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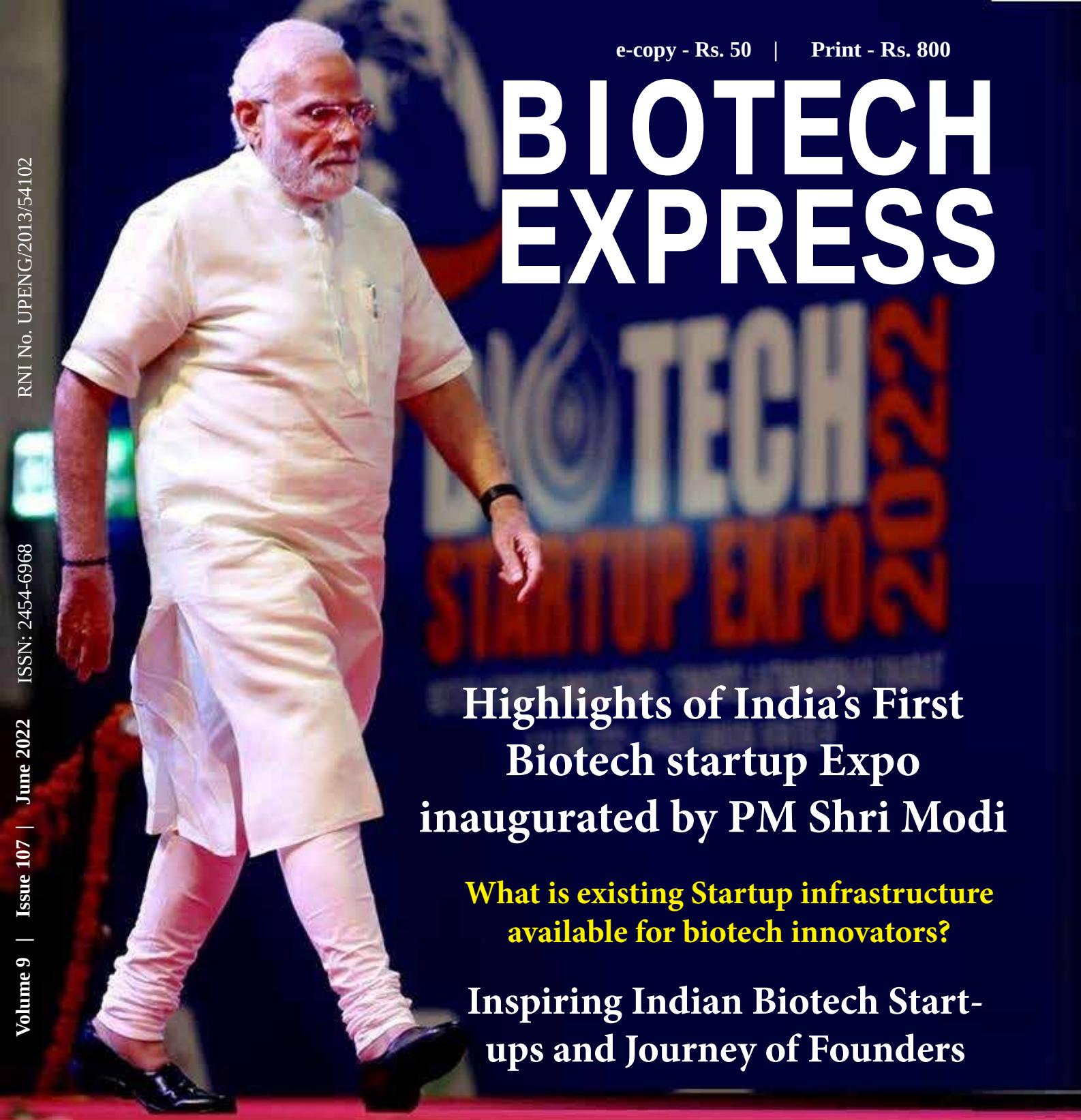

Highlights of India's First Biotech startup Expo inaugurated by PM Shri Modi

What is existing Startup infrastructure available for biotech innovators?

Inspiring Indian Biotech Start-ups and Journey of Founders

Obituary: Professor M. Vijayan: A tribute to Pioneer of macromolecular crystallography in India

New released Pfizer covid vaccine trial documents from USFDA reveals depopulation agenda, neonatal death?

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RNI No. UPENG/2013/54102 | ISSN: 2454-6968 | Volume 9 | Issue 107 | June 2022

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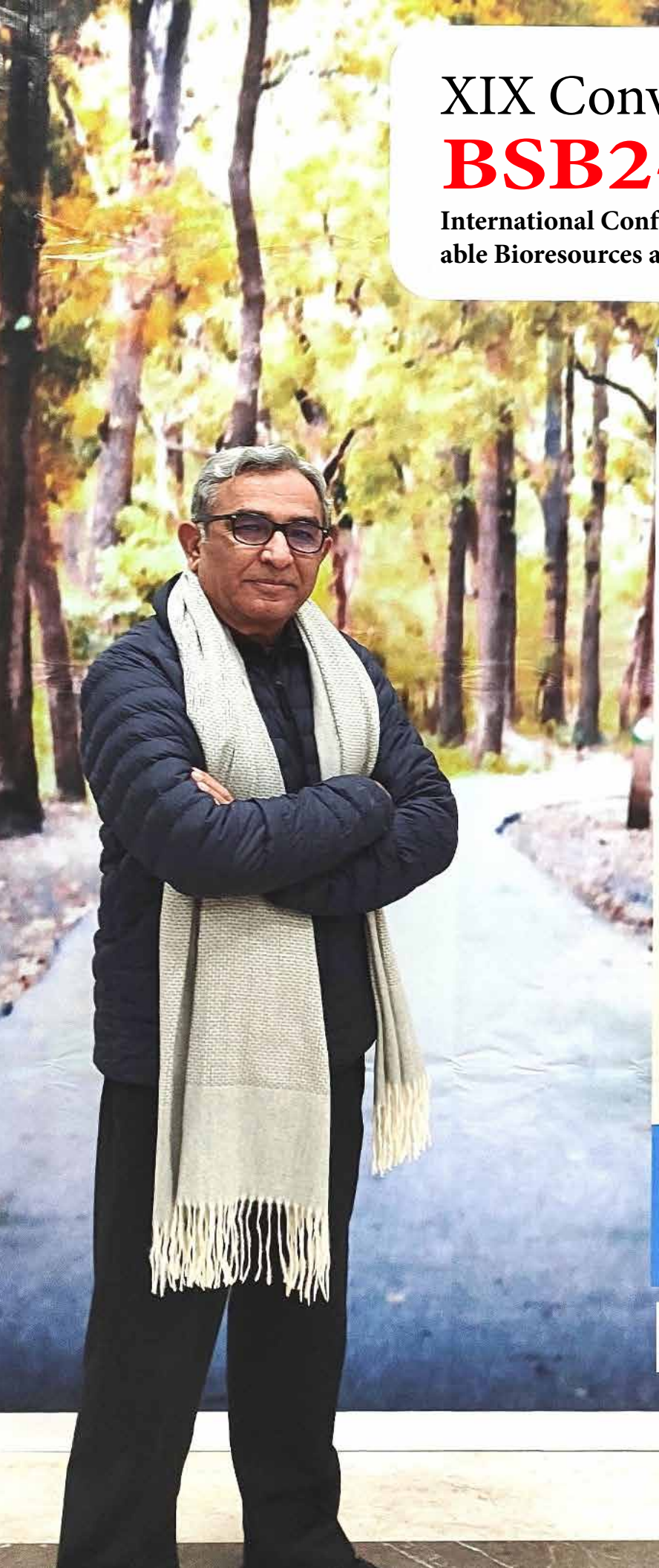
BSB2-2022

International Conference on Biotechnology for Sustainable Bioresources and Bioeconomy (BSB2-2022)



On behalf of the BSB2-2022 and the XIX Annual Convention of the Biotech Research Society, India (BRSI), we have the pleasure of inviting you to attend the conference at IIT Guwahati. This conference intends to present a unique spectrum of scientific programs on the most recent and exciting developments in Biotechnology, with focus on related cross-fields research and developments. The Conference is expected to display the numerous breakthroughs and significant developments in the selected thematic areas and their relevance to the welfare of mankind.

Prof Ashok Pandey
General Chair, BSB2-2022, Chief Mentor- BRSI,
CSIR-IITR, Lucknow, India

December 7-11, 2022
IIT- Guwahati

Details can be found at
https://www.bsb2iitg2022.in/

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Editorial

Highlights of India's first Biotech startup Expo inaugurated by PM Shri Modi

Kamal Pratap Singh

As a student during early 90s-20s many were heard of saying "Who Said Biotechnology Lelo Bhut Scope Hai". This implied that the biotech sector had limited opportunities in 90s and early 2000. The students were not getting enough jobs and research opportunities were very limited. It is estimated that out of 1000 students who were passing out only 5 students were going abroad for PhD and around 20-25 were getting admission in PhD in India. Most of the students were opting for foreign degree because the fellowship was very less in India and jobs after PhD were preferentially reserved for foreign degree holders. The infrastructure for biotech research was not developed and companies were very few and so the jobs for graduates and post graduates.

Development of biotech infrastructure was a challenging avenue for few early biological science leaders who with their efforts have changed the scenario and today India is very well versed with the infrastructure and manpower in biotech sector. The credit goes to many but the role of BIRAC in developing biotech company culture cannot be ignored which is working since 2012 to make Indian biotech industrial sector sustainable. This year BIRAC celebrated its 10th anniversary showcasing the current strength of biotech startup ecosystem through an event that was organized in Pragati Maidan, New Delhi and was inaugurated by Shri Narendra Modi, the Prime Minister of India.

On 10th June 2022 Prime Minister Shri Narendra Modi inaugurated the "Biotech Startup Expo – 2022", Minister of Science and Technology (Independent Charge) and Minister of state (Independent Charge) Ministry of Earth Science Shri Jitendra Singh, Shri Piyush Goyal, Minister of Textiles, Minister of Commerce and Industry and Minister of Consumer Affairs, Food and Public Distribution and Shri Dharmendra Pradhan, Minister of Education and Minister of Skill Development and Entrepreneurship were also present at the event. The

other eminent personalities who were present on the occasion were Dr Krishna Ella, MD Bharat Biotech, Prof G Padmanabhan, Emeritus Professor, IISC, Dr Srivari Chandrasekhar, secretary, DST, Dr Rajesh Gokhale, secretary, DBT, Dr Renu Swarup, Dr NK Ganguly, Dr. G. Taru Sharma Director NIAB, Dr Nakul Parashar, Director, Vigyan Prasar, DST among others. Around 5000 attendees were present during the 2 day event.

The presence of PM and other ministers showcase why the event was important for the Atma Nirbhar Bharat through biotechnology. The Expo which was organized to mark the completion of 10 years of setting up of BIRAC by the Department of Biotechnology(DBT) and the Biotechnology Industry Research Assistance Council (BIRAC) was first such event in the history of Biotechnology and was designed to act as a platform to connect entrepreneurs, investors, industry leaders, scientists, researchers, bio-incubators, manufacturers, regulators, government officials, etc.

During the welcome address, the moderator of the event Dr Rajesh Gokhale, secretary, DBT thanked all delegates for their presence in the event. He thanked PM Modi for his humble presence despite his hectic schedule and appreciated the motives of government of job creators in biotech sectors through startup support. He said this expo is an opportunity to experience the growth and innovations of biotechnology in the nation. By giving example of COVID -19 pandemic he discussed that how the biotechnology ecosystem has become an indispensable part of testing, tracking, tracing, prevention and cure.

Dr Jitendra Singh, during his address discussed the role of biotechnology in India and said how the government efforts have paid the results, the startups which were only 400 in 2014 now grown to more than 70,000. He also discussed how this pandemic has led the common people to think about biotechnology and how DBT and BIRAC have supported different products and vaccine in Pandemic. He added that there were sectors like agri and dairy which were not explored before but biotechnology has helped them to nurture.

While addressing the Biotech Startup Expo 2022, PM Modi hailed the country's startups industry. He said India's first Biotech Startup Expo is a reflection of the growth of the biotech sector in the country. "India's bio-economy has grown eight times in the last eight years. India is not too far from joining the league of top ten countries in the biotech global ecosystem," PM Modi said. He discussed five factors that are crucial for the development of biotechnology in the country i.e. diverse population and climate zones, talented human capital pool, Ease of doing business, Biopropducts' demand and growing interest of people in biotech sector.

Modi discussed Holistic and whole govt initiative in different sectors, he said earlier only few sectors were targeted but now we have changed the approach and thus now every sector is being focused for the development of the country. This drastic development in thinking and action is strengthening the country. The service sector has achieved 250 billion dollar goal and good exports increased to 450 billion dollar. To attain all inclusive development we are now focusing on all sectors like semiconductors, textile etc. For biotech sector too India is acting in various directions and the steps taken are appreciable which can be seen in biotech startup ecosystem. In the past 8 years, the number of startups has risen from a hundred to 70,000 startups. These are divided among 60 different sectors but important to note that every 14th startup (5300) belongs in the biotech sector, Modi said. Of these, as many as 1100 biotech startups were created only last year, he added. "Similarly, just 8 years back, the number of biotech products were limited to 10, but now the number has grown to more than 700."

The steps which were taken under Atal Innovation Mission, Make in India and Atma Nirbhar Bharat have enormously benefited biotech startups. After launching Startup India program there is huge rise of investors in biotech, number of bioincubators and total funding. Today India has 75 bioincubators against 6 in 2014 and 700 bioproducts against 10. PM also added that "India has already achieved 10 percent ethanol blending target for petrol. The deadline for achieving the target of 30 percent blending has also been reduced from 2030 earlier to 2025 now.

He also said that the youth are more interested in biotech because now India has support system for innovation, R&D which is available through various support systems including policies and infrastructure. Only the govt. knows and doer

is past and now India is moving forward with the notion of sabka Saath Sabka Vikas and thus several programs have been devised to support different sectors and bringing them on common platforms through events like Biotech Startup Expo 2022.

In the pandemic we have formulated policies to increase the testing capacities, vaccination development and inoculation and collaboration between various govt. and private stakeholders, PM Modi added. Last but not the least PM Modi concluded that today biotech sector is largest demand driven sector which can prosper India's ease of living through healthcare, agri, biofuels etc.

Inaugural addresses by PM Narendra Modi and Dr Jitendra singh was followed by panel discussion "Future Trajectory of Bioeconomy in Biotech Sector and Action Plan for Vision @2047" in which stalwarts of academia, industry and govt. agencies participated and discussed about the current developments and barriers in biotech sector. The panel was moderated by Dr Rajesh S. Gokhale, Secretary Department of Biotechnology (DBT) & Chairman, Biotechnology Industry Research Assistance Council (BIRAC).

