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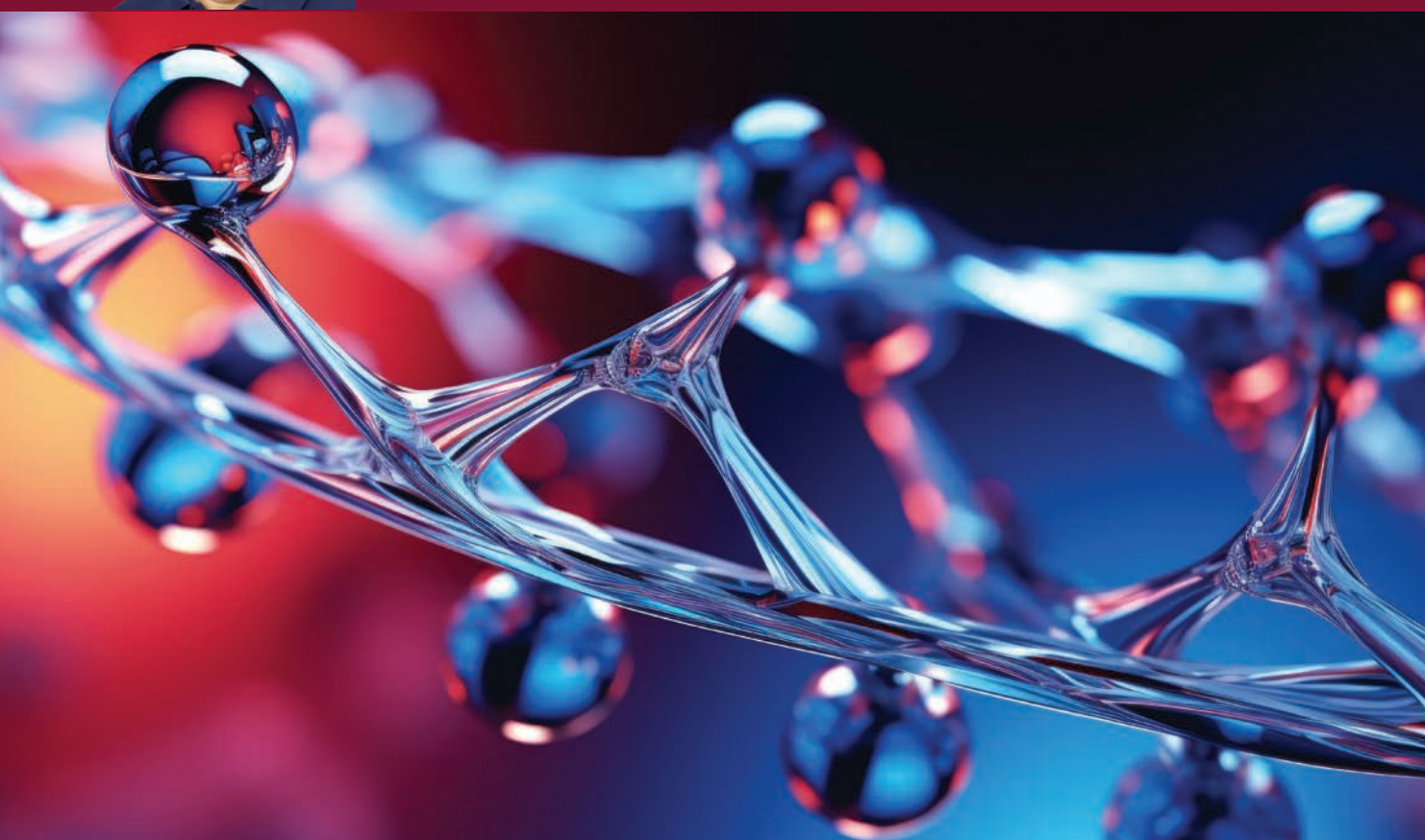
"Policy changes and the development of deep tech sectors are expected to stimulate domestic innovations and production"

– Prof. Ajay Sood, Principal Scientific Advisor to the Government of India



How **Deep Tech** is Powering India's Biopharma Future

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"It's imperative to manage indigenous production of drugs to reduce cost of therapies for rare diseases"

–Dr Meenakshi Bhat, Faculty, Centre for Human Genetics, Bengaluru

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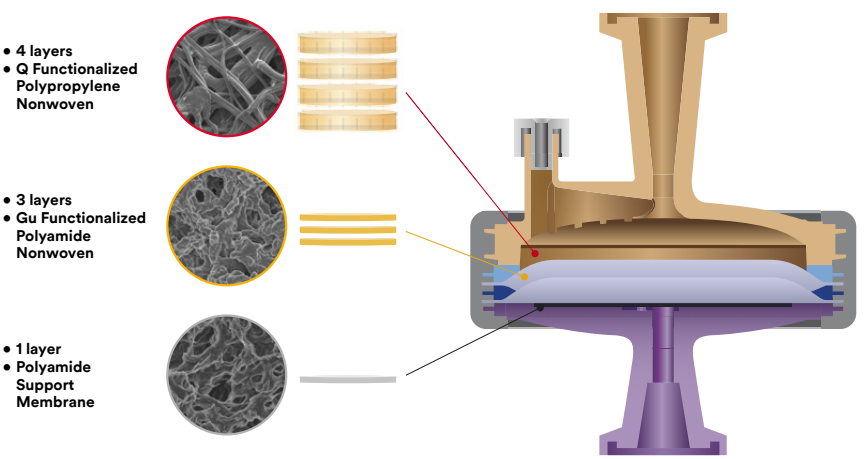

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Acknowledgement/ Feedback

Congratulations to BioSpectrum for putting up a wonderful programme with the first edition of BioStartups CEO and Founder Conclave 2024 in April.
- Dr Satya Dash, Berlin

India is a key innovator in the global scenario, and it is wonderful to see BioSpectrum playing a major role in highlighting the growth of the biotech startup ecosystem. **- Dr Renu Swarup,** New Delhi

Vertical investment is essential for cervical cancer screening in adult women.
- Dr Smita Joshi, Pune

Corrigendum

On page 29 of the May 2024 issue of BioSpectrum in an article titled "India Ramps Up HPV Vax Efforts" the photo of Dr Smita Joshi, preventive oncologist and programme director at Jehangir Clinical Development Centre, Pune was published incorrectly. Here is her photo. The inconvenience is regretted. **– Editor**

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Letter from Publisher

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

India's deep tech ecosystem is thriving, as evidenced by a multitude of startups that are committed to harnessing advanced technologies to create groundbreaking solutions. According to Startup India's database, there are 10,298 DPIIT (Department for Promotion of Industry and Internal Trade)--recognised startups classified across various sub-sectors within the larger deep tech space as of May 2023. Deep tech startups form a substantial portion of India's startup ecosystem, underscoring their notable presence and influence within the broader industry.

A majority of deep tech startups operate on a business-to-business (B2B) model, indicating their focus on serving enterprise clients and providing technology solutions tailored to specific industry needs. In the last decade, Indian deep tech startups have experienced remarkable growth, attracting significant funding and a surge in mergers and acquisitions, highlighting their strong potential and appeal to investors and larger companies. The deep tech startup landscape in India saw the addition of new ventures, bolstering the ecosystem and nurturing a dynamic entrepreneurial culture within the domain of advanced scientific development.

To support the growth of deep tech startups, the National Deep Tech Startup Policy (NDTSP) Consortium was formed and chaired by Prof. Ajay Kumar Sood, Principal Scientific Adviser to the Government of India has presented the Draft NDTSP on July 31, 2023. The policy has suggested nine necessary policy interventions namely Nurturing Research, Development & Innovation; Strengthening the Intellectual Property Regime; Facilitating Access to Funding; Enabling Shared Infrastructure and Resource Sharing; Creating Conducive Regulations, Standards, and Certifications; Attracting Human Resources & Initiating Capacity Building; Promoting Procurement & Adoption; Ensuring Policy & Program Interlinkages and Sustaining Deep Tech Startups.

We have covered an in-depth article titled 'How Deep Tech is Powering India's Biopharma Future' with inputs from venture capitalists, startups, policymakers, investors and solution providers and also covered an interview with Prof. Ajay Kumar Sood, Principal Scientific Adviser to the Government of India about the Draft National Deep Tech Startup Policy. He has shared his views about the tools needed to shape India's deep tech startup landscape, and the role NSTDP will play in enhancing the deep tech ecosystem.

India is also witnessing a rise in various animal diseases, which is driving the animal vaccine market. Increased awareness among livestock and pet owners about the importance of animal health, coupled with government initiatives promoting veterinary care, are also contributing to market growth. Furthermore, substantial R&D investments are propelling advancements in biotechnology, leading to the creation of more effective and safer animal vaccines. We have covered a story about how despite challenges, the animal vaccine industry in India is set for growth.

Besides, we have covered interaction with an expert on rare diseases who shared the ongoing translational research and ways and means of tackling rare diseases in the country.

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

Thanks & Regards,

Ravindra Boratkar,
Publisher & Managing Editor

COVER 18

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How Deep Tech is Powering India's Biopharma Future

Advancements in cutting-edge innovative technologies and the increasing availability of data have enabled various domains of the biotech and pharma industries to leverage resourceful approaches in driving progress, maintaining competitive advantage and accomplishing the ultimate goal of improved patient outcomes. Deep tech ventures, also referred to as hard tech as opposed to regular digital platforms, primarily focus on the fundamental core issues of a business. For India to become an 'innovation hub', with concerted transformative efforts of leaders and experts in life sciences, biotech, pharma, and healthcare, deep tech is pivotal. Experts opine that the next wave of startups from India, which is already gaining considerable traction, would be on deep tech and IP-based devices. Let's take a closer look at India's deep tech startup landscape and the vision of a successful deep tech ecosystem.

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"Policy changes and the development of deep tech sectors are expected to stimulate domestic innovations and production"

Prof. Ajay Sood,
Principal Scientific Advisor to the Government of India

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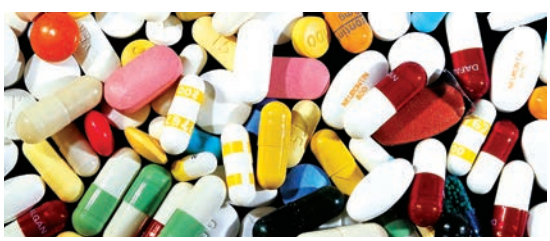
"India has the potential to emerge as a frontrunner in analytics, offering unparalleled solutions that outshine those of any other nation"

Jaswinder Chadha (Jassi),
President & CEO, Axtria Inc.

Animal Health

Speaking With



Top Video

How can artificial intelligence (AI) be leveraged to minimise burnout in the healthcare industry- Andy Ng, VP and MD for Asia Pacific and South Region at Veritas Technologies shares his perspective.

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Rajesh Kumar, Robotics & AI Architect at Addverb talks about the increasing use of collaborative robots or cobots in the healthcare settings.

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Regulars

A Doomed OTC Drugs Policy?

News reports in a section of the media indicate that a government-appointed committee is contemplating allowing the sale of commonly used drugs in general stores too. The committee, appointed by the Director General of Health Services (DGHS), will formulate a policy for over the counter (OTC) drugs.

The committee presented the list of the drugs that could be available OTC. As the prescription medicine list is available any medicine not included in this list is considered to be OTC.

During a recent meeting of the committee it was suggested by a member that the OTC type of medicine which are used commonly for cold, cough, painkillers, antacids etc. could be made available in general and grocery stores. The example of the US and some other countries is quoted to support the move since those countries allow sale of commonly used medicines in grocery stores. These countries also have an appropriate policy and guidelines for OTC medicines.

While allowing such a sale of OTC medicines in general stores, a lot of caution is required. A well-defined and strictly implemented policy and regulations will be needed. In this context, the example of e-pharmacies needs to be looked into. The Delhi High Court recently gave an ultimatum to the Union Health Ministry to frame a policy on online sale of medicines, within four months. The court also told the ministry that this will be the last opportunity to frame its final policy on the issue. The Centre had appointed an expert committee in 2015 to examine the issue. On the basis of the committee's report, the government came out with Draft Regulations in 2018. But, since then, there's been no progress.

While the e-pharmacy business is developing well, the regulations pertaining to it aren't still in place. In such a vacuum caused by lack of firm regulations misusers flourish taking disadvantage of the situation.

It is fine to allow people to buy OTC medicines from nearby grocery stores where residences are located far away from pharmacy stores. But that is not the case with any city in India, with an ever-increasing number of pharmacy stores at almost every nook and corner, at least in cities and towns. Data released by Uttar Pradesh's Food Safety and Drug Administration (FSDA) revealed that the number of drug stores saw a rise of 27 per cent from 2019 to 2022. Over 21,000 new retail chemist shops and over 16,000 wholesale pharmacies opened in UP during that period. The distance between two medical stores was less than 200 meters in several areas in Lucknow, the Lucknow Chemists' Association had noted in 2022.

The scenario in the country's largest state is no different than other states and cities and towns. One can find chemist shops at almost similar distances. Also, they remain open for more hours than grocery shops. Thus, the question is: 'do we really need to allow the sale of OTC drugs in grocery stores?'. The policy will have to deal with the issues like strict prevention of sale of medicines beyond expiry date and effective machinery to monitor it with firm actions in case of violations. Will the states' drug regulatory and controlling authorities be able to do that effectively is a question.

Providing all types of medicines through primary health centre is the right option. Another issue is how many villagers, semi educated and even illiterate in some cases, will be able to decide the medicine and its dosage due to lack of knowledge. They will have to depend on the local store owner for advise who may not give the right advice of dosage in an attempt to sell more pills or bottles. How could that be controlled?

Those who quote examples of the US and other countries should also remember that Sweden discontinued the practice of OTC medicine sale at the shops when cases of poisoning increased. Estonia has decided not to allow medicine sale in stores as the authorities feel that the people need pharmaceutical advice while buying medicines. Considering all these issues, is it really a great move? BS

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AFMS & ICMR join hands to undertake biomedical research for Armed Forces

Armed Forces Medical Services (AFMS) has signed a Memorandum of Understanding (MoU) for collaborative research and training with the Indian Council of Medical Research (ICMR). The MoU was signed by the Secretary, the Department of Health Research & Director General, ICMR Dr Rajiv Bahl, and Director General Armed Forces Medical Services Lt Gen Daljit Singh. The MoU aims to undertake cooperative and

collaborative activities, in the field of biomedical research and academics, which will address multidisciplinary scientific, technological and educational problems of relevance to the country and the Armed Forces. AFMS and ICMR have joined hands for health research in high altitude, battle-related trauma/ post-traumatic stress disorder, aerospace medicine, infectious diseases and other health issues faced by Armed Forces Personnel. Under the ambit of this MoU, various joint academic activities are also planned, including an opportunity for AFMS officers to register for PhD programmes.

India and New Zealand to have deeper collaboration in pharma

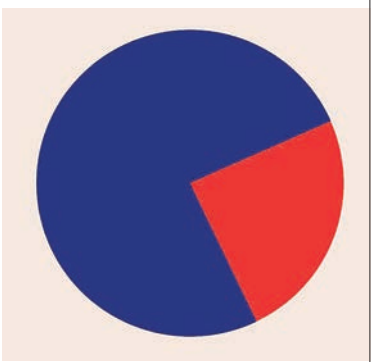
A delegation led by India's Commerce Secretary, Sunil Barthwal held several constructive and outcome-oriented meetings in New Zealand recently to work on ways to deepen the existing bilateral relations. These meetings were held with the Minister for Trade of New Zealand Todd McClay, Acting Chief Executive and Secretary of Foreign Affairs and Trade of New Zealand, Brook Barrington, at the India-New Zealand Business Council (INZBC) and the 11th India - New Zealand Joint Trade Committee (JTC) Meeting. Both sides discussed the establishment of robust bilateral economic dialogue architecture and the creation of working groups in sectors like Agriculture; Food Processing, Storage & Transportation; Forestry and Pharmaceuticals to facilitate ongoing collaboration on key trade and economic issues. Collaboration in the area of pharmaceuticals and medical devices sector was discussed at length, including the adoption of fast-tracking of regulatory processes and quality assessment of manufacturing facilities using, as appropriate, the inspection reports of comparable overseas regulators. Greater sourcing of medicines from India and cooperation in the medical device sector was also discussed.

DoP along with CII launches Meditech Stackathon 2024

Dr Arunish Chawla, Secretary, Department of Pharmaceuticals (DoP), Ministry of Chemicals and Fertilizers, has launched the Meditech Stackathon 2024 in collaboration with the Confederation of Indian Industry (CII). The Stackathon is a groundbreaking initiative designed to catalyse transformative change within India's burgeoning medtech sector by undertaking a comprehensive value chain analysis of select medical devices. Through close consultation with industry leaders, policymakers, and experts, the Stackathon aims to address critical challenges, foster domestic manufacturing, and reduce import dependence, thereby positioning India as a global leader in medical technology. The Stackathon would deliberate in eight focused groups namely Cancer Therapy, Imaging, Critical Care, Assistive Medical Devices, Body Implants, Surgical instruments and Hospital Equipment, Consumables & Disposables, and IVD Instruments and reagents, each tasked with specific objectives including segment-wise identification of important medical devices, assessment of import-export dynamics, examination of duty structures, and their implications across the entire value chain.

Bayer acquires remaining 25% stake in Bayer Zydus Pharma for full ownership

Bayer Pharmaceuticals and Zydus Lifesciences (formerly Cadila Healthcare) have announced the successful conclusion of their joint venture (JV) - Bayer Zydus Pharma Private Limited (BZPPL).



The 50:50 joint venture was established on January 28, 2011, for the sales and marketing of pharmaceutical products in India. Bayer is now securing full ownership of the entity, as per pre-agreed JV terms. The joint venture successfully leveraged the strengths of both companies to better serve the fast-growing Indian market. It combined Zydus's strong Indian marketing, sales expertise, wide distribution reach and rich industry network, with Bayer's global expertise in commercialising novel products and bringing in innovation to India. BZPPL made remarkable strides in various therapies including cardiovascular diseases, diabetes, women's health, ophthalmology and oncology.

