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DEPARTMENT OF GENETIC ENGINEERING

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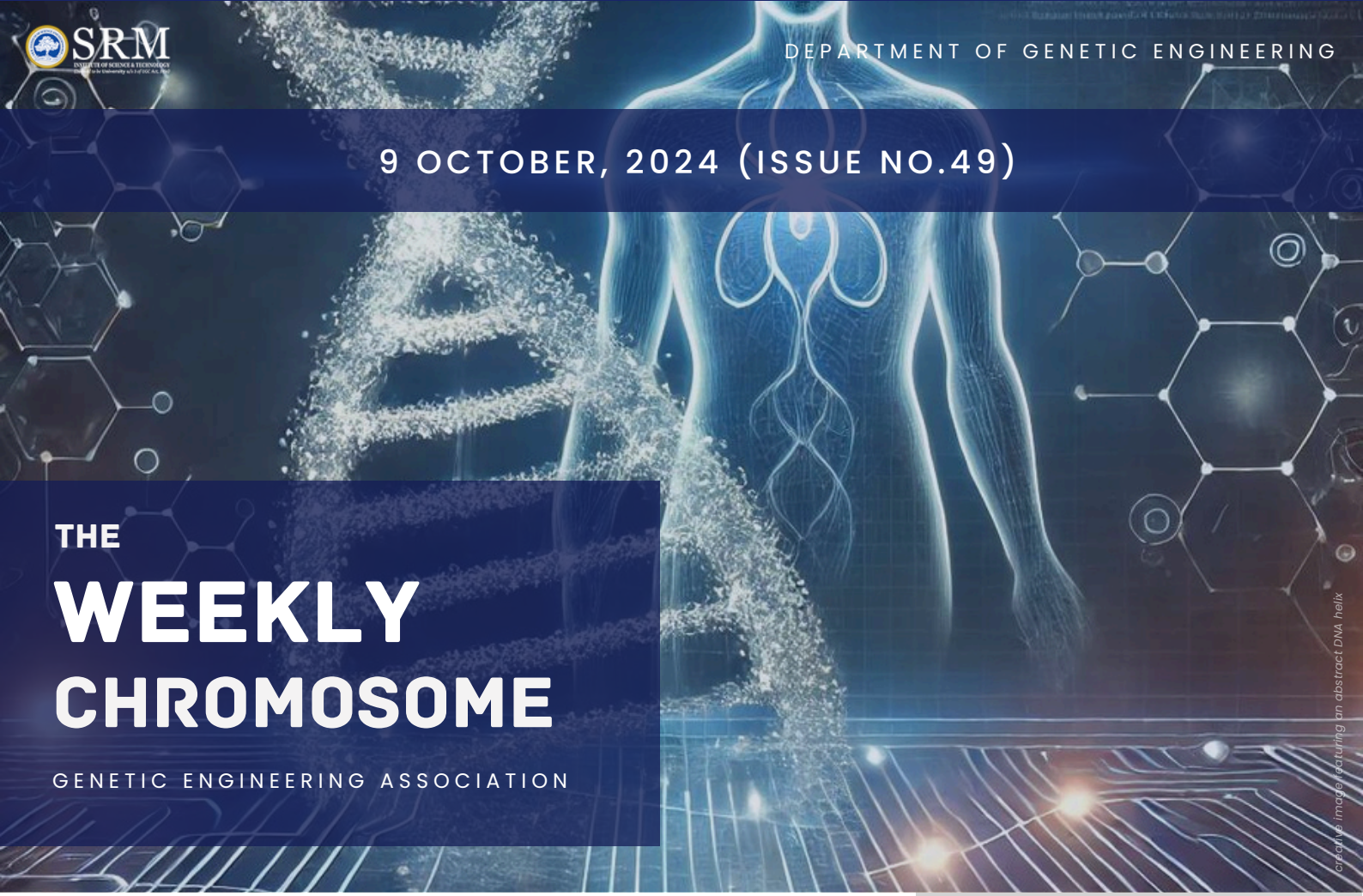


THE WEEKLY CHROMOSOME

GENETIC ENGINEERING ASSOCIATION

Creative image capturing an abstract DNA helix

Revolutionary Fluoro-Sugars Pave the Way for Advanced Disease Diagnostics

In an exciting breakthrough, scientists from the University of Manchester and the University of Leeds have engineered "fluoro-sugars," innovative artificial sugars that could transform disease diagnosis and treatment. These cutting-edge "glycofluoroforms" incorporate fluorine molecules, enabling them to block pathogens and detect bacterial toxins with remarkable precision—similar to the rapid tests used for COVID-19.

Professor Mahew Gibson highlights the significant advantages of these fluoro-sugars: they eliminate the need for animal-derived antibodies and boast heat stability, making them ideal for low-resource environments. The research team developed a diverse library of 150 versions of the crucial glycan LewisX, known for its interactions with various proteins. This groundbreaking work opens the door to more accurate diagnostics and targeted drug development, with the potential to tackle a wide range of infectious diseases and cancers.

