AMRITA VISHWA VIDYAPEETHAM
School of Nanosciences and Molecular Medicine

ASTRA

ASTRA FRONTIERS

IN THE LAB WITH
DR.BINDHU PAUL

REVIVING GIANTS:
SKIN CELLS TRANSFORMED INTO STEM CELLS

ECO MED'S BEST ABLE TRIUMPH:
THE TECH THAT'S BREAKING BOUNDARIES!

YOUR CELLS REMEMBER MORE THAN YOU THINK!

GET READY TO MOVE:
BIONIC LIMBS ARE CHANGING THE GAME!

CRACKING THE PHD CODE WITH
DR. PARASMAL SURESH

EDITION: 001

MESSAGE FROM THE DEAN

DR. SHANTIKUMAR NAIR

"IF YOU ARE GENUINELY PASSIONATE ABOUT SOMETHING AND ENJOY THE EFFORT INVOLVED, SUCCESS CAN FOLLOW WITH LESS STRAIN, AS ENTHUSIASM OFTEN FUELS EFFICIENCY AND CREATIVITY."

To interview Dr. Shantikumar Nair any other way than in person is to be woefully deprived of three-quarters of his impact, an aura that is resolutely charismatic in that it is entirely experiential: the sagacious eyes, still echoing the ardent passion he felt as he pored over a physics paper before we walked in.

For almost two decades, the Amrita School of Nanosciences and Molecular Medicine has been a pioneer in exploring nanomaterial applications in medicine, rallying the whole nation, and triggering expansiveness and innovation to such an extent that its success has contributed to the establishment of a new research centre in Faridabad, Delhi NCR. "But the vision now to take forward to the people through actual product development, that's called translational research", he says, further explaining what it means. Translating student innovations, into actual products that can make a difference for people, while relying on cutting-edge areas such as biotherapeutics, which has become a new frontier, providing a platform for more efficient and less toxic therapies. "The excitement is that there is growth in the new areas, the growth leads to product development and it is more interdisciplinary which means it's more inclusive. For me, that's the most exciting thing."

"Research to be successful requires students to be actively engaged not in research as a form of work, but research as a form of passionate involvement ", he adds when asked about the newsletter.
Research follows excitement, which stems from awareness of the potential of novel science, that may not be in textbooks.

"Most people say that it is the intellect which makes a great scientist. They are wrong: it is the character", said German scientist, Albert Einstein. Concurring with this idea, Dr. Shantikumar added, "To me, research is not a textbook thing, research is a sort of passion, an attitude, a mental state." Communicating with people, and articulating ideas, is what is at the heart of research. "A newsletter may not create a whole bunch of scientists all of a sudden but, it's a step in the right direction.", he maintains with an uplifting smile.

"They say that success is 1% inspiration and 99% perspiration, but I think that we can change that ratio" Dr. Shantikumar affirms. Success is stimulated by our view and interpretation of the world, not by accepting blindly what is told us, but by cultivating a unique outlook. Biographical movies of leaders in science, portraying their unique perspective of the world, or books divulging their thoughts accentuate how they looked at the world and saw something different. He adds, "I love physics even though I practice medicine. Reading Einstein's biography was greatly inspiring, not because it teaches you physics but because it teaches you how a great person thinks. That's what creates inspiration. When you feel that you can reach there and it's possible if you try, then you're inspired."

With great power or in this case knowledge, comes great responsibility. Misusing responsibility and misguiding society and other scientists by not taking your work sufficiently seriously or not working hard to ensure the depth and validity of your ideas, affects the progression of science. "If science has to be built, it has to be built by the work of so many people and we need to understand that we have that responsibility to build a tiny block on which others can stand and build some more." He adds, going on to summarize ethics in a nutshell, "It is the character that makes you understand that you're responsible for others with the work that you do. To make a difference, one has to be serious and shoulder responsibility."

Initiatives like the science club and newsletter are meant to imbue in students a feeling of excitement when it comes to learning and innovation, simultaneously providing a platform to learn and grow while being fun. Being able to share your ideas, listen to those around you, and be able to accept those ideas that are alien to you, can help you grow and gain perspective. After all, isn't that what science is all about?

MESSAGE FROM THE TEAM

Astra is a student-driven club that aims to foster a passion for scientific inquiry among students by providing them with a platform for exploring beyond their curriculum. We aim to enhance our students' understanding of ongoing scientific incidents as well as develop awareness of contemporary scientific issues, instilling a sense of responsibility towards environmental and technological challenges. The club also will provide them with a dais for illustrating their ideas, thereby nurturing curiosity and creativity. Astra aspires to prepare students for future careers in STEM fields and cultivates a lifelong interest in science. It invites eminent scientists to share their experiences, thereby inspiring students to explore diverse fields of science and technology. The club also emphasizes the importance of collaboration, problem-solving, and effective communication through group projects and presentations, ultimately nurturing independent thinkers within the scientific community.

The Astra Frontiers division of the science club aims to engage students in various scientific disciplines through a range of activities to foster a deeper understanding of scientific concepts and methodologies. Its primary objective is to provide valuable content that resonates with the courses offered by our Department of Molecular Medicine and Nanosciences and build a bridge toward the world of research.

As we dive into November, Astra is excited to share an engaging agenda hoping to ignite curiosity and foster collaboration among our members. This month, we bring in an exclusive interview with the winners of the BEST ABLE India South Zone competition: Mr. Stephin Tomy, Ms. B Akshaya, and Mr. Anish Rao (MSc Nanobiotechnology). We plunge into inspiring insights offered by the articles and pieces by our students, keen to share the leaps of innovation taking place in their fields. Additionally, we are thrilled to announce the interview with our 2024 PhD graduate, Dr. Parasmal S, where he speaks about his PhD experience. Lastly, we also encourage everyone to participate in the creation of our upcoming newsletters, where we will delve into current scientific developments and their societal impacts. We look forward to your enthusiastic participation and can't wait to see all the innovative ideas you bring to life for February!

Yours in discovery,
TEAM ASTRA.

MEET THE SCIENTIST:
DR. BINDHU PAUL

The curiosity of 9-year-old Dr. Bindhu Paul was unparalleled. As she stood facing the twilight sky, attempting to decipher the origin of organic molecules, she decided she would become a scientist. Fuelled by dreams of having her own lab one day, perhaps in her back veranda, she set forward to explore a prominent and impactful career.

Q. What drew you towards reproductive and developmental biology?

"My academic journey was shaped by my resolve to become a scientist. Miller's experiment, which I read from a quizbook, piqued my curiosity in uncovering the origin of organic molecules, and the formation, and origin of life. When you think about the origin of life naturally your interest goes to reproductive and developmental biology, as that's how life begins each time.

Q. How did your experiences in Japan shape your research and influence your current work here at Amrita Centre for Nanosciences and Molecular Medicine?

"Japan did a lot for me. The professionalism, how to remain attached while being detached, to not marry your research ideas owing to feasibility, and even how to master editing. We hold preconceived notions about the importance of English in the scientific world, a myth that was debunked by my professor as he expounded on the importance of using simple language in research papers, which helps influence global communities without presenting a language barrier. The lab helped foster my imaginative freedom and highlighted the importance of observation in research."

Q. With over 35 international publications, you've contributed extensively to our understanding of reproductive and developmental biology. Is there any particular study or finding that you're especially proud of?

"I am just a tool made by the hands of the universe, who am I to be proud of? Whatever I am discovering, those things including me already exist, and we are all evidence of that. I belong to nature, nature owns me, so I don't think I should be proud of it. I'm a tenant who is on this earth, in this form, and of course, we'll go back to some other form. I recall once being given a difficult project, which failed multiple times before, and it gave me the courage to take up anything. If you have a real research question and strategy you can make many things work. So, I can't be proud but I'm happy about being able to uncover it."

Q. Your lab has a unique fish facility with Japanese Medaka strains. Why did you choose Medaka as a model organism, and how does it support your research objectives?

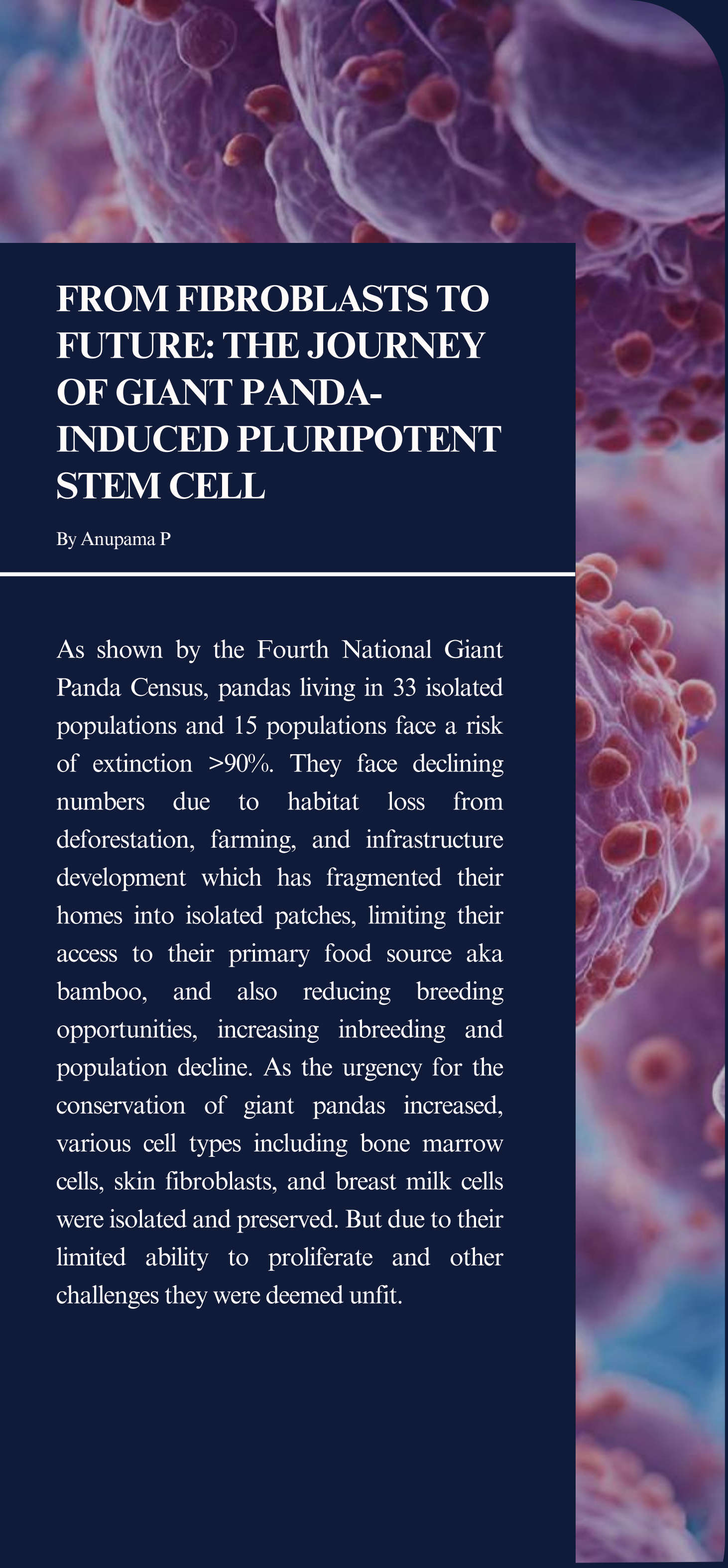
"To study normality, you must first understand abnormality. Mammalian mouse models present a lot of limitations to studying sex determination. Analysing the genetic basis, and cell differentiation requires inducing abnormality. Medaka models feature a unique attribute of manifesting different genetic and phenotypic sexual characteristics (modified using exogenous hormones), which aid in understanding the contribution of both genetics and epigenetics. Although I don't actively work with them anymore, I work with human samples now."