NephroPlus raises Rs 850 Cr in Series F round from Quadria Capital

Quadria Capital, one of Asia's largest healthcare-focused private equity firms, has announced an investment of Rs 850 crore in Hyderabad-based NephroPlus, Asia's largest dialysis network. Through this transaction, Quadria will acquire a significant minority stake through a combination of a primary investment and the purchase of shares from existing shareholders.

The transaction will support NephroPlus in serving the growing demand for high quality, affordable dialysis services across India and other markets in Asia. Founded in 2010, NephroPlus is a uniquely positioned dialysis provider operating in sizeable, high-growth markets across Asia with dominant leadership in India and a fast-growing footprint in the Philippines and other Asian countries. The company serves patients across dialysis centres in marquee hospitals and at standalone clinics, working with leading nephrologists. NephroPlus also delivers care through public-private partnerships in both urban and rural areas. Demand for dialysis services in the company's target markets is expected to grow at a rate of over 11 per cent annually over the next five years. Specialised chains such as NephroPlus are expected to gain market share as hospitals increasingly outsource dialysis operations and as governments seek to make high-quality dialysis services more accessible.

KKR buys Healthium Medtech from Apax Funds

KKR, a leading global investment firm, has announced the signing of definitive agreements under which funds managed by KKR will acquire Bengaluru-based Healthium Medtech, a leading Indian medical devices company, from an affiliate of Funds advised by Apax Partners LLP, a leading global private equity advisory firm. The acquisition will be made by a special purpose vehicle owned by KKR-managed funds which will acquire a controlling interest in Healthium group, including Healthium. Founded in India in 1992, Healthium is a medical devices company that develops, manufactures and sells a broad range of surgical products globally. Its comprehensive, high-quality portfolio caters to a wide spectrum of surgeons' needs, offering wound closure, arthroscopy, and advanced wound closure products. The Apax Funds acquired Healthium in 2018 and transformed the company from a domestic suture player into a global medical devices leader. KKR makes its investment from its Asian Fund IV. Healthium marks KKR's latest investment in the healthcare sector in India and Asia Pacific.

Apollo HealthCo raises Rs 2475 Cr from Advent International

Apollo HealthCo, a subsidiary of Apollo Hospitals Enterprise Limited (AHEL) and manages Apollo 24/7 vertical has entered into a binding agreement to raise equity capital of Rs 2,475 crore from Advent International, one of the world's largest and most experienced global private equity investors. In addition, Apollo 24|7 has entered into a framework agreement to integrate 100 per cent of Keimed, India's leading wholesale pharma distributor, in a phased manner over the next 24-30 months. Advent shall invest in compulsory convertible instruments over 2 tranches to secure 12.1 per cent stake in the merged entity, by valuing the combined entity at an enterprise value of Rs 22,481 crore. Apollo 24|7 is valued at an enterprise value of Rs 14,478 crore. Keimed is valued at an enterprise value of Rs 8,003 crore and pursuant to merger, Keimed shareholders would hold a maximum of 25.7 per cent stake in the combined entity, while AHEL would continue to remain the largest controlling shareholder with at least 59.2 per cent stake.

ChrysCapital invests ~$70M in La Renon Healthcare

ChrysCapital, one of the leading private equity funds investing in India, is investing ~$70 million in Ahmedabad-based La Renon Healthcare. La Renon, founded in 2007, carved its niche in the market with a unique approach towards chronic disease management and broke into the top 25 within just 16 years of its inception. Currently ranked number 24 in the Indian pharmaceutical market, La Renon Healthcare has been the fastest-growing domestic formulations company with a ~67 per cent CAGR in revenue and ~90 per cent CAGR at EBITDA since inception. ChrysCapital has made 14 investments in the sector over the last two decades, each returning stellar returns for the group. In its most recent exit, it generated over 3.5x returns after exiting from Mankind after holding it for about 5 years.

Maiva Pharma secures Rs 1,000 Cr from Morgan Stanley and India Life Sciences Fund

Maiva Pharma, a Bangalore-based Contract Development and Manufacturing Organisation (CDMO), has announced a significant milestone in its growth journey. The company has successfully raised approximately Rs 1,000 crore in primary and secondary funding from a fund managed by Morgan Stanley Private Equity Asia and India Life Sciences Fund - IV (ILSF - IV). This investment marks Maiva's first private equity fundraise and signals a significant move in the healthcare investment landscape. The funding has been utilised to acquire a controlling stake from existing investors and to infuse primary capital into the company. Maiva Pharma plans to allocate the proceeds towards the establishment of a new manufacturing facility near Hosur. This facility will boast capabilities in sterile dosage forms, including pre-filled syringes, bags, oncology, and hormonal injectables, thus expanding the company's production capacity and enhancing its product portfolio. Avendus, a leading financial advisory firm, facilitated the transaction as the exclusive financial advisor to Maiva and its shareholders.

SII partners with ImmunityBio for global supply of BCG

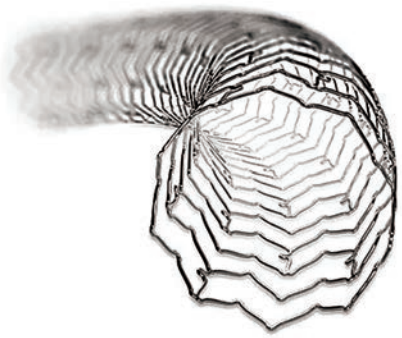
US-based ImmunityBio, Inc. has signed an exclusive global arrangement with the Serum Institute of India (SII), to supply ImmunityBio with Bacillus Calmette-Guerin (BCG). The agreement covers the manufacturing of standard BCG (sBCG) that is currently approved for use outside the US, as well as a next-generation recombinant BCG (iBCG) undergoing testing, intended for use in combination with ImmunityBio's ANKTIVA for currently approved and potential future indications, subject to regulatory approvals. The arrangement will result in additional supplies of the current standard sBCG immediately for trials. At the same time, the two companies will work to accelerate the ongoing Phase 2 clinical trials of iBCG currently being conducted in Europe which has so far demonstrated a safety advantage over standard BCG as well as enhanced immunogenicity in driving both CD8+ and CD4 T cells. The collaboration between SII and ImmunityBio comes on the heels of the US FDA's approval of ANKTIVA for the treatment of non-muscle invasive bladder cancer with carcinoma in situ (CIS). Increasing the available supply of BCG is intended to address shortages for the combination therapy with ANKTIVA.

Sanofi launches diabetes drug Soliqua in India

Sanofi India has launched its new diabetes drug Soliqua after having received marketing authorisation from the Central Drugs Standard Control Organisation (CDSCO) earlier last year. Soliqua is indicated as a treatment in adults with obesity and type 2 diabetes mellitus, to improve glycemic control as an adjunct to diet and exercise, in those who are insufficiently controlled on oral or injectable therapies. Soliqua is a once-daily injectable combination drug containing insulin glargine 100 units/ml, which is a long-acting basal insulin and lixisenatide, a GLP-1 receptor agonist. This global innovation is now accessible at a nominal therapy cost of Rs 1850 per pen, enabling wider access to patients living with type 2 diabetes mellitus.

SMT, HeartX partner to expand product offerings for Congenital Heart Defect

Surat-based medical device company Sahajanand Medical Technologies (SMT), has announced a strategic partnership with HeartX, a medtech company focused on research and development. Through this collaboration, SMT gains an innovative product line in the Congenital Heart Defect space. This collaboration not only broadens SMT's advanced product offerings within the Congenital Heart Defect space but also marks a significant stride toward revolutionising healthcare on a global scale. HeartX's portfolio includes advanced products like the JOVE VB Stent for Sinus Venous ASD, JOVE Versatile ASD (VASO), Fenestrated VASO and JOVE PFO, with ongoing developments in PDA and VSD closures as well as advanced visualisation systems for structural interventions. The collaboration between SMT and HeartX aims to address gaps in current medical procedures by prioritising simplicity, efficiency, and cost reduction. By leveraging SMT's global reach and regulatory expertise, HeartX's innovative products will be made more accessible to patients worldwide.



Abbott unveils Next-Gen XIENCE Sierra stent in India

Abbott, a global healthcare company, has announced the launch of XIENCE Sierra Everolimus (drug) Eluting Coronary Stent System in India. XIENCE Sierra is one of the latest generation stents in the XIENCE family, now available to people suffering from blocked coronary arteries. For interventional cardiologists, it brings unparalleled safety to the most complex cases. The company has developed several tools and devices that have improved the angioplasty procedure over the years. Percutaneous coronary intervention (PCI), also called coronary angioplasty, is a nonsurgical, minimally invasive procedure that improves blood flow to the heart. Physicians use PCI to open blood vessels in the heart that are narrowed or blocked by plaque. Often, a small mesh tube called a stent is placed to keep the artery open. XIENCE is one of the most-used drug-eluting stents in the world. XIENCE Sierra improves upon previous versions of XIENCE with an enhanced stent design, a new delivery system, and unique sizes to help doctors treat challenging cases. XIENCE Sierra has the same highly specialised coating that lowers the likelihood of the artery becoming re-blocked, as found in other XIENCE stents.

Neuberg Diagnostics forms JV with Sehgal Path Lab

Neuberg Diagnostics, one of the top 4 pathology laboratory chains in India, with more than 200 labs and 2000+ collection centres and having a presence in India, South Africa, UAE, and the USA, has joined forces with Sehgal Path Lab in a strategic joint venture aimed at enhancing the Haemato-Oncology segment. Sehgal Path Lab has garnered acclaim for its services in the field of haematology. The collaboration will see Sehgal Path Lab rebranded as Neuberg Sehgal Path Lab soon, aligning with Neuberg's commitment to delivering superior diagnostic solutions. Dr Kunal Sehgal, a nationally acclaimed haematopathologist, will continue to lead as the Managing Director and Chief Pathologist of the joint venture (JV). Dr Sehgal's expertise and leadership will be instrumental in driving the expansion of the laboratory into a Global Centre of Excellence for the Haemato-Oncology segment, with a specific focus on Flow Cytometry Assays, Bone Marrow examination and developing a Myeloma Speciality Laboratory.

Strand Life Sciences announces launch of prenatal genomic diagnostics portfolio

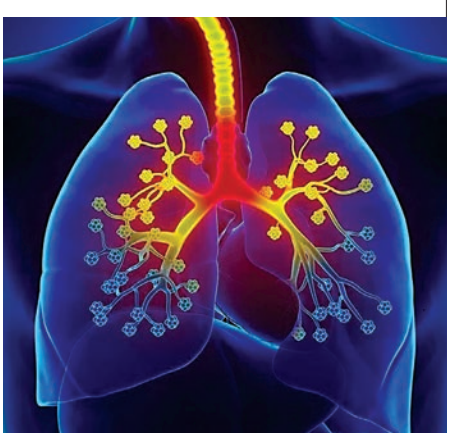
Bengaluru-based Strand Life Sciences has announced the launch of its prenatal screening and diagnostics portfolio with two breakthrough developments - CNSeq (sequencing-based identification of aneuploidies and copy number variations) and MaatriSeq (Non-Invasive Prenatal Screening). CNSeq brings the latest Next Generation Sequencing technology to an important prenatal test marking a significant leap forward in prenatal diagnostics. Leveraging proprietary software, CNSeq delivers unmatched precision in identifying Copy Number Variations (CNVs), outperforming traditional cytogenetic and molecular techniques. On the other hand, MaatriSeq is the first Non-Invasive Prenatal Screening (NIPS) solution validated on the latest high-throughput Illumina NovaSeq X Plus sequencing platform. This breakthrough offers a highly accurate and cost-effective solution, accessible to a wider community in India.

Beurer GmbH announces expansion plans in India

Beurer India, a subsidiary of Germany-based Beurer GmbH, a global leader in health and wellness technology, has announced its expansion plans in India for the next one year. The company would be launching a Blood Glucose Monitor Device by September / October this year which would be Made in India and would aim at transforming diabetes management in the country. As part of its expansion strategy, Beurer India is intensifying its make in India programme to tailor its health monitoring devices to the needs of the Indian market which would come with precision. The company plans to roll out several initiatives aimed at educating the public about the importance of regular health monitoring and how Beurer's products can aid in this process. These initiatives will include community outreach programmes, health camps, and collaboration with healthcare professionals and institutions to provide training and support on using these innovative Beurer products.

Alkem collaborates with 100 hospitals in Tier-1 & 2 cities for asthma management

Mumbai-based Alkem Laboratories has announced 600 to 700 camps across India, collaborating with nearly 100 hospitals in tier-1 and tier-2 cities under its 'Reliever Free India; initiative. This nationwide initiative was launched in 2023 with an aim to revolutionise asthma management by advocating for a shift in focus from reliance on reliever medications to the importance of controller medications. Reliever medications provide quick relief during asthma symptoms by opening up the airways. Controller medications are taken regularly to prevent asthma symptoms and reduce inflammation in the airways. After a successful first year, Alkem is intensifying the campaign in its second year. Asthma affects a staggering 262 million people globally, causing recurrent episodes of wheezing, breathlessness, chest tightness, and coughing. Through this campaign, Alkem Laboratories seeks to educate patients, healthcare professionals, and the general public about the benefits of controller medications in preventing asthma symptoms and reducing the need for rescue medication.



Omron Healthcare collaborates with AliveCor to improve heart healthcare in India

Omron Healthcare India, the Indian arm of the Japanese global leader in medical equipment for home health monitoring and treatment, has announced its collaboration with AliveCor India, the Indian subsidiary of the global leader in US FDA-cleared, CE marked and CDSCO approved personal electrocardiogram (ECG) technology. With this partnership, Omron Healthcare India now offers artificial intelligence (AI)-based handheld ECG technology besides being a top blood pressure monitor player in India. This collaboration, marking a significant milestone in Omron's "Going for Zero" vision to enhance cardiovascular health awareness and prevent incidents, brings forth devices including the first home BPM+ECG Monitoring FDA cleared Device (blood pressure monitor with AliveCor ECG capability in a single device) for early CVD (CardioVascular Disease) detection and management and AliveCor's FDA-cleared world's most clinically-validated and pocket-sized personal ECGs. These devices instantly detect various arrhythmias, including atrial fibrillation (Afib), bradycardia, tachycardia, and more.

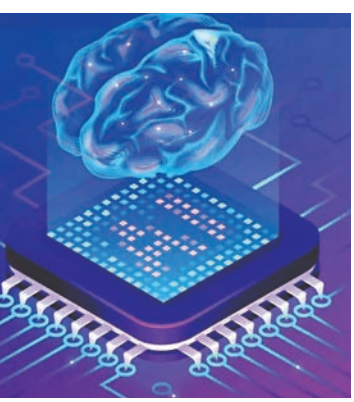
neuro42 secures investment from Karna Shinde

In a recent announcement, US-based medtech startup neuro42 has secured undisclosed investments from investor, Karna D Shinde. This is Karna's third round of investment in the company. neuro42, a game-changer technology in neurosurgery, recently received US FDA clearance for its innovative diagnostic MRI product. The 510(k) clearance, received in February 2024, marks a significant milestone for neuro42 and sets the stage for commercialising its cutting-edge diagnostic MRI machine later this

year. neuro42's portable MRI is designed to specialise in imaging the brain and head, focusing on MR-guided interventions. One of the primary drivers of innovation at neuro42 is its ability to amplify the capabilities of neurosurgeons, particularly in complex and time-sensitive procedures such as the treatment of brain tumours and epilepsy. The commercialisation of neuro42's MRI and robotic platform is expected to have far-reaching implications in neurosurgery, offering new possibilities for enhancing targeted treatment planning and patient care. As the startup prepares to launch its product later this year, anticipation is high within the medical community for the transformative potential of neuro42's advanced neuroimaging solutions.

Endimension Technology raises Rs 6 Cr

Endimension Technology, a Mumbai-based healthcare AI startup, has raised Rs 6 crore in a Pre-Series A round led by Inflection Point Ventures. Other investors in this round include Sucseed Indovation, SINE IIT Bombay and individual angel investors. Endimension Technology, incubated at IIT Bombay, is driven by the vision to harness artificial intelligence (AI) technology in radiology, ensuring early and precise diagnosis for patients globally. The funds will be utilised to fuel AI research and development, team expansion, and software enhancement. These strategic investments aim to bolster their market position, accelerate growth, and establish Endimension as an industry leader. The Indian radio-diagnosis market, growing at a CAGR of 15 per cent over the last decade, has got a lot of focus on equipment and infrastructure. The understated need is that of qualified professionals, i.e. radiologists, to manage this burgeoning demand. There has been growth across tier 1, 2 & 3 for equipment but the availability and prohibitive costs of trained radiologists exacerbate the problem of demand outstripping supply. Endimension focuses on leveraging AI to facilitate faster assessment and diagnosis, employing generative AI to streamline report generation and reduce the time required by radiologists.



Young Entrepreneurs Association launches Rs 50 Cr fund for Indian startups

The Young Entrepreneurs Association (YEA) and Magnifiq Capital Trust have partnered with Dr A Velumani to invest upto Rs 50 crore in Indian startups, handpicked and mentored by the latter. Dr Velumani, creator of Thyrocare, as jury and investor in StartUp Tamizha, brings his vast experience and expertise as he plans to select, invest and guide the young companies with the potential to scale. The announcement was made at YEA's Annual General Meeting held recently in Hyderabad, and reflects the organisation's ongoing effort to drive advancements in the startup ecosystem. Seed-stage companies innovating in these fields are encouraged to apply. The application process involves a detailed proposal submission, where the applicants will undergo a thorough review, ensuring a fair and insightful selection process for prospective recipients. YEA's history includes impactful investments in unlisted IPO shares in startups like Bira and Boat, and the association continues to provide one-on-one mentorship from YEA's members, many of whom are first and second-generation entrepreneurs.

