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A very innovative way of making people aware of the advances and facts about medicine. Even a common Man can understand the concepts in magazine easily. Keep going. Well organized contents, attractive pictures and precise information about a lots of important topics.

Dr. Shubha H. V
Assistant Professor at Sapthagiri Medical College
India

Dear Team, I am very much thankful and grateful that I got my article published in your esteemed E-health magazine. Special thanks to the chief editor and the team who is behind "InnoHEALTH". Such a great platform where everyone can showcase and express their thoughts in the healthcare through your magazine.

Tamanna Sachdeva
Project officer at Dakshayani and Amaravati Health and Education
India

Very well laid out magazine and are article are so current and reader friendly.

Ramesh Kumar Nanjundaiya
Global Ambassador - INDIA at Silicon Valley Forum (SVF)
USA

I would like to express my gratitude to the chief editor and editorial team of "InnoHealth" for the excellent coverage in the magazine published. The positive exposure you gave me on the International Nursing day.

Neha Lal
Sr General Manager - OPs & HR at GCS Medical College
Hospital & Research Centre
India

Your magazine is an extremely useful resource in the field of healthcare innovation. Keep up the good work!

Dr. Kanchan Mukherjee
Professor - Centre for Health Policy, Planing and Management
Tata Institute of Social Sciences (TISS)
India

EXECUTIVE OPINION

Improving Literacy To Improvise Healthcare

Dr. V K Singh

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InnovatioCuris

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> *We citizens also have a duty to take care of our health and not only criticize the government, with improving literacy we would understand healthcare better and contribute towards positive health of the community.*

WHO has defined Health as "state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" if we take this definition most of us are not healthy? There is a necessity to explain this definition to every fellow citizen and relevant functionaries. We as individuals should strive to achieve positive health, which is the duty of both state and individual. Health is a multisectoral approach and to achieve quality of life it is important that every department should plug in to be an integral part of a healthcare provider.

In our personal life we give more importance to money than health. Nation is healthy if individuals are healthy, but how much of the budget is allocated for health by governments in the last few decades. Pandemic has taught us lessons after we lost many precious lives. There is a lack of health infrastructure, manpower and rampant corruption was reported during the pandemic. Things are improving but too late and too little. There are many initiatives the government has taken to create devices, increase the number of medical colleges/AIIMS to self-sustain health services as per norms of WHO but it would take a few years before it fructifies. It has also created the National Health Authority and digital health mission to bring more efficiency. It would provide healthcare id to all citizens, healthcare providers and hospitals/nursing homes and clinics. Pharmacies and chemists would also be roped in. It is a herculean task to give ids to such a big population. This platform once completed should culminate into better control and qualitative health care at optimum cost.

We citizens also have a duty to take care of our health and not only criticize the government, with improving literacy we would understand healthcare better and contribute towards positive health of the community. We at InnovatioCuris strive to create qualitative healthcare at optimum cost by various initiatives. There are new issues created by use of technology such as Cyber attacks etc. It also opens new doors for legal and ethical issues. It increases efficiency by use of technology like Artificial Intelligence and our team continuously conducts training of healthcare providers to make them aware of these newer issues. We want active participation of all to take healthcare to greater heights.

We have Yoga day today and for better health take care of these national initiatives which have now become global. The benefits of Yoga are scientifically proven and now adopted as "International Yoga Day". Let us make India a healthy nation.

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Technological advancement in healthcare sector to tackle global problems

Michael Ditmore is the Co-founder and Executive Director of Novim.He currently serves on the Director's Council of the Kavli Institute for Theoretical Physics at UCSB.

Sachin Gaur, Executive Editor, interviews him regarding the technological advancement in various sectors with an emphasis on the healthcare sector

Q. Given your vast experience in building technology businesses. What is the hard part of building a technology business? What advice would you give your 20-year-old self if you were to start again?

A. It's never the technology - it's always the team. Finding the right mix of creativity and compatibility amongst the founders and core group is one of the most difficult things to accomplish in a startup.

Q. Increasingly we are breaking new ground when it comes to healthcare technology. What are the top challenges you see in building healthcare businesses?

A. Again, it's never the technology–here I believe it is coordinating between human expectations and societal systems, and the timing can be critical. Get too far ahead of what people will accept and you have no market–in healthcare that means both doctors and their patients. Medicine by definition is conservative and derivative. Doctors wish to do no harm, but they also need to derive income from the skills they were taught–threaten either of those premises, and regardless of the brilliance of your technology, you will go nowhere.

Likewise, if you get too far in front of what
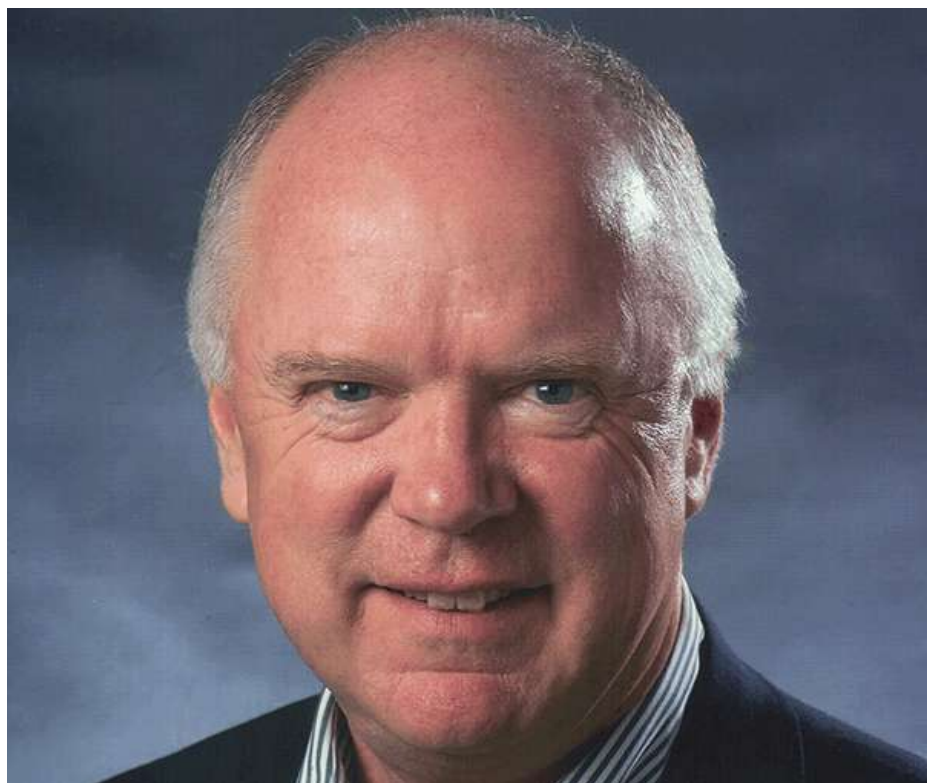
societal systems (government payers) will accept, you face a long and probably fruitless struggle.

Q. In a horizon of 3-5 years do you see any major advancements in the healthcare field, if yes, can you share your insights on what kind of these advances would be?

A. I think there is general agreement that the impact of artificial intelligence (AI) will be broad, deep and disruptive in the healthcare field. Even now, healthcare regulators are struggling to approve AI approaches to a number of fields and conditions. We have recently seen the first tentative FDA approval of AI screening in mammography–others will certainly

follow. Getting doctors and patients up to speed on these new tools will take time and training.

Q. Healthcare delivery has been costly both in terms of time and money. We have seen during the pandemic how collectively as humanity we pushed boundaries. Can we be more sustainable from here onwards in a systematic manner or will we go back to the old mindset and maintain the status quo of rising costs for healthcare.

A. Given human nature and the systems we construct, I think a bit of both will happen. As the pandemic fades from immediate perception, aided in part by our ever shortening attention spans (fed by a hyperactive media), we will struggle to maintain focus on what threats are actually most dangerous. Continuing misinformation and disinformation will only compound our struggle with that focus. Nevertheless, institutional elements within society seem to be getting better at adapting to this ever increasing rate of change and may actually evolve their "over the horizon" vision to the benefit of us all. I am an eternal optimist and I do see many things getting better.

Q. What can be done to improve our agility in general to responding to crisis situations. (Next pandemic are we ready for it ?)

A. I don't think we will ever be as ready as we could/should be. But, having said that, I believe we are getting incrementally better. Our tools, especially those developed during COVID (mRNA, CRISPR-CAS9) are definitely expanding at an astonishing rate and will find application in solving increasingly complex challenges.

Q. With the new geopolitical situation, we see questions being raised about the global supply chain. What kind of cross border collaboration would you see emerge from here? Especially between the USA and India.

A. In my view, India and the US have acted both gallantly and selfishly as current crises have evolved. The sharing of ideas and technologies has been particularly magnanimous, but when faced with perceived threats to their own populations, like most countries, they have tended to act in a more protectionist and self-centred manner. The result has been to damage the trust and efficiency of a global trading system that has taken decades to develop.

Q. When it comes to frontiers of science and technology, at times there is a lot of controversy involved. Think CRISPR, Genetically modified crops, geoengineering. What is your view on unresolved questions around emerging technologies in addressing the big challenges we face now ? (climate change for example)

A. Here again, unfortunately, the media has often not been our friend. Technology, like science, tends to be agnostic–for every good use, someone will find a bad one. But the way in which many of these breakthroughs are presented to the public can be unfortunate. GMO crops can be life-saving and a genuine answer to global starvation, but many people are needlessly terrified of them. CRISPER holds promise to eradicate truly horrible maladies, but it also may be used to tweek the human condition in vain and unpredictable ways. Geoengineering can actually cool the planet, but when to use it, at whose authority and with what unintended consequences is something worthy of real and thorough scientific study. And climate change, that grandest of all perceived threats to humanity, needs to be viewed with cooler eyes. Despite what you read, not every natural disaster is being driven by climate change. Nor is it proceeding at such breakneck speed that we need to stampede ourselves into policies that may well bankrupt our economies or blind us to wiser solutions. Perhaps most importantly, we must not let our fear of climate change–or any other change–lead us to proscribe the energy solutions so badly needed by so much of the world.

Q. Organisations such as yours, NOVIM, work to improve the understanding of cutting edge technologies. Why do we need them even more now? Do you see an urgent need for such actors with sustainability and climate change topics in mind?

A. In our lifetimes we've all seen the devastation of war and famine and disease, and we've read histories of conditions far worse in the past. As much as we might wish it, change is one thing we cannot avoid, and in many instances change works to our betterment. What seems different to me now is the rate of change has accelerated to the point where we have difficulty understanding it, planning on how to adapt to it, and accurately separating good change from the not so good–or even dangerous.

To twist a Mark Twain quote that is even truer today than when he said it:

"Misinformation can travel halfway around the world while the truth is putting on its shoes."

It is incumbent on us as members of a modern society to learn to discern the truth from the untruth, the meaning from the distortion, the science from the ignorance.

That is what NOVIM strives to do.

Q. Any key message for our readers on which areas to focus that can make healthcare more sustainable and affordable.

A. Read and learn everything you can about the rapidly changing world of healthcare, and then apply what you have learned to the benefit of your family, community, country and the world. These are incredibly fascinating times to be alive–and you have more opportunities than ever before to help your fellow man.

> **Our tools, especially those developed during COVID (mRNA, CRISPR-CAS9) are definitely expanding at an astonishing rate and will find application in solving increasingly complex challenges.**

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Rejuvenation Ayurveda : A New Impetus for an Old Tradition

■ **Dr. Shiban Ganju**

In recent times, people seem to have regained interest in discovering different ways to stay healthy for a long time into their old age. In sickness too, people often face a dilemma of choosing treatment from two available systems: modern or alternative. The former has built its foundation on biomedical experiments and the latter has evolved from a lived human experience of centuries. Alternative, which is also known as complementary medicine, includes an array of systems ranging from scientific to folklore. It includes Yoga, acupuncture, traditional Chinese medicine, and AYUSH. The AYUSH systems, which stands for Ayurveda, Unani, Siddha, and Homeopathy, have an established conceptual framework – proven and unproven - about the working of the normal human body, etiology of diseases and their therapy.

Ayurveda, a tradition of India for over 5000 years, reached its zenith around 100 BC by which its earliest stalwarts had created a cogent system, which had a logical strong foundation, a well-constructed edifice, and a demarcated boundary. Whatever fell beyond this boundary was probably not considered Ayurveda. The authors, Charka, Susruta, Vagabhat and others compiled experience, gained over previous centuries, in well-defined texts like Charka Samhita, Susruta Samhita, Ashtang Hridaya and others. Their intuition, observations, logic, and ethics set high standards for the pursuit of knowledge, which guided this tradition for a long time.

The treatises of Susruta and Charaka were translated into Chinese language in the 5th century and into Arabic and Persian languages in the 8th century. The Arabic translation reached Europe by the 12th century. The British showed some interest in Ayurvedic systems but after 1835, with the passage of the English Education Act,

they discouraged Ayurvedic and other native systems and gave preference to practice of western medicine. For the past many centuries, the system was not able to maintain original vigor and the knowledge withered or remained static.

In recent years, with newfound pride in its legacy, Ayurveda has regained its vitality to reclaim its rightful place. Many institutions have been working on different paths to reach a common goal: seek the truth in ancient knowledge, preserve what is known and unravel the unknown. After centuries of dormancy, multiple paths are reasserting the relevance of Ayurveda.

The path of the purists and preservationists:

The purists believe in the divine wisdom of Ayurveda, which originated from Brahma who passed it to Prajapati who in turn handed it to Atreya and so on. Among the

Vedas, it is Atharva Veda, which describes diseases and therapy in a systemic manner, though there are references to diseases in the earlier Rig Veda. The purists follow the Ashtang (eight-fold) system of Vagabhat, which includes Kaya Chikitsa (Internal medicine), Shalakya Tantra (Head, Eye and ENT), Shalya Tantra (Surgery), Agada Tantra (Toxicology), Bhuta Vidya (Psychiatry), Kaumara Bhritya (Pediatrics), Rasayana (Antiageing therapeutics) and Vajikarna (Fertility, aphrodisiacs). The classic practitioners follow the ancient practices in letter and spirit, which they consider perfect and need no modification.

Traditional practice:

The followers of this path are Ayurvedic doctors who get training from government accredited Ayurvedic medical colleges. Their training includes curriculum like

1 anatomy, physiology, and microbiology, which later culminates in learning Ayurvedic texts from ancient masters like Vagabhat. They use traditional Ayurvedic methods and biochemical tests and radiology to arrive at a diagnosis. Many traditional practitioners have no compunction in using western medicines to treat their patients even if they are forbidden.

Commercial:

In recent times people from all societies seem to have rediscovered the benefits of plants and herbs in health and disease. Two reliable market reports estimate that the herbal market size of the world could reach between 168 billion USD and 428 billion USD by 2026. WHO estimates that approximately 3.5 billion people in developing countries use plant-based medicines. At present, half the medicines in the market have natural origin.

Whatever fell beyond this boundary was probably not considered Ayurveda.

Profit drives the followers of this path. The marketing campaigns make generous use of well meaning words like organic, natural, herbal, antioxidant, detox. Market compulsions lead to claims that these products promote health, wellness, strength, cure diseases and are harmless without side effects. Such claims may not be Illegal but are often unsubstantiated.

Currently, India has a small share of the world market, partly because of poor R&D and quality standards. For international acceptance, recourse to clever marketing is essential but not sufficient. Integration with international markets would be possible if Ayurveda pursues intellectually honest research through established scientific methods to establish its veracity. The seekers of truth in ancient times used analytic methods available then and in modern times we should not be reluctant to use the tools of science available now. The integrated R&D could extend to manufacturing to match international quality. This could yield enormous economic benefits.

Public health:

Ayurveda has inherent strength in its philosophy to contribute vastly to public health. Unfortunately, this strength remains underutilized. An Ayurvedic public health system, with its holistic approach, could lead common folks to a healthier lifestyle. With its development and investment, an effective Ayurvedic health system could lead many public health functions: prevention of the preventable diseases, improving nutrition, promotion of physical activity, Yoga, mental health, and rehabilitation of the disabled. A dedicated public health system based on Ayurvedic principles will go a long way to reduce disease burden.

Advocacy:

Activists and believers have pursued this path to persuade the government to become enablers of an AYUSH eco-system. Their efforts have succeeded in opening new organizational structures, institutions, and funding for various avenues of growth. More needs to be done in basic research, standardization of therapy, patent laws, consumer protection and integrated education.

Integrative medicine:

Healthcare will flourish when we harmonize the biomedical system with Ayurveda; for too long these two have been running on parallel and often antagonistic tracks. It helps vested interests to keep the two systems in conflict; it is time to find synergies between them. The results of such merger should be quantifiable, replicable, and verifiable. Making the impact quantifiable avoids inscrutable jargon which is a part of intuitive claims.

Two myths prevail about Ayurveda. One held by biomedical doctors, who decry Ayurveda as quackery and the second perpetuated by Ayurvedic practitioners that their treatment has no bad side effects. Both are wrong. Here are two true stories from real life to counter both myths.

> **In recent years, with newfound pride in its legacy, Ayurveda has regained its vitality to reclaim its rightful place.**

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◣ Doctors already in practice could be offered courses both in
◣ Ayurveda and modern medicine to enhance their skills.

A close friend had severe vertigo; his head would swirl unless he lied down immobile. These episodes affected his personal and professional life. He spent a few years in treatment from many modern medicine doctors including one at a reputed academic center but got no relief. Out of desperation, he went to a prominent Ayurvedic clinic and under their therapy he got considerable relief.

In contrast, another friend was treated by an Ayurvedic doctor for abdominal pain, which worsened despite the caring diligence of the doctor. After many months, when she switched to a modern medicine doctor, it was too late. She succumbed to her disease and died soon after, partly due to her disease and partly due to toxicity of the herbal drugs.

The implication of these stories is that modern medicine should discard its smug superiority and Ayurveda should shed off its halo of holiness. None of them can claim to be a panacea.

Integration of the two systems could happen in the medical college or later at practitioner level. Students enrolled in modern medical colleges could take a course in Ayurveda; those who want to specialize could be offered advanced courses following MBBS. Doctors already in practice could be offered courses both in Ayurveda and modern medicine to enhance their skills. Over the long run, the two-track medical education of Ayurveda and modern biomedical medicine could be integrated into a single track; synthesis of the two systems could evolve into a modern Indian system for healthcare delivery. The consumer would benefit if she were not faced with the dilemma of choice.

Biomedical model:

Last two centuries have seen marked advances in understanding health and disease by studying the human body as a biological machine. Investigators of the biomedical model have developed a molecular basis of understanding the normal and abnormal functions of the human body in health and disease. New diagnostic technology has evolved in tandem to understand what was mysterious before. Therapeutic knowledge

has exploded in this field of biomedical models so that humans now live longer and healthier than even before in history. There are groups of investigators, who are diligently using modern tools to unravel the ancient knowledge. Some excellent work has been published in scientific journals and can be searched in medical knowledge data banks like PubMed and others. To globalize the knowledge and products of Ayurveda, we should meet international standards of research and product approval. The current gold standard is publication is a high impact peer reviewed journal and approval from the FDA, USA. A serious inquiry into the ancient may reveal kernels of truth and some fallacies. We should be bold to discard the fallacies and welcome the truth.