Evolving admirably from the little girl who aspired to set up a lab in her backyard, Dr. Bindhu Paul is today, a powerhouse scientist, one of the many crown jewels of our faculty at Amrita School of Nanosciences and Moleculuar Medicine.

GUESS WHAT?

The Japanese rice fish (Oryzias latipes), also known as the medaka, is a member of genus Oryzias (ricefish), the only genus in the subfamily Oryziinae

Oryzias latipes is a model organism and is extensively used in many areas of biological research, most notably in toxicology. Medaka have a short gestation period, and are reproductively prolific—characteristics that make them easy to rear in the laboratory.



FROM FIBROBLASTS TO FUTURE: THE JOURNEY OF GIANT PANDA-INDUCED PLURIPOTENT STEM CELL

By Anupama P

As shown by the Fourth National Giant Panda Census, pandas living in 33 isolated populations and 15 populations face a risk of extinction >90%. They face declining numbers due to habitat loss from deforestation, farming, and infrastructure development which has fragmented their homes into isolated patches, limiting their access to their primary food source aka bamboo, and also reducing breeding opportunities, increasing inbreeding and population decline. As the urgency for the conservation of giant pandas increased, various cell types including bone marrow cells, skin fibroblasts, and breast milk cells were isolated and preserved. But due to their limited ability to proliferate and other challenges they were deemed unfit.

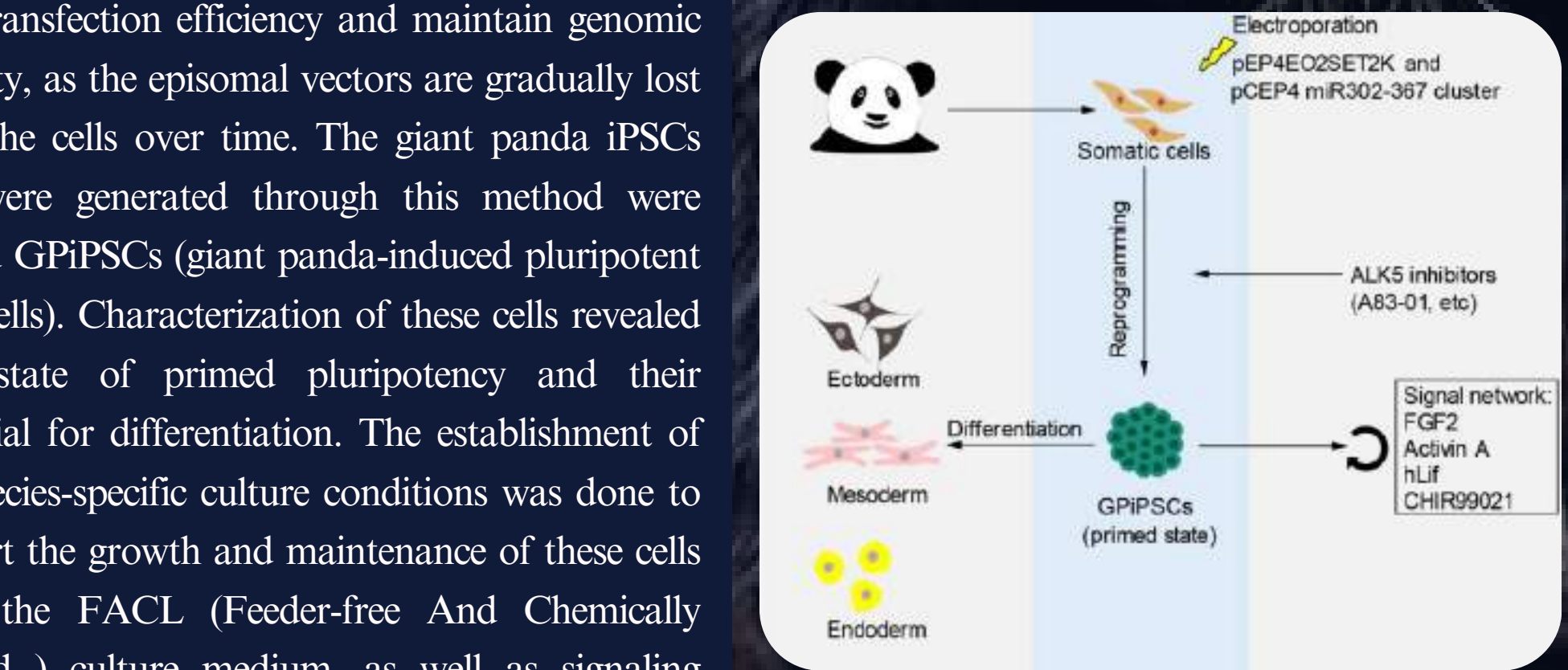
In the year 2006, Takahashi and Yamanaka achieved the reprogramming of somatic cells into iPSCs by introducing four transcription factors, namely, Oct4, Sox2, Klf4, and c-Myc.
In 2011, researchers speculated that inducing IPSCs could provide a way to conserve the endangered species and succeeded in generating stem cells from the cheek mucosal cells of giant pandas.

In 2019, Jing Liu, a stem cell biologist, got a request from the Chengdu Research Base of Giant Panda Breeding to create giant panda iPSCs from fibroblasts. They developed a method to create iPSCs from giant panda skin cells. This process is like transforming a regular car into a high-performance vehicle: the process involves introducing a specific microRNA cluster under specific conditions to convert fibroblasts into iPSCs.

These cells can potentially become reproductive cells, thereby preventing their extinction.

The generation of giant panda fibroblast cells was done using a non-integrating episomal vector method. Non-integrating episomal vector method is a technique used to generate iPSCs without permanently altering the target cell's genome. Episomal vectors are plasmids that replicate independently within the cell nucleus but do not integrate into the chromosomal DNA. The vectors carried reprogramming factors, such as Oct4, Sox2, Klf4, and c-Myc, which are essential for reprogramming somatic cells back to a pluripotent state.

By using this approach, researchers can achieve high transfection efficiency and maintain genomic integrity, as the episomal vectors are gradually lost from the cells over time. The giant panda iPSCs that were generated through this method were termed GPiPSCs (giant panda-induced pluripotent stem cells). Characterization of these cells revealed their state of primed pluripotency and their potential for differentiation. The establishment of the species-specific culture conditions was done to support the growth and maintenance of these cells using the FACL (Feeder-free And Chemically Lefined) culture medium, as well as signaling pathways essential for the maintenance of pluripotency and proliferation of GPiPSCs was also identified. This research provides a foundation for conservation efforts aimed at enhancing the genetic diversity of giant pandas much like a safety net that catches a falling trapeze artist.



PROPOSED MODEL FOR GENERATION AND CHARACTERIZATION OF IPSCS IN GIANT PANDAS.

FUN FACT

TARDIGRADES' RESILIENCE: TARDIGRADES, MICROSCOPIC WATER BEARS, CAN SURVIVE IN SPACE, EXTREME HEAT, COLD, AND RADIATION. THEY'RE OFTEN SEEN AS POTENTIAL "MULTIVERSE TRAVELERS" IN SCIENCE FICTION.

BEYOND THE THESIS: A CONVERSATION WITH *DR. PARASMAL SURESH*

Looking back at the year that passed us by, we discern quite proudly, the PhD laureates of our university. Read on to learn more about one such scholar's odyssey.

Q: Could you describe your approach to time management?

A: "Time management is a personal approach for me. Given my flexible schedule, I prioritize my work during periods of minimal external commitments. This allows me to focus without distractions. During PhD program, I successfully managed nine concurrent projects to meet the diverse needs of my friends and colleagues.
I employed a prioritization framework, ensuring timely delivery and sensitivity to their requirements. While I allocate specific time slots for client projects, my personal work schedule remains flexible."

Q: How do you handle constructive criticism or feedback?

A: "I welcome constructive criticism and actively seek feedback. I make it a point to visit my mentor Dr. Lalitha Biswas every morning and evening. During these daily interactions, she often shares her thoughts and insights, which I truly value. Comments from my friends and colleagues not only provide me with a fresh perspective but also encourage me to grow and improve."

Q: What potential research areas interest you for future exploration and what advancements in your field excite you the most?

A: "My academic background and PhD research focused on tuberculosis diagnostics, specifically clinical microbiology and molecular diagnostics of infectious diseases. However, my current research has shifted to cancer immunotherapy. I'm developing novel recombinant protein molecules and modular molecules for cancer immunotherapy, aiming to create innovative treatments for cancer patients. Although two fields are distinct, I'm excited to apply my skills and knowledge to this new area. My goal is to leverage pathogen molecules and their immune responses to better understand human responses during cancer development.
Considering the co-occurrence of cancer and infectious diseases, I'm exploring the intersection of tuberculosis and lung cancer. Patients with lung cancer are more susceptible to TB, presenting an opportunity to develop novel therapeutic strategies."

Q: Can you tell us about a challenging period and how you managed it?

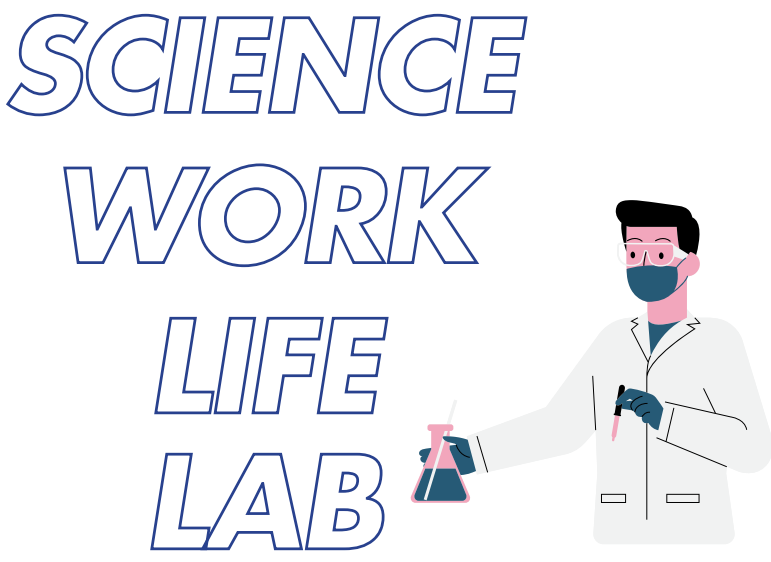
A: "Surprisingly, the COVID-19 pandemic proved to be a productive period for me. With many colleagues facing travel restrictions and limited access to the research facility, I had the unique opportunity to explore and familiarize myself with all the facilities on the research floor. While many of my peers found the pandemic to be a challenging time during their PhD journey, I didn't experience it as such. However, I did face a challenge when it came to writing my thesis. As someone who isn't accustomed to sitting for extended periods, I found it difficult to write for long stretches, but I persevered and completed my manuscript."

Q.Can you describe your BSc and MSc experience and what advice would you give to the current BSc and MSc students?

"Although I don't consider myself an experienced person to be doling out advice, I'd like to share some reflections from my journey. From pursuing my undergraduate and master's degrees in biotechnology to my current research, I've learned a thing or two.
Biotechnology, like many fields, encompasses various sub-disciplines. I focused on molecular biology and it's medical applications, which aligned with my interests. My advice to students is to identify a specific area within your chosen field that genuinely fascinates you. Once you've selected this niche, immerse yourself in it. This focused approach will not only deepen your understanding but also foster a stronger connection to your work."