The dias had panelist like Prof G. Padmanaban, Emeritus Professor, IISc Bangalore; Dr. Renu Swarup, Former Secretary, DBT ; Mr. Girish Krishnamurthy, Chief Executive Officer and Managing Director, Tata Medical and Diagnostics Private Limited; Dr. Anand Deshpande, Founder, Chairman & Managing Director, Persistent Systems; Dr. Krishna M. Ella, Chairman and Managing Director, Bharat Biotec, Hyderabad; Dr. Vijay Chauthaiwale, Advisor & Consultant and policy advisor; Mr. Rajiv Gandhi, Chairman & Managing Director, Hester Bioscience Ltd.; Dr. Usha Zehr Barwale, Executive Director, Mahyco Pvt. Ltd. and Dr. Sanjay Singh, Chief Executive Office, Gennova Biopharmaceuticals Limited.

Dr Gokhale discussed how important is to focus on India's 150 billion dollar bioeconomy goal and welcomed the guests who in one way or other have setup pioneer biotech companies and have contributed to policy developments so to carry forward biotech activities in the country.

Prof G Padmanaban, a policy maker since the setup of DBT in 1986, BIRAC and many other organizations discussed how we came up with DBT in 1986 after going through National biotechnology board in 1982. He memorize the role of Dr M K Bhan in setting up of BIRAC, and then how small programs have become permanent in due time. Earlier only devices and diagnostics were part of schemes but later reagents, Drug discovery and transgenics and gene editing in agriculture were incorporated in schemes rigorously. Reagents were taken seriously at that time because most of them were coming from foreign countries, he added.

Dr Renu swarup thanked all dignitaries and discussed the past and future of BIRAC. During the 10 year journey we have seen many zigzags, when in 2007 the seed was sown by Dr Bhan it was risk as we were not knowing the future of this startup but later we sustained and now we can see where the BIRAC stands today, she said. She further added that to grow it more in coming years we have to look on emerging innovative technologies and ideas.

Girish krishnammorthy discussed how healthcare is inaccessible as we have seen in pandemic. He discussed role of his company going to play for connected continous healthcare and patient centric healthcare through regulations, science and technology, talent harness and funding.

Dr Ella, MD of Bharat Biotech briefly discussed the scenario of biotech in country in 1986 when only two companies were there, one is Shantha Biotech and other is Bharat Biotech which were both startups. At that time the regulators

did not knowing about clinical research in biotech and that is the time when DBT involved through the participation of Dr Manju Sharma, Prof T S Rao, Prof G Padmanabhan and Prof N K Ganguly among others as torch bearers in regulatory measures. At that time only two major things were happening in the DBT Tissue culture and vaccine related work, but now things have drastically changed. Secondly he told that there was no funding for private players at that time, they were treated differently, but because of efforts of Dr Bhan and others the things have changed and now there are various funding programs available for innovators in academia and industry. Dr Ella also talked about food security for vegetarian and non- vegetarian lifestyles. Since America and Africa have preferential non vegetarian diet of beefs he talked about diseases of cattles. He emphasized the role of Clinical research in nutrition which is important for food security in a country like India where food habits are very diverse and lastly he advised stakeholders to take a firm stand on GMOs approvals in the country. About regulations he hinted that putting more regulation will kill science and thus demanded ease of doing research and smooth regulations in science.

Anand Deshpnade from Persistent Systems, a computational scientist discussed about the comparison between IT and biotech industry growth. He urged to use IT industry as road map to replicate developments for biotech industry. He said biotech industry has become interdisciplinary so we need to bring stakeholders from diverse field during interactions which can boom the field. Thirdly we need collaboration of academia, industry and young generation with full support of govt. like done in software industry when 100% tax holiday was given to software development by Department of Information Technology & Communication in 1990s. Fourth, he suggested for training of people in the field and last he suggested branding of biotechnology like done in IT field which was done by NASSCOM, he suggested to use branding strategies of NASSCOM and to replicate in biotech sector.

Vijay Chauthaiwale, a policy advisor who trained and worked as a molecular biologist until he joined the BJP, Shri VijayChauthaiwale heads its foreign policy department and the Overseas Friends of BJP cell. He told about his journey as the first BIRAC grant awardee, he discussed about the professionalism of Dr Renu swaroop in the BIRAC. Talking about international collaboration requirement in biotech he emphasized the development of manpower and bringing the knowledge to country wherever it is available through bilateral collaborations.

Overall, the Biotech Startup Expo 2022 act as a platform to connect entrepreneurs, investors, industry leaders, scientists, researchers, bio-incubators, manufacturers, regulators, government officials, etc. About 300 stalls were set up at the Expo, which showcase the applications of biotechnology in various fields such as healthcare, genomics, biopharma, agriculture, industrial biotechnology, waste-to-value, and clean energy, among others.

In addition, on the last day of event Shri Jitendra Singh launched an e-Portal of 750 Biotech products, Products developed during the 75th year of independence and the Coffee book of 75 Women Biotech Entrepreneurs.

Testimonials of Startups and Bioincubators attendees of Biotech Expo startup 2022

Anu Acharya, CEO & Founder Mapmygenome

Bio-Tech Start-Up Expo was an absolutely fantastic event and the fact that getting the Prime Minister of our country to come and visit all these innovations to understand the impact of biotechnology is huge.

I think what's happening in the biotechnology sector in the last few years is encouraging. We have also seen that BIRAC has actually been able to fund so many startups that otherwise would not have seen wings. I think for me this has been the best example of how the Government can actually help in pushing forward and giving wings to young startups.

Clearly, we have started to see a much more robust system around bio-tech space in India. I think one of the key enablers of that ecosystem is BIRAC. With the induction of BIRAC ten years ago, many startups got the first phase of life which has allowed more bio-tech start-ups to come up in the last years.

The genomics world was transforming everything around us. I started Mapmygenome when I came to realise there is a need for an Indian perspective in the genomics space. There is a need for genomic data specifically for the Indian population and to give something to the average Indian consumer, especially in the space of personalised, preventive healthcare. It is not just about the data, it is also about how we use it to create a health care system from a prevention perspective.

For example, we have a product called Genomepatri and we use it for the early prevention of health conditions. Some people are curious about their ancestral roots and for them, we have Genomepatri Heritage.

For some, they want to understand what kind of drugs are likely to work for them. It's called Medicamap. With Medicamap, we create a profile, to understand the toxicity and adverse reaction of medicines to a person.

Mapmygenone also has expertise in next-generation sequencing solutions like Whole Exome & Whole Genome Sequencing, Carrier Screening Tests, BRCA tests, etc

Along with our preventive genomics services, we have a team of Board Certified Genetic Counselors. They will help in understanding which actionable steps can one take based on their genomic results and lifestyle factors and give you personalised recommendations.

RoboLife, TIDES, IIT Roorkee

The Biotech Startup Expo 2022 provided us with a platform to reach a wide range of audience and also helped in networking with other people from this industry.

RoboLife is a faculty incubated start-up at TIDES business incubator, IIT Roorkee. We have developed a technology (patent published) which helps in patient registration in contactless manner. We launched the name of our contactless patient registration device – "TARA" at Biotech Startup Expo 2022.By using TARA one can reduce the long queues at OPD in hospitals.

The registration time per patient is 1.5 - 2 mins. By employing multiple devices, the crowd can be handled effectively and efficiently. Along with basic details of the patient, it can also measure the temperature, thus helpful in segregating the patients in case of Covid.

The patient data is stored in excel format for further use by the doctors.Further device can be used for communication between doctor and patients in ICU or wards.

In fact, device can be used in any public place where registration of persons are needed. The desired data can be asked as per the users need.

Sri Padmavati Mahila Visvavidyalayam-Women Biotech Incubation Facility (SPMVV-WBIF), Tirupati

Congratulates and appreciates the efforts put in by the BIRAC team for bringing together all the key players within the Biotechnology sector under one roof. Hon'ble Prime minister inaugurating the event made it clear about the importance given to the Biotechnology sector by the Govt of India.

SPMVV-WBIF, is the only BioNEST within the Universities of A.P. and also, we are on a mission to promote entrepreneurial skills among young women students, faculty and in around the state of A.P. We are proud and happy to share, one of our incubatees, founder of Sri Dharani Agro Tech was selected as one amongst "75 Women Biotech Entrepreneurs details" details of which will be included in the booklet to be released by BIRAC. Some of our other Start Ups in the field of Early Cancer diagnostics, Nano-Technology for surface protection and Ayurvedic remedies for complex diseases. Our Start Ups had an opportunity to interact with the venture capitalists to secure next level of funding. We profusely thank the DBT-BIRAC team for giving our team this opportunity to interact with other incubators, huge cohort of start Ups from all over India.

Biotech Start Up Expo 22 helped us to showcase our work within the field and received tremendous response to the hands-on Training courses we run for the students. We thank you for the opportunity and look forward to the next meetings in the Biotech Field from DBT-BIRAC.

Human Biogenesis

As young social entrepreneurs, we were delighted to be included by BIRAC for expo. It was really a great pleasure to meet other start-ups, investors and other biotech professionals. It was an event of the year for us. We were glad to witness enthusiasm by all the participants. Such initiatives of Mr. Narendra Modi, PM of India will bring new dawn for the emerging biotech industry in India. In no time, India will be at the pinnacle of rediscovering its image as healthcare powerhouse. We sincerely appreciate BIRAC for the efforts put in round the clock to make it a successful event

Human Biogenesis is a biotech startup working in diagnostic domain since 2020. Human Biogenesis is cofounded by Sachitanand Kumar Roy and Debabrata Mandal. Human Biogenesis is based in IIT Guwahati - BioNEST and supported by RIIDL (Mumbai), BIRAC, DST, Start Up India and FIIRE (Goa). We're a young and talented group of entrepreneurs and engineers with a groundbreaking idea that we hope will contribute towards a better tomorrow. We provide smart solutions for customers of all sizes and pride ourselves on our unparalleled, dedicated service. Our products: • SD Kit - A one-step semen detection kit - It helps in reducing cases of side effects including infertility and cancer in women population who consumes morning after pills after unprotected intercourse and increase of conviction rate in sexual assault cases especially in rural areas. • SC Kit - A one-step sperm count kit - It helps in detection of normozoospermia and moderate & severe oligozoospermia.

MachPhy

We come to innovator in area of clean energy and sustainable cooling, MachPhy Solutions Private Limited. The founder Mr Pradeep Rout adds in how BIRAC helped during the initial development of their cooling products. MachPhy has been supported by BIRAC under Biotechnology Innovation Grant (BIG) scheme.

The company deals with making hybrid cooling boxes which can be run off-grid and also come with option of using solar energy for cooling. The inventions await patent and are used in healthcare biologics, vaccines transport, post-harvest agriculture storage and retail.

Mr Rout talks about how BIRAC support has been instrumental for company to move forward and also how innovations in this sector are important. He further talks about importance of supply chain regulation in cold storage, an issue which we surfaced during the first few phases of the global pandemic. He reinforces that the government should support more indigenous startups to solve issues of the country.

Crescent Innovation and Incubation Council (CIIC)

Through this Biotech Startup Expo, we received the opportunity to meet many eminent scientists, government stakeholders and esteemed people from the Life Sciences sector. The expo provided a venue to exhibit several products of our startups, which provided the startups good exposure and leads. We also received the chance to interact with entrepreneurs, investors, industry leaders, scientists, researchers, bio-incubators, manufacturers, regulators and government officials.

Crescent Innovation and Incubation Council (CIIC) (www.ciic.ventures) is an incubation centre, which is the innovation arm of B. S. Abdur Rahman Crescent Institute of Science and Technology, Chennai started in the year 2019.

Our thrust areas include Life Sciences, Industry 4.0, Mobility and Transportation. The "Biotech Startup Expo-2022" was truly a revelation with innovations and newfound technologies, which were demonstrated by over 200 entrepreneurs.

The gracing of the occasion by our Hon'ble Prime Minister clearly showed the emphasis laid by GoI in promoting biotech sector across the country. BIRAC has been instrumental in imparting significant opportunities to entrepreneurs from the Life Sciences sector. It has constantly provided support to promote the innovation ecosystem in the bio-tech space. CIIC is grateful to be a part of BIRAC as one of the incubators funded by BIRAC in fulfilling its mission of building a US$ 100 billion Indian bio economy through startups and SME's. Through the BIRAC BioNEST scheme, CIIC was able to incubate and nurture 81 Life Sciences startups in a span of 3 years.

CEO & Director,

Crescent Innovation and
Incubation Council.

ASPIRE-BioNEST, UoH

ASPIRE-BioNEST Participated in Biotech start-up expo-2022 which is part of 10 Years celebration of the Biotechnology Industry Research Assistance Council (BIRAC) held at Pragathi Maidan, New Delhi. It was an honour to attend this power-packed event which was inaugurated by Hon'ble Prime Minister Narendra Modi, who spoke about the growing potential of this sector, along with the presence of Hon'ble Union Ministers - Dr. Jitendra Singh, Shri Piyush Goyal, and Shri Dharmendra Pradhan, and many other Govt. dignitaries who came together to make this event successful.

On this special occasion, ASPIRE-BioNEST showcased few innovative products developed by incubating start-ups and received applauds from the delegates and dignitaries who visited the stall. Some of the notable visitors includes Dr. Chintan Vaishnav, Mission Director of Atal Innovation Mission, NITI Aayog, Dr. Rajesh Gokhale, the Secretary, Department of Biotechnology (DBT) and Manish Dr. Diwan Head - Strategic Partnership & Entrepreneurship Development, BIRAC and others. At the event, ASPIRE BioNEST was represented by its Director Prof. Rajagopal, COO Dr. Anil Kondreddy and Sr. Technical Officer Mr. Kuswanth Kumar.

ASPIRE BioNEST is a Biotech incubator established in association with BIRAC at University of Hyderabad in 2018. ASPIRE BioNEST supports life sciences start-ups to translate their ideas into technologies, with its vast supporting infrastructure and knowledge pool, supported 50 start-ups so far. In 2021, ASPIRE BioNEST has been adjudged as Best Emerging Bio incubator in the country by BIRAC.

Editorial

What is existing Startup infrastructure available for innovators?

Dr Seema Pavgi Upadhye

The entrepreneurial process starts with challenges of working with the unknown and building resources for survival. Several micro and macro level factors including the personality and attitudes of the entrepreneur, identification and creation of opportunities, regulatory frameworks and market conditions, presence of other startups, cultural makeup of the location, access to trained talent, technology, market, finance and mentors influence the success (or failure) of a young enterprise.

The most important thing for an entrepreneurs is an idea and initial funding using which he can use to execute the programs needed to turn an idea into a product. Early 90s and 20s had no such programs for these budding entrepreneurs but after looking the success of the western model the Indian government has initiated various funding and other support programs for budding entrepreneurs.