Like many others in this field, our group, Atrimed (Named after sage Atreya, teacher of Charaka and Susruta) has also been working on an integrated Ayurvedic-biomedical model. Since 2003 we have been investigating the molecular basis of ancient therapeutics. We believe that plants, which have evolved for over 2 billion years, can inspire new drug discovery. Plants are factories of nature. Phytochemicals and secondary metabolites can lead to new bioactive compounds.

In the last two decades, Atrimed group has diligently built a library of all previously published Phyto-molecules and established a repository of real extracts from plants mentioned in Ayurveda. Atrimed also experimented in preserving endangered plant species in tissue culture. The virtual and real library could possibly be one be the largest in the world.

Such research necessitates the use of trans disciplinary teams to use technology from many labs. Some examples are recombinant technology to produce target protein; molecular biology to study biological reactions; tissue culture to study the effect of investigational molecules on living cells. Atrimed uses computational chemistry and a docking software to study these phytochemicals and has developed a software to predict absorption, distribution, metabolism, excretion, and toxicity. To understand

the therapeutic value of nutrition we are developing software to see the effect of food at molecular level, which may help in understanding the poly-pharmacology of various Ayurvedic drugs.

Atrimed has also succeeded in developing plant molecules with verifiable anti-viral activity both in lab and clinical setting.

Atrimed has collaborated with many reputed institutions. Some of them are Rajiv Gandhi Institute of Technology, Bangalore Bio-innovations Center, Rastriya Vidyalaya College of Engineering, Nitte center for animal studies, Nitte Gulabi Shetty Memorial Institute of Pharmaceutical Sciences, Institute of sciences Bhubaneshwar, Regional Center of Biotechnology Faridabad. Our company Atrimed has been awarded by Biotechnology Industry Research Assistance Council (BIRAC) and recognized by many government and private organizations.

The work of the Atrimed group has led to development of over one hundred effective products, which meet international standards of safety. Some products have been retested for safety in European labs to ensure they are free from toxic metals and pesticides. Manufactured in C GMP or FDA approved facilities, some of the products have been registered with FDA. As a result of high-quality work, Atrimed products are selling in India and many countries abroad.

Regulators and consumers:

The recent Ayurvedic resurgence forms but a minuscule part of the health and wellness universe. The private and public initiatives can expand only if enabled by the government and accepted by the global consumer. From the regulatory authorities in becoming enablers to people becoming informed consumers, all intermediary stake holders need to participate in rejuvenating this tradition.

The regulators could help evolve the market with a multi-pronged initiative, which would include new laws for intellectual property, new integrated medical training, funding of original research and controlling fake claims in marketing.

The growth of Ayurveda also requires an informed consumer who is equipped to utilize Ayurvedic or modern medicine. As many diseases are self-limiting, either one may suffice but the decision is critical when the disease demands an expert's help for recovery. Ideally, the treating physician would keep the patient's best interest foremost and guide her towards the best available treatment. But it gets muddled due to financial incentive the physician gets by providing treatment. In both modern and AYUSH systems, the practitioners range from altruistic to commercial, from competent to charlatans. Perhaps the ethics of ancient physicians are as important as modern technology. Ethical partitioners and empowered consumers probably provide are the best guardians for reinvigorating Ayurveda.

In our euphoria of novel discoveries, the ancient wisdom has been, unfortunately, relegated to an inferior status because of perceived low utility. But discarding ancient wisdom of our inheritance may be inimical to achieve the target of a healthier and happier human life. The rejuvenation of Ayurveda needs a new impetus, which integrates the traditional intuitive method with the analytical reductionist method of western science. The tradition of Ayurveda deserves neither derision nor worship; it needs honest investigation to establish its validity globally.

Dr. Shiban Ganju is a consultant specializing in gastroenterology, liver disease and nutrition in hospitals in the greater Chicago area. He is the Chairman, Atrimed Pharmaceuticals and also Founder of Save A Mother Foundation, USA. His commitment to and understanding of how to drive improvements in health outcomes has been nurtured & honed since 1972-73 when he worked in a slum near Delhi and where he helped build a school and dispensary.

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Yoga and Environment

■ **Dr. Debleena Bhattacharya**

The very existence of man depends upon the environment and to maintain a healthy living all our senses must be awakened by Yoga.

The relationship between Yoga and Environment has traversed a very long path. The touch of the grass blades drenched in morning drizzle under our feet when we walk over the green pastures is still the healthiest exercise. The fragrance of the flowers changes our mood and invariably makes us feel good no matter what time it is in 24 hours.

There is a very intriguing relation between the two where a peaceful mind gives the solutions to a problem and a sustainable environment can only thrive with a balanced mindset. The amount of pollution created by us,the humans, has

invariably led to the rise of various diseases and thus a chaotic situation as witnessed through the COVID-19 pandemic. The sedentary lifestyle,surrounded by concrete jungles and unhealthy consumption of food is often making a person sick, people are now in dire need for a healthy living and through Yoga this is often controlled. The self created environment of man has become the root cause of diminishing his very existence and one cannot escape the present lifestyle but a new lease of hope can be culminated through the practice of yoga.

The best part of yoga is its existence in the environment. Meditation calms the mind and it gives the option to hear the music of nature (chirping of birds) which is otherwise lost in the honking of the horns. Research has shown that touching

the soil with your hand elevates your mind as the microbes present in soil have effects on the brain in the same way as any antidepressant drugs.

Our five senses as depicted in Yoga are connected to Nature and one of the most vital role is played by Water. The first pollution was witnessed in water and through the book 'Silent spring' written by Rachel Carson on the spread of harmful pesticides like DDT in water, this problem was known to mankind. The reason behind the celebration of June 5 as Environment day is the starting of the Stockholm Conference in 1972 for awareness about the environmental pollution to all the 152 and more participating nations. The first environmental law was the Water Act that came in force 1974. Water thus is the most integral part of our existence.

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Yoga also depicts water in various forms like 'touch' witnessed by cold water therapy which controls the anxiety, improves the circulation, enhances the immunity and provides better emotional and physical resilience, uplifts the mood and clears the toxins from our body. The 'taste' of sweetness or salt is enhanced by the digestive juices secreted in our body and they are controlled by the drinking water.

After a heavy shower the earthy smell of soil known as 'Petrichor' comes which enriches our smelling senses and uplifts our mood. After rainfall the trees and plants also liberate beneficial natural chemicals known as 'Phytoncides' which have a very positive impact on our immune system and mood upliftment.

Researchers have found that there is a strong correlation between the sound of the waves and serenity in the mind.

The intermingling of both gives a clear picture that if we are causing harm to the environment it will cause an impact on our physical and mental well-being.

The world Yoga day as witnessed on June 21 is also the same day when the sun appears at its highest elevation to mark the solar solstice and there are so many yogas related to sun hence this day was unanimously declared by the United Nations as 'Yoga day'.

The five elements of Yoga like Air, Water, Fire, Earth and Space are connected to the Environment. The imbalance in any of them will cause problems for mankind. We need to preserve our earth by leading a sustainable lifestyle where the importance of Yoga is known to everyone. The answer to our good health lies in our environment and this reminds me of the lyrics of Bob Dylan that says 'The answer, my friend,

is blowing in the wind. The answer is blowing in the wind'.

Dr. Debleena Bhattacharya is presently Assistant Professor in Marwadi University (MU), Rajkot, Gujarat. Prior to joining MU, she has worked as Project coordinator for BIRAC-SRISTI PMU,a joint venture of Govt. of India and NGO located in Gujarat. She received her doctoral degree from IIT Dhanbad and her area of interest is wastewater treatment, environmental biotechnology, and molecular genomics. She has authored a book published by CRC Press, U.S.A alongwith scientific papers & book chapters. She is the Associate Editor of InnoHEALTH magazine.

Advanced AI for medical image analysis to detect and diagnose the early stages of critical diseases

■ **Resham Raj Shivwanshi and Saurabh Gupta**

Among all the other deadliest diseases, cancer is the most lethal cause of death, which may occur in various types and regions inside the human body. It arises due to uncontrolled cellular functionality that happens when cells start working independently and performing odd behaviors compared to their surrounding structures. When it occurs in the lung region, it creates a severe condition, as lung cancer's survival rate is lowest compared to other types of cancer. According to the report published in 2021 by global cancer statistics, the world's new cancer cases have reached 19.3 million, and lung cancer is the second largest cause of cancer after female breast cancer. In various research studies, it has been found that early cancer detection may increase the chances of long-term survival.

Furthermore, studies have indicated that a low dose CT scan and its automated analysis can be the best way of early cancer detection. It works without putting the human body in harm compared to other invasive procedures. Analyzing CT images to get insights into internal structure and abnormality has been vastly carried out by experts and radiologists in previous days. But due to the consistent efforts of researchers, artificial intelligence (AI) based disease detection systems have been gaining the direct attention of clinical practitioners and medical institutes for the past two decades. With increasing structured data in the medical field, more opportunities for finding precise and straightforward methods of diagnosis are opening. The modern world where we live now is just embarking on the long and exciting data science journey that can lead us towards unimaginable peaks of automated technological solutions. It is yet unclear how precise the medical technology would be in detecting and diagnosing diseases at their early stage.

Perhaps, the advanced algorithm defines the upcoming health issues before their occurrence in the human body. It allows someone to take corrective feedback in an ongoing lifestyle to prevent the forthcoming critical situation. Everything we imagined today may be possible in the near future but that requires consistent efforts to develop efficient techniques and algorithms.

With the collaborative or individual efforts of various scientific and research groups, algorithms are rapidly getting advanced by adopting the most trustworthy and less time-consuming methodologies. Deep learning and fine-tuned neural networks play an essential role in that context as they open new ways to modify existing techniques to obtain promising results. Inside the deep neural network, it's hard to know how they behave and interact, but by employing systematic hyperparameters and fine-tuning, outcomes and performance can be improved. Some key hyperparameters are learning rate, optimization algorithm, activation function, number of hidden layers, number of activation units, kernel size, pooling size, batch size, and number of epochs. Apart from the hyperparameter, the most crucial point is to decide a number of layers for the optimal and best performance of the network.

Creating balance with all these parameters is complex and requires multiple testing and experiments. It takes a lot of effort and time to maintain a balance between two different quantities for the increased performance of a deep learning network. This problem can be addressed by employing an additional algorithm responsible for performing the required analysis to choose the best hyperparameter and values to establish a fully automated and self-improving

deep learning network. Maybe the better strategy is to implement the most adaptive and high-performance AI algorithm, which helps detect and diagnose diseases on the individual and societal scale.

With this article, I would like to propose a "partial naturally randomized deep learning layers (PNRDL)" for the advanced performance of an automated detection system. The procedure is not tested yet, but the inclusion of optimization with a little bit of relaxing parameter in the form of partial naturally randomized weights may provide better human-level performance for the analysis of CT images to detect lung cancer or its early signs. In general, relaxing situations are when someone takes a break from the process to achieve the desired goal and spends some time doing other activities. Many philosophical studies discuss this period as the best period for finding new innovative, astonishing ideas that revolutionize the actual path of moving towards the desired goal. Sometimes it gives better outcomes than expected results that someone never imagined. I considered this not a coincidence but a part of natural computing through which anyone and everyone are connected. Billions of neurons continuously acquire weights inside the human brain by taking insights or parametric values. These values or parameters are generated by nature that add up with the brain as essential insights for the computation of various tasks, which sometimes reveal exceptional outcomes. I believe it is a substantial phenomenon that is seemingly random but not actually random as everything inside nature runs by natural computing. To introduce a relaxing period inside the machine, I propose a relaxed parameter-based, "partial naturally randomized deep learning layers" that takes random values for deep learning weight updation.

> **According to the report published in 2021 by global cancer statistics, the world's new cancer cases have reached 19.3 million, and lung cancer is the second largest cause of cancer after female breast cancer.**

Random values used in these experiments will be directly obtained from the naturally randomized numbers that are randomized and obtained during individual image analysis. After such procedures, it may be possible to get a deeper connection to the automated detection system through natural computing, where the randomization of parameters works as a relaxing situation in the case of the human being. By going through this procedure, I believe the development of automated disease detection systems has become more realistic and precise. Maybe the idea of making this type of system works fine, and the procedure discussed for disease detection render outstanding results if employed in other research and development purposes. Figure 1 below is showing a short description of the development of the proposed algorithm.

However, the proposed model is still under exploration as the procedure to obtain an utterly randomized number is still in the experimental stage. The first few tries to generate random values are conducted by taking never-repeating decimal digits of "pi". Although, they are also finite at any given period. Further trials to generate a natural randomized number to introduce relaxation sessions inside machine-learning operations are ongoing. The study aims to take insights from nature, always trying to say something to us regarding any event and situation. An American biologist, Barry Commoner once said that "everything is connected to everything else". It means the present case, past conditions, and future outcomes are not distinct. It is just our inability not to process the subtle insights of the surroundings and ignore them by considering them as random non-valuable information. Processing every element of information is not possible, but taking a small piece and extracting valuable insights is the way to achieve desired outcomes. The experimental scope of this research focuses on taking a machine into the time-space where some of its weight functions process the very subtle event of the natural parameter to extract essential values. The outcome of this process will generate a piece of information that helps to implement all-inclusive nature-driven algorithmic results. Unlike the existing computation system, it performs its task by combining insights of input data and instincts of current surroundings. It is an entirely radical approach to using AI techniques that can be time-consuming but taking a chance to develop and work upon this methodology may undoubtedly be helpful. After its successful implementation, it may be possible to implement a deeper bond with nature and harness the power of robust natural computing or actual computing.

Deep learning in AI also suggests that deeper and closely connected nodes are the one who dominates the outcomes. Similarly, the more dominant one around us (nature) should be deeply and strongly connected to every possible node (eg. deep learning algorithms and layers) to obtain the best possible results today and in the near future.

> **The experimental scope of this research focuses on taking a machine into the time-space where some of its weight functions process the very subtle event of the natural parameter to extract essential values**

Figure 1. Short description of the proposed algorithm
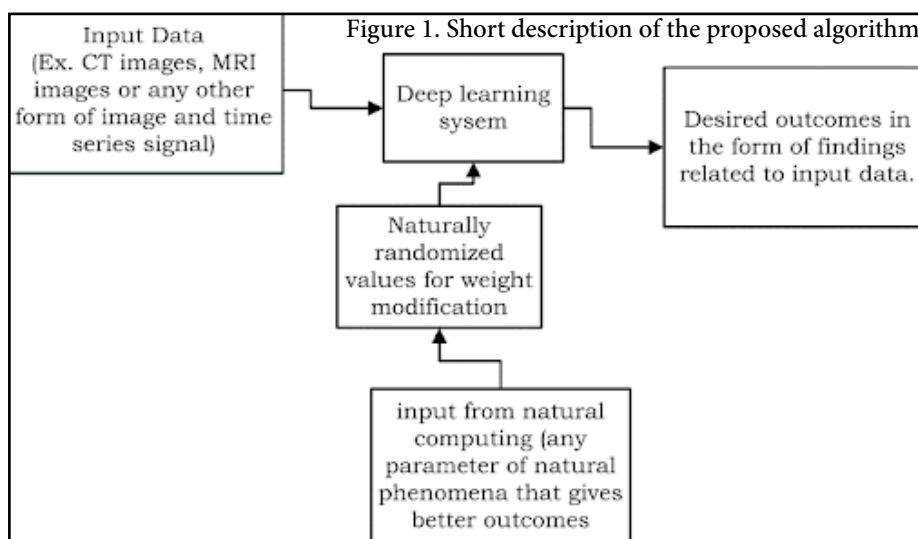
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Dr. Saurabh Gupta is an Assistant Professor of Biomedical Engineering, at National Institute of Technology Raipur. His primary areas of research are inverse problems, medical imaging and stochastic optimization, to develop technologies for community medicine and public health.

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WEIGHT LOSS THRESHOLD IDENTIFIED FOR CARDIOVASCULAR AND SURVIVAL BENEFITS IN PATIENTS WITH OBESITY AND DIABETES

Cleveland Clinic, America conducted an observational study on 1223 patients with obesity and type 2 diabetes who had undergone bariatric or weight loss surgery matched to 5978 patients who had usual medical care suffering from the above stated diseases. Nearly 80% patients had hypertension, 74% had dyslipidemia (increased cholesterol and triglycerides) and 31% were taking insulin for diabetic control. Different statistical models in relation to the effects of weight loss were then used to identify the minimum weight loss needed to decrease the risk of death and of experiencing major adverse cardiovascular events like heart failure, coronary artery events, cerebrovascular events , atrial fibrillation and kidney disease. The study revealed that 5-10% of surgically induced weight loss is associated with improved life expectancy and cardiovascular health. In comparison to about 20% weight loss is necessary to observe similar results with a non-surgical treatment. In addition this research also displays that metabolic surgery may contribute to health benefits that are independent of weight loss.

The study suggests that greater heart disease benefits are achieved with less weight loss post metabolic surgery than the medical weight loss using lifestyle interventions. Since the groundbreaking STAMPEDE Study was revealed, many additional studies have followed that have observed health benefits other than weight loss following metabolic surgery.

This research too is a secondary analysis of a large study that showed weight loss surgery is associated with a 40% reduction in risk of death and heart complications in obese and type 2 diabetic patients.

There are continuous studies going on to understand the physiological changes in the surgically modified gastrointestinal tract, the impact on hormone secretion and the microbiome. Those beneficial changes may contribute to the cardiovascular and survival benefits of metabolic surgery, independent of weight loss. Therefore more work needs to be done in this field to understand the underlying mechanisms for the health benefits of metabolic surgery in patients with obesity and type 2 diabetes.

SOURCE: *www.medindia.net*

'MIND U' – THE MENTAL HEALTH PODCAST IN HINGLISH

As per the National Mental Health Survey, depression is a mental illness that affects one in 20 indians. A frontrunner in the management of ill mental health is Fortis Healthcare in which it runs one of the most comprehensive and biggest mental health programmes in India under the leadership of Dr. Parikh and myUpchar is India's biggest healthtech startup. Not much substantial work has been done in the field of mental health in India especially in a language which is comprehensible by most of the Indian population. Keeping this lacunae in mind

upChar has created "Mind U' a first-of-its-kind deep dive into mental health and wellness podcast in Hinglish that is in a language that is accessible to most Indians and to many Indians living abroad in collaboration with Dr. Parikh and a team of experts from Fortis.

On this podcast leading experts under the leadership of Dr. Parikh will take listeners through crucial aspects of psychological well-being in 20 minutes or less speaking on topics ranging from clinical disorders like depression, deepdive into parenting to

topics related to youth like relationships, sexuality and social media.

The episodes of Mind U will be telecast on Apple podcasts, Google podcasts, Castbox, YouTube, Spotify, JioSaavn and HubHopper. In each episode the experts will answer a series of questions on the topic du jour and the topics range from parenting 101 to breaking up without breaking down.

Listeners can expect an in depth discussion about things which we all can relate to, that happen to us in our day today life like effective handling and navigation of social media and maintaining our relations even as our lives become busier and busier.

Listeners will be guided to see the connection between the things we do every day and our mental health. It is indeed a much needed step in this direction and we applaud the efforts made by Fortis Healthcare and myUpchar.

SOURCE: *www.medindia.net*

NEW COMMUNICATION DISCOVERED BETWEEN HUMAN EMBRYOS AND MOTHER

A team of researchers at The University of Manchester and Manchester University NHS Foundation Trust conducted an in vitro research which exhibited a new way human embryos communicate with their mother-to-be just after six days of its development.