Q.**How has your PhD prepared you for your career aspirations and what advice would you give to prospective PhD candidates?**

"When I first started as a technician on the research floor, I was eager to explore the various projects underway. However, my journey took an unexpected turn when I was offered the opportunity to pursue a PhD. I had never seriously considered pursuing a PhD, and I wasn't sure if I was eligible or prepared. Nevertheless, I leaped, and it was only after I began that I realized I had a lot to learn.
During the initial stages of my PhD, I struggled with presentations, report writing, and communicating my research to others. I was hesitant and scared, but as I progressed, I gained confidence and knowledge thanks to the valuable guidance offered by my mentors.
Looking back, my PhD journey has prepared me well for my future career. If I could give one piece of advice to my younger self, it would be to enjoy the journey and not just focus on career goals. It's essential to strike a balance between work and personal life, nurturing relationships with family and friends, and pursuing hobbies and interests outside of research.
I now realize that maintaining a healthy work-life balance is vital for overall well-being and avoiding burnout."



Q.Are there any books, papers, or documentaries that inspired or influenced your scientific perspective?

"Honestly, I'm not much of a bookworm. I don't usually read books for leisure unless they're fiction stories that catch my attention. The movie "Seventh Sense" had a lasting impact on me, particularly the scenes depicting recombinant DNA technology. Although the movie isn't scientifically accurate, it sparked my interest in biotechnology. I was already pursuing biotechnology, and seeing the department of biotechnology IIT Madras, featured in the movie resonated with me. At the time, I was fascinated by the movie's portrayal of biotechnology, but later I came to realize that it wasn't entirely scientifically true."

While a PhD is sometimes a road less travelled, inspiring stories help us comprehend the decisions whether they be the realities of opting to pursue a PhD or the fact that the "Seventh Sense" was not scientifically accurate.

CELLULAR MEMORY: IT'S NOT JUST ABOUT THE BRAIN!

By Lakshmi Preethi

Researchers have discovered something fascinating:

Non-neural human cells can also exhibit memory-like functions! Researchers recently looked into immortalized cell lines that express a luciferase reporter that is regulated by a promoter that is dependent on CREB. They used chemical signals to examine these cells' responses to various training techniques. In contrast to massed training, which entailed a single pulse, the scientists discovered that cells that received spaced training—four brief pulses of forskolin or phorbol ester—exhibited significantly stronger and longer-lasting luciferase expression. According to this, the timing of our learning experiences can have a big influence on how effectively cells "remember" them. ERK and CREB, two important memory-related molecules, were linked by the researchers to this enhanced reaction. They used chemical signals to examine how these cells responded to various training techniques. This implies that our learning events' timing may have a big influence on how effectively cells "remember" them. The researchers connected this heightened reactivity to two key memory-related molecules, ERK and CREB. This result suggests that memory-like processes can emerge from fundamental cell signalling dynamics, not exclusively neural circuits.

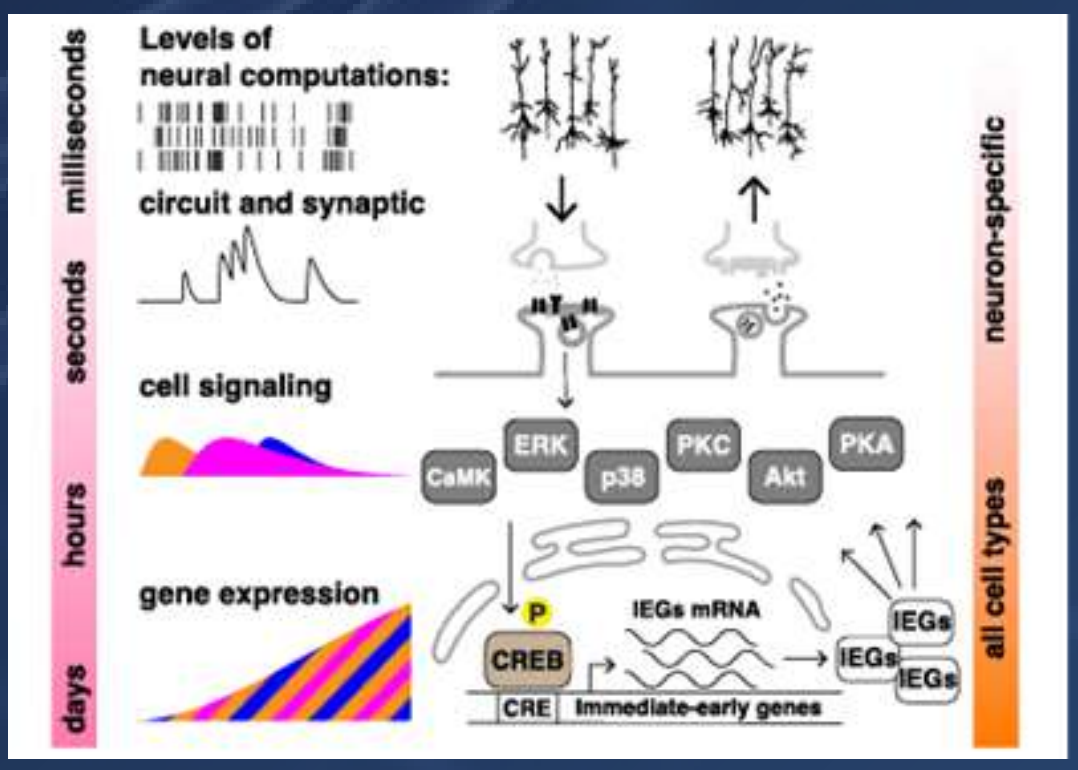


Fig: Neural computation occurs at multiple levels: 1. Circuit/synaptic level (milliseconds-seconds)
2. Cellular level: cell signalling (seconds-hours) and gene transcription (hours-days).During long-term memory formation, the transcription factor CREB integrates transient signals, modifying neuronal function through sustained transcription of specific genes.

FUN FACT

SATURN COULD FLOAT IN WATER: SATURN IS SO LIGHT FOR ITS SIZE (LOW DENSITY) THAT IT WOULD FLOAT IF YOU HAD A BODY OF WATER BIG ENOUGH.

THE SECRET INGREDIENT TO A SUCCESSFUL LONG-DISTANCE JOURNEY.

The wings of nature that survive a 2,000-mile-long migration may just harbor the panacea for modern-day aerodynamic constraints.

By Diya Rajesh Krishnan

A) Monarch butterfly, Danaus plexippus, nectaring, in Nova Scotia, Canada on July 11, 2015. Photo by Pat Davis.

Ever had to listen to your expatriate relatives complain about how flying miles to return home is just about the worst thing they endure all year? While flying across all those miles with hopes of making it to the other side in one piece is a journey most of us seem to dread, even more so if we're flying coach, a high-stakes two-way migration becomes as much as a part of their life cycle for Monarch butterflies.

Every fall, monarch butterflies embark on one of nature's greatest journeys, crossing thousands of miles from their summer home in Canada to the mountainous terrains of Central Mexico to elude the cold weather and then heading back north as the weather warms, much like birds do. Danaus plexippus, fondly called Monarchs, weighs slightly less than a single M&M. But what they lack in weight, they make up in tenaciousness, braving the onerous migration to the forested mountains of Mexico, where they settle in for winter hibernation.

Upon closer examination of the butterflies that do make this journey, researchers identified that migratory monarchs share a common attribute, the edges of their wings appear to be slightly spottier than their non-migratory relatives. "Everybody knows they (monarchs) have spots, but it's never been studied before," said Andrew K. Davis, a biologist at the University of Georgia, "All of a sudden, it seems like they're really important", he added.

Scientists examined over 400 images of monarch wings from different stages of migration and concluded that the dark and white pattern reduced drag and consequently improved aerodynamic efficiency. The dark bands absorbed more solar energy, heating a layer of air directly above them, while the white spots remained cool. This influenced the formation of tiny, swirling air pockets or "micro eddies" around the spots that serve to successfully reduce air drag on the butterflies' wings, making those long-distance journeys more bearable. Remarkably, the slightest shift i.e., a 3% decrease in black and a 3% increase in white spots can mean the difference between life and death during migration.

Mimicking the monarch's spots has a multitude of aerodynamic applications. Gliders and spacecraft can achieve high altitudes and speed with minimal energy loss. Monarch-inspired patterns on wind turbine blades may potentially reduce drag and increase subsequent power generation. Drones and unmanned aerial vehicles (UAV) can shoulder large payloads and decrease energy consumption. Hassanalian, a mechanical engineer at New Mexico Tech, pitched in saying, "Your drone would be able to carry more because this coloration helps them gain extra lift". To obtain more data, scientists hope to build and operate simulations of monarch wings in test chambers that resemble wind tunnels to further scrutinize the aerodynamics involved.

For the most part, this study aimed to uncover nature's remedy that could push through limitations in current technology; while subtly answering the age-old question, where do butterflies get their spots from?

B) Photo of a monarch in soaring flight, taken by John Blair. Note the position of the forewings, which are swept back during soaring.
Davis AK, Herkenhoff B, Vu C, Barriga PA, Hassanalian M (2023) How the monarch got its spots: Long-distance migration selects for larger white spots on monarch butterfly wings. PLoS ONE 18(6): e0286921. https://doi.org/10.1371/journal.pone.0286921

FUN FACT

THE "BIG BANG" MISNOMER: THE TERM "BIG BANG" WAS COINED SARCASTICALLY BY ASTRONOMER FRED HOYLE, WHO DIDN'T AGREE WITH THE THEORY.

ONE HEALTH REVOLUTION: ECO MED'S WINNING EDGE

On the 18th of October, 2024, three students: Stephin Tomy, Akshaya B., and Anish Rao represented the Amrita School of Nanosciences and Molecular Medicine at the BEST (Biotechnology Entrepreneurship Student Teams) competition by ABLE (Association of Biotechnology Led Enterprises) and swept the board to come first in the South Zonal Contest, successfully qualifying for the National round. Seizing the opportunity our team of interviewers managed to get an exclusive from the victors. Read on to know more about their impromptu yet inspiring journey to success.

Q. How did you prepare for this competition?
"Well, it's a little funny. This guy (Stephin) came up with the idea and he pulled us (Akshaya and Anish) in. His idea and choice of polymer were good so we decided to pitch in as well. Deepthy Ma'am suggested that we enroll in the competition. We had no idea how good our proposal would be. While enrolling, during the first round we had to provide an idea. We got a chance to experiment with our idea at the time of the Zonal competition."
"The team that formed was a very good mix of various aspects.", Dr. Deepthy Menon, the team's mentor weighed in.

The slew of non-biodegradable syringes that pile up in landfills poses a momentous threat to our environment. To come up with a comparatively economical alternative using a biodegradable material was the team's primary focus.

Q.**Could you speak a few words on the biodegradable syringe that you are developing?**
"The principal polymer we used is PBAT, the cheapest form of plastic, it is also FDA-approved. As it is used in the food industry, we thought of trying it out in the medical field for one health purpose, which is to balance out the medical waste while being non-toxic to the environment."
The product was presented by highlighting the merits of such a product for our hospital. The benefits extend not only to the students and environment but also to the institution, creating a positive impact for everyone involved.

Q. How has this experience influenced your future goals?
"We learned time management and teamwork. We learned how to communicate with our superiors and how to tackle money. Since this was discrete from our actual projects, we worked on convincing them to fund our project."

Q. What challenges did you face and how did you work on them?
"We brainstormed a lot on our idea. We tried out various compositions and compounds to eventually get here."