The Small Business Innovation Research Initiative (SBIRI) scheme of the Department of Biotechnology, Ministry of Science & Technology which was launched in 2005 was first funding program to boost Public-Private- Partnership (PPP) efforts in the field of biotechnology in the country. SBIRI was the first of its kind, early stage, innovation focused PPP initiative in the area of Biotechnology. Launching of SBIRI has worked as an enabling platform for the target organizations to realize their potential in terms of product and process development and taking them to the market. It facilitated innovation, risk taking by small and medium companies and bringing together the private industry, public institutions and the government under one roof to promote the research and innovation in the Indian Biotech Sector.

Realizing the potential of this PPP model in biotechnology, DBT and other stakeholders in the country decided to bring all support program under an umbrella of one organization which can handle all the tasks related to startups. This has led the creation of BIRAC i.e. Biotechnology Industry Research Assistance Council which was established in 2012 as a not-for-profit Section 8, Schedule B, Public Sector Enterprise, set up by Department of Biotechnology (DBT), Government of India as an Interface Agency to strengthen and empower the emerging Biotech enterprise to undertake strategic research and innovation, addressing nationally relevant product development needs.

Other major initiatives championing the movement has been funding from NITI Ayog under the Atal Innovation Mission, BIRAC under BioNest, DST under TDB and NIDHI PRAYAS. These support programs provided not only funding to innovators but also space and equipments in bioincubators to those who could not afford the infrastructure development on their own, it has been a key driver propelling momentum in ventures.

Bioincubation needs specialized infrastructure. Shared infrastructure platforms with well structured access models for critical equipment provide soft landing avenues for startups and significantly reduce initial investment. There has been substantial expansion in bioincubation space hubs such as Bengaluru, Hyderabad, Delhi, Pune and emerging ones such as Coimbatore, Kanpur, Punjab, Trivandrum etc. Within Northern India, the Delhi-Faridabad-Gurgaon region is an active hub with significant innovation activity supported by stellar academic institutions including

IIT Delhi, AIIMS, ICGEB, NII, THSTI, RCB and incubation anchors such as FITT, IIT Delhi.

Prominent global hubs are living examples of organic clustering common in this segment and its impact on increased probability of success. Examples include start-up and innovation clusters around San Francisco Bay Area supported by Silicon Valley, pioneering biotech companies such as Amgen and Genentech and abundant venture capital; Boston Biopharma cluster supported by presence of institutional backbone with Massachusetts Institute of Technology, Harvard, Massachusetts General Hospital, large pharma companies like Sanofi, Pfizer, Novartis, and the Minneapolis Medical devices hub led by giants like Medtronic.

Therefore, congruous factors like large corporates, other successful ventures, incubation infrastructure and policy initiatives have contributed to geographical consolidation, creating large biotech nuclei in India.

There are various schemes for start-ups which are funded by the following organization either independently or in collaboration. We are not going in detail here, the full information can be accessed on the respective websites or from offices of these organizations.

1. AIM - Atal Innovation Mission, NITI Aayog, Government of India
2. DARE - Department of Agricultural Research and Education, Ministry of Agriculture and Farmers Welfare, Government of India
3. DBT - Department of Biotechnology, Ministry of Science and Technology, Government of India
4. DoS - Department of Space, Government of India
5. DSIR - Department of Scientific and Industrial Research, Ministry of Science and Technology, Government of India
6. DST - Department of Science & Technology, Ministry of Science and Technology, Government of India
7. MDoNER - Ministry of Development of North Eastern Region, Government of India
8. MEITY - Ministry of Electronics and Information Technology, Government of India
9. MoD - MoFPI Ministry of Food Processing Industries, Government of India
10. MoSDE - Ministry of Skill Development and Entrepreneurship, Government of India
11. MoT - Ministry of Tourism, Government of India
12. MSME - Ministry of Micro, Small and Medium Enterprises, Government of India

The following fiscal initiatives have been taken-up by the Government to foster start-up ecosystem in the country:

Credit Guarantee Fund for Startups
ii. Tax Exemption on Capital Gains
iii. Tax Exemption to Startups for 3 years
iv. Tax Exemption on Investments above Fair Market Value

The Government of India and State Governments through Department of Biotechnology have made various efforts to promote biotechnology activities in the country by setting up biotechnology parks and incubators to promote translation research of products and services by providing necessary infrastructure support. These Biotechnology Parks offer facilities to Scientists, and Small and Medium sized Enterprises (SMEs) for technology incubation, technology demonstration and pilot plant studies for accelerated commercial developments.

These Parks are successfully accelerating the commercialization of new technologies, nurturing and maintaining emerging ventures and assisting new enterprises to forge appropriate linkages with other stakeholders of biotechnology sector including academia and Government. The Department has come up with 'National Biotechnology Parks Scheme' in which it is proposed to create an ecosystem to absorb the start-ups which have graduated from the incubators and give them a platform for further scaling up their R&D activities in collaboration with the state government and industry.

About Bio-NEST

Bio-NEST was launched by BIRAC with a vision that focused on fostering the biotech innovation ecosystem in the country. Bio-NEST program provides support to establish bio-incubators either as a standalone entity or as a part of the academia. Through Bio-NEST, BIRAC has supported more than 75 bio-incubators till date.

BOX: List of Some well established BioIncubators and BioParks in India

a-IDEA, Centre For Agri Innovation ICAR – NAARM, Rajendranagar, Hyderabad-30, Telangana.
VentureStudio Ahmedabad University, Gujarat.

-Andhra Pradesh MedTech Zone Limited, AMTZ Campus, Andhra Pradesh.
-Association for Bio-inspired Leaders and Entrepreneurs (Sastra TBI), Tamil Nadu.
-NCL-IIT (BHU)Incubation Center Malaviya Centre for Innovation, Incubation & Entrepreneurship, Varanasi, U.P.
-BioNEST BITS BIRAC, BITS Pilani K K Birla Goa Campus.
-Bio-incubation at C-CAMP NCBS-TIFR, GKVK, Bangalore.
-Bangalore Bioinnovation Centre Electronics City Phase 1, Bangalore.
-BBB – BSC BioNEST Bio-Incubator/ Regional Center for Biotechnology Faridabad, Haryana.
-Biotech Park Lucknow Lucknow, Uttar Pradesh.
-Bio360 – Life Science Park.
-Bio Pharma-IT Park Information.
-Bioriidl Somaiya Vidyavihar, Mumbai.
-Clean Energy International Incubation Center Rohini, New Delhi.
-Crescent Innovation and Incubation Council, B. S. Abdur Rahman Crescent Institute Of Science And Technology, Urapakkam, Chennai, Tamil Nadu.
-CSIR-Indian Institute of Toxicology Research CSIR – IITR, Lucknow.
-Delhi Pharmaceutical Science Research University, New Delhi.
-Entrepreneurship Development Center Venture Center, Innovation Park, Pune.
-Foundation for Innovation and Technology Transfer (FITT), Indian Institute of Technology, Delhi.
-Golden Jubilee Women Biotech Park, Chennai.
-Healthcare Technology Innovation Center, IIT Madras, Tamil Nadu.
-Hyderabad Eye Institute BioNEST
-MedTech Incubator at LVPEI L V Prasad Eye Institute, Hyderabad
-IIHR, Bangalore ICAR-IIHR, Bengaluru.
-IIITH-Foundation Hyderabad, Telangana.
-IIT Kanpur Bioincubator SIDBI Innovation & Incubation Centre, IIT Kanpur.
-IITM Bio-Incubator Taramani, Chennai.
-IKP Knowledge Park Secunderabad, Telangana.
-IKP-EDEN, Bangalore.
-Indian Agricultural Research Institute, New Delhi.
-Indigram Labs Foundation, Mohan Cooperative Industrial Estate, New Delhi.
-Institute of Advanced Study in Science and Technology, Guwahati, Assam.
-DBT- Institute of Bioresources and Sustainable Development Imphal, Manipur.
-International Crops Research Institute-ICRISAT, Telangana.
-KIIT Technology Business Incubator KIIT University, Orissa.
-Mazumdar Shaw Medical Foundation, Bangalore.
-Incubation Centre, Mizoram University.
-NIPER Ahmedabad, Gujarat.
-NIPER-Guwahati NIPER Guwahati, Assam.
-Panjab University, Chandigarh.
-Punjab Biotechnology Incubator (PBTI) Mohali, Punjab.
-PERD Center, Ahmedabad B. V. Patel Pharmaceutical Education and Research Development (PERD) Centre, Ahmedabad, Gujarat.
-PSG-STEP, Coimbatore, Tamil Nadu.
-SBTIC, Hyderabad, Telangana State.
-SINE, IIT Bombay, Mumbai.
-Sri Padmavati Mahila Visvavidyalayam SSIIE-TBI, Tirupati.
-Sri Ramachandra Institute for Higher Education and Research, Chennai, Tamil Nadu.
-SRISTI Innovation BIRAC's BioNest Project Gandhinagar, Gujarat.
-Veterinary incubation foundation at TANUVAS Chennai.
-TIEDS, IIT Roorkee, Uttarakhand.
University of Delhi Bioincubator.
-ASPIRE-BioNEST University of Hyderabad..
-Vellore Institute of Technology-Technology Business Incubator (VITTBI) Vellore, Tamil Nadu.
-TICEL Bio Park Ltd Taramani, Chennai.
-International Biotech Park Pune – Maharashtra.
-KINFRA Hi-Tech Park, Kerala.
-MITCON Consultancy & Engineering Services Ltd., Pune.
-Gujarat Akruti TCG Biotech Ltd. (GATBL) MIDC, Mumbai.
-Guwahati Biotech Park, IIT Guwahati.
-Punjab Biotechnology Incubator (PBTI) Mohali, Punjab.
-SAVLI Bio Incubator Akruti Biotech Park Vadodara – Gujarat,.
-Ramky Pharma City (India) Ltd.- Visakhapatnam, Andhra Pradesh.

Editorial

Inspiring Indian Biotech Startups and Journey of Their Founders

Kamal Pratap Singh

India's has witnessed growth of India's biotech start-up culture through a recent event held in New Delhi which was inaugurated by Prime Minister of India himself. The growth was long overdue and recently after pandemic it has gained the momentum but the some of the startups in biotech sector are not new and they have become giants after a long journey. Some of them failed and some survived, in this article we are covering some of the earliest startups that are successful today.

In the early years of development of biotechnology only the gene edited or recombinants products were considered under this category but today because of technological advancements anything that is of biological origin and has the potential of giving benefit to human through bulk production comes under this category. So we will see first about Shantha Biotech and will discuss about SII further.

If we talk about bulk production without any technological gene editing the first company which was established in India was serum Institute of India which has begun production of immuno-biologicals in 1966 using extraction process from horse serum. Shantha Biotech on the other hand which made India's first recombinant vaccine was first biotechnologycompany which reduced the production cost of vaccines to several folds. The vaccines that were expensive to buy from foreign market were made available on cheap prices by Shantha biotech.

1. Dr Varaprasad Reddy and Shantha Biotech

This first biotech startup in India dates back to year 1993 when Varaprasad Reddy built India's first biopharma company which produced India's first indigenously developed recombinant hepatitis B vaccine. It was the time when DBT was just established and no one had much idea of regulatory processes.

In the previous articles in Biotech Express it is discussed how Dr Varaprasad Reddy sold majority of his personal assets to make a biotechnology company that would provide cheap vaccines to Indian people. Before Shantha Biotech vaccines were imported in the country and were not

in reach of common people.

Initially he got some investors for the startup from Oman and India but because of delay in regulatory processes and other unforeseen circumstances he had to wait for few years before final production. This had caused huge loss to him but because of his determination and perseverance and after facing many hurdles he finally came up with a successful company and product. Later majority of equity in Shantha Biotech was taken by Sanofi in a Rs 3,740 crore deal which was about eight times its projected sales of Rs 440 crore in that year, however Dr Varaprasad is still a minor stakeholder in the company.

Dr Varaprasad was not a biologist but electronics engineer by profession, he was born in an agriculture family but a WHO conference in Geneva in 1990 inspired him to do something for country when he heard some critical remarks about India not being capable of developing a vaccine for Hepatitis B when disease was killing around 350,000 people every year in the country. He was not pleased with what he heard and started Shantha Biotechnics Ltd with a mission to produce cost-effective vaccines that would be available for the common man, while still maintaining international quality standards.

Today Shantha Biotech is producing several biopharma products thanks to Dr K I Varaprasad Reddy who brought biotech industrialization in India. Currently he is the Non-Executive Chairman of the Board of Shantha Biotechnics Pvt Ltd.

Shantha Biotechnics' successful development of recombinant products heralded the bio-pharma revolution in India which motivated many scientists and entrepreneurs to develop and produce life-saving drugs indigenously. Under his leadership, Shantha Biotechnics won several awards for the company's contribution in the field of bio-technology.

For his efforts in developing an affordable vaccine against Hepatitis B, Dr. Reddy was conferred upon the prestigious National Award – Padma Bhushan – by the Hon'ble President of India. Among his numerous achievements, he also received an Honorary Doctorate from Sri Venkateshwara University.

2. Dr Ella Krishna and Bharat Biotech

Another startup that was established around the time of Shantha Biotech was Bharat Biotech which has gained enormous attention in current scenario of pandemic as it is only company which produced India's only indigeneous COVID vaccine i.e. covaxin. As per reports it is the safest vaccine around the world which has least number of adverse event reporting after vaccination.

Dr Krishna Ella founded Bharat Biotech in 1996. He was a molecular biologist by profession who did masters in India and became research faculty at the Medical University of South Carolina in Charleston after earning his Ph.D. from the University of Wisconsin-Madison.

He gave up his faculty position in USA and came back to India in 1996 with a notion to do something for a country as Dhirubhai Ambani did while working as a manger in Oman.

He started his journey by setting up a small lab in Hyderabad, Bharat Biotech to produce innovative vaccines and bio-therapeutics with his wife Suchitra Ella. In 1999, the company launched its Hepatitis B vaccine Revac-B.

In 1996, He suggested to the then Chief Minister of Andhra Pradesh, N. Chandrababu Naidu to set up a biotech knowledge park (now called Genome Valley).

Under Dr. Ella's leadership, Bharat Biotech has grown to become a global

leader in innovative vaccines. Bharat Biotech was also the first in the world to find a vaccine for the Zika virus. Along with human biological, Bharat Biotech has also ventured into veterinary vaccines, food processing, and developing biotechnology infrastructure in the country.