- Aswini S, B.Tech III year

Featured in this issue

Meet the new GEA Class Reps!

We are pleased to introduce the class representatives for the Genetic Engineering Association. A hearty congratulations to **Ms. Sahasra** and **Ms. Madhumithaa N** from second year, **Ms. Ananya Sood** and **Mr. Mithul Abhinav** from third year and **Mr. Abhinav P.P.** and **Mr. Samuel Praburaj** from MTech, stepping into leadership roles. These individuals will be instrumental in fostering collaboration between students and the faculty, as well as driving initiatives in the field of Genetic Engineering and Biotechnology research. Wishing you all the best.

- Malavika Nair, B.Tech IV year

Unlocking Dormancy in Reproductive Potential

During evolution, humans lost the ability to activate embryonic diapause, a mechanism that slows development during the blastocyst stage. However, scientists from the Max Planck Institute and IMBA have found that decreasing mTOR signaling in human pluripotent stem cells (hPSCs) and blastoids induces dormancy, showing that this mechanism remains active and reversible. This discovery could improve IVF success rates by allowing for better embryo assessment and synchronization with the mother for implantation.

- Vanshikaa K B.Tech III year

Unlocking the Secrets of Cold Resistance: How Hibernating Cells Defy the Chill

While the use of therapeutic hypothermia and the preservation of organs at low temperatures for extended periods is currently limited by the sensitivity of human cells to cold stress, the molecular basis for the exceptional cold tolerance of mammalian "hibernator" cells remains largely unknown. In this study, researchers used a Syrian hamster cDNA library—derived from a mammalian hibernator—for gain-of-function screening to identify genes that confer cold resistance to cold-sensitive human cells. They identified Gpx4 as a potent suppressor of cold-induced cell death. Notably, Gpx4 was shown to prevent the accumulation of lipid peroxides, particularly at low temperatures. This was demonstrated through experiments involving genetic deletion of Gpx4 in hamster cell lines and pharmacological inhibition of the protein. Additionally, other ferroptosis-inhibiting pathways, such as mitochondrial and plasma membrane CoQ reduction and biopterin production, were genetically disrupted, further exacerbating cold-induced cell death in the absence of Gpx4. Altogether, these findings suggest that ferroptosis-suppressing pathways protect hibernating mammalian cells from cold-induced damage. When activated in non-hibernating cells, such as human cells, these pathways may help them resist cold stress.

- Keerthana R, B.Tech III year

A Day of Awareness: Winding up PCOS month with Dr. Usha's informative talk

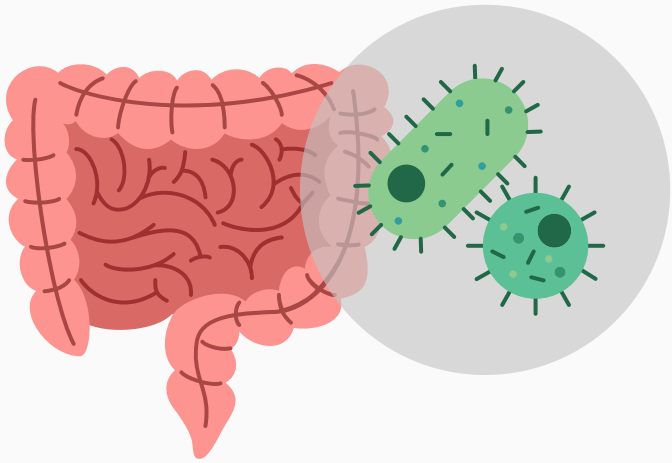
On September 30, 2024, the Rotaract Club and the Genetic Engineering Association (GEA) collaborated to host an engaging event to raise awareness for PCOS Awareness Month. Dr. Usha. B, Associate Professor in the Genetic Engineering Department, delivered a compelling presentation titled "PCOS: Genetic or Lifestyle?". As a dedicated researcher focusing on Polycystic Ovary Syndrome, she explored the complex interplay of genetic and environmental factors contributing to PCOS, particularly among the Indian population. Dr. Usha shared her major research findings, including insights into the genetic causes of the disorder and the role of medicinal plants in treatment, blending traditional knowledge with modern science. She emphasized the importance of early diagnosis and proactive management. The event successfully educated students about the implications of PCOS, fostering a supportive dialogue about women's health and encouraging attendees to advocate for their well-being.

- Shrishti Madhan, B.Tech IV year

Inflammation and Gut Microbiota in Precision health

Changes in gut microbiota and resulting inflammation are believed to be key factors in depression development. Researchers utilised the Mendelian Randomisation approach to explore how gut microbiota and cytokines influence depression onset. They identified protective factors such as *Romboutsia* and *Intestinimonas*, alongside risk factors linked to microbiota dysbiosis. The findings highlight the potential for personalised depression management through gut microbiota and cytokine profiling, supporting stool sample analysis for early detection and treatment.

- Sailaja Bimal Roy, B.Tech III year



EDITORS NOTE

We are excited to welcome **Dr. Kiran Kumar** as our new Head of the Department !