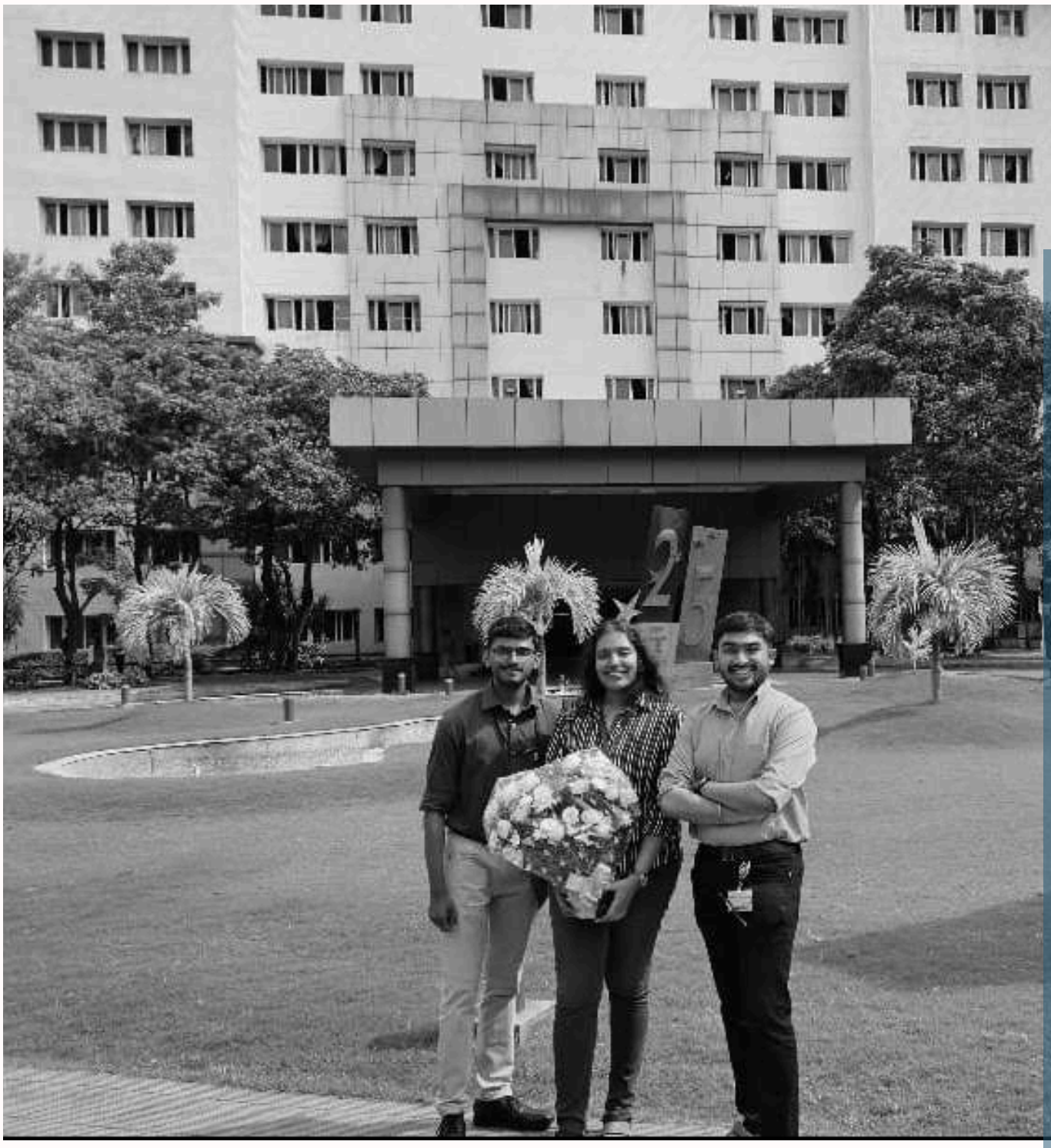
Q. How has this experience inspired you beyond your academic pursuits?
S.T: "Apart from getting funding, which had an impact on our research, we also learned how to work through issues as a team. Teamwork was one of the most important things that we learned during the process: supporting each other to balance out strengths and weaknesses."
A.R: "We learned how to effectively communicate with our superiors, like drafting emails with information and convincing them to take necessary steps."

Q. How did you focus, stay motivated on the project, and manage your time alongside other daily responsibilities?
"We dedicated at least half a day or one hour daily to the project. Since this was one of many tasks we juggled with our studies and other projects, we had to allocate additional time to it. We pulled it all together in about two months."

"This is something that steers towards a student-driven start-up."

Q. Was this project your main priority?
"No, it was just one of our priorities. We made it a point to give equal importance to others.'

"*One Health: Where sustainability meets healing. Biodegradable and eco-friendly solutions that benefit both individuals and the planet."*



"Taking the first step is always the hardest but, staying motivated, communicating effectively, sticking to your plan, and having a sound foundation all go in a stride toward real success."

Q. What was the most important takeaway from your experience with other participants?

A.R: "We realized that there are many innovative minds out there. After interacting with the other teams, we came to know that their ideas might have been even better than ours."

A.B: "From a scientific level, their idea might have been superb, but when it comes to practicality, feasibility, and execution, there must have been something in our project that helped us win."

Q. How do you think this experience will inspire the younger generation in the pursuit of success?

"The inspiration one draws from our journey is subjective. I would say that whatever idea you have, communicate it with your professors. Our Dean, Prof. Shantikumar Sir, has been very supportive of our ideas."

"You being students and we being teachers, we have a few years of training extra, and that brings in a very different perspective.", Dr. Deepthy Menon reflects. Mentors help converge ideas and they offer multitudes of support including providing contacts, guiding them on the right types of equipment, and the right place where testing can be done, all this makes mentorship crucial.

Q. What are some possible ways to motivate and ignite curiosity in younger dreamers to participate in such competitions and seek answers?

"Start by developing an idea, no matter how simple or flawed it may seem. Research the resources and gaps related to your idea and fine-tune accordingly. Apply scientific principles and communicate with your professors for guidance and feedback."

Q. Who supported you throughout this process?

"Our support was the family, friends, and professors. They formed a guiding structure that gave us varied insights, motivation, and encouragement for growth and improvement. Taking the first step is important, and such support helped overcome challenges towards success. Just remember, never look back, but keep moving forward. Our journey began with doubts and we prepared our presentation on our train to Vellore, but still with persistent efforts, we were able to win."

The team will go on to compete in the national-level contest taking place in December. Education translated to an application that benefits the greater good is what is championed by such competitions, schemes, and initiatives. Entrepreneurship contributes to a more wholesome field, combining knowledge of basic and applied science to apply basic understanding into an application. Unlike scientific research, there are many more dimensions to it. Adhering to our catchphrase "Stop Following the Crowd", we must learn to think differently and out of the box and traverse uncharted waters.

MEMORY'S TWIN PEAKS: BEGINNING AND ENDING

Time to unleash the gamer within!

By Muthulakshmi. G

Here, I have listed 10 random words, try reading them once and try to remember as many as you can:

Coffee, Thunder, Books, Camp, Humanity, Dolphine, Earphones, Magazines, Ice cream, and Friends.

After 30 seconds of reading, try to write down all the words you remember. Were the first and last few words easier to recall as compared to the ones in the middle? If so, you have just experienced the serial position effect. Let's take a closer look at the science behind this!

The serial position effect allows people to easily remember the first and last words rather than the words in the middle of a list. This term is coined by Herman Ebbinghaus. It has two effects, which are: the primary effect and the recency effect.

Primary effect: This implies that the words at the beginning of the list are easier to recall.
Recency effect: This implies that the words at the end of the list are easier to recall.

Let's understand these effects through the experiment done by Murdock in 1962:
103 students from an introductory psychology course of both sexes came forward as the participants for this study. These students were subjected to 10 – 40 lists of words. The list differs in the number of words (10, 15, 20, 30 40) and the speed at which they are presented (1 word/second or 2 seconds/ word).

The participants are assigned to six groups which differ in the number and speed of the words presented as shown in the table below:

	Seconds /Word	Number of words	Number of participants
GROUP I	2 Seconds/word	10 Words	18
GROUP2	1 Second/word	20 Words	16
GROUP3	2 Seconds/word	15 Words	19
GROUP4	1 Second/word	30 Words	19
GROUP5	2 Seconds/word	20 Words	15
GROUP6	1 Second/word	40 Words	16

FUN FACT

BANANAS ARE RADIOACTIVE: BANANAS CONTAIN POTASSIUM, AND SINCE POTASSIUM DECAYS, THAT MAKES THE YELLOW FRUIT SLIGHTLY RADIOACTIVE. BUT DON'T WORRY—YOU'D NEED TO EAT TEN MILLION BANANAS IN ONE SITTING TO DIE OF BANANA-INDUCED RADIATION POISONING

After the list was completed, the participants were asked to recall the words in any order. Participants were able to recall the first and last few words more easily than the middle words from the list.
From this experiment, Murdock concluded that the serial position of the word plays an important role in recalling it. Participants were able to easily recall the words at the beginning and end of the list while they failed to recall the words that were in the middle of the list. Hereby, he proved the primary and recency effects. How? Due to the occurrence of the Primary effect. As participants got enough time to memorize the words that were positioned at the beginning of the list, thereby, transferring them from short-term memory to long-term memory. Coupled with the occurrence of the Recency effect. As the last few words are still in short-term memory, they are easily recalled.

As the newer words are added to the short-term memory, the middle words are pushed out of the short-term memory and haven't been memorized and transferred into long-term memory. Hence, it is harder to recall or remember the middle words when compared to the first and last few words in a list.
You can see this in E-commerce websites, in which the products that are more likely to be sold are placed at the beginning/on the first page of the website. Even the first and last few links in the navigation menu are more likely to be clicked. Most important information regarding the products is placed either at the beginning or end of the product advertisement as it influences the decision of the customer.

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CURIOSITY CORNER

QUESTION

WHY IS THERE NO DAMAGE WHEN A WOODPECKER PECKS INTO WOOD WITH A G-FORCE OF 1400?

Watch out for the answer in our next edition!

FUN FACT

WHEN YOU BLUSH, THE LINING OF YOUR STOMACH DOES TOO. BLOOD RUSHES TO THE SKIN OF YOUR FACE WHEN YOU BLUSH. IT ALSO RUSHES TO THE LINING OF YOUR STOMACH.

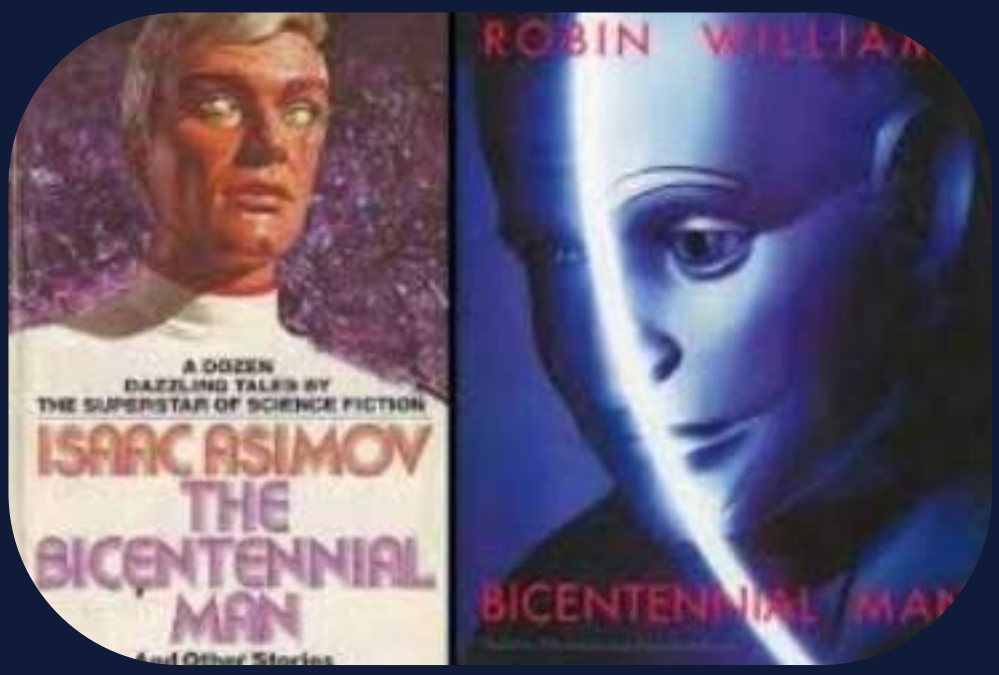
HOW AI IS CURRENTLY INFLUENCING THE ADVANCEMENTS IN UNDERSTANDING NEURODEGENERATIVE DISORDERS?