Today Bharat Biotech International Limited is a reputed Indian biotechnology company headquartered in Hyderabad, India engaged in the drug discovery, drug development, manufacturing of vaccines, bio-therapeutics, pharmaceuticals and health care products with over 700 employees. With more than 140 patents, the company has over 16 vaccines for bio-therapeutics, registered in 116 countries and the WHO prequalified vaccines in its portfolio. The vaccine in Bharat Biotech portfolio are Revac-B+, a recombinant hepatitis-B vaccine; TYPBAR, a vi polysaccharide typhoid vaccine; BIOPOLIO, a poliomyelitis vaccine; INDIRAB, a rabies vaccine; Revac-Bmcf, a thiomersal free recombinant hepatitis-B vaccine; TEVAC, a tetanus vaccine; Scorgen, a scorpion venom anti-serum; and BioHib, a haemophilus influenza type b vaccine.

The company is now worth over thousands of crores of rupees and has operating revenues range Over INR 500 cr for the financial year ending on 31 March, 2021.

For their outstanding contributions Krishna Murthy Ella and Suchitra Krishna Ella of Bharat Biotech were conferred the Padma Bhushan award in year 2022.

3. Dr Kiran Mazumdar and Biocon

The third notable biotech startup was of Kiran Mazumdar Shaw who first started as fermentation company supplying enzymes but later entered into Biopharma and now has become owner of a reputed company which supplies biopharma products worldwide. Today, Biocon worth around 40,000 crore Rs with many national and international collaborations in biopharma market. Mazumdar-Shaw is the first Indian businesswoman to reach a net worth of USD 1 billion.

Dr Kiran Mazumdar Shaw as a first generation entrepreneurs started Biocon India in 1978 in the garage of her rented house in Bengaluru with a seed capital of Rs. 10,000 after returning to India after completing graduate degree in brewing from the University of Ballarat, Melbourne, in 1975. Initially, she found no companies willing to offer a brewing job to a woman. Instead, she did consulting work for a few years before meeting Leslie Auchincloss, then owner of an Irish firm, Biocon Biochemicals. Impressed by Mazumdar-Shaw's drive and ambition, Auchincloss took her on as a partner in a new venture, Biocon India in 1978.

Initially, she faced credibility challenges because of her youth, gender and her untested business model. She also found it difficult to recruit people to work for her start-up, her first employee was a retired garage mechanic and her first unit was in a nearby 3,000-square-foot shed. The most complicated piece of equipment in her lab at that time was a spectrophotometer. Moreover, she faced the technological challenges associated with trying to build a biotech business in a country with poor infrastructure. Uninterrupted power, good quality water, sterile labs, imported research equipment, and workers with advanced scientific skills were not easily available in India at that period of time.

The company's initial projects were the extraction of papain (an enzyme from papaya used to tenderize

meat) and isinglass (obtained from tropical catfish and used to clarify beer). Within a year of its inception, Biocon India was able to manufacture enzymes and export them to the U.S. and Europe, the first Indian company to do so.

It is 1990, when Biocon Biopharmaceuticals Private Limited (BBLP) was incorporated to manufacture and market a select range of biotherapeutics.

In 2001 Biocon became the first Indian company to gain the approval of the U.S. Food and Drug Administration (FDA) for the manufacture of a cholesterol-lowering molecule. The company subsequently expanded exponentially. The Profits of the company jumped more than 42% in 2003 alone. After a wildly successful initial public stock offering the following year, Biocon's stock-market value skyrocketed, and Mazumdar-Shaw, with a nearly 40% stake in the company, became the richest woman in India. Mazumdar-Shaw became the recipient of numerous awards. The World Economic Forum (an international conference for the discussion of world economic, political, and social development) recognized her as a "Technology Pioneer" in 2000, and Ernst & Young named her best entrepreneur in the field of health care and life sciences in 2002. In 2005 Mazumdar-Shaw also received the Padma Bhushan award, one of India's highest civilian honours, for her pioneering work in industrial biotechnology.

4. Dr Cyrus Poonawalla and Serum Institute of India

SII need special mention in this article because it is the first company that was started in India to produce life saving vaccines and now is the world leader in vaccine production and supply. The company owner i.e Dr Cyrus Poonawalla was not a scientist or researcher or from the field unlike others but the startup came out of serendipity because Dr Poonawalla had to save his horses that were dying after shut down of his Stud Farms business.

As if now SII is the world's largest producer of vaccines, being the top supplier to WHO and UNICEF programs.

A conversation with a veterinarian at the farm led Dr Cyrus Poonawalla into the world of vaccines. He realized that the farm's retired horses were donated to the Haffkine Institute, which was owned by the government, to make vaccines from horse serum. Poonawalla thought of trying to meet the demand for vaccines in India by extracting the serum from the horses himself, in order to create vaccines at a much cheaper rate. Dr Balakrishnan, who gave him the idea that would transform his fortunes suggested that Dr Cyrus put up a processing plant in a corner of the Poonawalla farm and get into the business himself.

The family's advantage over the big pharma companies of that time was that they had plenty of land to house the horses. The family doctor, Jal Mehta, who subsequently became vice-chairperson of SII, introduced Dr Cyrus to Dr P.M. Wagle, who had just retired as director of the Haffkine Institute.

Dr Cyrus employed two scientists to build a small laboratory in a corner of the farm, which had a lot of barren land for breeding. During his initial years, Poonawalls faced hardships in arranging finances for his company. He started Serum Institution in 1966 with USD 12,000, which he raised by selling horses.

In 1966, the foundation stone for the SII was laid. It was a small-scale industry, with a capital of five lakh rupees to derive therapeutic serum from horse blood. In 1967 i.e. within three years, Serum launched its first therapeutic tetanus serum and started producing anti-tetanus vaccines of which there was a huge shortage in the country.

By 1974, it started making DTP vaccine, which is known to protect children from diphtheria, pertussis, and tetanus. In 1981, it created anti-snake venom serum to treat snakebites.

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Today in leadership of Dr Cyrus Poonawalla, Serum Institute of India has turned into the world's largest vaccine manufacturers, holds a 60 percent market share in the global vaccine manufacturing segment which is catering to 150 countries, including America and European countries. It is also a notable name in producing pediatric vaccines.

Few Notable recent biotech startups

XCode Life Sciences - Founded by Mohammed Saleem, Abdur Rab Abdur Rahman & Ramabadran Narayanan in 2010. It focuses on preventive healthcare by enabling individuals to understand their genetic makeup and helping them to improve their lives by creating personalized health, nutrition and fitness plan based on their genetic markers and disease risk. A couple of years back XCode also launched the world's first ever South Asian ancestry genetic test which enables south Asian people to trace their ancestry.

Vyome Therapeutics - Founded by Shiladitya Sengupta & Venkateswarlu Nelabhotla in 2010, Vyome Therapeutics is focused on treating inflammatory diseases like acne using its innovative next-generation therapeutic solutions. It has raised $48.3 million (₹355.7 crore) from Iron Pillar, Sabre Partners and Aarin Capital.

Farcast Biosciences - Founded by Pradip K. Majumder & Mallikarjun Sundaram in 2010, Farcast Biosciences was formely known as Mitra Biotech. The startup has developed its flagship platform called *CANScript* which helps oncologists to identify which drug will be most effective for their patients. They have raised $76 million (₹560 crore) from Northpond Ventures, Tata Capital & Accel.

Sea6 Energy - The company was founded by 4 IIT Madras students Sailaja Nori, Nelson Vadasseri, Sayash Kumar, Sowmya Balendiran and their professor Shrikumar Suryanarayan in 2010. Sea6 Energy calls itself an ocean operating system because it has managed to harness the seaweed grown in oceans in a sustainable way to create a range of bioproducts that can boost agriculture, enhance animal & plant immunity and provide an alternative source of energy.

MapMyGenome - Founded by Anu Acharya in 2013. It is a personal genomics startup that offers their customers DNA-based immunity report which offer insights about your risk towards certain immune system diseases as well as life style diseases they might be susceptible to. These reports also tell which drugs will be most effective for them based on their DNA.

Bugworks Research - Founded by Anand Anandkumar in 2014, Bugworks Research is a drug discovery startup that is designing antibiotics that can fight the superbugs which are immune to our traditional drugs. To date, this biopharma startup has raised $16.5 million (₹121.5 crore) from University of Tokyo Edge Capital, Global Brain Corporation and Aquipharma Holdings.

Zumutor Biologics - Founded by Kavitha Iyer Rodrigues in 2013, Zumutor Biologics is one of the leading immune-oncology startups that help in treating cancer by targeting the body's immune system. To date, it has raised $41.6 million (₹306.4 crore) from Accel, Chiratae Ventures & Bharat Innovation Fund.

MedGenome- Founded by Sam Santhosh in 2013 , MedGenome offers genome–based diagnostics and research solutions. It uses DNA sequencing to help pharmaceutical companies develop personalised medicines for diseases like Cancer, Diabetes and other rare diseases. MedGenome has raised around $119 million (₹876.4 crore) from investors in recent years.

These biotechnology startups are working at a speed of light to reach the sky heights by expanding their network. The advent of digitization & artificial intelligence has advanced the way science can deal with health issues. Let's hope that in future more innovation, discoveries and development will be carried out in the biotech industry in order to advance the healthcare system worldwide.

Obituary

Professor M. Vijayan: A tribute to Pioneer of macromolecular crystallography in India

May 28, 2022

Professor Mamannamana Vijayan, an eminent molecular biophysicist who made significant contributions to the study of amino acids, proteins, and macromolecules passed away on April 24, 2022. He had over five decades of association with the Molecular Biophysics Unit at the Indian Institute of Science (IISc), Bengaluru, where he served in various capacities such as Professor, Chairman of Molecular Biophysics Unit, Chairman of Division of Biological Sciences, and Associate Director, IISc.

In his passing, the country has lost not only one of its most distinguished scientists but also an enthusiastic spokesperson for science. In his remarkably productive career that spanned over five decades, Vijayan was a researcher, a teacher, and an administrator who influenced his surroundings.

Vijayan was born in Cherpu, Thrissur in 1941. A piece of sage advice from Achutha Menon, the future Chief Minister of Kerala, that a good student should not be wasted on local politics led politically inclined Vijayan to Allahabad University in 1961, for a master's degree after graduating from Sree Kerala Varma College.

In later years, Sri Krishna Joshi (later Director General CSIR and President, Indian National Science Academy) nudged Vijayan into physics, leading his entry into the Indian Institute of Science (IISc), Bangalore, in 1963 as a Ph.D. student eventually.

In IISc, he was mentored in the emerging field of X-ray crystallography by M. A. Viswamitra, and influenced by the Head of the Physics department, R. S. Krishnan, who had succeeded C. V. Raman.

"It was in IISc that I met Vijayan for the first time, almost half a century ago," recollects Prof P. Balaram, an eminent Indian biochemist, and a former director of the IISc. "At IISc Vijayan found his scientific calling and his future wife, Kalyani, a fellow student in

the crystallography laboratory," adds Prof Balaram.

During 1968 to 71, Vijayan was a postdoctoral fellow in Prof Dorothy Hodgkin's research group at the University of Oxford, a celebrated crystallographer, and a Nobel Prize winner of 1964 for her classic structure determinations of cholesterol, penicillin, and Vitamin B-12. During that period, he studied x-ray diffraction data of insulin crystals and played a prominent role as part of Dorothy Hodgkin's team in unravelling of the structure of insulin in 1969.

After completing his post-doctoral research at the University of Oxford, he returned to India in 1971, initially appointed in the Physics department but soon to move, in 1974, to G. N. Ramachandran's newly formed Molecular Biophysics Unit (MBU) at IISc.

In 1971, resource constraints were a hurdle in the immediate initiation of macromolecular crystallography so, Vijayan initiated a programme involving the preparation and X-ray analysis of crystalline complexes of amino acids and peptides, with the original objective of elucidating, at the atomic resolution, the interactions significant in the structure, assembly, and function of proteins, said Prof Balaram.

"One of the early grants that we got was a project to determine the crystal structures of proline peptides from the Indian National Science Academy (INSA). Vijayan and I were co-investigators, receiving a grant of Rs 10,000, which we shared to the last rupee," remembers Prof Balaram.

Prof Vijayan's initial programme was found to have implications for chemical evolution and the origin of life. He then studied the structure and interactions of non-steroidal anti-inflammatory analgesics and performed small-molecule crystallography on ionophores and related compounds. In the early eighties, one of his major concerns was developing biological macromolecular crystallography in India.

Vijayan started with lectins, which specifically bind to cell surface carbohydrates. He determined the de novo structure of the tetrameric peanut lectin and jacalin of jackfruit seeds specific to the tumour associated T-antigens. In peanut lectin, his group also demonstrated the importance of water in carbohydrate binding, including the generation of specificity. He also studied other lectins from garlic, snake gourd and banana.

Later, Prof Vijayan initiated structural studies on lectins from mycobacteria to study host-pathogen interactions. In mycobacteria, they determined the structures of Rec A, uracil N-glycosylase, ribosome recycling factor peptidyl t-RNA hydrolase, enzymes in the CoA synthesis pathway and RuvA.

His work received international attention and proved to be a significant landmark in developing structural biology in India. The students who cut their teeth on these protein structures began to spread out to many other centres in India. The importance of structural biology grew, and the instrumentation for crystallography became accessible to many national laboratories and academic institutions.

Prof Vijayan also played roles in science reforms like "The choice-based credit semester was implemented by the government of 2006-2011 in Kerala" based on the report filed by an expert panel headed by him.

Prof T P Singh, an eminent Crystallographer of India, and a close associate of Prof Vijayan remembers him as an internationally acclaimed structural biologist, who inspired many scientists and guided them through the intricate procedures.

"I had the opportunity to witness how prudently he went about tackling some burning issues at the global Inter-Academy meeting in Japan, where I worked with him as the Vice President. I had the fortune of being his first Ph.D. student and lucky to get his impactful guidance throughout my career," says Prof Singh.

Prof Vijayan was a member of India's prestigious societies and served them in various roles. He became a Fellow of INSA in 1987 and later served as president of INSA from 2007 to 2010. He was a Fellow of many other academies including The World Academy of Science (TWAS) Founder President of the Indian Crystallographic Association, President of the Indian Biophysical Society. He served many international scientific organizations, including the International Union of Crystallography (IUCr), the International Union

Picture: Prof M Vijayan and Prof. T P Singh, AIIMS when discussing issues at hand during the meeting of G-10 academies in Tokyo, Japan.

of Pure & Applied Biophysics (IUPAB), the International Council for Science (ICSU), the Inter Academy-Panel (IAP) and the Inter-Academy Council (IAC), and as president of the Asian Crystallographic Association.

During his lifetime he received numerous honours and awards, including Padma Shri in 2004, SS Bhatnagar Award, Ranbaxy Award, OP Bhasin Award, G N Ramachandran Medal, and the first GN Ramachandran Medal by Indian Science Congress Association.

