

HEALTHCARE HORIZONS

*Innovations, Investments
and Global Impact*

BCKIC Foundation
MAGAZINE

VOLUME III



Healthcare Horizons:

Innovations, Investments, and Global Impact marks Volume 3 of the BCKIC Magazine series—each edition spotlighting a high-impact sector shaping our collective future. Published by the Bhubaneswar City Knowledge Innovation Cluster (BCKIC) Foundation, this healthcare-focused volume explores pioneering innovations, scalable solutions, and impact-driven collaborations redefining the contours of health and wellness in India and beyond.

Rooted in BCKIC's mission to enhance healthcare accessibility and equity, this edition brings together powerful stories of transformation—where technology meets community, innovation meets inclusion, and partnerships drive purpose. From population-wide screenings to sustainable menstrual hygiene solutions, every initiative underscores our commitment to translating ideas into impact.

A small establishment in BCKIC's public health is the Population Health Screening Program, developed in collaboration with MedTel. Using smart diagnostics and real-time analytics, the program screens over 40,000 individuals annually and spans 60+ sub-centers in Balangir, Odisha. In urban slums like Berhampur, door-to-door NCD awareness campaigns are bridging healthcare gaps at the grassroots.

In maternal and women's health, initiatives like SPARSA and digital maternal diagnostic kits support safe pregnancies in underserved communities. BCKIC's eco-friendly sanitary napkin project has been recognized on the Manthan O/o PSA platform. These units, set up in Odisha's tribal blocks, integrate menstrual hygiene with livelihood generation, empowering tribal women while advancing sustainability.

BCKIC's role in fostering frontier technologies is equally transformative. From IoT-enabled point-of-care diagnostics to cardiac monitoring and infectious disease solutions, the magazine highlights solutions that blend affordability with clinical relevance. The UK-India Digital HealthTech Bootcamp, co-hosted with the British High Commission in India, selected 28 startups from over 260 applicants, with six progressing to explore commercialization in the UK. Complementing this, the UK NHS Immersion Program and the Clinician Peer Support Program (CPSP) have expanded global and national health innovation linkages.

This magazine is more than a publication—it is a platform of purpose. It convenes thought leaders, changemakers, and visionaries to catalyze dialogue, inspire action, and advance healthcare innovation with lasting social impact.

W
O
R
L
D
C
O
N
F
E
R
E
N
C
E





Foreword



Prof. Anil Koul

Professor of Translational Discovery
London School of Hygiene & Tropical Medicine (LSHTM)
London, United Kingdom

It is a privilege to present this volume of the *BCKIC Healthcare Magazine*, published by the Bhubaneswar City Knowledge Innovation Cluster (BCKIC) Foundation, an initiative of the Office of the Principal Scientific Adviser to the Government of India. This edition brings together diverse voices from academia, industry, publishing, policy, and investment, along with inspiring stories from startups that are redefining healthcare solutions.

India is rapidly emerging as a global force in healthcare, driven by world-class research, innovative products, digital health initiatives, and a thriving entrepreneurial ecosystem. The perspectives featured in this magazine, from both Indian and international experts, reflect the strength and momentum of this sector, while also highlighting the need for collaboration, accessibility, and sustainable innovation.

By curating such volumes, BCKIC demonstrates its commitment to fostering dialogue, knowledge sharing, and visibility of homegrown innovation. I am confident that this magazine will serve as a valuable resource for all stakeholders and inspire continued efforts towards building a healthier, more resilient future.

FOREWORD





Preface From *Chairman*

On behalf of the Bhubaneswar City Knowledge Innovation Cluster (BCKIC), we are proud to present the third issue of our flagship publication, Healthcare Horizons: Innovations, Investments, and Global Impact. Supported by the Office of the Principal Scientific Adviser to the Government of India and launched under the vision of the Prime Minister's Science, Technology, and Innovation Advisory Council (PM-STIAC), BCKIC continues to catalyze transformational change in the science and technology ecosystem of India.

This edition is a tribute to the spirit of innovation in healthcare, featuring real-world solutions that bridge gaps, save lives, and redefine possibilities. From rapid diagnostics and teleophthalmology to connected care and sustainable nano-engineering, the contributions in this edition reflect the diverse and dynamic pulse of India's healthcare startup ecosystem.

Each article is authored by pioneers—founders, scientists, clinicians, and changemakers—who are addressing some of the most pressing challenges in our health systems. These stories are not just case studies of success but blueprints of resilience, ingenuity, and purpose-driven entrepreneurship. Whether it's reducing corneal blindness, transforming pediatric surgery, or bringing oncology screening closer to communities, these innovations are creating impact at scale.

At BCKIC, we firmly believe that healthcare transformation must be inclusive, interdisciplinary, and globally relevant. Our role as a knowledge and innovation hub is to amplify such efforts, foster strategic collaborations, and unlock the full potential of healthcare startups, institutions, and enablers across India and beyond.

As we look ahead, our commitment remains unwavering—to nurture innovation, attract investments, and build a future where healthcare is accessible, affordable, and adaptive to global needs. This magazine is a celebration of that vision and the collective force driving it forward.

To all our contributors, partners, and readers, thank you for being a part of this transformative journey. May these insights inspire new connections, new solutions, and a renewed commitment to a healthier world.



Dr. Mrutyunjay Suar
Chairman, BCKIC Foundation

Let's shape the future of **HEALTHCARE** together.





Note From CEO

Bhubaneswar City Knowledge Innovation Cluster (BCKIC) is happy to release its third edition magazine: Healthcare Horizons: Innovations, Investments, and Global Impact. Supported by the Office of the Principal Scientific Adviser to the Government of India and guided by the Prime Minister's Science, Technology, and Innovation Advisory Council (PM-STIAC), this edition reaffirms our commitment to fostering healthcare innovations that are inclusive, scalable, and globally impactful.

At BCKIC, we believe that the transformation of healthcare is a collective mission—not the sole responsibility of clinicians or researchers. True progress emerges at the intersection of science, entrepreneurship, and collaboration. The innovations featured in this issue exemplify this synergy, spanning from cutting-edge diagnostics and digital health solutions to grassroots innovations and global health accelerators. Together, they reflect the pulse of an evolving ecosystem tackling some of the most urgent healthcare challenges of our time.

These are not just stories; they are blueprints of how bold ideas, when supported by the right networks and intent, can drive systemic change.

This magazine is both a celebration of purpose-driven innovation and a call to action—for deeper investment in sustainable health technologies, stronger public-private-academic partnerships, and inclusive models that prioritize accessibility and real-world impact.

I extend my heartfelt gratitude to all our contributors, partners, and stakeholders who have infused this issue with their knowledge, passion, and purpose. Your contributions are a testament to how innovation can be both compassionate and cutting-edge.

Together, we are not just imagining the future of healthcare—we are building it, one idea at a time.



Dr. Namrata Misra
CEO, BCKIC Foundation

**The Innovations
featured in this issue
exemplify this synergy,
spanning from
cutting-edge diagnostics &
digital health solutions to
GRASSROOTS
INNOVATIONS &
GLOBAL HEALTH
ACCELERATORS.**



Benefits Claim Form

IDENTIFICATION NUMBER

--	--	--	--	--	--	--	--	--	--

Name (First, Middle Initial and Last)

Signature (If you are an employee, please attach)

Signature (If you are a contractor, please attach)

PLEASE PRINT OR TYPE ONLY IF IT HAS CHANGED

Current address (including zip code) (If you have moved through the year, please attach a separate form for each move.)





Acknowledgement

We extend our heartfelt gratitude to the **Office of the Principal Scientific Adviser (PSA) to the Government of India** for their visionary leadership in placing healthcare innovation at the forefront of national development. Our special thanks go to **Prof. Ajay Sood, Principal Scientific Adviser**, for his strategic foresight, and to **Dr. (Mrs.) Parvinder Maini, Scientific Secretary**, for her unwavering support and encouragement in fostering healthcare-focused initiatives across India's Science and Technology (S&T) clusters.

We deeply appreciate our esteemed contributors from industry, academia, healthcare startups, NGOs, and international organizations. Your insights and experiences have enriched this issue, highlighting how innovation can address pressing health challenges, empower communities, and build resilient systems.

Special thanks to the dedicated team at BCKIC Foundation—**Dr. Aanchal Katoch** for leading content collection, editing, and review; **Ms. Prasanti Bal** for her creative and impactful design work; **Mr. Sudhir Jha, Mr. Arpan Ghosh**, and **Mrs. Smrita Pathak** for their essential support. This edition reflects the dedication, teamwork, and commitment to creating a meaningful impact.

*Finally, to our readers,
Thank you for joining us on this journey.
Together, let us continue to push boundaries and
co-create a healthcare ecosystem that is bold,
inclusive, and future-ready.*



EXPERTS

02

Dr. Sapna Poti

Office of the Principal Scientific Adviser to the Govt. of India
Systems & Collaborations in HealthTech

Dr. Harshal Patil

Momentum One Zero, Queen's University, Belfast, UK
Catalysing Global Health Innovation

07

14

Prof. Rodney A. Hill

University of Idaho, USA
Intellectual Power & Nanomedicine

Dr. Gullapalli N Rao & Dr. Suryasnata Rath

L V Prasad Eye Institute
LVPEI @ Home

20

24

Dr. Taraprasad Das and Dr. Sujata Das

L V Prasad Eye Institute
Action for Vision

Dr. Rajesh Parishwad

ACS International India Pvt. Ltd.
VC Funding

29

34

Dr. Rohit Srivastava and Dr. Arnab Ghosh

IIT Bombay | AFMC Pune
Nano to Scale

45

Mr. Partha Pratim Das Mahapatra

EzeRx Health Tech Pvt. Ltd.
Pulse of Progress

Mr. Vikramaditya Tirthani

Mediklik Webhealth
Rising Above Challenges with VENSI

49

59

Dr. Pooja Goswami

Ramja Genosensor
Rapid Diagnostics for Antibiotic Resistance

Dr. Lalit Ranjan Manik

MedTel Healthcare
Connected care & Innovation

63

68

Dr. Akash Bihari Pati

AIIMS Bhubaneswar
Pediatric Surgical Care

Dr. Swagatika Panda

SOA University
Oral Cancer Screening

72

STARTUPS



WISDOM &
EXPERIENCE



Expert
PERSPECTIVES



Role of Systems and Collaborations for access to **HEALTHCARE** through **TECHNOLOGY DEVELOPMENT & DEPLOYMENT**

Potential of Technologies in Health Sector

India has a mixed **healthcare system dominated by private providers**, with nearly 70% of outpatient visits and 58% of inpatient episodes occurring in the private sector. This system often marginalizes low-income populations due to affordability issues.

Out-of-pocket expenditure (OOPE) remains a major barrier, particularly for outpatient care and medication, which are often excluded from health insurance schemes. This leads to catastrophic health expenses for many households. About 70% of healthcare infrastructure is concentrated in urban areas, serving only 30% of the population.

Disease Burden is another challenge. Challenges in health range from primary health care, infectious diseases, antimicrobial resistance, mental health, lifestyle disorders, critical illnesses, and so on.

Dr. Sapna Poti

Director, Strategic Alliances,
O/o Principal Scientific
Adviser, GoI





Health is also a huge cause for debts in the underserved areas, far more than marriages and education, there is not only a loss of daily wages of the employee but due to lack of timely and low-cost diagnosis, it drives the poor towards further poverty.

All of these have technologies as a horizontal cutting across all aspects of Health. Hence it is prudent to develop more relevant technologies and innovations in this space should be our primary focus.

Further, with the **One Health approach** to balance health of people, animals and environment, health also has overlaps with waste management when it comes to disposal of bio-medical waste, with sanitation and with water due to water-borne diseases etc. Thus, we need to focus on health holistically, encompassing all these areas.

In addition, in the context of our nation, **we also need to deal with focusing on technologies in such a manner that they provide health access to the poor with a focus on gender and class disparities.**

In this context for primary health care, fever panels, low-cost screening, low-cost blood tests, tele-medicine, early and proactive diagnosis and x-ray-related diagnostics become quite relevant. Healthcare access to blood banks, temperature management, cold storage, drone delivery, etc., also needs our attention to provide for remote fringe areas.

Women and gender issues are huge. Ayushman insurance data shows that the insurance amount allocated for the family is usually utilized for men and the boys in the family.





This pushes back the health care even more, and hence technologies and research per se should focus on women's health issues. Maternal health, menstrual hygiene, issues of infertility, endometriosis, and even mental health issues of women are not attended to easily.

Deployment of technologies can also be a challenge; in this context, capacity building is necessary, especially with a focus on training of paramedical, lab technicians, and doctors on the usage of these technologies. Even more so with paramedical staff as there is a massive need of this set of skills not only in rural areas where there is a lack of medical support through highly qualified doctors but also in the urban areas with the aging population and the urban poor. Mohalla clinics, Nutritional Rehabilitation Centers (NRC), Sick Newborn Care Unit (SNCU) need a massive number of paramedical support. Diagnostics requires trained lab technicians. Technologies help with not only access to health care but also provide the **training tools for capacity building.**

Proactive Self Care through Information gathering and access. Minor ailments, issues related to contraceptives, abortions etc could be avoided if there was enough access to information for timely support. This not only includes information on public health systems that are GI mapped, information on diagnostic labs, clinics, hospitals, doctors, paramedical staff etc but also includes data and information that can help prevent the health issues.



APPs for mental health is one such example of preventive care information. Supporting United Health Insurance with health data storage, digitalization of health records, interoperability, digitalization, AI for data mining and analytics etc.

Given the above scenario and huge challenge of providing for the **poor, gender and caste agnostic treatment there is a huge need for technologies.** From the office of the Principal Scientific Adviser to Government of India a movement towards this was undertaken during the covid times and continues till date.

Importance of Systems and collaborations:

A) O2 for India movement – this was managed with stakeholders from Industries, academia, startups and logistics supply chain management agencies. Systems were developed through committees of academia evaluating the technical aspects of the oxygen concentrators, oxygen plants, ventilators etc, committee of Industry panel assessed the scalability of these innovations submitted by the startups.

B) Reagents – India was facing issues with imported reagents and hence we took a decision to indigenize reagents for testing kits, a system was developed where in TCS provided a global market place to source markets within and outside of India, FIND provided the international market, NCBS and CCMB worked on R&D, startups worked on developing the reagents, Rockefeller provided for the Project Management Unit and the funding for development of indigenous reagents.



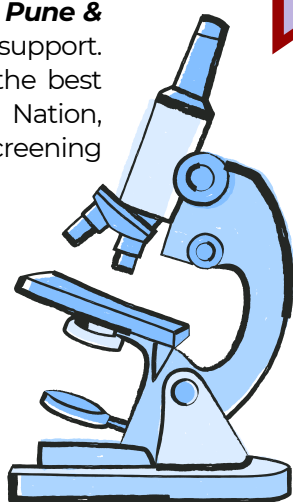
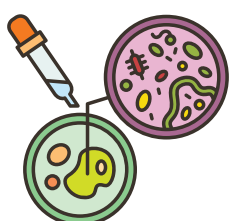


This entire system was both digital and physical, supporting seamless scale-up of reagents for testing kits.

C) Extension Hospitals –

Government infrastructure was going through stress during those times, and hence we brought in a startup from IIT Madras, Modulus Housing to work on the construction of modular hospitals across the nation. Modulus had an innovation with necessary certification, however did not have a prototype. We requested Wells Fargo to fund the prototype and Tata Memorial Hospital to develop the same in their Munger premises. America India Foundation was appointed for the project management, The State Government provided 15,000 square feet of land pro bono to construct these hospitals, and several CSR organizations came together to fund the construction of extension hospitals. Currently, the startup has sourced funding from the National Health Mission and several State governments. The project management system that was put in place with close monitoring managed the scale-up.

D) My Labs Diagnostics – this is a startup that was the first to receive the certification. They were connected to **NCL Pune & Venture Center** for support. Today they are one of the best diagnostics in the Nation, providing low-cost screening panels/self-test kits.



E) National Lab Technicians Training –

During the pandemic, there was a requirement to set up a training and evaluation program to train virtually and at times physically the lab technicians on the covid testing. TIFR Hyderabad was hired to develop the curriculum and provide the courses, PAN-IIT was selected for centralized project management, NIE was requested to manage the Northern regions of India. Certified courses were run at a pan-India level to manage the massive testing requirements. Systems at the National level with stakeholders that were largely white collared volunteers were developed, and large projects were executed.

F) Blocktrack – we also brought in a team from IIT Madras, to develop a Blockchain-based information management system that could securely digitize and help manage healthcare information, critical for a time when physical access was challenged by the pandemic. This effort was supported through a CSR grant from Infosys, and the project was demonstrated at the IIT Madras Institute hospital in summer 2021. Today, this effort has nucleated into an IIT Madras spin-out company, Plenome Technologies, which is developing Blockchain and AI-based solutions for transforming healthcare delivery through rapid digitalization and medical insights.

Some impactful health project initiatives facilitated through the **MANTHAN PLATFORM** O/o PSA to the Govt of India.

1

USAID's Momentum Country and Global Leadership & Villgro Innovation Foundation in collaboration with the Office of the Principal Scientific Adviser to the Government of India, launched **Yash Entrepreneurs Program** aimed at **driving innovation in Sexual & Reproductive Health space** through social entrepreneurship.

2

Mentored Laboratory Training for COVID supported by BMGF, FINDx with TIFR Mumbai, Hyderabad, NII, CCMB, Pan IIT Reach for India.

3

Clinical research platform for Infectious disease and neglected rare diseases by **NCBS** through **funding from HUDCO**, targeted at specifically lower socio-economic strata, who cannot afford the higher costs of diagnostics and treatment. This facility will cover work on virology, bacteriology, human immunology, and RNA therapeutics and is designed to further strengthen national infectious and neglected rare disease priorities.





4

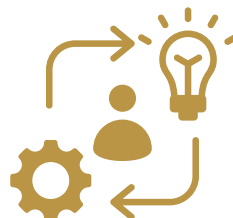
USAID through SAMRIDH collaborated as a partner with the Office of the Principal Scientific Adviser, Government of India, in the **National Consortium of OXYGEN (O2 TO INDIA) initiative**. The Office of PSA, GoI facilitated the national-level supply chain management of critical raw materials, including zeolites, establishment of small-scale oxygen plants, production of compressors, and the manufacturing of final products such as high-quality oxygen cylinders, concentrators, and ventilators. SAMRIDH and Office of PSA collaborated as mutual deal sourcing partners which identified suitable and reputable entities for Project O2. Office of PSA nominated a representative for the Advisory Committee of SAMRIDH to review and provide recommendation on the funding of entities. Entities with a focus on Oxygen solutions were screened and successfully awarded under this collaboration. The support went beyond initial funding to provide technical and business advisory services by SAMRIDH.