The study also put light on the fact that the embryos could detect foreign cells in their environment including pathogens. Early human embryos are highly sensitive to their local environment but before this study, relatively less was known about how they detect and respond to specific environment cues.

This study has discovered a signalling system which is generated by the embryo which allows communication with mother in a new way wherein it was found that when foreign cells are detected by the embryos' special proteins called Toll Like Receptors(TLRs), cytokines (IL8) are produced which typically plays a role in the body's immune system by engaging neutrophils to the inflammation site. The team examined the behaviour of the embryo throughout the fifth and sixth days of the embryos' development wherein it is free-living in the female body before implanting into the uterus lining.

It is already known that embryos communicate with mothers when they begin to implant but we do not know why this above-mentioned new signalling happens. Perhaps this presence of TLRs in the fallopian tube and vagina is an additional way of signalling an inflammatory response to the maternal tract in response to pathogens or to modulate the implantation process and the initiation of pregnancy.

The team used a literature search of published data to analyse the expression of TLRs and related genes in human embryos. Then they cultured 25 days old human embryos in the presence of poly (I:C) and flagellin which attach to the toll-like receptors TLR3 and TLR5. EThe team only investigated TLR 3 and 5 and on the sixth day, they measured gene expression and cytokine production to compare the results with the controls.
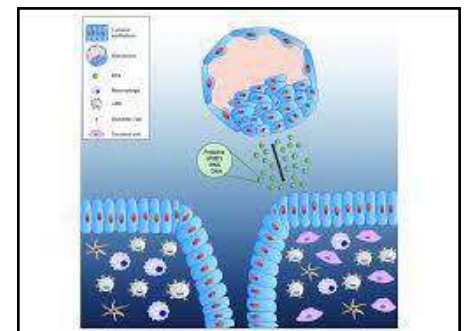
The data also reveals that there is a balance between suppression and stimulation of the innate immunity response in embryos. That may reflect the need for embryo survival in the presence of benign foreign cells versus the need for maternal tract to respond to infection. This groundbreaking research may help to understand fertility issues, helping people who struggle to achieve natural conception and even enhancing IVF methods. The research is published in the Journal Human Reproduction Today. Still further investigations need to be done to determine whether the TLR stimulation response is effective during the embryonic journey in the fallopian tube.

SOURCE: *www.healtheuropa.eu*

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NON-INVASIVE VENTILATORS BY MAX VENTILATOR

New multifunctional non-invasive (NIV) ventilators have recently been launched by Max Ventilator with built-in oxygen therapy and humidifier. The device is simple to use, is lightweight and offers unique multipurpose features. It is adaptable as it can be used both for newborn and adult. This device can also be used if a patient doesn't require non-invasive ventilation but needs oxygen therapy. Thus it can do both non-invasive ventilation and oxygen treatment as a single unit. This is the USP of this product since so far there is no solution in the market which combines non-invasive ventilation and oxygen treatment. The NIV is portable and comes with a trolley which is 5 kgs in weight.

It is suitable to be used for patients suffering from COVID, pneumonia and neonates. For use in neonates, special kind of mask needs to be connected to the device thereby taking care of neonatal breathing difficulties immediately after birth. This aims to reduce the neonatal mortality rate.

There is an internal blending capability in the device for increasing the oxygen content from 31% to 100%. It also helps in the management of excess gases produced so that they do not affect other patients in the ICU. The NIV is equipped with a 7-inch touchscreen display and can save observed parameters and operational settings for 72 hours. It gives minimal damage to the user and has both BiPAP and CPAP modes making it suitable for usage by patients with sleep apnea also. The uniqueness of this product lies in the fact that no cleaning is necessary and the device may be used by a second patient. The device is priced at a quarter of traditional ventilators. If an imported ventilator costs around 10-12 lacs INR , then this device costs only 25% of that amount. The company envisions that this device can reduce the requirement for critical ventilators by half. Thus is a potential game changer in the healthcare industry.

SOURCE: *www.financialexpress.com*

ONCE DAILY, SINGLE INHALER-TRIPLE THERAPY FOR COPD PATIENTS

In India COPD is estimated to affect more than 100 million people which accounts for more than 9.5 percent of all deaths. So an effective solution to its management is sought. Keeping this in mind, a market leader in pharmaceuticals, GlaxoSmithKline has recently launched one of the first once daily single-inhaler triple therapy (SITT) named "Trelegy Ellipta" (fluticasone furoate/umeclidinium/vilanterol) for Chronic Obstructive Pulmonary Disease (COPD)

patients in India. Trelegy is administered through the innovative Ellipta inhaler which provides accurate dosage via its consistent dose delivery mechanism and is associated with less inhaler teaching time than other commonly used inhalers.

The product launch follows the approval by the Drugs Controller General of India (DGCI) of Trelegy Ellipta as a maintenance treatment to prevent and relieve symptoms associated with COPD in patients aged 18 and above.

SOURCE: *Pubmed*

ADVANCED PROPHYLAXIS TREATMENT FOR HEMOPHILIC PATIENTS

Japanese Pharmaceutical giant, Takeda Pharmaceutical Company has launched an innovative extended half-life recombinant Factor VIII (Rfviii), 'Adynovate', using established technology (controlled PEGylation) for patients with haemophilia. Adynovate is administered in three steps with the BAXJECT III system, eliminating the need to disinfect the vial because vials are already assembled in the system housing.

MEDIABRIEF — Takeda

This medicine in combination with MYPKFIT makes it the first and only FFDA approved application, providing a tailored and interactive prophylaxis therapy option which allows both the patients and healthcare professionals to monitor factor VIII levels in real time. When the predicted factor VIII levels of haemophilic patients are low, an alert is sent to them and also reminders when their infusions are due. This feature gives a great prophylactic coverage of patients. The medicine can be stored for upto three months at room temperature without exceeding 30 degrees celsius/ 80 degree Fahrenheit.

SOURCE: *www.biospectrumindia.com*

ZERO ASSISTANCE INTEGRATED DIGITAL HEALTH CENTER LAUNCHED BY IHL

With a huge rural Indian population it is a gigantic task to provide accessibility of preventive and predictive health screening to the remotest areas of rural India where even primary healthcare facilities are scanty. But committed to handling this adverse condition is Health Link Pvt. Ltd., which has recently launched India Health Link (IHL) Care Digital Health Centre in Khagaria, Bihar making it the first-of-its-kind zero assistance Integrated Digital Health Centre (DHC) in the remote district of Khagaria with a population of more than 16 lakh people with almost 47% women inhabited in 306 villages. This Digital Health Centre also contains the world's first Made in India Health Kiosk (Hpod) having multi-lingual compatibility with 12+ Indian languages with teleconsultation integrated with pharmacy and laboratory.

This facility will give the people of Khagaria a walk-in experience who can get their key vitals captured within 5 minutes and also get their unique IHL Health Accounts created which can also be integrated with Ayushman Bharat Health Account (ABHA) as it is the key to digital healthcare journey. This model aims to fill the healthcare delivery crisis which rural India is in dire need of as we have abysmally low doctor-patient ratio of 1:1456 and also of paramedics by helping the Anganwadi workers and ANMs to focus on their door to door visit programs. IHL Care Digital Health Centre has developed a proprietary 'hPOD' which is a self-service ATM size health station capable of screening more than 20 essential vital parameters including temperature, pulse, blood pressure, SpO2, ECG and Body Mass Composition without medical assistance. The health pod will also allow teleconsultation withApollo TeleHealth doctors. The villagers will be aided to create their own electronic health records and take control of their wellness by making informed health choices.

SOURCE: *www.expresshealthcare.in*

S&T MINISTER CALLS FOR GREATER CONNECT BETWEEN INDUSTRY AND ACADEMIA

Union Minister of State (Independent Charge) Science & Technology and Earth Sciences, Minister of State PMO, Personnel, Public Grievances, Pensions, Atomic Energy and Space, Dr Jitendra Singh today said that the future bNew Delhi, May 12 (India Science Wire): Union Minister of State (Independent Charge) Ministry of Science & Technology, and Ministry of Earth Sciences, Minister of State PMO, and Minister of State Ministry of Personnel and Public Grievances, Dr. Jitendra Singh on Thursday laid stress on building sustainable start-ups with indigenous innovations.

Speaking at the inaugural event of "Iconic 75 Industry Connect ('i' Connect)" at Jorhat, Assam, he said, the innovative start-ups by the young entrepreneurs must shoulder the responsibility for India's ascent in the next 25 years, when the country will celebrate 100 years of its Independence as a frontline nation in the world.

The industry connect programme aims to explore globally benchmarked technologies and products for making the country self-sustaining and self-generating. While the research establishments in the country are well equipped to develop world-class technologies and products in laboratories, there is a gap in taking these to the market and ultimately to the society, said Dr. Jitendra Singh.

Noting that research and industry share a reciprocal relationship to thrive and grow, the Union Minister urged the industry to have an equal stake in R&D through meaningful investment to make and take world-class products from laboratories to market. He also underlined the need for brand building of the products to carve a niche in Indian and world markets.

Referring to Prime Minister Narendra Modi's vision of Government-Industry Connect, Dr. Jitendra Singh said, that the iconic 75 Industry Connect ('i-connect) events aim to forging partnerships with industry in 10 thematic /focus areas. It is a consolidated effort of DSIR/CSIR, DBT, DST, MoES, and other scientific departments of the Government of India to reach out to the industry. Coming together of several scientific departments for the cause of science is a phenomenon seldom seen before, and team spirit is the key mantra of the Government, the Minister added.

Dr. Jitendra Singh said the reason to start the series of industry i-Connect from Jorhat in Assam stems from the Prime Minister's high priority for developing the North-Eastern Region. He reminded that in 2014 itself, Modi had made it clear that the Government's priority was to bring the underdeveloped regions of the North-East, J&K, and other hill states and island territories at par with the developed regions of the country. He hoped the northeast region would become the destination of future start-ups, entrepreneurship, and new investment.

Dr. Jitendra Singh lauded the role of scientific organizations in India's progressive journey and added that the industry knows the intricacies of taking the technologies from labs to land. He said, given this, the forging of partnerships with industry is of paramount importance and called for further strengthening of ties between academia and industry to develop cutting edge technologies and products and deliver them in the shortest possible time frame to realise the vision of Prime Minister for "Samarth" and "Atmanirbhar Bharat".

The Minister informed that each 'i-Connect event would include a variety of programs such as conferences, plenary talks, technical exhibitions, B2B meetings, round table discussions and breakout sessions, enabling the promotion and fostering of businesses.

The unique series of 75 Industry Connect ('i'-connect) events put up by the Ministries of Science & Technology & Earth Sciences aim to showcase the achievements in diverse S&T areas as part of the Azadi Ka Amrit Mahotsav celebrations, commemorating Independent India's 75 years of progress and the glorious history of its people, culture, and achievements.

Dr. Jitendra Singh said, that as an outcome of these events, he would look forward to receiving White Papers for thematic areas for collaborative research and technology development. This should have definitive targets and well-thought plans/roadmaps for achieving the same with strict timelines, the Minister stressed.

In his address, Shri Keshab Mahanta, Minister for Health and Family Welfare, Science and Technology and IT, Assam Government said that the CSIR Compendium of Technologies for Entrepreneurship of Relevance in North East India will help in building technology-based entrepreneurship in the region.

Dr. V. K. Saraswat, Member NITI Aayog, in his address, said that in the last 7-8 years, India has jumped from 85 to 47th rank in Global Innovation Index, which has created a major cultural shift in the start-up culture in the country. He said the country could further leapfrog in the Innovation Index by bringing more and more industry into the innovation eco-system.

CREDITS: *India Science Wire*

FUTURE BELONGS TO TECHNOLOGY-DRIVEN ECONOMY

Union Minister of State (Independent Charge) Science & Technology and Earth Sciences, Minister of State PMO, Personnel, Public Grievances, Pensions, Atomic Energy and Space, Dr. Jitendra Singh today said that the future belongs to the technology-driven economy.

Emphasizing adopting an integrated approach rather than acting in silos, Dr. Singh also stressed the urgency of creating an "innovation ecosystem" for start-ups. Dr. Jitendra Singh was speaking at the National Technology Day-2022 event, coinciding with India becoming a nuclear-empowered country after successful nuclear tests at Pokhran on May 11, 1998. India is already on the ascent; and science, technology and innovation will be the key determinants of the roadmap for the next 25 years when we celebrate 100 years of India's Independence, Minister added.

Dr. Jitendra Singh also presented awards to the seven most successful start-ups on the occasion. The awards are given for the pioneering work in Quantum data security, Covid-19 testing kits, A-I powered Robot for electronic assembly, Cryogenic technologies, and Cyber security systems. This award is given to a technology startup for developing indigenous technology with potential for commercialization. In addition to the trophy, the award includes a cash prize of Rs. 15 Lakh.

The Minister also presented awards to Women Scientists in Translational Research and Women Entrepreneurs, the National Awards for successful commercialization of indigenous technology, and the award under MSME category.

Dr. Jitendra Singh said that both the startups and women entrepreneurs have a high priority for Prime Minister Narendra Modi, and the Department of Science and Technology (DST) is taking all the steps to promote them to their full potential. Pledging complete support to the Start-ups by pro-actively reaching out to them, the Minister promised full financial support and even offered to change the rules to strengthen the support system.

Dr. Singh also launched the Scientific Social Responsibility (SSR) and Scientific Research Infrastructure for Maintenance and Networks (SRIMAN) guidelines on the occasion. He said that SSR as an institutional mechanism is a significant step to reach out to the widest spectrum of stakeholders of S&T with knowledge, human resources, and infrastructure to make effective use of existing assets for the benefit of society. He said, in tune with the spirit of CSR to earmark some profit for public service, SSR will enable sharing of knowledge and infrastructure.

Dr. Jitendra Singh recalled Prime Minister Narendra Modi's inaugural address of 104th Indian Science Congress, in which he advocated for SSR for engaging science for the societal welfare. Dwelling on the SRIMAN guidelines, Dr. Jitendra Singh said, scientific infrastructure is the foundation of research and innovation, and facilitating its availability, accessibility, and sharing needs to become a key goal, particularly for countries like India with limited resources.

The Minister added that manufacturing of indigenous instruments to reduce dependency on imports is also essential along with human resource development for operations and management of Research Infrastructure (RI).

Dr. S. Chandrasekhar, Secretary, DST, said, Guidelines' scope extends to all Govt. scientific departments, research organisations, and grantee agencies that support development of Research Infrastructure (RI) and all the organisations receiving funds for conducting research and development. Private institutions can also be partners and or beneficiaries in such endeavours based on mutual agreement.

Secretary, Technology Development Board (TDB), Rajesh Kumar Pathak, said that after successfully conducting nuclear test in Pokhran on 11th May 1998, former Prime Minister, Late Sh. Atal Bihari Vajpayee declared India a full nuclear Country. 11th May is observed as National Technology Day is observed on 11th May every year to celebrate the achievements of scientists, researchers, engineers, and all others involved in science and technology.

TDB, a statutory body of the DST, Government of India, by the virtue of its mandate, honours technological innovations that have helped in the national growth under the aegis of National Awards from the year 1999.

CREDITS: *India Science Wire*

Compiled by:

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▶ WELL BEING
The visible effects of Niacinamide

■ Sunayana Raju

Just like how mitochondria are the powerhouse of the cell likewise niacinamide is the power ingredient of the skincare world. Niacinamide is a water-soluble vitamin i.e., vitamin B3. Our body doesn't produce niacinamide naturally but it can make it with the help of niacin supplements, tryptophan in the body can also be converted into niacinamide.

Niacinamide did show some visible effects on the skin when applied topically. The list of its benefits keeps flowing and one can reap its benefits over time with proper usage.

Firstly it acts as a lipid barrier. Niacinamide helps produce ceramides which contribute to 50% of skin lipids that forms skin barrier naturally. These ceramides prevent permeability by forming a barrier preventing trans-epidermal water loss in case of dry skin and retaining moisture.

Niacinamide also acts as an anti-inflammatory agent. Inflammation could be intrinsic or extrinsic. It helps reduce inflammation, redness, itchiness, acne, and scars. Also minimises open pores that may be due to not enough hydration of skin, early stage of ageing, and loss of moisture. It also has an immunosuppressive effect on the UV rays the of sun that may cause skin degeneration and photoaging and hyperpigmentation that may be due to overproduction of melanin. As it is known when skin is exposed to UV rays the skin tries to protect itself by producing melanin, it's a protein that brings out the colour of the skin. When it is produced more than required it leaves pigmented marks or patches on the skin which is nothing but hyperpigmentation.

> **Niacinamide not only just acts on the skin condition but helps improve overall skin texture by enhancing the cellular function of the skin.**

> **Retinol is highly potent and these side effects start to fade out after discontinuing its usage. But in combination with niacinamide, it complements each other.**

Niacinamide is a holy grail for acne-prone skin. It helps in regulating the sebum production which contributes to breakouts and acne. Propionibacterium acnes is the bacteria responsible for the formation of acne. Niacinamide reduces the action of this bacteria eventually helping heal acne.

Niacinamide not only just acts on the skin condition but helps improve overall skin texture by enhancing the cellular function of the skin.

Niacinamide is one such ingredient which acts on all skin conditions from hydration to treating skin conditions like eczema. Incorporating niacinamide in skincare is the right choice with changing lifestyles and unpredictable environments and climate changes.

But there's a certain concentration that has to be applied on to the skin. 2-5% is the effective range for any topical niacinamide product. Its easily absorbed into the skin so applying low concentration initially to check its compatibility with the skin is highly suggestible. Even a few drops of the product are more than enough for its absorption into the skin.

Niacinamide in combination with other skincare ingredients is also recommended to reap the benefits of the product.

Retinol is best known for its anti-ageing property, reduces fine lines and wrinkles and signs of early ageing and also helps in the production of collagen. But it all comes up with the cost of skin dryness, irritation due to dryness and irritation can lead to redness and even hyperpigmentation. Retinol is highly potent and these side effects start to fade out after discontinuing its usage. But in combination with niacinamide, it complements each other. Niacinamide provides strength to the skin along with required hydration and anti-inflammatory effect also helps retinol work on the skin without irritating the skin.

Next is hyaluronic acid is the hydrating agent produced by our own body. Fine lines and wrinkles also appear due to dehydration and loss of moisture. Hyaluronic acid draws water and can hold up to 1000 times its weight. But with age, the body produces less hyaluronic acid so with the topical application the need can be fulfilled. It helps in cell turnover which is nothing but shedding out dead cells

and replacing them with new young cells. Both niacinamide and hyaluronic acids are water-based ingredients and are the power combo hydration ingredients. They quench the need for hydration of the skin in their way. Niacinamide strengthens the skin barrier preventing moisture loss and hyaluronic acid draws water and provides more hydration and plumped up skin with reduced lines and wrinkles.

Be it any product or an ingredient nothing can work wonders overnight. Human skin is the most delicate and sensitive part and takes time to get accustomed to any sort of extrinsic or intrinsic changes. So the same way niacinamide is effective yet takes time to show visible effects and always it is safe to use lower concentrations at the beginning for understanding skin compatibility and eventually changing according to the skin's needs.