Leading structural biologist, Prof Avadhesha Surolia considers Prof. Vijayan to be the most outstanding crystallographer that India has produced. "We began our scientific collaboration in 1978 that established the discipline of macromolecular crystallography on proteins as it stands in India today. This epic collaboration lasting 44 years trained countless structural biologists, leading to establishing of numerous crystallographic centers throughout India, which would not have been possible without his outstanding leadership, and exemplary commitment to science in the country," Prof Surolia recollects. He recalls Prof Vijayan as exceptionally intense yet warm and generous, the one who looked after the welfare of everyone around him.

"After the Government of India established the Department of Science and Technology, Vijayan was the first to write a grant application to establish a facility for macromolecular crystallographic research in the country," recalls Prof M. R. N. Murthy.

"Although he was not religious, his deep commitment to the welfare of others gave an impression of his inner spirituality. He and his crystallographer wife Dr. Kalyani Vijayan kept their house door always open to students, collaborators, and innumerable international friends," Prof Murthy elucidates.

If India has become internationally competitive in macromolecular crystallography today, it is to a substantial extent, due to Prof Vijayan's efforts. With the passing away of Prof Vijayan, India has lost a celebrated scientist who grew India's scientific caliber through his relentless efforts. While it is difficult to reconcile the loss of a scientific visionary of Vijayan's caliber, his monumental contribution to the science and society will be cherished and adored by one and all.

His autobiography titled 'A Life among Men, Women and Molecules' has been published by the Indian National Science Academy.

Source: India Science Wire, DST

New released Pfizer covid vaccine trial documents from USFDA reveals depopulation agenda, neonatal death?

What has been concluded after new document release from Pfizer, while imagining if it can be true with Indian vaccines too…

On June 9, 2022, a trend on twitter revealed that Pfizer documents indeed gives an idea of agenda that the pharma companies and regulators like FDA and CDC were promoting, either to depopulate the population as Bill gates have asked or to give profits to pharma companies. The document revealed many hidden problems that the Pfizer and regulators saw but never documented in public domain and top of that asked US court to release the document in next 75 years, but thanks to the Judges they have come forward for public welfare and respected freedom of speech. In lack of this order we would not have known the hidden agenda of this private and public players that they propogated for their own motives.

Since now we know that FDA, CDC and compnies like Pfizer have played with public, it is now turn to see whether this will be done in world's second largest democracy i.e. India. Previously the request fo Dr Jacob Puliyal was rejected by court by in light of several evidences the supreme court of India ordered no vaccine mandate and release of document from Drug Regulator of India, but still the experts and public are waiting to see and fact check the documents that were submitted to regulators by Serum Institute of India, Bharat Biotech, Zydus Cadila and Biological e-limited.

In the previous article " " in Biotech Express we have already discussed about several severe adverse events that were reported in India after Indian covid vaccines despite the fact that reporting was not appropriate and lack several adverse event reports.

Let us see now what has been concluded after new document release from Pfizer, while imagining if it can be true with Indian vaccines too…

The US Food and Drug Administration (FDA) attempted to delay the release of Pfizer's COVID-19 vaccine safety data for 75 years despite approving the injection after only 108 days of safety review on December 11th, 2020. But in early January 2022, Federal Judge Mark Pittman ordered them to release 55,000 pages per month. They released 12,000 pages by the end of January.

Since then, Public Health and Med-

ical Professionals for Transparency (PHMPT) has posted all of the documents on its website. The latest drop happened on 1st June 2022.

One of the documents contained in the data dump is 'reissue 5.3.6 postmarketing experience.pdf'. Page 12 of the confidential document contains data on the use of the Pfizer Covid-19 injection in pregnancy and lactation.

Pfizer state in the document that by 28th February 2021 there were 270 known cases of exposure to the mRNA injection during pregnancy. Forty-six-percent of the mothers (124) exposed to the Pfizer Covid-19 injection suffered an adverse reaction.

Of those 124 mothers suffering an adverse reaction, 49 were considered non-serious adverse reactions, whereas 75 were considered serious. This means 58% of the mothers who reported suffering adverse reactions suffered a serious adverse event ranging from uterine contraction to foetal death. A total of 4 serious foetus/baby cases were reported due to exposure to the Pfizer injection.

But here's where things get rather concerning. Pfizer state that of the 270 pregnancies they have absolutely no idea what happened in 238 of them.

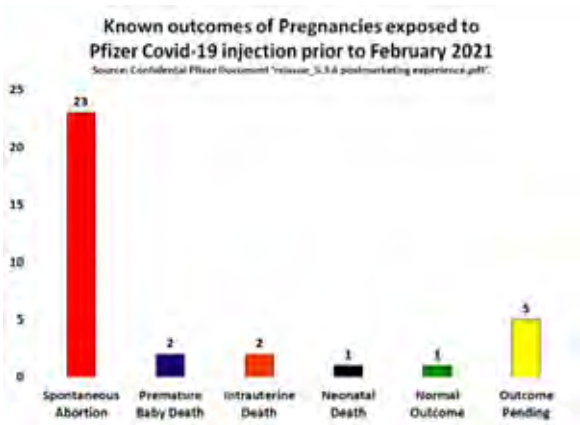
But here are the known outcomes of the remaining pregnancies –

There were 34 outcomes altogether at the time of the report, but 5 of them were still pending. Pfizer note that only 1 of the 29 known outcomes were normal, whilst 28 of the 29 outcomes resulted in the loss/death of the baby. This equates to 97% of all known outcomes of Covid-19 vaccination during pregnancy resulting in the loss of the child.

When we include the 5 cases where the outcome was still pending it equates to 82% of all outcomes of Covid-19 vaccination during pregnancy resulting in the loss of the child. This equates to an average of around 90% between the 82% and 97% figure.

Pfizer and Medicine Regulators hid dangers of Covid-19 Vaccination during Pregnancy due to Animal Study finding an increased risk of Birth Defects & Infertility

The limited animal study talked about in the official guidance actually uncovered the risk of significant harm to the developing foetus, but medicine regulators in the USA, UK and Australia actively chose to remove this information from public documents.



The actual study can be viewed in full here and is titled *'Lack of effects on female fertility and prenatal and postnatal offspring development in rats with BNT162b2, a mRNA-based COVID-19 vaccine'*.

The study was performed on 42 female Wistar Han rats. Twenty-one were given the Pfizer Covid-19 injection, and 21 were not. The results of the number of foetuses observed to have supernumerary lumbar ribs in the control group were 3/3 (2.1). But the results of the number of foetuses to have supernumerary lumbar ribs in the vaccinated group were 6/12 (8.3). Therefore on average, the rate of occurrence was 295% higher in the vaccinated group.

Supernumerary ribs also called accessory ribs are an uncommon variant of extra ribs arising most commonly from the cervical or lumbar vertebrae.

So what this study found is evidence of abnormal foetal formation and birth defects caused by the Pfizer Covid-19 injection.

But the abnormal findings of the study don't end there. The 'pre-implantation loss' rate in the vaccinated group of rats was double that of the control group.

Pre-implantation loss refers to fertilised ova that fail to implant. Therefore, this study suggests that the Pfizer Covid-19 injection reduces the chances of a woman being able to get pregnant. So, therefore, increases the risk of infertility.

So with this being the case, how on earth have medicine regulators around the world managed to state in their official guidance that *"Animal studies do not indicate direct or indirect harmful effects with respect to pregnancy"*? And how have they managed to state *"It is unknown whether the Pfizer vaccine has an impact on fertility"*?

The truth of the matter is that they actively chose to cover it up.

We know this thanks to a 'Freedom of Information (FOI) request made to the Australian Government Depart-

ment of Health Therapeutic Goods Administration (TGA).

Another study, which can be found in the long list of confidential Pfizer documents that the FDA have been forced to publish via a court order here, was carried out on Wistar Han rats, 21 of which were female and 21 of which were male.

Each rat received a single intramuscular dose of the Pfizer Covid-19 injection and then the content and concentration of total radioactivity in blood, plasma and tissues were determined at pre-defined points following administration.

In other words, the scientists conducting the study measured how much of the Covid-19 injection has spread to other parts of the body such as the skin, liver, spleen, heart etc.

But one of the most concerning findings from the study is the fact that the Pfizer injection accumulates in the ovaries over time.

In the first 15 minutes following injection of the Pfizer jab, researchers found that the total lipid concentration in the ovaries measured 0.104ml. This then increased to 1.34ml after 1 hour, 2.34ml after 4 hours, and then 12.3ml after 48 hours.

The scientists, however, did not conduct any further research on the accumulation after a period of 48 hours, so we simply don't know whether that concerning accumulation continued.

Newborn Baby Deaths hit critical levels for 2nd time in 7 Months in March 2022

Official figures reveal that the rate of neonatal deaths increased to 4.6 per 1000 live births in March 2022, a 119% increase on the expected rate of deaths. This means the neonatal mortality rate breached an upper warning threshold known as the 'control limit' for the second time in at least four years.

The last time it breached was in September 2021, when neonatal deaths per 1000 live births climbed to 5.1. Although the rate fluctuates month to month, the figure for both September 2021 and March 2022 is on a par with levels that were last typically seen in the late 1980s.

Public Health Scotland (PHS) did not formally announce they had launched an investigation, but this is what they are supposed to do when the upper warning threshold is reached, and they did so back in 2021.

At the time, PHS said the fact that the upper control limit has been exceeded "*indicates there is a higher likelihood that there are factors beyond random variation that may have contributed to the number of deaths that occurred*".

Our final piece of evidence to support the claim that Covid-19 vaccination is going to lead to depopulation comes in the form of more real-world data, but this time from the USA.

According to the Centers for Disease Control's (CDC)) Vaccine Adverse Event Database (VAERS), as of April 2022, a total of 4,113 foetal deaths had been reported as adverse reactions to the Covid-19 injections, 3,209 of which were reported against the Pfizer injection.

The CDC has admitted that just 1 to 10% of adverse reactions are actually reported to VAERS therefore the true figure could be many times worse. But to put these numbers into perspective, there were only 2,239 reported foetal deaths to VAERS in the 30 years prior to the emergency use authorisation of the Covid-19 injections in December of 2020. *(Source)*

And a further study which can be viewed **here**, found that the risk of suffering a miscarriage following Covid-19 vaccination is 1,517% higher than the risk of suffering a miscarriage following flu vaccination.

That concludes our third piece of evidence. So now we know –

Confidential Pfizer documents showing a miscarriage rate between 82% and 97%,

The only animal study performed to prove the safety of administering the Pfizer vaccine during pregnancy indicating an increased risk of infertility and birth defects.

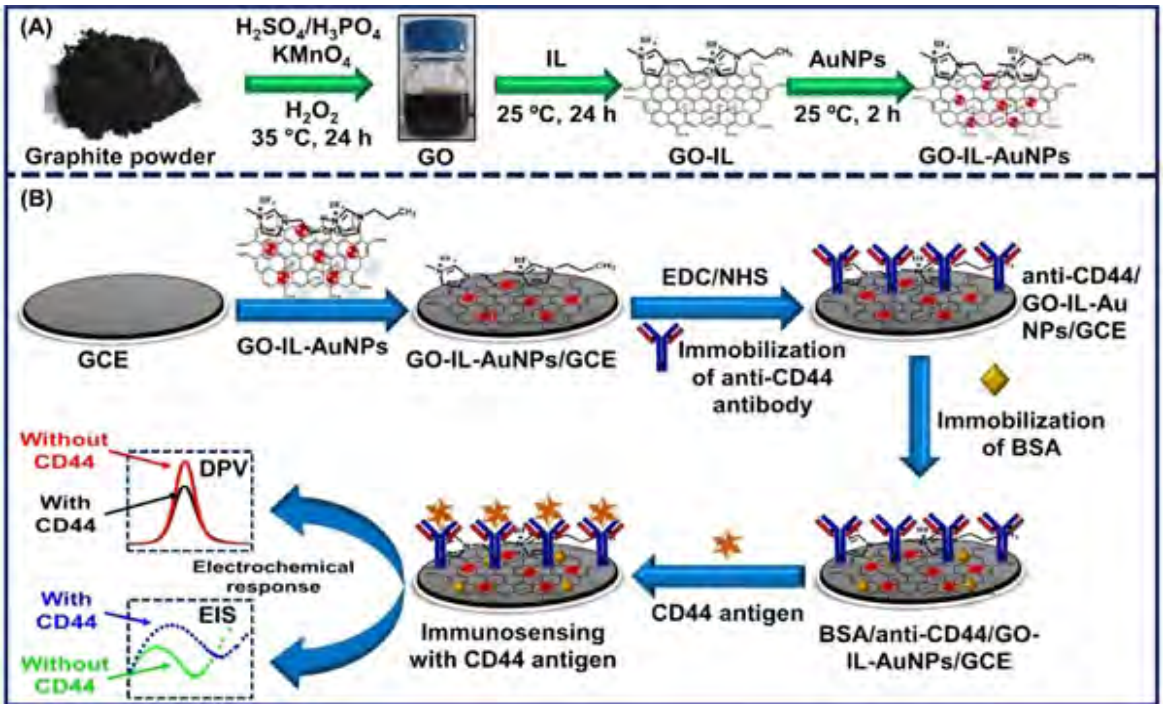
Further confidential Pfizer documents revealing the vaccine accumulates in the ovaries, data from Scotland revealing cases of Ovarian cancer are at an all time high,

Further data from Scotland revealing deaths of new born babies have hit critical levels for the second time in seven months, and CDC VAERS data showing Covid-19 vaccination increases the risk of suffering a miscarriage by at least 1,517%,

In spite of the above evidences that revealed from Pfizer documents it becomes necessary to hear and act on the request of Dr Jacob Puliyal who want to scrutinize the information of covid vaccines trials and thus seeks safety for further use of vaccines.

Source: https://expose-news.com

Indian Researchers devise supersensitive immunosensor for early breast cancer detection



Breast cancer is the common term for breast tumor subtypes with distinct molecular and cellular origins and clinical behavior. Breast cancer is the most frequently diagnosed life-threatening cancer and the leading cause of cancer death in women worldwide. An estimated 2.2 million breast cancer cases were diagnosed worldwide in 2020.

Scientists across the globe are working to develop effective diagnostic procedures for early detection and thus prevention of breast cancers. The available tests include imaging tests that allow doctors to examine internal organs in noninvasive ways. Computerized tomography (CT) scan, bone scan, magnetic resonance imaging (MRI), positron emission tomography (PET) scan, ultrasound, and X-ray are examples of noninvasive tests. Further doctors can also advise biomolecular tests such as ELISA and Biopsy that are invasive.

The existing imaging tests have limitations, like it can sometimes generate low-quality images or morphological structures. Invasive techniques like biopsy can be painful. In addition, the methods are time-consuming, expensive, and require skilled personnel to perform the tests.