6

The ClimateX Health Challenge, an initiative by PATH in collaboration with the Office of PSA, GoI, and the Manthan platform, has driven innovation to address the critical impacts of climate change on public health. It has empowered startups to create scalable solutions, such as Takachar, which developed portable systems to convert crop residues into bio-products, reducing air pollution and respiratory illnesses. Praan, another winner, introduced affordable air purification technology for urban areas, tackling air quality-related health issues. These innovations have significantly improved community resilience by reducing disease burdens and enhancing environmental sustainability. The challenge has also strengthened healthcare infrastructure by enabling renewable energy solutions like Newtrace, which developed cost-effective electrolyzers for green hydrogen production, helping hospitals adopt sustainable practices. Community-centric solutions such as mobile health units equipped with telemedicine tools have expanded access to care in remote regions. Insights from these projects are influencing policy frameworks, integrating climate resilience into public health systems, and driving long-term impacts across India. **The ClimateX Health Challenge stands as a model for innovation-led action against climate-driven health crises.**

5

Community of Practice for MSD for Mothers' Strengthening Systems for Safer Childbirth-Merck: MSD for Mothers (MfM) announced a bold new \$25M initiative, Strengthening Systems for Safer Childbirth, that set out to pick up the pace in saving women's lives and achieve SDGs targets to reduce maternal mortality. To accelerate action, MfM focused on fostering community-led solutions, tapping into underutilized private sector innovations. **6 coalitions representing twenty collaborators across four countries - India, Nigeria, Kenya and Sierra Leone** - came on board to implement solutions based on the needs and preferences of the women in their communities.



Extrapolating from some of the above learnings we are working on various system-based technology development and dissemination. **Working collaboratively with Industries and academia through Manthan, Rural Smart Village Centers (RSVC), Manthan IFIA Technology Industry Incubator (MITTI), Upscaling Tier 2 and Tier 3 colleges for Holistic Advancement of their Network (UTTHAN), Centers of Excellence, Women in STEM and School Innovations.**





Momentum One Zero: Catalysing **GLOBAL** **HEALTHCARE INNOVATION**

Bridging Borders Through Innovation: The Vision of Momentum One Zero

Imagine a world where healthcare is transformed by digital technology and data insights. **Momentum One Zero, led by Queen's University Belfast (Queen's)—a member of the Russell Group of research-intensive universities—is driving this change.** The healthcare sector is evolving rapidly with digital advancements.

Especially between India, the UK, and Ireland. Bhubaneswar City Knowledge Innovation Cluster (BCKIC) Foundation showcases how cluster ecosystems can forge impactful partnerships. Momentum One Zero (M1.0) is a vital integrator, promoting innovation and expanding possibilities through global partnerships.

Dr. Harshal Patil

BDM-Digital Health,
Momentum One Zero
Queen's University,
Belfast, UK





➤ Momentum One Zero: Driving Global Digital Health Innovations

Funded by one of the UK's ambitious City and Growth deals[i] – The Belfast Region City Deal[ii], Momentum One Zero stands out as a beacon of digital and data innovation, uniquely positioned to drive global digital health advancements. With a mission to create sustainable economic growth while tackling global challenges, M1.0 serves as a commercially focused digital and data innovation centre for collaboration & transformative solutions by combining its world-leading expertise at the convergence of cybersecurity, wireless connection, and artificial intelligence, with domain-specific expertise in life and health sciences.

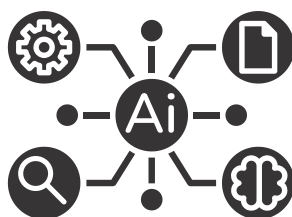
By leveraging Queen's expertise across multiple disciplines, M1.0 has established itself as a catalyst for innovation in Digital Health, Agri-Food, and Cybersecurity.



One of the cornerstones of our work is fostering partnerships that enable real-world impact. Our Digital Health Hub embodies this ethos, acting as a dynamic space where cutting-edge technology and life and health science expertise converge to address pressing challenges. Through collaborative efforts, we've created a foundation for meaningful innovation that spans.

➤ Cyber-AI Hub: Pioneering Innovation and Driving Economic Growth in Northern Ireland

The Cyber-AI Hub, part of Momentum One Zero, has a rich history of driving innovation in cybersecurity and artificial intelligence. Established as part of Queen's digital technology initiative, it translates advanced technology into solutions for industry challenges. The hub has developed AI-enabled cybersecurity solutions, trained future workforces, and equipped industries with advanced tools.



This has positioned Belfast as a top destination for Foreign Direct Investment in cybersecurity outside the United States[i]², creating 2,700+ jobs and generating £230m GVA in Northern Ireland³. The Hub's success has inspired similar initiatives in digital health and other sectors, showcasing the power of collaborative innovation.





➤ Digital Health Hub: Building on Cyber-AI Legacy for Healthcare Innovation

The Digital Health Hub at Momentum One Zero is a testament to our commitment to advancing healthcare through technology. As part of Queen's, the hub leverages the university's expertise in life and health sciences, digital technologies, and knowledge transfer to businesses. The hub is designed to foster collaboration between academia, industry, and government, creating a dynamic environment where innovative digital solutions can thrive. Our multidisciplinary team, comprising experts in artificial intelligence (AI), machine learning (ML), and various life and health disciplines, works together to address the most pressing challenges in digital health.



➤ Momentum One Zero: A Collaborative Model for Innovation

Momentum One Zero operates on a collaborative working model that brings together academic researchers, industry partners, and government stakeholders. ***Our approach involves co-designing projects with industry partners. The key to this is our dedicated AI/ML engineering team, who are experts at translating academic ideas into products and services that are close to market adoption with the help of life and health science expertise at Queen's. This model ensures that our innovations are not only cutting-edge but also practical and scalable.***

By providing access to state-of-the-art facilities, including on-prem edge/cloud computing platforms and software environments like AWS and Azure, we enable our partners to accelerate their product development and bring their solutions to market faster.





➤ Momentum One Zero and Queen's: Pioneering Innovation in Healthcare and Technology

Momentum One Zero and Queen's University Belfast are involved in innovation within healthcare and technology. The Digital Health Hub at Momentum One Zero supports the development of ideas to address challenges in the healthcare sector. By promoting collaboration and innovation, the goal is to create projects with practical applications that have an economic impact.



Collaboration with the Northern Ireland Trusted Research Environment within Health and Social Care (essentially the NHS) in Northern Ireland involves analysing legacy patient health datasets related to renal disease, neurological conditions, and cancer. The objective is to use this data analysis to archive legacy systems, enhance health services, and improve clinical outcomes. The data will be used safely and securely for approved research purposes and made accessible for further research upon receiving necessary regulatory approvals.

A Knowledge Transfer Partnership (KTP) between Queen's, Cirdan - a global provider of informatics and imaging solutions - and Royal Victoria Hospital Belfast received the Best UK KTP award. The project focused on developing AI tools: an algorithm for X-ray analysis to expedite breast cancer diagnosis, and a cloud-based AI model for detecting tumours in colon polyp whole slide images with 95% accuracy[i]. This partnership demonstrated the effective collaborative approach in enhancing efficiency in clinical laboratories globally.

Collaboration with Altomics Datamation Ltd, a Belfast-based precision medicine company, aims to develop a novel proteoform and peptide library. This project seeks to identify previously unidentified dark proteome and lay the groundwork for future advancements in deep learning for the discovery of novel biomarkers and therapeutic targets.





➤ Momentum One Zero: Integrating Northern Ireland's Innovation Ecosystem for Healthcare Solutions

Momentum One Zero is integrated into the wider innovation ecosystem across Northern Ireland, the Republic of Ireland, and Great Britain, collaborating with various institutes and organisations to develop healthcare solutions. Key partners include the Future Medicines Institute, which aims to enhance R&D productivity through interdisciplinary collaboration, and the Precision Medicine Centre, which focuses on advanced data analytics, digital pathology, and genomics for diagnostic, prognostic, and therapeutic development. The Institute of Research Excellence for Advanced Clinical Healthcare works as an integrated clinical research centre, fostering a patient-centred, innovation-focused, and digitally enabled research environment. The Centre for Digital Health Technologies supports the creation of medical devices and diagnostic solutions aimed at improving healthcare efficiency and patient outcomes.

The Advanced Manufacturing Innovation Centre assists in advanced manufacturing to support the development and commercialisation of technology solutions.

Momentum One Zero collaborates with Invest Northern Ireland, the economic development agency for Northern Ireland, to attract investment, support economic growth, and drive innovation. Northern Ireland's dual-zone economy enables effortless trade with both the EU and the rest of the UK without border checks, tariffs, or customs declarations.

Furthermore, Invest Northern Ireland offers substantial assistance, services, and programs to support businesses, including financial aid and skill development, making Northern Ireland an attractive destination for Research, Development, and Innovation.

The wider network helps Momentum One Zero maintain its position in healthcare innovation, advancing through partnerships with research institutes and industry collaborators.





► Northern Ireland: A Hub for Innovation in Life and Health Sciences

Northern Ireland is a prime location for innovation across life and health sciences, technology and connected health, and medical engineering and manufacturing. The region has a pro-business environment, structural support through government initiatives, a highly skilled, experienced, and adaptable workforce, and is a cost-effective location for investment. Along with the £1.3 billion investment in the City and Growth Deals, Northern Ireland offers exciting future opportunities for health, life science, and data-tech industries.



There are over 250 life and health science companies, from Small and Medium Enterprises to Large Enterprises, in Northern Ireland. The sector generates a turnover of \$1.6 billion[i], showcasing Northern Ireland's life and health sciences expertise to the world.

Academic experts from our universities are extremely active in helping to build and apply world-class research capabilities that support businesses, locally and globally. The region is home to the world's first mobile defibrillator[ii], developed by the late Professor Frank Pantridge (based at Queen's), and big pharma & biotech multinationals like Almac and Randox. Ten percent of the world's cholesterol tests are manufactured in Northern Ireland[iii]. Cancer research is a flagship program, with discovery science underpinning both spin-out and spin-in companies which are delivering innovation in cancer diagnostics and treatment[iv].





➤ Momentum One Zero: A Vision for Collaborative Progress in Digital Health

As the global healthcare sector undergoes significant changes, Momentum One Zero invites stakeholders across India and beyond to participate in developing digital health solutions. Through platforms like BCKIC and international collaborations, we aim to advance digital health and set new standards for global healthcare innovation. We encourage stakeholders across India to join us in this initiative, working towards a future where healthcare is both accessible and transformative.

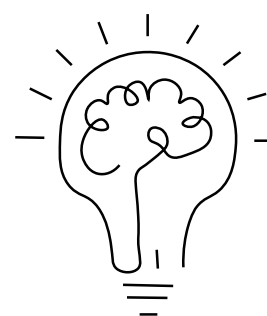
Website: <https://www.momentumonezero.com/>

Email: momentumonezero@gub.ac.uk

Phone: +44 (0)28 9097 1700

References:

1. <https://www.belfastcity.gov.uk/belfastregioncitydeal>
2. <https://belfastregioncitydeal.co.uk/>
3. What are the top global FDI hubs for cybersecurity? Investment Monitor
4. Northern Ireland is the #1 international investment location for US cyber security projects | NI Connections
5. Jobs, Growth, Excellence: Northern Ireland's Thriving Cyber Security Sector | CSIT | Queen's University Belfast
6. Queen's University partnership wins Innovate UK's top KTP award | Business | Queen's University Belfast
7. Showcasing Northern Ireland's Life and Health Sciences Expertise to the World | Invest Northern Ireland
8. Work of late Queen's Professor Frank Pantridge celebrated for transformational impact | News | Queen's University Belfast
9. <https://www.investni.com/sites/default/files/documents/static/library/invest-ni/documents/northern-ireland-key-facts-booklet.pdf>
10. Lawler, Mark et al. "Delivering a research-enabled multistakeholder partnership for enhanced patient care at a population level: The Northern Ireland Comprehensive Cancer Program." Cancer vol. 122,5 (2016): 664-73. doi:10.1002/cnrc.29814



Challenges in harnessing **INTELLECTUAL POWER** to drive **INNOVATION** in **NANOMEDICINE** - A global view.

Throughout my career as a scientist and leader across universities in the United States and Australia, ***I have remained deeply committed to discovering the most effective ways to foster innovation and success.*** Globally, science unites the brightest minds, bridging political and cultural divides that might otherwise be challenging to overcome.

At its core, **“SCIENCE IS ABOUT PURSUING THE TRUTH.”**

Prof. Rodney A. Hill

Associate Professor of Physiology
University of Idaho, USA





When it comes to innovation, particularly within a highly specialized and technical field such as **Nanomedicine, it is crucial to recognize that interdisciplinary scientific collaboration lies at the heart of success.** The recent visit of the editorial board members of the scientific **journal**

“PRECISION NANOMEDICINE”

to KIIT was a remarkable experience, highlighting the enthusiasm of this globally distinguished group in engaging with the excellence in Nanomedicine demonstrated by KIIT's faculty and students. Such collaborations hold immense potential to advance the field of Nanomedicine, fostering meaningful, far-reaching, and lasting impacts on global human health and well-being.

Universities worldwide serve as hubs of infrastructure and intellectual environments that nurture free thinking and innovation. In this supportive setting, scientists are encouraged to seek scientific truth through rigorous research. In the context of Nanomedicine, this pursuit extends beyond academic curiosity, aiming to enhance the well-being of society by improving health outcomes and quality of life worldwide.

Innovation in modern medicine requires a disciplined and methodical approach, from developing novel diagnostic tools and methodologies to delivering safe, efficacious, and impactful therapeutics to an increasingly interconnected global community. **Nanomedicine, as one of the most innovative and promising platforms, offers unparalleled opportunities to deliver transformative benefits for society, spanning multiple healthcare domains.**





Political and Policy Frameworks for **Safe & Effective Nanomedicine Development**

While universities, faculties, and students face numerous challenges in developing new diagnostics and therapeutics to improve public health, governments, industries, and professional and scientific societies also have crucial roles to play in supporting health innovations. Fortunately, many of these entities possess a global perspective, although some may remain partially inward-looking or even parochial. The future success of global healthcare lies with those who maintain a more global outlook.

The term "**diaspora**" is now widely used to describe the dispersion of cultures that once had a geographic base to being distributed worldwide. In this context, while fostering connections not only within university communities but also with governments, industry, and professional and scientific societies, it is essential to leverage the global diaspora's influence to advance innovation in Nanomedicine.

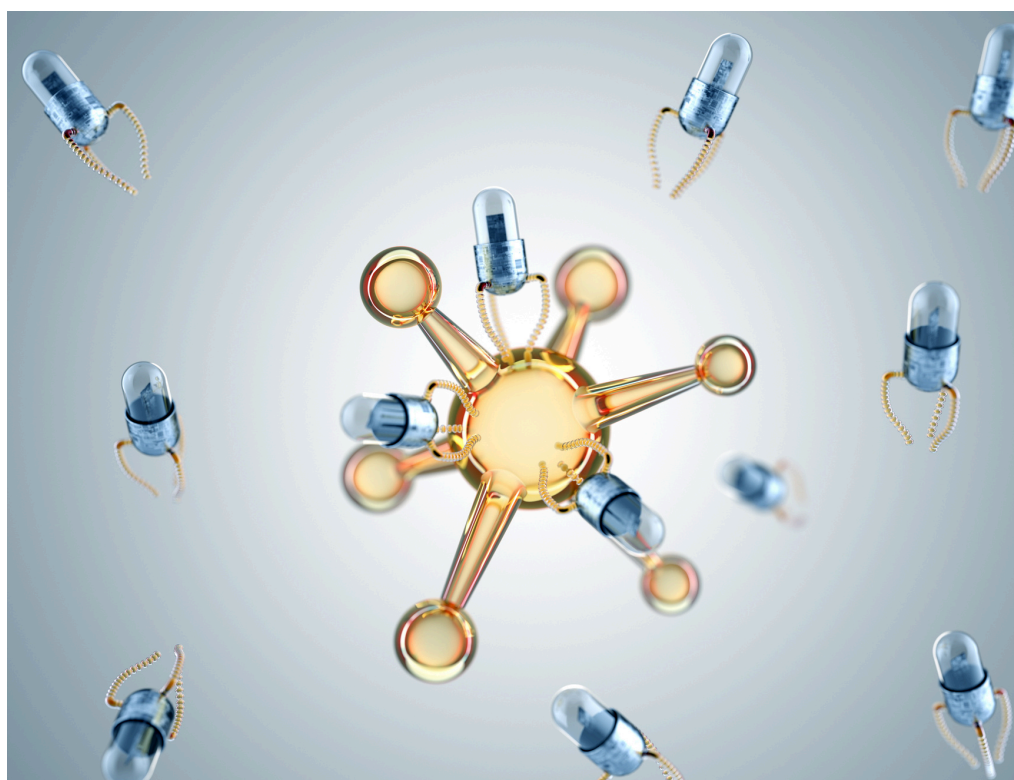
As highlighted earlier, science serves as a unifying force, and within the global diaspora, we share far more in common for mutual benefit than the factors that set us apart. Now, more than ever before, our pursuit of innovations in Nanomedicine holds immense potential for widespread impact, driven by our deep and enduring interconnectedness.

Fortunately, many governments also recognize this. *To explore the policy frameworks that guide the development of novel nanomedicines, I will focus on two key frameworks: one originating in the United States and the other in India.*

There have been many iterations of these frameworks provided by governments, in collaboration with universities and with industry; that have been available since the early part of the 21st century. A recent example, we will delve into, just a little here, **should give the reader some deeper sense of the challenges before us and what we can do to overcome these challenges, together.[1]**

When examining the supporting frameworks, it becomes clear that they have more similarities than differences. The latest guidelines developed by the Indian Government align closely in intent with the US FDA document mentioned earlier.

This consistency not only supports international collaboration but also highlights that healthcare is a global effort. It also shows the scale needed to successfully develop new diagnostic and therapeutic tools.





Universities have the talent and infrastructure to take innovations from the lab to the initial stages of commercial development. However, the cost of bringing even one new drug to market—while meeting strict safety, efficacy, and effectiveness standards—is far beyond what universities can manage on their own. More on this later!

