Imprint Vol III Issue III

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IMPRINT

NIBMG in Bits & Bytes

Scientist Talks

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NIBMG GHIBLIFIED

DESIGN BY VINAY, JYOTISHMAN & DIVYANK

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FROM THE RESEARCH OFFICE

Dr. Alpana Dave

The past few months have witnessed the announcement of the 2024 Nobel Prizes in Physics, Chemistry, and Medicine—each recognizing groundbreaking discoveries that are shaping the future of biomedical research. The Nobel Prize in Physics honored advances in artificial intelligence and neural networks, Chemistry celebrated innovations in protein structure prediction, and Medicine acknowledged the pivotal discovery of gene regulation by microRNAs. These awards highlight the power of interdisciplinary research and its potential to unlock new frontiers in science.

To further promote interdisciplinary research and collaborations, we organized conclave with IISER-K and a symposium on Infectious diseases which saw distinguished members from the Indian scientific community engaging in stimulating discussions and fostering partnerships. We also celebrated our Institute Day with great enthusiasm, marking another milestone in our journey. We are delighted to share the initiation of four new grants funded by four different funding agencies namely, DBT (PI: Dr. P.B. Raghavendra), WB-DBT (PI: Dr. Souvik Mukherjee), Tata Trust (PI: Dr. Nidhan K. Biswas) and GCI-BIRAC (PI: Prof. Arindam Maitra).

This issue of IMPRINT, features an insightful interview with Prof. Sandeep Singh in the Scientist Talks where he talks about stories from his lab and reflections from his personal journey. As in previous issues, we showcase our research achievements, events and range of activities in these past months in this Newsletter.

We hope you enjoy reading it- do not miss the crossword at the end!

SCIENTIST TALKS

UN-SCRAMBLING WITH SANDEEP

What inspired you to pursue cancer research - personal experience, curiosity, or a key moment in your studies? After all these years, what still fascinates you about cancer biology?

My entry into cancer research was quite unexpected. Back in 2001, I had applied for a PhD at NCCS, but I missed the email informing me that I was selected. With no personal email access and no mobile phone, I only found out because a senior spotted my name on the list and tracked me down through a neighbor's landline! By the time I joined, most labs were already assigned, and I ended up in a cancer lab - so in a way, cancer research chose me. Over the years, the field's constant evolution, from gene cloning to spatial biology, has kept me motivated. Every new tool allows us to answer questions we once couldn't, making the pursuit of understanding cancer endlessly exciting.

You've lived and worked in so many different places—Varanasi, Shimla, Pune, the U.S., and now Kalyani. If you had to rank them based on food, weather, and overall vibe, which place wins in each category? Also, any travel memory that stands out—whether it's an adventure, a cultural shock, or a funny incident?

I have spent all my childhood in Banaras, so that's the most important and fascinating place for me. We used to sit on the ghat for hours, just enjoying the wind and chatting. Those school-time memories are the best. In Shimla, I had this routine every Sunday afternoon where I'd take a bus from my hostel in Summer Hill, sit on the last seat, and just enjoy the music and weather during the ride to wherever the bus went—Kufri or some other place and then return the same way. I did that for two years and loved it. So for journey and vibe, Shimla wins. Food-wise, Pune is the best. It has a strong restaurant culture. We had a mess at NCCS that was run by students, and every Saturday when the cook had the night off, everyone went out to eat. The U.S. was the most boring, very monotonous. Everything looks and feels the same, only the monuments differ. As for Kalyani, I like its slow pace. It reminded me of Tampa, where I did my postdoc—small colonies, greenery, little traffic. When I came to Kalyani, it had no multiplex, hardly any restaurants, just a calm and quiet vibe, which I really liked. Still today, it has only one traffic light! So yeah, everywhere I've been, I've tried to enjoy. The bottom line is, you should enjoy wherever you are.

PC- VINAY MORE

What was your 'Aha!' moment in choosing science - an experiment, a mentor, or something else?

When I joined NCCS for my PhD, many new faculty members had also just started, and I got to witness firsthand how they built their labs from scratch - empty rooms gradually filling with instruments, students, and ideas. Seeing their enthusiasm and interactions with students was inspiring, and I knew I wanted to follow the same path. One key lesson I learned early on was the importance of research funding; the labs producing groundbreaking papers in Nature and Cell had strong financial support and cutting-edge technology. That realization motivated me to pursue research abroad, gain experience, and eventually return to establish my own lab.

Science Twitter is full of memes about grant rejections, peer reviews, and PhD struggles. Do you secretly browse these memes for fun? If you had to describe your research career so far in a viral meme format or hashtag, what would it be?

Yeah, actually I didn't really know that these kinds of memes existed until recently. But when I was doing my postdoc, there was this website called PhD Comics which was very famous back then. I had a subscription and used to get a comic every day, and we really enjoyed those. These new memes, I think, are a bit overrated. They sometimes show things that may not be very realistic.

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But PhD Comics felt very real. One cartoon I still remember was about different types of mentors, like one was called the “slave hunter,” and another was “control freak.” I think if I had to pick a hashtag then it would be “#ControlFreak” because I really like to see a “Control” before any experiment is shown to me!

You’ve mentored and taught many students - what’s the funniest or most unexpected question a student has ever asked you? Also, if you could give your PhD students one ‘life hack’ to survive research, what would it be?

Most of the time, students don’t ask me funny questions - they only come with tough ones! But I do remember a funny moment from my own PhD days. I was new in the lab, learning how to draw blood from mice for glucose estimation. There’s a technique where you use a tiny capillary tube to collect blood from the eye. One day, I walked up to my PhD supervisor and confidently said, “Sir, I need mice for bleeding.” He looked at me for a second and then asked, “You need mice for breeding?” - and that was it! He had this knack for turning things into a joke to keep the lab environment light and fun, and to this day, I remember that moment clearly.

As for a PhD life hack, I’d say: trust your experiments! When results don’t match your expectations, don’t immediately think you did something wrong - repeat it, observe carefully, and rethink your hypothesis. Some of the most unexpected results can lead to real discoveries. If you doubt yourself too much, you’ll just keep discarding valuable data. So, stay curious, stay patient, and most importantly, enjoy the process!

What does a typical day in your life look like? Are you an early morning person who starts the day with yoga, or do you rely on five cups of coffee to survive? Also, do you believe scientists can ever truly achieve work-life balance, or is that just a myth?

Oh no, not five cups—just one cup is enough! My mornings start with sending the kids to school. After that, I give myself 30–40 minutes for some fitness exercises. So the morning is very simple and regular. But yes, I believe you should give at least 30–40 minutes every day to yourself, whether it’s yoga, pranayam, or any kind of exercise.

As for work-life balance, I think it’s not a myth at all. It's always there. It’s not like you’re working all the time or always having fun. For example, in the U.S., my kid was very small and in day-care, which closed at 6:30 p.m.

That meant I had to finish work by then and go pick him up. So how could I work till 8? You just need to plan your day properly. It’s only in the mind that there’s no balance. Even at home, if you get some free time, just read a good paper before sleeping, that’s enough. Science is a profession you choose, nobody forces you into it.

Did your family support your decision to pursue a PhD, or did they hope you'd become a doctor or engineer?

My parents never forced me to become a doctor or engineer. I did appear for the pre-medical test (PMT) and even got admission to a medical college after my second attempt. But by then, I was already pursuing my BSc, and when I also cleared my MSc entrance, we decided I should continue in that direction. So, I went ahead with MSc, and then naturally, PhD followed. My father himself had done an MSc in botany, so in our family, there was never any pressure to become a doctor. If you have a doctor in the family, sometimes it feels like a compulsion for at least one child to follow that path, but for us, that was never the case.

Every researcher has that one bad lab day—when experiments fail, reagents go missing, or equipment refuses to cooperate. During your PhD, how did you deal with those frustrating moments? On the flip side, what was your most memorable or cherished experience with your PhD guide that still brings a smile to your face? Looking back, how did your postdoctoral journey shape you into a more mature and independent researcher? If you could go back and give your younger PhD self one piece of advice, what would it be?

My PhD guide was very supportive and gave me a lot of freedom. If something wasn’t available in our lab, I didn’t need to ask for permission to get it from another lab. He gave me the freedom to talk to anyone. I actually learned how to be a good mentor from him. He showed me how important it is to be approachable and kind, both as a scientist and as a mentor.

Looking back, my postdoctoral journey really shaped me into a more mature and independent researcher. I had always wanted to work on developmental biology, and by the time I started my postdoc, cancer stem cells were just emerging as a new area. My mentor attended the AACR meeting that year where he heard about cancer stem cells. On returning, he was very excited about this work and encouraged me to start working on it.

SCIENTIST TALKS

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He added that to my project and let me run it independently—ordering, planning, and designing experiments. That gave me a lot of confidence. I worked on cancer stem cells for almost four years, and that lab still continues the work. One of the postdocs after me even discovered a small molecule based on my work, which is now patented. That experience really helped me, including in getting this job. As for advice to my younger PhD self, I actually wouldn't change anything. I loved my PhD time. I learned swimming, played TT, watched movies, and just enjoyed life.

What's your go-to music for a break - Kishore, Rafi, or something unexpected? Any song you can't resist singing? And if NIBMG had a faculty rock band, who'd be in it, and what would you name it?

Jagjit Singh is my all-time favorite, and if I had to pick one song, it would be *"Tum Itna Jo Muskura Rahe Ho, Kya Gham Hai Jisko Chhupa Rahe Ho."* As for a rock band - well, Jagjit Singh probably wouldn't approve! But if I had to form one at NIBMG, I'd definitely have Priyadarshi on board—he plays a wonderful Iktara and sings well too. We'd call our band *"Rhythm"*.

Okay, we have to ask—rumor has it that you're a strong believer in astrology. Now, this is quite the plot twist for a scientist! What's the story behind this—was there a mind-blowing prediction that turned you into a believer, or have the stars always been in your favor? And be honest—have you ever checked your horoscope before a big experiment, a grant application, or maybe even a tough faculty meeting?

I am from Banaras, where everyone believes in God. My father's grandfather, Satyadev Narayan Singh, was a very famous scholar and astrologer. He even received the President's Award from Dr. Sarvepalli Radhakrishnan. So, I come from that lineage. I won't say astrology is not a science, maybe it's just not proven yet. I believe that more research in quantum physics might one day connect some of these dots.
Do I plan my day based on astrology? No. But I do believe in certain things like superpowers, God. I follow Sikh philosophy, which says there is one God who is the same in you and me. I believe in the presence of one superpower that inspires us to think. So if you think deeply, when we speak or act, where do those thoughts come from? We understand how the brain functions, but not how thoughts originate. So I believe this superpower somehow guides us and our thoughts.
So if my wife says a day is auspicious, I respect that—because something inspired her to say it. I don't reject it just because I'm a scientist. Life begins in chaos, with all cells the same, and then things sort themselves out. So yes, astrology may inspire people to act, but what really matters is doing your work honestly.
If someone says it's a bad day or a good day, don't argue, just do your work. If it's meant to happen, it will. If it's not, maybe that's how it was meant to be.

We heard you have a stake in a hotel in Banaras! How did that happen? And most importantly - can NIBMG folks get a "Professor Singh Special Discount"?

Yeah, so you can relate this to my previous answer - whatever comes, it has to fall into the right place. This opportunity came to us naturally. We are three brothers - my younger brother lives in Banaras, my youngest brother is in Hyderabad working at Infosys, and I am here. My younger brother, who lives in Banaras, is already in the hotel business. He got the opportunity to acquire another business and approached us to see if we wanted to be partners. Since he was already experienced in this field, it felt like a safe and logical decision. That's how it happened. So yeah, if anyone is visiting Banaras and struggling to find good accommodation, just let me know, discounts are always given!

You are here in West Bengal for so many years. Do you miss your culture and festivals or have you just mingled yourself with the Bengalis here? What is your favourite Bengali festival and Bengali food?