Sunayana Raju is presently working as research Associate for Hetero Labs limited Hyderabad in formulation R&D injectables department (Non Onco).
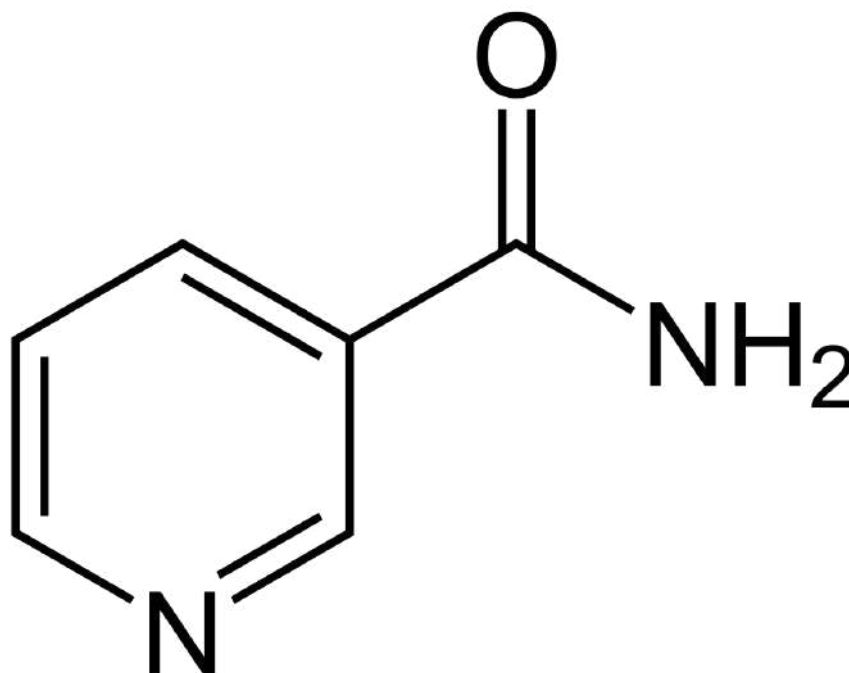
Essential Eye Care Pro Tips

■ **Dr. Swati Dave**

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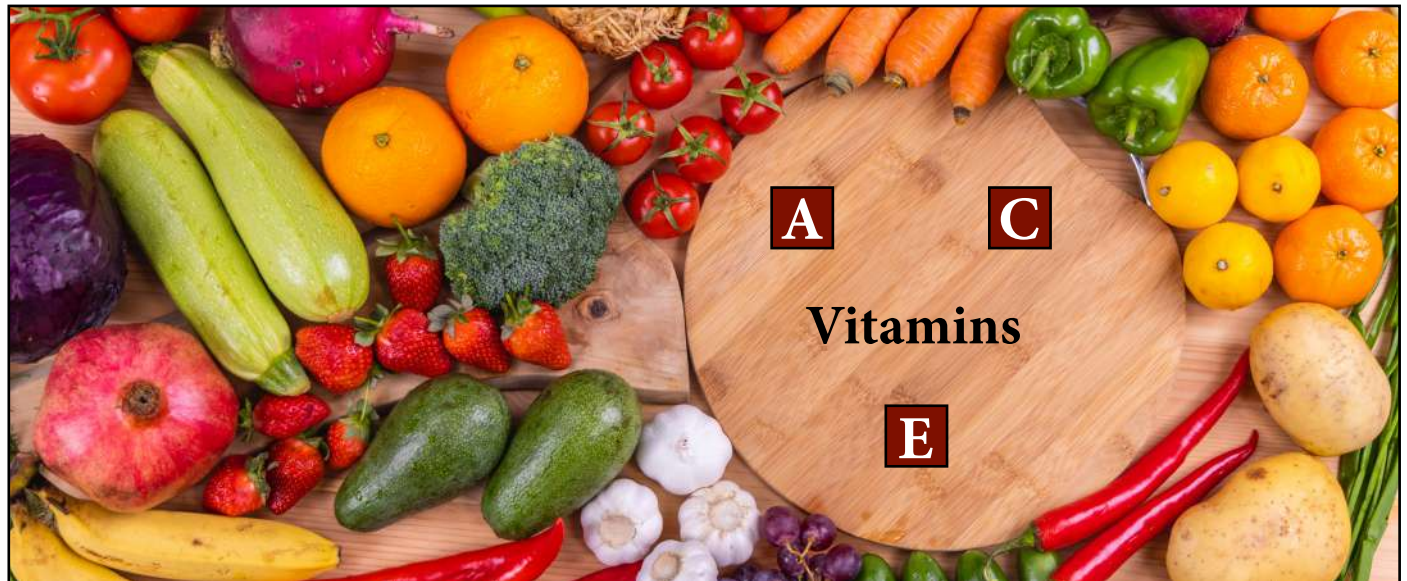
"Work From Home" has been a serious concern around the world amid deadly pandemic. WFH actually means: being in front of a screen: computer or tablet or smartphone, at all times on a daily basis. This extended digital device usage in blue lights at close distance, is leading our generation to digital eye strain or screen vision syndrome, a group of eye and vision related problems: eyestrain, blurry vision, trouble focusing at a distance, dry eyes and even headaches. Be vigilant about eye-related issues, such as dry eyes, cataracts, macular degeneration. Take care of your eyes everyday to maintain good eye health.

Our eyes have a higher metabolic rate resulting in quicker free radical formation, which means cells in the eye have a hyperbolic need for protecting antioxidant nutrients like vitamin A, C and E. Oxidative damage caused by vulnerability to environmental pollution, smoke, harmful rays and increased screen time can slowly take a toll on the eye cells and may affect eyesight. But these antioxidants work to halt this damage by neutralizing free radicals. Tears are water-based, but they also contain a mucus and oil component, so a lack of essential fatty acids like DHA and EPA may lend to dry eye symptoms.

Consult a dietitian nutritionist to eat-right and protect your eye-sight. A nutritious diet full of healthy fats, antioxidants (function as a natural sunblock) and anti-inflammatories may help keep eyes healthy. The specific nutrients our eyes need include the following:

Vitamin A is required to maintain functioning of the cornea and is part of the pigment rhodopsin, which enables light to be converted into electrical signals that get interpreted as vision. Not only vit-A, other eye nutrients like vit-C, vit-E, zinc, selenium, and omega-3s, are worth adding to our daily meals for eye health.

Beta carotene is an antioxidant that converts into vitamin A and is the deep yellow/orange pigment in color-rich vegetables like carrots, papaya, sweet potatoes and pumpkins. Vit-A nourishes the cornea and retina to work properly. Eating yellow/orange pigment in colored vegetables has become synonymous with having good eyesight and healthy eyes. They contain lycopene, a carotenoid that appears to slow cataract formation.

Vit-A deficiency is the leading cause of preventable blindness in children worldwide.

Vitamin C produces collagen, a structural protein to our eyes. It helps prevent or delay age-related eye damage by repairing and growing new tissue cells. Studies suggest vitamin C might help prevent cataracts (clouding of eye lens) and the progression of age-related macular degeneration (AMD). Good sources of vitamin C include raw: amla, bell peppers, oranges, and lemons. Collectively, sweet potatoes, pumpkins, carrots, mangoes, papaya, apricots, and oranges are rich in vitamins A, C, and E.

Zinc and **copper** fights free radicals and are vital to retinal health as they delay the AMD and eyesight loss.

Zeaxanthin, lutein and vit-C are antioxidants that protect the macula and can lower risks of developing AMD, cataracts, or other eye damage. Dark, leafy greens (spinach, and other dark greens) are top sources of lutein and zeaxanthin that absorb a substantial amount of blue light rays, preventing them from entering the interior eye to keep light-induced free

> **Our eyes have a higher metabolic rate resulting in quicker free radical formation, which means cells in the eye have a hyperbolic need for protecting antioxidant nutrients like vitamin A, C and E.**

> **The eyes are very sensitive to the hot air during summer. Eye care becomes quintessential to our overall well-being as the temperatures rise.**

Vitamin E is responsible for protecting the fatty acids in retina from harmful oxidation. Omega-3 fatty acids are the healthy fats essential for retinal health and for tear function. They help reduce risks of developing eye disease. Eating oily fish like tuna, sardines, salmon, trout and mackerel, may provide some relief from dry eye syndrome caused by inadequate tear production and a lack of tear film over the eyes. Incorporating more vit-E rich foods like eggs, almonds, sunflower seeds, hazelnuts, and peanut butter are all important for eye health. Other good sources of vit-E include nuts and seeds: sunflower, chia, or flax seeds, peanuts, walnuts, cashews, and other nuts.

In addition to eating well, when it comes to eye health, one should:

• Avoid rubbing eyes.
• Use protective eyewear.
• Never look directly at the sun.
• Limit sun exposure and wear sunglasses blocking 99% to 100% of UVA and UVB rays, when you're outdoors.
• Splash eyes with cold water 2-4 times a day.
• Cut overall screen time and wear blue light-filtering glasses.
• Have your eyes examined regularly, even if you haven't noticed problems.

• Follow proper contact-lens care instructions, if any.

EYE EXERCISES TO IMPROVE VISION HEALTH

These eye exercises may help to relax eye fatigue and keep eyes healthy from becoming strained or irritated. Set up your workplace cautiously. Placement of computer monitor should be within 20"-24" of your eyes. Keep the computer screen slightly below your eyes level. Set lighting to minimize glare from windows and lights on the screen. Blink frequently to protect your eyes from tiredness.

The 20-20-20 rule: Practice to look away from digital screen every 20 minutes. Look at something 20 feet away for 20 seconds, to rest your eyes. This prevents eye fatigue due to blue lights.

Blinking breaks: When glued to TV/Laptop screen, generally we forget to blink. This can cause our eyes to become dry or irritated. Set reminders to take tiny blinking breaks to refresh your eyes.

Palms for relaxation: Place your palms over your closed eyes, without putting any pressure, until it's completely black, for about 30 seconds. It also helps with eye fatigue and eye relaxation.

Figure eight: Train yourself to draw imaginary a big number eight on the wall or in the air - 10 feet away for a few times. Roll your eyes: The eye-rolling exercises means to look right and left without moving your head. Followed by looking up and down, without moving your head.

The eyes are very sensitive to the hot air during summer. Eye care becomes quintessential to our overall well-being as the temperatures rise. This scorching heat is extremely harmful to the eyes. Because of the high levels of pollutants and irritants in the air, our eyes may have allergic reactions. Redness, itching, burning sensation, watery eyes, and gritty eyes are the well-known signs of eye suffering. While these issues are usually temporary, they can be highly uncomfortable.

Focus on eating fabulous foods to boost eye health is one of the most important things you can do for your eye health. Sunny days call for polarized sunglasses and head covers, protecting the eye area from damage from ultraviolet light.

Dr. Swati Dave is a dietician and currently associated with ESIC Model Hospital in Gujarat. Her research interest lies in Clinical nutrition,Community nutrition and Public health nutrition.

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How To Deal With Postpartum Stress - A Mother's Perspective!

■ **Riccha Arora**

Welcoming your little one brings along lots of surprises and challenges. Every new mother who has just stepped into the motherhood journey will go through the postpartum stress. A simple meaning of postpartum is "the phase of mood swings after the baby's birth" or its after-delivery stress that can last up to 2 weeks or until your body comes back to a pre-pregnancy state. Now being a mother of 2 yrs old I am sharing my experience of going through the postpartum phase. The birth of a baby triggers a sudden feeling of excitement along with a puzzled mind about stepping into motherhood. A body goes through various changes during pregnancy time until the baby's birth. Changes I refer to are- mood swings, crying spells (crying about every small thing), sleep disorders, body aches and many other emotional and physical changes. You can also say it is a learning phase for new parents. A mother's world functions around the baby with whole new challenges lined up to face.

Becoming a parent is a joyous thing that is truly incomparable. However, for new mothers, this phase is all about adjusting to their everyday routine. Because a baby needs a lot of care and attention that leads to sleepless nights for new mothers. It is frustrating and tiresome but eventually, new parents become habitual of it. Although it's important to take care of your baby, simultaneously a mother has to take care of herself as well.

> **Postpartum stress or baby blues is the sadness that a mother faces after the delivery. It's a common thing experienced by every mother and it doesn't need medical treatment unless it becomes severe and lasts long.**

Postpartum stress or baby blues is the sadness that a mother faces after the delivery. It's a common thing experienced by every mother and it doesn't need medical treatment unless it becomes severe and lasts long. If you have a question in mind as to how to get to know whether you have baby blues symptoms? Here are 9 common signs of postpartum stress:

• Having trouble eating habits
• Sleeping disorder
• Excessive worry
• Lack of concentration
• Irritability
• Sadness and hopeless
• Losing interest
• Want to be alone all the time
• Feel cranky and anxious

This phase can be overcome by taking small steps toward your health. I am sharing with you 6 secrets to manage postpartum stress or baby blues:

1) Meditation: An Invaluable gift passed down to generations. It's a healthier way to stay fit and happy. Initially start your routine with 10 to 15 minutes of meditation once the routine is set try introducing other exercises as well. You can also opt for walking or yoga. I have introduced meditation to my daily routine during the 6th month of pregnancy and continuing. It's a proven stress-buster in every way.

2) Keep a check on your eating habits: Becoming a parent is not an easy task. Your little one needs your timely care and attention, however, do keep a check on your health as well. Choose your food wisely with the right amount of nutrients. Some of the must-included foods in your diet have to be fruits, green vegetables, cereals, eggs etc. Your eating habits directly affect your baby, especially for breastfeeding moms.

3) Inculcate a hobby: Introducing a hobby has always been a stress reliever. Be it reading, painting or anything that makes you feel enjoyable. Take out some time from your busy routine to flourish your passion.

4) Do not compromise your sleep time: Do keep a check on your rest time. A new mother requires at least 9 hours of sleep to restore her energy and cope with the postpartum stress. Although your baby will take time to adjust to the daily routine and for the first few months, you will face sleepless nights. Here is when you can take the help of your partner. Parenthood is a shared duty and balancing the situation together will certainly help new mothers to recover quickly.

5) Look up to experienced mothers: It is true that parenthood is a 24X7 job, however taking some time out and interacting with other moms can do wonders for your health. Sharing your fears and taking their experiences can be a game-changer to your health.

6) Ask for support: Taking care of a baby is not at all one person's job. Look up to your family, friends and relatives to ask for support in doing some household work or in handling the baby's daily activities. Having a positive social circle around you can help you in coping with life difficulties.

Follow these 6 simple tips to overcome the problem. Postpartum stress is normal and common among new moms. With proper care, support and engaging yourself in a positive environment postpartum stress and anxiety can be treated within time.

> **Becoming a parent is not an easy task. Your little one needs your timely care and attention, however, do keep a check on your health as well.**

Riccha Arora is a homemaker and a mother of two year old. She has had a passion for writing from a very tender age and also writes in blogs on parenthood & travel.

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Towards successful medical device: A Developers Perspective

■ Dr. Jaspal Singh

Modern healthcare is highly dependent on use of medical devices. These are increasingly becoming essential for delivery of quality healthcare. Unfortunately, over 80% of our medical devices and systems are imported. It is widely believed that the Indian medical devices industry has an opportunity to leapfrog. More so, in the wake of Govt. recent imperatives and initiatives for ' "swadeshi' technologies. No wonder, medical device development is an important part of the initiatives of several Govt. funding agencies including DST, BIRAC, MeitY, etc. However, the sponsored projects often end up as research articles for a journal and further development is quite often lacking. It is important to understand that not only the technology and the product scenario are dynamic but also the prototype-to-product journey is a challenging task. As a first step, understanding the market and its dynamics is very important. Some of the key features of the domain include :

(1) Research in this area needs multidisciplinary commitment

As medical devices are meant to interface human bodies and need advanced electronics technologies so excellence is desirable in multiple domains. Knowledge and skills in electronics / IT, Biomedical engineering as well as detailed understanding of human anatomy/ physiology is essential for working in this area. Additionally mechanical / physical design / ergonomics and market knowledge is also very important. This can be achieved by proper collaborative approach only. It is important to understand that the medical professional has a key role to play in the whole process and most often they are unable to spare sufficient time.

(2) Domination of imported products

The medical device market is dominated by imported products, which comprise around 80% of total sales. The domestic companies are largely involved in manufacturing low-end products for local and international market. Lately, many multinational companies have established local presence by acquiring established domestic companies or starting a new business. So, you are in a way competing with international products.

> **A large number of projects and technologies end up as proof of concept or set of research publications. Testing at concept stage or prototype is difficult unless a suitable medical professional / department is involved in the process.**

(3) Lack of successful indigenous medical products: The irony

Research and development in the domain of medical devices is very challenging. While reaching proof of concept level may be a bit easy and interesting; but taking the product to final technology readiness levels (industry grade / marketable products) is rather difficult and tedious. To start with, as it is easy for researchers to relate with the human body, the subject is highly appealing. With some study and skills, conception and proof of concept also becomes feasible. However, the real problems start after this. A large number of projects and technologies end up as proof of concept or set of research publications. Testing at concept stage or prototype is difficult unless a suitable medical professional / department is involved in the process. Often public healthcare institutions are highly overburdened and so, clinical trials become very difficult. Further, in the absence of information on functional testing, performance evaluation and lack of facilities to undertake such activities, it becomes very difficult to demonstrate / evaluate the worth of the developed technology.

(4) Medical device marketing is a tough nut to crack.

Next, assuming a good product is developed, the medical device market is very dynamic and multi-dimensional. The medical device industry in India is presently valued at USD 5.2 Billion and is growing at 15.8% CAGR. Currently, India is counted among the top 20 global medical devices market and is the 4th largest medical devices market in Asia after Japan, China and South Korea and is poised to grow to USD 50 billion by 2025 as per some industry estimates. And so, a host of international companies and imported medical products dominate the markets. Proper aesthetics, performance and certifications play a very important role. Also, every practitioner wishes to buy only the best product (and not just any product) so the quality criteria is very important and the competition is fierce. So, there is a demand for people with a marketing background.

Thus, in spite of a very good number of medical device enthusiasts an equivalent translation to successful products is limited. So, there is a need for engineers and researchers with practical (hands on work) and medical device market exposures. The commitment and the 'open-mind' approach of the involved medical practitioners is essential for successful translation into products.

To summarise, following considerations are suggested to developer/ researcher to reach a successful translation to medical device product:

• **Take the collaborative approach:**

Collaboration of a research and a translation organisation is a must. Preferably a medical department should also be associated from the beginning. Involvement of industry from beginning may be counterproductive (as it limits the scope to one or few establishments only. instead open calls inviting participation towards the end can be more effective).

• **Involve market information at an early stage:**

It may be preferable to involve a suitable person (preferably an expert with MBA and M.Tech in related areas) at the time of evaluation and review stages. He may be able to give some suggestions.

• **Consider challenges of prototype-to-product journey:**

The prototype-to-product journey is probably the most critical and one of the most difficult. So, the easiest answer to this is just do not try to do everything by yourself. Involve professional / experienced groups for the complexities.
• Of course, last but not the least, do protect your IPR appropriately.

Happy journey to successful products.

> **In spite of a very good number of medical device enthusiasts an equivalent translation to successful products is limited.**

Dr. Jaspal Singh is head of electronics group at CDAC, Mohali and has several projects to his credit.

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Public wants both Ayurveda and modern medicine: How Technology can facilitate this?