I want to emphasize how these policy frameworks and government guidance help scientists succeed in Nanomedicine innovation. The following discussion focuses on an idea that might seem simple at first glance but is essential for protecting the public while also enabling successful innovation. The US FDA document, along with various national guidelines, is thorough and detailed to ensure that early steps in Nanomedicine innovation prioritize product safety and effectiveness.

Before diving deeper, I want to briefly address a concerning trend seen in some Western societies: the rise of minority views that, despite lacking evidence, are critical of science. This phenomenon often stems from misinformation spread through social media, which is troubling for scientists, professionals, scientific organizations, the informed public, and society as a whole. I'm mentioning this to highlight the thoughtful approach taken by FDA policymakers when crafting their 2022 guidance. With this context in mind, I'll now discuss a specific part of the 2022 guidance, quoting directly:

“

Note that FDA does not categorically judge all products containing nanomaterials or otherwise involving the use of nanotechnology as intrinsically benign or harmful. Rather, for all products (nanotechnology-derived or otherwise), FDA considers the characteristics of the product and its safety and effectiveness for its use.

”

The guidance clearly states that Nanomedicine innovations will not be unfairly scrutinized just because they are based on "nano" technology. This is important to note, especially considering the concerns raised earlier about a minority of anti-science views. In practice, this means that Nanomedicines will be evaluated with the same level of rigor and safety considerations as any new diagnostic or therapeutic.

[1]Drug Products, Including Biological Products, that Contain Nanomaterials. Guidance for Industry. U.S. Department of Health and Human Services Food and Drug Administration. Center for Drug Evaluation and Research (CDER). Center for Biologics Evaluation and Research (CBER). April 2022.Pharmaceutical Quality/CMC product. The FDA's primary role is to protect the public while also supporting innovation that benefits society.

By highlighting this specific point, I want to help readers understand the challenges scientists, universities, and the industry face when developing healthcare products that are safe, effective, and beneficial.





From Discovery to Commercialization: **The Path for Nanomedicines**

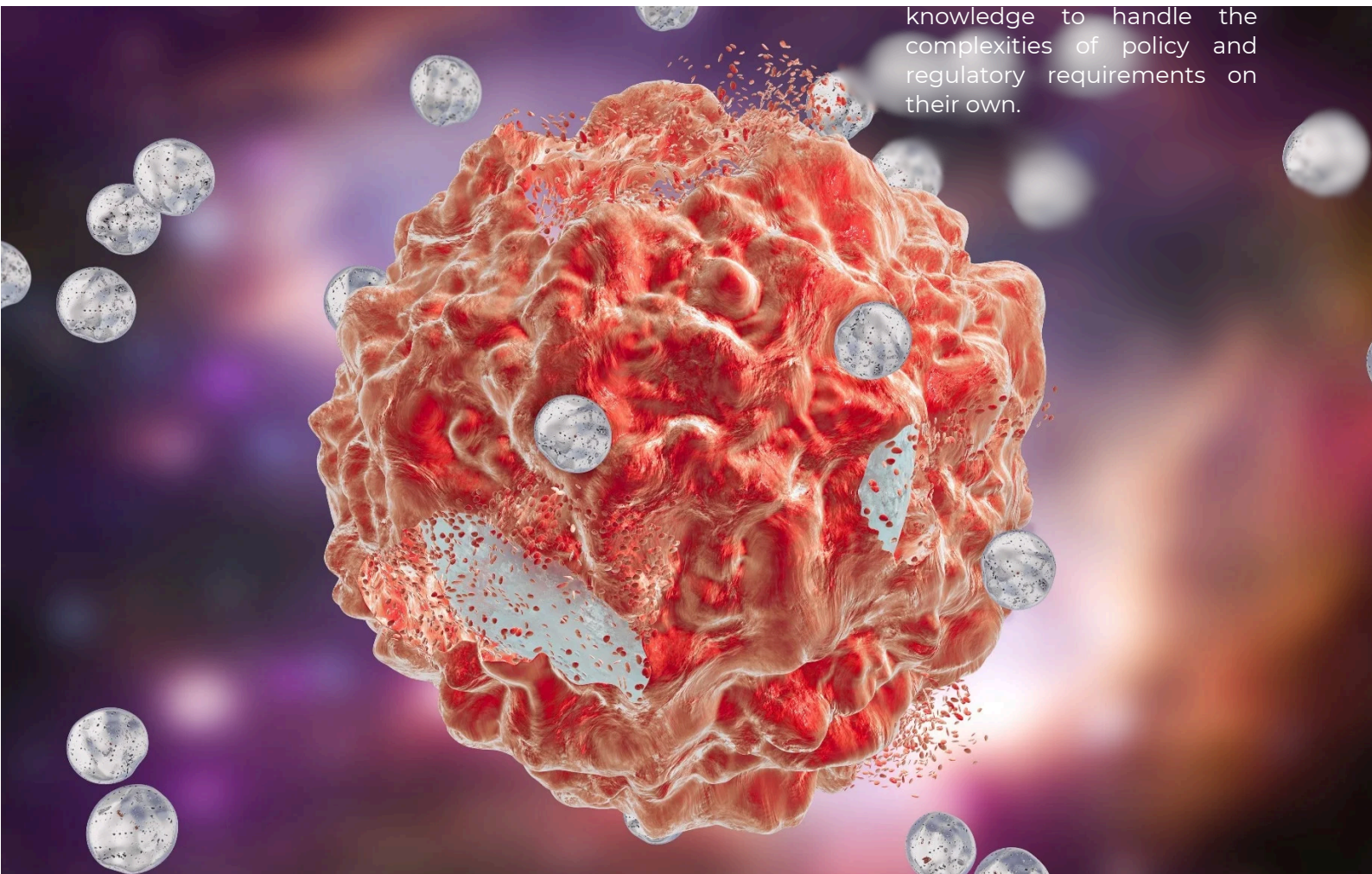
Transitioning from basic scientific discoveries to the commercialization of safe and effective Nanomedicines is a complex process. **Universities around the world play a crucial role in this journey by fostering innovation and taking the first steps toward commercialization.**

To support this, universities have developed leadership roles and infrastructure that bridge the gap between academic research and commercial applications.

Innovation hubs, startup communities, and entrepreneur networks established within universities are essential in guiding early-stage Nanomedicine innovations toward commercialization.

These hubs connect innovators with venture capitalists, angel investors, and funding opportunities like crowdfunding. There are numerous success stories from this strategy, which could be an interesting topic to explore further.

One of the most critical roles universities play is providing oversight and guidance, especially considering the global nature of Nanomedicine development. As discussed earlier, government policy frameworks, while consistent across nations, are not identical. Universities help navigate these differences, offering contractual support and expertise to ensure that early commercialization efforts align with international standards. This support is vital, as academic innovators often lack the resources and knowledge to handle the complexities of policy and regulatory requirements on their own.





Universities Leading the **Way in Nanomedicine Commercialization**

One important point to highlight is that universities play a leading role in the early commercialization of Nanomedicines. Taking a promising product from the lab to clinical trials is a long and complex process, and universities are often at the forefront of this journey.

A good example of this is the database **ClinicalTrials.gov**, which documents the development of Nanomedicines in the United States. To better understand the role of universities, I recently conducted a quick search of the database using the term "**nano**". The search returned **593 studies**, and it was interesting to see that over **500 of these studies were primarily sponsored by universities or medical institutes**. In contrast, large pharmaceutical companies sponsored fewer than **20 studies**.

This data shows that despite the high costs of developing new diagnostic or therapeutic products, universities are not just supporting basic research but are also actively creating pathways for commercialization.

They achieve this through innovation hubs that nurture entrepreneurship and connect researchers with investors such as venture capitalists, angel investors, and crowdfunding platforms.

One effective strategy used by universities is creating **innovation spaces** where startups at various stages of commercialization can work together. Placing new startup directors close to more experienced entrepreneurs encourages informal interactions and knowledge sharing, which can be crucial for the growth of young companies, especially during their early, vulnerable stages.

On a personal note, I had the opportunity to experience a similar support system firsthand when I was an American Council on Education Fellow at the University of Michigan. During my fellowship, I worked in the Office of the Vice President for Government Relations, where I learned about Ann Arbor SPARK. This organization provides extensive support for innovation and commercialization, offering resources and guidance to startups. I highly recommend exploring Ann Arbor SPARK's website for more insights into their impressive model for fostering entrepreneurship and commercialization.

Closing Thoughts

Developing **Nanomedicines** from innovation to commercialization is a complex and challenging process. In this discussion, I've shared some insights into how **universities** can help navigate these challenges.

At their core, **universities** aim to **foster innovation** and support the **intellectual growth** of people **through education and research**. **Nanomedicine programs** around the world hold great potential, offering **multidisciplinary, multicultural, and international collaboration** opportunities. These programs not only advance science but also help build **connections between academia, government, industry, & the wider community**.

Looking ahead, the **future of Nanomedicine** is promising. Sustaining **innovation** and improving **global health** will require ongoing **collaboration, open-mindedness**, and a willingness to **share ideas**. By **working together** and building **strong partnerships**, we can drive progress and positively impact **human health and well-being** on a global scale.





LVPEI@HOME: A Hybrid Teleophthalmology Model for Elderly Eye Care

At L V Prasad Eye Institute, we remain committed to our motto “so that all may see”. Before we delve into the challenges faced in fulfilling this mission we must bear in mind facts about elderly health and eye care in India. Elderly population in India is projected to double in the next 30 years from 10% in 2020 to 19% in 2050 (India Ageing Report-2023, UNFPA). Estimates predict a 340% increase in the elderly over 75 years by 2050. Public health and policy will be impacted by this imminent demographic shift (Population Ageing in India-LASI,2020).

In the HOMES study reported by Marmamula S. et al. prevalence of visual Impairment (VI defined as worse than 6/18 in the better eye) among elderly (>60 years) was reported to be 30% and the predominant causes of VI were cataracts 46%, uncorrected refractive error 27%, after-cataract 15% and posterior segment pathology 6.5%.¹ The findings suggest that 88% of VI in the elderly is treatable.¹ A separate report from the HOMES study (n=1074 elderly) on co-morbidities among elderly showed 28% had diabetes and 57% hypertension.² Falls were seen in 29% of the elderly and those with VI were at significant risk of a fall.²



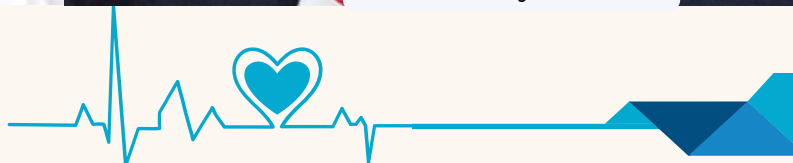
Dr. Suryasnata Rath

Network Director, Operations In-Charge
Elderly Eye Care and Home Care Services
Consultant Ophthalmologist



Dr. Gullapalli N. Rao

Founder-Chairman
L V Prasad Eye Institute





Before we embark on finding solutions to the problem we need to keep in mind some relevant insights documented by the **NITI Aayog Report, 2024**. These include;

- **75%** of the elderly have one or more **chronic disease**
- **50%** of the elderly have **mobility restrictions**
- **28%** of elderly utilized **out-patient** and **8%** **in-patient care**
- **71%** of elderly live in **rural areas**
- **87%** of the elderly have access to smartphones but there is little evidence to show how many of them are digitally literate and can use them optimally.
- Health care expenditures of the elderly are predominantly out-of-pocket

Over time an erosion of the traditional joint family structure in India has been noted with a preference for nuclear families especially in urban areas. Further, limited awareness of government health schemes and digital literacy has placed the senior citizens of India at a crossroads. Geriatric and palliative care exist mainly in cities. A large majority of elderly people in rural communities with health, economic, and digital challenges have limited access to quality health/eye care.

Therefore, pragmatic tailored strategies in public health and policy are needed to meet this challenge. We must remember that the quintessential general practitioner who could make a home visit to take care of our elderly is near extinct like the sparrow! In an era witnessing rapid urbanization and a trend towards super-specializations in medical practice, the need of the hour is to devise complementary, not necessarily alternate, eye care delivery models to reach the doorstep of all “those who cannot reach us.”

LVPEI@Home for Elderly Eye Care

Often moments of crises act as drivers for change. The COVID pandemic was an eye-opener. Even before COVID-19 struck, teleophthalmology platforms existed but had barely made inroads as alternate healthcare delivery platforms. Ideally, an alternate health/eye care model must fulfill several criteria to be effective in reaching a target population and be sustainable. They must be targeted, integrated into existing healthcare systems, economically viable, and scalable in exigencies.

LVPEI launched a network-wide service named –

LVPEI@Home with generous support from Standard Chartered Bank.

LVPEI@home fulfills the criteria outlined above and can cater to the eye care needs of our elderly population.

Teleophthalmology provides substantial economic and environmental benefits at primary (rural) and tertiary (urban) eye care systems in India.^{3,4}





What Constitutes LVPEI@Home

LVPEI@Home aims to take comprehensive eye care closer to the doorstep of people. After an appointment is fixed either through the telephone or at the reception desk, a trained optometrist/vision technician visits the patient's home on an electric scooter. He carries portable equipment needed for an eye examination in a box. He performs the following at home:

- History Taking
- Torch Light Examination
- Refraction Check to find the best spectacle correction
- Intraocular Pressure Check
- Examination of the outer (anterior) eye with high-resolution pictures
- Examination of the inner (posterior) eye with high-resolution pictures

Details of the comprehensive eye examination are uploaded on-site to the LVPEI Connect application. A teleconsultation via the LVPEI Connect application (powered by WellZio) connects the patient and caregivers either via a voice or video call. At the end of the teleconsultation, the patient receives an electronic report with key observations, diagnosis, management plan, and prescription for glasses and medicines, if any. E-report is integrated into eyeSmart (the electronic medical record), making the findings from the visit at home available for future consults with an eye doctor within the LVPEI eye care system. This ensures continuity of eye care. Additionally, when advised by the doctor, select investigations like ultrasound B-Scan, visual field (Om), and optical coherence tomography can be done at home through a second scheduled visit.

LVPEI@Home is a step further to routine teleophthalmology platforms and those that deliver prescription glasses at home. Under LVPEI@Home, a trained optometrist physically visits the patient at their home and conducts a comprehensive eye examination, followed by a teleconsultation with an ophthalmologist on video-call. It is suited for both new and existing (follow-up) patients.

Where will LVPEI@Home available? Will this be available for the elderly living in rural India?

LVPEI@Home is available for the elderly living in both urban and rural areas at 7 different locations (3 tertiary centre, 3 secondary and one centre of excellence with city centres as one cluster) within our pyramidal network.

Urban areas include:

- Hyderabad in Telangana,
- Bhubaneswar in Odisha,
- Vishakhapatnam and Vijayawada in Andhra Pradesh.

Rural areas include:

- Sircilla in Telangana,
- Berhampur in Odisha,
- Madanapalli in Andhra Pradesh.
- Based on impact and sustainability this may be expanded to new locations within LVPEI pyramid over time.



Figure 1: Photograph showing LVPEI@Home service at an old-age home with an elderly gentleman (top-left), anterior segment examination with hand-held slit lamp (top-right, bottom-left) developed by the innovation team of L V Prasad Eye Institute and posterior segment (bottom-right) examination by hand-held fundus camera.





What will be the direct and indirect impact of LVPEI@Home?

LVPEI@Home will directly impact the health of the elderly population in several ways. They are

- Improves the well-being of senior citizens of the country to bridge the gap between capacity and need consequent to the demographic shift.
- Improved quality of life for elderly individuals
- Provide continuity of care through digital health record and integration with hospital visits.
- Equity in eye care through the balance between paid (urban) and free eye care (rural).
- Covers ALL who cannot reach the hospital because of mobility, morbidity, and economic constraints. The elderly who are diagnosed with cataract will be provided transport to and from the tertiary/secondary centre and cataract surgery performed at no cost to them.
- Alternate model that can be scaled in pandemic-like scenarios.

Sustainability of the LVPEI@Home will be achieved by incorporating strategies that include:

- Cross subsidy between paid (predominantly urban) and free (predominantly rural) homecare at 1:3 ratio respectively.
- Annual subscription - concierge service for metropolitan cities like Hyderabad.
- Trained vision technicians for recording data points that are uploaded and Teleophthalmology for video consult with eye doctor for efficiency.
- Electric vehicle for mobility to reduce transport cost and carbon footprint and pollution.

Vision 2020 aims to eliminate avoidable blindness by identifying and treatment of conditions causing avoidable blindness. LVPEI@Home aligns with the vision 2020 targets with the following common objectives:

- Identification of cataract and surgery to restore vision.
- Identification of uncorrected refractive errors and providing free spectacles to underprivileged.

References

- 1.Marmamula S, Barrenakala NR, Challa R, Kumbham TR, Modepalli SB, Yellapragada R, Bhakki M, Khanna RC, Friedman DS. Prevalence and risk factors for visual impairment among elderly residents in 'homes for the aged' in India: the Hyderabad Ocular Morbidity in Elderly Study (HOMES). Br J Ophthalmol. 2021 Jan;105(1):32-36.
- 2.Marmamula S, Barrenakala NR, Challa R, Kumbham TR, Modepalli SB, Yellapragada R, Bhakki M, Friedman DS, Khanna RC. Falls and visual impairment among elderly residents in 'homes for the aged' in India. Sci Rep. 2020 Aug 7;10(1):13389.
- 3.Rani PK, Khanna RC, Ravindrane R, et al. Teleophthalmology at a primary and tertiary eye care network from India: environmental and economic impact. Eye (Land). Published online January 22, 2024.
- 4.Rani PK, Peguda HK, Chandrashekher M, et al. Capacity building for diabetic retinopathy screening by optometrists in India: Model description and pilot results. Indian J Ophthalmol. 202169(3):655-659.





Call to Action: **Reduce** **CORNEAL BLINDNESS** and Improve **EYE BANKING**

Blindness is a major public health problem in India. The recent RAAB (rapid assessment of avoidable blindness) survey conducted during 2015-19 by the National Program for Control of Blindness and Visual Impairment (NPCB&VI), Government of India, suggests the prevalence of blindness (presenting visual acuity <3/60 in the better eye) in the country at 0.36%. The RAAB survey also showed that the major causes of blindness (aged ≥50 years) are cataract (66.2%), corneal opacity (8.2%), cataract surgical complications (7.2%), posterior segment disorders (5.9%) and glaucoma (5.5%). The corneal opacity is the leading cause of blindness (37.5%) in the population aged 0-49 years.

