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SPECIAL EDITION IN HONOR OF THE INTERNATIONAL DAY OF WOMEN AND GIRLS IN SCIENCE

PUBLISHED BY DEPARTMENT OF BIOTECHNOLOGY, SAFI INSTITUTE OF ADVANCED STUDY, VAZHAYOOR, MALAPPURAM, KERALA, 673633

PRINCIPAL'S MESSAGE

It is my pleasure to introduce the 4th issue of Biostumag. I am proud to see our biotechnology students' innovative spirit, curiosity, and passion shine through in this magazine. Biostumag showcases the latest research, trends, and ideas in biotechnology, highlighting your hard work, dedication, and creativity.

As future leaders in biotechnology, I urge you to harness your skills to make a positive impact on healthcare, sustainability, and the world. I wish you all the best and look forward to Biostumag's continued growth and success.

Best regards,

Prof. E. P. Imbichikoya
CEO, SAFI group of Institutions



MESSAGE FROM THE HOD

Dear Students,

I am thrilled to see the 4th issue of Biostumag, our department's magazine, come to life. This issue is a testament to the creativity, hard work, and dedication of our biotechnology students. As the HOD of the Biotechnology Department, I am proud to see our students exploring the vast possibilities of biotechnology and showcasing their knowledge, skills, and passion through this magazine.

I congratulate the editorial team and contributors for their outstanding efforts in producing this issue. Your commitment to excellence and teamwork is truly commendable. Biostumag has become an integral part of our department's identity, and I am confident that it will continue to inspire and motivate our students to achieve greatness.

Keep up the excellent work!

Best regards,

Dr. Sahaya Shibu B
Head of Department, Biotechnology
SAFI Institute of Advanced Study (Autonomous)

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Women In Science: Breaking Barriers And Shaping The Future!

Throughout history, women in science have faced significant challenges, yet they have made groundbreaking contributions that have shaped our understanding of the world. Despite systemic barriers, their perseverance and intellect have propelled scientific discovery forward in fields ranging from physics and medicine to environmental science and technology.

Marie Curie (1867-1934) - The first woman to win a Nobel Prize and the only person to win in two different scientific fields (Physics and Chemistry), Curie's research on radioactivity laid the foundation for modern nuclear science and medical treatments.

Rosalind Franklin (1920-1958) - A key figure in the discovery of DNA's double-helix structure, Franklin's X-ray diffraction images provided critical insights that James Watson and Francis Crick used in their model of DNA.

Despite their contributions, women in science have historically faced discrimination, lack of access to education, and exclusion from scientific institutions. Even today, women remain underrepresented in many fields of science, Technology, Engineering, and Mathematics fields, particularly in leadership positions. Gender bias, unequal pay, and lack of funding for female-led research continue to be significant obstacles. Women in science are not just making history—they are shaping the future. By fostering inclusive environments and ensuring equal opportunities, society stands to benefit from the full potential of scientific talent, regardless of gender.

~ Nadha Nazar
3rd year BSc biotechnology

Dept. of Biotechnology, Supports Care Home And Kuthiravattom Patients

January 22, 2025

In a heartwarming display of compassion and social responsibility, biotechnology department organized an extension activity aimed at supporting the residents of Care Home and Kuthirvattom patients. On January 22, a team of enthusiastic students and faculty members came together to prepare nutrient-rich chapatis for these deserving individuals

The event was part of the college's ongoing efforts to engage with the local community and promote social welfare. By preparing and distributing nutritious food, the team aimed to provide tangible support to those in need, while also fostering a sense of empathy and understanding among the student body.

The chapati-making activity was a resounding success, with over 1400 chapatis prepared and distributed to the residents of Care Home and Kuthirvattom patients. The event not only provided a much-needed nutritional boost but also brought joy and warmth to the recipients. Our department of biotechnology is proud to have played a small part in making a positive impact on the lives of these individuals. We believe that such initiatives not only benefit the community but also help shape the values and character of our students.

We extend our gratitude to the management and staff of Care Home and Kuthirvattom for their cooperation and support. We also appreciate the enthusiasm and dedication displayed by our students and faculty members, without whom this event would not have been possible.