Using AI to operate in our brain?

by Meenakshy By Meenakshy Sreekanth

Humble History of Artificial Intelligence

Artificial Intelligence (AI), labelled as the "latest" or mainstream technology has existed for more than a decade. From Issac Asimov's fictional stories such as the 'Bicentennial Man', the term Robot or automation was known. During the late 1900s 'Gakutensoku', a robot created by Japanese scientist Makoto Nishimura, was utilised to show human expressions, which can be called the humble beginning of the advanced technology that we have nowadays. During the 1950s, Alan Turing revolutionised the concept of Machine Intelligence, in his publication COMPUTING MACHINERY AND INTELLIGENCE, published in October 1950. He pertained to the concept of "Can machines think?". At that time, this question was a bit controversial, as it can lead to the thought that one day machines can end humanity.



Issac Asimov's Bicentennial Man

In 1955, John McCarthy coined the term 'Artificial Intelligence' during a workshop at Dartmouth College. McCarthy then invented LISP (List Programming) which is the foremost programming language used for AI. McCarthy is now known as the father of Artificial Intelligence and has won the prestigious ACM Turing Award (1971). Then the various applications of AI originated starting from Watson by IBM, and Siri by Apple and the latest and most popular application of AI, which is known by almost everyone is ChatGPT by OpenAI.

AI is known to decipher many challenges which mainly require creativity. Philosophers once proclaimed that creativity is something that is unique to us humans. But in the current era, we cannot abide by the statement, as the 'Impossible paintings' of Vincent van Gogh were easily regenerated using AI. This is just a glimpse of what AI is capable of, even brain tumour detection is just a piece of cake for this revolutionary technology.

The human brain is one of the most mysterious yet unique organs that we carry. It is believed to make us who we are, carrying our memories, personality, and preferences and even control our heartbeat, hunger, sadness, happiness, and whatnot. It is indeed a peculiar organ, as we do not know many mechanisms and science behind our so-called 'memories'. Apart from its uniqueness, lies serious problems which are the disorders associated with it.

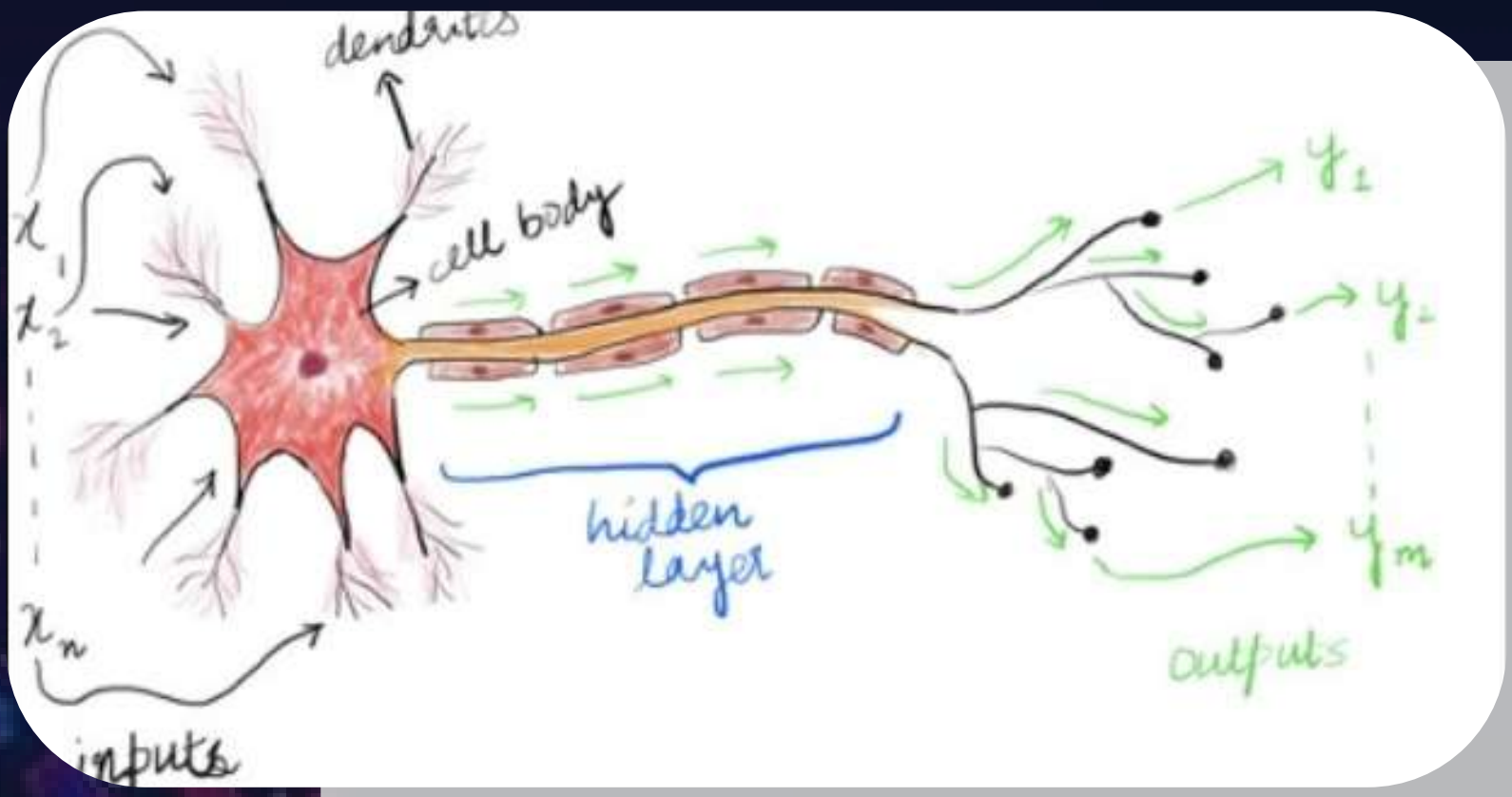
An insight to Neurodegenerative Disorders

Neuro-de-generative disorders (NDD), as the name implies degenerate neurons or the structural and functional unit of the brain. Neurons cannot be regenerated like hepatic cells, hence when a significant number of neurons is lost it can show adverse effects on the quality of life. Effects include decreased cognition, motor abilities, and diminished memories. Despite the immense research in modern medical science, an effective solution is extremely challenging in both Therapeutics and surgery. Diseases such as Alzheimer's (AD) and Parkinson's (PD) are the most known and popular NDDs and they impact many families, these disorders are not easy for the individual or their loved one.
The main notion of this is to decipher how Artificial Intelligence can decrease disease progression or improve the quality of life of people diagnosed with NDDs.

How AI is influencing current Research in Neurodegenerative Disorders?

From predicting seizures to being a tool in localisation for neurosurgery, AI is indeed impacting neurosciences with its accuracy and versatility. It is widely used in CAD (Computer-Aided Detection) and successful AI models have been deployed to detect the alterations present in the radiographic images of suspected AD patients. Most importantly, AI is very much used in large-scale data processing and research for further information on how to manage NDDs. AI indeed holds great promise in disease detection, Intraoperative Assistance, Post-operative monitoring, and Robot-Assisted Surgeries. But it is also important that we consider the ethical notions behind this technology such as consent and to ensure data privacy.

IBM Deep Blue playing Chess against Garry Kasparov, Russian Chess master.



Neurons and Artificial Neural Network- Similarities

Neuroscience coupled with AI is a dynamic and novel approach, which is expected to have many exciting advances in the future that could potentially help individuals and families struggling with the effects of NDDs.

Winding up

In conclusion, the journey of Artificial Intelligence (AI) from its humble beginnings, marked by early robotics and Alan Turing's groundbreaking concepts, has evolved into a revolutionary force influencing various aspects of our lives. One of the most promising and impactful applications of AI is its role in understanding and addressing neurodegenerative disorders (NDDs).

AI has emerged as a powerful ally in the battle against Neurodegenerative Disorders (NDDs). From predicting seizures to aiding in neurosurgery localization, AI's accuracy and versatility are transforming neuroscience. In particular, AI plays a crucial role in Computer-Aided Detection (CAD), detecting alterations in radiographic images associated with suspected Alzheimer's patients. Large-scale data processing and research benefit from AI's capabilities, offering insights into NDD management.

The promise of AI extends beyond disease detection to intraoperative assistance, post-operative monitoring, and robot-assisted surgeries, ushering in a new era of precision and efficiency in neurosurgical interventions. However, ethical considerations, including consent and data privacy, must be paramount in the integration of AI into healthcare practices.

As AI and neuroscience forge ahead, the novel approach holds exciting prospects for future advances. The collaborative efforts between AI developers, healthcare professionals, while integrating ethical considerations, ensure that this technology contributes meaningfully to alleviating the burdens of individuals and families grappling with the effects of neurodegenerative disorders.

Molecules that pass the vibe check

01 Hydrogen

The Atom of the Molecules
by **Dr. Shantikumar Nair** and **Dr. Laxman Raju Thoutam.**
Liquid hydrogen is used as rocket fuel due to its high density.
When it is combined with liquid oxygen, it creates a powerful thrust with which a rocket can be pushed forward.

02 Myelin

Love for Biochemistry
by **Dr. Krishnakumar Menon**
Myelin is the brain's "INTERNET SPEED BOOSTER"!
Without it, nerve impulses would crawl along at 2 miles per hour, but with myelin, they can zoom up to 260 miles per hour.

03 Chitosan

Science's Lego Block
by **Dr. Jayakumar**
Chitosan acts as a natural pesticide and plant growth enhancer, strengthening plants' immune systems against diseases.

04 Glucose

The Sweet Energy Source of Life
by **Dr. Deepthy Menon**
The name "glucose" comes from the Greek word glykys, which means "sweet". It's also known as dextrose.

05 Serotonin

The Happy Molecule
by **Dr. Gopi Mohan** and **Dr. Dhanya Narayanan**
Serotonin is the precursor for melatonin production, controlling our sleep-wake cycle - the circadian rhythm.

06 Peptidoglycan

The Bacterial Armour
by **Dr. Raja Biswas**
Bacteria produce enzymes called autolysins that degrade their own peptidoglycan to remodel cell walls during growth or division.

07 Nucleic Acids

DNA AND RNA - Person and their Personality
by **Dr. Lalitha Biswas** and **Dr. Lekshmi**
Scientists have extracted DNA from ancient fossils and even space dust collected from outer space, which proves that DNA can survive in extreme conditions for billions of years. RNA can undergo editing even after transcription from DNA.

08 p53

The Guardian of the Genome
by **Dr. Bindhu Paul**
“It’s easy to get to the top of the mountain, but harder to stay there.” p53 is crucial for cellular stability, but its frequent mutations in cancer highlight the ongoing challenge of maintaining that stability.