Blindness and visual impairment affect the quality of life of individuals and their families. In India, there are an estimated

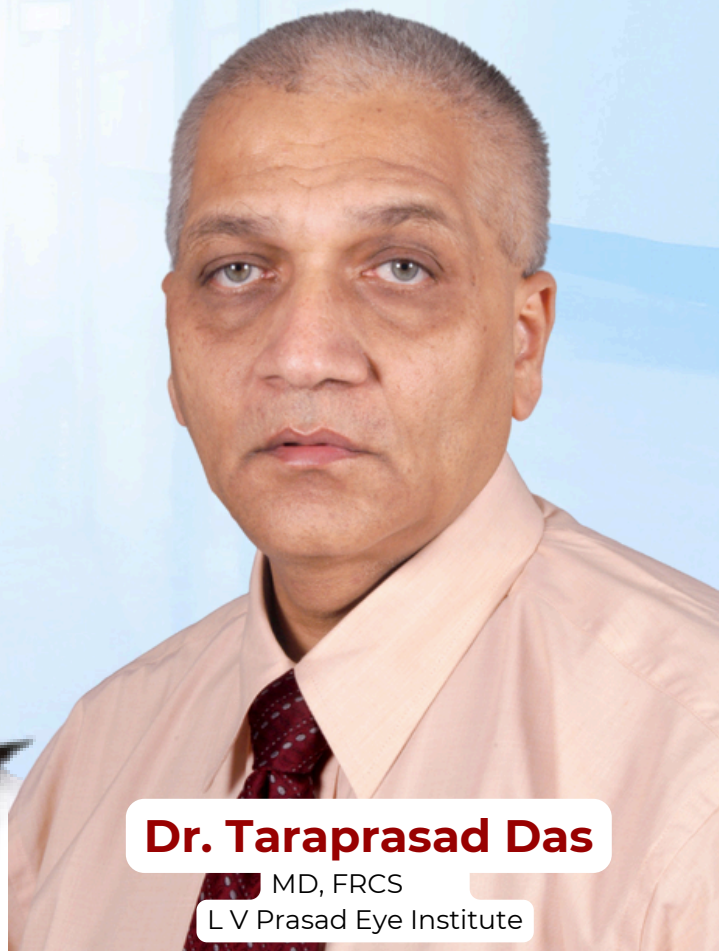
4.95 million blind people and 70 million vision-impaired people, including 0.24 million blind children. The estimated net loss of gross national income (GNI) due to blindness in India is INR 845 billion, and the per capita loss of GNI per blind person is INR 170,624.

Hence, **it impedes the socio-economic stability and growth of the nation.**



Dr. Sujata Das

MS, FRCS
L V Prasad Eye Institute



Dr. Taraprasad Das

MD, FRCS
L V Prasad Eye Institute





The causes of corneal blindness include a wide variety of infective and non-infective diseases that cause corneal scarring and result in functional blindness. Since most reports on corneal blindness are in people aged ≥ 40 , corneal diseases are underrepresented in children and young adults. The risk factors for a higher prevalence of corneal blindness are related to poverty, water sanitation, climate, and geography.



Figure 1. Demand and supply of donor cornea in India

Corneal transplantation is one viable option for restoring vision in patients with corneal opacities, and keratoplasty (corneal transplantation in any form) is the most frequent type of biological tissue transplantation in the world. Extrapolating the figures of the RAAB survey with India's current population, the estimated number of corneal-blind individuals would be 420,000, and 25,000 to 30,000 people are added annually. In Odisha, the number of people with corneal blindness is estimated at 10,000, with an addition of about 1,000 people each year.

The availability of donated corneas is very low in our country due to inadequate epidemiological information, lack of public awareness, deficient fiscal resources, suboptimal infrastructure, insufficient knowledge of eye banking, and lack of trained personnel. To address the corneal blindness problem in India, we need approximately 100,000 transplantable corneal tissues available yearly, over a 3x increase from the present level of about 29,000. (Figure 1) To meet this demand, 200,000 donor corneas with a utilization rate of 50% or so are required.

Eye Banking and Corneal Transplantation in India: Regulations and Progress

The Eye Bank Association of India (EBAI), a not-for-profit society, was established in 1989 to promote public awareness about eye donation and establish uniform eye banking standards. The Transplantation of Human Organs Act (THOA) was enacted in 1994, repealing the Corneal Transplant Act of 1983, enabling a registered medical practitioner to harvest eyes anywhere. The Act was further amended to include tissues in 2011 and was published as Transplantation of Human Organs and Tissues Rules 2014 (THOTA).

EBAI : 1989

THOA : 1994

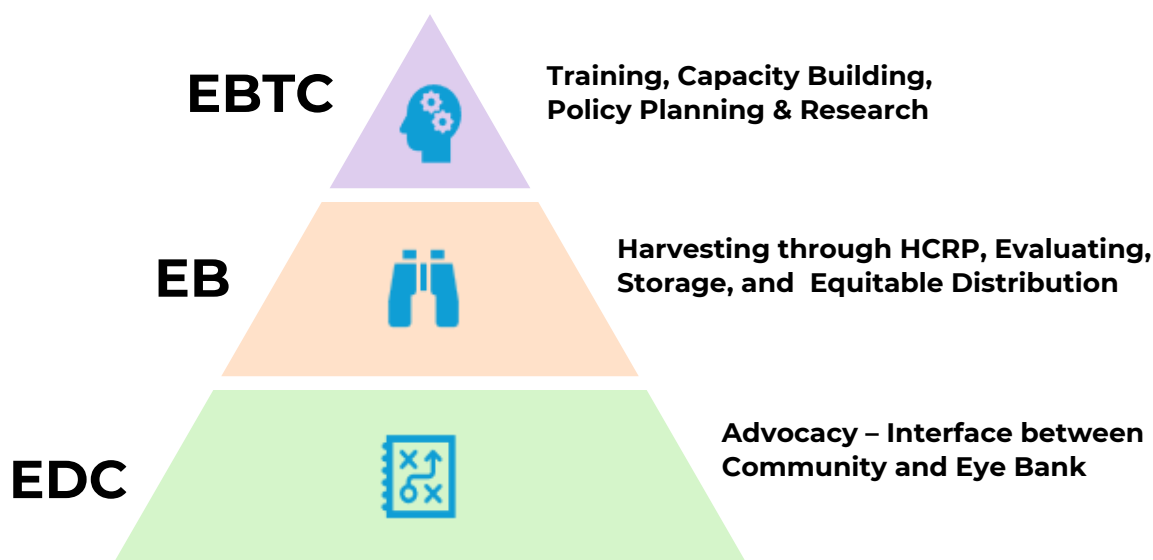
THOTA : 2014





Corneas were explicitly stated to be tissues and were not to be treated as organs. Consent for donation from the legal next-of-kin was extended to include more relations with possible legal responsibility for the deceased. Trained technicians, who are not registered medical practitioners, are authorized to harvest corneas. The Act also advocated the widespread availability of transplant coordinators and counsellors to strengthen the **Hospital Cornea Retrieval Program (HRCRP)**. In 2018, an amendment to the **Central Motor Vehicles Act** was passed, which ensured the recording of the donor status of the license holders. The medical standards for eye banking in India were framed in 1999 and updated in 2020.

The success of keratoplasty depends upon the quality of the donor cornea, the nature of the recipient's pathology, and the postoperative care. **Eye Banks (EBs)** play an essential role in providing high-quality tissues to cornea surgeons through appropriate procurement, storage, and distribution of tissues. Ideally, EB is a not-for-profit community organization created and managed by community members. Its primary function includes harvesting donor corneas, detailed donor tissue and donor blood sample processing, tissue storage, and subsequent distribution to the corneal surgeons.



(Figure 2. Structure and Function of Eye Bank)

A 3-tier community system has been proposed for India consisting of an EB Training Centre (EBTC) at the top, an EB in the middle, and Eye Donation Centres (EDCs) at the bottom of the pyramid. (Figure 2) EDCs should be affiliated with an EB; its main functions are to increase public awareness about eye donations, coordinate with the community and eye bank, and harvest, store, and transport corneal tissue and blood from donors to the EB. EBs are assigned the pivotal role of increasing public awareness, harvesting, evaluating, storing, and distributing corneal tissue equitably. The EBs are also assigned to run the which involves retrieving donor corneal tissue from the deceased in major hospitals and medical schools. EBTCs are specialized EBs meant to serve additionally as training centres for EB personnel in addition to research and policy planning.

In 2020, there were 380 functional EBs and EDCs in India (Ministry of Health and Family Welfare, Government of India). The 'VISION 2020 – Right to Sight' has set a target of establishing 20 EBTCs, 200 EBs, and 2000 EDCs in the country. The EBs are now accredited by the National Accreditation Board of Hospitals (NABH) and are regularly reviewed.





1980s, corneal transplants carried a very high failure rate due to various factors. The eye banking in India was suboptimal and needed to meet acceptable international standards. In 1989, the Ramayamma International Eye Bank (RIEB) was established at the LV Prasad Eye Institute (LVPEI) Hyderabad with the help of the International Federation of Eye Banks (IFEB). This was the first eye bank with international standards in Asia and the developing world. Later, adopting the Hospital Corneal Retrieval Programme from the USA Eye Banks significantly accelerated the harvesting of corneas. The success of HCRP at RIEB encouraged many other organizations and cities in India to adopt this model, leading to greater availability of donor corneas for transplantation. RIEB also manufactured a commonly used cornea preservation medium, the McCarey-Kaufman medium, within its laboratory facility; it helped transition to retrieving the corneal scleral rim. Over the past two decades, the LVPEI has added three more **eye banks in Bhubaneswar (Drushti Daan Eye Bank, DDEB), Visakhapatnam (Mohsin Eye Bank, MEB), and Vijayawada (Tej Kohli Eye Bank, TKEB).**

Today, the LVPEI's eye banks prepare and distribute **~9000 pre-cut corneas for lamellar procedures**, accelerating the progress exponentially to keep pace with the changing keratoplasty techniques.

Till 2023, LVPEI's Eye Bank Network harvested ~139,000 corneas, and ~83,000 were utilized. The tissues are distributed to cornea specialists within LVPEI and other transplant centres across India after an extensive evaluation of the retrieved corneas. This amounts to nearly a quarter of the cornea harvested and utilized in India. The LVPEI achieved a significant milestone in 2024 when it performed its 50,000th corneal transplant at the Institute. It is possibly the highest number ever performed by a single Organisation/Institute anywhere in the world. In recent years, LVPEI Eye Bank Network has been building capacity by creating new Eye Banks both within the country and internationally.

In **Odisha, 'Drushti Daan' started eye banking activities in 2002** to promote eye donation and reduce corneal blindness. LVPEI Bhubaneswar synergized Drushti Daan's public awareness, advocacy, and networking efforts with its expertise in tissue harvesting, evaluation, preservation and distribution, knowledge management, and capacity building. Drushti Daan Eye Bank was established in 2007 with the help of Eyesight International™, Canada and SightLife™, USA. Today, DDEB at LVPEI Bhubaneswar is one of the top 10 eye banks in the country. It has harvested over 16,000 corneal tissues with the successful implementation of HCRP in the state. This eye bank's corneal tissue utilization rate is also high (>80%). The Government of Odisha has facilitated DDEB's HCRP in all the district head-quarter-level hospitals and government-run medical schools.





Tackling the challenges of corneal blindness requires a data-driven approach, such as (i) an epidemiological study to determine the number of individuals (with corneal blindness) that can be treated by keratoplasty and those who have been transplanted for visual rehabilitation, (ii) investment in training for corneal surgeons and eye banking professionals (iii) long-term graft survival and visual outcomes after keratoplasty procedures, etc. LVPEI's Eye Bank Network, in association with the Eye Bank Association of India (EBAI), is working on a comprehensive strategy for establishing a Corneal Graft Registry of India. **The registry will be a valuable tool** for monitoring the data gaps in epidemiological information and analyzing long-term corneal transplant outcomes to improve eyecare services and optimize resource management.



“

We have come a long way in eye banking in India. We have overcome many hurdles. Yet there is a lot to work for.

”





VC Funding: IGNITING INDIAN HEALTHCARE INNOVATION

**Fueling India's Healthcare Revolution:
The Vital Role of Venture Capital in
Deep-Science Innovation**

Dr Rajesh Parishwad

Senior Associate Director, Global Strategy
for Society Programs
ACS International India Pvt. Ltd.





BURGEONING ECOSYSTEM

The Rise of Deep-Science Healthcare Startups

India has a rapidly growing start-up ecosystem with over 100,000 start-ups set up in the last decade or so but the deep science and technology start-ups account for a small percentage of this. With estimated **3,500 deep-science startups** now dotting India's innovation landscape, the demand for VC funding is more critical than ever.

This burgeoning ecosystem reflects India's incredible talent pool and its potential to become a global hub for deep-science innovation. Yet, the sheer number of startups intensifies competition for resources, making the role of venture capitalists even more pivotal.

Healthcare startup founders highlight the critical role of early-stage funding. Without it, many innovative ideas might never progress beyond the conceptual phase. They emphasize that beyond capital, the belief and confidence investors provide are invaluable, empowering them to pursue bold ideas with the potential to change lives.

For the early-stage funding, the Indian Government has played a significant role through its initiatives and regulatory support to deep-science startups, particularly in the healthcare sector.

The **Biotechnology Industry Research Assistance Council (BIRAC)**, established under the **Department of Biotechnology (DBT)**, is a cornerstone of this effort. BIRAC provides grants, equity funding, and incubation support to biotech startups, aiming to de-risk early-stage innovation. BIRAC's impact has been tremendous on the Indian biotech ecosystem as it has supported over 500 startups and facilitated the development of more than 100 technologies.

The Indian **Department of Science and Technology (DST)** also plays a crucial role, offering programs like the **National Initiative for Developing and Harnessing Innovations (NIDHI)** that provide seed funding and support systems for startups. These initiatives reflect a strategic commitment to fostering innovation and bridging the gap between research and market-ready products.





UPHILL TASK

Challenges in scaling

Unlike software-based startups that can scale quickly with minimal upfront investment, deep-science startups in healthcare face a steep uphill climb. Developing a new drug, diagnostic tool, or medical device involves years of R&D, rigorous clinical trials, and regulatory approvals and processes that can cost tens or even hundreds of millions of dollars.

For instance, bringing a new drug to market globally can take 10-15 years and upwards of \$1 billion, while even smaller-scale innovations like point-of-care diagnostics require significant investment in prototyping, testing, and validation. Add to this the need for advanced laboratories, skilled scientists, and collaborations with academic institutions or hospitals, and the financial burden becomes clear.

However, VCs face challenges such as long development timelines, regulatory complexities, and market uncertainty, making healthcare startups inherently risky investments. Limited expertise in evaluating such innovations and concerns over scalability and market acceptance in India's diverse healthcare landscape further hinder decision-making.

Kavya Prudhvi from Athera Venture Partners

observed that about 4-5 years ago, VCs hesitated to invest in deep-science startups as the market in India was nascent. "We see a path now that makes more business sense for VCs to invest in deep-science startups," she said.

The urgency and importance of VC funding resonate deeply within the industry. Venture capitalists acknowledge that investing in deep-science startups isn't just about financial returns; it's about fueling innovation that can redefine entire sectors. While the risks are significant, the potential for a monumental impact on healthcare outcomes is a powerful motivator.





SYMBIOTIC RELATIONSHIP

Bridging Investors & Deep-Science Startups

The relationship between venture capital and deep-science startups is symbiotic. Venture capitalists bring more than just funds as they offer strategic guidance, industry insights, and a network of connections. For startups, this partnership can be the catalyst that transforms a groundbreaking idea into a market-ready solution.

Independent initiatives are stepping in to bolster the ecosystem. **ACS Ignite**, launched by the **American Chemical Society (ACS)**, is one such effort. Focused on fostering innovation, ACS Ignite 2024, a first-of-its-kind event for deep science startups, provided mentorship, networking, and funding opportunities for over 25 Indian deep-science startups.

The event, which attracted over 15 VCs, aimed to bridge the gap between venture capitalists and startups in deep science. Following the success of this program, the next edition will be focused on **Healthcare Innovation at the Global Scientific Conference, held at IIT Bombay in October 2025**. Also, the ACS Ignite program is going global with plans to **host one in UAE in 2025** and will be partnering with **IIT Delhi Abu Dhabi campus and FortyTwo.VC**, a venture capital firm.

ACS Director Deeksha Gupta, highlights the need for greater attention from the VC community. "Deep-science startups have not received the focus they deserve in India. Beyond funding, VCs provide mentorship and networks that are critical for growth. This program aims to bridge that gap," she states.

Asutosh Upadhyay, co-founder of FortyTwo.VC, believes the deep science healthcare ecosystem represents India's most compelling venture frontier today.

“

With AI advancements and affordable computing power, we're witnessing unprecedented opportunities to solve critical healthcare challenges both locally and globally.

”



INVESTORS





Need to Bolster Investor Confidence

However, the investment hurdles such as lengthy commercialization timelines, regulatory complexity, and capital intensity are precisely what create apprehension within the Investor community. Many investors remain hesitant due to unpredictable R&D outcomes, the technical expertise required for proper due diligence, and unclear exit pathways in this nascent ecosystem.

Asutosh advocates a blended grant funding approach with strategic venture capital, creating milestone-driven structures that respect scientific development while enforcing commercial discipline. This balanced framework, he says, can help overcome the risk aversion that's currently holding back potentially transformative investments in India's healthcare landscape.

As the Indian ecosystem matures, the convergence of robust government initiatives, independent support programs, and proactive venture capital investment paints a promising picture. The potential for innovation is immense, and with the right support, deep-science startups can not only revolutionize healthcare in India but also set new benchmarks on the global stage.



Conclusion

India's deep-science healthcare ecosystem is at a pivotal moment, with innovation surging and venture capital playing a crucial role in scaling groundbreaking technologies. While challenges remain—ranging from long R&D cycles to regulatory complexities—the increasing interest from investors, government support, and independent initiatives like ACS Ignite are creating a more conducive environment for deep-science startups to thrive. By fostering collaboration between startups, venture capitalists, and policymakers, India has the potential to emerge as a global leader in healthcare innovation. The road ahead may be demanding, but with sustained investment and strategic guidance, the country's scientific entrepreneurs can drive transformative change, improving healthcare outcomes both locally and globally.