We are committed to fostering a culture of social responsibility and community engagement. Through various extension activities and outreach programs, we strive to make a positive impact on the lives of those around us

**~Muhammed Basil k
3rd year BSc biotechnology**



Stop Seeking Empowerment- Own The Power You Already Are

On this beautiful day of celebrating women, I want to add one thing—one truth that often goes unspoken. The most magnificent force in this world is the seamless blend of masculine and feminine energy, walking hand in hand. We often hear that the Earth is called Mother Earth, as it nurtures, protects, and embraces all life with unconditional love. But this world thrives not only because of kindness and care; it flourishes because strength and spontaneity walk beside them, bringing balance. Just as a child is born from both a mother and a father, the wonders of this world are shaped by both energies, complementing each other in perfect harmony.

And in this harmony, dear woman, lies your true power. The world does not need to give you strength—you already are strength. The world does not need to empower you—you are empowerment itself. You were born with resilience woven into your DNA, with the ability to love, nurture, heal, and rise. Your body, mind, and soul move in a divine, cyclical rhythm, designed with an intelligence that knows how to create, how to protect, how to endure. You are not just here to be admired; you are here to be known. Know yourself. Embrace every gift, every instinct, every boundless depth of love within you. You are not weak, and you never have been. The courage you seek is already inside you. The love you give is the most beautiful force in existence. The world may try to define you, but you—only you—get to decide who you truly are.

So stand tall, with your heart wide open. Love without fear. Create without doubt. Heal without hesitation. And most of all, be unapologetically you. Because this world was never meant to exist without you—it was meant to thrive because of you.

**~ Jiya O Antony
Co-founder & CEO, Houtoliv**

MAGIC MILLET

Department of biotechnology conducted a national conference on magic millet. The conference aimed to unite millet researchers, discussing the current research status and future directions. It covered studies on millet improvement through biotechnological, genomic, and transcriptomic approaches. Additionally, it explored millet products, processing, nutrition, and health benefits. The conference fostered knowledge exchange and collaborative networks among researchers. This global initiative aims to elevate awareness about millet's significance, foster research development and encourage sustainable farming practices to ensure food security and combat the effects of climate change. The main presentation was featured by Dr Dinesh Chandra Joshi, senior scientist of ICAR-Vivekananda Institute of Hill Agriculture and Dr Manivetrivedhan, senior scientist of ICRISAT and many more

**~Afthab K E
3rd year BSc biotechnology**

A New Era In Immunotherapy: Bi-Specific Antibodies For Complex Diseases

Bi-specific antibodies are artificial B proteins that can bind to two different antigens or epitopes at the same time. They are a type of monoclonal antibody (mAb) that are designed to treat complex diseases by engaging two disease targets with one molecule.

BsAbs can cause multiple physiological or anti-tumor responses, which may be independent or connected.

Cocktail effect

BsAbs can act like a "cocktail" of two mAbs, but patients may only need one antibody treatment. BsAbs may produce more significant treatment effects due to their synergistic features. BsAbs can come in many formats, ranging from small proteins to large immunoglobulin G (IgG)-like molecules. They can be used to treat a variety of conditions, including cancer, autoimmune and infectious diseases, and inflammatory conditions.

~Ishma Kadheeja

3rd year BSc. biotechnology

The CRISPR-Cas9 Gene Editing Tool: A Revolutionary Breakthrough In Genetics

The discovery of the CRISPR-Cas9 gene editing tool has transformed the field of genetics, enabling scientists to edit genes with unprecedented precision and efficiency. This groundbreaking technology has far-reaching implications for various fields, including medicine, agriculture, and biotechnology.

CRISPR-associated protein 9, is a bacterial defense mechanism that has been repurposed for gene editing. The system was first discovered in the 1980s by Japanese scientists, but it wasn't until 2012 that the CRISPR-Cas9 gene editing tool was developed by Jennifer Doudna and Emmanuelle Charpentier.

The CRISPR-Cas9 system consists of two primary components: a small RNA molecule (guide RNA) and the Cas9 enzyme. The guide RNA is programmed to recognize a specific DNA sequence, while the Cas9 enzyme cuts the DNA at the targeted location. This precise editing capability has opened up new avenues for research and treatment of genetic diseases.

CRISPR-Cas9 gene editing tool has revolutionized the field of genetics, enabling scientists to edit genes with unprecedented precision and efficiency. While there are challenges and controversies surrounding its use, the potential benefits of CRISPR-Cas9 are vast and varied. As research continues to advance, it is likely that CRISPR-Cas9 will play an increasingly important role in shaping the future of genetics and biotechnology.