■ **Dr. Sanjiv Kumar, Dr. Neeta Kumar & Dr. Debleena Bhattacharya**

The controversy

There have often been Ayurveda and modern systems of medicine. Recently this debate kicked off after controversial remarks of Baba Ramdev ridiculing modern medicine as 'stupid' and questioning its ineffectiveness as many doctors lost their lives to it. These remarks during the pandemic were dangerous as it undermined the faith of the public in the proven scientific interventions which saved many lives during unprecedented times of misery and death. Modern medicine's contribution to improve health and longevity cannot be denied. An average Indian's life is around 70 years today compared to around 32 years at the time of independence.

The substantial decline in infant, child and maternal mortality, eradication of smallpox, yaws and polio and elimination of neonatal and maternal tetanus to name a few achievements of modern medicine. The Health Ministry promptly expressed its disapproval over Ramdev's remarks, issuing a letter to the Yoga Guru to retract his statements. Ramdev complied with it and withdrew his statement. But he continues to ask questions on effectiveness of allopathy in treating various diseases in his Yoga training sessions and other platforms. The current debate tends to further polarise – either you are with Ayurveda or allopathy—there is no room for the majority of people who think that both methods are beneficial to the public. In India, the public has a deep rooted, millennia-old belief in Ayurveda.

It is reflected in sociocultural traditional health practices seen in almost every household in India. Though modern medicine has saved millions of lives, it can certainly be further enriched with evidence-based Ayurvedic philosophy, practices, and treatments. It is a marvelous achievement of modern science to have developed effective vaccines to prevent COVID-19.

India's western-influenced education system, inherited from Lord Macauley, labels all traditional wisdom including Ayurveda as unscientific and inferior. This mindset needs to change to scientifically evaluate practices and treatment in Ayurveda and other traditional systems of medicine and accept these to maximise the benefit to the common man.

> The current debate tends to further polarise – either you are with Ayurveda or allopathy–there is no room for the majority of people who think that both methods are beneficial to the public.

Strengthening evidence-based practice of Ayurveda and Allopathy

Doctors who follow science believe that modern medical practice is evidence-based and continuously evolving as we learn from research and other sources including traditional systems. Ayurveda (Charak Samhita) also has a system of verification and is different from modern medicine and it looks for proof (pramana) which includes Aaprtopdesha (expert opinion), pratyaksham (observation), anumaan (inference) and yukti (reason and experimentation). In modern medicine the power of evidence from these 'pramana' in considered low as compared to evidence that emerges from randomized controlled double-blind trials, meta-analysis, and systematic reviews. The Ayurvedic system of pramana (proof) can be strengthened with modern medicine's approach of strengthening evidence using these recent methods to improve its credibility, acceptance and trust.

People want both Ayurveda and

Allopathy to treat their health problems:

The Ayurvedic philosophy and beliefs are widely accepted not only in India but are gaining more acceptance even in the western world. A study across 18 states in India (NHSRC, 2010) showed that 73% of people used home remedies, mostly influenced by Ayurveda, for treatment of their most recent sickness episode. For common ailments such as cough, cold, diarrhoea, minor cuts, burns, insect bites etc, 50-98% used home remedies, mostly Ayurvedic practices. The reasons ascribed by the people for this include; previous experience in family and community as it worked; strong belief that it heals; easy to use; inexpensive; easy availability etc. The public has deep-rooted faith in Ayurveda. They often use these together. Local health traditions and customs, influenced by Ayurveda for thousands of years, have become part of home remedies and become an important way of life in both health and sickness.

Both Ayurveda and Allopathy may not be perfect systems by themselves but together offer a better chance to prevent

and alleviate suffering and misery of people from diseases. To build credibility, we need to avoid premature claims of effectiveness of various treatments. These premature claims were seen both by Ayurveda and modern medicine during COVID pandemic. The claims of effectiveness of interventions such as hydroxychloroquine in prevention and plasma therapy in treatment of COVID were dropped when evidence suggested that these do not work. Ayurvedic practitioners at times are adamant that ayurvedic treatments and practices are never harmful. There is a need to be open, honest and transparent to build credibility of a system. NHSRC (2010) study also found high utilization of AYUSH services in states such as Tamil Nadu and Kerala refuting the argument that people resort to them because of inaccessible or unaffordable modern health services. The study found that 70% of the allopathic doctors in the government system felt that AYUSH systems are not redundant and can be strengthened. They emphasized the need for research and documentation in AYUSH.
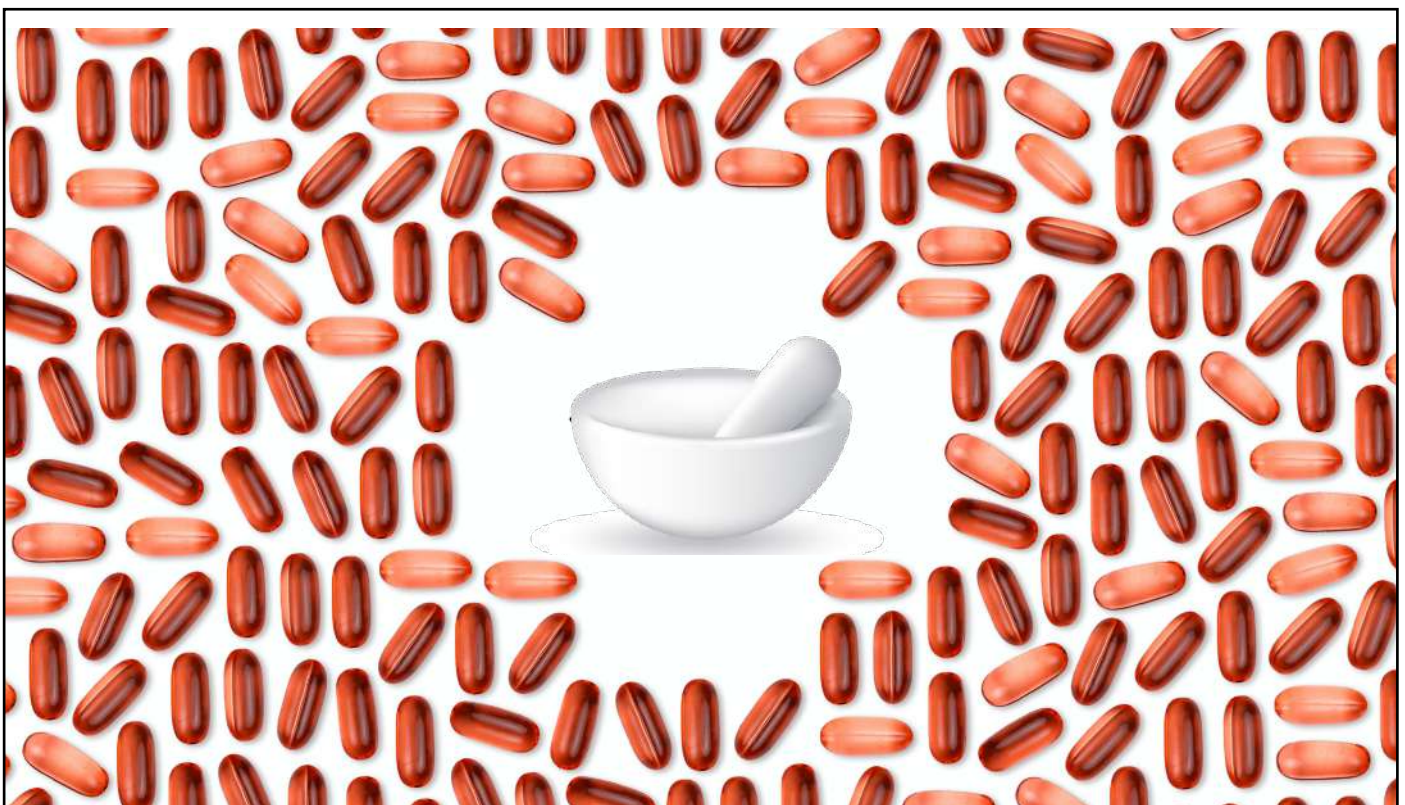
Need for a better understanding of Ayurveda and Allopathy

Ayurveda is a comprehensive system of medicine that evolved in India which uses a range of treatments, including panchakarma ('five actions'), yoga, massage, acupuncture, and herbal medicine, to encourage health and wellbeing. Ayurveda makes use of natural herbs, extracts, plants, and some metals and claims that 'all Ayurvedic remedies are close to nature and do no harm'. Though modern medicine practitioners have seen serious side effects of some ayurvedic medicines such as those treatments containing lead and other heavy metals. Contrary to the common belief especially among Ayurveda practitioners, Allopathy not only works to treat symptoms and illness but also has effective interventions, such as vaccines, to prevent diseases. Pharmaceutical drugs play a major role in allopathy. The modern medicine, as it is practiced today, is very different from Allopathy which had its origins in Greece about 2,400 years ago, when it included purgatives, catharsis, bloodletting etc. Most of these practices have been discarded, as modern medicine looks for evidence on effectiveness of interventions based on research. There is always a profound discussion on proving which intervention is better and a biased conclusion may be counterproductive and undermine public trust. Pharmaceutical drugs play a major role in allopathy. Drugs are developed either to alleviate the symptoms of the diseases directly or alter the way the body responds to it. Drugs do generally cure diseases but sometimes their side effects affect the patient adversely.

Category	Ayurveda	Allopathy
Body	Life energy protects health Spirit, Mind, Body connection	Biochemicals, physiological and anatomical basis
Origin of Disease	Tridosha (Kapha, Vata & Pitta) theory. Disturbances (Vikar) in their balance	Agent-host-environment are three major elements where diseases originate.
Life Style	Food, yoga, meditation	Biochemicals, physiological and anatomical aberrations which need to be corrected.
Medicines	From plants and herbs	Pathology & Microbiological basis From chemicals, synthetic compounds, medical devices and surgical interventions
Approach	Addresses the root cause as understood in Ayurveda	Achieves cure and prevention through antibiotics, address physiological processes and vaccines.
Treatment	Facilitates natural healing process which may take more time	Quicker relief in acute and life-threatening ailments and control of disease and symptoms
Side Effects	Claim no side effects. However, side effects of preparations such as heavy metals used are well known when these patients go for treatment in modern medicine	The side effects of each medicine and intervention and their frequency are documented. Hence side effects are well known.
Evidence for medicines and treatments	Anecdotal evidence. The process may lead to inefficiency and irreversible side effects which are not acknowledged	Each intervention is tested during the elaborate trials in animals and humans and even when in use in the market. Only when benefits outweigh side effects are these medicines approved.
Cost	Inexpensive	Expensive and the cost of treatment is going up over time.
Malpractices	Less common	Pharmaceutical companies and corporate hospitals often 'blamed' for putting commercial interest above patient's interest

As India is still grappling with the resurgent coronavirus outbreak and persistent increase in non-communicable diseases, both the Ayurveda and Allopathy practitioners need to realise that both treatments coexist, without the need to discredit the other. Ayurveda and Allopathy have unique characteristics that distinguish one from the other. It, however, does not mean that there should be a debate over the supremacy of one treatment over the other. Each of them has proven beneficial in treating patients, and therefore they both deserve to serve humanity in their own way. The debate, if at all, should be on how best to integrate the two systems to benefit the public.

Ayurvedic and Allopathy as complementary systems

Modern medicine is the perfect tool in cases of serious illnesses. Ayurveda looks at keeping people healthy and correcting the imbalance which is the cause of diseases. For non-communicable diseases Ayurveda with Yoga and meditation can effectively improve life style and Allopathic provide medications such as metformin to a weary pancreas, in diabetes, to release more insulin or give insulin and for high blood pressure give medicines which bring it down and prevent damage it causes to heart, brain, kidneys and eyes. Thus complementing each other to improve outcome and improve quality of life.

Under the National Health Mission, the government has collaborated with AYUSH and modern medicine practitioners in the government health facilities. The government also encourages cross referral of cases from Ayurveda and other AYUSH systems to modern medicine and vice versa to benefit the public.

There is collaborative research being done in institutions such as AIIMS Delhi and new AIIMS. Kshar Sutra, an Ayurvedic treatment for piles emerged as an effective and easy treatment that could be tried before resorting to surgery. Many new AIIMS have herbal gardens in the campus to grow herbal ayurvedic medicines and promote research and complementary approaches to treat patients. Ayurveda promotion should be based on science and not politics. Political will is needed but too much politicization becomes counterproductive.

Technology to promote Ayurveda and modern medicine for public benefit

The government plans to roll out a 'One Nation, One Health System' policy by 2030, to integrate modern and traditional systems of medicine like allopathy, homoeopathy and Ayurveda in medical practice, education and research. Technology can be an effective vehicle for this integration for the population to get the maximum benefits from various systems of medicine. The government has taken many initiatives to bring technology to improve healthcare in both AYUSH and the Ministry of Health and Family Welfare. However, there are hardly any initiatives to use technology to integrate various systems of medicine. The technology can help in accelerating the integration in various systems of medicine and its smooth operationalization to move towards 'One Nation, One Health System' policy. Given below are some suggestions:

(i) **Health and Wellbeing:** Yoga and meditation have proven their utility to improve health and wellbeing of the people. The current government has helped the UN to have International Yoga Day on 21st June to promote yoga across the world. Yoga can be integrated with other initiatives of modern medicine to address current epidemic of life style related noncommunicable diseases such as high blood pressure, diabetes, cancer, cerebrovascular diseases such as stroke, mental health problems. Improved health and wellbeing will also reduce probability of infectious diseases and mortality.

(ii) **Integrated AI based treatment protocols:** AI is helping modern medicine practitioners in many ways. The evidence-based AYUSH interventions for common health conditions can be integrated into these. The AI experts need to work with joint medical teams drawn from the relevant systems of medicine.

(iii) **Online Orientation of the current medical and Ayurveda practitioners and medical students of all systems of medicine to** understand basics of other systems of medicine in prevention and treatment of common conditions during their basic and speciality trainings. This will help them understand the philosophy and approaches of other systems of medicine in the best interest of the patient.

(iv) **Integrate the current technology initiatives** including technology incubators and Health Technology Assessment (HTA) to improve quality and access to health care are being run parallel in Ayurveda and modern medicine. There is a need to engage practitioners of other systems of medicine for better integration from the initial stages of application of technology in healthcare.

(v) **Digitization of all medicines** from all systems of medicine at one platform. It should include all medicines from drug trial stage to use that will bring transparency, standardization, drug control, quality control, decision support and continuity of care.

(vi) **Uniform standards of drug trial:** The drug trial registries of both AYUSH and MoHFW should be brought together and be available to the general public on one digital platform. This will build trust among practitioners and the general public that indigenous medicines are subject to the same standards.

> **AI is helping modern medicine practitioners in many ways. The evidence-based AYUSH interventions for common health conditions can be integrated into these.**

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(vii) Standardization and Quality Control of Ayurvedic drugs as per modern medicine standards. This will strengthen scientific validation of ayurvedic medicines and increase the trust of the public and practitioners of modern medicine.

(viii) Use modern scientific technological approaches in Ayurveda such as nanotechnology, molecular docking, molecular dynamics etc to strengthen the efficacy of Ayurvedic medicines

The current debate is unnecessary, short sighted, discriminatory, counterproductive and self-protective. It must change how the two systems can work together for the larger benefit of the society. Both Ayurvedic physicians and MBBS doctors take oaths (Charak Shapath and Hippocratic oath) to act in the best interest of the patients. The best interest of the patients can be served only if they use the best available treatment irrespective of the system it comes from. The general public will benefit more if the two systems work closely together. The debate should shift to how to bring the two systems together to accelerate improvement in health of the people. Technology is being used in a big way to improve quality and access to health in both traditional and modern medicine. Both the Ministry of AYUSH and Ministry of Health and Family Welfare are spearheading the use of technology. There is a strong need to use technology to integrate the various systems to maximize health benefits to the public and accelerate the government's policy of 'One Country, One System' by 2030.

> **Both Ayurvedic physicians and MBBS doctors take oaths (Charak Shapath and Hippocratic oath) to act in the best interest of the patients.**

Dr. Sanjiv Kumar is a public health physician with 45 years of experience across more than 30 countries in South Asia, Africa, Central Asia and Central eastern Europe. He was Dean and later Director, International Institute of Health Management Research. New Delhi. He was also Executive Director at National Health Systems Resource Centre, Ministry of Health and Family Welfare, India. He led development of many policy and strategic documents to improve health in India including Guidelines for treatment of conditions of public health significance and National Health Policy 2017 and was a member of the core group to prepare National Health Research Policy, 2021. He has contributed to 125 scientific literature, books and chapters and has also been conferred with many accolades including UNICEF awards for his professional contribution. Presently he is the Founder Chairperson and Managing Trustee, Three Domain Health Leadership Foundation and develops and conducts training in leadership.

Prof. Neeta Kumar did MD in Pathology from the AIIMS, New Delhi and worked in progressively responsible positions at national and international at AIIMS and MAMC. She was Visiting Professor at University Hospital of Geneva and Aga Khan University Hospital, Nairobi. She was a consultant to WHO HQ in many areas especially in cancer control. Currently she is working as Professor and Head, General Pathology, Jamia Millia Islamia, New Delhi. She has special interest in medical education and research. She is Course Co-director for the various training workshops for since 2013. She was also chairperson of the internal research review committee at Jamia. She is a prolific scientific writer and has published more than 150 scientific papers, contributed chapters in WHO publications.

Dr. Debleena Bhattacharya is presently associated with Marwadi University (MU), Rajkot, Gujarat. Prior to joining MU, she has worked as Project coordinator for BIRAC-SRISTI PMU, a joint venture of Govt. of India and NGO located in Gujarat. She received her doctoral degree from IIT (ISM) Dhanbad and her area of interest lies in wastewater treatment, environmental biotechnology, and molecular genomics. She has authored a book published under CRC Press, U.S.A and has contributed her work through various scientific papers & book chapters. She is the Associate Editor of InnoHEALTH magazine.

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Furthering the Medical Devices Sector in India

■ Arvind Kumar Prajapati

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The medical devices segment is diverse, creative, and dynamic sector that includes a wide range of products such as implants, surgical instruments, medical equipment, In-vitro diagnostic reagents, and consumables. It is an essential part of the healthcare system for diagnosis, treatment, and prevention of health issues. The Indian medical devices market is currently estimated to be $11 bn, with global market share of nearly 1.5% . India is Asia's 4th biggest market and ranks in top 20 global medical devices markets. It is reported that the Indian medical devices sector is at its nascent stage and import centric, around 80% of

medical devices are imported to meet the domestic requirements, majority of them come from the US, China, and Germany. Despite high import dependency, the Indian medical devices sector is expected to grow at 7 % CAGR during 2021 to 2025 and is projected to observe the rapid growth in the Asia Pacific market. The accelerated growth is anticipated due to concurrent reasons such as rising demand of devices because of global pandemic, rising prevalence of chronic diseases, and elderly population which is expected to grow by 41% in 2031 compared to 2021. To reduce the import dependency and satisfy the rising demand of medical devices,

a comprehensive, and carefully devised strategy is required, which shall assist in achieving the fundamental objectives such as accessibility, affordability, quality, in-house manufacturing and skilled manpower.

The various government initiatives

Although 100 percent FDI through automatic route in medical devices was allowed in 2014, tangible attention of policy makers and bureaucrats appeared only in the last two or three years during and post-pandemic.