Sustainable Innovations in Healthcare:

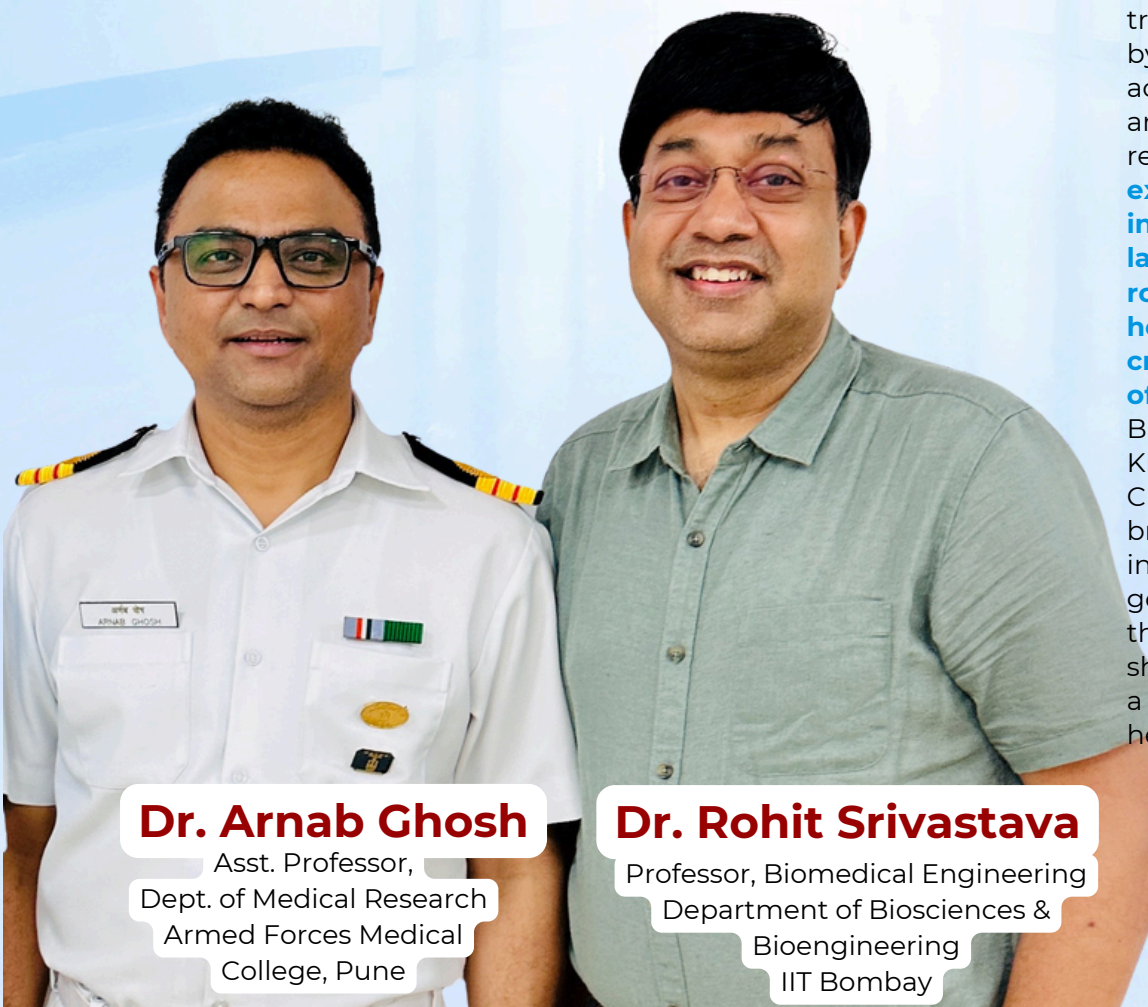
From **NANO-ENGINEERING** to **SCALABLE SOLUTIONS**

1. Dr. Rohit Srivastava, Vigyan Shri, Himanshu Patel Chair Professor, FNASc, FNAE, FAMS, Nanobios Lab, Department of Biosciences and Bioengineering at Indian Institute of Technology Bombay

2. Dr Arnab Ghosh, MD, PhD, Asst Prof, Dept of Medical Research, AFMC, Pune

Sustainability in healthcare innovation has become critical to address rising global health challenges while minimizing environmental and economic costs. **NanoBios Lab, under Prof. Rohit Srivastava at IIT Bombay, has developed cutting-edge technologies, ranging from nano-engineered diagnostics to biodegradable implants and cancer therapeutics.**

These technologies are transforming healthcare by prioritizing accessibility, affordability, and environmental responsibility. **This article explores 20 key innovations from the lab, emphasizing their role in sustainable healthcare and the critical contributions of ecosystems** like the Bhubaneswar City Knowledge Innovation Cluster (BCKIC). By bridging academia, industry, and government efforts, these innovations showcase pathways for a greener future in healthcare.



Dr. Arnab Ghosh

Asst. Professor,
Dept. of Medical Research
Armed Forces Medical
College, Pune

Dr. Rohit Srivastava

Professor, Biomedical Engineering
Department of Biosciences &
Bioengineering
IIT Bombay





INTRODUCTION

The global healthcare system is under increasing pressure to address chronic diseases, infectious outbreaks, and an aging population while ensuring sustainability¹. Medical waste from disposable equipment, energy-intensive manufacturing, and inefficient healthcare delivery exacerbates environmental challenges². Nano-engineering and translational research offer solutions to these problems by integrating sustainability into the innovation process.

At the forefront of this shift is NanoBios Lab at IIT Bombay, led by Prof. Rohit Srivastava, which has developed innovative, eco-friendly technologies.

The lab's focus spans diagnostics, therapeutics, and sustainable biomaterials, aligning with the broader goals of collaborative ecosystems like the BCKIC. These initiatives demonstrate how sustainability-first approaches can revolutionize healthcare delivery, particularly in low-resource settings.





EMERGING NANO-ENGINEERED INNOVATIONS

UChek: Mobile-Based Urine Analysis System



Figure 1. UChek: Mobile-Based Urine Analysis System

UChek, a smartphone-integrated diagnostic device, automates urine analysis using a dipstick and camera-based interpretation. By eliminating bulky equipment, UChek provides portable, accurate, and cost-effective diagnostics for resource-limited settings. It has been deployed widely in rural areas, **aiding in early detection of infections and metabolic disorders.**

Suchek: Indigenous Glucometer

India has a diabetes prevalence of nearly 11%, with many cases undiagnosed due to limited access to testing³.

Suchek, a low-cost glucometer, provides an indigenous alternative to expensive imports. Its affordability and accuracy make it a critical tool for **diabetes management in underserved regions.**



Figure 2. Suchek: Indigenous Glucometer





CholChek™: Lipid Profile Analyzer

CholChek™ addresses the need for affordable cardiovascular disease management. The device, using enzymatic assays, enables rapid lipid profiling in under 30 minutes, especially useful in community health camps. Funded by BIRAC, its scalability underscores the role of public-private partnerships in healthcare innovation.



Figure 3. Cholchek™ device





SUSTAINABILITY IN THERAPEUTICS

Biodegradable Bone Screws

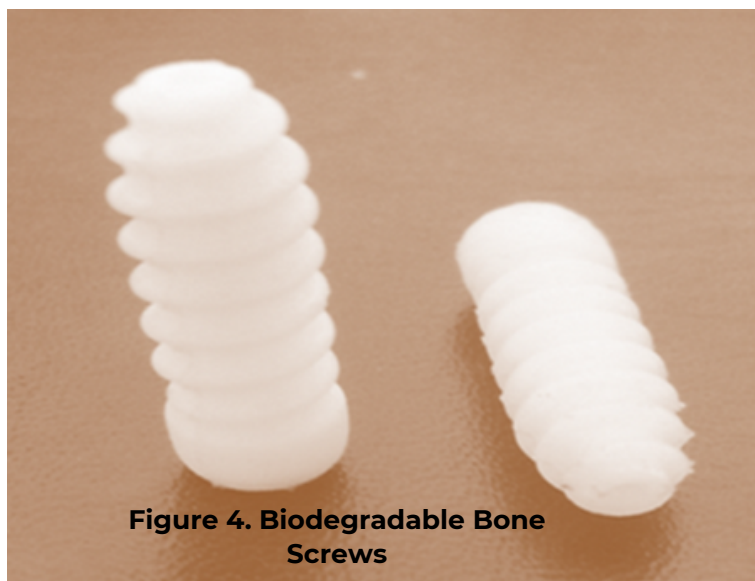


Figure 4. Biodegradable Bone Screws

Traditional orthopaedic implants often require surgical removal, leading to additional costs and risks⁴. The **biodegradable bone screws developed by NanoBios Lab dissolve naturally in the body**, reducing the need for secondary surgeries. These **screws are cost-effective and environmentally friendly, eliminating post-use medical waste.**

Gold Nanoparticle-Based Photothermal Therapy

Cancer treatments often involve significant environmental costs due to their resource-intensive processes⁵. Gold nanoparticle-based photothermal therapy offers a **sustainable alternative by directly targeting cancer cells with minimal off-target effects**, reducing resource use and side effects⁵.

Microneedle Drug Delivery Systems

Microneedle patches developed by the lab allow painless transdermal drug delivery, suitable for vaccine administration and chronic disease management. **Their biodegradable composition aligns with environmental goals** while offering practical benefits for patients.

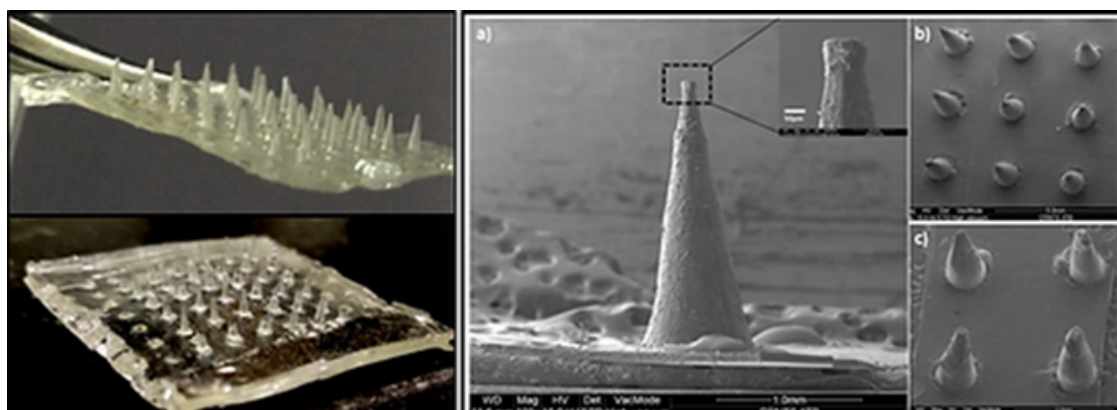
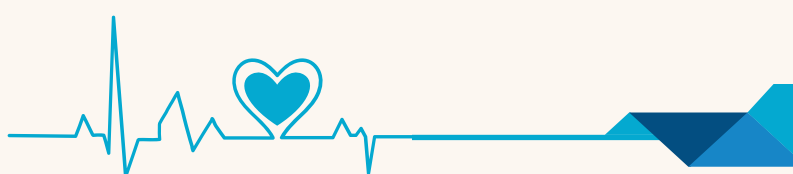


Figure 5. Microneedle Drug Delivery Systems





DIAGNOSTIC TECHNOLOGIES DRIVING EARLY DETECTION

TropChek: Cardiac Marker Detection

Cardiac diseases remain the leading cause of mortality worldwide⁶. TropChek, a point-of-care device for detecting cardiac biomarkers, is a game-changer in diagnosing myocardial infarction in low-resource settings. It is highly accurate, portable, and significantly more affordable than imported alternatives.

Glycated Albumin Detection

Gestational diabetes and anaemia often complicate maternal health⁷. NanoBios Lab's glycated albumin detection tool offers a reliable diagnostic method, particularly in cases where HbA1c measurements are unreliable due to anaemia.

Fluorescent Biosensors for Kidney Disease

uSmart™, a device that measures urinary albumin-to-creatinine ratios, provides an affordable and portable solution for early kidney disease diagnosis, essential in preventing progression to chronic kidney failure.

CHALLENGES IN SCALING TRANSLATIONAL RESEARCH

While these innovations represent significant progress, scaling them to **meet national and global healthcare needs** involves overcoming several challenges:

Regulatory Barriers: Many nano-engineered devices require rigorous testing to meet international safety and efficacy standards⁸.

Scalability: Transitioning from lab-scale prototypes to mass production remains a critical bottleneck, often referred to as the "valley of death" in healthcare innovation pipelines.

Cost Constraints: Keeping the cost of development and manufacturing low while maintaining sustainability metrics is challenging.



“

The collaborative framework of ecosystems like BCKIC plays a vital role in addressing these challenges by fostering industry-academia partnerships, streamlining funding mechanisms, and supporting early-stage product validation.

”





THE ROLE OF CLUSTER ECOSYSTEMS: BCKIC AS A CATALYST

Facilitating Industry-Academia Collaboration

BCKIC's hub-and-spoke model connects research institutions with industry partners to co-develop technologies. For instance, **NanoBios Lab's partnership with Biosense Technologies Pvt. Ltd.** has resulted in the **successful commercialization of devices like UChek and Suchek.**

Capacity Building

Through workshops, training programs, and shared infrastructure, BCKIC builds the technical capacity of researchers, clinicians, and startups. This integrated approach accelerates the translation of innovations from the lab to the market.

EXPANDING HORIZONS WITH ADVANCED DIAGNOSTIC TOOLS

SmartSense: Integrated Critical Care Analyzer

Critical care often requires rapid and accurate multi-analyte diagnostics to guide treatment decisions.

SmartSense, developed with support from the Wellcome Trust, integrates point-of-care testing for multiple biochemical parameters into a single portable device. **This innovation enhances ICU efficiency while reducing resource utilization.**



Figure 6. SmartSense: Integrated Critical Care Analyzer





Electrofinder™: Sodium and Potassium Detection

Electrolyte imbalances are life-threatening conditions that demand rapid diagnosis.

Electrofinder™, developed under the MHRD IMPRINT Scheme,

provides a portable solution for monitoring sodium and potassium levels in critical care settings. **Its compact design makes it ideal for deployment in emergency response units.**



Figure 7. Electrofinder™: Sodium and Potassium Detection

Non-Invasive Anaemia Detection

Using a smartphone-based system, this technology screens for anaemia by assessing pallor in the conjunctiva, nail bed, and tongue. The non-invasive approach reduces patient discomfort and provides an affordable solution for anaemia screening in rural healthcare settings.

Point-of-Care Tuberculosis Diagnostics

Tuberculosis (TB) remains a significant global health challenge, especially in resource-constrained regions. NanoBios Lab has developed **affordable, rapid diagnostic devices that detect TB biomarkers in sputum and blood samples.** These innovations enhance early detection, crucial for containing the disease.





THERAPEUTIC ADVANCEMENTS

Insulin Infusion Microneedle Patch

Managing diabetes effectively requires consistent and controlled insulin delivery. The lab's microneedle patch provides a painless and sustained method for insulin administration. By eliminating the need for multiple daily injections, this innovation improves patient compliance and reduces medical waste.

COVID-19 ICU Monitoring Systems

During the COVID-19 pandemic, NanoBios Lab developed affordable and IoT-enabled ICU monitoring systems. These systems track critical parameters such as oxygen saturation, pulse rates, and IV fluid levels, ensuring efficient use of hospital resources during peak demand periods.

Biodegradable Polymeric Nanoparticles

The development of biodegradable polymeric nanoparticles enables targeted drug delivery, enhancing the efficacy of treatments for chronic diseases like cancer. These nanoparticles degrade naturally, reducing environmental impact and improving patient safety.

SUSTAINABLE SOLUTIONS IN IMAGING AND CANCER CARE

Fluorescent Polysaccharide-Based pH-Responsive Compositions

This innovative imaging platform leverages pH-responsive fluorescent compositions to enhance visualization during surgical and therapeutic procedures. It provides real-time feedback, reducing surgical risks and improving outcomes.

Photothermal Cancer Therapy

Utilizing gold nanoparticles, this therapy targets tumors with precision using heat generated by near-infrared light. This approach minimizes damage to healthy tissues and reduces reliance on resource-intensive chemotherapy protocols.

Nano-Engineered Orthopaedic Implants

Bone and joint injuries often require implants, which traditionally involve secondary surgeries for removal. NanoBios Lab's biodegradable implants eliminate this need while improving recovery outcomes and minimizing waste.





ROLE OF COLLABORATIVE ECOSYSTEMS: SCALING INNOVATION

BCKIC's Unique Approach

BCKIC exemplifies how cluster ecosystems accelerate innovation by bridging academia, industry, and government. By facilitating shared infrastructure, expertise, and funding, the cluster ensures that innovative technologies transition seamlessly from research to application.

FUTURE DIRECTIONS: A CALL TO ACTION

The future of sustainable healthcare innovation lies in scaling these advancements globally. Key focus areas include:

Digital Integration: Leveraging AI and IoT to optimize healthcare delivery and enhance diagnostics.

Policy Support: Establishing streamlined regulatory pathways for nano-engineered products.

Green Manufacturing: Prioritizing eco-friendly production methods for medical devices.

Conclusion

The work of Prof. Rohit Srivastava and NanoBios Lab highlights the transformative potential of nano-engineering in achieving sustainable healthcare. Innovations such as UChex, CholChex™, and biodegradable implants demonstrate how science can address pressing healthcare challenges while aligning with environmental goals. Collaborative ecosystems like BCKIC play a crucial role in scaling these solutions, ensuring their impact is felt globally. As healthcare systems evolve, sustainability must remain at the forefront of innovation, enabling equitable, affordable, and eco-conscious care for all.

References

1. Ageing and health. <https://www.who.int/news-room/fact-sheets/detail/ageing-and-health>.
2. Healthcare waste. <https://www.who.int/news-room/fact-sheets/detail/health-care-waste>.
3. Anjana, R. M. et al. Metabolic non-communicable disease health report of India: the ICMR-INDIAB national cross-sectional study (ICMR-INDIAB-17). *Lancet Diabetes Endocrinol* 11, 474–489 (2023).
4. Kim, T., See, C. W., Li, X. & Zhu, D. Orthopedic implants and devices for bone fractures and defects: Past, present and perspective. *Engineered Regeneration* 1, 6–18 (2020).
5. Hantel, A. & Abel, G. A. An Action Plan for Environmentally Sustainable Cancer Care. *JAMA Oncol* 6, 469 (2020).
6. Di Cesare, M. et al. The Heart of the World. *Glob Heart* 19, 11 (2024).
7. Petry, C. J. Iron Supplementation in Pregnancy and Risk of Gestational Diabetes: A Narrative Review. *Nutrients* 14, 4791 (2022).
8. Scimeca, J. C. & Verron, E. Nano-engineered biomaterials: Safety matters and toxicity evaluation. *Mater Today Adv* 15, 100260 (2022).