HCG Founder Dr Ajaikumar launches Inviga Healthcare Private Equity Fund

Dr B S Ajaikumar, Doctorpreneur, Founder and Executive Chairman of HealthCare Global Enterprises Ltd (HCG), has announced the launch of Inviga Healthcare Fund (IHF), a thematic healthcare-focused private equity fund headquartered in Bengaluru. Co-founded by Ajay Garg, Founder and Managing Director of Equirus Capital, IHF marks a significant step towards revolutionising the Indian healthcare landscape by enhancing accessibility, affordability and quality of healthcare for all sections of society. Having secured an initial close of $20 million, the fund is poised to empower entrepreneurs and drive meaningful change across the entire Indian healthcare value chain. In its maiden investment, the Bengaluru-based Inviga Healthcare Fund has announced support for Mynvax, a biotech startup focused on developing novel recombinant vaccines for human respiratory viral diseases, including seasonal influenza and COVID-19. Mynvax is co-founded by Prof. Raghavan Varadarajan and Dr Gautham Nadig, Professor and alumnus respectively of the Molecular Biophysics Unit at the Indian Institute of Science.

C-CAMP, BFI to focus on key emerging healthcare solutions

Bengaluru-based Centre for Cellular and Molecular Platforms (C-CAMP), has signed a Memorandum of Understanding (MoU) with Blockchain for Impact (BFI), a philanthropic organisation, to join the BFI-Biome Virtual Network, a catalyst, that will nurture cutting-edge biomedical science and innovation and accelerate the impact of transformative scientific advances in moving the needle for key healthcare challenges in India. With the support of BFI, C-CAMP plans to jumpstart the last-mile sprint to commercialisation of these important emerging solutions by providing access to more state-of-the-art infrastructure, regulatory networks, funding and scale-up opportunities. BFI will allocate over $200,000 over three years, leveraging C-CAMP's expertise to develop essential programmes for healthcare-based startups. C-CAMP being an organisation to foster deep science research and innovation for societal impact, the goals and mandates of both partners naturally align and complement each other. The partnership is expected to blur disciplinary boundaries in approaching biotech R&D, promote cross-integration of expertise and infrastructure, and provide multidisciplinary insights into need identification, problem-solving and solution implementation.

Ultrahuman to manufacture smart rings in US

With smart ring market leadership within its sights, Bengaluru-based startup Ultrahuman has announced plans to open a manufacturing facility poised to accelerate its production capacity. The UltraFactory will be located in Indiana, US. It opens within the next six months and will be the launchpad for Ultrahuman's next phase of growth. The UltraFactory will offer an end-to-end production capability and is based on the company's first operational model of such a facility in India. This development comes hot on the heels of a $35 million fresh investment in the company (series B funding round) and reaffirms Ultrahuman's ambition to become the market leader in the smart ring space in the next 12 to 15 months. The company has already seen phenomenal growth over the past year, becoming the second-largest player in the smart ring market while maintaining profitability. The opening of the new UltraFactory, will add a production capacity of 200,000 smart rings and present an additional $100 million revenue opportunity annually. This is a push towards establishing smart ring market leadership in the US.

How Deep Tech is Powering India's Biopharma Future

Advancements in cutting-edge innovative technologies and the increasing availability of data have enabled various domains of the biotech and pharma industries to leverage resourceful approaches in driving progress, maintaining competitive advantage and accomplishing the ultimate goal of improved patient outcomes. Deep tech ventures, also referred to as hard tech as opposed to regular digital platforms, primarily focus on the fundamental core issues of a business. For India to become an 'innovation hub', with concerted transformative efforts of leaders and experts in life sciences, biotech, pharma, and healthcare, deep tech is pivotal. Experts opine that the next wave of startups from India, which is already gaining considerable traction, would be on deep tech and IP-based devices. Let's take a closer look at India's deep tech startup landscape and the vision of a successful deep tech ecosystem.

Scientists and industry experts define deep tech ventures as those startups or companies that expressly work on innovations that are based on existing substantial scientific, technological, or engineering discoveries and breakthroughs. Deep tech startups operate around the idea of providing palpable solutions to complex problems in existing health solutions, as well as in business models and operations, to pave the way not only for improved products and innovative scientific methodologies but also bring about large organisational changes in the pharma and healthcare sectors.

Industry leaders also delve deeper into describing deep tech ventures as those that work to identify certain physical constraints of industries that have 'not been solved for decades' and then focus on developing/improving the physical product(s) using big data and digital platforms based on advanced technologies. It seems like a consensus among industry players operating at various levels that even though the proportion of deep tech startups among new businesses may be lower, their impact will tend to be noteworthy, as their science and business models, harbouring a forward-looking objective, could help to tackle big problems. The speedy growth and evolution of computational approaches, systems biology, Artificial Intelligence (AI), quantum computing, etc., combined with ease of access to computing and the trend shifting towards data-driven science, are paving the way to overcome barriers to scientific innovation. This seems to have set the stage for the establishment and development of diverse deep tech startup ventures in India.

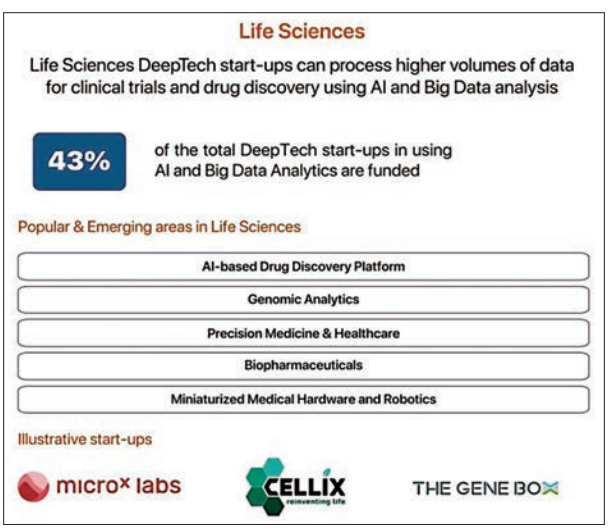
According to the India Deep Science Tech analysis report published by Ankur Capital & Tech Sprouts, 'it is the right time to build in India for the world – With its efficient capital use, competitive talent pool, and large domestic markets, India offers an ideal ecosystem for developing and scaling deep science tech solutions'. As per a 2021 report published by Nasscom, India is home to over 3000 deep tech startups, which make up 12 per cent of the Indian startup ecosystem. This is a rapidly growing sector with a 53 per cent CAGR over the last decade. Approximately $2.7 billion in funding was raised by the deep tech startup ecosystem in 2021, and over 30 mergers and acquisitions in this space occurred in 2021 alone.

There are multiple areas within the life sciences sector where India is seeing the emergence and growth of deep tech ventures. Experts weigh in that the nascent drug discovery ecosystem in India has the potential to take huge strides by leveraging AI, where the ultimate gains are in the form of significantly reduced costs and timelines for a potentially superior product delivered. A recently published analysis by Loestro Advisors opines that such advances help in 'leveling the playing field from a resources standpoint and enable smaller, under-resourced players to pursue cutting edge scientific innovation'. While the use of AI for drug discovery is becoming increasingly popular within this niche, other areas of focus include immunotherapies (like CAR-T), novel therapeutics (like CRISPR, stem cells), genomics and proteomics, novel drug delivery systems, small and large molecule therapeutics (biologics, peptides).

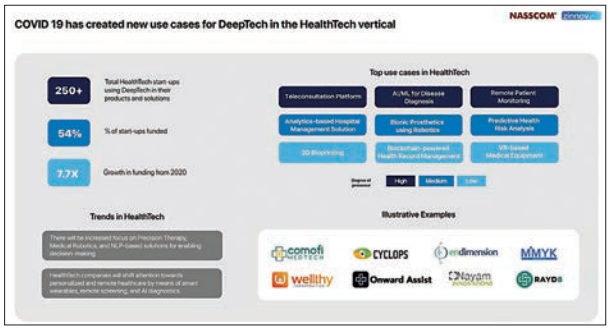
Trending areas

According to Ankur Capital report, the Indian deep science AI companies have predominantly focused on spectral image and genomic data analysis for applications ranging from diagnostics to robots. India's biotechnology sector has seen a significant rise in investments following COVID-19. The data from the report states that nearly $900 million was allocated between 2013 and 2023, driven by a focus on therapeutics, diagnostics, and sustainable agri-food technologies. Key investments include Molbio Diagnostics and Bugworks.

Multiple reports by industry experts and researchers in the past few years demonstrate that in the life sciences sector, deep tech is being utilised in several areas like computational pharmacology, in silico clinical trials, synthetic biology, synthetic data, generative AI, genomics and multi-omics-powered targeted therapeutics, nanomedicine, blockchain technologies. Additional fields being cited as a part of deep technology by experts also include robotics, quantum computing, and 3D printing. There has been an upward trend in R&D-intensive sectors. While other technologies have been coming up at significant pace and depth, AI stands out as the consistent facilitating technology of the last decade.



Source:Zinnov CoNXT Research & Analysis, from NASSCOM 2022 report



Source:Zinnov CoNXT Research & Analysis, from NASSCOM 2022 report

From the perspective of funding priorities, trends in deep tech ventures are being shaped overall, in India as well as globally. Sharing his insights, Dr Amandeep Singh, Project Lead, MP Advisors, San Francisco, California said, "Given that the macroeconomic conditions are not very favourable, VCs are focused on some subcategories of life sciences deep tech that either have less regulatory challenges, give a chance for early cash flow, or address a very large challenge. In the areas of personalised medicine and diagnostics, OMIC technologies are becoming crucial as the drugs become increasingly specific. Deep tech technologies that aid in diagnosis are hot in space. In the pharma sector, antibody and protein engineering fields saw the highest funding in 2023. This is directly related to synthetic biology and drug discovery field, with impact going beyond biopharma to agro-industry, industrial enzymes, food industry and more."

Data-centric startups that are building proprietary niche biology datasets, like pathology-EHR-Claims linked datasets for a particular disease area and companies that are building deep tech driven robotics to automate biopharma R&D are also some of the dominating trends in the deep-tech ventures.

He further added that in the healthcare space, the focus will be on aspects like workflow automation and remote patient monitoring utilising AI health chatbots, sensor-based detection of disease progression using AI, etc. where technologies that improve back-end processes like patient intake, triaging, and summarising patient history, etc. to give back the time to doctors.

Startups in India - a glance

Several deep tech startups in India in the life sciences space are showing promising growth trajectories. ImmunoACT, an IIT Bombay spin-off company, incubated at SINE is focussed on driving India's first CAR-T cell therapy 'NexCAR19', which is a recent success story stemming from a deep science venture. 'Eyestem', a C-CAMP incubatee, is working on scalable cell replacement therapies

in ophthalmology. C-CAMP, one of the largest innovation centre and incubator for startups in India, is home to seven such deep tech startups that have been making significant strides in their respective areas.

Achira, a Bengaluru-based medical technology company, focuses on developing innovative, point-of-care (PoC) testing solutions. Achira has developed its proprietary lab-on-chip platform to perform rapid, multiplexed assays. Bugworks, a C-CAMP resident incubatee, aims to discover novel biopharmaceutical assets for treating antibiotic-resistant bacterial infections and oncology solutions using a systems biology approach.

String Bio, another Bengaluru-based company, has developed a platform - SIMP (String integrated methane platform) – to deliver methane from wastes and natural resources using engineered microorganisms. Pandorum Technologies Pvt Ltd develops platforms to manufacture personalised 'homo-chippiens' and human organs on demand. CogniAble, supported by the Division of Electronics Engineering and Computer Science (EECS) at the Indian Institute of Sciences, Bangalore, was founded by researchers and scientists from the Indian Institute of Technology Delhi along with paediatricians, psychologists, and BCBAs from India and USA.

CogniAble brings affordability, accessibility, and high-quality management solutions for neurodevelopmental disorders like autism right to

the client's doorstep. Another deep tech startup at EECS, IISc is Mimyk that is building intelligent and immersive solutions and simulation platforms for medical procedures. These systems are powered by AR/VR, Robotics, and visual computing technologies. Mimyk is co-founded by EECS and Mechanical alumni.

Hyderabad-based D-Nome aims at democratising molecular diagnostics with their cell-free synthetic bio tech enabling rapid, accurate & scalable diagnostics and other platform applications. Their proprietary D-LAMP diagnostic technology enables deviceless nucleic acid amplification. MedGenome, the Gene Box are other examples of successful ventures in the area of deep data analytics-based genetic and genome science for diagnostics, precision medicine and predictive healthcare.

What will DeepTech startups need?

According to the Nasscom report 'India's DeepTech startups – poised for impact', about 60 per cent of deep tech startups cited their two main challenges to be talent and market access; and 55 per cent of deep tech startups seek to engage with academia for research guidance.

Skills and talents required for deep tech startups are very niche and specific, and conscious measures to bridge the gap between talent demand and existing skilled workforce can boost the country's deep tech ecosystem. Entrepreneurs, industry experts, and leaders aim to bridge this gap through various shifts

"Global collaborations and a stronger Intellectual Property Rights (IPR) Regime can help boost the technological and innovation landscape in India, thus fostering its deep tech startup ecosystem."

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"Not every kind of business may not get the kind of capital required to reach that stage even though the innovation is great. So, there may be various disruptive innovations that may have gotten buried in the M&A process, but overall, M&A is a crucial part of any startup ecosystem, including the deep tech sector."

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Co-Founder & Managing Partner, Ankur Capital

"The importance of inducing a distinctive mindset of a vision and motivation to cover not just technological milestones, but also carry out organisational shifts and milestones where entrepreneurs should hold the passion to monetise themselves."

- Dr Vishal Gandhi,
Founder & CEO, BioRx Venture Advisors

in the sector's infrastructure, such as launching initiatives to boost industry-academia alignment, reskilling employees with technical skills to keep up with evolving trends and uplifting the expertise to convert their strong knowledge base in science and technology to commercial products.

Prof. Ajay Sood, Principal Scientific Advisor to the Government of India, emphasized a couple of factors that will be crucial in achieving future preparedness in the emerging domains of science and technology. "Capacity building, boosting R&D, having in place conducive policies and regulations to encourage innovation while safeguarding society from potential risks." He also added that global collaborations and a stronger Intellectual Property Rights (IPR) Regime can help boost the technological and innovation landscape in India, thus fostering its DeepTech start-up ecosystem.

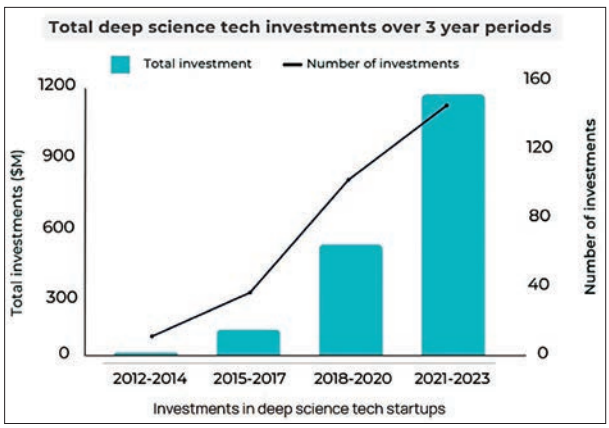
An increased focus and investment in achieving future preparedness in technology, along with an already flourishing biotechnology research and entrepreneurship landscape may help India's deep tech startup ecosystem to develop and grow.

Jaswinder Chadha, President & CEO, of Axtria Inc., shared his views on strategies for scale-up and product commercialisation for India's deep tech startups focussed on 'precision medicine' and 'personalised healthcare' areas of therapy. "As the focus of pharma companies shifts from generic drugs to specialty medicine, deep tech startups have significant opportunities in niche areas like precision medicine and personalised healthcare. Conducting a thorough market analysis and identifying target customer segments are vital for these startups. Collaborating with industry experts who understand customer needs and the healthcare environment can provide valuable insights and guidance throughout their journey.

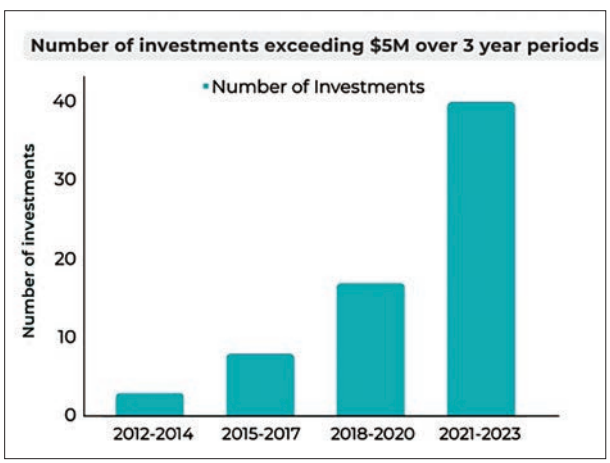
With resources stretched thin, startups must make careful decisions from the start. One of the most critical areas for initial investment is data infrastructure. Given the regulated nature of the data, setting up the right security, anonymity, and process for handling the data is essential. The amount of structured and unstructured data available from many sources has exploded, making it easy to acquire masses of fragmented data that can be difficult to manage and enrich in the future. Strict data governance, along with the right infrastructure, is the key, and giving your customers the confidence that you know how to handle their patients' data is required for success."

Investments

According to the findings published in Nasscom's 2022 report "India's DeepTech Startups – Poised for Impact", access to seed capital and dedicated deep-tech thematic funds seems to hold benefits for new and upcoming deep-tech startups. According to Ankur Capital & Tech Sprouts report, investment in deep science tech startups has consistently doubled every three years since 2010, with projections to surpass $10 billion by 2029, indicating robust growth and investor confidence. Also, the number of investment rounds exceeding $5 million has doubled every three years; and since 2017, follow-on rounds have outpaced fresh funding, demonstrating increasing investor interest and commitments in the deep tech sectors.