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To strengthen the medical devices sector, the government provided the financial support of 25 crore to Andhra Pradesh MedTech Zone (AMTZ) for a common facility centre. Subsequently, to improve manufacturing in cancer/radiotherapy, imaging devices, renal and cardio-respiratory devices and implants sectors, the production linked incentives scheme for medical devices was initiated in 2020, with an amount of 3,420 crore. Further, the medical devices parks were envisaged by allocating 400 crores for developing the medical devices, research facilities and skilled manpower. By introduction of the medical devices rule 2017, which categories the medical devices in four classes, the quality and efficacy was inducted in this sector. Moreover, the national pharmaceutical pricing authority swung in action for price capping of knee implant, stents, oxygen concentrator and point of care devices (POC) to reduce the dealer's margin. To address the rising price of drugs, the government opened 8604 affordable outlets (Jan Aushadhi Kendras) which offer 1451 drugs and 240 types of surgical supplies. Another step towards Universal Health Coverage (UHC), The initiative of the Ayushman Bharat-Pradhan Mantri Jan Arogya Yojana (AB-PMJAY) was pioneered by providing the health insurance of ₹ 5 lakhs per family per year, which covers approximately 50 crore Indian poor and vulnerable families. The forenamed initiatives deserve the praise for notable work by the government, but there is still a necessity to advance medical devices sectors to achieve the vision medical devices sectors to achieve the vision of affordable and quality care to every stratum of the society.

Areas of improvement and suggestions

Despite various schemes initiated by the government, there is a necessity for a comprehensive and clear roadmap for accelerated and continuous growth in the sector. The urge for improvements in the sector is further stressed by the diversity in the medical devices product segment which demands the wide range of interventions in different areas as underscored below.

Medical devices regulation:

The single window online portal for efficient management of information associated with medical devices is essential. The online portal should allow ease in medical device registration, obtaining import and manufacturing licensing, clearance for clinical investigation to all the stakeholders like Co-WIN portal used for vaccination drive.

Research and Development (R & D) funding:

The allocation of dedicated funds to encourage joint research with industry, academic and start-ups is much entailed. The fund should be disbursed for building contemporary laboratories for various evaluations, implant and instruments testing, animal studies, equipment testing etc. for R & D activities. These well-equipped laboratories could lead to enhanced research-oriented collaboration, partnerships and innovation in the domestic medical devices sector.

Price regulation of medical devices:

The projected Indian annual per capita income in 2022 is ₹ 1,78,944 ($2,357.643) which translates ₹14,912 per month. The per month income for quality health services to common people is surely less, thus price regulation of medical devices and hospital charges could play an important role in offering affordable medical devices to all. However, careful understanding of medical devices and well devised strategy for price regulation will be required to maintain stability in the medical devices segment.

Healthcare Infrastructure:

The highly infectious COVID-19 virus has created panic in the healthcare community and its deleterious episodes are continuing. On other hand it has emphasised the need for infrastructure requirements. The various media reports stressed the shortage of beds in health care centres, which left patients unattended for a long time. This insinuated the need for a good physical foundation for health services and healthcare research for better management and treatment of diseases. Thus, the need for contemporary healthcare infrastructure is essential, which may also attract the domestic manufactures to invest in medical devices sectors.

Promoting the collaboration:

The idea of industrial cluster near to all academic Institutions, could provide the essential environment for industrial collaboration, The global giant in medical devices technology such as Medtronic, Stryker, GE Healthcare, Philips, and Medtronic shall be encircled in this type of collaboration, it can be easily done since most of them already have centres in India. The triple helix model, commonly used in western countries, shall be tried in this collaboration initiative, where government, industry and Institutes would interact for improvement in the domestic medical devices segment.

> **The medical devices parks were envisaged by allocating 400 crores for developing the medical devices, research facilities and skilled manpower.**

Patenting is the formal way to protect innovative ideas.

Innovation parks:

The promotion of the ecosystem that houses the network of institutions, start-ups, clinical setting, funding agencies is much needed. This type of ecosystem is called innovation parks; the medical devices parks should be initiated to provide the impetus to scale up the production, encourage the research to market translation and quality medical devices. These parks shall further have strong association with the Ministry of Human Resource Development to make necessary corrections in National Education Policy 2022, by designing proper course work to meet the domestic medical device industry requirements.

Creating centres of excellence:

The further boost in creating centres of excellence at reputed institutes would attract world class faculties to engage them in medical devices which are fit for India. These centres shall be further strengthened to drive the role in product development, validation, certification, promote the safety and efficacy and use of latest technology such as Internet of Things (IoT), Robotics, Telemedicine, Artificial Intelligence (AI) etc in the medical devices sector.

Trained Human Resource:

As pre survey from AMTZ the half of the workforce in the medical devices sector are unskilled, signaling the need for skill development programs in this sector. The National Institutes for medical devices like IITs, NITs and IISc could be envisaged. These institutes shall provide training, internship, and hands -on experience in medical devices. Further, association with private players shall be encouraged for research and training funding. The course curriculum in these Institutes shall be drafted such that it brings doctors, technicians, service engineering, scientists, and engineers together like Clinical Engineering, a joint initiative by three Institutions namely IIT Madras, SCTIMST and CMC Vellore to improve the skills in the domain.

IP (intellectual property):

Patenting is the formal way to protect innovative ideas. Intellectual property right offers various advantages such as, competitive advantages against the established competitors, prevents ideas from theft, and signals to investors about the new technology. Patenting in the Indian medical devices sector shall be encouraged for continuous and stable growth in the sector.

Custom Duty:

It is a long pending request from the Indian Medical devices industry to increase the custom duty on imported medical devices. The demand is to increase the custom duty from 0 to 7.5 % to 15% and reduce the GST from 18% to 12%. The call on the request shall be considered after proper evaluations, since on one side it will ease the entry of local medical device manufacturers in the market but on other side it will lead to deficiency of quality and innovative product in market.

Acceptance of personalized treatment:

Personalized care often called precision medicine is tailor-made treatment to patients based on their molecular profiling. It is an emerging and exciting treatment approach which envisages an important role in preventing and predicting diseases and educates patients to get the right treatment. There shall be a policy to promote such patient centric treatment initiatives within the country, which will contribute to the growth in the medical devices segment since personalized medicine has over-reliance on diagnostic devices.

The aforementioned suggestions are specific to build a strong foundation for the Indian medical devices sector. These are a few steps to reduce import dependency and realize the self-reliant India. If these areas are stressed for the next decade, India could become the global supplier in medical devices from the status of importer.

Arvind Kumar Prajapati is a Scientist/Engineer at Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST), Department of Science and Technology, Government of India, Trivandrum, Kerala. He has been closely working in design, development, testing and validation of Knee, Hip, and Spine implants and instruments.

> The various media reports stressed the shortage of beds in health care centres, which left patients unattended for a long time. This insinuated the need for a good physical foundation for health services and healthcare research for better management and treatment of diseases.

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Classification of Inter-Ictal Epileptic Seizure using Combined Machine Learning and Deep Learning Approach

■ **Prateek Pratyasha**
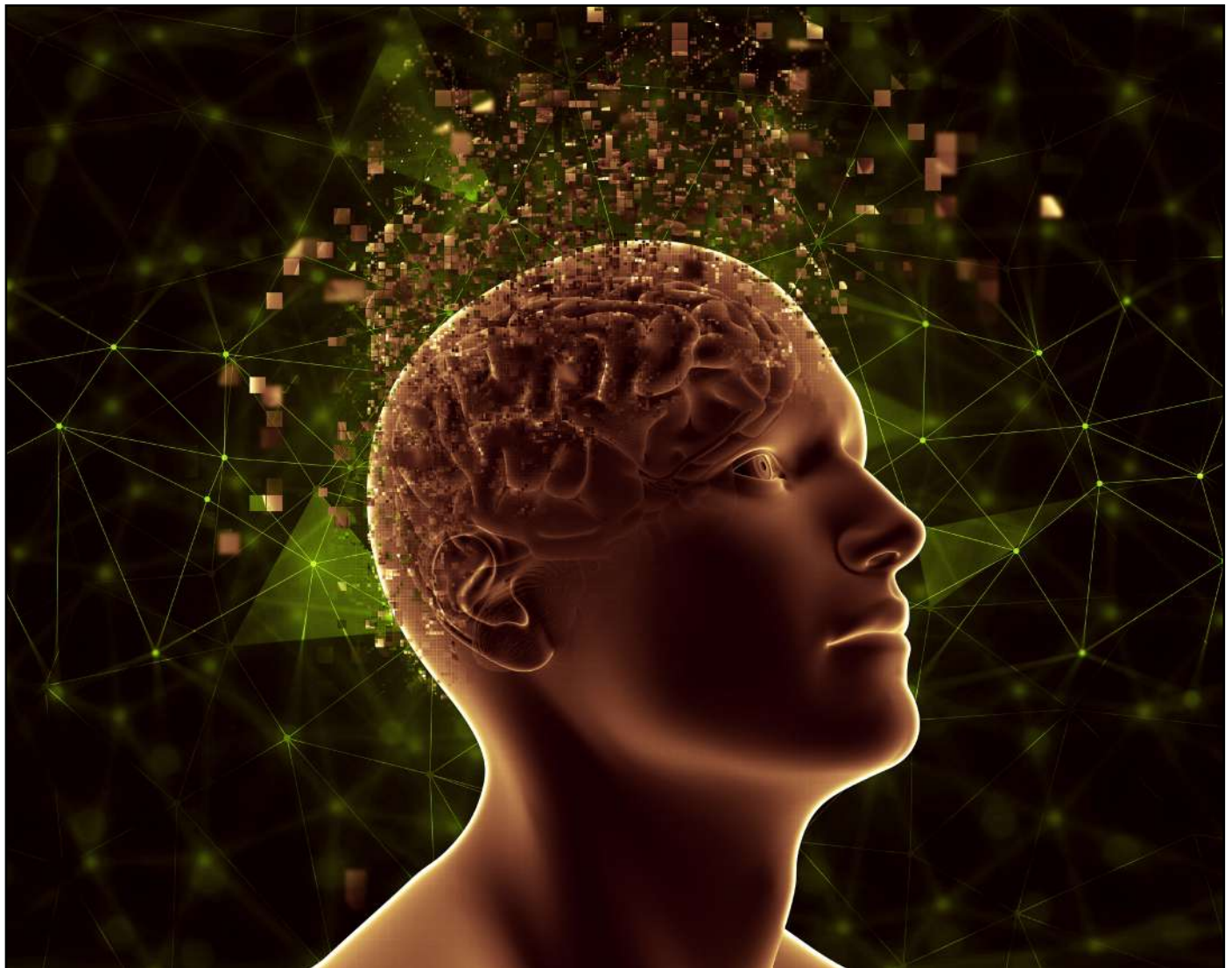
Prediction of Epileptic seizure is recently blooming as the most challenging task in order to amend the life of a patient. Specially, the inter-ictal state of Epilepsy needs more diagnostics attention for its unpredictable interrupted properties. In order to analyze the EEG recordings, various machine learning techniques have been implemented but many of them lack in bringing the brain network analysis into account which is the most vital way to predict, diagnose and detect the neural disorder with its level best accuracy. In this paper, EEG signals are collected from an open source and preprocessed by using Discrete Wavelet Transform where the features are extracted. In the next step, the features are transformed into a robust multi-dimensional array retaining its spatial properties. In the succeeding step, the array sequence is fed to a Deep Convolutional Neural Network to classify the disease using the training data.

Epilepsy is the most rarely recognizable neurological disorder characterized by an enduring predisposition to exaggerate recurrent seizures and that fatally affects the individual.

A Detailed Description on Epileptic Seizure

Epilepsy is the most rarely recognizable neurological disorder characterized by an enduring predisposition to exaggerate recurrent seizures and that fatally affects the individual. Any abnormal neural activity localized in the cerebral cortex is called epileptic seizure (ES). The seizure causes the normal brain network to evoke neurons in a self-sustained hyper-synchronized manner and ultimately affects cognitive function. According to a survey of World Health Organization (WHO), 70 million people worldwide are suffering from epilepsy trails, however recognized as most rarely detected brain dysfunction. The task of detecting or predicting ES is still a concerned research since the past three decades. Inter-ictal ES emerges from random spikes, slow yet sharp complex neuro waves which is different from clinically observed ES and mostly the symptoms are observed in children. However, the automated detection and prediction algorithms depending on electroencephalographic (EEG) measurements are characterized for the transition of signals from the inter-ictal to the ictal state by identifying the image patterns significantly. Therefore, the baseline inter-ictal properties are vital. However, many inherent assumptions are commonly implicated to monitor the EEG activity during this inter-ictal state which is relatively constant and interrupted during seizure occurrence.

To determine the type of seizure and brain areas involved, an Electroencephalogram (EEG) is performed. EEG has various unparalleled properties for its immense usages to study ES such as signals are recorded with high temporal resolution and low cost, and systems are capable of both long term and portable monitoring. Capitalizing on the specific properties of EEG, a number of EEG based approaches have been developed for the automatic prediction of epileptic activity. The analysis of EEG signals for the purpose of ES detection and prediction have been advanced with the help of the most efficient machine learning technique such as Brain Network analysis. Networks in a regular, lattice-like configuration are characterized by high clustering and a long average path length. In recent longitudinal studies, we are more concerned about graph-based brain network analysis, in which the nodes in the graph are represented by the electrodes while the links are defined by the measure of association between the nodes. Accordingly, we found increases in average clustering and path length and decreased weight dispersion indicating that normal brain maturation is characterized by a shift from random to more organized small-world functional networks. However, this analysis is receded for the reason that it required the entire graphical data to be processed simultaneously which is less effective for the graphs with billions of nodes and edges.

To address the above challenges, the present investigation has sought to develop a novel prediction strategy for seizure detection based on Neural Network (NN) analysis during inter-ictal state of seizure. We have considered the ES data, remove the random noises from the data by using Discrete Wavelet Transform (DWT) and then convert them into more robust multi-dimensional array tensors and obtain a sequence whose topology retains spatial information. Once all the frameworks of sequences are gathered, they are fed into D-CNN for classification. ES is predicted by inter- and intra- individual generalized properties.

Preprocessing of Data

The dataset being used in this paper are imported from CHB-MIT open source contains scalp EEG data of 23 patients recording 844 hours of seizure occurrence facing total 163 seizures.

Fig. 1
Data captured using 22 electrodes at sampling rate of 256 Hz.
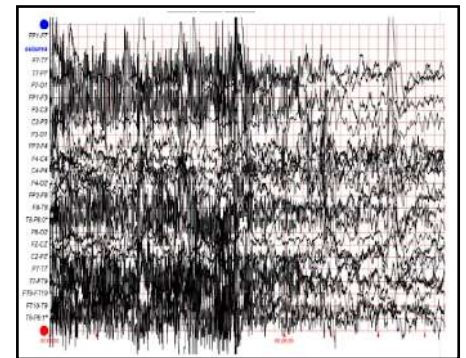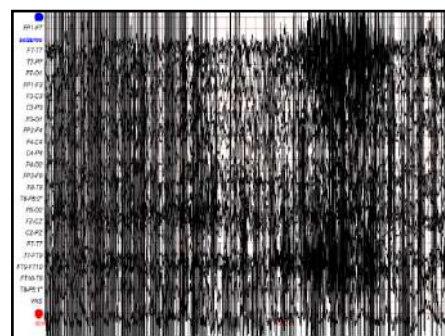
Fig. 2
Tree structure of DWT
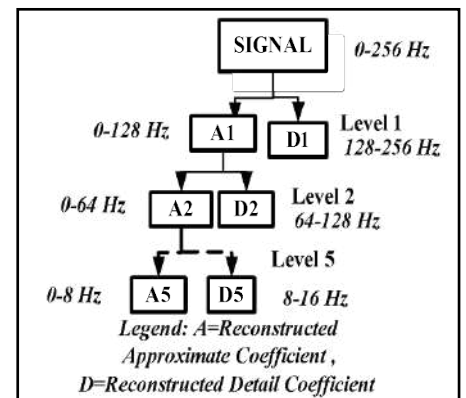
Fig. 3
Framework of the proposed system
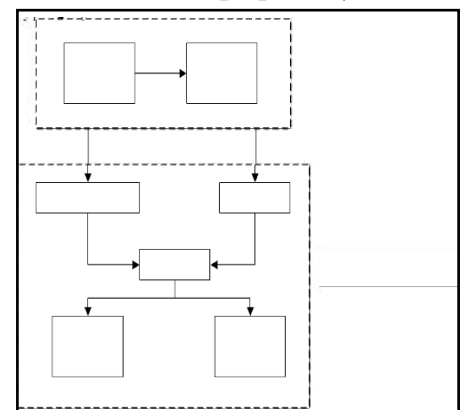
In Fig. 2 the tree structure of DWT is shown where the original image is decomposed in time domain using a high pass filter (HPF) and a low pass filter (LPF) sequentially. Later on, it is down sampled by 2 to calculate each level using the coefficient values.

This experiment follows two major steps; primarily data processing and followed by a classifier. In data processing, the original images obtained from patients are extracted using DWT. In the second step, the preprocessed data is fed to D-CNN for the prediction of epilepsy.

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> **In the future, predicting onset seizures can be further improved by reducing the training time and thereby, allowing doctors to diagnose the disease more quickly in an organized manner.**

The proposed technique

The architecture of D-CNN was predominantly developed in 80's. The technique is updated and refined periodically and becomes the most improved deep learning method during the 21st century. The latest version of D-CNN is unwrapped as compared to earlier known neural networks. The trending technique occupies a multi-layered architecture well compatible in the domain of digital image processing, computer interfaced medical imaging and medical image analysis. It commands significantly with high resolution spatial image approachable for prediction, classification and segmentation problems. The block of D-CNN has multiple Convolutional layers, pooling layers and one fully connected layer as shown in figure 4 (a) and (b) depicting two different layered CNN models such as 2-DCNN and 4-DCNN respectively.

Fig. 4(b)
2-DCNN Model
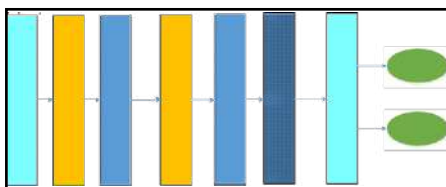
Fig. 4(b)
4-DCNN Model
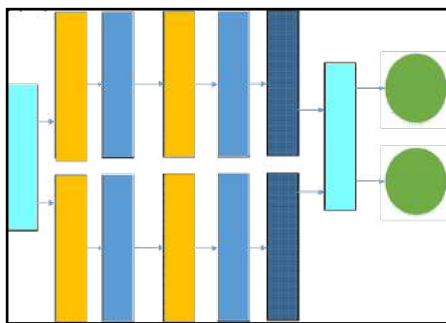
Architecture of 2-DCNN model is the combination of two similar types of DCNN models comprises of a kernel size (3×3) with 32 filters each. The pooling layer has a pool size of (2×2). Its activation function is known as softmax activation function.

The 4-DCNN model is the combination

done by a simple concatenation of the two similar 2-DCNN models with softmax as activation function.

To validate the efficacy of the classifier, four types of desire classes are distinguished such as True Positive (TP), False Positive (FP), True Negative (TN) and False Negative (FN).