From Vision to



Reality **STARTUPS**

INNOVATING

HEALTHCARE





Pulse of Progress:

EZERX'S JOURNEY

From IDEA TO IMPACT



In a world where people struggle every day even for basic healthcare, one man's struggle and sacrifice have revolutionised the Medtech landscape.

Partha Pratim Das Mahapatra, founder and CEO of EzeRx, aims to make healthcare accessible and affordable for everyone, regardless of their socioeconomic status.



Partha Pratim Das Mahapatra

Founder and CEO
EzeRx Health Tech Pvt. Ltd.





THE CURRENT LANDSCAPE

Anemia, a condition where the body lacks enough healthy red blood cells, affects over half of women in India in poor communities. Standard ways to diagnose it often need blood samples special tools, and trained staff - which many areas don't have. This lack of easy-to-access healthcare has led to many undiagnosed cases among women in rural parts.

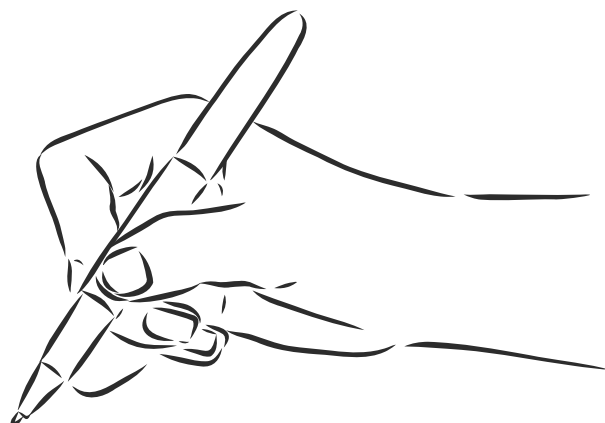
We need new easy-to-use, and portable tools to diagnose anemia. As healthcare systems worldwide struggle with limited resources and growing needs, technology plays a key role in filling these gaps.



A PERSONAL JOURNEY

Partha's fight against anemia hits close to home. His mother's battle with this condition showed him the hidden epidemic affecting countless people. "Seeing my mother struggle with anemia made me think about how many others might be dealing with it without knowing," Partha remembers. This insight put him on a journey that would transform his life and the lives of millions.

With his background in Electronics and Telecommunication Engineering, and driven by his love for new ideas, Partha started EzeRx in 2018.



His goal? To build a device that could spot anemia fast , and without needing any blood.





THE INNOVATION

Meet **EzeCheck** - a **cutting-edge non-invasive tool to screen hemoglobin** that's shaking up how we spot anemia. "We faced a big hurdle in making the device portable yet super accurate," Partha says.

We realized that to help in country areas, it needed to be simple to operate and move around.

Through tireless work and testing, Partha and his EzeRx crew pulled off what many thoughts couldn't be done. EzeCheck can find anemia in under 60 seconds, with an impressive 85-90% success rate - all without needing a blood sample.

But Partha's dreams go beyond just finding anemia. **"Right now, we're creating a kit for women's health,"** he hints pointing to the wider effect EzeRx hopes to have on making healthcare easier to access and develop a wellness program for women's health.

THE IMPACT

From the beginning, **EzeRx has affected over 24+ lakh people.** Their technology has an impact beyond health tests - it gives power to people. EzeCheck offers fast painless screenings, which lets people take charge of their health women in poor areas.

"We want medical tech for everyone," Partha says summing up his idea of helping society through healthcare. People have noticed this approach. EzeRx has won many prizes, like the

TATA Social Enterprise Challenge and the NASSCOM AI Gamechangers 2022 award.

EzeRx has also received its support from major industry leaders and is **backed by pharma giants like Sun Pharma.**





LOOKING AHEAD

As EzeRx keeps growing, Partha's dreams grow too. He sees EzeRx becoming a company that uses data to make devices using AI to help millions of people around the world. "AI is the next big thing," Partha says.

AI is the next big thing," Partha says.

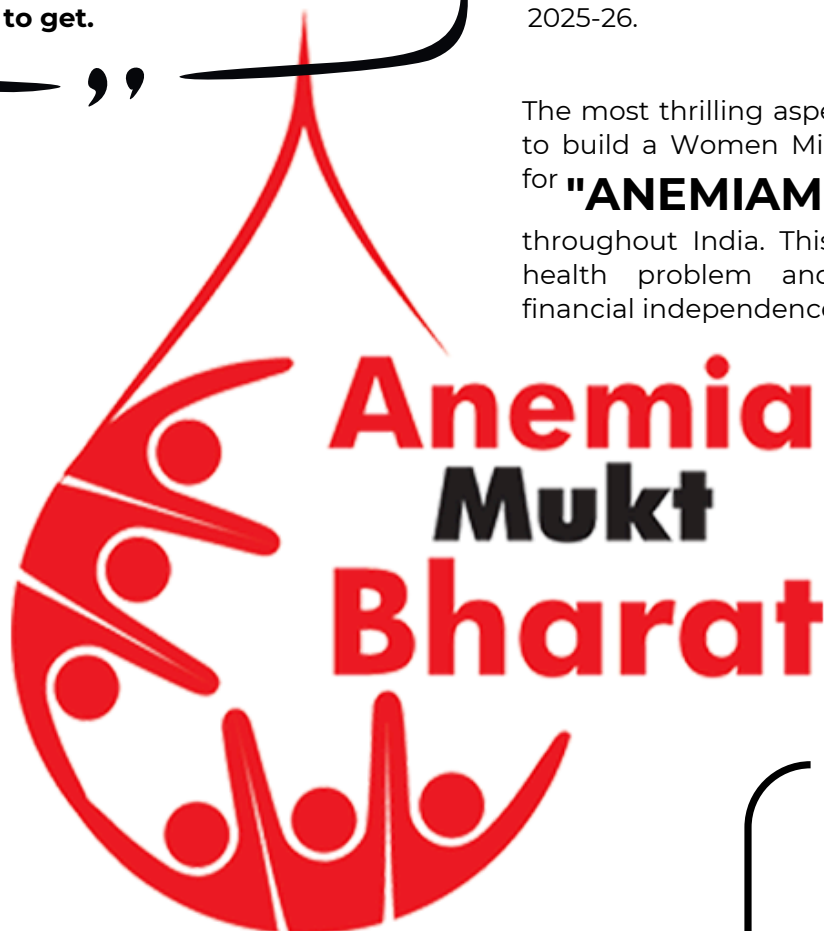
It will take off in the coming years changing how we make healthcare easy to get.

This forward-looking view shows in EzeRx's big goals. They plan to spread to **Southeast Asia, the MENA region, Latin America, Europe, and the USA.**

The company also hopes to launch an IPO by 2025-26.

The most thrilling aspect however, is the chance to build a Women Micro Entrepreneur network for **"ANEMIAMUKHTBHARAT"**

throughout India. This project tackles a crucial health problem and also boosts women's financial independence



Conclusion

Partha Pratim Das Mahapatra's path from a worried son to a healthcare pioneer shows how personal drive can spark social change. Through EzeRx, he's not creating tech; he's reshaping how people access healthcare.

Looking ahead, we can see that trailblazers like Partha will shape a fairer healthcare scene. By mixing cutting-edge tech with a deep grasp of what society needs, EzeRx is leading the way to a new age of medical technology - one where everyone can get good healthcare, not just the lucky few.

In Partha's words, **"We're not just building devices; we're building a healthier future."**

And with each Blood Free test, each life touched, ***EzeRx is causing a revolution in healthcare, one drop at a time.***





Rising Above the Challenges:

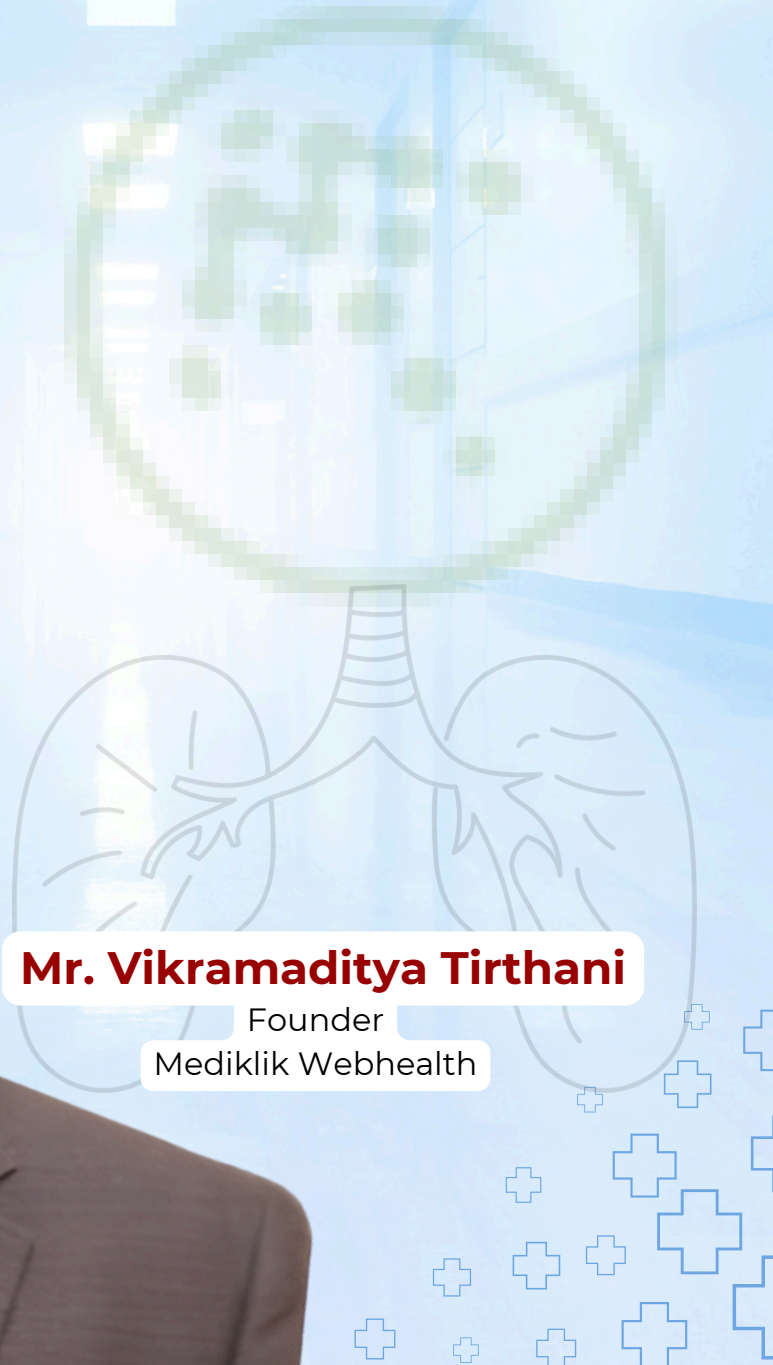


VENSI A New Era in **RESPIRATORY SOLUTIONS**



Mr. Vikramaditya Tirthani

Founder
Mediklik Webhealth





Smart **RESPIRATORY** Devices





Overview: Bridging the Gap in Critical Care Solutions

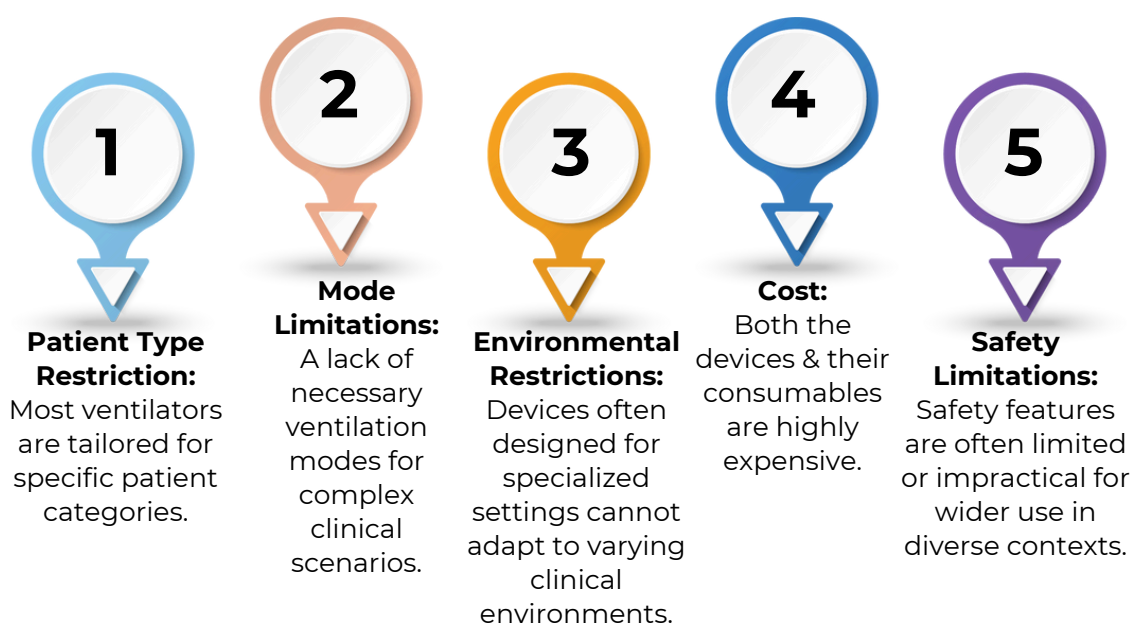
Each year, over 3.6 million people die from respiratory illnesses in India alone. Shockingly, over 46% of these deaths are due to the lack of access to adequate respiratory devices. The global market for ventilators and respiratory care devices **presents a tremendous opportunity, with a potential size exceeding USD 1.7 billion.** However, the ability to effectively fulfill this demand, especially in developing countries like India, is hampered by two major challenges: **high costs, both upfront and operational, and the complex requirement of developing technology that adheres to international regulatory standards.**

The COVID-19 pandemic posed an unprecedented test for healthcare systems globally, and India was no exception. During the height of the pandemic, there was a rush to develop ventilators domestically, driven by the urgent need to save lives. Unfortunately, many of these rushed solutions failed to meet clinical requirements and ended up abandoned, often metaphorically—and literally—in **“device graveyards.”**

These ventilators, hastily produced without adhering to the stringent safety and efficacy standards required for life-saving devices, were insufficient for critical care, underlining a crucial fact: the development of a ventilator is not just about assembling parts; it requires an intricate combination of medical insight, engineering precision, and rigorous safety testing.



Globally, even many established ventilators suffer from critical limitations:





These limitations mean that current ventilators are often environment-specific—ICU ventilators aren't suitable for transport, neonatal patients can't use adult ventilators, and advanced clinical tools come with prohibitive price tags. The challenge, then, was to develop a versatile, safe, and cost-effective ventilator that caters to the unique requirements of healthcare systems in developing countries like India.

The true challenge of building a ventilator lies in understanding its role as a life-critical device. It demands the highest level of precision and reliability. Creating such a device requires not only a skilled team but also the dedication to meet and exceed international safety standards.

In response to these challenges, we at *Mediklik embarked on the journey to develop*

VENSI

a next-generation smart ICU ventilator that not only addresses the challenges exposed during the pandemic but stands tall as a symbol of quality and safety.

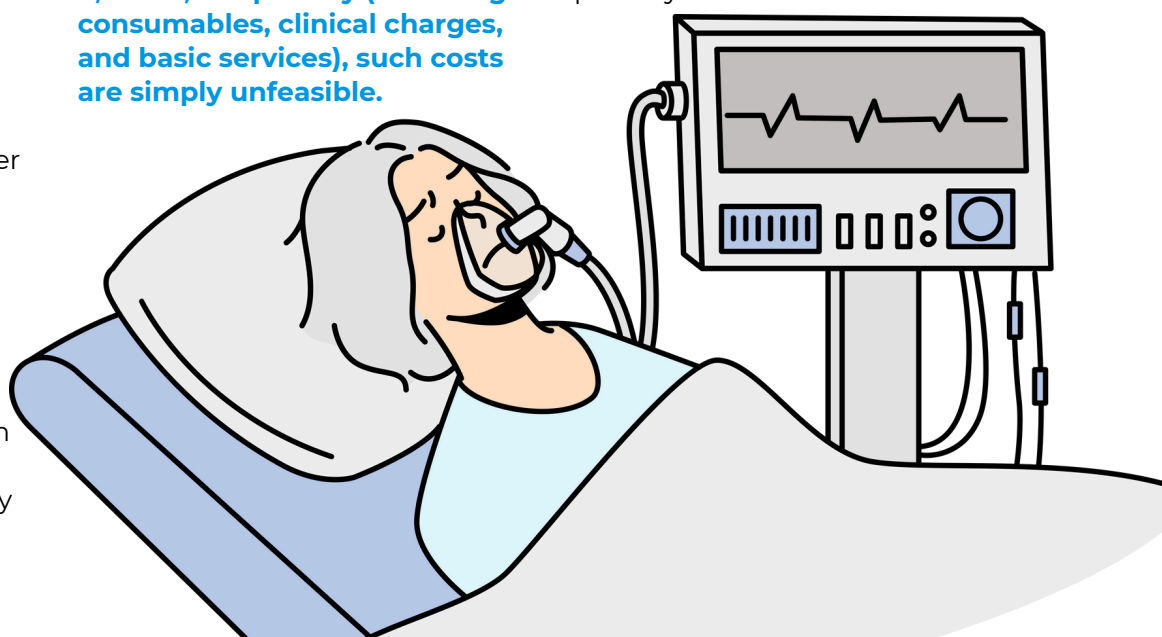
The Challenge of Ventilator Technology: Identifying the Needs and Gaps

Ventilators differ greatly in terms of the technologies they employ, each with its own set of pros and cons:

- **Pneumatic Ventilators** are compact but offer limited functionality.
- **Compressor-Based Ventilators** are sturdy but bulky.
- **Plastic Turbine Blowers** are smaller but have a limited lifespan.
- **Ceramic Turbines** provide excellent performance but require disposable flow sensors, which are prohibitively expensive for many hospitals in India.