~Sara Jabeen

3rd year BSc. biotechnology

ALGAE AS BIOFUEL

These include some plants with an inch size which can be useful providers of biofuel. They rapidly grow only under sunlight cultural conditions, water and carbon dioxide. These plant-like organisms are known to secrete oils that can be converted to biodiesel hence can be used in place of fossil energy. Algae unlike corn yields many folds more fuel in the same space that one would use to cultivate corn. They can also be grown on regions that can hardly support the normal farming practice. This is so because, as the algae matures, it reduces on greenhouse gases by absorbing carbon dioxide. This makes algae as a source of fuel renewable but in addition to that it is environmentally friendly. Algae have the capability to be grown in ponds water tanks and even in the wastewater system due to flexibility in the methods used. With regard to algae, we have a clean and efficient source of tapping into biofuel that will enable powering the future.

~Abdul Azeez N

1st yr BSc biotechnology

Russian Cancer Vaccine: A Breakthrough In Oncology

Russia has made a groundbreaking development in cancer treatment with its mRNA-based cancer vaccine. This vaccine has shown promising results in pre-clinical trials, suppressing tumor growth and potential metastases.

The vaccine uses a personalized approach, relying on genetic analysis of each person's tumor to identify specific mutations known as neoantigens. These neoantigens are then used to create an individualized vaccine that trains the immune system to recognize and target cancer cells.

What's more, artificial intelligence plays a crucial role in accelerating the development process. By leveraging AI and neural network computing, researchers can now create personalized vaccines in under an hour, a significant reduction from the previously lengthy process.

Russia plans to distribute the vaccine for free to patients starting early 2025, marking a significant step forward in making advanced cancer treatments more accessible.

~Afna Jasmin

3rd yr BSc biotechnology

Precision Medicine: Affording The Success Of Science

Science has made remarkable advances in understanding the molecular basis of disease, generating new and effective rationally-designed treatments at an accelerating rate. However, health systems face increasing challenges to the sustainability of equitable health care. Drug development is a major contributor to health costs – the average cost of getting a new drug into the market is estimated at US\$1.3 billion. Globally, governments and industry recognize that fundamental changes are essential to help address the sustainability of health care.

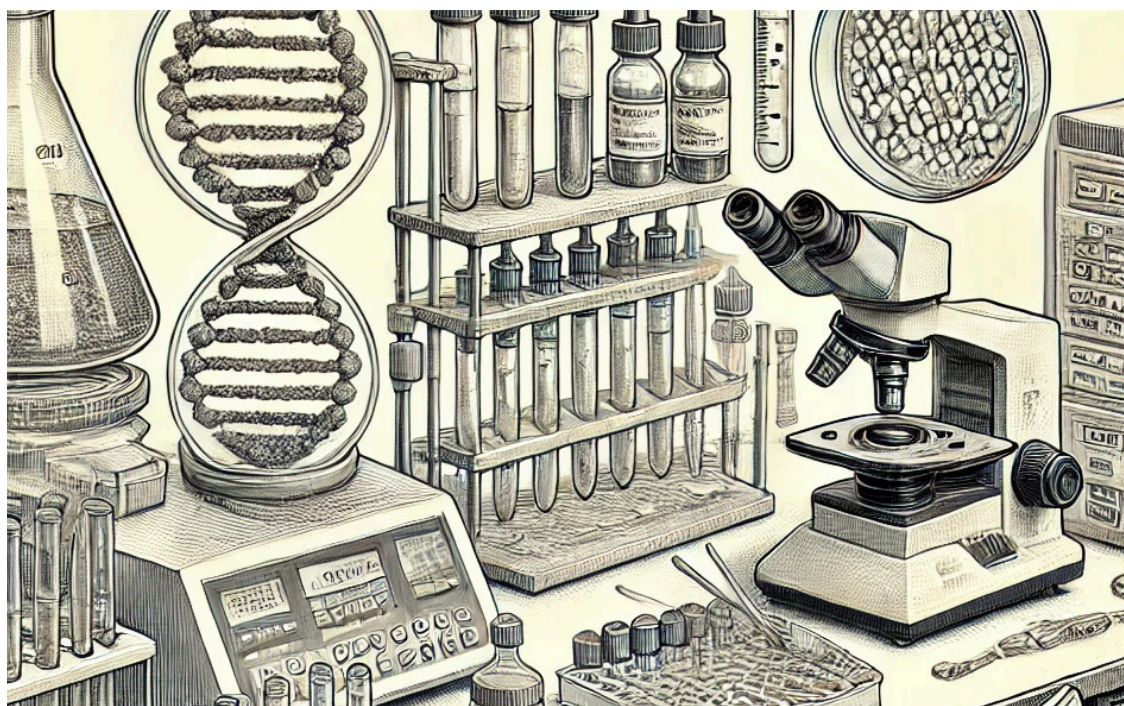
This issue is particularly pressing for cancer, the leading cause of death in higher-income countries.