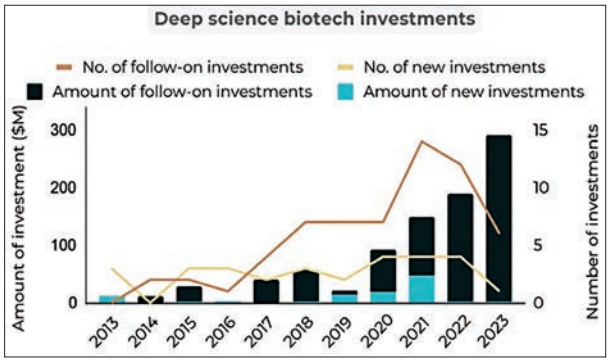
Source: India Deep Science Tech report published by Ankur Capital & Tech Sprouts



Source: India Deep Science Tech report published by Ankur Capital & Tech Sprouts

AI and biotechnology lead funding

AI and biotechnology have historically dominated India's funding landscape (80 per cent of total investments since 2010), with advanced materials gaining momentum in recent years. Recent years have seen a notable increase in follow-on funding for early AI ventures, with 2022 witnessing five investments exceeding $10 million, underscoring a growing interest despite a slowdown in fresh investment.



Source: India Deep Science Tech report published by Ankur Capital & Tech Sprouts

Experts believe that investments in the deep tech space will be highly rewarding for investors, owing not only to their societal and market impact but the yet untapped potential of the sector as new technological advances come to the forefront with rapid rates.

Considering the inherent characteristic of demand for the large early-stage funding for R&D and prototype development, combined with deep tech startups' lengthy life cycle, Dr Amandeep Singh shared that a good strategy for investment in this sector would be phased funding. Implementing a staged investment approach that aligns with key developmental milestones usually flies well with investors. Startups should plan what are the key milestones in development, and what funds, timelines, and resources would be needed for each phase. For an asset-focused startup, proof of concept at the activity stage or preclinical data, and clinical trial initiation phase act as key milestones. For a SaaS/software company, it can be the launch of an MVP, the addition of a second offering, and so on", he said.

In line with this, Rema Subramanian, Co-Founder & Managing Partner of Ankur Capital said, "Entrepreneurs should focus on what is the money that will be required for achieving (the next) milestones", further adding that if a startup stays undercapitalised to reach the milestone, follow-up rounds of funding may become an issue.

Adding another dimension, Dr Vishal Gandhi, Founder & CEO, BioRx Venture Advisors said that monetisation is a very important part of any startup ecosystem. The importance of inducing a distinctive mindset of a vision and motivation to cover not just technological milestones, but also carry out organisational shifts and milestones where entrepreneurs should hold the passion to monetise themselves.

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Commenting on whether the traditional mergers and acquisitions (M&A) strategy would benefit deep tech venture space, instead of sticking to a deep tech startup ecosystem, Rema Subramaniam added that M&A is a very important part of any startup ecosystem, as every innovation may not go on to become a stand-alone large business. "Not every kind of business may not get the kind of capital required to reach that stage in a market even though the innovation is great. So, there may be various disruptive innovations that may have gotten buried in the M&A process, but overall, M&A is a crucial part of any startup ecosystem, including the deep tech sector", she added.

Dr Amandeep Singh elaborated, "An M&A path has several advantages, such as access to the deep knowledge of navigating existing commercial frameworks including market channels and know-how regulatory guidelines, which can be beneficial in scaling operations. However, the M&A path is only successful when there is a greater than 90 per cent match between the DNA of companies. If the goals and priorities of two companies are different, it is better to just collaborate with larger companies. The best path for a startup is to stay agile, continuously refine its go-to-market strategy, and achieve a sizeable scale while catering to the dynamic needs of the sector. Any startup should consider an M&A before reaching saturation in an 'S-curve', where increasing the scale anymore is going to be very difficult without raising large capital or believes that growth will not be possible without a large partner."

Innovation in deep tech-biotech ventures is forming an exciting new landscape for India's life sciences sector. It remains to be seen how the future of deep tech in India shapes up and how the deep tech sector shapes India's biotech landscape. BS

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“Policy changes and the development of deep tech sectors are expected to stimulate domestic innovations and production”

Prof. Ajay Sood, Principal Scientific Advisor to the Government of India

With an aim to support and nurture the unique requirements of deep tech startups in India, the government of India has released a draft policy called the National Deep Tech Startup Policy (NDTSP) in July 2023. The draft policy is strategically formulated to ‘stimulate innovation, spur economic growth, and promote societal development’ by effectively utilizing deep tech research-driven innovations. India's deep tech vision encompasses four key pillars: securing India's economic future, progressing towards a knowledge-driven economy, bolstering national capability and sovereignty through the Atmanirbhar Bharat imperative, and encouraging ethical innovation. The policy will aim to provide a comprehensive framework to address the challenges faced by deep tech startups and provide definitive policy interventions to enhance the ecosystem. Prof. Ajay Sood, Principal Scientific Advisor to the Government of India, in an interaction with BioSpectrum, spoke about the tools needed to shape India’s deep tech startup landscape, and the role NSTDP will play.

Can developing the niche deep tech sector in India’s biotechnology landscape contribute to boosting domestic production of cutting-edge technologies, novel drugs, and therapies?

Quick answer, Yes. Over the past decade, India’s biotech sector has experienced significant growth in various aspects, including capacity, capabilities, and market demand. This growth is evident in the surge of biotech startups, which have increased from 50 in 2012 to over 6000 today. The bio-economy has added $10 billion over the past decade and is projected to exceed $100 billion by 2025.

India’s expanding expertise in areas such as digital public infrastructure, advanced data analytics and ongoing technology mission programs such as on AI and Quantum will further bolster the capabilities of the biotech sector. India’s advanced digital capabilities can be harnessed to develop new drugs and therapies.

Moreover, India is making strides in developing its indigenous population genomics dataset and analysing its microbiome, which will enhance precision medicine/healthcare approaches.

Currently, India imports about 80 per cent of its medical hardware and devices. However, policy changes and the development of deep tech sectors are expected to reduce imports and stimulate domestic innovations and production.

How will the government look to boost the deep tech startup ecosystem, especially in the life sciences and pharma domains?

According to the Department for Promotion of Industry and Internal Trade (DPIIT) data, India is home to more than 1,17,000 startups in 2023, with nearly 10,000 of them being in the deep tech sector. The proposed National Deep Tech Startup Policy (currently under the final stage of approval) is aimed at encouraging the integration of emerging technologies and advancing societal growth through the effective use of research-driven deep tech innovations.

Deep tech startups are distinguished by their extended gestation period compared to other startups. Among many key priorities unique to deep tech, the proposed national deep tech startup policy aims to (a) facilitate access to a variety of capital sources, (b) establish and share facilities for product prototyping and validation, (c) encourage the public and private sectors to adopt indigenous deep technologies, and (d) create a favorable regulatory environment for innovation to flourish.

NDTSP aims to also address the diverse challenges encountered by deep tech startups across various sectors. These challenges differ in magnitude depending on the sector, necessitating customised interventions. Acknowledging the distinct risks and opportunities within the life sciences and pharmaceutical domains, a tailored approach

Growth and sustenance of India's deep tech sector

1. Capacity Building: Enhance the skills of the current generation and educate young minds by incorporating relevant curricula in educational institutions. Provide opportunities for the existing workforce to upgrade their skills through professional development courses. Capacity building and attracting and retaining talented human resource by - introducing specialised courses, bridging industry academia gap through guest lectures, mentorship programs, and fostering collaboration between international and Indian universities.

2. Boosting Research and Development: Promote and financially support research in emerging fields, also in basic research in addition and applied and translational research activities. This needs to be achieved through a combination of government grants and investments from the private sector.

Currently, India's R&D is primarily driven by the government. Despite improvements in our Global Innovation Index (GII) ranking from 81 in 2014 to 40 in 2023, data from 2020 shows that our global share in total patents granted is only 2 per cent. Increased participation from the industry in setting goals, providing funding, etc., will enhance the R&D ecosystem and the inclusion of emerging technology. A case in point is the space sector, where modifications are aimed at increasing India's share in the global space economy from the current 2 to 10 per cent in the near future. The establishment of IN-SPACe introduces the necessary regulatory measures for the private sector's involvement in space activities.

Nurturing the Research, Development & Innovation ecosystem in the country should be one of the overarching priorities to build a stronger foundation for the future preparedness in the emerging domains of science and technology. It is also essential to synergize collaborative research between diverse stakeholders including academia, industry, central and state government.

3. Regulatory Framework and Standards: It is crucial to put in place conducive policies and regulations that encourage innovation while

safeguarding society from potential risks. For example, rising needs and concerns w.r.t data privacy for AI applications in healthcare. In case of emerging and disruptive technologies, setting standards is important to meaningfully structure interactions among the stakeholders. To provide a safe environment for testing functionality and potential risks regulatory sandboxes are important. While setting standards for emerging domains of science and technology in India, involvement of international players should be based on sectoral sensitivities and strategic implications.

4. Global Collaboration: Science and Technology (S&T) pursuits are global endeavors and do not operate in isolation. By fostering collaboration with international partners, India can leverage expertise in adopting, developing, and scaling technologies. This will pave the way for successful integration of emerging technologies into the R&D landscape, ensuring India's future competitiveness.

5. Public Engagement: Engaging the public in discussions about the future of science and technology can help ensure that these developments align with societal values and needs.

6. Stronger Intellectual Property Rights (IPR) Regime: To foster a climate of trust and encourage innovation by ensuring creators have their work protected internationally it is important to actively engage in discussions within global IP conventions and strengthen cross-border IP protection.

Addressing the patenting landscape for emerging technologies and ensuring clear guidelines for these emerging fields can encourage responsible innovation and attract investment in these critical sectors. BS

is essential. Rather than adopting a one-size-fits-all strategy, sector-specific strategies need to be deployed by concerned agencies to foster innovation in these crucial domains.

When will the draft NDTSP policy become a reality?

The current draft version of the NDTSP is truly a stakeholder-driven document incorporating inputs came through different rounds of consultations and public feedback mechanism. At present, the policy is going through its final stage of inter-ministerial consultations leading up to the cabinet approval process, coordinated by the DPIIT. We expect to have this policy enacted as soon as possible. BS

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“India has the potential to emerge as a frontrunner in analytics, offering unparalleled solutions that outshine those of any other nation”

« **Jaswinder Chadha (Jassi),** President & CEO, Axtria Inc.

A successful serial entrepreneur, Jaswinder Chadha founded Axtria – Ingenious Insights in 2010. In less than 15 years he has led its global growth as President and CEO to a 3,500+ person enterprise serving dozens of clients in more than 50 countries, including a majority of the world’s top global life-sciences enterprises and several in the Fortune 50. A proven expert in delivering data analytics and artificial intelligence successes to life sciences companies through the skilled work of employees in North America, Europe, and India. Jaswinder, known in the industry as Jassi, shares his views with BioSpectrum about the surge of deep tech startups and their relevance in India and the rest of the world. ***Edited excerpts:***

India is seeing a rise in deep tech startups in the life sciences and healthcare space, with an increasing focus on ‘precision medicine’ and ‘personalised healthcare’ areas of therapy. In this context, what can be good strategies for such deep tech startups for scale-up, finding product market, and product commercialisation? Does Axtria have product solutions in the pipeline for these startups?

As the focus of pharma companies shifts from generic drugs to specialty medicine, deep tech startups have significant opportunities in niche areas like precision medicine and personalised healthcare. Conducting a thorough market analysis and identifying target customer segments are vital for these startups. Collaborating with industry experts who understand customer needs and the healthcare environment can provide valuable insights and guidance throughout their journey.

With resources stretched thin, startups must make careful decisions from the start. One of the most critical areas for initial investment is data infrastructure. Given the regulated nature of the data, setting up the right security, anonymity, and process for handling the data is essential. The amount of structured and unstructured data available from many sources has exploded, making it easy to acquire masses of fragmented data that can be difficult to manage and enrich in the future. Strict data governance, along with the right infrastructure, is the key, and giving the customers the confidence that they know how to handle their patients’ data is required for success.

We have developed a suite of products tailored for the life sciences industry that can turn investment analyses into pinpoint strategies. Axtria DataMAx for Emerging Pharma provides robust data management and analytics capabilities, enabling startups to streamline data integration, enhance data quality, and gain actionable insights that provide a competitive advantage in the market.

Given the dynamic landscape of India’s life sciences and healthcare sectors, and especially with deep tech startups in this space increasing in India, what are Axtria’s plans for operations in the Indian market and Axtria’s expectations for growth trajectory in the Indian market?

Our primary contribution to the life sciences industry revolves around utilising analytics and software technology to streamline and enhance the efficiency of product commercialisation. Our optimised sales and marketing strategies help minimise inefficiencies, consequently reducing healthcare costs for our clients. Within just a few hours, our solutions accomplish tasks that once took months, substantially improving cost efficiency and empowering our clients to make informed decisions swiftly.

While India's market potential is still in its developmental phase, we recognise immense opportunities to leverage the same solutions here that we've refined for global markets. Despite existing cost-consciousness and infrastructure challenges, India's burgeoning healthcare landscape provides room for innovation and growth. Through strategic

investments in data acquisition and technology infrastructure, Indian companies can harness the transformative potential of analytics and AI, enhancing efficiency and fostering competitiveness on a global scale.

How can data analytics-based solutions contribute to a targeted approach to alleviating, or even curing, chronic diseases?

Data analytics plays a pivotal role in targeting chronic diseases more effectively. By leveraging predictive analytics and machine learning algorithms, healthcare providers can identify high-risk patient populations and intervene early to prevent disease progression. Data analytics can also facilitate personalised treatment approaches by analysing diverse data sources, including clinical records, genetic profiles, and lifestyle factors. This integrated approach enables healthcare professionals to tailor interventions to individual patient needs, maximising treatment efficacy and minimising adverse effects.

In addition, data analytics can support ongoing monitoring and optimisation of treatment protocols, ensuring that patients receive the most appropriate care throughout their disease management journey. Early identification of high-risk patients enables timely interventions and personalised treatments. Medical imaging analysis that leverages AI detects cancers sooner and predicts cardiovascular issues. In neurodegenerative diseases, AI spots early symptoms, while in diabetes, it predicts complications. These technologies empower proactive healthcare, improving patient outcomes and potentially eradicating disease. Overall, data-driven insights empower healthcare providers to take a proactive and targeted approach to alleviating chronic diseases, potentially leading to improved patient outcomes and even the eventual cure of certain conditions.

What bottlenecks, does Axtria visualise, need to be overcome in India's pharmaceutical and healthcare sectors in general, to ensure more effective patients' access to therapeutics and medical facilities? Especially from the perspective of deep domain data analytics expertise, how is Axtria positioned to help the above-mentioned sectors overcome the bottlenecks?

Several key challenges persist in India's pharmaceutical and healthcare sectors, hindering effective access to therapeutics and medical facilities for patients. These challenges include regulatory complexities, fragmented data ecosystems, and inadequate healthcare infrastructure in rural areas. India should identify domains where it can excel and aim to achieve global leadership. We firmly believe that data analytics represents a prime opportunity in this regard. India has the potential to emerge as a frontrunner in analytics, offering unparalleled solutions that outshine those of any other nation.

Data analytics plays a pivotal role in targeting chronic diseases more effectively. By leveraging predictive analytics and machine learning algorithms, healthcare providers can identify high-risk patient populations and intervene early to prevent disease progression. Data analytics can also facilitate personalised treatment approaches by analysing diverse data sources, including clinical records, genetic profiles, and lifestyle factors. This integrated approach enables healthcare professionals to tailor interventions to individual patient needs, maximising treatment efficacy and minimising adverse effects.

Axtria's deep domain-data analytics expertise plays a crucial role in overcoming these challenges. By harnessing advanced analytics techniques, Axtria enables healthcare providers to streamline operations, optimise resource allocation, and enhance patient care delivery. Axtria helps identify high-risk patient populations through predictive analytics, allowing targeted interventions and personalised treatment approaches. In addition, Axtria's solutions facilitate data integration and interoperability, enabling seamless information exchange across healthcare systems and stakeholders. BS

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Projected Boom Phase of Livestock Vaccines?

India, home to the world's largest livestock population of 535 million according to the 20th Livestock Census 2020, faces a significant challenge: the growing burden of animal diseases. This situation has prompted an urgent response from both global pharmaceutical and biotech organisations, which are tirelessly researching and developing innovative methods to cure and contain these diseases. Pharmaceutical companies are focused on creating new drugs to treat suffering animals, while biotech firms are spearheading the development and manufacturing of vaccines to prevent diseases before they strike. Let's examine the key players involved in putting India on the global map for livestock health solutions.

In India, leading companies such as Indian Immunologicals Limited (IIL), Hester Biosciences, and Biovet are at the forefront of this crucial work. They are collaborating with premier research and academic institutions not only in India but also in countries like the USA, UK, and Australia to develop new vaccine entities to combat complex diseases.

Besides there are other animal vaccine companies such as Zoetis, Inc., Elanco India Private Limited, Merck Limited, Ceva Animal Health India Pvt Ltd, Biomed Healthcare, Globion India Private Limited, Biovet Pvt Limited, Brilliant Bio Pharma Pvt Ltd, Indovax Private Limited etc. which are providing the best solutions to the Indian livestock industry.

These efforts extend to partnerships with global companies to develop vaccines tailored for various domesticated animals, including pets, cattle, pigs, goats, and sheep. This collaborative approach ensures that India remains a pivotal player in the global fight against animal diseases, continuously working to improve animal health and safeguard livestock, which is essential for the country's economy and food security.