Fig. 5
Confusion Matrix to classify the seizure
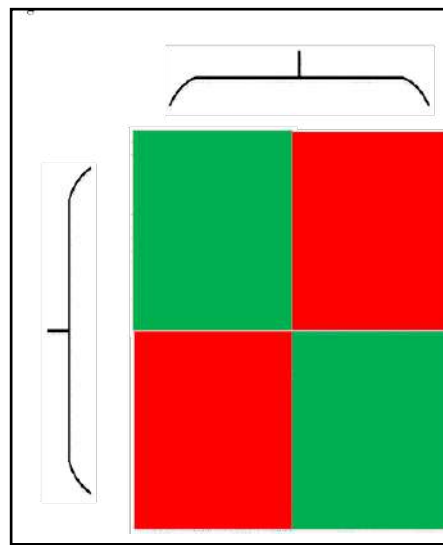
Performance index of the classifier is validated by considering the values of confusion matrix.

- TP: These are the accurately predicted positive values interpreting the actual class to be true and the predicted class to be true.
- TN: These are the accurately predicted negative values interpreting the actual class to be false and the predicted class to be false.
- FP: When the actual class is false and the predicted class is true.
- FN: When the actual class is true but the predicted class is false.

Further analysis on the matrix is performed by the following formulas such as:

1. $\text{Accuracy} = \dfrac{TP+TN}{TP+TN+FP+FN}$

2. $\text{Precision} = \dfrac{TP}{TP+FP}$

3. $\text{Recall} = \dfrac{TP}{TP+FN}$

In the future, predicting onset seizures can be further improved by reducing the training time and thereby, allowing doctors to diagnose the disease more quickly in an organized manner. Therefore, future research should be conducted to reduce the number of parameters available in the model. This research work needs to be extended by adding Electromyogram (EMG) Electrocardiogram (ECG) data, implicating simplified feature extraction techniques and improving the number of supervised and unsupervised classifiers.

> **To address the above challenges, the present investigation has sought to develop a novel prediction strategy for seizure detection based on Neural Network (NN) analysis during inter-ictal state of seizure.**

Prateek Pratyasha is presently pursuing Ph.D. under the department of Biomedical Engineering at National Institute of Technology Raipur. Her areas of research are cognitive recognition, neural plasticity, artificial intelligence and Optogenetics.

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LATEST NEWS IN HEALTHCARE

HKSTP AND BOEHRINGER INGELHEIM VENTURE FUND LAUNCH CO-INCUBATION PROGRAMME TO FAST-TRACK R&D IN INFECTIOUS DISEASES AND IMMUNOLOGY

Post pandemic, this partnership between HKSTP and BIVF seems quite an ironic move as it marks a key milestone to drive Hong Kong's biomedical technology development. Both local and global qualified startups in infectious diseases and immunology can apply for the same. Should the healthcare industry take this as a sign to make the healthcare industry resilient and combat ready to face whatever the future holds with respect to possibilities of any pandemic.

Hong Kong Science and Technology Parks Corporation (HKSTP) announced recently that it is partnering with global research-driven biopharmaceutical leader, Boehringer Ingelheim Venture Fund Limited (BIVF) in a strategic co-incubation collaboration to promote and nurture startups in research and development for infectious diseases and immunology.

According to reports, HKSTP is dedicated to collaborating with sector leaders in building the strongest I&T eco-system to help startups via business development, mentorship, and investment initiatives.

Reportedly, this partnership between HKSTP and BIVF marks a key milestone to drive Hong Kong's biomedical technology development. Moreover, both local and global qualified startups in infectious diseases and immunology can apply to the incubation programme to access the full capabilities of the HKSTP ecosystem and BIVF's extensive biotech funding network. Additionally, incubatees can access one-on-one coaching and assessment to track key research milestones, while receiving expert guidance from HKSTP on commercialisation, manufacturing, scaling-up and marketing strategy to ensure successful innovation, plus vital funding opportunities and investment insight from BI.

"Hong Kong is now Asia's largest and the world's second largest fundraising hub for biotech. As HKSTP marks our 20th year of propelling success and innovation, our mission is to drive the growth of biotech to another level with world class leaders like BIVF. We will maximise the GBA growth opportunities for high-potential tech talents and early-stage startups to ensure the region emerges as a global I&T powerhouse," Albert Wong, CEO of HKSTP, said in a statement.

"Our partnership with BIVF, provides early-stage startups and promising university spinoffs with vital support at the most critical stage of their long and challenging biotech innovation journey. Incubatees will have access to our Incu-Bio Programme, with total incubatees doubling up in the last five years. The startups can also access funding support of up to HK\$6 million, with financial subsidies and upfront grants to cover regulatory activities such as clinical trials," Dr. Grace Lau, Head of Institute for Translational Research of HKSTP, stated. "The world has faced growing public health challenges in recent years.

As Boehringer Ingelheim's strategic investment arm, BIVF focuses on the development of new science in areas with huge unmet medical needs such as infectious diseases and immunology. The co-incubation program jointly initiated by HKSTP and BIVF will enable us to identify more breakthrough technologies in the early stage of development. With the funding and infrastructure support offered by HKSTP and BI's expertise and experiences in the successful development of breakthrough mediations for patients, we foster the startup companies and bridge the gap between science and industry for the local ecosystem. We look forward to developing together with HKSTP next-generation therapies in the fields of infectious diseases and immunology with long term partnerships," said Dr. Frank Kalkbrenner, Global Head of the BIVF.

"The innovation competency of biopharmaceuticals in Asia is rising quickly. To grab the opportunities in this market, Boehringer Ingelheim has set up the External Innovation Hub in China which brings our Research Beyond Borders, Business Development

& Licensing and Venture Fund groups under one umbrella. Now we're thrilled to see that the biopharmaceutical industry is picking up rapidly in the Guangdong–Hong Kong–Macau Greater Bay Area, it's a great opportunity for us to partner with HKSTP to develop the local ecosystem, and further enhance China's dual-circulation scheme. We hope to offer our continuous support to more home-grown innovations to be recognized on the global market and eventually benefit the patients worldwide." said Mr. Felix Gutsche, President & CEO, Boehringer Ingelheim China.

According to reports, programme incubatees will also benefit from HKSTP's rapidly-growing biotech R&D capabilities including the HKSTP Institute for Translational Research (ITR). This will enable biomedical startups to turn their innovative biomedical technologies to life-changing impact on patients and society.

SOURCE: *www.financialexpress.com*

STANDARD CHARTERED & SEVA FOUNDATION LAUNCH NEW INITIATIVE – ENVISION TO CREATE CRITICAL ACCESS TO EYE CARE FOR 4 MILLION PEOPLE IN INDIA

Access to vision care is a growing concern in the United States and around the world. Better access to vision care is also essential for millions of people throughout the world who are in danger of losing their vision because of undiagnosed glaucoma, age-related macular degeneration (AMD), cataracts, nerve impingements, infectious diseases, severe refractive errors, and a host of other serious conditions. Without convenient access to screening and diagnostic services, they risk losing their sight. Recognizing the importance of reaching out to individuals and families, Standard Chartered & Seva Foundation has taken a proactive approach to improving access to care on a local and national level.

Standard Chartered Bank, India and Seva Foundation have partnered to create critical access to eye care for four million people in underserved communities in India through a new initiative – Envision. The two organisations along with partner hospitals will establish 65 new vision centres across nine states in India – Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Odisha,

Tamil Nadu, Uttar Pradesh, Telangana and West Bengal.
Under Envision, vision centres will be established in areas that do not have access to eye care, extending the country's ability to deliver universal eye health coverage. These new vision centres will be set up by 15 leading eye care providers by December 2024 and will collectively provide 400,000 eye exams, 67,000 glasses,

and conduct 16,000 eye surgeries.
Vision centres are local, permanent establishments that provide access to eye care services to underserved communities, including women and children. They are equipped to meet 80% of all eye care needs and can refer patients to nearby hospitals for complex cases. The staff at these centres is recruited and trained locally, thereby generating employment opportunities.

Karuna Bhatia, Head – Sustainability, India, Standard Chartered Bank said, "With our collaboration with Seva Foundation we endeavour to provide critical eye care to people who would not have easy access and not be able to afford this treatment. Through Envision, we will establish infrastructure and systems to help us in realising our vision under the Bank's 'Seeing is Believing' initiative of tackling avoidable blindness and making eye health facilities accessible to more communities across the country. So far under our Seeing is Believing programme, the Bank has reached 14 million people in India, conducted 2.58 million cataract surgeries through our existing network of 265 vision centres across 22 states."

Kuldeep Singh, Programs Manager for India & Bangladesh at Seva Foundation said, "This initiative highlights the Seva Foundation's commitment to build and strengthen the primary care delivery model at grassroots level in the country. India has an estimated 270 million people with vision loss and 80% of them can be treated at primary eye care vision centres. Poor eye health imposes a non-trivial recurring cost to the Indian economy equivalent to 0.57% of GDP (INR 1,158 billion), a substantial constraint on the country's growth aspirations."

SOURCE: *www.indiaeducationdiary.in*

PM INAUGURATES CENTRE FOR BRAIN RESEARCH AT IISC IN BENGALURU

The CBR has been created at a cost of Rs 280 crore and it will carry out vital research in rural Karnataka to provide appropriate, evidence-based public health interventions to delay the onset of dementia and thereby slow its progress.

Prime Minister Narendra Modi inaugurated the Centre for Brain Research (CBR) which is situated in the premises of the Indian Institute of Science (IISc). The Prime Minister also participated in the stone-laying ceremony of Bagchi-Parthasarathy Hospital.

The CBR has been created at a cost of Rs 280 core and it will carry out vital research in rural Karnataka to provide appropriate, evidence-based public health interventions to delay the onset of dementia and slow its progress.

The 832-bed not-for-profit Bagchi-Parthasarathy Hospital will be built at a cost of Rs 425 crore. This will integrate science,engineering and medicine on a single campus, taking full advantage of the century-old excellence of IISc in science and engineering.

Governor Thawar Chand Gehlot, Chief Minister Basavaraj Bommai, Union Minister for Coal, Mining and Parliamentary Affairs Pralhad Joshi were present on the occasion. Donors for the Bagchi-Parthasarathy Hospital, Chris Gopalakrishnan couple, Bagchi and Parthasarathy family members were also in attendance.

Earlier, while on the way to IISc, Prime Minister Modi stopped his car and waved at thousands of party workers at Mekhri Circle. The crowd chanted slogans and were overjoyed as PM stepped out to wave at them PM Modi also put out a tweet in Kannada explaining the programmes he is participating in the state.

SOURCE: *health.economictimes.com*

INTO THE METAVERSE: HYDERABAD'S YASHODA HOSPITALS BECOMES FIRST INDIAN HEALTHCARE GROUP ON PLATFORM

Yashoda Hospitals Group has acquired space on Decentraland to construct a metaverse platform where users can buy and sell property apart from engaging them in other life-like activities. The virtual clinic is hoped to be operational by next year.t

By now, chances are you've heard all about the new surround-yourself technology known as the "metaverse", the purported next big online thing conceived by Mark Zuckerberg.

For those unaware, the metaverse is sort of the internet brought to life, or at least rendered in 3D. Meta CEO Zuckerberg has described it as a "virtual environment" you can go inside of, instead of just looking at on a screen. People can meet, work and play, using virtual reality headsets, augmented reality glasses, smartphone apps or other devices.

Hyderabad-based Yashoda Hospitals Group has acquired space on Decentraland — a metaverse platform where users can buy and sell property and engage in other life-like activities — in order to set up a virtual clinic.

As per The Print, The 'land' acquired by the group measuring 16 x 16 'metres' is a virtual experience centre where users can learn more about the chain of hospitals, the services it provides, and the doctors on its panel.

By next year, the space will be ready to as a virtual clinic where the avatars of patients will be able to seek expert consultations from doctors, according to the group — for a fee that will depend on the doctor and may eventually be on par with that of physical consultations, as per the report.
"Since the beginning, we have aimed to be progressive as a group, we have many firsts to our accolade, including clinical excellence, infrastructure, and innovation. We have been early adopters of digital technology that adds value to our ecosystem, from Web 1.0 to Web 2.0 and now Web 3.0. We believe the future will be driven by core technologies like the blockchain and Web 3.0, moving from a centralized to a decentralized ecosystem." Dr Abhinav Gorukanti, director of Yashoda Hospitals said in a statement, as per Financial Express.
"Setting up our presence on decentraland

is the first step towards our efforts and acceptance of decentralized tech, we will continue to upgrade and invest in making our digital infrastructure future-ready," he added.

Gorukanti told The Print that buying space on Decentraland marks the group's plunge into the metaverse, adding that they are working on "evolving the experience" by placing a receptionist to take things forward.

"There are, of course, a lot of limitations to the metaverse; emergency services will have to be physical. However, lifestyle, mental health, and nutrition, these are things that can be on this platform," he added.

In February, The Apollo Group of Hospitals announced a tie-up with 8chili Hint VR (Virtual Reality) platform.

As per The Indian Express, the announcement was made by Dr Sangita Reddy, Joint Managing Director, Apollo Hospitals who said the move was done to allow both patients and doctors to engage in virtual reality as that was the future.
"The main focus of VR in patient care would be for pre-post operative counselling, increasing patient outcomes by bringing in relaxing narratives that induce control over one's psychological responses. The VR will also help in a personalised approach to every patient," Reddy said.

"People learn best by doing, which is why healthcare is a natural fit for immersive VR training. Findings support the equivalence and superiority of VR training, the time to skill mastery and the economic savings in this platform as compared to traditional methods," said Dr Sangita Reddy. She further explained that the virtual reality platform will help take VR immersive training at scale and efficiencies.

According to the hospital, California-based 8chili Hint VR is an end-to-end

platform to manage metaverse strategy helping in original 3D content creation, metaverse customisation and also delivery of this content across various metaverse real estate. Speaking about the entire new venture, Dr Prathap C Reddy said, "Virtual Reality will change how we enrich the healthcare community and also improve patient experiences. Apollo Hospitals is excited to work with Hint VR to find solutions into our care continuum."

SOURCE: *www.firstpost.com/india*

Parthvee Jain is presently working with NASSCOM to build flagship initiatives and partner ecosystems. She is an engineer with specialization and interests in fields of Biotechnology, Healthcare, Food Processing, and Nutraceuticals.

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IC InnovatorCLUB
13th virtual meeting report

Professionalism in Nursing

■ Vijaya Tripathi

The meeting commenced with Dr. V.K. Singh, Managing Director of InnovatioCuris Foundation of Healthcare & Excellence, introducing the IC InnovatorCLUB and the motive behind having "Professionalism in Nursing" as the theme for the edition of the meeting. He mentioned the importance of nursing as Health cannot survive without nursing. He thanked speakers and participants for taking out the time for the session and introduced Captain Sandhya Shankar Pandey as Moderator of the session and handed over the session to her.

Capt. Sandhya gave everyone a warm welcome to the meeting. She mentioned the pandemic era and how, despite the pandemic still being ongoing, nurses had emerged victorious. There has been a lot

of admiration and recognition for the profession, as well as a resurgence of its identity and respect. But what about the feelings of the professionals? First and foremost, are they prepared to accept this full acceptance and capitalise on this chance once their profession has truly reaped all the rewards and profits they have accrued over the past 2.5 years? Or is it engaging enough to attract the young people of the next generation, ensuring that this is the career that will allow them to develop, grow, and have a great life ahead, or is it actually well-ingrained in our policies, institutions, and educational system, ensuring that we actually nurture the values in the generation to be carried forward.

Next, Captain Sandhya introduced Dr.

Raminder Kalra, the first panellist, who is a renowned academician in the nursing community and eminently known for bridging the gap between service and academics. She then introduced the second panellist, Capt. Indira Rani, a highly qualified nurse with an M.Phil. who decided to work in the hospital and had become an expert in nursing operations. Afterwards, Captain Sandhya introduced Dr. Vinod K, the director of nursing at Medanta, the medical facility, as the third panellist. Vinod is the first Indian nurse to graduate and enrol in an advanced management degree program at Indian School of Business. Last but not the least, Captain Sandhya introduced Kajal Gupta, who is in the process of developing into a qualified nurse.

Capt. Sandhya then introduced herself. She is currently in charge of the nursing services for the hospitals in the Fortis healthcare network. She also oversees the state of Delhi and NCR for the Association of Nurse Executive of India.

Capt. Sandhya began the session with her questionnaire. The first query she asked to the panel was 'What does professionalism in nursing mean to you, and do you believe it to be important?'

Capt. Indira expressed her appreciation for the invitation to participate on the panel for the question on the distinction between professionalism and profession. According to Captain Indira, professionalism is always found in knowledge, skills, and competence and is protected by ethics. Professionalism in nursing also entails exhibiting a steadfast dedication to the field and a determination to consistently provide the greatest standard of care to patients while respecting the principles of accountability, respect, and integrity. In response to the question of why professionalism is important, she said that it is a symbol of commitment, dependability, and responsibility. It also embodies the organization's ideals and makes a strong impression. Additionally, it promotes cooperative connections and open lines of communication while assisting in ensuring and protecting the health as well as wellbeing of patients. The environment and effectiveness of healthcare institutions are positively impacted by professionalism. Do you believe that nurses at different levels in hospitals

display proper behaviour consistent with being a professional nurse?

The next question Captain Sandhya posed to Mr. Vinod said that nurses in hospitals at various levels do indeed behave appropriately as professionals. He asserted that, in his opinion, there is no use in complaining because, in order to ensure that your nurses meet your expectations, something must be created. He continued by saying that the most important aspect of professionalism is for nurses to prioritise their patients. Communication is the second area that may need improvement. Effective communication can solve 99 percent of healthcare problems. The following step is to work together. Collaboration between departments within your own organisation, or teams made up of departments that care for patients. The final item is adopting a positive outlook.

Do you believe that we are instilling the appropriate elements when we are growing and moulding the nurses of the next generation? Capt. Sandhya then asked Dr. Raminder. The basic requisition according to Dr. Raminder, is a thorough curriculum updated in accordance with NEP, appropriate infrastructure, a wealth of clinical experience, faculty serving as role models, a faculty preceptor student model, mentor-mentee and counselling services, and strong leadership. This is leading to some issues, so areas of worry include unfilled faculty posts that result in a lack of clinical supervision, non-attendance at colleges, a dearth of clinical experience offered, and exorbitant clinical experience fees.

As the discussion continued, Capt. Sandhya inquired Capt. Indira the following question: Whether they hire the correct kind of nurses, and if not, then what difficulties do they run into when deciding whether or not to hire them? She excitedly said that her move

from boardroom to behind nurse had been a really fulfilling one. The six traits of today's next-generation nurses, she continued, are: champions of consistency; proponents of value; care equalisers; "tuned in" to the medicine crisis; naturally tech savvy; and the patient's advocate. In conclusion, nurses of the new or future generation are empowered and involved. They investigate the priorities of nurses who have been in practise for 10 years or less. They are adaptable, self-assured, and prepared for change. Additionally, they desire something unique and difficult, and they advance swiftly in their careers. The difficulties in attracting younger generations, shrinking finances, the rise of nursing specialties, a lack of communication amongst recruiters, the need for night shift leaders, and problematic relationships were only a few of the difficulties noted by Capt. Indira. The difficulties in hiring and keeping employees come from their desire for flexible schedules, a sense of appreciation, and engagement. Only then will we be able to strike a balance if the entire nursing generation updates themselves to match this nursing generation.

