030, the GCC market is estimated to exceed $100 billion, with 2500 GCCs across the country employing over 4.5 million people.

Cities like Bengaluru, Hyderabad, Delhi NCR, Mumbai, Pune and Chennai are the most popular destinations offering a conducive environment for GCCs in India. However, tier-II towns such as Visakhapatnam, Jaipur, Vadodara, Kochi, and Chandigarh are becoming equally popular. Data reveals that US-headquartered firms account for the majority of the operational GCC footprint in the top 6 cities of India, followed by European firms.

One of the key aspects of GCCs in India is the availability of a highly skilled workforce, as the country produces millions of graduates each year, trained across fields such as engineering, computer science, biotechnology and business management. Also, the cost of operating a capability centre in India is much lower than in developed countries, such as the US and the UK.

Focusing on the pharma sector, the GCC market has grown considerably in the last few years. These centres, also known as global in-house centres (GICs), cater to various functions such as clinical trials, drug safety, regulatory filings, and drug discovery for global pharma giants. For instance, French pharmaceutical giant Sanofi has established its GCCs in Hyderabad to play a pivotal role in driving innovation, research, and development in healthcare, leveraging Sanofi's extensive experience. Likewise, Swiss firm Novartis has a significant GCC presence in India with centres primarily located in Hyderabad and Bengaluru.

Another example is UK-based pharma company AstraZeneca which has over 3,100 employees across its innovation and technology centres in Chennai and Bengaluru which hosts 50 per cent of the company's technology operations.

Recently, Switzerland-headquartered Roche opened its digital centre at Pune that can accommodate nearly 1,300 professionals focused on developing cutting-edge solutions using the latest technologies, including data and analytics, cloud computing, AI and ML.

With AI adoption increasing within the pharma sector, companies are now tuning their respective GCCs to maximise the benefits of this technology. As a result, AI is predicted to disrupt and transform capability centres in the coming decades, and this calls for GCCs in India to position themselves as a model template for developing AI centres of excellence.

For instance, pharma GCCs can transform data into a strategic asset, making them more agile and competitive, with the help of AI. This technology can prove to be the ultimate problem-solving companion by creating a panacea through process automation, with AI-driven bots and algorithms adeptly handling repetitive and rule-based tasks. AI can minimize errors and accelerate operations, ushering in newfound efficiency, accuracy, and cost savings for the pharma GCCs. In addition, GCCs can utilise AI's pivotal role in enhancing customer support with AI-driven chatbots and virtual assistants responding instantly to customer inquiries, leading to elevated customer satisfaction and unwavering loyalty.

But this would require pharma GCCs to invest in developing a robust AI infrastructure to support the development and deployment of AI solutions at scale, responsibly and ethically. An equal focus would have to be on establishing a strong AI talent pool with a strong background of scientific knowledge of pharma R&D.

GCCs would also have to develop strong partnerships with startups, academia and IT experts to keep abreast of the latest AI upgrades, and to foster a culture of knowledge sharing and collaboration. Looking ahead, we expect AI-based GCCs for the Indian pharma sector to drive the next wave of global growth. BS

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