According to ***Dr K Anand Kumar, Managing Director of Indian Immunologicals Ltd (IIL),*** the demand for animal vaccines in the country is huge and IIL is standing in the forefront to meet this demand. In fact, IIL stands as the market leader in veterinary and human biologicals in India, producing over 150 vaccine products and hugely catering to the National Animal and Human Health Immunisation programme.

"At present our goal is to enhance the quality of livestock in the country, but at the same time we also want to utilise our technological capabilities for the benefit of the people. Keeping this in mind, IIL operates one of the largest veterinary vaccine manufacturing plants globally and possesses robust infrastructure and cold chain distribution capabilities, allowing us to effectively reach both domestic and international markets," says Anand Kumar.

A few highlights of some of vaccine manufacturing companies that are majorly catering to the animal healthcare needs are as follows:

Indian Immunologicals Limited

Currently, IIL is a significant player in the animal health market by offering a variety of therapeutic products for livestock and companion animals to enhance their productive and reproductive status along with prophylaxis against certain diseases. The product portfolio comprises vaccines, formulations and nutraceuticals. Additionally, it also markets generics and over-the-counter (OTC) products that are available at veterinary retail stores across India.

In 2022, IIL announced expansion of operations in New Zealand through its subsidiary Pristine Biologicals NZ. During the same year it announced that it will invest about Rs 700 crore to set up a new animal vaccine manufacturing facility in Genome Valley, Hyderabad to meet the vaccine security of the nation against economically important diseases such as Foot and Mouth disease (FMD) and other emerging diseases. The facility will create total employment for around 750 people.

At present IIL is exporting 150 different types of vaccine for both animal and human to more than 50 countries across the globe. It is also notable here to highlight that IIL is the first Indian company which has developed rabies vaccine through tissue culture,

and is credited for developing the world's first vaccine for porcine cysticercosis, a tape worm like parasite usually found in pigs.

Some of the important animal vaccines that are in pipeline for development at IIL include Marker Vaccine for infectious Bovine Rhinotracheitis and Multicomponent Clostridial Vaccine.

Not just IIL, there are also a host of pharmaceutical and vaccine manufacturing firms like Biovet, Hester and others which are equally catching up to cater to the demands of the animal vaccine segment in India.

Biovet

For instance, Biovet, which is a subsidiary of Bharat Biotech, has invested Rs 200 crore for establishing First Biosafety Level-3 PlusAg Vaccine manufacturing facility at Malur in Karnataka. The company is expanding and upgrading its existing infrastructure to manufacture Foot and Mouth Disease (FMD) in animals. The company has successfully manufactured BioFMD-Oil Vaccine to cure and prevent various clinical signs like fever, profuse salivation, Nasal discharge, Vesicle on tongue, lip, and dental pad in cattle, sheep, goat and pigs.

In addition to FMD vaccine, the company is also manufacturing other vaccines like Bluetongue Disease Vaccine, Haemorrhagic Septicaemia Disease Vaccine, Johne's disease Vaccine and Black Quarter Disease Vaccine etc, which are all catering to prevent and cure various diseases in Animals.

Highlighting about the company's facilities, ***Narayan Singh, Managing Director of Biovet Pvt Ltd*** observed that the company is a leader in FMD vaccine production and it has established a world class facility at the Malur in Karnataka. "We have invested Rs 150 crore for setting up a world class facility for manufacturing FMD vaccine. At Biovet our R&D division is engaged in the development of products and processes, and in transferring the technologies to the production section. The focus is on inventing and developing vaccines for new infectious, emerging and reemerging diseases of animals at economical and affordable prices," says Singh.

From a one-product company, Biovet is now growing to a multi-product company because of its in-house R&D and process development. Biovet in collaboration with national and international organisations is bringing in the latest concepts and methods in product development.

India's Leading Animal Vaccine Manufacturers

- Indian Immunologicals Limited
- Zoetis, Inc.
- Elanco India Private Limited
- Merck Limited
- Ceva Animal Health India Pvt Ltd
- Biomed Healthcare
- Globion India Private Limited
- Biovet Pvt Limited
- Brilliant Bio Pharma Pvt Ltd
- Hester Biosciences Ltd
- Indovax Private Limited

For ensuring biosafety, the company has set up India's 1st and World's 2nd BSL-3 + Ag Production Animal Facility, this Global Standard Facility was set up with an investment of Rs 150 crore. It is also a BSL-3 + Ag Large Animal Testing Facility located at Bengaluru, in Karnataka.

Hester Biosciences

Another major animal vaccine manufacturer in India, Hester Biosciences provides preventive medicines to various categories of animals. The company was founded by Rajiv Gandhi, CEO and Managing Director in 1997. The company which had started by releasing a single vaccine then has today grown into Asia's largest vaccine producers, exporting various animal vaccine products to different countries globally.

The company's product portfolio includes Inactivated Vaccines, Live Vaccines, and animal and poultry healthcare products. Hester has recorded considerable growth by contributing to the National Animal Immunisation programme in India. Recently, all states in India have initiated an

Drivers of Market Growth

The Global Surge in Zoonotic Diseases: With 75 per cent of developing infectious diseases classified as zoonotic, there's a concerning global rise in their prevalence. Contributing factors include heightened demand for animal protein, intensified farming practices, exploitation of wildlife, and population expansion. India, amid its burgeoning population and urbanisation, grapples with a substantial burden of zoonotic illnesses.

Expansion of Livestock Population: India's female cattle count has surged by 18 per cent since the last census, now standing at 145.12 million. This growth is propelled by factors like increased fertility rates, consolidation of animal farms, and larger herd sizes in dairy establishments.

Surging Demand for Animal Products: India's milk production capacity is poised to hit 330 million tonnes by 2024, accompanied by a 30 per cent surge in egg production since 2014. The poultry sector is witnessing an annual growth rate of 12–15 per cent, with urban markets satisfying 80 per cent of the demand. This uptick is driven by rising purchasing power, evolving lifestyles, and enhanced prosperity.

Rise in Pet Healthcare Market: The Indian pet care segment anticipates a robust compound annual growth rate (CAGR) exceeding 20 per cent by 2021-22. Factors fueling this surge include escalating disposable incomes, shifting lifestyles, heightened awareness, and a proliferation of dual-income households. Common pet ailments like kennel cough, parvovirus, leptospirosis, infectious canine hepatitis, and rabies underscore the pivotal role of vaccinations in pet healthcare.

Increased R&D Spending: The pharmaceutical facet of the animal healthcare arena is forecasted to expand at a 5.4 per cent annual rate until 2027. Rising instances of zoonotic diseases, augmented feed output, and heightened consumer consciousness regarding animal welfare are pivotal drivers spurring demand for pharmaceuticals in the animal healthcare sphere.

Source: https://www.ibef.org/blogs/animal-vaccine-opportunity-in-india

immunisation programme targeting Lumpy Skin Disease through the Goat Pox Vaccine; this has helped the country gain good profits. However, the company had faced some hurdles in the exports of animal vaccines to international markets due to a decline in demand.

Apart from catering to vaccines for cattle, sheep, goat and pet animals, Hester Biosciences is also contributing heavily for the poultry sector. Apart from catering the animal vaccine needs of India, Hester has also established its unit in Africa and began production in 2021 and meeting the unmet demand of the African animal sector.

"In addition to catering to the domestic demand in India, we are also exporting our animal vaccines to various countries where there is a huge demand. Particularly, Africa, as a continent, is still an untapped market for immunisation of animals against diseases. Africa has a huge gap in demand and supply as there are only a few animal vaccine manufacturers in the entire continent. Tanzania has the third-largest herd of domestic livestock in the world. We not only see this as a wonderful opportunity for growth, but also as a way to promote better health for human beings through healthier animals," said ***Rajiv Gandhi, CEO and Managing Director, Hester Biosciences.***

Today, Hester Biosciences has emerged as one of India's leading animal healthcare companies and is the second largest poultry vaccine manufacturer in the country.

Growing Burden of Livestock Diseases

The India animal health market size reached Rs 80 billion in 2023. Looking forward, IMARC Group expects the market to reach Rs 160.5 billion by 2032, exhibiting a CAGR of 7.8 per cent during 2024-2032. The growing occurrences of zoonotic diseases, the increasing investment by the government authorities to enhance animal healthcare, and extensive research and development (R&D) activities conducted by key players are some of the major factors propelling the market.

Diverse segments contribute to India's animal healthcare market, with livestock comprising 51 per cent, poultry 35 per cent, companion animals 8 per cent, aquaculture 5 per cent, and other animals 1 per cent. Key vaccines, such as those targeting Peste des petits ruminants (PPR), Brucellosis, and FMD, are in high demand, reflecting the nation's commitment to combating prevalent animal diseases and ensuring food security.

The sector's expansion is fueled by increasing demand for animal-derived products, including eggs, dairy, and meat, alongside a growing affinity for companion animals. As the prevalence of animal diseases rises, so does the imperative for robust vaccination programmes, positioning India for sustained growth in this domain.

A proactive governmental stance, epitomised by

initiatives like the 'National Animal Disease Control Programme,' further amplifies opportunities for growth in the animal healthcare sector. Through strategic investments and collaborative efforts, India is poised to not only meet domestic demand but also emerge as a prominent player in the global arena of animal vaccination, shaping the future of veterinary healthcare on a worldwide scale.

Indian Animal Vaccine Industry Growth

The Animal Vaccine Industry in India is experiencing significant growth, driven by various factors such as the rising prevalence of zoonotic diseases, growth in the livestock population, increasing demand for animal products, a burgeoning pet healthcare market, and growing investment in research and development (R&D) for drug and vaccine development. Under government initiatives like "One Health," there is a concerted effort to tackle health threats through an intersect oral approach, emphasising the interconnectedness of animals, the environment, and human health. Regulatory bodies like the Veterinary Cell of the Central Drugs Standard Control Organisation (CDSCO) and research institutions like the Indian Institute of Veterinary Institute (IVRI) play crucial roles in overseeing and advancing the animal health sector.

The Veterinary Cell of CDSCO is responsible for regulating animal health products in India, ensuring their safety, efficacy, and quality. Technical reviews for product registration of farm and companion animals are conducted by the Department of Animal Husbandry and Dairying, while the Department of Fisheries oversees aqua products. The IVRI is instrumental in researching and evaluating biologicals in the veterinary sector.

According to a TechSci Research report, the Indian animal vaccine market stood at $235.52 million in 2023 and is projected to grow at a compound annual growth rate (CAGR) of 5.02 per cent from 2025 to 2029. This robust growth can be attributed to several factors, including the increasing prevalence of animal diseases and heightened awareness about animal health among livestock and pet owners.

The rise in various animal diseases is a significant driver for the animal vaccine market in India. Increased awareness among livestock and pet owners about the importance of animal health, coupled with government initiatives promoting veterinary care, are also contributing to market growth. Furthermore, substantial investments in R&D are propelling advancements in biotechnology, leading to the creation of more effective and safer animal vaccines.

"In a country like India, where livestock is integral to the economy, animal health is crucial," observed ***Dr Ravinder Reddy, Vice Chancellor of P V Narasimha Rao Veterinary University in Hyderabad.***

"Livestock directly impacts the livelihood of millions, particularly in rural areas where agriculture and pastoral activities are the main income sources. Healthy livestock contributes to food security by providing essential products such as milk, meat, and eggs."

Strong Demand & Continuous Innovations

The animal vaccine industry in India stands at the cusp of growth, yet faces several challenges hindering its full potential. Regulatory complexities, inadequate infrastructure, and limited awareness about preventive healthcare among animal owners are among the hurdles. Storage costs and a shortage of skilled personnel further complicate matters, especially in rural areas with unreliable electricity supply.

However, amidst these challenges lie opportunities for collaboration and advancement. Initiatives like "One Health" and the National Animal Disease Control Programme offer avenues for cooperation. Strengthening regulatory frameworks, enhancing R&D capabilities, and leveraging technological innovations can pave the way for overcoming obstacles and unleashing the industry's full potential.

Technological advancements, notably in artificial intelligence and big data analytics, have revolutionised vaccine development. These breakthroughs have accelerated the creation of highly effective vaccines, bolstering disease prevention and control efforts.

Despite challenges, the animal vaccine industry in India is set for significant growth. Factors such as rising demand for animal products, increasing pet ownership, and growing awareness about zoonotic diseases are driving this trajectory. With supportive government initiatives and a conducive regulatory environment, India is poised to emerge as a global leader in animal vaccination and pharmaceuticals.

In conclusion, sustained investment in R&D and biotechnology will propel the industry forward, offering innovative solutions for animal health. As key players continue to develop effective vaccines, India's role in global animal health will strengthen, benefitting both livestock and human populations alike. BS

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“The shift towards cleanroom garments & pharma manufacturing uniform is not merely a trend, it’s a calculated movement towards responsible pharma sector”

« **Manas Kumar,** Global Director Pharma & Director Strategic Marketing and Business Development- APAC, Lindström Oy, India

Finland-based Lindström, a leading global provider of workwear, cleanroom workwear, and mat services, is making significant strides in its expansion efforts, particularly in key markets such as India, China, Vietnam, and Turkey. These expansions are strategically aimed at serving a diverse range of industries, including biopharma, pharmaceuticals, and the food sector. In a recent interview with BioSpectrum, Manas Kumar, Global Director Pharma & Director Strategic Marketing and Business Development- APAC at Lindström Oy, sheds light on the company's ambitious growth plans and its commitment to sustainability. ***Edited excerpts:***

Lindström has recently opened a larger cleanroom facility in Hyderabad. How do you plan to increase your presence in the Indian workwear services market with respect to the pharma and healthcare industry?

We're thrilled about our leadership in workwear and cleanroom services, especially in Hyderabad, India's bustling pharma hub. Our recent moves, like opening our second top-notch cleanroom facility and relocating to a bigger, modern workwear spot in Telangana, show just how committed we are to this vibrant region. It's all part of our big plans to solidify our place as forerunner in the global textile services sector. We're talking about investing in cutting-edge facilities and expanding our capacity to meet the growing needs of industries like biopharma, pharma, and more. Our new facility is a significant milestone in our growth journey. Doubling our workwear capacity in Telangana means we're ready to tackle the rising demand for top-quality workwear in the biopharma and pharma sectors.

Speaking of numbers, we've got 11 workwear and 2 cleanroom units across India, managing a whopping 2.5 million garments in circulation thanks to our amazing team of over 900 employees. This feeds into our global portfolio of 21 million textiles, showcasing our extensive reach and capabilities in 24 countries across Europe and Asia. But it's not just about the numbers or the facilities; it's about delivering exceptional services and tailored solutions to our clients in biopharma and pharma. Our Cleanroom Service journey in India started in Pune in 2017, & since then, we've been partnering with big names in the bio pharmaceutical world across Maharashtra, MP, Gujarat, & even Himachal Pradesh.

We're all about keeping things hygienic, compliant, and efficient, which is why our focus on regulatory standards, operational efficiency, and customer satisfaction drives our success in these critical industries. Our latest facility in Hyderabad is equipped with top-notch cleanroom tech, perfect for industries like biotech and pharma where precision is key. Our focus on maintaining stringent hygiene and compliance standards, operational efficiency, and customer satisfaction continues to drive our success in these critical industries.

Could you please share some details about your expansion plans in the Asian market, catering to the pharma sector there?

Lindström has solidified its position as a market leader in providing cleanroom services to pharmaceutical companies in both India and China, recognising the pivotal role these nations play as the pharmacy of the world. This commitment underscores our dedication to delivering compliant services and sustainable solutions in the rapidly growing pharmaceutical industry.

In China, Lindström's recent expansion includes the inauguration of a new state-of-the-art facility in Tianjin, the fourth Cleanroom service centre added to our existing locations in Beijing, Shanghai, and Guangzhou. These centres are strategically placed to meet the evolving needs of industries requiring cleanroom solutions, particularly in the

pharmaceuticals and semiconductor industry.

The increasing demand for sustainable workwear solutions that adhere to international hygiene and regulatory standards is a key driver in China, reflecting the commitment of both domestic and international companies to ambitious sustainability goals. Beyond China and India, Lindström's expansion efforts also extend to South Korea. In 2023, we opened a state-of-the-art compliant workwear unit in Pyeongtaek, doubling our production capacity to cater to the diverse needs of customers across industries such as pharmaceuticals, food processing, and electronics. This expansion demonstrates our ongoing commitment to providing top-notch solutions and services to clients across Asia and beyond.

How is Lindström investing into technology to provide the critical workwear services to the pharma industry in Asia?

Asia's pharmaceutical market, representing roughly a fifth of the global industry, is a dynamic landscape with distinct demands in India and China. India focuses on generics and cost-efficient solutions, while China's emphasis is on high-value biotech and biosimilars with stringent requirements. In this competitive environment, outsourcing services have become crucial, allowing pharma companies to concentrate on innovation and core functions.

Traditionally, many companies managed laundry in-house, but today's pharmaceutical facilities often exclude laundry facilities from their designs. This shift reflects the industry's evolving focus on core activity and outsourcing non core to improve efficiency and compliance. Garments are as vital as raw materials in the manufacturing process; any interruption can halt operations. Compliance and data integrity are paramount concerns for companies considering outsourcing, given the industry's strict regulations.

At Lindström, we leverage smart digital technology to provide comprehensive item-level audit trails. Our RFID-tagged garments enable precise tracking of usage and wash-wear cycles, ensuring compliance and data accuracy. This technology-driven approach aligns with the industry's evolving needs, optimising efficiency and transparency throughout the garment lifecycle. Beyond workwear, Lindström offers rental services for reusable goggles and mops tailored to cleanroom requirements. Our use of RFID technology enhances traceability, monitoring each item's journey from laundering to usage for optimal cleanliness and efficiency.

The narrative around pharmaceutical uniforms is changing in 2024 and beyond. How is Lindström setting its sustainability goals in this context?