09 Oxygen

You need it to live
by **Dr. Binulal Nelson Sathy**
Oxygen was first discovered in the late 18th century by multiple scientists, including Joseph Priestley and Carl Wilhelm Scheele, who independently identified it as a distinct element. Antoine Lavoisier later named it "oxygen," meaning "acid former," due to its role in forming acids.

10 Oxytocin

The Love Hormone
by **Dr. Maya Sreeranganathan**
Listening to music not only elevates mood but can trigger oxytocin release, making it a powerful tool for enhancing emotional bonds.

MEANWHILE IN A LAB FAR FAR AWAY...

LABYRINTH OF SCIENCE: CRACK THE CODE

ACROSS

4. Stem cell's highest potency level

5. Body's response to infection or injury

8. Educational guess in science

10. Antigen presenting cell

DOWN

1. Environmental influence on genes

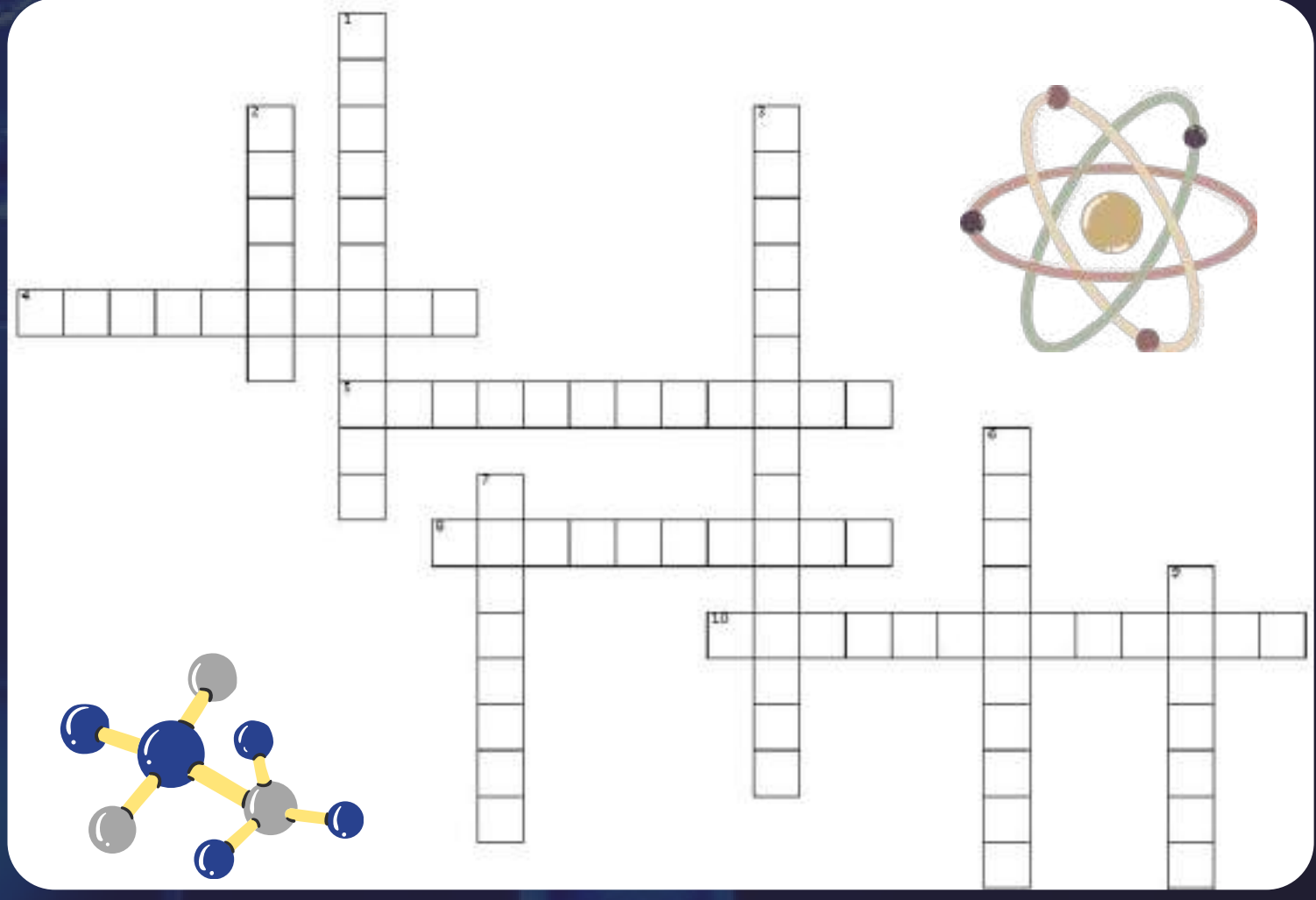
2. Popular computer programming language

3. Natural emission of light by living organism

6. Semiconductor nanoparticle that fluoresce

7. Glycolysis product

9. Unprogrammed cell death caused by injury



A NEW KIND OF MITOCHONDRIA

By Richard Jome

It may surprise you to learn that both of these structures are mitochondria. Like everyone else, researchers were taken aback by the discovery that mitochondria could develop into specialized subpopulations. It turns out that there are two types of mitochondria, which may help explain how they can simultaneously synthesize vital cell building blocks and generate energy even in the face of scarce resources.

Mitochondria are known as the powerhouse of the cell. They are responsible for the bulk of our ability to make ATP. But it's become clear over the last few years that that's not all they do. Mitochondria are essential for other things in our body, and that is synthetic reactions that build the building blocks of proteins and lipids that allow us to engage in cell division and cell repair.

Now, that makes sense when there are plenty of resources around. But when resources are limited, such as if a cell is damaged, that's hard to explain. When the mitochondria are depleted of the nutrients required to produce ATP or engage in the creation of molecules as precursors, they must decide whether to burn it to CO2 and water, which they cannot recover or to use those molecules as building blocks with the same energy that would otherwise be used to produce ATP.

FUN FACT
COSMIC MICROWAVE BACKGROUND (CMB): THE FAINT GLOW OF RADIATION FROM THE BIG BANG STILL PERMEATES THE UNIVERSE. THIS “AFTERGLOW” IS JUST 2.7 KELVIN (-270.45°C) TODAY.

So, to figure out how this is possible, Craig and the team took cells and starved them of resources. When they did so, they found that the mitochondria were separating into two very different subpopulations. One is an expert in making ATP and looks quite familiar to the one you know from school. So, the mitochondria that are enriched in ATP synthesis become the perfect mitochondria that you want to put in a textbook to explain how mitochondria are an energy factory.

The other was less textbook-ready, but they were experts at making the cell building blocks. The other population actually still has the double membrane of classic mitochondria, but it's filled with filaments of proteins. These proteins seem to be key, as Craig in the team narrowed down what was allowing this division of labour to one specific protein that is at the centre of these filaments.

There was one linchpin protein that was necessary to make the judgment between these two pathways. That gene has a terrible name and no one knows much about it. It's called pyrroline-5-carboxylate synthase. And these two types of mitochondria may be key to helping researchers understand things like cancer.

In severe cancers, as they grow, the tumor cells acquire these segregated mitochondria that allow them to maintain their growth. Linking this strange mitochondrial behaviour and cancer will need more work, which Craig and the team are pursuing. But for now, it's fair to say that these little organelles that we all know from school are a lot more complicated than we thought, and likely have more mysteries to uncover in the future.

SCIENCE MEETS SENSATION: THE NEW ERA OF BIONIC LIMBS

Researchers are looking into innovations in brain implants, neural interfaces, and skin transplants to help people with paralysis or amputation regain sensation. Bionic limbs have been helpful to amputated patients. However, they still face challenges due to a lack of natural sensation and discomfort.

By Anjusha P.S and Anakha K.A

JOURNEY THROUGH BRAIN IMPLANTS

Scott Imbrie almost lost his life in 1985 because of a major car accident. He shattered 3 of his vertebrae and severed 70% of his spinal cord, because of which he had limited sensation or mobility in several parts of his body. Thanks to scientists who introduced the Implanted "Brain-Computer Interface" (BCI), now Imbrie can use a robotic arm to receive sensory information according to what his arm is doing. This was a result of the immense hard work of scientists to pave the way for people with missing or paralyzed limbs
to restore lost sensation.

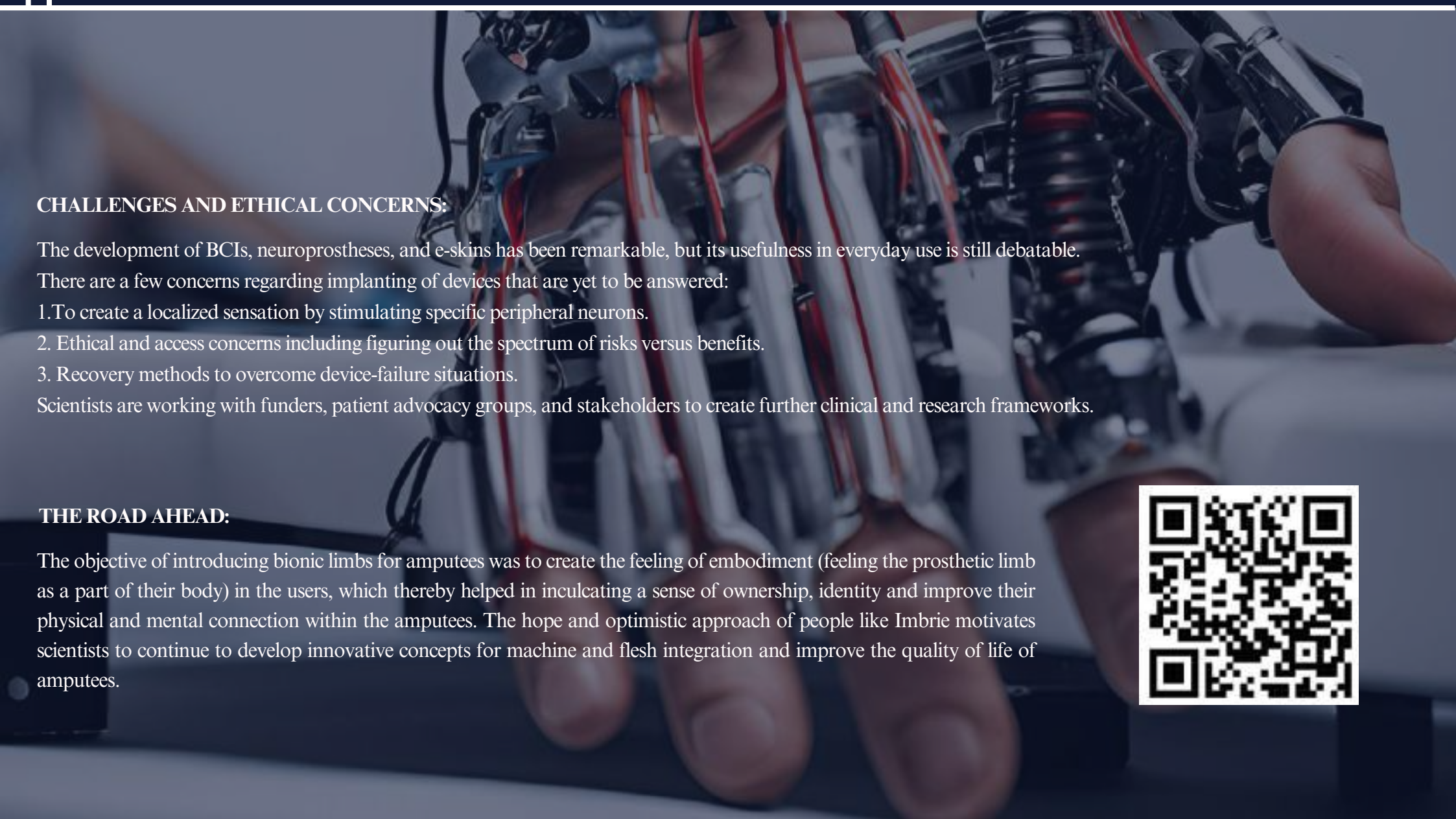
EMBODIMENT AND PROPRIOCEPTION

While scientists focused on implementing every aspect of somatic sensation, Hugh Herr, an engineer from MIT, Cambridge, prioritized restoring those sensory inputs that improve mobility and function in prosthetic limbs. The amputated patients should feel that the prosthetic is a part of their body- a sensation called Embodiment. His team attempted to regrow sensory nerves and integrate them with prosthetic limbs. This has shown a promising approach in clinical trials, providing users with a sense of limb positioning also known as Proprioception.