So, you know, Sikhs are everywhere, any country, you'll find a Sikh person. We have a huge Sikh community here in West Bengal, so I don't really miss anything. Also, I was actually born in Kolkata. So even though we're Punjabi, we've always had strong ties to Bengal. I didn't come to West Bengal because of that, though. Everyone asks why I didn't go to Delhi or Chandigarh, but I came here because of NIBMG. When I saw the institute's vision, I knew I wanted to be a part of something futuristic in cancer research. Roshogolla is one of our favorite sweets. As for festivals, everyone's favorite here is Durga Puja, and I like it too. They call it Kali Puja here instead of Diwali, but the spirit is the same.

RAPID FIRE

UN-SCRAMBLING WITH SANDEEP

What is the weirdest cuisine you have ever tried?

Octopus. So, it was in the US, and it was served to us. I had it, and at first, I thought there was something crispy. I didn't really understand what it was, so I asked. They told me it was octopus. It wasn't very different from other things I've had, but yeah, it was a weird realization that I was eating octopus. But it was good - crispy and salty.

If you had to cook one dish for your entire lab team (and they HAD to eat it), what would you make? And more importantly - should they be worried?

Maggi. Worried? No, no, they will enjoy it! That's why I'm saying I will cook Maggi with confidence, and they can enjoy it. My kids love my Maggi!

Imagine you're stranded on a deserted island with only three things from your lab. What would you bring and why?

Deserted island and lab things! Probably the bubble wrap - to sleep on that. Yeah, lab is not a good place to survive on an island. Maybe lab coat also.

Conferences are an essential part of academic life. What's your personal conference survival strategy?

My strategy is simple - I go through the abstract book, mark the speakers or posters I really want to see, and attend those sessions. I also like to interact, so I find interesting people, talk science, and explore collaborations. I don't sit through every talk since many may not be relevant. That's the strategy!

What's the weirdest or funniest thing that has happened to you at an international conference?

Conferences are usually serious, so nothing particularly funny has happened. But during my last U.S. visit in 2019-2020, I was presenting a poster when a senior researcher suggested a paper by his colleague. I read it, found it important, and asked Kavya to work with the data. It ended up shaping her research in a very positive way. So, serious discussions at conferences can be really valuable!

We know you've had some intense matches with Moulinath Sir—any memorable or hilarious moments from those games that you'd like to share with us?

Moulinath's playing style can be quite irritating because no matter what you do, he will always return the ball. So, you need a lot of patience when playing against him. I am a fast player, while he focuses on just keeping the ball in play, waiting for me to make a mistake rather than taking risks himself. Sometimes, it gets monotonous, so I start doing the same - just returning the ball. Then we both end up staring at each other, waiting for the other to make the first mistake. But it's always fun to play with him!

If an AI assistant could take over one part of your job—writing research papers, dealing with grant applications, or supervising students—which one would you gladly hand over?

Oh! Supervising students.

Indian researchers are famous for their jugaad (creative hacks). Have you ever come up with a brilliant, last-minute makeshift solution in your lab that saved an experiment or equipment?

Yes, that always happens. Sometimes in experiments, something is missing, so we have to add or try something else to make use of the reagent already used. My memory is short for these things, but yes—once the ECL reagent wasn't working, probably because it was old. I knew that if you add a few drops of fresh H_2O_2, it acts as a substrate, and you start seeing the signal. So that kind of jugaad saved the experiment.

RAPID FIRE

UN-SCRAMBLING WITH SANDEEP

What's your favorite childhood memory?

I've actually forgotten. A lot of people have asked me this before, but somehow, I don't remember my school days. I don't know how, but I've lost those memories.

What's the best piece of advice you've ever received?

The best piece of advice I received was from my MSc teacher after I gave the NCCS interview. He told me that if you're going to work for 8 hours, divide that time, spend 30% actually doing experiments, another 30% on routine things like lunch or talking to friends, and the rest of the time should be for reading. If you're only working and not reading, you won't truly understand what you're doing. That advice became a routine for me. I try to spend at least 60% of my time reading about the experiments I'm doing, and I tell my students the same—more reading, less doing, actually works better.

If you were to devote the rest of your life to philanthropy, what cause would you choose?

I would go for basic school education. Many underprivileged people don't ask for help due to self-respect, so there should be a system where their children can study without them feeling humiliated.

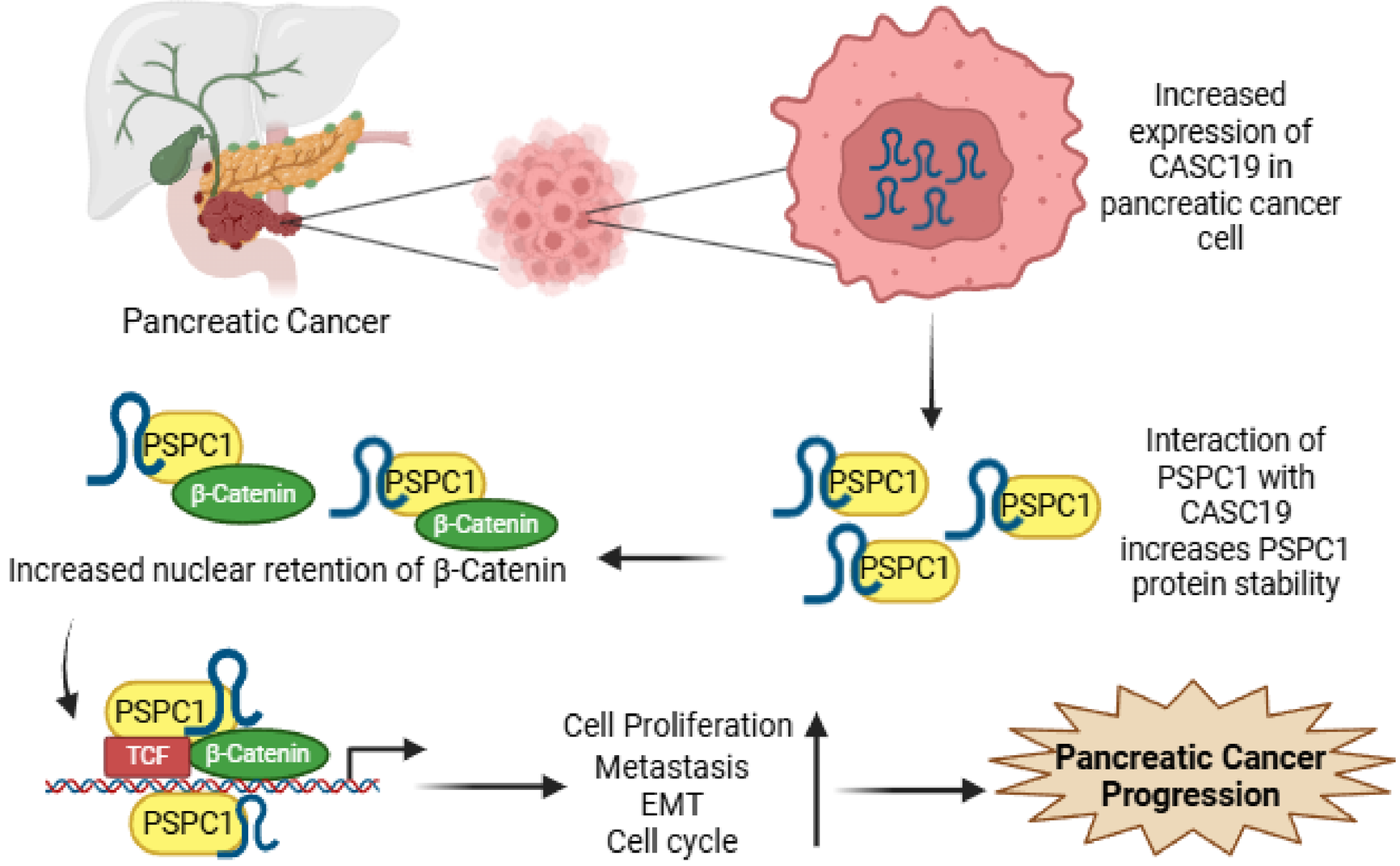
If you had a whole year off from research to learn a completely new skill, what would you choose?

I think I will become an athlete, may be a swimmer.

RESEARCH SPOTLIGHT

Mechanistic Insights into long noncoding RNA CASC19: A Key Regulator of PSPC1 Stability to Drive Advancement in Pancreatic Cancer

Moumita Mukherjee, PI: Dr. Srikanta Goswami



Pancreatic cancer is a very common cause of cancer related death worldwide. We have found that a novel long noncoding RNA CASC19 is present in high amounts in pancreatic cancer tissues and cell lines and is associated with poor survival of the pancreatic cancer patients. Thus, we wanted to understand how this molecule helps the cancer progression.

We overexpressed and silenced CASC19 expression in a pancreatic cancer cell line and performed some cellular assays to see how CASC19 affects cancer cell growth, spreading, and cell death. We have found that CASC19 overexpression helps the cancer cells grow and spread while preventing them from dying and vice versa when CASC19 is knocked down.

We have also studied how CASC19 affects the transcriptome of the pancreatic cancer cells. Consequently, CASC19 was found to affect certain pathways inside the cells, such as the TGF-β and β-Catenin-TCF pathways, which are important for cancer advancement and metastasis.

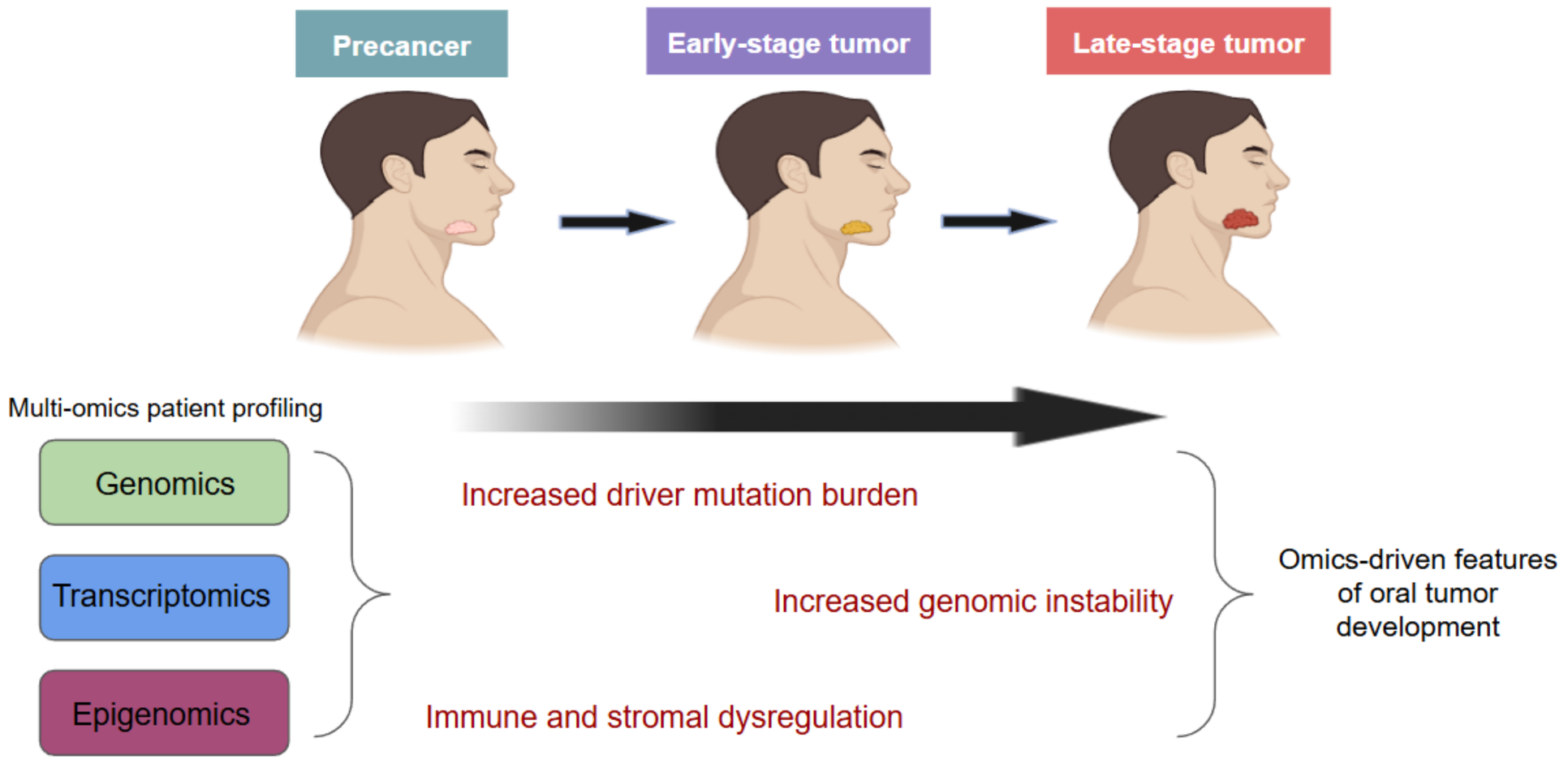
CASC19, a nuclear lncRNA was identified to interact with a nuclear protein called PSPC1, which is also reported to help cancer metastasis. Interaction with CASC19 prevents PSPC1 degradation, making it stable and allowing more PSPC1 to be available. This, in turn, helps another protein, β-Catenin, an oncogenic transcription factor and a known PSPC1 interacting protein, stay in the nucleus, which ultimately promotes cancer advancement.