As we journey into 2024 and beyond, the dialogue surrounding pharmaceutical gowning is experiencing a significant transformation, with a strong emphasis on reusability & recycling. At Lindström, we recognise the pivotal role that sustainable practices play in aiding the pharmaceutical industry's efforts to reduce its carbon footprint. By prioritising reusability & recycling in pharmaceutical gowning, we can significantly minimise waste & environmental impact.

Our sustainability objectives are deeply rooted in our commitment to environmental stewardship, resource efficiency, and ongoing innovation. We have set ambitious targets aligned with global climate goals, aiming to halve greenhouse gas emissions by 2030 and achieve net-zero emissions by 2050 across our entire value chain. This commitment drives us to increase the utilisation of recycled and bio-based materials in our textiles, transition to sustainable energy sources in our service centres, and adopt eco-friendly alternatives in customer deliveries.

A key strategy in our sustainability approach is the promotion of circular economy principles. This entails designing garments for durability, implementing efficient laundering processes, and spearheading recycling initiatives. By prioritising longevity and reducing the need for frequent replacements, we contribute to a more sustainable supply chain and lessen environmental impact.

Our smart digital solutions, including RFID tagging and item-level audit trails, play a pivotal role in enhancing sustainability. These technologies not only optimise operational efficiency but also enable precise garment management, minimising waste and ensuring responsible resource utilisation.

Collaboration and partnerships are fundamental to our sustainability journey. We actively engage with our customers to implement environmentally conscious practices, such as optimised garment usage and efficient laundering schedules, fostering a culture of sustainability throughout the value chain.

In essence, Lindström is dedicated to leading the way in sustainable pharmaceutical workwear by integrating eco-friendly materials, efficient processes, and innovative technologies. Our vision is to create a more sustainable and resilient future for the pharmaceutical industry, where environmental responsibility and operational excellence are interconnected pillars of success. The shift towards a more eco-conscious approach to cleanroom garments and pharmaceutical manufacturing uniform is not merely a trend, it's a calculated movement towards a greener, more responsible pharmaceutical sector. BS

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“It’s imperative to manage indigenous production of drugs to reduce cost of therapies for rare diseases”

« **Dr Meenakshi Bhat,** Faculty, Centre for Human Genetics, Bengaluru

Dr Meenakshi Bhat, Faculty, Centre for Human Genetics, Bengaluru who has been involved in initiatives to raise awareness about rare diseases for nearly two decades, entered the field when there was hardly any awareness about a handful of rare genetic diseases like Down’s Syndrome. Now, with the government's involvement and a steadily increasing effort from aware citizen volunteers are slowly but surely advancing the establishment and development of the infrastructure required for tackling rare diseases and helping patients. While multiple challenges are faced on various dimensions – be it lack of awareness about rare diseases, relatively slow-paced translational research to develop new drugs and the exorbitant price of existing therapies that mostly need to be brought in from other developed nations, a handful of organisations such as Organisation for Rare Diseases in India (ORDI), are contributing their fair share to alleviating patient distress. In an interaction with BioSpectrum Dr Meenakshi Bhat shared her views on ongoing translational research in the area of rare diseases in the country and plans for the next one or two years in tackling rare diseases, among other issues. ***Edited excerpts:***

What has it been like to raise awareness about rare diseases among patients and medical professionals?

It is important to emphasise that quite a few times, doctors fail to recognise that the symptoms of a patient are due to an underlying rare genetic disease. So, we need specialised doctors who have the time to take detailed patient histories, dissect the spectrum of problems the patient has, and then order the right kind of diagnostic tests the patients may require. This is especially important when the diagnosis is required to take place in a key time frame so that it does not become too late to help these patients. This is the case mostly in children.

Very few doctors in the current medical infrastructure are trained to correctly diagnose rare diseases, and even fewer to do pregnancy-related diagnoses. We have less than 200 doctors in each category of rare diseases for a population of 140 crores. Stressing the importance of training doctors to deal with rare diseases, we have been conducting training programmes for a one-year fellowship course for people with a Doctor of Medicine (MD) in Paediatrics to consult, diagnose, and treat patients with rare diseases. This has been running through the Rajiv Gandhi University for Health Sciences (Indira Gandhi Institute of Child Health) since 2013. As of today, the fellowship has successfully imparted the necessary skills to fifteen doctors and they are now spread all over the country.

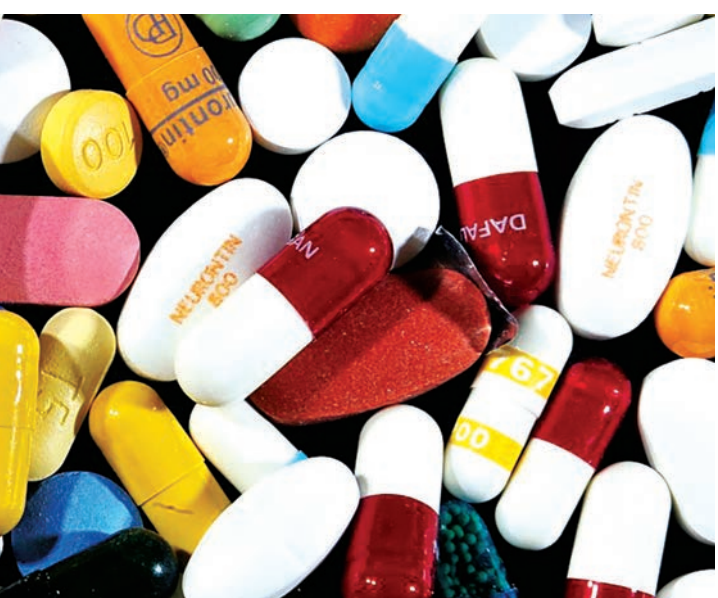
Compared to the West, where people get diagnosed with rare genetic diseases when the baby is in utero, India is still a few steps behind wherein ‘we are lucky if we can diagnose a child with a rare disease in the first seven years of life when the first symptoms start to arise.’ This gap is due to the current lack of awareness about the existence

and understanding of rare diseases in several communities and social classes, and with events like 'Racefor7' and organisations like ORDI, this is exactly what we aim for – to raise that initial awareness at a very early stage so that families can be prepared and an infrastructure of medical help for the new-born children can be set-up to fruitfully deal with alleviating the disease manifestations.

What are your views on the fundamental and translational research ongoing in the country?

At the level of fundamental research on rare diseases, it seems to be ample in the country. The level at which medicine and science talk to each other is when real development happens. In that area, the Department of Biotechnology (DBT) and Indian Council of Medical Research (ICMR) have been supportive in terms of research funding, as well as in aiding the set-up of registries for recording epidemiological data of patients with rare diseases which is an important aspect of being able to tackle these.

The next question is being able to afford the medicines. One of the most challenging parts of dealing with the issue of rare diseases begins after a diagnostic test is done because either suitable treatments or medications do not exist, or they are often not affordable. We need to increase the awareness about diagnosis and also the type of treatments we need to develop. In 2021, the Government of India announced the National Policy for Rare Diseases, wherein any individual, child or adult, who has a rare disease that has a definitive treatment will be provided with a health cover of rupees Rs 50 lakh per year by the Government of India.



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What infrastructure needs to be in place to create an ecosystem of opportunities for all kinds of stakeholders involved in tackling rare diseases?

I think it will probably always be a "Hub-and-spoke Model". There will always be a central body in a city or state that has the ease of communication. But without a patient advocacy group like ORDI, one can never make everything successful by operating in isolation. Spoke-wise, enabling an infrastructure of online consultation by doctors for those patients who cannot travel to the healthcare facility.

What, according to you, would be a good plan for the next few years for tackling rare diseases?

I think we should start focussing more on core, translational research to boost 'Make-in-India' efforts. Start small, reap the low-hanging fruits by aiming to manufacture and commercialise the existing drugs, and aim to develop new drugs in the long term. To achieve the aim of lowering cost of therapies for patients with rare diseases, it is imperative to manage indigenous production of the required drugs.

How many patients have been able to receive treatment or help for alleviating the pain of rare diseases?

Independent of ORDI, our Centre for Human Genetics, combined with the state's children's hospital, we have seen and consulted around 30,000 families (not just children) affected by rare diseases. BS

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“New biopharma modalities -peptides, oligo, mRNA, cell and gene therapy, ADCs, and bispecifics - will drive the analytical markets”

« **Shailendra Chavan,** Sales Director, Chemistries & Supplies Division, Agilent Technologies

Shailendra Chavan, a Sales Director Chemistries and Supplies Division at Agilent Technologies, has over two decades of experience from previous roles at Agilent Technologies. He holds a MSc in Chemistry from University of Mumbai. With a robust skill set that includes LC-MS, Gas Chromatography, Mass Spectrometry, Chromatography, Analytical Chemistry and more, he contributes valuable insights to the analytical industry. In an interaction with BioSpectrum he sheds light on the market trends in the Biosuppliers segment and discusses some of the emerging trends that is projected to change the future course of the laboratory and analytical instrument industry in India and globally. ***Edited excerpts:***

How do you perceive the current market trends for laboratory and analytical instruments/equipment 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 analytical instrument market in India for biopharma is growing. This growth can be attributed to several factors, including the increased investment by pharmaceutical companies in large molecules to broaden their product pipelines, as well as the rise of Contract Development and Manufacturing Organisations (CDMOs). Large molecules, due to their complexity, require thorough characterisation, aiding in understanding the efficacy of drugs. Additionally, there is a growing demand for highly reliable data that meets international standards.

Globally, the market is expanding, especially in affluent countries that heavily invest in complex biologics and various modalities. The reputable stature of Indian pharmaceutical companies is garnering global attention, leading to increased engagement with Indian multinational companies.

However, several challenges are being encountered. For instance, in terms of cost of development and complexity. To adapt to new trends, and advancements, and ensure market sustainability, significant investments are required in developing new instruments or workflows. This entails substantial costs, which may be prohibitive for some customers at present.

Supply chain challenges are also being faced. With increasing demand for instruments, raw materials and components need to be sourced from various countries. Disruptions in the supply chain due to geopolitical issues can impact production timelines and costs. The market is highly competitive, with each player striving to innovate for a competitive advantage. Thus, keeping pace with this trend necessitates investment in research and development. The growing complexity of analysis for large molecules requires skilled scientists to design workflows and analyse data. Companies must invest in developing these skills among their employees and provide customer training on the use of these instruments.

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

Some of the recent advancements that have really changed the face of the laboratory equipment and analytical instrument sector include Automation, Process Analytical Technology (PAT), Miniaturisation, AI Integration, Multi-Attribute Monitoring (MAM), and Digitalisation/Data Management.

Furthermore, there is a need to provide complete workflows for upcoming applications in various analysis areas. Agilent, as a leader in the field, continuously develops new workflows to meet regulatory requirements and provide customers with trusted answers. Our capable team of scientists supports customers in utilising the latest Agilent platforms from our Centre of Excellence.

How do you assess the growth prospects of the Indian market, especially for laboratory and analytical instruments/equipment?

The Indian market for laboratory and analytical instruments is steadily growing. Agilent, for instance, has a significant number of its products like chromatography and mass spectrometry already installed in the country. As new regulations demand highly sensitive and advanced technology products, there's a growing replacement market. Many organisations are looking to upgrade their current infrastructure to the latest platforms. Additionally, as markets expand into new sectors like semiconductor testing, there will be a high demand for niche technologies such as atomic spectroscopy. Regulations in fields like food, pharmaceuticals, and biopharmaceuticals are continuously evolving. This evolution is expected to drive further market expansion in India over the next few years.

Could you share details about your company's revenues & expectations for the coming year?

Our company's revenues stand at $6.83 billion as of December 2023. While India continues to experience growth, we anticipate growth in all global markets as well. However, there are several uncertainties surrounding us, including rapidly changing macroeconomic conditions and conflicts in certain regions. Predicting growth projections requires considerable effort under such circumstances. Nevertheless, we are committed to surpassing market growth both in India and globally.

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

There are regulatory challenges for the biopharma sector such as tough approval processes, biological product complexity, regulatory uncertainty, manufacturing & QC regulations & regulatory harmonisation.

What kind of support do you expect from the government to foster industry growth?

The government plays a pivotal role in fostering the growth of the biopharma sector. Currently, there is a strong focus on vaccine development, with substantial resources being allocated through agencies like BIRAC to support biopharmaceutical endeavours in India. The government is actively promoting innovation and collaboration by sponsoring research and development (R&D) facilities, startups, and small and medium enterprises (SMEs) engaged in drug discovery, biomanufacturing, and analytical characterisation. Furthermore, initiatives are in place to invest in skill development for individuals in the biopharma sector through partnerships with leading R&D institutes & private enterprises. These programmes aim to bridge the gap between academia & industry & promote a lab-to-market approach. Public-private partnerships are instrumental in leveraging the strengths of academia to conduct crucial biopharmaceutical research, thereby driving innovation & growth in the sector. In response to the post-COVID landscape, the government has made significant investments in infectious disease research, exploration of new therapeutic modalities, and support for emerging players, such as those involved in CART therapy development.

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

Yes, we've planned to establish a Center of Excellence (CoE) in Hyderabad's pharmaceutical and biopharmaceutical hub, which is currently attracting investments in the biopharma sector. Furthermore, Agilent has entered into collaborations with CCAMP and IIT Delhi for application and skill development purposes. Additionally, we are in advanced discussions with potential collaborators to form partnerships in areas of mutual interest.

What future trends do you foresee in the laboratory and analytical instruments/ equipment industry, both in terms of technology and market demand?

From a market perspective, new biopharma modalities such as peptides, oligo, mRNA, cell and gene therapy, ADCs, and bispecifics will drive the analytical markets. Increased focus on vaccines will continue to bring investments in various infectious diseases in the future. There will be much focus on having sustainable technologies or workflows that will improve productivity. There will be a demand for analytical instruments that provide actionable insights from complex data for decision-making in R&D and production.

What is the current market size for laboratory and analytical instruments/equipment in India and globally?

The Indian analytical instrument market reached approximately $3.77 billion in 2023, highlighting its significance in the country's economy and scientific research. The market is expected to grow at a CAGR of 11 per cent by reaching approximately $9.65 billion by 2032. The analytical instrumentation market size is expected to grow from $ 49.47 billion in 2023 to $ 66.27 billion by 2028, at a CAGR of 6.02 per cent during the forecast period (2023-2028). BS

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“We specialise in producing DNA of extraordinarily high purity for gene therapy and genetic vaccine research”

« **Dr. Martin Schleef,** Founder and Managing Director, PlasmidFactory GmbH

The PlasmidFactory GmbH was founded in 2000 in Bielefeld/Germany, with four employees. In the meantime, under the leadership of the Founder and Managing Director , Dr. Martin Schleef, the company has become a well-known contract manufacturer (CDMO) for plasmid and minicircle DNA.

Today, PlasmidFactory has 50 highly qualified employees. For more than four years now, the company has been working at full speed and on an extraordinary scale - in addition to scientific research and optimisation of production –especially for production of mRNA vaccines. Dr Schleef shares his insights about PlasmidFactory and his rich experience in developing life-saving products.

You have been working in plasmid research and production for more than 30 years and have played a crucial part in contributing to the development of the COVID-19 mRNA vaccine. How did this come about?

PlasmidFactory specialises in producing DNA of extraordinarily high purity for gene therapy and genetic vaccine research. We are an established supplier to biotechnology and pharmaceutical companies as well as to universities and research institutes worldwide. We are well-known within the industry. All manufacturing, research and development is concentrated at the Bielefeld site in Germany. Our manufacturing processes for plasmid DNA are ideally suited for producing mRNA vaccines based on it.

Was the rapid growth in demand for mRNA for vaccines surprising?

Not really. Plasmids have been used as starting materials for manufacturing viral vectors (AAV, Lenti, etc.), and for producing RNA for quite some time. In particular, the production of plasmid DNA as a starting material to produce RNA cancer therapeutics and vaccines has become very important, especially against the background of the COVID-19. RNA is considered a promising vaccine candidate for the prevention of certain viral infections. It has the advantage of neither integrating into the genome of the cell nor remaining in the long term as a potentially effective active molecule in a patient's body. Besides protection against COVID-19, recently developed mRNA-based vaccines have been tested for their protection against influenza virus, Zika virus, cytomegalovirus, and many others. In addition, various mRNA vaccines are currently being tested for their tolerability when used as combination vaccination. So, as you can see, the current applications for mRNA are not yet exhaustive, and we look forward to continuing to play an essential role in the value chain.

Large-scale manufacturing and production in the highest purity grades of plasmid and minicircle DNA as a starting material for RNA vaccines has gained importance. How did you ensure that PlasmidFactory can handle both parameters simultaneously?

We have been working in this area for several years and are constantly optimising it. Even before COVID-19, we significantly expanded our capacity in 2020 to meet the orders of our national and international customers. In the summer of 2020, the concept for the laboratory expansion was finalised. We received funding from the NRW state government and have been able to produce on a multi-gram scale in High Quality Grade to support the COVID-19 vaccine industry.

Moreover, investments have been made to implement the manufacturing of DNA in full GMP Grade. The newly built GMP facility is also located in Bielefeld and will be up and running by the end

of summer 2024. This will enable us to provide our global customers not only with High Quality Grade but also with GMP Grade plasmid and minicircle DNA on a large scale.

You mentioned the term "High Quality Grade". Is it your creation, and what exactly does it mean? How does it differ from GMP Grade?

Yes, initially, it is, but it denotes "high quality", so the term is now also used by other manufacturers.

Our "High Quality Grade" plasmid DNA was established over 15 years ago based on the EMA guidelines CHMP/BWP/2458/03, CPMP/BWP/3088/99, and, since 2021, on EMA/246400/2021 for highest quality requirements. For product safety reasons, the manufacturing process avoids using substances of animal origin throughout the entire production chain. It guarantees the highest possible product purity through reliable separation of impurities, e.g., bacterial chromosomal DNA or damaged plasmids. To prevent further contamination, only one plasmid is produced at a time in the facility used exclusively for High Quality (HQ) Grade plasmids; no parallel plasmid productions occur in the same facility.