To overcome the above limitations, a team of scientists from CSIR-Advanced Materials and Process Research Institute (AMPRI), Bhopal, has developed a highly sensitive electrochemical immunosensor for the detection of a breast cancer biomarker CD44 antigen, the study has been published in the April 2022 issue of ACS Applied Materials & Interfaces.

The CD44 antigen is a cell-surface glycoprotein involved in cell-cell interactions, cell adhesion, and migration. In humans, the CD44 antigen is encoded by the CD44 gene on chromosome 11. Studies have demonstrated that CD44 remains one of the major molecules associated with breast cancer and several other kinds of tumors. Hence the early detection of CD44 antigen could

be a crucial biomarker for exploring the development of breast cancer at a very early stage.

Serological-based diagnostics gain considerable attention for diagnosing breast cancer biomarkers in clinical samples. The most common are optical, electrochemical, and mass-sensitive biosensors. The biosensor-based detection has several advantages over the existing cancer detection diagnostic tests: high specificity, rapid detection, ultralow detection limit (LOD), cost-effectiveness, portability, and low sample volume requirement. In addition, they have remarkable biocompatibility and stabilizing potential for biomolecules.

Researchers from CSIR-AMPRI have devised a highly sensitive immunosensor using Graphene oxide with a large surface area and contains different functional chemical groups on its surface, making it a suitable electrode material in electrochemical immunosensor fabrication with higher sensitivity. 'Graphene oxide has low conductivity, so we have used highly conductive materials like Ionic liquids to enhance its conductivity, said Dr. Raju Khan, Principal Scientist, CSIR-AMPRI.

To further improve the properties of the GO-IL nanocomposite, gold nanoparticles (AuNPs) were also combined with the GO-IL nanocomposite. The resultant GO-IL-AuNPs hybrid nanocomposites were also previously used by many researchers to develop an electrochemical sensor for the detection of dopamine in urine and a voltammetric biosensor for the detection of 2,4-dichlorophenol up to nanomolar concentration.

Herein, we synthesized an electrochemical immunosensor constructed using GO-IL-AuNPs on a glassy carbon electrode (GCE) to detect CD44 antigen, a breast cancer biomarker, added Dr. Khan.

The scientists used various methods to validate the structural and functional capabilities of the synthesized nanomaterials using UV - visible spectroscopy, FTIR spectroscopy, Raman spectroscopy, X-raydiffraction (XRD), field-emission scanning electron microscopy (FESEM), and transmission electron microscopy (TEM).

The devised process exhibits excellent electrochemical detection performance against the CD44 biomarker responsible for breast cancer. Furthermore, our work demonstrated that the developed immunosensor has a wide detection range and an ultralow limit of detection (LOD) compared to other reported biosensors. Therefore, the proposed immunosensor could be successfully utilized in the point-of-care clinical applications for rapid detection of the CD44 antigen, added Dr Khan.

The research team led by Dr Raju Khan, included Pushpesh Ranjan, Shalu Yadav, and Mohd. Abubakar Sadique.

Source: India Science Wire and Nature India

Featured News

Amrita Vishwa Vidyapeetham gets CDSCO nod for clinical trials of first-of-its-kind synthetic jaw-bone graft

May 26, 2022

Amrita Vishwa Vidyapeetham announced that it has got approval from the Central Drugs Standard Control Organization (CDSCO) for conducting a pilot clinical trial for a novel bone graft developed jointly by Amrita School of Nanosciences, Amrita School of Medicine, and Amrita School of Dentistry, Kochi.

The synthetic bone graft, named Nanotex Bone, provides a first-of-its-kind solution in the world for patients who lose part of their lower jaw (mandibular bone) due to cancer, injury, or trauma.

The product, patented by Amrita Vishwa Vidyapeetham, can enable patients to lead a close-to-normal life even after losing a portion of their oral cavity bone, according to the doctors.

On the possibility of whether the recipient's body may reject the graft, Dr. Subramania Iyer, Professor & Chairman of Plastic & Reconstructive Surgery and Head & Neck Surgery at Amrita School of Medicine, Kochi told Financial Express.com: "The fibula flap is one standard which we use in all the patient and through a microsurgical method we have about 90-95 percent of survival rate.

Our success rate is equivalent to the world's rate. We do such surgeries quite frequently. So, that is not an issue. But putting this implant on that and looking at the survival that's what we are looking at.

Scientists Grow Plants in Soil from the Moon for the First Time

May 28, 2022

For the first time in human history, scientists marked a milestone in lunar and

space exploration as they have successfully grown plants in soil from the moon collected during the Apollo 11, 12, and 17 missions.

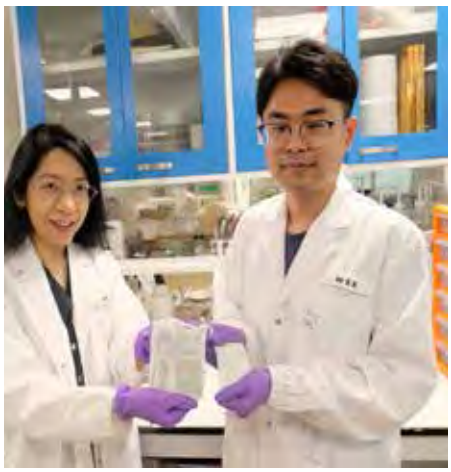
Scientists Rob Ferl and Anna-Lisa Paul from the University of Florida showed that plants have successfully sprouted and grew in lunar soil. Their study also investigated how plants respond biologically to the moon's soil, or lunar regolith, which is radically different from soil found on Earth. This work is the first step toward growing plants for food and oxygen on the moon or during space missions. The research also comes as the Artemis Program plans to return humans to the moon.

Ferl and Paul designed a deceptively simple experiment: plant seeds in lunar soil, add water, nutrients, and light, and record the results. It was complicated because the scientists only had 12 grams — just a few teaspoons — of lunar soil to do the experiment. On loan from NASA, the scientists applied three times in the last 11 years for a chance to work with the lunar regolith. To grow their tiny lunar garden, the research team used thimble-sized wells in plastic plates normally used to culture cells. Each pot had approximately a gram of lunar soil that was moistened with a nutrient solution and planted with a few Arabidopsis seeds. Before the experiment, the researchers were not sure if the seeds planted in the lunar soils would sprout, but nearly all of them did.

The researchers observed differences between the plants grown in lunar soil and the control group. Some of the plants grown in the lunar soils were smaller, grew more slowly, or were more varied in size than their counterparts. The plants' response to lunar soil may be linked to where the soil was collected, according to the scientists who worked on the research. They found that the plants with the most signs of stress were those grown in what lunar geologists call mature lunar soil. These mature soils were exposed to more cosmic wind, which alters their makeup. On the other hand, plants grown in comparatively less mature soils fared better.

NTU Singapore scientists develop a 'fabric' that turns body movement into electricity

Scientists at Nanyang Technological University, Singapore (NTU Singapore) have developed a stretchable and waterproof 'fabric' that turns energy generated from body movements into electrical energy.



A crucial component in the fabric is a polymer that, when pressed or squeezed, converts mechanical stress into electrical energy. It is also made with stretchable spandex as a base layer and integrated with a rubber-like material to keep it strong, flexible, and waterproof.

In a proof-of-concept experiment reported in the scientific journal Advanced Materials in April, the NTU Singapore team showed that tapping on a 3cm by 4cm piece of the new fabric generated enough electrical energy to light up 100 LEDs.

Washing, folding, and crumpling the fabric did not cause any performance degradation, and it could maintain stable electrical output for up to five months, demonstrating its potential for use as a smart textile and wearable power source.

The prototype fabric produces electricity in two ways: when it is pressed or squashed (piezoelectricity), and when it comes into contact or is in friction with other materials, such as skin or rubber gloves (triboelectric effect).

To fabricate the prototype, the scientists first made a stretchable electrode by screen-printing an 'ink' comprising silver and styrene-ethylene-butylene-styrene (SEBS), a rubber-like material found in teethers and handlebar grips to make it more stretchable and waterproof.

This stretchable electrode is then attached to a piece of nanofibre fabric that is made up of two main components: poly(vinylidene fluoride)-co-hexafluoropropylene (PVDF-HPF), a polymer that produces an electrical charge when compressed, bent, or stretched; and lead-free perovskites, a promising material in the field of solar cells and LEDs.

NTU PhD student Jiang Feng, who is part of the research team, explained: "Embedding perovskites in PVDF-HPF increases the prototype's electrical output. In our study, we opted for lead-free perovskites as a more environmentally friendly option. While perovskites are brittle by nature, integrating them into PVDF-HPF gives

the perovskites exceptional mechanical durability and flexibility. The PVDF-HPF also acts an extra layer of protection to the perovskites, adding to its mechanical property and stability."

The result is a prototype fabric that generates 2.34 watts per square metre of electricity -- enough to power small electronic devices, such as LEDs and commercial capacitors.

The fabric showed good durability and stability -- its electrical properties did not deteriorate following washing, folding, and crumpling. It also continued to produce a continuous stable electrical output up to five months.

FDA Approves First Measles Vaccine in Half a Century

June 06, 2022

GSK shared exciting news Monday morning, announcing that the company's vaccine for protection against measles, mumps and rubella (MMR) has been approved by the U.S. Food and Drug Administration. The company filed a Biologics License Application in August of 2021, supported by data from six clinical studies.

GSK's MMR vaccine first met with regulatory approval in 1997, when the biologic was approved for commercialization in Germany. Since then, it has been approved for use in all European countries, New Zealand, Canada and Australia. Clinical trials included over 17,000 participants from each vaccination age group, 12 to 15 months, four to six years old and over the age of seven, to evaluate the safety and efficacy while mirroring the ages of recommended inoculation. Additionally, the studies were designed to compare efficacy against already approved competition.

According to the U.S. Centers for Disease Control and Prevention, children should receive two inoculations of an MMR vaccine before adolescence. Prior to the approval of GSK's MMR vaccine in the U.S., only one MMR vaccine has been available. This vaccine, licensed to Merck, can be administered to children one year or older and has been the standard of care since its approval in 1971. Recognizing an opportunity to revamp the MMR vaccine market, pharma companies have been working to develop an alternative.

Last week, BioSpace reported that the market for measles vaccines may reach $6.41 billion USD by 2026 as a result of the increased number of cases. The compound annual growth rate is estimated to be 7.1% annually.

Corbevax gets DCGI nod as heterologous Covid booster dose for adults

04 Jun 2022

Pharmaceuticals firm Biological E Ltd (BE) on Saturday announced that it's Covid-19 vaccine Corbevax has been cleared by the Drugs Controller General of India (DCGI) as a booster for 18 plus after their primary vaccination with two doses of Covishield and Covaxin.

This means that adults fully vaccinated with Covishield or Covaxin can take Corbevax as their third or booster shot.

With this, Corbevax becomes the first vaccine approved as a heterologous Covid-19 booster.

The Corbevax booster dose can be given six months after administration of the second shot of the Covid-19 vaccine.

Recently, BE furnished its clinical trials data to the DCGI which after a detailed evaluation and deliberations with Subject Experts Committee, granted their approval for administering Corbevax as a heterologous booster dose to people who have been vaccinated.

BE's clinical trial data showed that its Corbevax booster dose provided significant enhancement in immune response and excellent safety profile required for an effective booster.

Mahima Datla, Managing Director of Biological E Ltd, said, "We are very happy with this approval, which will address the need for Covid-19 booster doses in India. We have crossed yet another milestone in our Covid-19 vaccination journey. This approval reflects once again the sustained world class safety standards and high immunogenicity of Corbevax."

AstraZeneca, Daiichi Sankyo Move the Bar in Metastatic Breast Cancer

Jun 06, 2022

AstraZeneca and Daiichi Sankyo aim to reshape the metastatic breast cancer care landscape with the antibody-drug conjugate Enhertu. Data presented at the American Society of Clinical Oncology meeting this weekend show that treatment with Enhertu demonstrated a 49% improvement in median overall survival by more than six months compared to chemotherapy alone.

Data from the DESTINY-Brest04 study, which included 557 patients, is being touted as groundbreaking, as Enhertu is the first HER-2-directed therapy to demonstrate a survival benefit in this population, potentially redefining treatment for approximately half of all patients with breast cance. Breast cancer is the most common cancer globally, with more than two million cases diagnosed in 2020. It is estimated that about half of all breast cancer patients have tumors that express HER-2, either positive or negative. HER2 testing is routinely used to determine appropriate treatment options for patients with breast cancer.

DESTINY-Breast04 is the first Phase III trial of a HER2 directed therapy that showed a "significant and clinically meaningful survival benefit in previously treated patients with HER2 low unresectable and/or metastatic breast cancer," he said. Gallant added that data from the study indicates a need to "change the way we classify and treat metastatic breast cancer to ensure these patients are effectively diagnosed and treated."

Enhertu is an antibody-drug conjugate comprised of a humanized anti-HER2 IgG1 monoclonal antibody. It has previously been approved as a treatment for adults with unresectable or metastatic HER2-positive breast cancer who have had two or more previous anti-HER2-based therapies in the metastatic setting.

In 2021, Enhertu became the first HER2-directed medication approved to treat gastric cancer in the U.S. in the last ten years. Specifically, it was approved for the treatment of adult patients with locally advanced or metastatic HER2 positive gastric or gastroesophageal junction (GEJ) adenocarcinoma who have received a prior trastuzumab-based regimen.

AstraZeneca and Daiichi Sankyo noted that targeting the lower range of expression in the HER-2 spectrum may offer another approach to delay disease progression and extend survival in patients with metastatic breast cancer. Currently, patients with low HER-2 positive tumors have limited treatment options after their disease progresses on endocrine therapy. Additionally, the companies said there are few targeted options for those patients who are HER-2 negative.

Results presented at ASCO showed Enhertu (trastuzumab deruxtecan) provided "superior and clinically meaningful progression-free survival and overall survival" in breast cancer patients with hybridization (ISH)-negative) unresectable and/or metastatic breast cancer with hormone receptor (HR) positive or HR-negative disease compared to standard of care treatment, physician's choice or chemotherapy.

European Commission Approves Two GM Crops for Food and Feed

May 25, 2022

The European Commission has authorized two genetically modified

(GM) crops for food and animal feed. The Commission's authorization decision does not allow for the cultivation of the two GM crops, maize, and soybeans in the EU. The GM crops have gone through a comprehensive and stringent authorization procedure, which ensures a high level of protection of human and animal health, and of the environment.

The European Food Safety Authority (EFSA) has issued a favorable scientific assessment concluding that these GM crops are as safe as their conventional counterparts. The authorizations are valid for 10 years, and any product produced from these GM crops will be subject to the EU's strict labeling and traceability rules.

Kenyan Gov't Gives Nod to Use of Bt Cottonseed Cake for Animal Feeds

The Government of Kenya has granted approval for importation of duty-free genetically modified (GM) cottonseed cake for manufacture of animal feeds as the country seeks to arrest the current shortage and unaffordability of feeds.