In developed countries, ceramic turbines combined with disposable proximal flow sensors are considered the industry standard. However, **these sensors must be discarded after each use and can cost between INR 12,000 to 15,000 per sensor.** This is manageable in countries with advanced healthcare funding structures, but **in India, where government healthcare reimbursement is around INR 6,000-8,000 per day (including consumables, clinical charges, and basic services), such costs are simply unfeasible.**

As a result, hospitals often resort to reusing these disposable sensors, which not only compromises patient safety but also increases the risk of cross-contamination and ventilator-associated infections. Global manufacturers have largely ignored this issue since the Indian market is comparatively small for them, and addressing these issues would not be economically viable in their primary markets.





Some of the very common cases which are ignored in ICU's but are very common are shown below



These are the most common example of reuse of disposable sensor, and are most common sources of contamination and infections.

Over the last fifteen years, my work with nearly all available ventilators led me to one clear conclusion: if we could develop a system that uses the benefits of ceramic turbines without the need for costly disposable sensors, it would be a game-changer for respiratory care—not just in India, but globally.





A Story of Impact: VENSI's Real-World Difference

I remember clearly the story of Ramesh, a 32-year-old father from a small village near Jagdalpur. During the second wave of COVID-19, his condition deteriorated rapidly, and he was transferred to an ICU. The hospital, like so many others, was struggling with insufficient and unreliable ventilators. They used an old ventilator that had repeatedly been patched up due to a lack of options. Unfortunately, like many makeshift solutions, it failed at the most critical time.

Ramesh's story was one of many that reaffirmed our commitment to developing VENSİ. When we were later able to install the VENSİ ventilator in that very hospital, it was deeply moving to see how our technology changed the course of care for patients in similar critical conditions. **Now, there were no more makeshift solutions, no more "device graveyards"—just reliable, high-quality respiratory support.**

The Journey to Building VENSI: Rising Above Challenges

Developing VENSİ was not just about designing a ventilator; it was about **overcoming the skepticism surrounding Indian-made medical devices after the pandemic experience.** My own journey as the founder of Mediklik has been a testament to resilience and vision. With over 15 years of experience in the healthcare sector, spanning roles as a service engineer to working in sales and development with industry leaders like Johnson & Johnson, I have witnessed firsthand the gaps in our healthcare system. With this knowledge, I founded multiple companies with one shared goal—delivering innovation and quality to the healthcare industry.

VENSİ stands as our flagship achievement, a smart ICU ventilator designed to excel on all fronts, meeting and surpassing global safety standards. Our approach was systematic and time-consuming, yet absolutely necessary to ensure every aspect of VENSİ was validated against the highest standards. We were deliberate in creating a device that could not only perform but also be trusted in the most critical of moments.

Introducing VENSİ: A Comprehensive Solution to Address the Critical Gaps

With these challenges in mind, we developed VENSİ—a ventilator that not only meets but exceeds all international safety standards. It is an advanced ventilator suitable for all patient types, offering a wide array of high-end ventilation modes, with the ability to adapt to different environments.

Most importantly, VENSİ integrates our patented *Breathing Cassette technology* a solution that eliminates the need for expensive, disposable proximal flow sensors.





The **Breathing Cassette** is an innovative component that integrates all sensory parts and safety features into a single, easily removable block. After each patient use, the breathing cassette can be removed and sterilized using a standard autoclave machine.

This sterilization process guarantees complete safety while keeping operational costs low. The unique design ensures that the sensors remain fully functional even after exposure to high-temperature and high-pressure sterilization.



In addition to this, the breathing cassette comes with an inbuilt **Sterilization Monitoring System** that tracks the sterilization status after every use. This feature provides clinicians with a clear indication that the cassette has been sterilized according to recommended protocols, thereby eliminating the risks associated with improper sterilization and ensuring patient safety.

VENSI: A Ventilator for All Situations

The VENSI ventilator is designed to overcome the common limitations found in existing devices:

1. Patient Type Versatility: VENSI supports a full spectrum of patient types—adult, pediatric, and neonatal—making it suitable for different scenarios and enabling cost-effective deployment.

2. Multiple Ventilation Modes: With comprehensive high-end ventilation modes, VENSI is equipped to manage even the most complex clinical requirements.

3. International Safety Standards: VENSI has been designed from the ground up to meet stringent international safety certifications, ensuring both quality and reliability.

4. Cost Efficiency: The patented Breathing Cassette not only lowers the operational costs compared to existing ceramic turbine solutions but also significantly reduces the risk of cross-contamination. This makes VENSI both an effective and economically viable option for hospitals in developing regions.

5. Environment and Application Flexibility: VENSI can adapt to various clinical settings, from ICU use to transport, eliminating the need for multiple specialized ventilators.





Key Innovations: VENSİ's Unique Technology for Real-World Challenges

The VENSİ ventilator represents a collection of pioneering innovations, including our patented breathing cassette technology. This component addresses a specific issue faced by developing countries like India—the need for a durable, cost-effective solution that ensures patient safety without compromise.

The breathing cassette technology is built to function reliably even in challenging conditions where resources are limited, while still complying with rigorous international safety norms. This feature alone sets VENSİ apart, ensuring that the ventilator remains a practical solution for diverse healthcare environments.

Voices from Our Journey: Collaboration & Endorsement

Creating VENSİ was not a solitary journey; it was a collaborative effort involving multiple startups, engineers, and healthcare professionals who were united by a common vision—to create a truly reliable Indian ventilator that can stand shoulder to shoulder with any international counterpart.

One of the key partners in the development of VENSİ, **Dr P K Neema, Professor and Head, Anaesthesiology Professor and Head, Anaesthesiology, All India Institute of Medical Sciences, Raipur** reflected on the collaborative journey:

“

The journey of building VENSİ with Mediklik was unique—unlike the rush to develop devices during COVID, this was a focused, methodical process. We tested every aspect rigorously, and the outcome is a ventilator that meets international standards and is truly a product we can be proud of.

”



Additionally, **frontline healthcare workers** who have tested VENSİ in critical care situations have expressed their confidence in the product. **Dr. Onkar Khandelwal, Associate Professor at Medical College Raipur Department Of Paediatrics**, shared his perspective:

“

I've seen the disparity in quality across ventilators during the pandemic. What stood out to me about VENSİ is its reliability and precision. It's a device that was developed with the challenges of critical care in mind, and the patented breathing cassette is a game-changer for hospitals like ours that often struggle with maintenance and cost.

”





“ — Testimonial from

Mr. Anil Das, Industry Veteran and Former Country Leader, Mindray India & Welch Allyn

Having been in the medical devices industry for decades, I've witnessed the evolution of ventilator technology across the world. What Mediklik has achieved with VENSI is truly remarkable. It's rare to find a product that so comprehensively addresses the specific needs of a developing healthcare ecosystem like India's while still maintaining the standards necessary to compete on a global scale. The Breathing Cassette innovation, in particular, stands out as a breakthrough—eliminating the high costs and contamination risks associated with disposable sensors.

VENSI is not just another ventilator; it represents a paradigm shift. It combines advanced technology, affordability, and usability, which are critical for the Indian healthcare landscape. Vikramaditya and his team have shown true resilience and innovation, and I believe VENSI has the potential to set a new benchmark for ventilator technology, not only in India but globally. It's a product developed with insight, precision, and a deep understanding of clinical needs, which is precisely what our healthcare system requires.

— Mr. Anil Das, Industry Veteran and Expert in Medical Devices

”

Reimagining the **Future of Indian Healthcare**



The development of VENSI was not merely an engineering project; it was a mission to restore faith in Indian innovation within the healthcare industry. With a focus on precision, reliability, and patient safety, VENSI stands as a testament to what's possible when we take the time and effort to create something built to last.

We are just at the beginning of our journey. Over the next few years, we plan to introduce six more respiratory care devices that will contribute to building an ecosystem of advanced respiratory support tailored for India. Our mission is to ensure that quality healthcare is accessible to everyone, irrespective of where they are located.





A Vision to Transform Healthcare in India

VENSI represents our commitment to transforming healthcare in India. It is not just about making a ventilator; it is about making a difference in critical care—about ensuring that no one dies because the technology was too costly, poorly maintained, or unavailable.

“
The Breathing Cassette technology is the embodiment of our philosophy—to innovate for those who need it most, to create solutions that are effective, affordable, and safe.
”

With VENSI, we are not only changing how ventilators are used in critical care but also setting a new benchmark for what is possible when technology is developed with true patient needs at the forefront.

This journey has been challenging, but it is also one filled with hope and promise—a promise that every patient will have access to the life-saving care they deserve.





Ramja Genosensor: Innovating Rapid Diagnostics for ANTIBIOTIC RESISTANCE



Transforming Infection Detection: A Leap Towards Faster, Smarter Healthcare

Ramja Genosensor Pvt Ltd, a **med-tech startup incubated at IIT Delhi**, has revolutionized the landscape of healthcare diagnostics with the development of the **world's first paper-based device that can detect bacterial infections and antibiotic resistance in just 90 minutes.**

This cutting-edge technology empowers physicians to administer the right antibiotics to patients at the right time, bypassing the lengthy wait for lab results.

Dr. Pooja Goswami

Director
Ramja Genosensor





This innovation is a **game-changer in combating antibiotic resistance, an escalating global health crisis**. The company is also advancing its technology by developing additional diagnostic panels for the sensor-based point-of-care device, expanding its potential applications.

Overview of the Current Research Landscape, Challenges, and Necessary Interventions

In the global battle against bacterial infections and antibiotic resistance, timely and accurate diagnostics are crucial. Traditional methods, such as culture tests, often take 48-72 hours to deliver results, leaving patients vulnerable to improper treatments or prolonged suffering.

The delay is particularly critical in the case of life-threatening conditions where immediate intervention can make all the difference. This gap in healthcare diagnostics has led to a growing need for faster, more reliable tools.

Many current solutions, such as automated machines or advanced diagnostic labs, require high infrastructure, specialized staff, and significant financial investment, making them inaccessible to underserved populations.



The Ramja Genosensor Solution

Ramja Genosensor Pvt Ltd, addresses these challenges with its groundbreaking paper-based device, the first of its kind in the world. This device can identify bacterial infections and detect antibiotic resistance in just 90 minutes—an enormous leap forward compared to the traditional methods. The device's simplicity, low cost, and rapid response make it a game-changer in point-of-care diagnostics.

By utilizing state-of-the-art technology and a sensor-based approach, the Ramja Genosensor offers physicians the ability to select the most appropriate antibiotic treatment for patients without waiting for lab results. This speed and precision could reduce the widespread misuse of antibiotics, ultimately contributing to the fight against antibiotic resistance.





Founder's Journey and Vision

The founder's journey of the RAMJA Genosensor is marked by personal tragedy and a commitment to innovation. Dr. Pooja Goswami, the founder and director, lost her father due to an infection during cancer treatment in 2014.



Dr. Goswami has a strong academic background, having worked as a scientist at the All India Institute of Medical Sciences for 13 years and completing her Ph.D. in Molecular Biology.

Since 2018, she has been incubating RAMJA Genosensor at IIT Delhi, where the startup has gained recognition and received several grants and awards for its innovative work in the field of infection detection and antimicrobial resistance.

This experience motivated her to address the gap in infection detection time, which typically took three days. She aimed to reduce this time significantly, leading to the development of the RAMJA Genosensor technology, which can detect infections and antimicrobial resistance in just 90 minutes from any biological fluids.

“

Quotes from Innovators and Startups

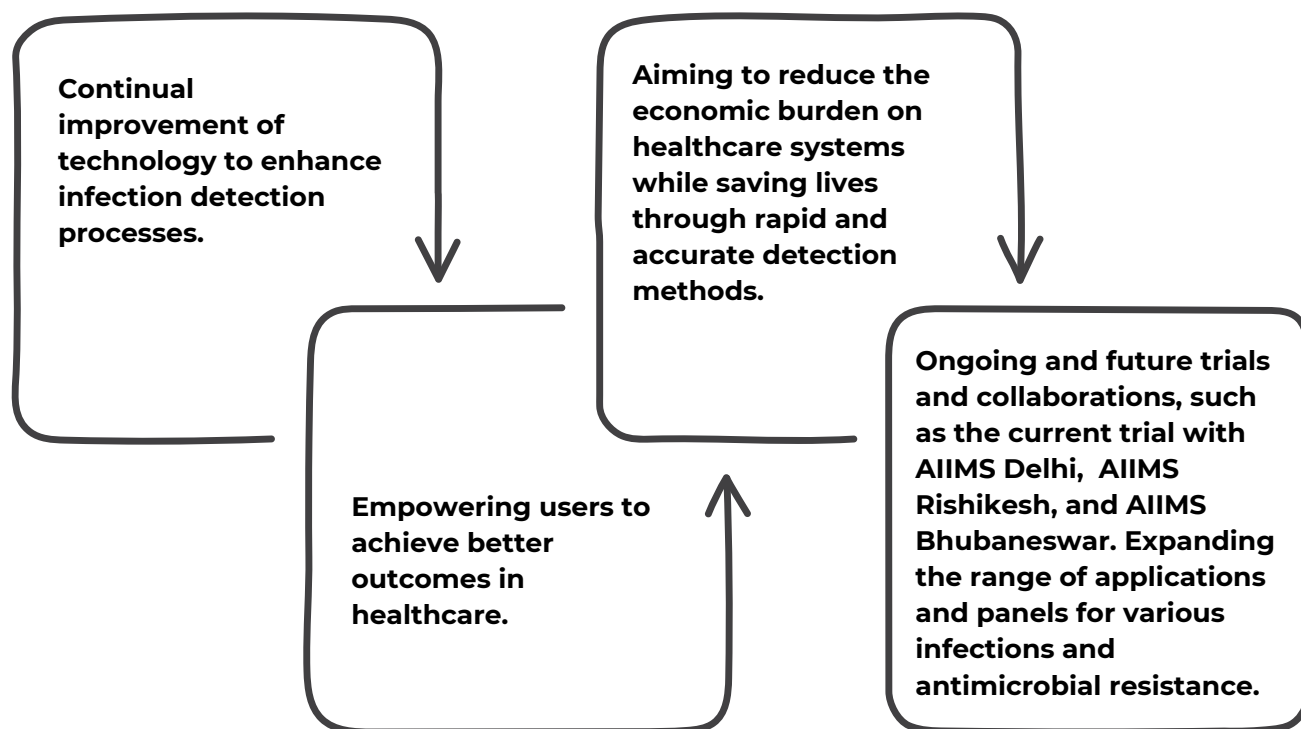
Pooja Goswami reflects on the development of the Genosensor, saying, **"We knew that we had to create something that was not only effective but also practical for everyday use. The healthcare system is only as good as its accessibility. By making diagnostics quicker and more affordable, we are ensuring that patients receive the right treatment at the right time."**

”





Innovating Infection Detection



Collaborating for Progress: The Role of Science & Technology Clusters

Ramja Genosensor's collaboration with BCKIC (Bhubaneswar City Knowledge Innovation Cluster) has played a crucial role in expanding its outreach and impact.

As part of the cluster's initiative to foster innovation and industry-academia partnerships, BCKIC facilitated Ramja's association with **AIIMS Bhubaneswar** for clinical trials, strengthening the startup's validation process. Such strategic collaborations demonstrate how science and technology clusters can accelerate the journey of startups, bridging the gap between innovation and real-world implementation, ultimately driving progress in healthcare and diagnostics.





MedTel Healthcare: Transforming Healthcare Access with INNOVATION & CONNECTED CARE



Inspiration from Tragedy: A Doctor's Mission to Save Lives

The story of MedTel Healthcare began with a heartbreaking experience that shaped the vision of its founder, Dr. Lalit Ranjan Manik. Dr. Manik witnessed a mother sitting by her second son's bedside as she helplessly watched him succumb to malaria. The tragic loss of life—due to delayed diagnosis and limited access to quality healthcare—left an indelible mark on him. This devastating moment fueled Dr. Manik's resolve to find a solution that could bridge the gaps in India's healthcare system, particularly for those in remote areas.



Dr. Lalit Ranjan Manik

Co-Founder
MedTel Healthcare





Drawing on his 15 years of experience as a public health expert, including roles with the @World Health Organization (WHO) and the Ministry of Health in Saudi Arabia, Dr. Manik embarked on a mission to leverage technology to save lives. This passion and vision ultimately led to the creation of MedTel Healthcare and its flagship platform, **MedTel-iLab**.

Innovating for Impact:

MedTel-iLab was designed as a connected care platform to address the healthcare challenges faced by rural communities and underserved populations.

It seamlessly integrates digital diagnostic devices with teleconsultation capabilities, allowing healthcare providers to receive instant reports and actionable insights in real-time. This capability is particularly crucial for remote areas where access to specialists is limited.

“

Our goal with MedTel-iLab was to create a comprehensive platform that not only diagnoses but also connects, says Dr. Manik.

We wanted to provide healthcare professionals with the tools they need to make timely, data-driven decisions—regardless of their location or resources.

”





Real-Life Impact: Transforming Health Outcomes

One example of MedTel-iLab's impact can be seen in a heart screening camp conducted in a rural area. The platform's AI-powered diagnostic engine detected signs of an inferior wall infarction—a potentially life-threatening condition.

The user and the hospital received an immediate alert, and upon consultation with a cardiologist, the diagnosis of an acute myocardial infarction (MI) was confirmed. Swift action, including angioplasty the next day, saved the user from severe complications, underscoring the platform's potential to make life-saving interventions possible in remote areas.



Scaling Innovation: MedTel Healthcare's innovative approach and commitment to reaching communities have enabled it to:





Key Initiatives: Bringing Healthcare to the Last Mile

1 Maternal Care in Balangir, Odisha:

MedTel Healthcare transformed maternal care for over 10,000 pregnant women by deploying IoT-based medical devices to monitor vital parameters and detect high-risk pregnancies early. The initiative was recognized by UNICEF for its positive impact on maternal and child health outcomes.

Project Video: <https://bit.ly/46bQxer>

2 Arogyam-NCD Door-to-Door Screening Initiative:

Launched by the Berhampur Municipal Corporation in Odisha, this project revolutionized non-communicable disease (NCD) screening by providing door-to-door monitoring services. Over 40,000 screenings were conducted, helping identify and manage chronic conditions early. This initiative earned the "Gold Medal" at the SKOCH Awards for its transformative approach.

Project Video: <https://bit.ly/3JNMICJ>

3 SPARSA - Safe Pregnancy & ANC Surveillance:

This initiative targeted maternal health at the grassroots level by deploying 200 digital diagnostic kits across 1364 Village Health, Sanitation & Nutrition Day (VHSND) sites in Angul district, Odisha. It provided continuous health monitoring for pregnant women, promoting safe pregnancies and reducing the risk of complications.