In summary, high levels of CASC19 help pancreatic cancer grow and spread. Targeting the CASC19/PSPC1/β-Catenin pathway could be a new way to treat pancreatic cancer.

RESEARCH SPOTLIGHT

Early biomarker detection of oral cancer progression : Multi-omics based insights in Indian OSCC-GB patients

Shouvik Chakravarty, PI : Dr Nidhan K Biswas

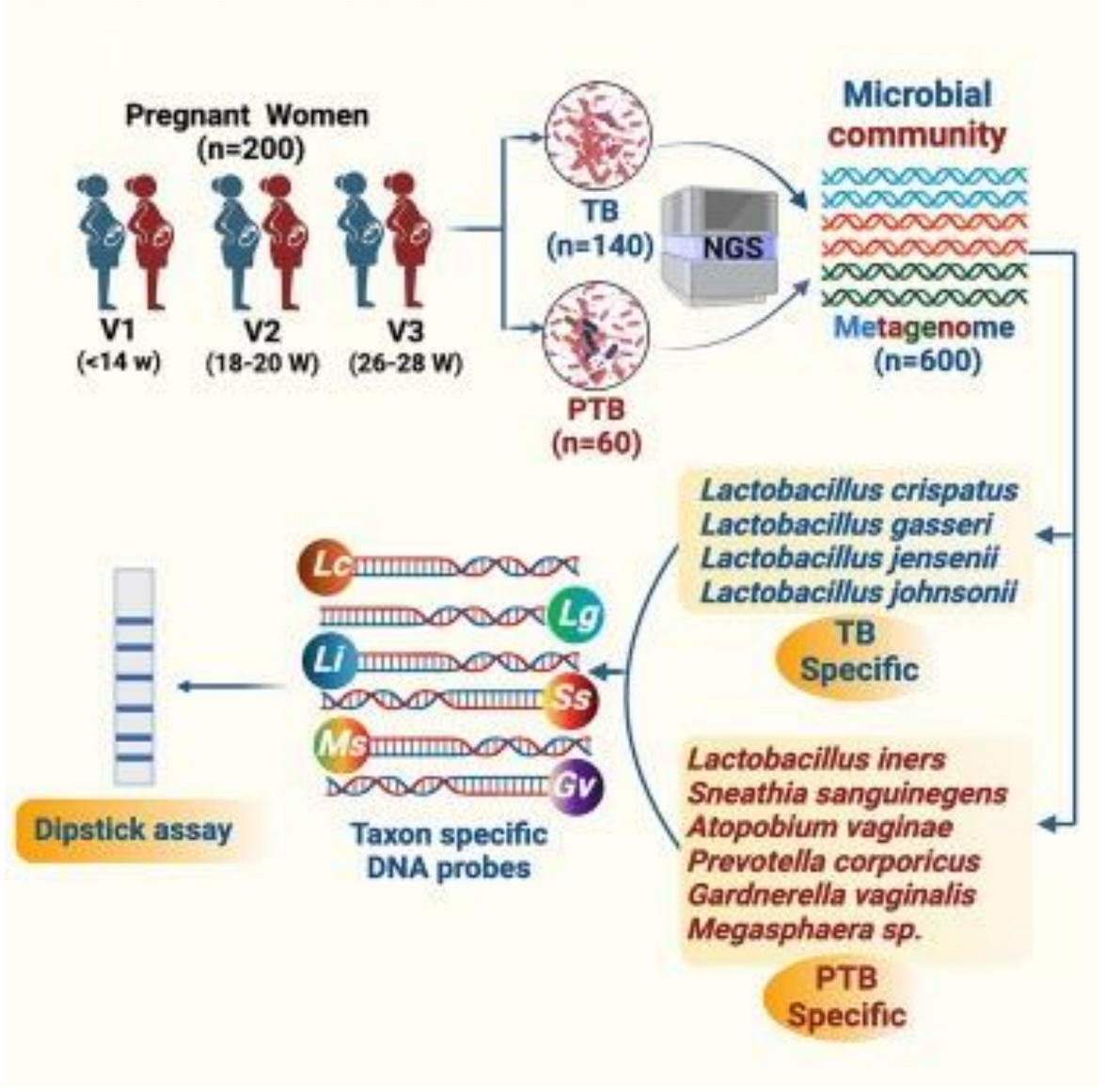


In India, oral cancer of the gingivobuccal complex (OSCC-GB) is the third most common, and 5-year survival is low (~50%). The major risk factor is the usage of smokeless, chewable tobacco. The main challenge in Indian OSCC-GB clinical management is the late reporting of patients (~70%) to the clinics, making early molecular genomic marker identification important for better therapeutic decision-making. In particular, oral precancerous lesions (leukoplakia) acquire oncogenic alterations and transform to late-stage cancer, but the driver molecular genomic alterations leading to precancer development remains unknown. To identify early-stage genomic markers leading to oral tumor development, we have performed deep omics-driven (genomic, transcriptomic, epigenomic) characterization of oral precancer (n=50), Early stage (n=100) and Late stage (n=100) OSCC-GB patients. Our study has identified driver TP53, CASP8 and CDKN2A mutations, increasing genomic instability (DNA repair defect) and immune infiltration dysregulation as key features of oral tumorigenesis. We validated the hypothesis of early CASP8 somatic mutations as pro-tumor genomic cues in multi-regionally sampled tumor and dysplastic oral tissues and concluded that a cascade of genomic events, following a specific order leads to oral tumorigenesis. Our findings have significant implications towards better risk stratification and clinical patient management.

IN PUBLIC EYE

Previse preterm birth in early pregnancy through vaginal microbiome signatures using metagenomics and dipstick assays.

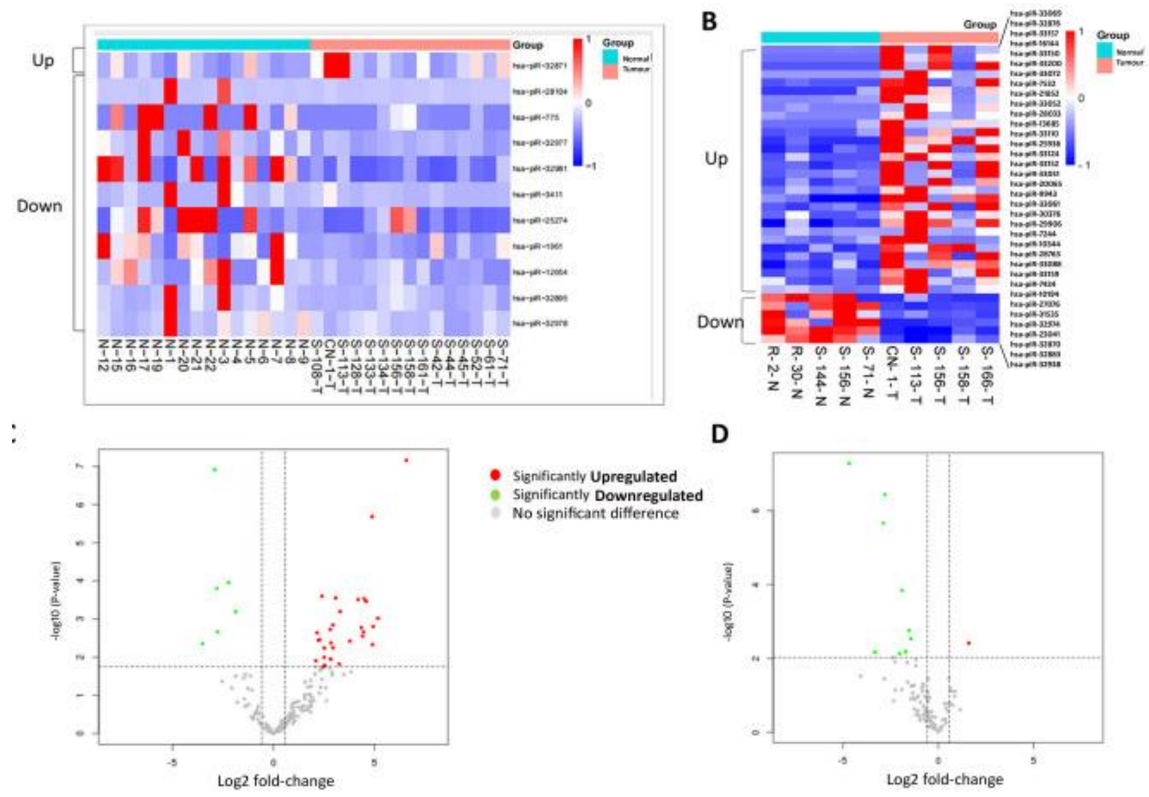
Talukdar D & Sarkar M et al., iScience. 2024 Oct 23; doi: 10.1016/j.isci.2024.111238



Delivery of a baby before 37 weeks of gestation, defined by the term “preterm birth”, incurs adverse health problems in the newborn. In India, approximately 13% of babies are premature, contributing to 23.4% of preterm births worldwide. Vaginal microbiome shows ethnic disparities. Dr Souvik Mukherjee and his team in collaboration with scientists from THSTI, conducted a metagenomics study where they analyzed 600 vaginal swab samples, from 140 women who delivered at term and 60 women who delivered PTB. The study found *Lactobacillus* was prevalent in term births while *Gardnerella*, *Atopobium*, and *Sneathia* were more common in preterm ones. With the identification of specific microbial genomic signatures, they developed a dipstick assay for identifying preterm-associated microbiota in resource-constrained settings.

Correlating tissue and plasma specific piRNA changes to predict their possible role in pancreatic malignancy and chronic inflammation.

Saha B et al., Biomed Rep. 2024 Oct 7;21(6):186. doi: 10.3892/br.2024.1874.