Reducing phantom limb pain by peripheral nerve stimulation enhances its efficiency. This is important because when amputees experience natural sensation from prosthetic limbs with little to no error, it gives them a sense of ownership. This leads to an improvement in the psychological condition of amputees.

THE FUTURE OF E-SKIN (ELECTRONIC SKIN)

Zhenan Bao, an engineer from Stanford University is working on e-skin, a synthetic material that can mimic human skin's sensory capabilities and also communicate with the nervous system by generating signals. These materials help prosthetics feel more lifelike than ever.



CHALLENGES AND ETHICAL CONCERNS:

The development of BCIs, neuroprostheses, and e-skins has been remarkable, but its usefulness in everyday use is still debatable.
There are a few concerns regarding implanting of devices that are yet to be answered:

1.To create a localized sensation by stimulating specific peripheral neurons.

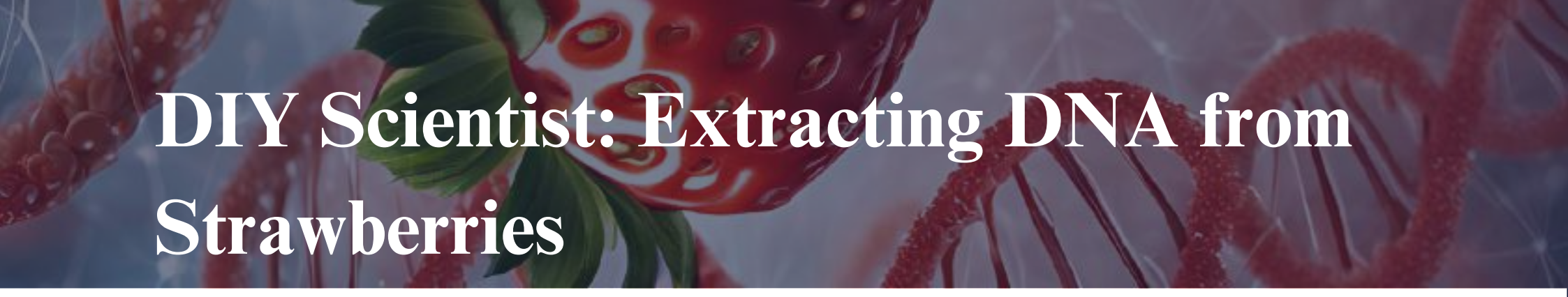
2. Ethical and access concerns including figuring out the spectrum of risks versus benefits.

3. Recovery methods to overcome device-failure situations.

Scientists are working with funders, patient advocacy groups, and stakeholders to create further clinical and research frameworks.

THE ROAD AHEAD:

The objective of introducing bionic limbs for amputees was to create the feeling of embodiment (feeling the prosthetic limb as a part of their body) in the users, which thereby helped in inculcating a sense of ownership, identity and improve their physical and mental connection within the amputees. The hope and optimistic approach of people like Imbrie motivates scientists to continue to develop innovative concepts for machine and flesh integration and improve the quality of life of amputees.

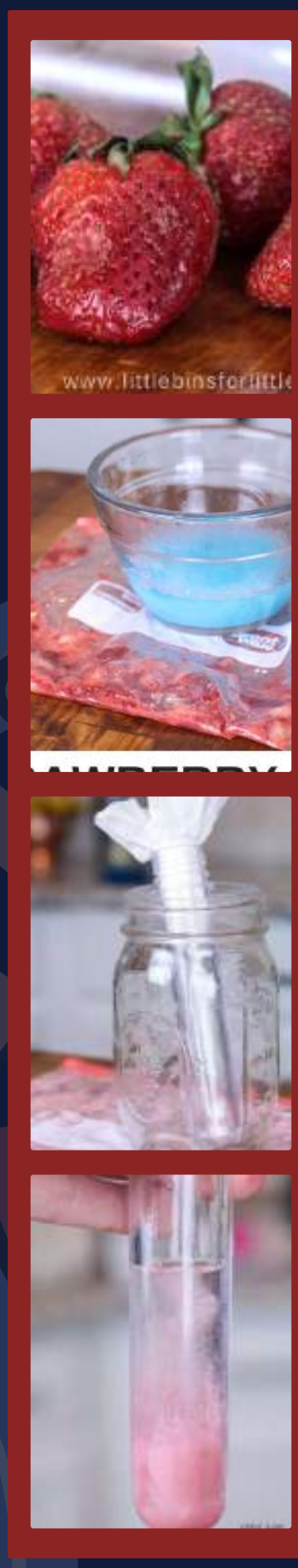


DIY Scientist: Extracting DNA from Strawberries

Hey there, readers! You've already mastered the art of extracting DNA from bacteria, so let's kick it up a notch and extract some DNA from something a little juicier — strawberries. It's a simple, yet impressive experiment that's perfect for your kitchen lab. Plus, strawberries have a ton of DNA, which means you'll get a great yield, making it feel like you've discovered the secret to life itself (or at least part of it). Ready to take a bite into this fruity science? Grab your lab coat — or apron — and let's get started!

MATERIALS REQUIRED:

- 1 ripe strawberry (preferably organic, but we're not picky)
- 1/2 cup of water
- 1 teaspoon of salt
- 1 teaspoon of dish soap (yes, dish soap!)
- A coffee filter or cheesecloth
- Ziplock bag (a sturdy one, not the flimsy kind)
- A clear glass or plastic container (a clean glass jar works fine)
- Rubbing alcohol (freezer-cold is best)
- A pair of tweezers or something to collect the DNA (or anything that looks like it could be a makeshift science tool)



STEPS

1. Mash up the strawberries in a zip-lock bag (think of it as squashing a strawberry smoothie).

2. Mix 1/2 cup of water, 1 teaspoon of salt, and a tiny squirt of dish soap — this is your extraction buffer (don't drink it, though).

3. Add the extraction buffer to your mashed strawberries and mix gently, being careful not to break any precious DNA too much.

4. Strain the liquid into a clean glass, making sure you leave the big chunks behind.

5. Slowly pour cold rubbing alcohol into the glass (the DNA will clump together at the alcohol-water interface — it's like a science magic show)

6. You can wrap the stringy DNA around the tweezers or simply pick it up with your hands (assuming you're ready for that level of scientific intimacy).

There you go, team—no centrifuges, no fancy reagents, just a strawberry, some soap, and a bit of alcohol. You've just had a DIY DNA extraction, and we think that deserves a round of applause (and maybe a strawberry smoothie). Until next time, keep experimenting, keep learning, and keep being awesome scientists!

THE FUTURE OF HEALTHCARE: A RACE AGAINST RESISTANCE

Find more about the origins, effects, and remedies of antibiotic resistance.

By Nandana Udayan

Imagine a world where common infections become life-threatening. That's the reality, we are faced with antimicrobial resistance (AMR). One of the biggest risks to global public health in this century is antimicrobial resistance (AMR).
What is AMR? The effective prevention and treatment of an ever-increasing range of infections caused by bacteria, parasites, viruses, and fungi that are no longer susceptible to the common medicines used to treat them is threatened by antimicrobial resistance (AMR).

The issue is made worse by the proliferation of resistance genes among other microbes. The spread of AMR poses a danger to the advancements in the treatment of infectious diseases and may have significant repercussions for global public health and healthcare systems. Effectively treating infections is getting harder as bacteria, viruses, fungi, and parasites develop more resistance to drugs. With the development of new antibiotics like methicillin, erythromycin, and tetracycline, after the pencillin resitance there was renewed optimism that infectious diseases could be defeated.

However, the issue of bacterial resistance surfaced once more. Methicillin-resistant Staphylococcus aureus (MRSA) was originally discovered in a case in 1962. There have also been reports of some bacteria becoming resistant to other antibiotics.
How do we prevent AMR? Avoid unnecessary antibiotic use, as they can contribute to resistance. Practice good hygiene, like frequent hand washing, to prevent infections. And most importantly, get vaccinated to protect yourself from preventable diseases.

FUN FACT

ELEPHANT CANCER IMMUNITY: ELEPHANTS RARELY GET CANCER BECAUSE THEY HAVE 20 COPIES OF THE TUMOR-SUPPRESSING GENE TP53 (HUMANS HAVE ONLY ONE).

GENETIC CHOICES: WHAT ANGELINA JOLIE AND THE CRISPR TWINS TEACH US ABOUT THE POWER AND RESPONSIBILITY OF GENETIC INTERVENTION.

By Anusree Manoj

Genetic therapies involve interventions that target our genome to address and potentially cure defective parts of its DNA. Compared to conventional treatment strategies that often carry undesirable side effects, genetic therapeutics offer a promising future by directly modifying our gene defect inside the body (in-vivo) or outside (ex-vivo) before reintroducing the corrected cells. Thus, through genome editing, precise correction of the defective DNA parts can be achieved- thereby solving the root cause of diseases that were once thought to be untreatable.

However, the journey from theory to practice is far from straightforward. The complexity of the human genome, the challenge of targeting specific cells, and ethical considerations all pose significant hurdles. This article aims to spread awareness about the significance of informed choices, bio-ethics, and the potential of CRISPR technology.

THE CASE OF LULU AND NANA

CRISPR/CAS-9, a genetic tool that allows precise cutting and modifications of DNA at specific sequences is widely used due to its simplicity, and efficiency and can theoretically cure genetic disorders. However, in November 2018, a Chinese scientist claimed to have cured HIV in twins during the embryonic stage. While this raised hopes, it also sparked global outrage and ethical concerns. The creation of genetically modified embryos, though common in plant and animal research, crosses ethical and scientific boundaries when applied to humans which is why the birth of the twins is not a technical breakthrough but represents a crossing of ethical and scientific boundaries.

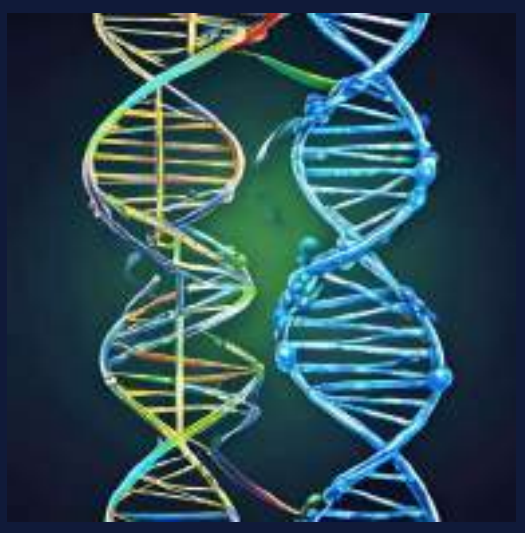
The CRISPR/CAS-9 technology, still in its infancy requires plenty of research and trials before it can be practiced without any risks. For example, the off-target effects are bound to happen and will generate undesired effects such as cancer and cardiovascular diseases. However, if no such changes occur (which is still unknown), the girls can develop protection against HIV infection and most importantly they will be able to transmit this trait to their children.