Capt. Sandhya asked Mr. Vinod once more, "Can you give me any examples from your day-to-day situations where you have been concerned about the missing links?"

In response to the above question Mr. Vinod gave the following responses that always put the patient first. For instance, if I don't want to sponge bathe the patient, let's take him or her to the bathroom.
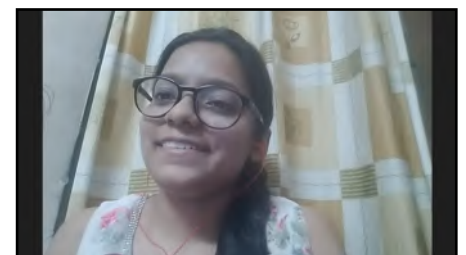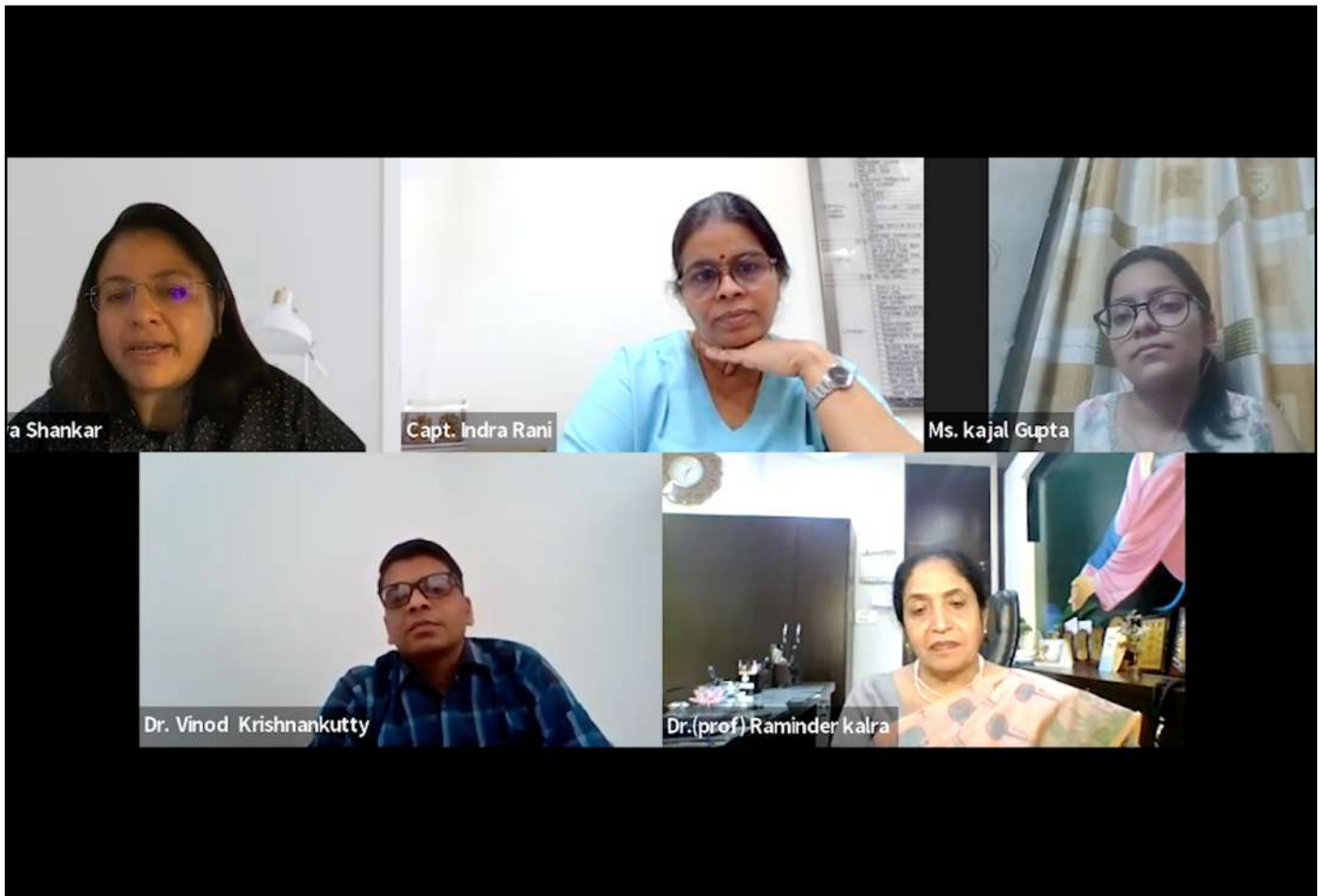
Effective communication is the second factor. For a nurse, passing over is the most crucial role. A patient's life could be lost if the patient is not appropriately turned over to the next staff member. The third factor is teamwork and mentoring. For instance, veteran nurses must appropriately train new nurses without disparaging them. The collaboration is based on the idea that everyone has an equal role to perform. The fourth crucial factor is having a positive attitude. For instance, if you begin your shift with a bad mood, mistakes may be made that endanger the life of a patient. The second is to stay current with your information. Through social media and other means, you can stay informed. Be honest and accountable for your work, for instance, by checking and monitoring vital signs and recording the medications you have administered. The most crucial factor in ensuring that patient care is safe in hospitals is ethical behaviours. After that, Capt. Sandhya asked Ms. Kajal Gupta, trainee nurse, if she was happy with the way she had been trained in her institute, how she was being mentored,

and what advice she would provide to her coworkers who wanted to become successful nurses. Kajal responded that she can say she is satisfied for three key reasons. The first is that she is extremely happy and grateful to be a student at Holy Family College of Nursing, one of the top nursing schools in the nation. The second is exposure to practical work, or clinical experience, which you obtain in hospitals. The institution's additional efforts and investment come in third. She continued by elaborating on each of the three topics, such as the necessity of clinical experience for students in order for them to get exposure and confidence. Additionally, the college has made particular efforts to boost the students' confidence. Various mentors are assigned, and special mentoring programmes are offered. . Finally, she wants to convey to her coworkers that it is crucial to develop physical fitness and stamina early on because a career in nursing requires it. So it's crucial to keep healthy habits. The second step is to learn all that is being taught to you.

Capt. Sandhya concluded the meeting by thanking the panellists. For vote of thanks she further extended it to Mr. Sachin Gaur, Director of Operations at the InnovatioCuris Foundation of Healthcare & Excellence. He concluded with the notion that a strong foundation of healthcare delivery is nursing. The nursing community is a capable keeper. It mostly controls the emotional impact of receiving medical care. He gave a heartfelt respect to the nursing profession and the sacrifices made by the healthcare industry.

Vijaya Tripathi, is the Head of Market Access and Partnerships at InnovatioCuris. She is pursuing post-graduation in Healthcare management from IIHMR Delhi. As a hardworking and passionate person, she likes to use her knowledge and skills to work in support and favour of healthcare organizations.
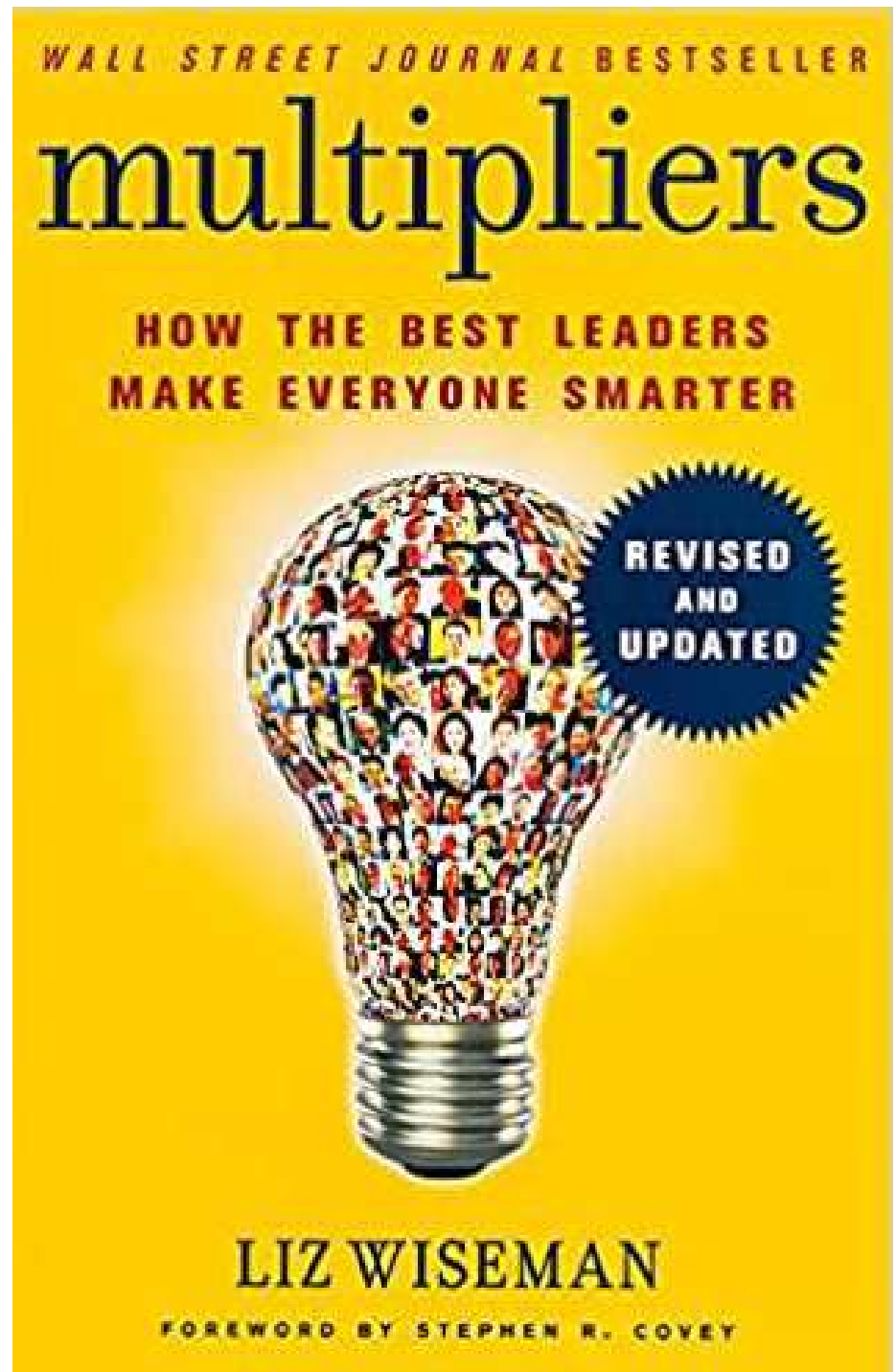
▶ BOOK REVIEW

Reviewed by Sachin Gaur, Executive editor for InnoHEALTH Magazine

I discovered recently through my network this book called as Multipliers by Liz Wiseman. It was fun and easy read. Given that one of the most important skill in the 21st century is to (collaborate) work in teams and it seems that many leaders are not able to get the best of their teams. The author calls such leaders as ´diminishers´ and it seems supported by research that a leader who is a diminisher the team productivity is only 50% from their possible output. On the other hand, the leaders which the author terms as ´multipliers´ can get twice as much as possible out of their teammates with their enabling and encouraging approach to management.

It is a no brainer that in a leadership role you would want to be a multiplier and enable your organization to achieve lot more out of less. However, sometimes a genius leader itself maybe a road block in being the multiplier. As their own genius prevents from expecting a solution someone from their team and they would always want to have the best by their ownself than anyone else. On the other hand the leaders which are genius makers create environment for other such geniuses to emerge in the team.

So, if you are looking to build a team or already having a team. This is the book for you and for you to reflect on your approaches of managing team. Are you a genius or a genius maker.

WALL STREET JOURNAL BESTSELLER

multipliers

HOW THE BEST LEADERS MAKE EVERYONE SMARTER

REVISED AND UPDATED

LIZ WISEMAN

FOREWORD BY STEPHEN R. COVEY

ADVERTORIAL

FROM CONVICTION TO CONFIRMATION

■ **Girish Bhardwaj**

Vishal Kapadia | Ashish Sethia | Girish Bhardwaj | Tashi Aggarwal | Sandeep Behl

It was the year 2019 when we (Medacsis Team- Ashish Sethia, Tashi Aggarwal, Sandeep Behl and me) had started the noninvasive low-intensity NIR light therapy. A phone call from Mrs Nalini Ramesh Shah was received about a girl of 7 years old. Upon understanding that in the year 2017 because of high fever her neuronal activities were hindered as many respective neurons degenerated.

Since 2017 she was on a kind of vegetable state. Her parent who lives in a Chawl in south Mumbai visited all the hospitals, but the results were in vain.

With the reworked history, the baby girl was suffering from TBI due to a high fever causing

(i) Severe cerebral and cerebellar atrophy, including atrophy of thalami. Apart from this, the white matter changes in the bilateral periventricular white matter are of questionable significance

(ii) Large areas of restricted diffusions in almost the entire cerebral parenchyma. Bilaterally.

(iii) Mild leptomeningeal, with sever meningoencephalitis.

She had lost the movements of limbs, speech, controls, recognition and cognitive functions completely with severe neuronal damage. The parents and the respective doctors had done whatever was the best in their capacities and abilities.

Now after hearing all this, we had no clue how can we help them However, we know that somehow NIR therapy can be tried as there are no side effects if we restrict the time for which we had our respective physiologist and doctors.

We performed the therapy with the help of Mr Nalini Ramesh Shah for about six months. Then one fine day we received the call from her mother that our little angel could lift her neck (Along with our therapy the neurophysiology therapy was imparted by Mr Krishna).

We all got goosebumps and started monitoring her other activities. However, for the next two months, we observed nothing. Then one day her father told us that she is audible and had started responding expressing her anger, smiling and other behaviours. It was a moment of joy.

Then suddenly Pandemic Covid-19 struck the world and we had to refrain from the therapy.

After about six months we resumed the therapy and by the end of the year, 2021 on a lying down position started taking the flips.

Till now she can maintain those developed activities and no further improvements.

However, our little angel motivated us to carry on with our conviction and to date, we have been able to heal insomnia*, migraine*, stress* and muscular atrophy.

We did try to manage the patients with Parkinson's disorder and progressive supranuclear palsy, but the results were not motivating.

NOW A RECOGNITION FROM IJ SR IS ANOTHER BOOSTER FOR US !

Influence of Low intensity light waves on neuronal based activities in TBI patient

www.medacsis.in www.theralicht.com
Author: Girish Bhardwaj – Theralicht™ LLP

Abstract:

Infrared light therapy is a form of light therapy, which involves getting exposed to sufficient intensity of infrared light to experience health benefits. NIR light therapy involves shining concentrated wavelengths of light between 810nm to 850nm onto bare skin. The treatment is based on the irradiance and radiance factors of the light photons interacting with light-sensitive molecules within each cell. As NIR light photons reach these molecules, this stimulates the cells' mitochondria to produce more adenosine triphosphate (ATP), which fuels cellular energy production.

This, in turn, energizes all cells irradiated by the light. Cell-protecting factors such as antioxidants are released to counteract cell degeneration from inflammation. And, the cells are able to perform their functions more efficiently, including repair and regeneration. This heightened functionality has anti-aging benefits as well as the ability to treat the underlying causes of many diseases and disorders.

The infrared spectrum is between 700 nm to 0.1 mm in wavelength, which can be divided into near, mid, and far-infrared spectrum. The longer the wavelength, the lower the frequency and the further the light can penetrate tissues.

Different kinds of infrared wavelengths have different health benefits.

NIR- Near-infrared light, with wavelengths between 700 – 1400 nm, generates the most heat but does not penetrate deep into human tissues. In addition, the 760 – 895 nm range of infrared light can stimulate the mitochondria function, which can increase metabolism, improve tissue repair, and reduce inflammation9, 10.

mNIR- Mid-infrared light, with wavelengths between 1400 – 3000 nm. It penetrates deeper than near-infrared light and generates more heat than far-infrared light. Mid-infrared light can help expand blood vessels and increase circulation so that blood can reach injured or inflamed areas of the body.

Far-infrared light, with wavelengths between 3000 nm – 0.1 mm. Far infrared penetrates deepest into the tissues. Its health benefits come from both generating heat and other properties. Far-infrared light can potently reduce inflammation and oxidative stress. It increases circulation, improves blood vessel and heart functions, reduces pain and fatigue, and normalizes blood pressure11

Introductions:

The case of a baby girl aged 7 years (2019) with TBI with wear off year (2017) 2 years was to be dealt. With the reworked history the baby girl was suffering with TBI due to high fever causing

• Severe cerebral and cerebellar atrophy, including atrophy of thalami. Apart from this the white matter changes in the bilateral periventricular white matter of questionable significance

• Large areas of restricted diffusions in almost entire cerebral parenchyma. Bilaterally.

• Mild leptomeningeal, with sever meningoencephalitis

She had lost the movements of limbs, speech, controls, recognition and cognitive functions completely with severe neuronal damage. The parents and the respective doctors had done whatever the best in their capacities and abilities.

Aim:

Our main aim was to trigger and normalise cerebral blood flow along with the regeneration of affected thalamic and respective regions. The aim was also to observe the retinal movements while reducing the Oculomotor Dysfunction which got developed coz of TBI.
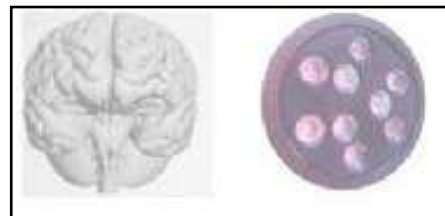
Method:

The non-invasive low-intensity light therapy was considered for the next couple of months. The default mode network-DMN plays a critical central role in normal brain activities, presenting greater relative deactivation during more cognitively demanding tasks. After deactivation, it allows a distinct network to activate. This network (the central executive network) acts mainly during tasks involving executive functions.

The procedure of red or near-infrared (NIR) light to stimulate or regenerate tissue is known as photobiomodulation. It was discovered that NIR (wavelength 710–940 nm) and red (wavelength 600 nm) (LEDs) can penetrate through the scalp and skull and have the potential to improve the subnormal, cellular activity of compromised brain tissue.

Based on this, different experimental and clinical studies were done to test LED therapy for TBI, The patient was subjected to LILT (690~910 nm) on an alternate day basis with a head wrap around device for 20 minutes in the morning along with the spine cord subjected to (640~840 nm) on alternate day basis. Along with this, the patient was given thyme-leaved gratiola (Btahmi) and promising results were found. It leads us to consider developing different approaches to maximize the positive effects of this therapy and improve the quality of life of TBI patients.

Results:

The significant improvement in holding saliva, and reduction in Oculomotor Dysfunction were noticeable in 6 months. The therapy was continued and in a span of 14 months from the commencement of the therapy (still ON) the movement of the limbs, improvement in metabolism, speech, cognitive functions and recognition have been observed.

The Medacsis-LILT therapy is being continued with the hope that this baby girl will be back to some normalised condition in the next 1-2 years from now (March 2021

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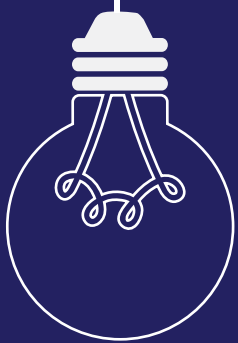**InnoHEALTH Annual international healthcare conference**
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