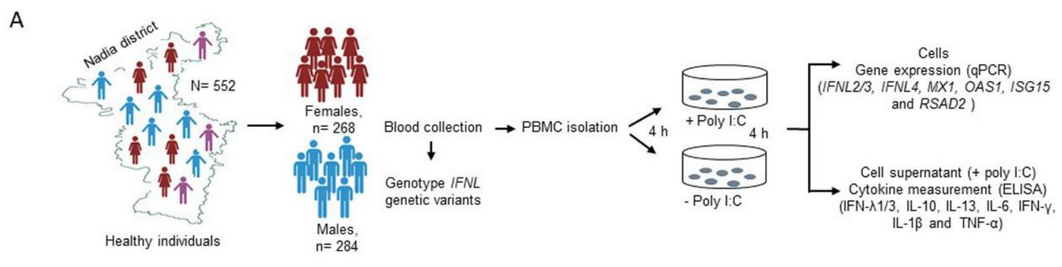


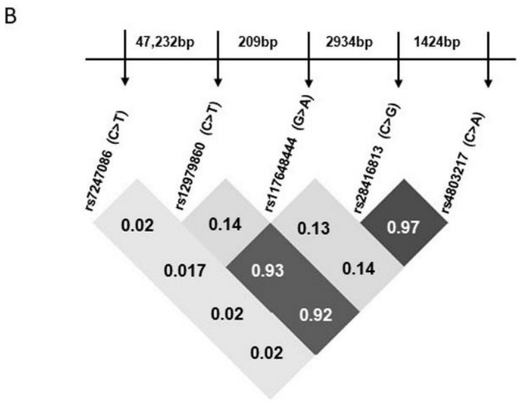
Pancreatic ductal adenocarcinoma originates from the ductal cells of pancreas and is characterized by an aggressiveness that is mostly due to the lack of early detection biomarkers. In a study by Dr Srikanta Goswami and his group, the role of piwi-interacting RNAs (piRNAs) in tumorigenesis and inflammation associated with pancreatic cancer (PC) and chronic pancreatitis (CP) has been investigated. They identified 36 deregulated piRNAs in tumor tissues and 11 in plasma of PC patients. Key piRNAs hsa-piR-23246, hsa-piR-32858, and hsa-piR-9137 were correlated in both plasma and tissue, which proves them to be potential biomarkers. In CP plasma, 19 piRNAs targeted genes to chronic inflammation were also identified which can be explored for future biomarker development.

IN PUBLIC EYE

Evidence for a sex-dependent effect modification in the association between IFN-λ DNA polymorphisms and expression of IFN-λ and interferon-stimulated genes in human PBMCs.

Roy DG et al., Cytokine. 2024 Dec., doi: 10.1016/j.cyto.2024.156779.





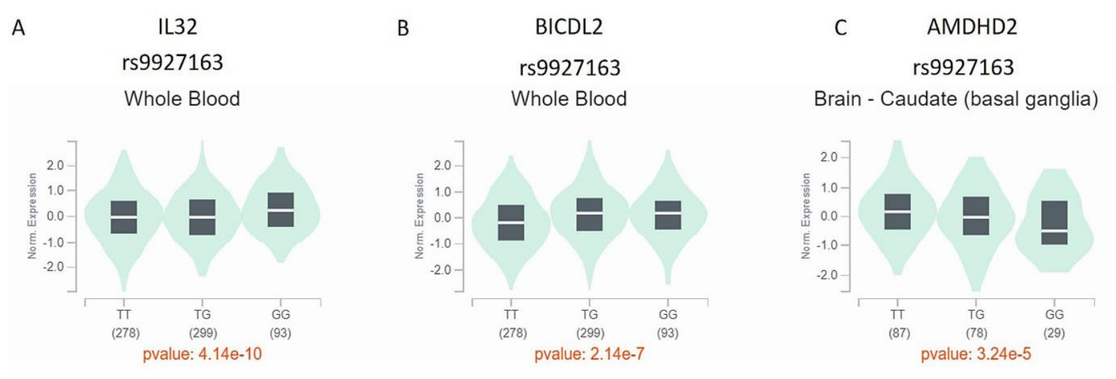
C

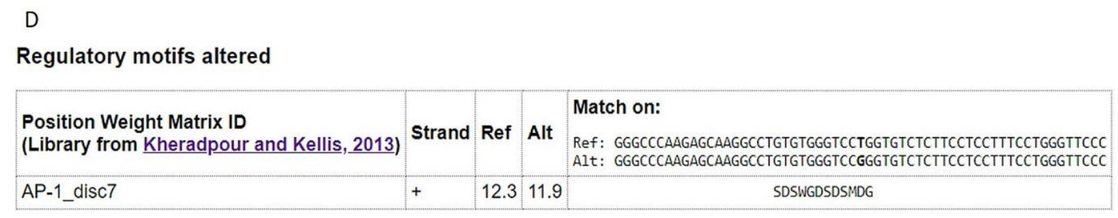
Variants	N	Alleles	MAF %	HWE p-value
rs7247086	525	C>T	5.7	0.16
rs12979860	544	C>T	24.5	0.1
rs117648444	550	G>A	4.5	0.3
rs28416813	547	C>G	24.04	0.1
rs4803217	551	C>A	24.6	0.14

Human interferon lambda (IFNL) locus has several genetic variants whose roles in regulating *in vivo* gene expression and maintaining anti-viral states are still unclear. Dr Chinnaswamy and his teammates examined the expression of IFNL2/3, IFNL4 and four IFN-stimulated genes (ISGs) (MX1, OAS1, ISG15 and RSAD2) in around 550 healthy individuals and found that males secrete higher levels of INFL than females. IFNL3/4 variants significantly influenced IFNL secretion and interferon-stimulated gene (ISG) expression; however, opposite effects were observed in males and females. The study highlighted complex interactions between gender, IFNL genetic variants, and antiviral responses, suggesting that sex is a strong effect modifier. However, no strong correlation was observed between IFNL levels and ISG expression.

A novel genetic association of IL32 with tuberculosis.

Gautam A et al., Cytokine. 2024 Dec;184:156783. doi: 10.1016/j.cyto.2024.156783.





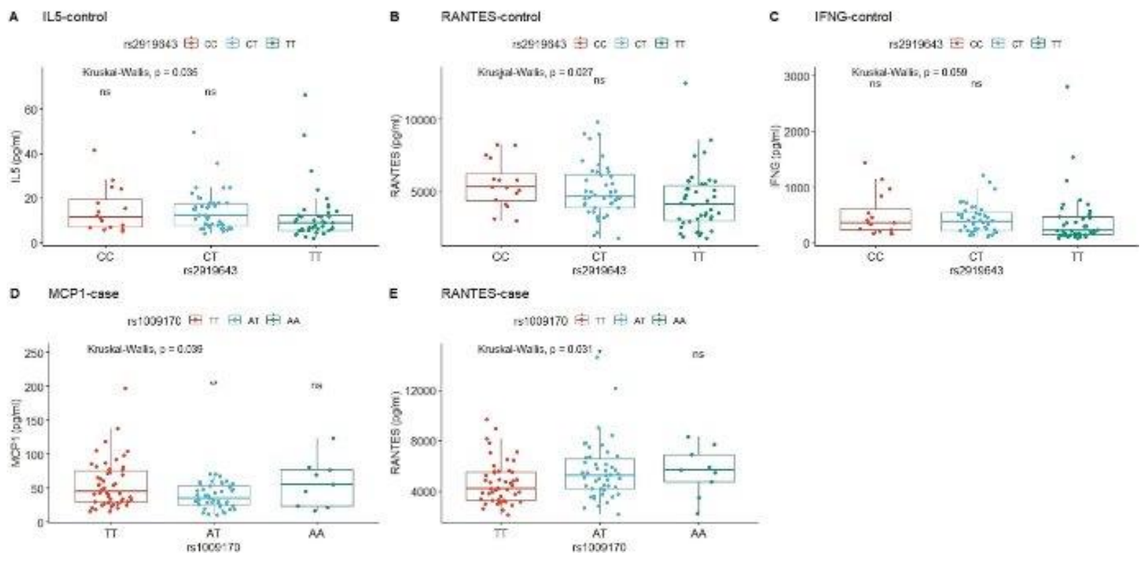
Tuberculosis is a pathogenic infection that is a serious public health concern for the Indian population. Dr. Bhaswati Pandit and her team tried to understand disease susceptibility in tuberculosis, which is highly influenced by genetic variants of cytokine genes. IL32, which is a pleiotropic intracellular cytokine, has different isoforms, with varying pro and anti-inflammatory potentials. Using a targeted sequencing approach, the IL32 gene was sequenced in TB positive cases and TB negative household contacts. The intronic variant rs9927163(G/T) was revealed to be associated with pulmonary TB. Compared to the GG genotype, individuals with TT genotype had a higher expression of IL32δ, which is a risk factor for TB. The study thus reports a novel genetic association of IL32 variant rs9927163, which influences disease susceptibility in TB patients.

Genetic association of missense (rs2919643), intergenic (rs2057178) and a 3'UTR (rs1009170) variant with tuberculosis: A replication study from India.

Gautam A et al., Infect Genet Evol. 2024 Dec;doi: 10.1016/j.meegid.2024.105690.

Tuberculosis is a highly contagious infection that affects the lungs. Susceptibility to TB and the severity of the disease are significantly influenced by host genetic factors. Dr. Bhaswati Pandit and her team conducted a replication study, where they studied nine candidate SNPs and tested their association with TB susceptibility in an

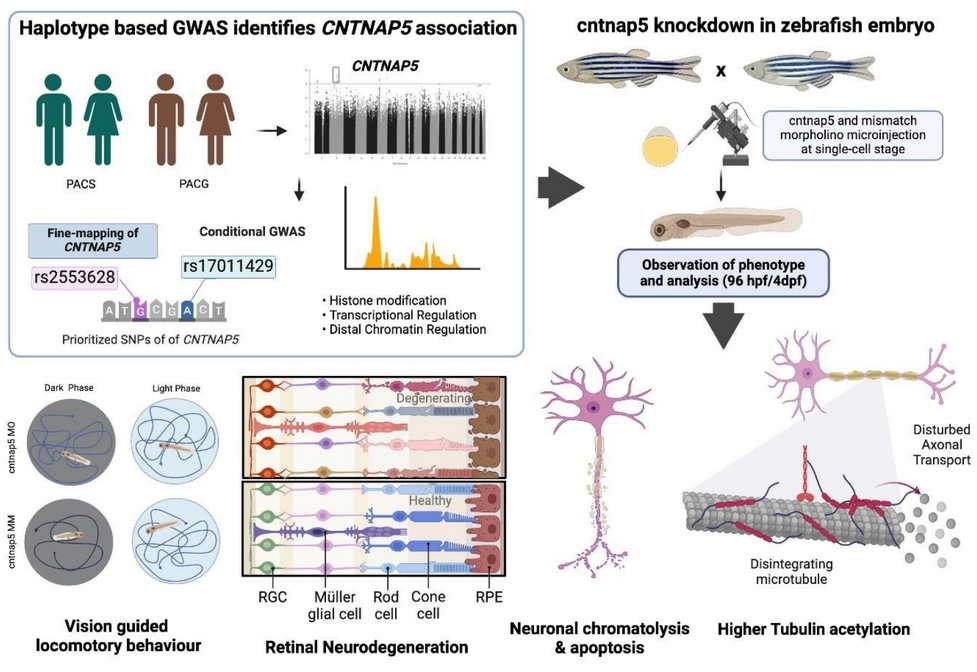
IN PUBLIC EYE



independent cohort of TB cases and household contacts from West Bengal, India. Their study revealed the association of rs2919643, rs2057178 and rs1009170 with TB in the Indian cohort. Among these three SNPs, rs2919643 demonstrated the strongest association with disease susceptibility, with CC being the risk genotype, whereas rs2057178-A allele was found to be protective against TB. The study highlights the population specific role of host genetics in TB and provides relevant insights into TB pathogenesis.

Functional investigation suggests CNTNAP5 involvement in glaucomatous neuro-degeneration obtained from a GWAS in primary angle closure glaucoma.

Chakraborty S et al., PLoS Genet. 2024 Dec , doi: 10.1371/journal.pgen.1011502.