In a Gazette Notice exempting duty on imported raw materials used to manufacture animal and chicken feeds, Treasurer Cabinet Secretary Ukur Yatani has allowed eight manufacturers to import up to 28,000 metric tons of GM cotton seed cake from Bt cotton. "The imported cottonseed cake shall be either GM or non-GMO in accordance with the laws of Kenya and Kenyan standards applicable under the laws of Kenya and implemented by the Kenya Bureau of Standards and the National Biosafety Authority," reads the notice.

This development signals the critical contribution of biotech cotton in addressing the incessant feed crisis that has pushed the country's livestock sub-sector to the brink. The new directive is a clear demonstration by the Government to prioritize Bt cotton as one of the country's economic enablers.

The use of Bt cottonseed cake to manufacture animal feeds opens a huge opportunity for Kenyan cotton farmers to tap into diverse markets for their produce. The farmers have an opportunity to close the feed deficit by growing more cotton for seed cake. Kenya rolled out commercial farming of the biotech cotton in 2020, and currently farmers in eastern and western regions are already cultivating the crop which is three times more productive than conventional varieties.

The big demand for cottonseed cake will revitalize the cotton sub-sector and open up a lucrative income stream for farmers. The decision to allow importation of GM cottonseed cake comes hot on the heels of a national dialogue on building Kenya's sustainable animal feed system held in Nairobi. Speaking during the dialogue, Livestock Principal Secretary (PS) Harry Kimtai hinted that the Government would address the ban and approval of GM crops on a case-by-case basis.

Giving the clearest indication yet that the ban will soon be lifted, the PS revealed the Government has developed a biotech crop Post-Release Monitoring Framework for Bt maize. "The Post-Release Monitoring Framework will be sufficient in safeguarding human health as the country considers lifting the GM food import ban," said PS Kimtai. The dialogue proposed a raft of recommendations for building a sustainable feed system in the country.

IIT Guwahati develops affordable prosthetic leg

Researchers at the Indian Institute of Technology (IIT) Guwahati have developed a prosthetic leg specifically designed for Indian conditions. It is suitable for uneven terrain and supports Indian needs such as cross-

legged sitting, and deep squatting. It is also adjustable for the different age groups and multiple stages of prosthesis use.

This research was funded by the Ministry of Education, Government of India and the Department of Biotechnology, Government of India. IIT Guwahati Researchers collaborated with 151 Army Base Hospital, Guwahati, Tolaram Bafna Kamrup District Civil Hospital, Guwahati, Guwahati Neurological Research Centre (GNRC), North Guwahati, and North Eastern Indira Gandhi Regional Institute of Health and Medical Sciences (NEIGHRIMS), Shillong.

A team led by Prof S Kanagaraj, Department of Mechanical Engineering, IIT Guwahati, set out to tackle these issues. Prototypes of their models developed by this research team are currently undergoing trials. A methodology is being developed to fit a 3D-printed test socket which is verified using computer analysis.

Pfizer Got Away with Vaccine Fraud Because Government Was Co-Conspirator:

June 1, 2022

Pfizer has asked a U.S. court to throw out a whistleblower's lawsuit on the basis that the company can't be guilty of fraud, abuse, and protocol violations in its COVID Vaccine clinical trials because its contract with the U.S. government allowed them to skirt regulations and federal laws that typically apply to government contracts.
In other words, Pfizer was allegedly able to make false statements to the government, and lie about the safety and efficacy of its product, "because the government was in on it with them!" according to Robert Barnes, the lead lawyer in the case.

The whistleblower, Brook Jackson, was the regional director for the Ventavia Research Group, the company that was conducting Pfizer's pivotal phase III trial in Texas in 2020.

In September of 2020, Jackson emailed a complaint to the FDA, informing the agency of the company's allegedly dangerous and shoddy research practices. The FDA took no action on her email, and Pfizer continued to use the company. Ventavia fired her after she tried to expose the alleged fraud, abuse, and protocol violations she witnessed during the trials.

In the BMJ report published last November, Jackson said she witnessed researchers falsifying data, unblinding trial participants, and employing inadequately trained vaccinators. She also said researchers were slow to follow up on a multitude of adverse events.

By court order, 55,000 internal Pfizer clinical trials documents were forcibly disclosed to the public last March, after the FDA asked the court to keep them under wraps for 75 years. The court order was in response to a Freedom of Information (FOIA) request by the Public Health and Medical Professionals for Transparency.

Roche Therapy for Rare Form of Alzheimer's Falls Short in Phase III

Jun 16, 2022

Genentech (Roche) and Banner Alzheimer's Institute, reported disappointing results Thursday from another Phase III trial evaluating long-term Alzheimer's disease candidate crenezumab.

The trial was evaluating crenezumab's ability to slow or prevent Alzheimer's disease in cognitively unimpaired people who carry a specific gene mutation that causes early-onset Alzheimer's disease. The medicine is a monoclonal antibody engineered to neutralize neurotoxic oligomers, a form of beta-amyloid. Swiss company AC Immune initially discovered the drug.

The trial aimed to treat autosomal dominant Alzheimer's Disease (ADAD), a rare, inherited form of the disease caused by a single gene mutation in the APP, PSEN1 or PSEN2 genes. It accounts for less than 1% of all Alzheimer's cases globally. ADAD has a much earlier onset than other forms of Alzheimer's, typically targeting people in their 30s to 60s. It has an average age of onset of 44, causing dementia at 49 years old, on average.

The study, dubbed the Alzheimer's Prevention Initiative (API) Autosomal Dominant Alzheimer's Disease (ADAD) Colombia Trial, follows two previous Phase III failures, CREAD 1 and 2. Those 2019 studies included patients with early (prodromal to mild) sporadic Alzheimer's disease. The company halted those studies after a pre-planned interim analysis indicated the drug was unlikely to meet the primary endpoint, which was a change from baseline in the Clinical Dementia Rating-Sum of Boxes (CDR-SB) Score.

In the latest trial, the drug failed to hit the co-primary endpoints, missing statistically significant clinical benefit in the rate of change in cognitive abilities or episodic memory function. These were measured via the API ADAD composite cognitive score and the Free and Cued Selective Reminding Test (FCSRT) Cueing Index. Trial investgiators did observe small numerical differences in favor of crenezumab, but none were statistically significant.

Excluding the controversial approval of Biogen's Aduhelm (aducanumab) in 2021, this is a familiar story in Alzheimer's drug development, with hundreds of compounds having failed mid- and late-stage trials over the last decade.

Family set to take legal action over death of son, 26, who died from blood clots after AstraZeneca Covid jab

17 May 2022

The heartbroken family of a 26-year-old graduate who died from 'catastrophic' blood clots on his brain two weeks after he received an AstraZeneca vaccine are set to take legal action over his death.

Jack Hurn, from Redditch, died last June, after receiving his first dose at a Dudley vaccine centre on May 29.
On Monday, an inquest will open into his death, which his family - who are considering a clinical negligence claim - hope will provide the answers they are looking for. Lawyers for the family say he and his girlfriend Alex Jones were told there was no Pfizer vaccine available on the day he was vaccinated.

They had allegedly asked staff about

alternative vaccines as they were 'aware of concerns around the use of AstraZeneca' for younger people.
A spokesperson for the law firm said: 'The family are looking at a clinical negligence claim but are waiting for the results of the inquest to decide on next steps.'

Moderna and Pfizer: Lawsuits and Charitable Giving on the Agenda

Moderna told a Delaware federal court that it was immune from patent-infringement charges over the COVID-19 vaccine because it supplied the vaccine for a U.S. government effort. Alnylam Pharmaceuticals Inc is required under a longstanding federal law to sue the government directly over shots used in its nationwide vaccination effort, Moderna said in a motion to dismiss the lawsuit. Cambridge, Massachusetts-based Alnylam sued Moderna and Pfizer Inc in Delaware in March, seeking royalties for the lipid nanoparticle (LNP) technology their vaccines use to deliver genetic material known as mRNA.

Moderna made a motion for the courts to dismiss patent challenges filed by Genevant Sciences and Arbutus Biopharma. In a statement, Moderna said, "The claims brought by Genevant and Arbutus are unfounded because Moderna's COVID-19 vaccine does not infringe any valid patents." In a filing, Moderna sought to have the lawsuits dismissed claiming the two companies "have sued the wrong party in the wrong court." Genevant indicates it will object to Moderna's motion to dismiss. The Wall Street Journal reported that Genevant said, "Rather than respond to the substance of our claims, Moderna is trying to shift responsibility for its patent infringement to the U.S. taxpayer."

They also battled a patent challenge from the National Institutes of Health (NIH), who claimed they should be co-patent owners of the mRNA COVID-19 vaccine because of their involvement in its RNA sequence. This involves a different component of the vaccine than the claims made by Genevant and Arbutus. Moderna argued that it recognized the "substantial role" that the NIH's National Institute of Allergy and Infectious Diseases (NIAID) scientists played in developing the vaccine and those contributions are highly valued. However, Moderna did not agree that NIAID researchers co-invented the mRNA sequence of the vaccine. They argued they had picked the mRNA sequence without the input of government scientists "who were not even aware of the mRNA sequence until after the patent application had been filed."

Moderna, which currently has no other product on the market, brought in $17.1 billion in vaccine sales in 2021.

Concerns Mount Over COVID-19 'Rebounds' After Treatment With Pfizer's Paxlovid

May 25, 2022

Concerns are mounting for people who have been given Pfizer's Paxlovid treatment regimen after contracting COVID-19, only to become positive for the infection once again after completing the treatment.

The U.S. Centers for Disease Control and Prevention (CDC) and other health officials have stepped in to clarify the rise in infections, issuing a warning for the unlucky patients who experience symptom recurrence after treatment with Paxlovid.

U.S. health officials have acknowledged reports of rising COVID-19 infections over the last month. From mid-April to mid-May, reports of new COVID-19 cases have jumped from 12,000 to almost 20,000. Death rates have remained stable during this rise.

Prior to the CDC's announcement, the red flag had already been waved. At the beginning of May, 3CL Pharma Ltd., a Todos Medical Ltd. subsidiary, released data from a 30-day case study of a patient who had experienced COVID-19 rebound infection after taking a full course of Paxlovid. The data reported that the patient had severe symptom recurrence on the final day of the Paxlovid treatment regimen.

The U.S. Food and Drug Administration issued a statement several weeks ago about the medicinal intervention for recurrent infections. Clarification was given that a longer course of Paxlovid would provide no benefits to patients, regardless of recurrence or symptom rebound. The administration added that urgency has been given to addressing recurrent infection concerns.

Biotech Industry News

CCI, India approved absorption of Covidshield Technologies into Biocon Biologics

May 20, 2022

The Competition Commission of India (CCI) has approved a proposed deal involving Serum Institute Life Sciences, Covidshield Technologies and Biocon Biologics.

Once the deal is complete, Serum Institute Life Sciences Pvt Ltd will have about 15 per cent stake in Biocon Biologics Ltd, according to the notice filed with the regulator.

Covidshield Technologies Pvt Ltd (CTPL), a wholly-owned subsidiary of Serum Institute of Life Sciences, will be merged into Biocon Biologics.

In a tweet on Wednesday, the watchdog said it has cleared the "merger by absorption of Covidshield Technologies into Biocon Biologics in consideration for acquisition of approximately 15 per cent equity shareholding of Biocon Biologics by Serum Institute Life Sciences."

CTPL was incorporated to undertake the business of marketing, selling and distributing vaccines, drugs and other pharmaceutical products.

Biocon Biologics Ltd is a subsidiary of Biocon Ltd. It offers treatment for chronic and acute diseases such as diabetes, oncology, nephrology, cancer, and autoimmune diseases.

The company also has research and development centres, and manufacturing facilities. Deals beyond certain thresholds require approval from CCI, which keeps a tab on anti-competitive practices in the market place.

Serum Institute's cervical cancer vaccine

June 1, 2022

Serum Institute of India's indigenously-developed India's first Quadrivalent Human Papillomavirus vaccine (qHPV) against cervical cancer might soon hit the Indian market.

As per various reports and sources, an expert panel of India's central drug authority on June 15, 2022 recommended granting of market authorization to the vaccine.

Cervical cancer in India ranks as

the second most frequent cancer among women between 15 and 44 years of age.

Media reports mentioned that Prakash Kumar Singh, director (government and regulatory affairs) at SII had applied to Drugs Controller General of India (DCGI) on June 8 for market authorisation of qHPV after completing the phase 2/3 clinical trial with support of the Department of Biotechnology to ensure its early availability in the country.

In the application, Singh is claimed to have stated that qHPV vaccine CERVAVAC has demonstrated robust antibody response that is nearly 1,000 times higher than the baseline against all targeted HPV types and in all dose and age groups.

The SII has also made a presentation before the working group of HPV constituted separately by the NTAGI to review the data and usefulness of this vaccine.

Bharat Serums and Vaccines partners with NCL, Pune

June 11, 2022

Mumbai-based Bharat Serums and Vaccines has partnered with the National Chemical Laboratory (NCL), Pune, a constituent laboratory of the Council of Scientific and Industrial Research (CSIR), Government of India.

This collaboration primarily focuses on the evaluation of certain recombinant cell line technologies developed by NCL for biopharmaceutical products currently under development at BSV.

The technology involves using CRISPR/Cas9 techniques to perform specific modifications of mammalian cell lines to achieve certain desired product quality attributes.

Sanjiv Navangul, MD and CEO, BSV said, "Through this collaboration, we are delighted to tap some of the best research minds in the country to help us bring innovative treatments and cures for patients in India and the world."

Ayush Ministry, DBT sign MoU for cooperation on evidence-based biotech interventions in Ayush sector

May 24, 2022

The Ayush Ministry and the Department of Biotechnology (DBT) on Wednesday signed an MoU for mutual collaboration to explore the possibility of cooperation, convergence and synergy to bring out the expertise under one platform towards evidence-based biotechnological interventions in the Ayush sector.

In a statement, the Science and Technology Ministry said the joint R&D efforts ranging from fundamental science to validation and thereafter product development will significantly help in the growth of Indian contributions to this im-

portant sector not only nationally but internationally as well.

Emphasis would be given to mechanistic studies of Ayurveda Therapeutics, it said. The MoU would also focus on biotechnological R&D and Ayush interventions to improve the quality of life as well as life span (Vayahsthaapana Rasayana) and bring down the associated morbidity pertaining to chronic diseases such as diabetes, obesity, cardiovascular disease, osteoarthritis, cachexia, pain management and infectious diseases like tuberculosis, the ministry said.

Paraguay cancels order for one million Covaxin doses citing quality issues

June 07, 2022

Paraguay has cancelled the order for one million doses of Covaxin, the COVID-19 vaccine produced by India's Bharat Biotech, media reports said on June 7.