Project Video: <https://bit.ly/3EGbUJe>

Building a Resilient and Scalable Solution:

MedTel Healthcare's journey was not without its challenges. Reaching remote areas with limited connectivity, ensuring interoperability of multiple IoMT devices, and maintaining data privacy were some of the key obstacles faced. However, through strategic collaborations with technology partners and government agencies, MedTel was able to build a robust, secure, and scalable platform that serves the unique needs of the last mile.





Expanding the Reach of Connected Care:

MedTel Healthcare envisions a future where technology bridges the gap between healthcare providers and patients, ensuring quality care is accessible to all, regardless of location.

By continuously innovating and collaborating with stakeholders, MedTel is poised to expand its reach and impact, transforming healthcare delivery across India and beyond.

“

MedTel Healthcare has been an invaluable partner in our journey at MedLumos toward redefining healthcare access in rural areas.” by MedLumos Pvt Ltd. **“We have been using their comprehensive telemedicine kit with iLabs in our rural telemedicine clinics. Its user-friendly workflow empowers our paramedics and doctors at MedLumos Tele-clinics to provide evidence-based, quality medical care to the rural population.”**

“We believe that everyone deserves access to quality healthcare,” says Dr. Manik. **“Through continuous innovation and collaboration, MedTel is dedicated to making this vision a reality, ensuring that no one is left behind.”**

”

Building a Resilient and Scalable Solution:

MedTel Healthcare's journey was not without its challenges. Reaching remote areas with limited connectivity, ensuring interoperability of multiple IoMT devices, and maintaining data privacy were some of the key obstacles faced. However, through strategic collaborations with technology partners and government agencies, MedTel was able to build a robust, secure, and scalable platform that serves the unique needs of the last mile.





Bridging Gaps in Pediatric Surgical Healthcare Through INNOVATION



The Role of Startups in Revolutionizing Healthcare

Translating an idea from laboratory to clinical application is the crucial factor in healthcare advancements.

In these days, start-ups are not only created to commercialise innovative items but also serve as primary innovators. They are leveraging advanced technology and integrating it with the current healthcare delivery system to save costs and enhance productivity and efficiency. The sector is increasingly orientated towards market demand for innovation and research. Startups are essential in exploring innovative research concepts that are both creative and solution-oriented.



Dr. Akash Bihari Pati

Addl. Professor, Pediatric Surgery
AIIMS Bhubaneswar





The State of Pediatric Surgical Care in India

The under-five mortality rate has significantly decreased from 242 per 1,000 live births in 1961 to 29 per 1,000 live births in 2022. [1] However, the values exceed those of many developing nations. Although India has attained the United Nations' Sustainable Development Goal regarding child mortality ahead of schedule, the problem is in sustaining this achievement. Policy makers often focus solely on medical conditions affecting child mortality, such as diarrhoea, pneumonia, and malnutrition. The medical and social programs are directed towards these disorders. An often-overlooked approach to decreasing child mortality is Paediatric Surgery. It is imperative to monitor the evolving trends in disease burden, such as malignancies and congenital abnormalities necessitating surgical intervention.



An estimated 396 million children in low- and middle-income countries lack access to surgical care. [2]

Paediatric surgeons primarily manage children with congenital abnormalities and other conditions necessitating surgical intervention. India, with a population of 336,906,000 children under the age of 15, has merely 1,600 paediatric surgeons.

The government recently increased the number of paediatric surgery training positions in several medical institutions to enhance the quantity of qualified paediatric surgeons in the country as an initial measure.

However, these seats lie vacant for the most of the time. A recent analysis indicated that 19% to 75% of paediatric surgery positions were unoccupied in several medical colleges across India. [4] There is an enormous disparity in the geographic distribution of currently trained paediatric surgeons. A significant number of paediatric surgeons favour practicing in cities of tiers 1 and 2 due to inadequate infrastructure in other regions.





The Problem Faced

Pediatric surgical care requires specialized instruments, intensive care, and long-term rehabilitation.

However, several barriers hinder access and innovation:



Socioeconomic Constraints: Many parents, especially in lower-income settings, forgo necessary treatment due to financial limitations, lack of awareness, or gender bias.



Industry Hesitation: Low demand discourages investment in miniaturized surgical tools and therapies for children.



Medical Workforce Shortage: Pediatric surgery is less financially rewarding, leading to fewer specialists entering the field.



Research & Funding Gaps: Fragmented research, weak academia-industry collaboration, and inadequate funding slow progress in pediatric healthcare.



“**Addressing these challenges requires interdisciplinary collaboration, translational research, and sustainable funding strategies to drive innovation and improve pediatric surgical outcomes.**”

Our Innovations

1. Electrochemical sensor for Hirschsprung Disease:

Hirschsprung disease is a congenital condition in children, causing intestinal motility dysfunction due to the absence of ganglion cells. This leads to nerve hypertrophy and excess acetylcholine secretion, resulting in muscle rigidity and functional obstruction. Current diagnosis relies on frozen biopsy, which is time-consuming, requires specialized expertise, and can yield subjective results. Misdiagnosis may lead to multiple surgeries. **We have developed an electrochemical sensor that detects elevated acetylcholine levels using an enzymatic electrode, enabling real-time, cost-effective, and accessible diagnosis. This innovation, supported by BIRAC's BIG 17 award, enhances diagnostic accuracy and supplements pathologists' expertise, paving the way for a reliable point-of-care solution.**

2. Surgical Safety Checklist:

The World Health Organisation (WHO) has developed a surgical safety checklist to enhance safety in operating rooms. This must be executed at various stages of the surgical operation. Reports from many regions worldwide indicate that the checklist was not adhered to all throughout the surgery. We implemented an **Android app-based checklist that incorporated a forcing function to ensure compliance during surgery. The use of this modified checklist resulted in a compliance rate of 100 percent, markedly surpassing the usual procedure. [6]**





Equity and Accessibility in Pediatric Surgery

The emphasis is on the advancement of cost-effective and accessible healthcare devices. The soaring expenses of healthcare render it inaccessible for numerous individuals in the developing nations. The fair allocation of healthcare resources poses a significant difficulty in certain regions of the world. Surgical management for children is not prohibitively expensive.

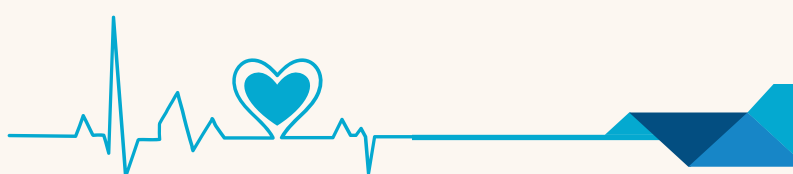
It is comparable to the expenditure incurred by the government for vaccination or other initiatives. Consequently, **all paediatric surgical interventions can be encompassed within the Ayushman Bharat program. The Indian Association of Paediatric Surgeons has recently advocated to modify insurance packages to include the unborn.**

Due to the insufficient number of paediatric surgeons available for the rural population, rural patients are compelled to travel considerable distances under challenging circumstances. Innovations to address this gap are of paramount importance, rather than introducing robotics for surgical procedures.

The utilisation of telehealth and artificial intelligence can assist in these domains. As these technologies advance, they promise to democratise healthcare and tackle global health concerns, facilitating a future in which quality care is universally available.

References

1. World Bank Open Data [Internet]. [cited 2025 Jan 2]. World Bank Open Data. Available from: <https://data.worldbank.org>
2. Mullapudi B, Grabski D, Ameh E, Ozgediz D, Thangarajah H, Kling K, et al. Estimates of number of children and adolescents without access to surgical care. *Bull World Health Organ*. 2019 Apr 1;97(4):254–8.
3. Think Global Health [Internet]. 2024 [cited 2025 Jan 2]. How Pediatric Surgery Could Help India Reach Its Development Goals. Available from: <https://www.thinkglobalhealth.org/article/how-pediatric-surgery-could-help-india-reach-its-development-goals>
4. D'Cruz AL. Pediatric surgery in India — The way forward. *J Indian Assoc Pediatr Surg*. 2016;21(2):47–8.
5. Roy S, Sain S, Roy SS, Mathur A, Pati AB. Design and development of an electroanalytical enzymatic sensor using anodized laser induced graphene for the management of Hirschsprung Disease. *Diam Relat Mater*. 2022;130:109524.
6. Pillai J, Pati A. The Joint Commission Journal on Quality and Patient Safety 2023; 000:1-5 INNOVATION REPORT Use of Technology to Improve the Adherence to Surgical Safety Checklists in the Operating Room. *Jt Comm J Qual Saf*. 2023 May 22;2023; 000:1–5:1–5.
7. Saxton AT, Poenaru D, Ozgediz D, Ameh EA, Farmer D, Smith ER, et al. Economic Analysis of Children's Surgical Care in Low- and Middle-Income Countries: A Systematic Review and Analysis. *PLOS ONE*. 2016 Oct 28;11(10):e0165480.
8. Soon, unborn child can be insured for birth defects. *The Times of India* [Internet]. 2021 Oct 24 [cited 2025 Jan 2]; Available from: <https://timesofindia.indiatimes.com/india/soon-unborn-child-can-be-insured-for-birth-defects/articleshow/87231205.cms>





From Academia to Entrepreneurship

A Journey of Resilience and Innovation in

ORAL CANCER SCREENING



Embarking on a journey from academia to the complex world of entrepreneurship is not a path one stumbles upon lightly. For me, it was a transformation forged through dedication, sincerity, and an unyielding passion for improving outcomes in oral cancer patient. With 14 years of experience as a clinician and academician in dentistry, specialised in Oral Pathology, my journey was rooted in the meticulous world of oral disease diagnosis and my passion for oral cancer research. However, the path from identifying a problem to crafting a real-world solution is an odyssey of its own.

This story is not just about the scientific strides I've made but about those moments of doubt and perseverance, those dreams fostered in research labs, and the fulfilment of seeing a life-changing technology come to life.

Dr. Swagatika Panda

Associate Professor
SOA University





The Early Years: Seeds of Curiosity

From the start of my career, I was captivated by the complexity of oral diseases. The mouth isn't merely a mirror of one's health; it's a gateway that reveals so much about the human body. I realized early on that oral cancer, particularly in regions with high tobacco use, was a prevalent and often silent threat. We can enhance the outcome of the disease and quality of life of the patients if oral cancer is diagnosed at an early stage. Despite the advancements in healthcare, there was a gap in easy, accessible screening tools for oral cancer, because of which mortality and morbidity rate of oral cancer is not declining. **The limitations in early detection of oral cancer haunted me, motivating me to explore further avenues.**



Entering Research: From Curiosity to Purpose

My academic pursuits became more than a profession; they became a calling. I had always wanted to merge clinical insights with research, **hoping to bridge the gap between lab results and clinical applications.** Oral cancer became my research thrust. I delved deep into the pathogenesis of oral cancer, unravelling the molecular intricacies and studying the diagnostic tools available at the time. However, the more I researched, the more I realized how limited our resources were for an accessible, cost-effective screening method that could be widely used. **I was fortunate to have the support of my university, Siksha 'O' Anusandhan University, Bhubaneswar, from the very beginning.**



Siksha 'O' Anusandhan,
Bhubaneswar

My academic pursuits They didn't just provide a foundation for my career as a researcher, but also cultivated an environment where I could explore my ideas freely. My institution played a vital role in shaping me as a clinician and an academic and also recognized the potential of my work to transition into a larger sphere. Their unwavering support equipped me with both the technical skills and the confidence to venture into uncharted territories.

The Turning Point: Conceiving a New Approach

In 2018, after years of research and careful consideration, I began developing an innovative solution. My goal was simple yet ambitious: **to create a ready-to-use, stable, and palatable formulation that dental surgeons could use to screen for oral cancer in patients with suspicious oral lesions.** I envisioned a tool that would be both affordable and effective, empowering clinicians to integrate cancer screening seamlessly into routine examinations. This idea wasn't born out of a sudden epiphany but was a gradual culmination of years of clinical observations and laboratory findings. I knew I was on to something that could potentially improve outcomes of oral cancer, but there was a long way to go from a concept to a real-world application.





The First Big Break: DBT, BIRAC Grant

With the concept of formulation and its delivery method in place, I got an opportunity to incubate myself at KIIT TBI, Bhubaneswar, where Dr Namrata Mishra, Dr Nibedita Jena, and Dr Aseem Mishra provided the mentorship and further shaped the idea.

I applied for the BIRAC (Biotechnology Industry Research Assistance Council), DBT grant in 2018. It was 12th December 2018, when I received the news of acceptance of my grant proposal, it was a moment of immense pride and relief. **The grant wasn't just financial support; it was validation that my idea held promise.** Receiving the BIRAC, DBT grant gave me the resources to establish the initial proof of concept.

The journey that followed was filled with rigorous testing, refining, and re-evaluation. Every setback, every experimental result that didn't align with expectations, felt like a personal blow. But each success, each milestone crossed, gave me renewed hope and strength. As the proof of concept began to take shape, I realized that **my journey required intellectual protection**, and business acumen in addition to the scientific rigor. I applied for an Indian patent.



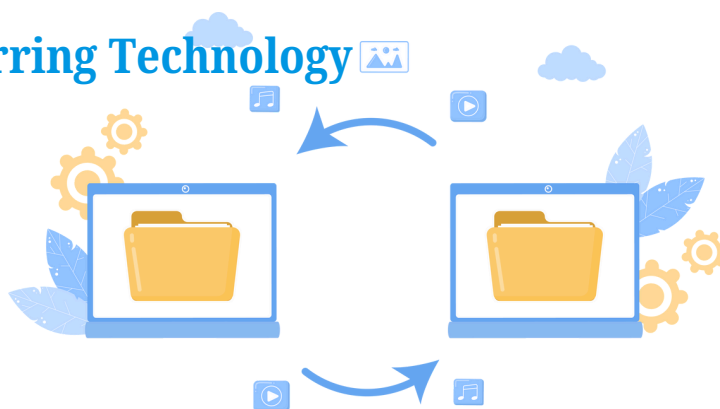
जैवप्रौद्योगिकी विभाग
DEPARTMENT OF
BIOTECHNOLOGY



My academic background hadn't prepared me for the challenges of commercialization, but I was determined to see this project through. In 2021, I took the monumental step of **establishing my startup Quickblue Oral Care Pvt Ltd which was further supported by Startup Odisha.** Shifting from an academic and clinical environment to the fast-paced world of intellectual property and business plan, was exhilarating but daunting. There were days when I missed the familiar hum of academic debates, interaction with my students, and the satisfaction of patient diagnosis. But the thought of my work helping countless others was a powerful motivator that kept me pushing forward.

The Culmination: Transferring Technology to Supriya Life Sciences

By end of 2022, after relentless attempt to overcome regulatory hurdles, I realized that there **exist significant challenges in bringing this product to the market, due to the product's classification as a 'new drug.'** This status demands rigorous regulatory hurdles, and extensive multi-institutional clinical trials to secure new drug approval from CDSCO. The vision of Dr Amaresh Panda, Lead of **KIIT TBI's Technology Transfer Office (TTO)**, played a crucial role in bringing this concept to life.



Through his expertise in transforming innovative ideas into tangible solutions, we achieved a milestone in October 2023, the successful transfer of our patent application to Supriya Life Sciences, a respected Mumbai-based pharmaceutical company founded in 1987. Seeing years of hard work come to fruition was surreal. I reflected on the countless hours spent in the lab, the sleepless nights preparing grant applications, and the many sacrifices made to ensure the project's success.

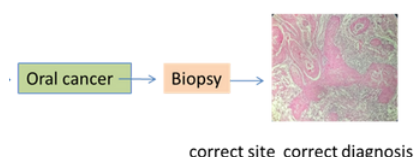
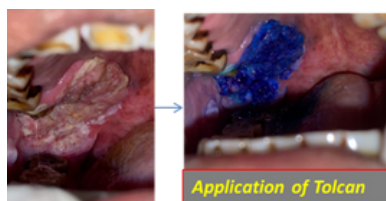




Throughout this journey, the unwavering support of my family, friends, and well-wishers was indispensable.

My family stood by me through countless hours of testing, iterations, and setbacks, their encouragement reminding me I was never alone in this endeavour. Friends and well-wishers celebrated every achievement, big and small, constantly affirming that my work had the potential to impact lives on a larger scale.

I owe a deep sense of gratitude to the patients who participated in our studies with resilience and patience. Their cooperation allowed us to refine the product and validate the proof of concept. Without their trust and willingness, this journey might not have reached its full potential.



Affordable user friendly chairside oral cancer screening kit for oral cancer screening and biopsy site identification

Continuing the journey: Patents and Global Aspirations

Granted Indian patent not only safeguarded the intellectual property but also paved the way for the technology to be recognized globally. Recently, I have applied **for national phase entry of Patent Cooperation Treaty (PCT) application in eight countries, aiming to make this technology accessible worldwide.** As I look ahead, I am also focused on exploring the **therapeutic potential of Improved Toluidine Blue O in oral cancer treatment**, adding a new dimension to my work beyond screening. I am sure I will keep on innovating, to fight against oral cancer.

Reflections and suggestions for Aspiring Academic Entrepreneurs

Becoming an academic entrepreneur has transformed me in ways I hadn't anticipated. In addition to acquiring knowledge on intellectual property and its application process, process of regulatory approval, *this journey taught me resilience and adaptability.*

It's one thing to explore ideas within the walls of academia, where the primary goal is discovery. But in the entrepreneurial world, the stakes are different. Success isn't measured by publications or citations but by the real-world impact and accessibility of the solution. To those considering this path of knowing the innovation,

I would highlight the importance of Perseverance, Gratitude, and non-stop learning.

In this journey, be ready to face countless challenges, from funding constraints to regulatory hurdles. Persevere through them, for every obstacle is a stepping stone to your eventual success. Surround yourself with people who believe in your vision. Show the gratefulness towards your family, friends, mentors, and colleagues whose encouragement will sustain you during tough times. Transitioning to entrepreneurship requires new skills, from understanding business models to handling finances. Embrace this learning curve which will anchor through the highs and lows.

Each milestone reflects the progress you've made and worth celebrating.





BCKIC

Bhubaneswar City
Knowledge Innovation
Cluster Foundation

Bhubaneswar City Knowledge Innovation Cluster (BCKIC) Foundation

*An Initiative of the Office of the Principal Scientific Adviser to the
Government of India.*

Email: chairman@bckic.in | ceo@bckic.in

Web: www.bckic.in

DESIGN
by Prasanti Bal
Senior Creative Designer,
BCKIC Foundation