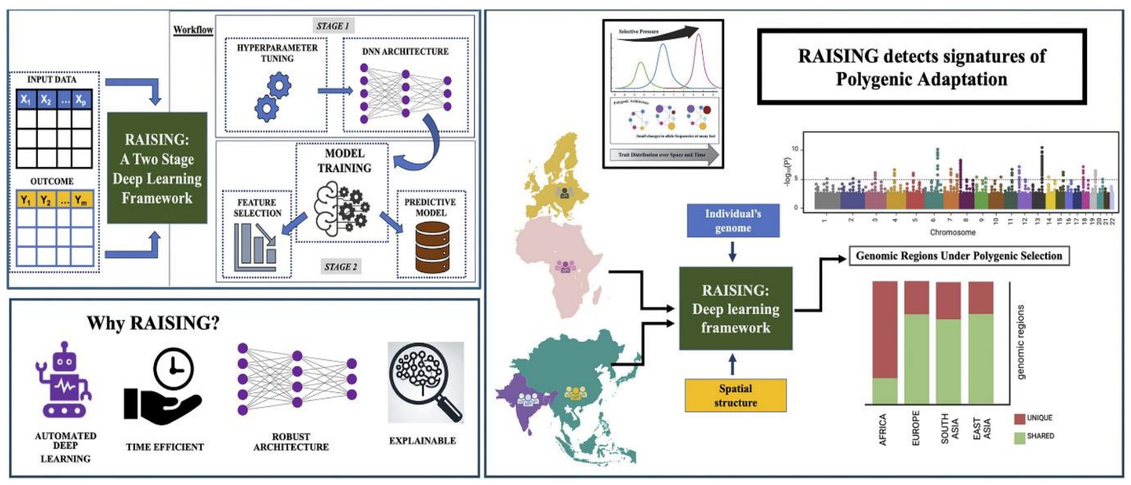


Neurodegeneration in the retina and optic nerve head leads to glaucoma, the leading cause of irreversible blindness worldwide. A type of it, primary angle closure glaucoma (PACG), is prevalent mostly in east and south-east Asia.

Through a previous GWAS, Dr Moulinath Acharya's lab identified *CNTNAP5* as a putative candidate gene. In this study, Dr. Acharya, Dr. Samsiddhi Bhattacharjee and Dr. Mahua Maulik and their team extend their knowledge of *CNTNAP5* involvement in glaucoma using antisense oligo knockdown of cntnap5a and cntnap5b in zebrafish. They observed disrupted retinal structure, increased cell death, and neurodegeneration. Double knockdown larvae showed restricted movement in light, indicating vision loss. This study provides the first direct evidence linking *CNTNAP5 to* retinal neuronal loss and glaucoma, highlighting its potential role in disease progression and as a therapeutic target.

Deep learning insights into distinct patterns of polygenic adaptation across human populations.

Tripathi D et al., Nucleic Acids Res. 2024 Dec, doi: 10.1093/nar/gkae1027



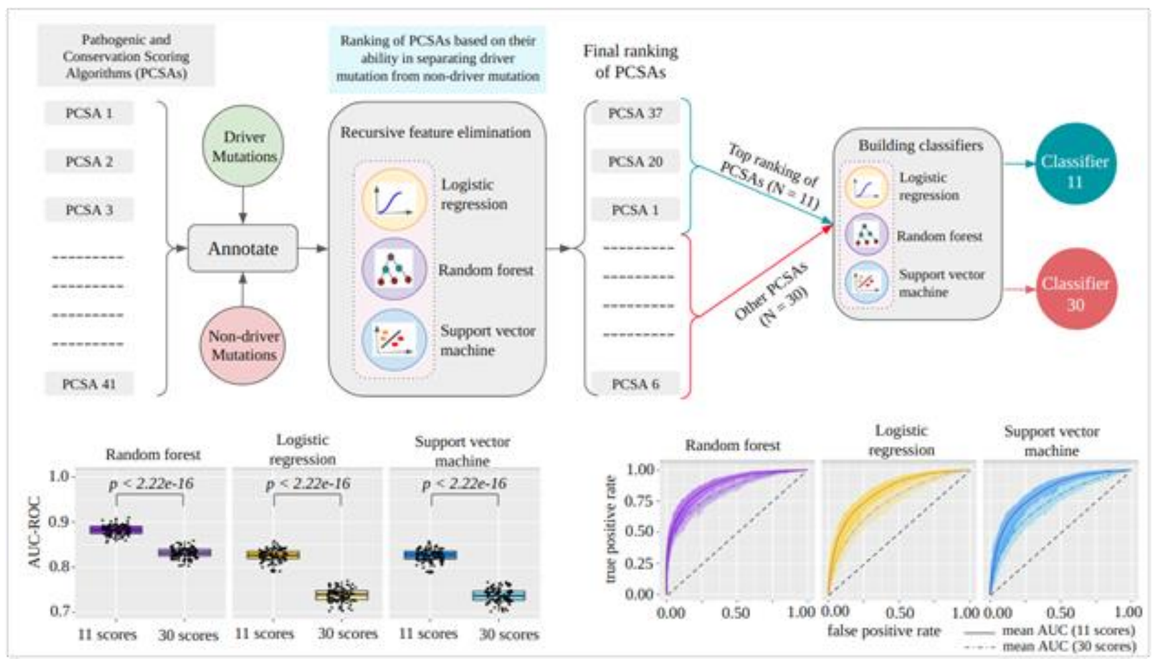
Professor Analabha Basu along with his group have developed RAISING, a deep learning framework designed to detect polygenic adaptation in human genomes by optimizing neural network architecture and performing feature selection. Tested on simulations incorporating demographic history and selection gradients, RAISING has outperformed Phylogenetic Generalized Least Squares (PGLS), ridge regression and

IN PUBLIC EYE

DeepGenomeScan, achieving upto 28% higher true positive rates (TPRs) and reducing computational time by 60-fold. In more complex demographic scenarios, it showed 17-fold higher TPR with fewer false discoveries. They developed a sliding window method that enabled genome-wide analysis, identifying distinct polygenic selection patterns in African, European, South Asian and East Asian populations. Notably, around 70% of identified African regions were unique, which supports the Out of Africa model.

An ensemble machine learning-based performance evaluation identifies top In-Silico pathogenicity prediction methods that best classify driver mutations in cancer.

Das S et al., BioData Min. 2025 Jan. doi: 10.1186/s13040-024-00420-x.



Pathogenic and Conservation Scoring Algorithms (PCSAs) are important bioinformatic methods that assess the harmfulness of genomic mutations and play crucial roles in clinical decision-making. Existing PCSAs give conflicting assessments. Some PCSAs classify a mutation as pathogenic whereas other PCSAs classify the same mutation as benign. This inconsistency can lead to confusion and misdiagnosis.

Dr. Nidhan K. Biswas along with his group aimed to find a better way to assess the accuracy of these PCSAs. We used a powerful machine learning approach to analyze how well different PCSAs predict the impact of genetic changes in cancer. We found that a specific combination of PCSAs consistently outperformed others in identifying cancer associated pathogenic mutations in head and neck and other cancers like breast, lung, and colorectal. This research helps us understand which algorithms are most reliable, leading to more accurate diagnoses and better treatment decisions for cancer patients.

Phosphorylated BLM peptide acts as an agonist for DNA damage response.

Agrawal R et al., Nucleic Acids Res. 2025 Feb, doi: 10.1093/nar/gkaf106.

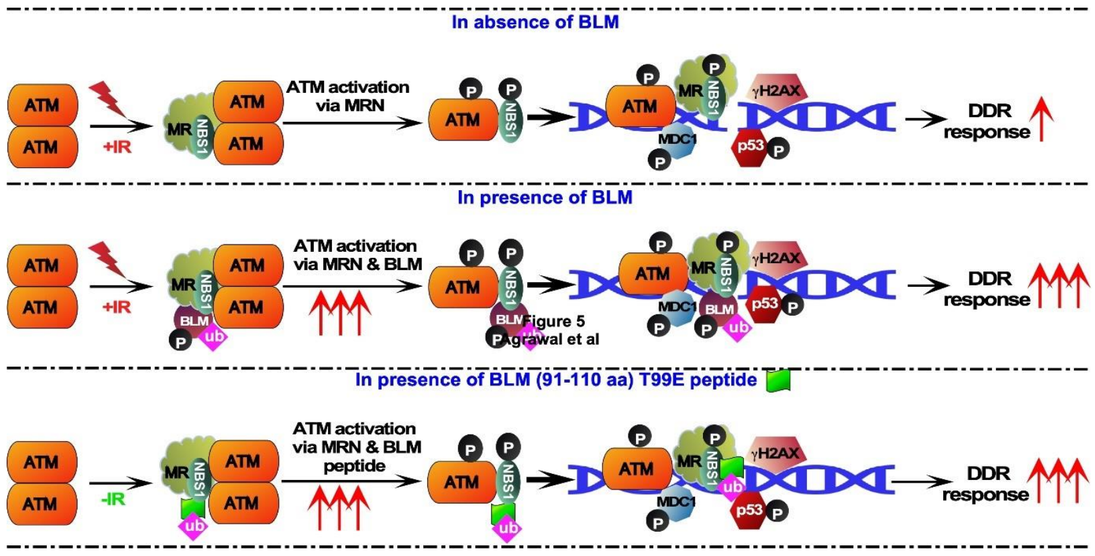


Figure 5 Agrawal et al

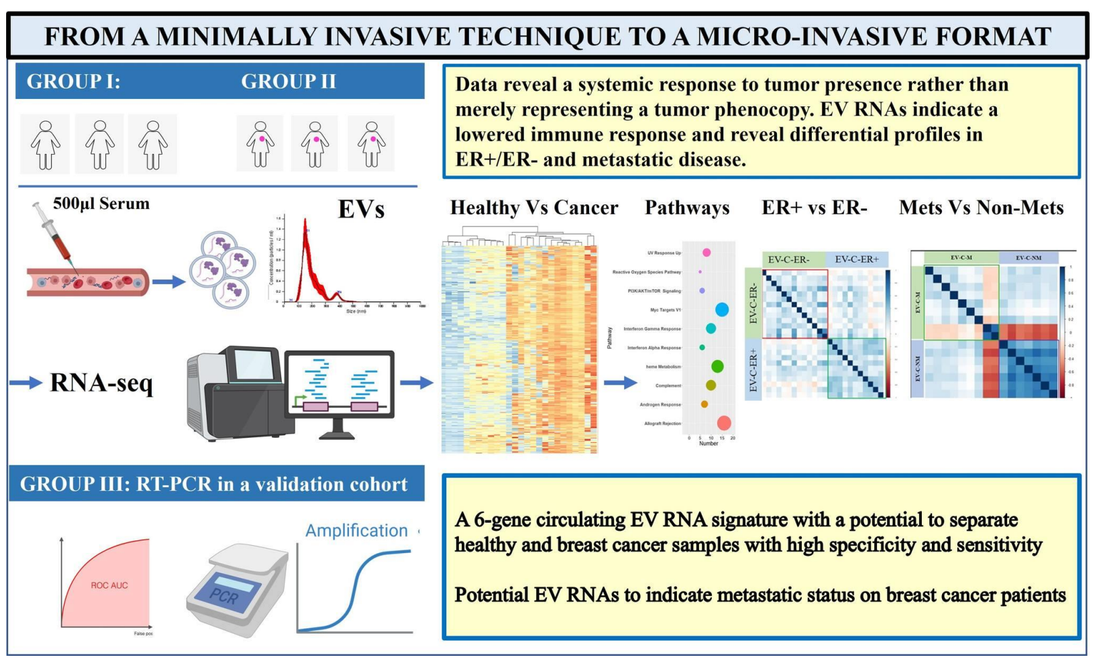
Cells have developed sophisticated mechanisms known as the DNA Damage Response (DDR) signalling pathway to counter DNA damage from both internal and external sources. A central player in this pathway is ATM (ataxia-telangiectasia mutated), a serine/threonine protein kinase. Activated monomeric ATM phosphorylates numerous downstream targets involved in DNA repair, cell cycle control, autophagy, apoptosis and senescence. This activation sets off a series of events aimed at safeguarding against the accumulation of mutations and tumorigenesis. However, very little is known about the mechanisms which promote and sustain DDR activation. Work from Dr. Sagar Sengupta's lab demonstrated a feed-forward loop between another DNA damage response

IN PUBLIC EYE

protein, BLM, and ATM. In this process ATM phosphorylates BLM at Threonine 99 (Thr99). The phosphorylated BLM more efficient disruption of the ATM dimer, leading to increased ATM activation. The disruption can also be achieved with equal efficiency by a 20 mer BLM peptide phosphorylated at Thr99, thereby activating ATM and allowing the robust activation of DNA damage response. Hence the 20-mer BLM peptide can be considered for usage for delaying and/or prevention of cancer.