While an official statement was awaited, sources told Hindustan Times that the supply contract has been scrapped due to quality control issues.

The newspaper claimed that Paraguayan health minister Julio Borba, while speaking to a regional news channel last week, confirmed that the government will initiate the cancellation of Covaxin order.

"It is there (the agreement), but it is also in the process of closing. We had problems and we decided to close the contract with them, it is in the process of being closed," the report quoted him as saying.

Bharat Biotech was yet to react to the development by the time preliminary reports had emerged. The company sources, however, told Business Standard that all export orders already stand cancelled as the vaccine production has been halted.

"This is an old development, because Bharat Biotech stopped exports of Covaxin long back, and is now upgrading its manufacturing sites. Any orders therefore stand cancelled," a source told the publication, in response to the reports that blamed quality issues for the cancellation of order by the Paraguayan government.

Bharat Biotech had, on April 1, announced the temporary slowing down of production of Covaxin across its manufacturing facilities, noting that it has completed its supply obligations to procurement agencies and foresees a decrease in demand.

The vaccine maker had said that it would focus on the pending facility maintenance, process and facility optimisation activities for the coming period.

On April 2, a day after the company announced the slowing down of Covaxin production, the World Health Organisation said it was suspending the vaccine's supply through the UN procurement agencies.

"There will be interruption of supply of Covaxin due to suspension of production for export...Bharat has committed to comply by addressing the GMP deficiencies and is developing a corrective and preventive action plan, for submission to the Drugs Controller General of India (DCGI) and WHO," the global health agency had said.

Industry lobbying on WHO overshadowing public health policy, researchers suggest

May 18, 2022

A new article looks at how producers of such products as commercial milk formulas, processed foods, alcoholic beverages, pharmaceuticals and electronic gaming software have been ramping up efforts to influence United States policy toward the WHO.

Has the World Health Organization become collateral damage in the wars over global commerce? Producers of such products as commercial milk formulas, processed foods, alcoholic beverages, pharmaceuticals and electronic gaming software have been ramping up efforts to influence United States policy toward the WHO. This, University of California, Davis, researchers suggest in a new paper, compromises a global health governance system that should be free of commercial influence.

The article, published today in the May 2022 issue of Global Health Governance, is the first comprehensive study of lobbying expenditures directed at the U.S. government related to policy towards the WHO, the lead United Nations authority on health. Data uncovered through Freedom of Information Act requests -- and through analysis of other public documents and disclosures dating back to 2006 -- reveal cross-industry coordination aimed at shaping WHO operational policy and public health guidelines, as well as the funding of the WHO itself, Russ said.

"It's not about any one administration or party," Russ said. "This intensifying corporate lobbying over U.S. positions on global health is problematic because it elevates commercial interests in processes shaping global health objectives. Furthermore, these corporate entities have vast, concentrated pools of private wealth to draw on that public-interest groups lobbying for health policy cannot match."

The WHO recommendations that were targeted by lobbyists, according to researchers, include common health-promoting policy efforts such as:

- constraining inappropriate marketing of infant and toddler formulas that can confuse parents making choices about breastfeeding and children's nutrition
- encouraging consumers to limit sugar and alcohol in their diet
- broadening access to essential medicines, including COVID-related programs
- drawing attention to the addictive effects of video games
-

Although not directly linked to this coalition, the tobacco industry has undertaken simultaneous lobbying in recent years on efforts to criticize the WHO for limiting input by commercial actors in shaping global health policy, with one tobacco-linked group recommending a 25% cut to U.S. funding for the organization, according to researchers.

The researchers noted that the U.S. has stronger disclosure laws than other member states of the WHO, making a similar analysis of European Union countries impossible.

Bad Science

A paper claimed to describe 'the first potent and specific COVID-19 drug.' Now retracted

June 7, 2022

A paper about the discovery of "the first potent and specific anti-COVID-19 drug" has been retracted after it emerged that the compound wasn't so novel after all.

The article, published in May 2021 in Chemical Papers has been cited seven times, according to Clarivate Analytics' Web of Science.

According to the retraction notice:
The Editor-in-Chief has retracted this article. After publication, Dr Michal Šoral (Slovak Academy of Sciences) raised concerns with respect to the complete inconsistency of the NMR spectra presented in the Supplementary Information files with the assigned structure of the key compound cyanorona-20 ((E)-N(4-cyanobenzylidene)-6-fluoro-3-hydroxypyrazine-2-carboxamide) in this article. Independent post-publication peer review supported these concerns and verified that there is overlap of the NMR spectra with those in a previously published article (Rabie 2020). In addition, independent efforts to reproduce the synthesis of cyanorona-20 were unsuccessful. The Editor-in-Chief therefore no longer has confidence in the results and conclusions presented. The author does not agree with this retraction.

Milan Polakovič, editor-in-chief of Chemical Papers, told us, "I have nothing to add besides what was officially reported." Rabie's affiliation is listed on the retracted paper as "Dr. Amgad Rabie's Research Lab. for Drug Discovery (DARLD), Mansoura, Egypt."

In Retraction Watch count, the retraction is the 235th of a COVID-19 paper.

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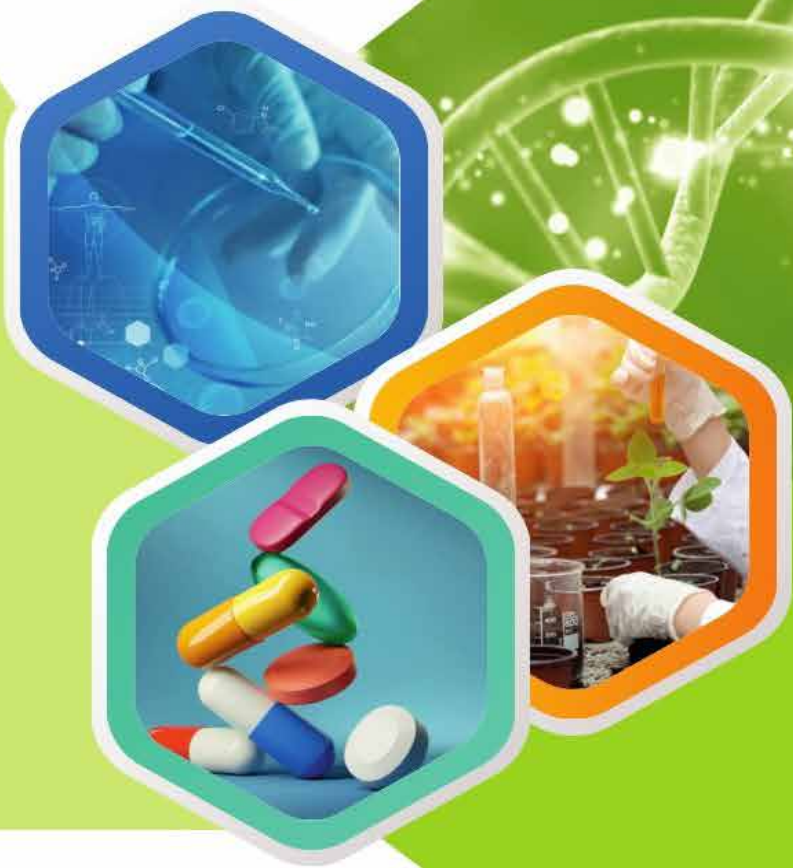

Last date for submission of proposals: 31st July, 2022 (up to 5:30 pm)

For queries, please contact: GM & Head - Investment, BIRAC. Email: investment.birac@gov.in

Former Weill Cornell cancer researcher up to 20 retractions

The journal Cancer Prevention Research has retracted nine papers at once from a group of cancer researchers led by Andrew Dannenberg, formerly of Weill Cornell Medicine.

The bundle of retractions brings Dannenberg's total to 20, according to our database, nearly doubling the 11 he had previously. Kotha Subbaramaiah, also formerly of Weill Cornell Medicine, is a coauthor on all of the newly retracted papers, and two of the notices point the finger at figures that he prepared.

Dannenberg and Subbaramaiah retired from Cornell in the space of three months in late 2020 and early 2021, Retraction Watch has learned, and the university has forwarded a report of their investigation into the matter to the U.S. Office of Research Integrity.

The newly retracted papers have been cited a total of nearly 500 times, according to Clarivate Analytics' Web of Science, with more than half of those cites to the 2011 paper "Obesity Is Associated with Inflammation and Elevated Aromatase Expression in the Mouse Mammary Gland."

That paper has one of the more informative retraction notices:

This article (1) has been retracted at the request of the authors. Following a review by Weill Cornell Medicine, evidence of data falsification or fabrication was found in two figures prepared by Dr. Kotha Subbaramaiah. Suspicious duplications of band images were found in Fig. 3A. In Fig. 10C, it appears that the bottom row of bands has been cut and moved to align directly with the annotations on the top of the page. A copy of this Retraction Notice was sent to the last known e-mail addresses for the 13 authors. Eleven authors (Kotha Subbaramaiah, Louise R. Howe, Priya Bhardwaj, Rhonda K. Yantiss, Xi Kathy Zhou, Victoria A. Blaho, Timothy Hla, Peiying Yang, Levy Kopelovich, Clifford A. Hudis, and Andrew J. Dannenberg) agreed to the retraction; two authors (Baoheng Du and Claudia Gravaghi) did not respond. The authors apologize to the scientific community and deeply regret any inconveniences or challenges resulting from the publication and subsequent retraction of this article.

A few other authors, including CEO of the American Society of Clinical Oncology Clifford Hudis, overlap between the papers, but only Subbaramaiah and Dannenberg are listed on all nine.

All of the articles have comments on PubPeer pointing out similarities between images. Some of the comments on the team's work date back to 2018, the year that the pseudonymous critic Claire Francis first alerted journals and Weill Cornell to the potential issues. Dannenberg's retraction count shot up in 2019, when the Journal of Biological Chemistry retracted nine papers in bulk. He also had a paper retracted from the Lancet in 2006, and another from Cancer Discovery in 2021.

Researchers who jumped into the field from distant disciplines published lower impact work, study finds

In recent months, as vaccines and treatments helped reduce the pandemic's severity, members of the lab have turned away from working on COVID-19. With so many researchers piling into the field, Schoggins says, "there was a sense of saturation." As a result, his Ph.D. candidates began looking elsewhere for promising dissertation topics.

Overall, the number of pandemic-related papers appears set to decline this year, after explosive and unprecedented growth in 2020 and 2021 (see graph). In key disciplines such as infectious diseases and public health, the proportion of new papers devoted to COVID-19

appears to be flattening out (see table). And in fields more distant from pandemic science, the share of COVID-19 papers is declining, suggesting researchers are returning to their core interests.

The pandemic prompted a massive influx of scientists into related research. As of April, more than 500,000 pandemic-related journal articles and preprints had appeared, according to an analysis of the Dimensions bibliographic database by Philip Shapira of the University of Manchester, who studies industrial innovation. Although those publications make up just 4% or so of all scientific papers published from 2019 through early this year, the surge of papers on a new topic was unmatched in the history of science. In certain disciplines the shift was especially dramatic. Shapira's analysis—presented in an April bioRxiv preprint—shows that in virology, the share of papers focused on coronaviruses and the diseases they cause went from roughly 3% in 2019 to 28% in 2021, and in infectious diseases the share rose from less than 1% to 23%.

Such numbers have raised concerns about what some scientists call the COVID-ization of research. They fear too many researchers rushed into work outside of their expertise, resulting in poor-quality studies.

One recent analysis suggests such fears are not unfounded. Two-thirds of authors who had at least one publication on COVID-19 in 2020 had no previous papers on a related topic, Dashun Wang of Northwestern University and colleagues reported in an arXiv preprint in July 2021.

In addition, by using a metric it developed, the team found that papers published on ¬COVID-19 in 2020 had lower impact on average than non–COVID-19 papers published during the same year. Using a different metric that measured a paper's novelty, the group found that the further a researcher had pivoted from their usual area of expertise, the lower the impact of their COVID-19 publications.

A version of this story appeared in Science, Vol 376, Issue 6595

Notice

Motilal Nehru National Institute of Technology
Allahabad, Prayagraj-211004,India

Advertisement No. 02/2022, Dated 24.05.2022

Recruitment of Assistant Professor in various Departments of the Institute

[Assistant Professor (Grade-II) – Academic Level 10 /11 (On contract) and Assistant Professor (Grade-I) – Academic Level 12]

Online applications are invited from eligible applicants for teaching posts at the Academic level of Assistant Professor Grade-II & Grade -I in various departments of the Institute. For further details and Online application submission, please visit the Institute website **http://www.mnnit.ac.in**

Date of availability of detailed advertisement on the Institute website and opening of Online submission of application is **24.05.2022.**

Last date of submission of online application is **30.06.2022.**

Printout (Hardcopy) of duly filled Online Application along with self-attested copies of all supporting documents, and proof of application fee payment must reach to the following address latest by **07.07.2022** upto **5.30 P.M.**

The Registrar
Motilal Nehru National Institute of Technology Allahabad
Prayagraj-211 004, Uttar Pradesh, India

REGISTRAR

Notice

National Institute of Pharmaceutical Education and Research – Ahmedabad

Palaj, Opp. Air force Station Head Quarters, Gandhinagar – 382355, Gujarat, India
Phone: +91 79 66745555,
Email:recruitment@niperahm.res.in
Website: www.niperahm.ac.in and **https://niperarecruitments.in**

EMPLOYMENT NOTIFICATION NO.NIPER-A/2022/Estt/01 Dated 10/06/2022

The National Institute of Pharmaceutical Education & Research (NIPER) - Ahmedabad is an Institute of National Importance established by an Act of Parliament under the aegis of Department of Pharmaceuticals, Ministry of Chemicals & Fertilizers, Government of India.

Posts: Scientists / Technical Supervisor Grade – I and II

The commencement date and last date for submission of applications are as under.

Date of Commencement of Online Application	**10/06/2022 (11:00 AM)**
Last date of receiving Online Application & Payment of Fees	**11/07/2022 (5:00 PM)**

RGCB Biotechnology Skill Development Program in Molecular Diagnostics and Next Generation Sequencing

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Eligibility : First Class B.Tech or M.Tech in Biotechnology, MBBS or BVSc, M.Sc (Biotechnology or Life Science) or MD or MVSc from any recognized University.
Course Duration: 6 months accelerated program, No. of Seats: 20, Age Limit: 30 years
Fees: Rs. 60,000/- (Rupees Sixty Thousand), payable in full at the time of admission

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The **Biometra TRIO** thermal cycler includes three independent blocks in one instrument. Both multiuser environments as well as users with lower sample numbers but different samples will enjoy this model. The three-block design and the specific Temperature Optimization Step function support the fast optimization of ideal annealing temperatures.

Biometra TRIO

Biometra TAdvanced Twin

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