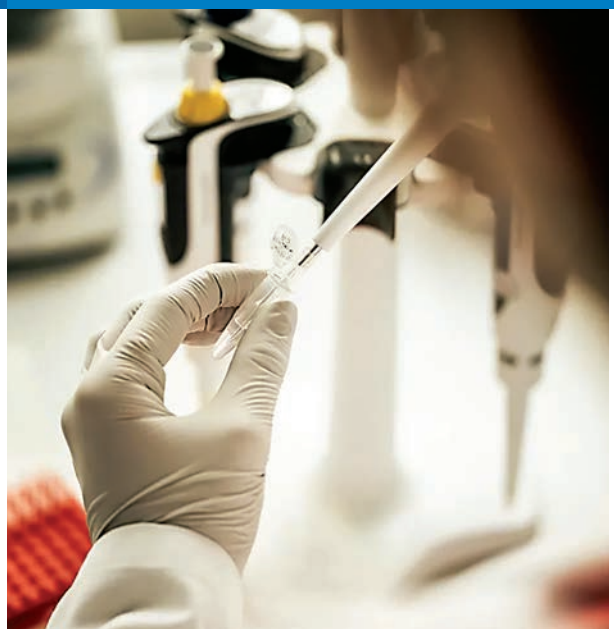
The HQ fermentation is physically separated from the purification (chromatography) to ensure that downstream processing of the sensitive DNA is not affected by live contaminants.

Actually, HQ Grade products are already being used in clinical trials studies. However, GMP Grade goes one step further by exclusively using single-use equipment and complying with applicable GMP guidelines, and it is, of course, GMP certified. This is a stand-alone trait and signifies another important step in PlasmidFactory's goal to further extend the lead over the competition.

What unique expertise do you have in this field?

The proprietary, unique purification process is one of our unrivalled advantages. It results in a high grade of pure, supercoiled (ccc) plasmid monomers that meet regulatory requirements to form a defined, homogeneous product, which undergoes a series of cell bank and plasmid DNA product quality control checks before release.

High-quality Grade Plasmid DNA is produced based on a cell bank (RCB) created at PlasmidFactory and the uniquely effective proprietary ccc Grade DNA technology. For both the cell bank and the plasmid DNA product,



PlasmidFactory offers a wide range of quality controls, so a product is ultimately created that is tailor-made for the respective application or as per the corresponding regulatory requirements.

For example, our High Quality Grade Plasmid DNA is used in the GMP-compliant production of recombinant viruses, antibodies and RNA for clinical trials.

Our products and processes are continuously and precisely optimised and, if necessary, further developed because we want to be uncompromising in quality and competence.

HQ and GMP Grade DNA are required not only for vaccine production but also in the field of cancer research. Could you elaborate?

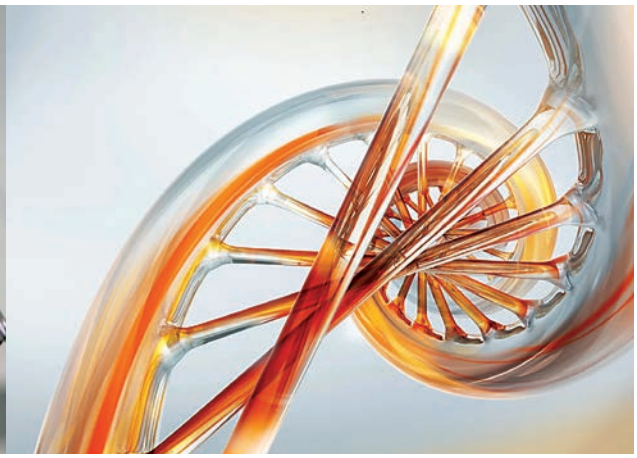
That's right, with our national and international customer base, we at PlasmidFactory are also well positioned in other research areas.

Exciting and no less important is the so-called CAR-T cell development. Ongoing research and advancements in CAR-T-cell technology currently unlock new possibilities for personalised and targeted cancer treatments. This groundbreaking approach has demonstrated remarkable success.

PlasmidFactory has developed and patented a method for producing CAR-T cells. In contrast to conventional methods, no viral vectors are used here, but PlasmidFactory's proprietary minicircle technology. Corresponding products are currently undergoing clinical trials.

Has the proprietary minicircle (MC) technology contributed to the success of CAR-T cell therapy?

Yes, without "MC" it does not work: Minicircle DNA contains practically only the "Gene of



Interest" (GOI). Unnecessary sequences used only for the plasmid production process are completely removed. A safe and highly effective vector system is the result. It already meets the future regulatory requirements for gene therapy and vaccination.

We also produce customised minicircles using our unique, patented method: the plasmid containing GOI is the starting material. This is inserted into the so-called "parental plasmid". From this, the minicircle DNA molecule is produced by recombination, which consists almost exclusively of GOI.

The minicircle DNA, produced with our proprietary technology, is patented for use in CAR-T cells worldwide and is exclusively available at PlasmidFactory.

What kind of R&D activities do you have at PlasmidFactory?

The R&D activities of the PlasmidFactory are carried out in our laboratories, as well as in close cooperation with national and international partners.

For example, in the fields of:

- Optimisation of vectors to produce viral vectors (AAV or LV) or for efficient antibody or RNA production
- Development of resistance gene-free vector systems (e.g., minicircles)
- Investigation of the influence of various factors on the long-term stability of plasmid DNA (e.g., plasmid size, DNA concentration, storage medium, freezing and thawing conditions)
- DNA vaccines
- High cell density cultivation
- Single use technology in process technology
- Linear DNA vectors with loops at their ends (MIDGE)
- Vector development and gene transfer

Besides these scientific collaborations, we are also implementing strategic partnerships. In 2022, we partnered with ARCHIMED, a leading investment firm focused exclusively on healthcare industries. With ARCHIMED at our side, we are strengthened in expanding our business globally.

In addition, we have also found a more specific partner to support us in entering the Indian market.

Does this mean you have a new strategy to meet the increasing demand for highest quality DNA in the Indian market?

Yes, we do. After the success in handling COVID-19 in India, a large number of biotechnology and pharmaceutical firms are investing heavily in mRNA R&D. We are pleased to introduce Dr Nagaraj Rao, RRR Labs, Navi Mumbai, as our new partner in India. Dr Rao is well-known in the Indian pharma industry and among Indian biopharmaceutical and vaccine manufacturers for providing customers with state-of-the-art media and feeds for mammalian cell culture in recent years. Having lived in Germany for a decade earlier, his strong support and his role in bridging communication gaps between Indian and German companies play a crucial role in the success of such technology-driven businesses.

Being a biologist, how are you able to balance the business and research activities?

I am a biologist and researcher who manages the PlasmidFactory family. PlasmidFactory's products are manufactured by an energetic team of motivated colleagues.

Our work here is in the service of science, but of course, science also meets entrepreneurship in our company. We remain researchers for researchers!

With new convincing ideas and unique techniques, we want to advance biotechnology together - a simple part of my DNA.

Sightsavers India opens applications for Fellowship Programme 2024 for ophthalmology

Sightsavers India, a development organisation dedicated to eradicating avoidable blindness and promoting equality of opportunity for individuals with disabilities, has announced the commencement of applications for its annual Fellowship Programme for the year 2024. The programme is scheduled to commence in August 2024. The Sightsavers India Fellowship Programme provides a distinctive and promising career pathway for ophthalmologists, crafted to guide selected fellows through a rewarding 24-month journey. This structured programme enhances skills and provides mentorship across various domains, including clinical and surgical ophthalmology, as well as managerial and holistic life skills development. Upon acceptance, fellows undergo an intensive four-month training focused on Small Incision Cataract Surgery (SICS), a vital aspect of the fellowship. Subsequently, they are placed within peripheral centres across one of eight states- Madhya Pradesh, Uttar Pradesh, Bihar, Jharkhand, West Bengal, Rajasthan, Chhattisgarh, and Odisha.

Jaipur's IIHMR University introduces certificate course on digital health

IIHMR University (previously known as Indian Institute of Health Management Research), Jaipur, has launched its first-ever certificate course on digital health for aspiring professionals interested in navigating the corridors of the digital healthcare ecosystem. The objective behind launching this course is to develop healthcare professionals with an understanding of digital health innovations so they can contribute in enhancing the performance of health systems keeping availability, affordability, and quality of healthcare services on top priority. Approved by the advisory board at the School of Digital Health, the 6-month-long immersive programme is designed and conceptualised by the faculty members at IIHMR University. The course is curated keeping in mind the geographical barriers hence, it will be conducted in online mode. Through this launch, the School of Digital Health is focused on aggressively engaging in all verticals of the healthcare segment and contributing to the government's agenda of making India's healthcare digitally armed.

Institutes in India, the UK enter into partnership to improve healthcare outcomes

King's College London, Guy's and St Thomas' NHS Foundation Trust, the Hinduja Foundation UK and P.D. Hinduja Hospital & Medical Research Centre (owned and managed by the National Health & Education Society) have announced a new strategic partnership to advance training, education and research capacity building focused on healthcare outcomes. King's College London, Guy's and St Thomas', and the National Health & Education Society have signed

a memorandum of agreement which will deliver King's and Guy's and St Thomas' training in clinical and non-clinical short courses, research capacity building and executive education to health professionals in India and the UK to mutually share the best clinical practices. Separately, a significant philanthropic gift from the Hinduja Foundation UK will enable health engineering research and clinical innovation through PhD and Masters scholarships for students from India in biomedical engineering and imaging sciences. Together, these joint activities will create the Hinduja-King's Health Partners Academy.

Dr Krishna Ella takes the helm of IVMA as President

The Indian Vaccine Manufacturers Association (IVMA) has announced Dr Krishna M Ella, a distinguished scientist and successful entrepreneur, as the association's new President for two years from April 2024-2026. Dr Ella, Co-Founder, Executive Chairman of Bharat Biotech, acknowledged as the father of Genome Valley, and known for his pioneering work in biotechnology with his visionary leadership in the biotech industry, is set to steer the Association towards new horizons in vaccine development and production. Dr Ella takes over the Presidency from Adar C Poonawala who held the post from 2019 to March 2024.

For the current 2-year term, Mahima Datla, Managing Director of Biological E assumes the role of Vice President; T. Srinivas, CFO of Bharat Biotech, will be Treasurer and Dr Harshavardhan, will continue as Director General of IVMA. His appointment comes at a critical time when the world is grappling with emerging infectious diseases and the need for preventative vaccine research and development, and access to safe and affordable vaccines, is more pressing than ever.

Jaideep Ghosh joins Heartnet India's Advisory Board as Chief of Strategy

Bengaluru-based startup Heartnet India, a rapidly scaling digital health innovator committed to 'Delivering Quality and Affordable Healthcare for All' has announced the induction of Jaideep Ghosh to its Advisory Board as Chief Advisor- Strategy. Ghosh will advise on critical business strategies, including go-to-market initiatives, brand management, investor relations and talent management, among others alongside the leadership team. He will take an instrumental role in directing Heartnet India to accomplish its mission of reaching a target of 10,000 care points within the next 24 months, making cardiac care accessible and affordable across India. An alumnus of Columbia Business School in New York, Ghosh has a distinguished career of over two decades. He currently serves on the Advisory Council of Harvard Business Review and previously held leadership positions as Chief Operating Officer at Shardul Amarchand Mangaldas & Co., a premium law firm, and a senior Partner, National Industry Head and COO at KPMG Management Consulting. He is also dedicated to social causes, holding an advisory board position at a grassroots organisation providing education to underserved communities.

EzeRx appoints Arnab Bhattacharya as Sales Director

Bhubaneswar-based medtech startup EzeRx has announced the appointment of Arnab Bhattacharya as Sales Director. In this pivotal role, he will spearhead the commercialisation strategy and sales efforts for EzeRx's innovative medical device scheduled for launch later this year. Bhattacharya brings over 22 years of experience driving revenue growth and building high-performing sales teams in the pharmaceutical industry across diverse geographies in India. With an outstanding track record of success in Eastern, Northern, and North-Eastern regions, he has consistent results for all the organisations he's been associated with while gaining deep insights into varied therapy areas. Before joining EzeRx, Bhattacharya served as Zonal Manager at Nutrigold India based in Delhi, overseeing operations across Delhi NCR, Chandigarh, Punjab, Rajasthan, Uttarakhand, Jammu & Kashmir, and Western Uttar Pradesh. He also held key regional and area business manager roles in Kolkata, West Bengal, Bihar, Odisha, Jharkhand, and the North- Eastern states.

Maximizing the Efficiency of Genomic Laboratories through ROBOTIC LIQUID HANDLING

Next Generation sequencing, or massively parallel, high-throughput technology continues to play integral role in genomic research, supporting the investigation into various biological processes in human disease, genetic inheritance, immunity, cancer, and others.

For many labs across the globe, speeding-up assays and increasing experimental throughput are essential for maintaining a productive workflow amid ever-growing demand. In the dynamic and demanding field of genomic research, the adoption of automated liquid handling technologies represents a pivotal advancement. BRAND's state-of-the-art liquid handling system provides unmatched precision, adaptability, and efficiency, underpinning the robustness and dependability of high-throughput genomic methods.

Sample Preparation: Liquid handling systems are used to accurately dispense reagents, enzymes, and DNA/RNA samples during the NGS library preparation process. Precision in pipetting ensures that the correct volumes are added, minimizing errors in library construction.

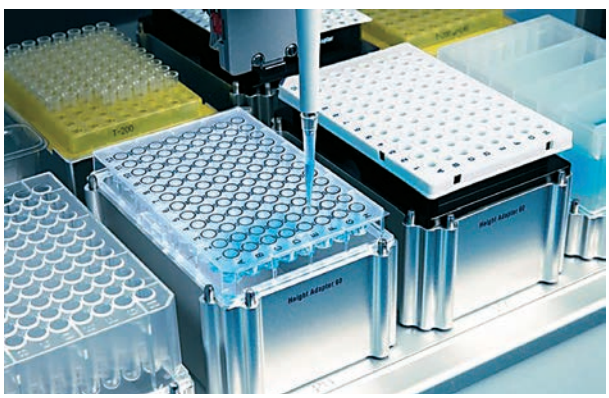
Reducing Contamination: Precise liquid handling minimizes the risk of cross-contamination between samples, which is critical in NGS to avoid mixing genetic material from different sources.

Pooling and Dilutions: Accurate pipetting is essential when creating sample pools or diluting samples to achieve the desired concentration. This affects the uniformity of sequencing coverage across samples.

Minimizing Sample Loss: High precision ensures that minimal sample material is wasted during the process, which can be especially important when dealing with limited or precious samples.

Consistency: Liquid handling systems provide consistent results across multiple runs, reducing variability in NGS data, and making experiments more reproducible.

Error Detection: Modern liquid handling systems often include error detection mechanisms to alert users to potential issues during pipetting, further enhancing accuracy.



High-Throughput: Automation and robotics in liquid handling enable high-throughput NGS, allowing researchers to process a large number of samples efficiently.

When dealing with a situation where you accidentally miss pipetting into the right well of a microplate, it's a good practice to maintain transparency and take corrective actions.

The BRAND Pipetting Robot/ liquid handling system can be an important solution to minimize human errors and ensure precise and accurate pipetting. These automated systems are designed to handle liquid transfer tasks with high precision, reducing the risk of accidental mistakes and improving the overall reliability of laboratory work. Using such a system can greatly enhance the accuracy and reproducibility of experiments. This approach allows you to acknowledge the mistake and implement a clear solution to ensure the integrity of your experiment or analysis.

In essence, the accuracy and precision of liquid handling systems are critical for obtaining reliable and high-quality NGS data, especially when dealing with large-scale sequencing projects or valuable samples. Proper calibration, maintenance, and validation of these systems are essential to ensure their performance in NGS workflows.

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IIT Roorkee, UnivLabs collaborate to develop biodegradable ureteral stents

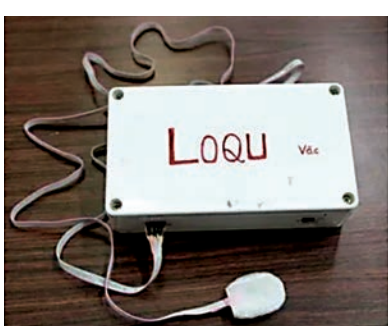
The Indian Institute of Technology (IIT) Roorkee, and Gurugram-based UnivLabs Technologies have joined hands to translate research findings into real-world applications. Through a Technology Transfer Agreement and a Memorandum of Agreement (MoA), the collaboration aims to develop and commercialise technology related to biodegradable ureteral stents, a breakthrough innovation poised to transform urological care. The patented technology, titled 'A biodegradable polymeric composite with enzymatic degradation for ureteral stents and its methods of preparation,' holds immense promise in addressing challenges associated with conventional ureteral stents. These stents are commonly used to maintain fluid drainage from the kidney to the bladder in cases of ureteral obstruction caused by various clinical conditions. Unlike non-degradable stents currently in use, the biodegradable stents developed by a team of researchers from IIT Roorkee and UnivLabs Technologies offer several advantages.

IISc launches 'Longevity India Initiative' to pioneer ageing research in India

The Indian Institute of Science (IISc) in Bengaluru has announced the launch of the Longevity India Initiative, a project focused on efforts to extend human 'healthspan' and tackle ageing-related challenges. The initiative has also started a large-scale clinical study that will involve researchers from multiple IISc departments, clinicians, industry, philanthropists and civil society. This initiative seeks to enhance the understanding of ageing through both fundamental and applied research, and to develop solutions that can improve quality of life. The initiative has received initial grant funding support from Prashanth Prakash, Founding Partner, Accel India. The Longevity India Initiative brings together a multidisciplinary team of experts from academia, industry, and healthcare to address complex challenges related to ageing. The initiative will leverage advanced research to develop interventions that can help manage age-related diseases more effectively, with an emphasis on promoting healthy ageing across India. MS Ramaiah Hospital and Bangalore Medical College & Research Institute have officially partnered to conduct a clinical study for identifying biomarkers of ageing.