Potential applications of gene expression profiles obtained from circulating extracellular vesicles in breast cancer

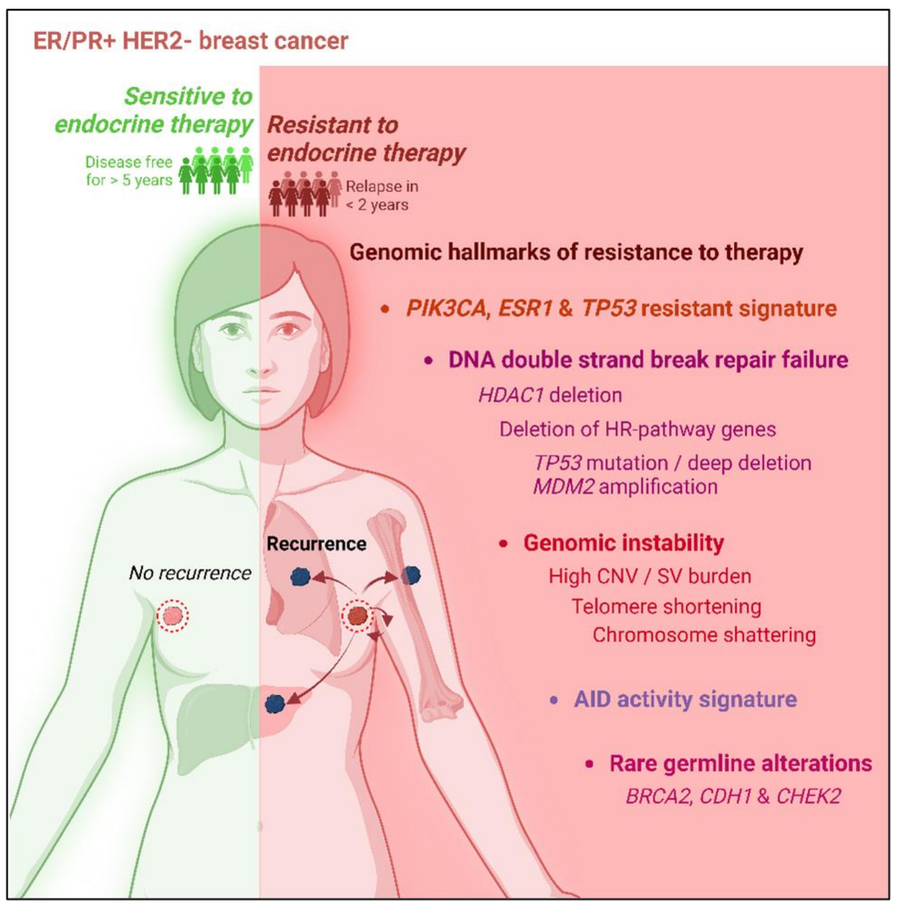
Gupta A et al., J Liq Biopsy. 2025 Jan 19;7:100287. doi: 10.1016/j.jlb.2025.100287



This study by Prof. Kartiki V. Desai and team, demonstrates a minimally invasive protocol for transcriptomic profiling of extracellular vesicles (EVs) derived from small volumes of serum/plasma samples from breast cancer patients. RNA-seq analysis of EVs from patients and healthy donors identified several differentially expressed genes (DEGs). Enriched pathways included key cancer-related processes such as immune response, cell growth, and blood vessel formation. Further analysis suggested enrichment of immune, endothelial, and stromal signatures. The top DEGs were validated in an extended cohort, achieving consistent classification of cancer versus healthy samples. Moreover, separate DEG sets distinguished ER+ vs. ER– and metastatic vs. non-metastatic cases. Higher expression variability was noted in metastatic EVs. These findings validate the feasibility of EV RNA profiling from limited serum inputs, offering a robust foundation for EV-based biomarker development for breast cancer detection and stratification.

Genomic hallmarks of endocrine therapy resistance in ER/PR+HER2- breast tumours

Ghosh A et al., Commun Biol. 2025 Feb doi: 10.1038/s42003-025-07606-x.



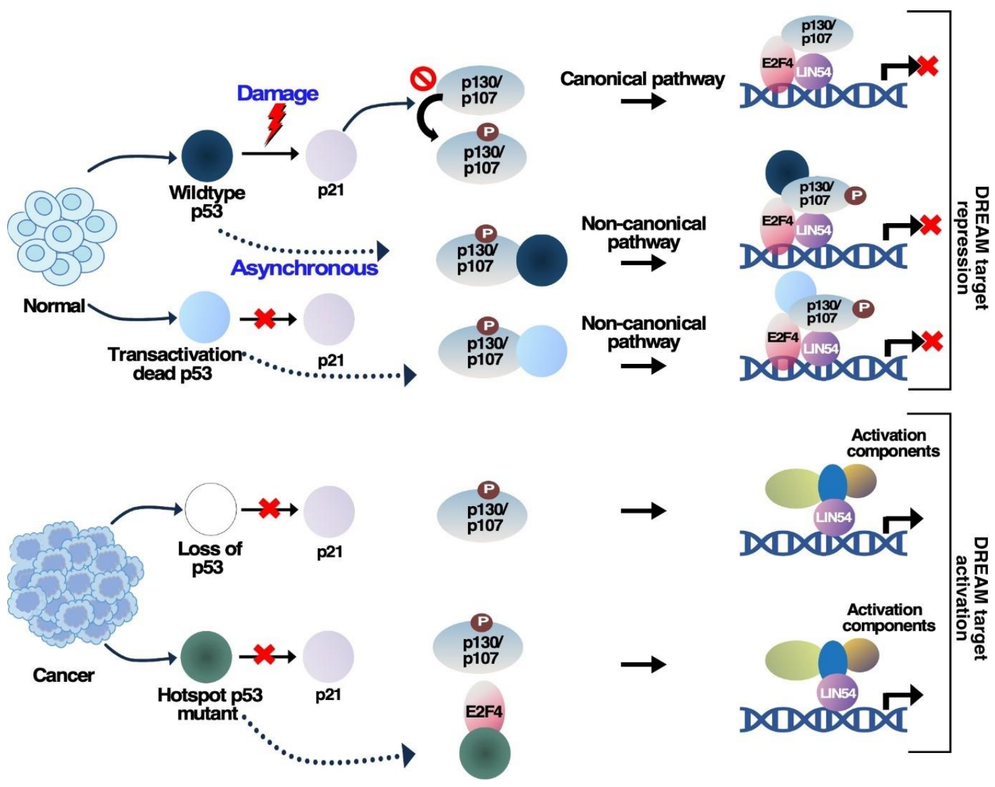
ER/PR+HER2- breast cancers are the most common type globally, including in India, and can be treated with hormone therapies like anti-estrogens or aromatase inhibitors. However, some patients do not respond to these treatments and experience cancer recurrence, leading to frequent relapse. The genetic reasons behind this resistance are not fully known. A study led jointly by Dr. Nidhan K. Biswas in collaboration with TMC Mumbai, performed genome sequencing on cancer samples from breast cancer patients who did not respond to hormone therapy and those who remained disease-free for at least five years. The study found that a "*resistance*

IN PUBLIC EYE

mutation signature" involving three genes, and defects in DNA-repair pathways were linked to therapy-resistance. The study also found that genome instability, including high levels of genetic changes and telomere shortening, were key markers of this therapy-resistance. This research points out newer opportunity for targeting genome-instability for therapy-resistant ER/PR+HER2- breast cancer patients

p53 regulates DREAM complex-mediated repression in a p21-independent manner.

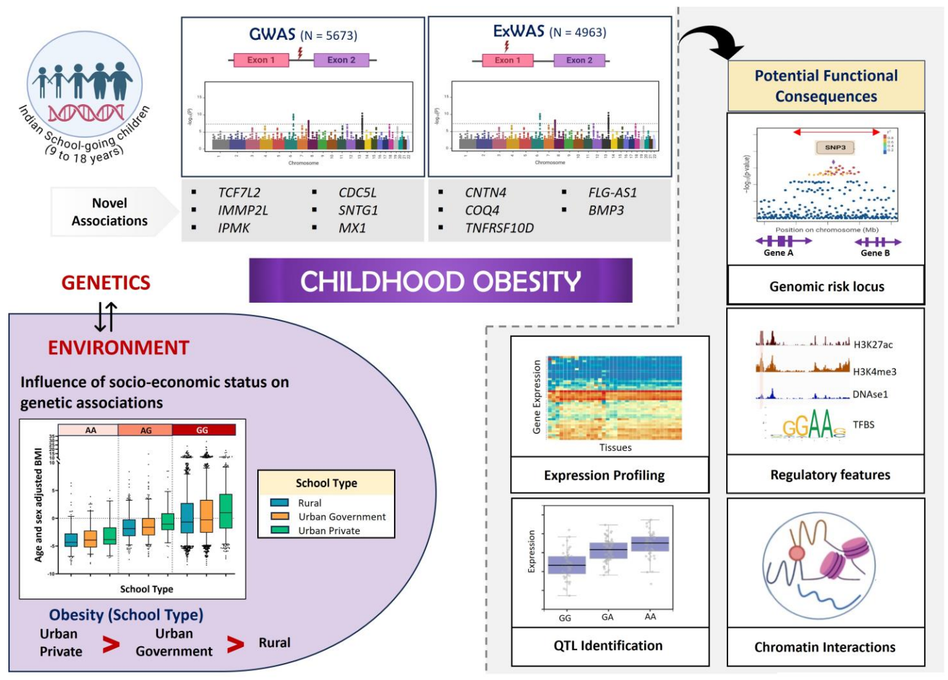
Agrawal R et al., EMBO J. 2025 Mar, doi: 10.1038/s44318-025-00402-7.



Tumour suppressor p53 is popularly called the guardian of the genome. Much less is known about p53's function as a transcriptional repressor. Till now it has been thought that p53 causes the repression of genes indirectly via the so-called canonical pathway. Challenging the above mechanism we now show that there also exists a "non-canonical" pathway in parallel to the "canonical pathway". In the "non-canonical" pathway p53 can directly bind with p107/p130, recruits the DREAM complex to the target promoters and thereby causes repression. Hence in this process the transactivation function of p53 is not required to cause repression. Importantly we also provide evidence that this phenomenon occurs over the entire genome. They provide evidence that the number of genes being repressed by p53 is more than doubled than what is known at present. Altogether the results provide a paradigm shift in the study of p53 biology – an entirely new pathway has been unearthed which, in future, may lead to better designing of p53 based cancer therapy.

Mapping the landscape of childhood obesity: genomic insights and socioeconomic status in Indian school-going children

Nair JM et al; Obesity (Silver Spring). 2025 Apr; doi: 10.1002/oby.24248.



Typically, obesity was considered to be an evil of the rich and the inactive but an increasing trend in the proportion of obese individuals is observed across all socioeconomic categories, both rural and urban. Gene and environment interact together to cause outcomes. To understand the implication of these recent trends, Prof. Analabha Basu and collaborators considered investigating childhood obesity, in both rural and urban settings, among school-going children in and around Delhi. We found that both affluence and urban lifestyle is positively correlated with higher obesity in both sexes and along all age-groups. We also identified that genes which predisposes to obesity, interact with the above mentioned factors to further aggravate the conditions.

EVENTS, AWARDS & OUTREACH

Events

Cleanliness Drive 2024

The birth anniversary of the Father of the Nation was celebrated at BRIC-NIBMG with a cleanliness drive. The Director, Faculty members, Administrative staff, and Research scholars participated and took a pledge for cleanliness.