Furthermore, several scientists pointed out major issues with this experiment, the most prevalent one being mosaicism, where the gene edits were non-uniform which implies that they could still be fully vulnerable to HIV.

Even more troubling is that the twins were reportedly not at risk of developing HIV to begin with. The babies were two living human beings, and potentially their descendants too, will now have to face the consequences of this controversial experiment.

Casgevy is the first FDA-approved therapy utilizing CRISPR/Cas9 for SCD. In clinical trials, CRISPR-based therapies are being used to treat Neurological, blood, and autoimmune disorders, cancers, and other infections. As quoted by a professional, “At this point, all hypotheticals, the words ‘potentially’ and ‘could’ or ‘in principle’ are gone, CRISPR is curative.”

In addition, the designer twins are the ONLY real-world example of human germline gene editing gone awry, and worryingly, some individuals want to push the boundaries and carry out similar experiments. As gene editing continues to advance, it pushes ethical and social boundaries, underscoring the need for thoughtful discussions around fairness, accessibility, and privacy.



GENETIC TESTING OF ANGELINA JOLIE

The actress’s decision to undergo testing was influenced by her family history where many women had been affected by cancer at some point in their lives. The test results showed that she had mutations that significantly increased the risk of developing breast and ovarian cancers for which eventually she chose to undergo preventive treatments. This is a practical example of how making informed decisions at the right time can help treat lethal diseases that may develop in the future.

Personally speaking, I support DNA forecasting because of the valuable insights I will gain about my future health. However, many people that I have encountered in life are hesitant about gene testing, they prefer to live in the present, free from the worries of a potential disease that may not manifest or have no cure. Therefore, people have the right to choose to know, to not know, and to keep their genetic information private or public. Knowledge is a powerful tool and for some, they would want to know about their predisposition to such conditions as it provides an opportunity to prepare for the worst. However, for the others, this knowledge might just bring unnecessary anxiety.

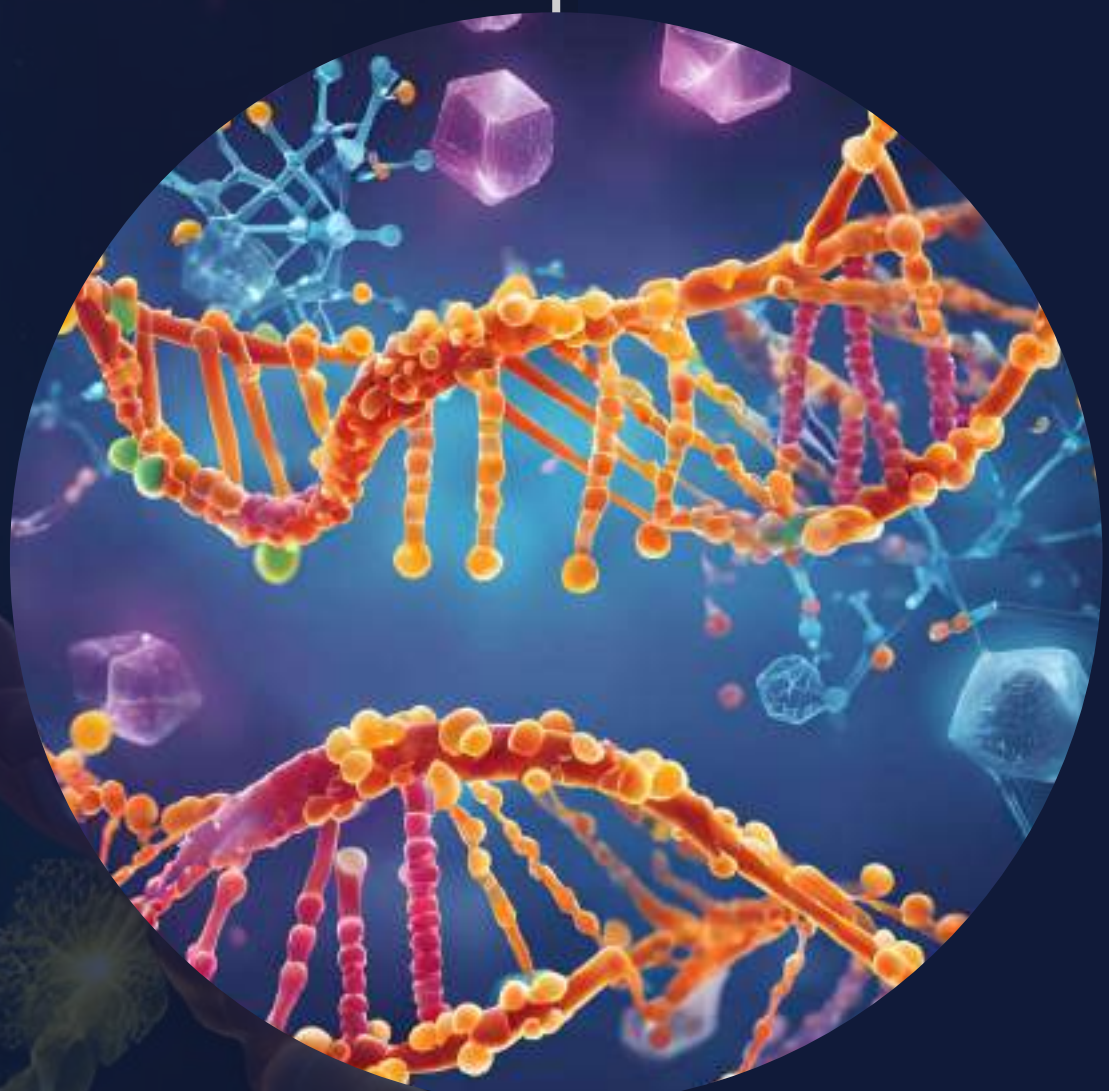
Let’s take the example of Alzheimer’s disease, a condition that progressively robs a patient of their memory, eventually rendering them an inability to even recognize their loved ones. The condition is known for being profoundly heart-wrenching for the caregivers. It takes an emotional toll on the family from seeing their loved one gradually lose their connection while the affected person is largely unaware of his or her actions or words.

In the given context, should patients keep their results confidential, especially if it could affect the emotional well-being of the family?

Genetic testing not only affects the individual but can also have serious implications for the family members. It can encourage family members to undergo testing, potentially saving lives or can allow their family to prepare emotionally and financially for what comes next while exploring preventive lifestyles or experimental therapies.

On the contrary, if one family member is found to have a genetic predisposition, others may feel pressured to undergo testing themselves. Revelation of such information can also affect their professional life and raise questions about fairness, accessibility to insurance, and discrimination. Ultimately, the decision to undergo genetic testing is personal and requires sensitivity and respect for individual boundaries.

Both genetic testing and CRISPR gene editing techniques raise ethical and personal concerns. Balancing scientific advancements for individual choice and responsible policies is crucial for their ethical applications.



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FUN FACT

FROGS AND ROCKET FUEL:
THE SKIN SECRETIONS OF CERTAIN FROGS HAVE BEEN STUDIED FOR THEIR ABILITY TO HELP BREAK DOWN ROCKET FUEL, SHOWCASING AN UNUSUAL BIOENGINEERING APPLICATION.

GET, SET, CERTIFICATIONS !

INTERNSHIPS IN INDIA

1. *CSIR-IGIB*: provides opportunities for internship/training to students with good academic records as well as interest and aptitude in research. The Maximum duration of the internship/training can be up to one year.

2. *SUMMER RESEARCH FELLOWSHIP PROGRAMME (SRFP) JNCASR*: This is a flagship program of the JNCASR, introduced in 1991. The admitted students are given a fellowship of Rs. 10,000/- per month. Students pursuing UG/PG programs in the disciplines of Science/Engineering/Technology/Medicine/Veterinary Sciences are eligible to apply.

3. *NGSF Internship Program 2024*: Next Gen Scientists Foundation (registered under the Trust Act of India 1882)offers an opportunity to fund internships for undergraduate and postgraduate students who wish to gain research experience in life sciences.

4. *ILS Training Program*: Candidates interested in pursuing Short-term training (1-3 months) or Master's thesis dissertation projects (4-6 months) are required to contact individual scientists and write a formal email to them showing their interest in working in their respective lab.

INTERNATIONAL INTERNSHIP OPPORTUNITIES:

1. *France Excellence Charpak Summer Training Scholarship*: This program is designed for Indian students enrolled in an Indian institution at the Bachelor's or Master's degree level, planning to undertake a short-term internship or research project at a French laboratory or institution during their academic break (between May and August).

2. *Khorana Program for Scholars*: The Department of Biotechnology (DBT), Govt. of India, Indo-U.S. Science and Technology Forum (IUSSTF) and WINStep Forward are partnering to support the prestigious Khorana Program for Scholars named in honor of Dr. Har Gobind Khorana, who won the Nobel Prize in 1968 for his work at the interface of Chemistry and Biology while a member of the University of Wisconsin-Madison faculty. The Khorana Program will provide opportunities for Indian students to get research exposure at leading U.S. universities over the summer of 2025 for 10-12 weeks.

3. *The Max Planck Institute for Human Cognitive and Brain Sciences*: They are happy to offer internships to students of disciplines relevant to the Institute's research. Core computer skills are essential, as preparation, conducting, and analysis of experiments are all computer-based. A good command of English would also be of advantage - the working language at the Institute is English, and most papers are published and presentations are Held in english.

EDITOR'S NOTE

One of the earliest and most endearing impressions, from our journey of creating our first issue, was taking in the astounding amount of content that flowed in from all domains of our department. Our newsletter is meant to be a platform for students and members of our department alike to share their scientific insights, thoughts, and prowess. It was a pleasure uncovering the creative side of STEM and collating all the innovative input to create the ideal newsletter. If you just discovered our newsletter, we trust our content resonates with your enthusiasm and augments your intrigue to learn more. Like all the greats, we aim to leave you with more questions than answers (you're welcome). And lastly, we sincerely hope you enjoy reading our newsletter as much as we enjoyed creating it.

Onward to new frontiers,
Lakshmi Preethi and Diya Rajesh Krishnan

Email:
Think you've found the next frontier? Share it with us at
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OUR TEAM - NOV 2024

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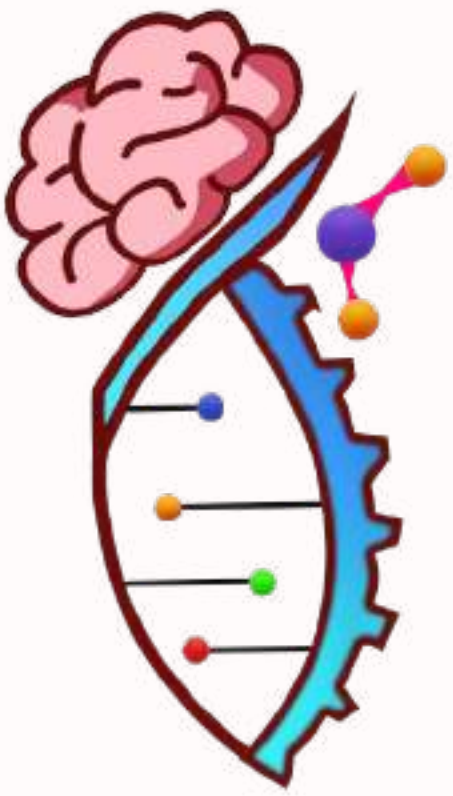
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