IIT Guwahati pioneers groundbreaking speech reconstruction technology

Researchers at the Indian Institute of Technology (IIT) Guwahati have achieved a significant breakthrough in the field of speech technology with the development and patenting of 'LOQU', a novel method to generate human speech signals directly from vocal cord vibration signals. During speech, vocal folds vibrate due to intrinsic laryngeal muscle movement. In some cases, like mutism from apraxia, individuals may have normal vocal fold vibration without sound production due to coordination issues in tongue or throat muscles essential for speech. Derived from the Latin word for 'To speak or talk', this technology captures vocal fold movement without invasive procedures, utilising sensors placed over the throat. This innovative approach allows for the reconstruction of speech signals from vocal cord vibrations, offering promising applications for speech-impaired individuals and medical settings. The prototype of LOQU has been developed on a laboratory scale at a cost of under Rs 2000.



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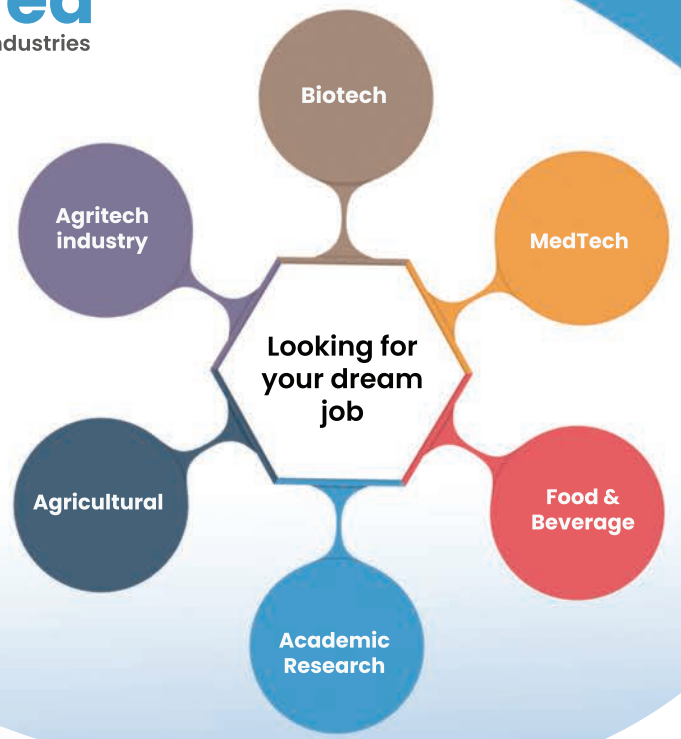

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IIT-K to develop health technologies for soldiers in difficult terrains

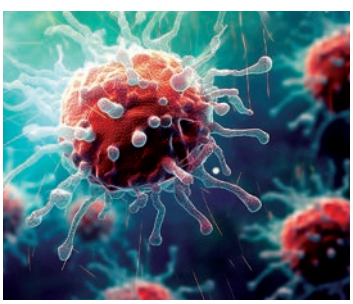
The Armed Forces Medical Services (AFMS) has signed a Memorandum of Understanding (MoU) for collaborative research and training with Indian Institute of Technology Kanpur (IIT-K). The MoU was signed by Director General Armed Forces Medical Services Lt Gen Daljit Singh & Officiating Director, IIT Kanpur Prof. S Ganesh. Under this MoU, AFMS and IIT Kanpur will team up to undertake research and develop new technologies to address health problems faced by soldiers in difficult terrains. IIT Kanpur will provide technical expertise for developing artificial intelligence (AI)-based diagnostic models, at the Armed Forces Centre for Computational Medicine established in Armed Forces Medical College, which is a first of its kind amongst medical colleges in India. Under the ambit of this MoU, faculty exchange programme, joint academic activities and development of training modules will also be planned. AFMS is dedicated to provide the highest level of medical care to soldiers and collaboration with institutes of national importance like IIT is a significant step towards this commitment.

Scientists target spermidine production to combat emerging drug resistance in Salmonella

Scientists at the Department of Microbiology and Cell Biology (MCB), Indian Institute of Science (IISc), Bengaluru have pinpointed how Salmonella Typhimurium, causal organism of typhoid, uses a key molecule called spermidine to shield itself from the onslaught of the host's defence machinery. They also find that an existing US FDA-approved drug can reduce spermidine production, weakening the bacterium's ability to cause infection. The researchers found that spermidine is crucial for Salmonella to protect itself from oxidative stress inside the macrophages. Spermidine specifically regulates the expression of an enzyme called GspSA, which causes spermidine to bind strongly to a protein called Glutathionyl (GSH). This conjugate forms chemical bonds with various bacterial proteins, strengthening and shielding them during oxidative stress. Mice infected with mutant Salmonella lacking the ability to import and produce spermidine showed higher survival rates compared to the ones infected with normal Salmonella.

New antigen to boost production of antibodies against cancer cells

Researchers at the Indian Institute of Science (IISc) in Bengaluru have designed a synthetic compound (antigen) that can latch on to a protein in blood and hitchhike a ride to the lymph node, where it can boost the production of antibodies against cancer cells. The approach gives a new direction to develop vaccine candidates for a variety of cancers, the researchers say. Inside the human body, cancer cells can weaken or shut down the production of antibodies that target and eliminate them. Developing a cancer vaccine, therefore, involves modifying or creating a mimic of an antigen found on the surface of cancer cells to turn up or turn on this antibody production. In recent years, scientists have turned to carbohydrates found on cancer cell surfaces to develop these antigens. To design the new compound, researchers zeroed in on a truncated carbohydrate called Tn found on the surface of a variety of cancer cells, and synthesised it in the lab. Then, they combined it with a long-chain, oil-loving chemical – unlike carbohydrates which are water-loving – to form bubble-like micelles.



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Rockwell Automation to open 98,000 sq ft manufacturing facility in Chennai

Rockwell Automation, providing automation solutions to Indian manufacturers across sectors like pharma and life sciences, FMCG, and packaging, has announced plans to open a new manufacturing facility in Chennai. The 98,000-square-foot facility with space for potential expansion will help Rockwell build a more resilient, agile, and sustainable supply chain in the Asia Pacific region and around the globe. Rockwell is investing in India by expanding its manufacturing presence and building a new factory in Chennai. The facility will be located in the same industrial park as Rockwell's CUBIC manufacturing facility to help maximise supply chain resilience and create additional career opportunities for employees. The facility in Chennai is expected to open in the first half of 2025 and will employ about 230 workers by the end of the year.

Waters accelerates development of gene-based therapeutics with new columns

US-based Waters Corporation has introduced a new GTxResolve Premier Size Exclusion Chromatography (SEC) 1000Å 3-micron (3 µm) Columns. Waters has implemented a unique combination of novel packing materials and MaxPeak Premier High-Performance Surface (HPS) technology into the columns to help scientists accelerate the development of gene-based therapeutics, including cell & gene, mRNA and LNPs. SEC has emerged as an important platform analytical technique, but existing technologies require extensive column conditioning, consume large amounts of samples, and require lengthy run times to resolve imperfect impurities, making them an solution. Waters GTxResolve Premier SEC 1000Å 3 µm Columns address those challenges by providing higher sensitivity, resolution, and throughput by combining novel particle technology with low adsorption MaxPeak Premier HPS Technology.

HiMedia unveils Centre of Excellence for 3D Cell Culture Lab in Mumbai

HiMedia Laboratories, a leading biotechnology company in Mumbai, has announced the inauguration of its state-of-the-art Centre of Excellence (CoE) for 3D Cell Culture Laboratory. This facility represents a significant milestone in HiMedia's commitment to advancing scientific research and fostering collaborative partnerships in the field of 3D cell culture and bioprinting. The CoE for 3D Cell Culture Laboratory is poised to be a hub of innovation, where cutting-edge technologies and pioneering research will converge to shape the future of cell culture methodologies. With a dedicated focus on 3D cell culture and bioprinting, the facility is equipped with state-of-the-art infrastructure and advanced instrumentation, ensuring precision and efficiency in research and development activities. The facility will spearhead research initiatives aimed at developing innovative solutions and methodologies in 3D cell culture and bioprinting. This includes exploring novel biomaterials, optimising culture conditions, and enhancing bioprinting techniques. It will serve as a collaborative platform for sharing knowledge, resources, and expertise to accelerate the translation of research into tangible applications.

Agilent introduces cutting-edge spectral flow cytometry solution NovoCyte Opteon

US-based Agilent Technologies Inc. has announced the NovoCyte Opteon Spectral Flow Cytometer, propelling flow cytometry into a new era of and accessibility. This cutting-edge system sets a gold standard for acquiring, analysing, and reporting flow data across diverse domains, from basic research to drug discovery and therapy development.

The NovoCyte Opteon represents a significant leap forward in flow cytometry technology, with configurations ranging from three to five lasers and support for up to 73 high-quality detectors. It meets researchers' needs for sophisticated, large-panel flow cytometry assays while maintaining the easy-to-use features of the NovoCyte portfolio. Researchers can now explore cellular mysteries with unparalleled precision, simultaneously analysing over 40 markers, providing great flexibility in flow panel design.

Qiagen enhances bioinformatics workflows with new secondary analysis solution for oncology

Germany-headquartered company Qiagen has announced the availability of QCI Secondary Analysis, a cloud-based software-as-a-services (SaaS) solution enabling high-throughput secondary analysis for use with any clinical next-generation sequencing (NGS) data. This turnkey service supports all Qiagen QIAseq panels and seamlessly integrates with QCI Interpret, Qiagen's clinical variant interpretation and reporting software, to deliver highly scalable and customisable Sample to Insight workflows for oncology and inherited disease applications. Expanding on the Qiagen Clinical Insights (QCI) portfolio, QCI Secondary Analysis is designed to streamline analysis from a range of assay types, enabling labs to process more sequencing data without extensive time and resource investment.

Bio-Techne announces new distribution agreement with Thermo Fisher

Bio-Techne Corporation, a global life sciences company providing innovative tools and bioactive reagents for the research and clinical diagnostic communities, has announced a significant milestone in its commitment to providing cutting-edge solutions to its customers. Effective May 1, 2024, Bio-Techne has entered into a strategic distribution agreement with Thermo Fisher Scientific, a leading provider of laboratory products and services, in Europe. This partnership marks an important collaboration between two industry leaders in the fields of scientific research, diagnostics, and biotechnology. Under this agreement, Thermo Fisher, through the European arm of its Fisher Scientific Channel, will distribute Bio-Techne's extensive portfolio of innovative products, including antibodies, proteins, Immunoassay kits, reagents and enzymes to laboratories and research institutions across Europe. Bio-Techne's state-of-the-art products are designed to accelerate research and improve outcomes in areas including cell and gene therapy, immunology, neuroscience, and more. With this collaboration, Thermo Fisher reinforces its commitment to providing customers with access to the latest technologies and expertise, ultimately advancing scientific knowledge and improving human health.

Revisiting 'Benefits vs Risks' of COVID-19 Jabs

A potential disruption has recently emerged in many parts of the world, in the form of a new family of COVID-19 sub variants, being dubbed as the 'FLiRT' variant. As per the Centers for Disease Control and Prevention in the US, this Omicron offshoot which is being called FLiRT is based on the technical names for the amino-acid mutations, i.e. amino phenylalanine (F) replaces leucine (L), and arginine (R) is replaced by threonine (T).

In particular, KP.2 which is one of the several variants being referred to as 'FLiRT variants', is dominating the COVID-19 infections lately. While medical experts in the US are not raising much concern over this new development, the government in Singapore has issued a health advisory asking people to wear masks again.

According to news reports in India, infections have recently become dominant in Maharashtra with over 70 per cent of samples tested for genome sequencing found to have KP.2 variant, with the reports having been shared with the central and state health departments for further action.

If we consider this new situation to be a 'summer wave' of COVID-19, one does wonder if another shot of vaccine would be required to calm this down. Amidst this uncertainty, another round of news is flashing that multinational pharmaceutical company AstraZeneca is withdrawing sales of its COVID-19 vaccine globally, since there is a surplus of more updated vaccine options that target new variants of the virus.

While the company states that this is a business decision, a response to the declining sales of the older vaccine since other options are more relevant, it comes at a time when the vaccine has come under scrutiny for causing side effects.

Researchers have found that the AstraZeneca vaccine, sold in India under the brand name Covishield by Pune-based Serum Institute of India (SII), is linked to Vaccine-Induced Immune Thrombocytopenia and Thrombosis (VITT), a blood clotting disorder. According to the scientists from Flinders University in Australia, who recently shared their study in the New England Journal of Medicine, VITT emerged in 2021 during the pandemic, particularly after the use of the Oxford-AstraZeneca vaccine, which is based on adenovirus vectors.

According to media reports, soon after AstraZeneca announced the global withdrawal of its COVID-19 vaccine, SII gave the statement that the firm had stopped the manufacturing and supply of additional doses of Covishield since December 2021. In fact, to shift the focus from these ongoing concerns on the COVID-19 vaccine and its related side effects, AstraZeneca has apparently gone ahead to announce the launch of a new COVID-19 prevention drug.

Covaxin is also under the scanner, based on a recent study by Banaras Hindu University (BHU). Nearly one-third of the individuals who received Bharat Biotech's Covaxin reported 'adverse events of special interest,' or AESI, according to a one-year follow up study conducted by a team of researchers at BHU.

Nearly 50 per cent of 926 participants in the study complained of infections during the follow-up period, predominated by viral upper respiratory tract infections.

In response to these findings, the Hyderabad-based vaccine manufacturer found this study to be inconsistent, marred by lapses. Bharat Biotech has been asserting that its COVID-19 vaccine has demonstrated 'excellent safety track record' in several studies.

After reviewing multiple cases of side effects post vaccination, doctors in India have been urging the government to review the science behind all the COVID-19 vaccines, including Covishield and Covaxin.

An active surveillance and monitoring mechanism appears to be a 'need of the hour' to ensure vaccine adverse events are identified as early as possible, and not ignored. BS

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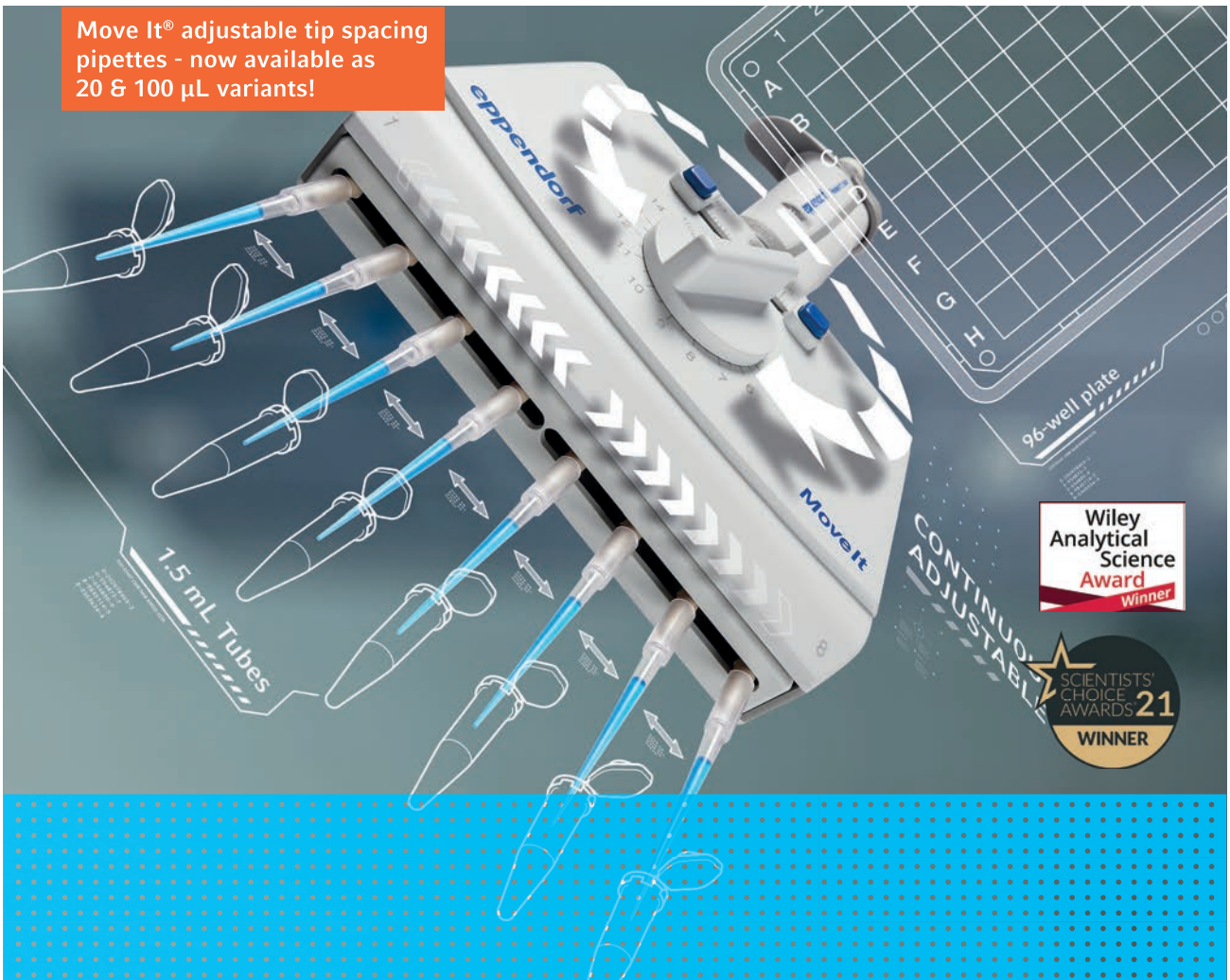

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