Vigilance Awareness Week 2024

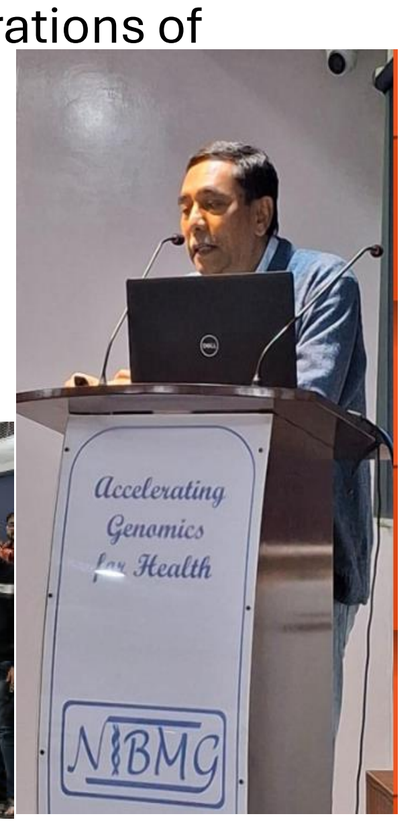
NIBMG proudly observed **Vigilance Awareness Week 2024** by taking the Integrity Pledge. Embracing this year's theme Culture of Integrity for Nation's Prosperity, we stand for transparency and accountability. We were honored to host **Mr. Aniruddha Ghosh, Advocate, Hon'ble High Court**, for an insightful talk on *"Corruption in India and Ways to Mitigate It."*

NIBMG & IISER Conclave

NIBMG had the privilege of hosting the **Curtain Raiser to IISF 2024**, in collaboration with the **IISER**.
This conclave featured **14 engaging talks** by eminent researchers from both institutes, showcasing cutting-edge research and fostering meaningful discussions across diverse scientific disciplines.

Obaid Siddiqi Memorial Oration 2025

We commemorated the birth anniversary of the visionary scientist **Dr. Obaid Siddiqi**, whose pioneering work in molecular biology and genetics continues to inspire generations of researchers. The occasion featured an enlightening oration by **Dr. Shantanu Chowdhury**, Chief Scientist at **CSIR-IGIB**, who spoke on the **Indian Breast Cancer Genome Atlas** and his research in **telomere biology**. His talk highlighted the transformative potential of India-specific biomarkers in improving breast cancer prognosis and treatment.



EVENTS, AWARDS & OUTREACH

Events

INSTITUTE DAY 2025

Annual Sports Week

The spirit of camaraderie, healthy competition, and boundless enthusiasm came alive during the NIBMG Annual Sports event! From the adrenaline-fueled matches of kabaddi, cricket, football, and volleyball to the strategic battles of chess, carrom, and badminton, the event offered something for everyone.

Talk & Poster Session

We were honored to host Dr. T. S. Balganesh, President, GangaGen Biotechnologies. His talk offered deep insights into innovative therapeutic approaches. Following the seminar, students showcased their cutting-edge research during an engaging poster session. The display of diverse scientific ideas and interactive discussions highlighted the enthusiasm and rigor of our young researchers.

Cultural Event

NIBMG's cultural events lit up the campus with music, dance, drama, and art—showcasing the incredible talent and diversity of our community. From energetic performances to heartfelt expressions, it was a vibrant celebration of creativity and togetherness.

Infectious Disease Symposium

BRIC-NIBMG proudly hosted its first Infectious Disease Symposium, a landmark event that brought together leading scientists from premier institutions across India to share pioneering research and perspectives in the field of infectious diseases.

EVENTS, AWARDS & OUTREACH

Events

76th Republic Day

On the proud occasion of **India's 76th Republic Day**, we at unite to celebrate the spirit of **democracy, unity, and progress** that defines our nation. It is a moment to reflect on our journey and reaffirm our commitment to building a brighter, inclusive, and innovation-driven future for all.

National Science Day

We welcomed students from local schools and colleges to our **Open Day** in celebration of **National Science Day**. They explored our research facilities, interacted with scientists, and learned about cutting-edge work at **BRIC-NIBMG**.
A **debate competition** on science, funding, and academic systems sparked insightful discussions among our students.

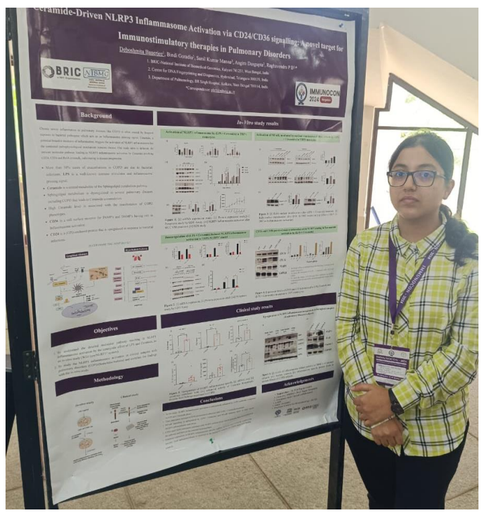
International Women's Day

"The future of science is diverse, and women are leading it with resilience and brilliance."

As part of our **International Women's Day** celebrations, we were honored to host **Dr. Subhra Chakraborty**, Distinguished Scientist at BRIC-NIPGR, for an inspiring lecture. She shared her remarkable journey and pioneering work in **plant genomics**, emphasizing the powerful role of women in shaping the future of science.

Awards

Ms. **Deboshmita Banerjee** (PI: Dr. P.B. Raghavendra) proudly represented **NIBMG** at the **IMMUNOCON 2024**, held at **IISc Bengaluru** from **October 17–20, 2024**.
She captivated the scientific community with her **insightful research poster** and was honored with the **Student Travel Award**, recognizing her promising contribution to the field.

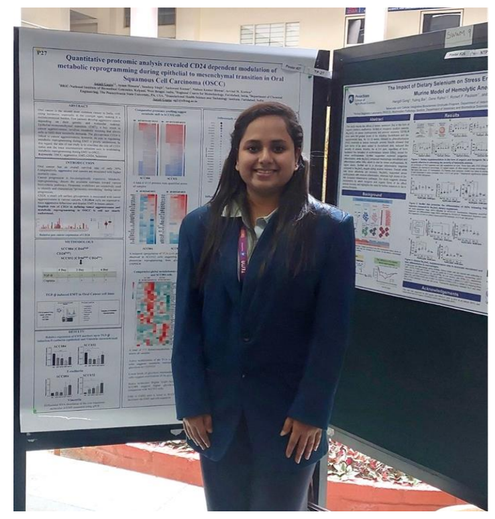


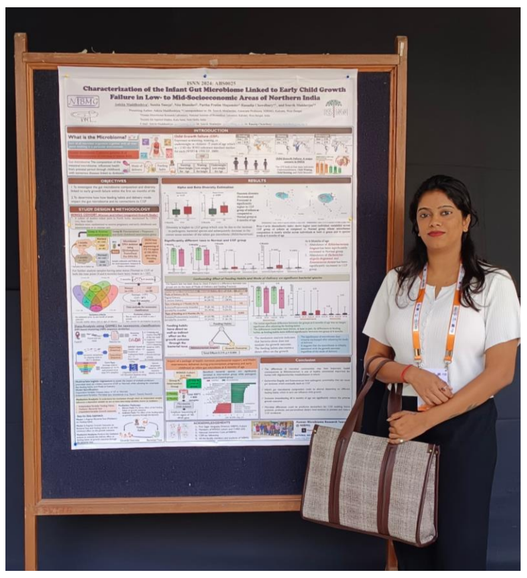
EVENTS, AWARDS & OUTREACH

Awards

Ms. Arunima Acharya, (PI: **Prof. Arindam Maitra)**, received the **Best Oral Presentation Award** (Sitaram Joglekar Award**)** at the **44th Annual Meeting of the Indian Association for Cancer Research (IACR)** and the **International Conference on the Convergence of Fundamental and Translational Approaches in Cancer Theranostics 2025**.

Ms. **Anjali Gupta** (PI: Dr. Arvind Korwar) represented **NIBMG** at the 18th International Conference on Trace Elements in Man and Animals (TEMA) jointly hosted by **Penn State University** and the **Ramaiah Group of Institutions** in Bengaluru. She received the **Trainee Award** for her exceptional oral and poster presentation.

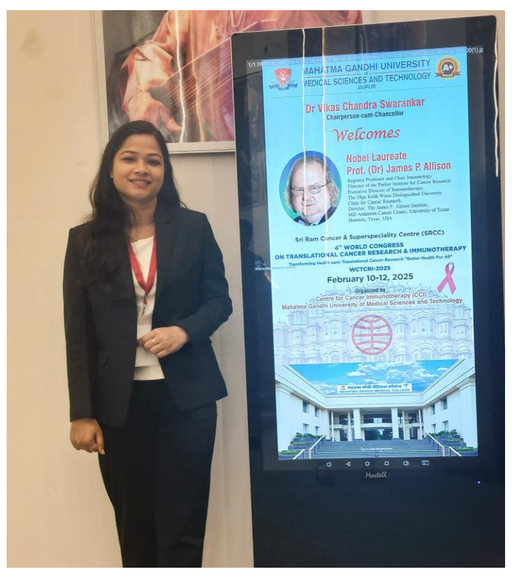


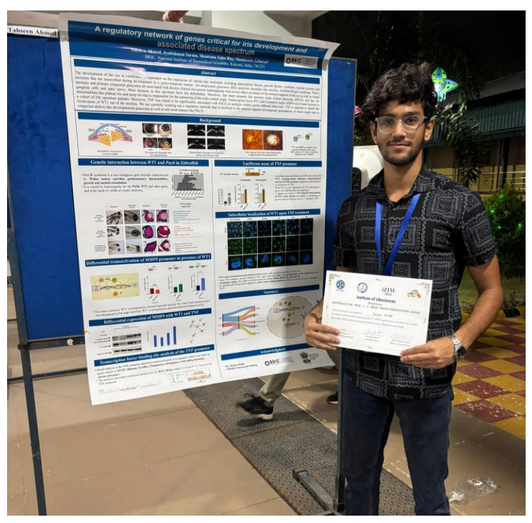


Ms. Ankita Maddheshiya (PI: Dr. Souvik Mukherjee), showcased her research at the **17th Congress of the International Society of Nutrigenomics and Nutrigenetics (ISNN 2024)** held in Mumbai.

Her insightful **poster presentation** captivated the audience and judges alike, earning her the **1st Prize,** a remarkable recognition at an esteemed international forum.

Ms. Subhashree Jena (PI: Prof. Sandeep Singh), delivered a captivating **rapid-fire oral presentation** at the prestigious **4th World Congress on Translational Cancer Research and Immunotherapy (WCTCRI) 2025**. Her outstanding presentation was recognized with the **Best Presentation Award**, a testament to the depth, clarity, and innovation of her research.





Mr. **Tahseen Ahmed** (PI: Dr. Moulinath Acharya) represented **NIBMG** at the **Indian Zebrafish Investigators Meeting (IZIM) 2024**. Tahseen was honored with the **Best Poster Award**, a testament to his outstanding research and scientific acumen.

EVENTS, AWARDS & OUTREACH

Outreach

India International Science Fair 2024

BRIC-NIBMG proudly showcased its pioneering research and scientific innovations to an enthusiastic audience of school students and visitors at **IISF-2024**. Our vibrant stall served as a gateway to the exciting world of genomics, sparking curiosity, fostering learning, and inspiring the next generation of scientific explorers.

"Successful and impactful science needs to be shaped and disseminated through the people we are doing it for"

We are dedicated to nurturing young minds by introducing them to the captivating realm of biomedical research. In line with our commitment to outreach, we hosted Biotechnology students from Amity University, Asutosh College, MSc and MTech Bioinformatics students from Maulana Abul Kalam Azad University of Technology, and B.Tech. Biotechnology from Adamas University

CREATIVE CORNER

A love story

The Wind slowed to settle, my Feather beautiful; so brave so alone
For long he blew it, hither and thither, in search of a good home

She whispered to me, Wind was her guide, she was to be borne
And suffer a passage adverse, without complain, nor utter a moan

Once softly she floated; gently she rested, on a little patch of Leaf
In a newfound love, languidly she laid, inebriated by his nectar sweet

Tender was their nightly Moon, the gay birds lent their twitter
The Sun showered diamond sparkles and set their eyes aglitter

Father Time merely watched, and silently passed into years many
Each turn he smiled, for fond he grew, of this friendship uncanny

Now Mother Nature, she knows that balance is life, her task it is to oversee
That the Wind he blows, the Feather it floats, and the Leaf endures the tree

She thwarted the Sun, waned the Moon, and summoned the mighty Rain
Soaked was the Feather as she clung to the Leaf, and every drop was pain

The mighty tree shuddered to shake the Leaf, as predator wickedly its prey
Resolute and curled, the Leaf sheltered his love, from this Nature fey

Humbled was Nature by their devotion, since not unkind was she
Prudent and wise, she sought counsel of her, children three

Thus gathered the Wind, the Sun, the Moon, for she had beckoned
Father Time stood soundlessly, smoking his pipe of seconds

Exclaimed Mother Nature, “Oh! How can I keep them together?
Yet be true to my purpose, my service, and gratify the Maker!”

Much shining and blowing, ceaseless clamor then followed
As thoughts grew reticent, Father Time’s brow furrowed

He said, “Though endless I am, I can into pieces be broken”
Thus, were born Winter, Spring, Summer and Autumn

Each Spring bears a Leaf, Every Summer meet the lovers
Each Autumn sheds the Leaf, to float with the Feather

But in Winter alas, The Maker claims his fine
Death for the Leaf, heralds the verdict Divine

Lonesome in grief, the Feather wanders, Wind but howls
Cold is the Sun, pale the Moon, Mother Nature scowls

Father Time smokes patiently, as he trusts Destiny
And Hope he fosters, knowing Spring is a certainty

As I marvel at this cycle, the cold makes me quiver
But warm is my heart, in my book waits my Feather

~ Kartiki Desai

“Superman ?, nope it’s a superbat” –

Big brown bats (Eptesicus Fuscus) recently got recognised with a superpower and that is ageless hearing. Unlike humans and other animals, these bats don’t hear any worse as they grow older. Combined with their long-life span and a fundamentally similar auditory system, they really make a powerful model organism.

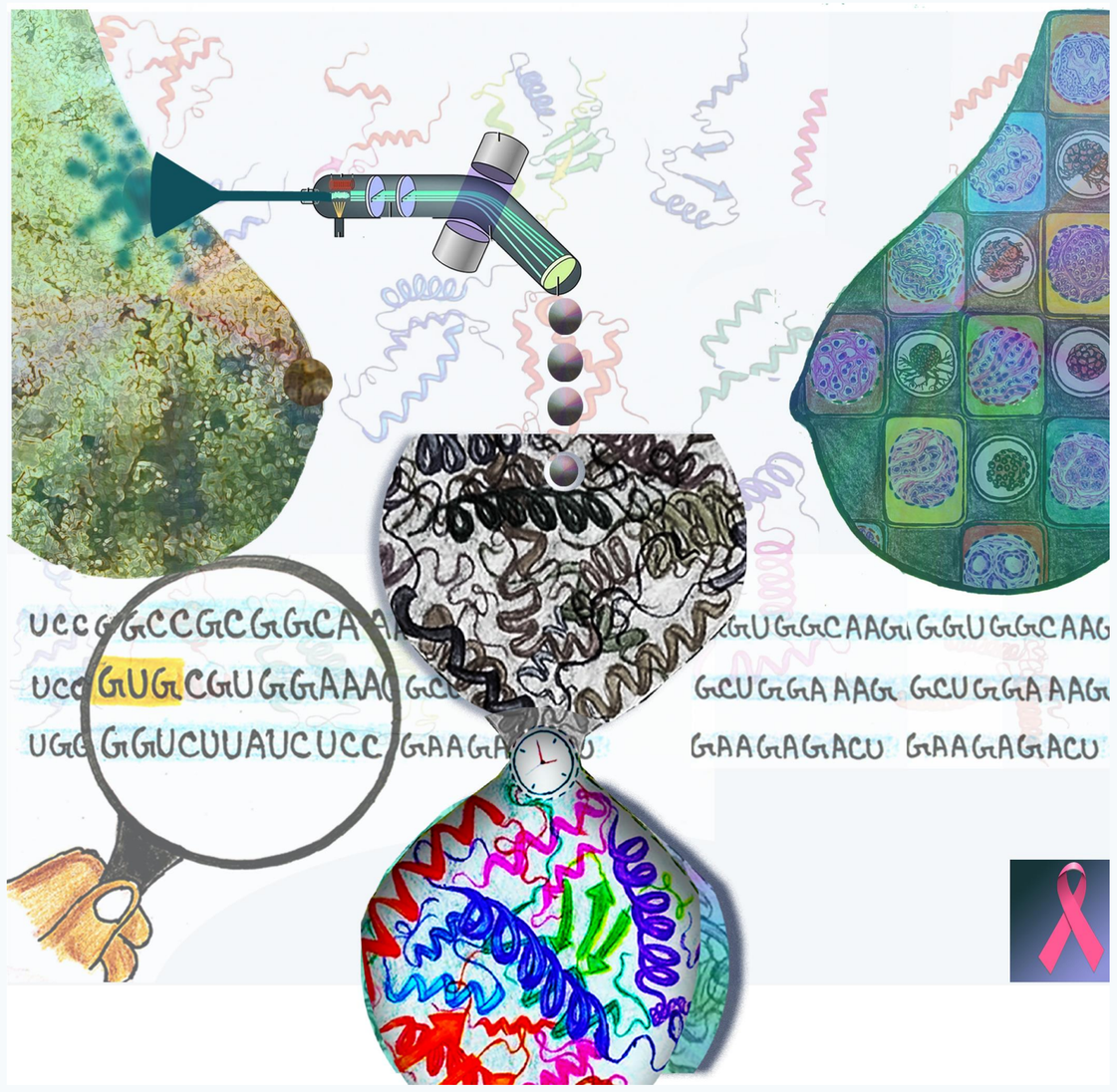
Ref : Capshaw, G., Diebold, C. A., Adams, D. M., Rayner, J., Wilkinson, G. S., Moss, C. F., & Lauer, A. M. (2024). Resistance to age-related hearing loss in the echolocating big brown bat (*Eptesicus fuscus*). *bioRxiv : the preprint server for biology*, 2024.07.15.603592. https://doi.org/10.1101/2024.07.15.603592

“It was not just mosquitoes trapped in amber” –

Tardigrade fossils, the rarest of the fossils, with only 3 being available worldwide are found trapped in amber. With new technology to study their 3D structures, it seems that these water-bears were hanging out with dinosaurs and were already diversified 80 mya.

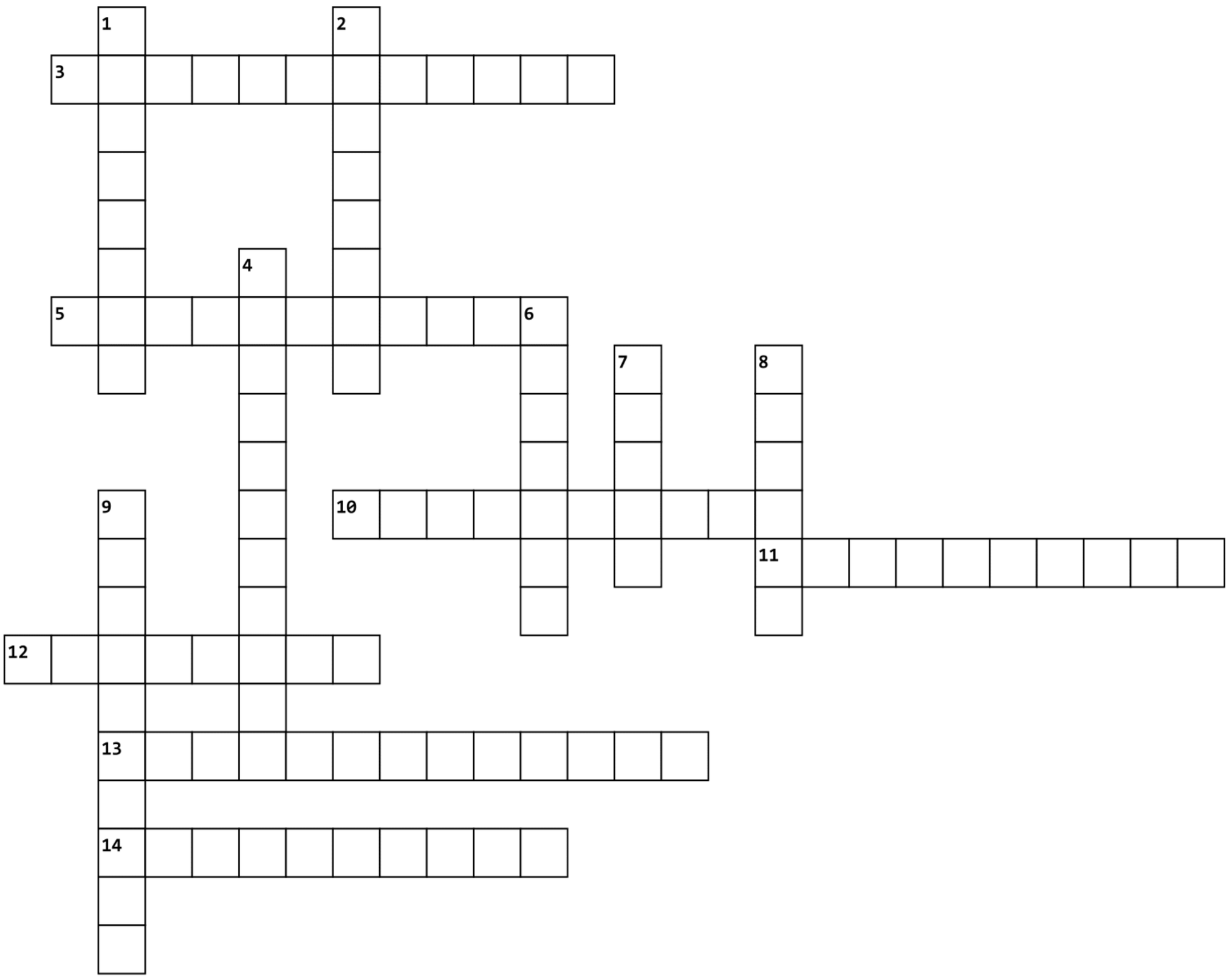
Ref : Mapalo, M.A., Wolfe, J.M. & Ortega-Hernández, J. Cretaceous amber inclusions illuminate the evolutionary origin of tardigrades. *Commun Biol* 7, 953 (2024). https://doi.org/10.1038/s42003-024-06643-2

~ Soumya Sau



~ Riya Deb

CROSSWORD



Across

3. Study of genetic material recovered from environmental samples

5. Study of heritable changes in gene expression without altering DNA sequence

10. Large-scale study of proteins and their functions

11. Condition of having more than two sets of chromosomes

12. Process of removing introns and joining exons in mRNA

13. Complete set of RNA transcripts in a cell or organism

14. Non-functional gene remnant due to mutations

Down

1. Genetic constitution of an individual organism

2. DNA region that increases gene transcription efficiency

4. Addition of a methyl group to DNA, often silencing genes

6. Conservation of gene order across species

7. Portion of the genome that encodes proteins

8. Genome editing tool based on bacterial defense mechanisms

9. Group of alleles inherited together from a single parent

~ Sahil Ali Khan

MEET THE TEAM

IMPRINT | VOLUME 3 | ISSUE 3

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