Precision medicine is a revolutionary approach to healthcare that tailors medical treatment to individual patients based on their unique genetic profiles, environments, and lifestyles. This innovative strategy enables healthcare providers to predict which treatments will be most effective for specific patients, reducing trial-and-error approaches and minimizing side effects. By leveraging advanced technologies such as genetic sequencing, genomics, and artificial intelligence, precision medicine holds immense promise for transforming the diagnosis, treatment, and prevention of diseases, ultimately leading to better patient outcomes and improved quality of life.

Precision medicine is a transformative approach to healthcare that revolutionizes the way medical treatments are tailored to individual patients. By taking into account a patient's unique genetic profile, environmental factors, and lifestyle, healthcare providers can predict which treatments will be most effective, reducing the traditional trial-and-error approach and minimizing harmful side effects. This innovative strategy relies on advanced technologies such as genetic sequencing, genomics, epigenomics, and artificial intelligence to analyze vast amounts of patient data and identify specific molecular mechanisms underlying diseases.

The applications of precision medicine are vast and hold immense promise for transforming the diagnosis, treatment, and prevention of diseases. For instance, genetic testing can identify specific mutations associated with increased risk of certain diseases, enabling early interventions and targeted therapies. Moreover, precision medicine can help optimize drug development by identifying the most responsive patient populations, thereby streamlining clinical trials and accelerating the approval of new treatments. Ultimately, precision medicine has the potential to improve patient outcomes, enhance quality of life, and redefine the future of healthcare.

~Fathima Rafeeq
3rd year BSc. Biotechnology



The Unsung Heroes of Molecular Biology

DNA scavengers are substances or enzymes that can break down or degrade DNA fragments. They work by targeting and removing unwanted or contaminant DNA from a particular environment ensuring that only the desired DNA remains intact. DNA scavengers can be categorized into enzymatic, chemical, and physical types, each employing different mechanism to manipulate DNA.

Many DNA scavengers have specific binding sites that allow them to attach to DNA molecules. By binding to DNA, they can effectively "trap" it, preventing it from participating in cellular functions like replication or transcription. This helps maintain cellular homeostasis and prevents potential damage from excess DNA. In experiments like PCR, gene cloning, or sequencing, even small amounts of contaminant DNA can lead to misleading results. DNA scavengers also ensures that only DNA relevant to the investigation is analyzed, maintaining the accuracy and reliability of forensic evidence. Contaminant DNA can cause sequencing errors, leading to incorrect data interpretation. In diagnostics, particularly in detecting pathogens or genetic markers, contaminant DNA can lead to false diagnoses. Techniques like CRISPR/Cas9 require precise control over the DNA being edited. DNA scavengers help to remove any unwanted DNA fragments that could interfere with the editing process, ensuring that the gene editing is precise and effective. Hence DNA scavengers are vital for maintaining the accuracy, reliability, and integrity of DNA-based experiments and applications by effectively removing contaminant DNA, they also help to prevent errors, ensuring reproducibility, and maintain the overall quality of research and diagnostic processes.

~Anusree K.
2nd year BSc. Biotechnology

Bioenergy

Bioenergy is a form of energy that is able to be replenished. It comes from natural materials known as biomass. Biomass is composed of plants, agricultural leftovers, and algae. Bioenergy has the potential to be a renewable alternative to conventional fossil fuels. This reduces harm to the environment at the same time it also satisfies growing energy demands. Using bioenergy is crucial for transitioning to a more sustainable energy system through the use of biofuels for heating homes and generating power using biogas. Bioenergy is crucial in the fight against climate change because it is carbon-neutral, with plants absorbing CO₂ during their growths. Moreover, advancements in bioengineering are increasing the possibilities for harnessing energy from overlooked sources. Ongoing research and advancements in bioenergy can revolutionize the energy sector by offering a renewable alternative for future generations.

~Ayshathu Shaziya
1st year BSc biotechnology

EARTHWORM AS BIOFERTILIZER"

People consider earthworms to be some important workforce in helping to convert waste into nutrients for soil. Others feed on organic things such as fallen leaves or other dumped materials like scraps of food. This waste in the earthworm digestive systems is degraded and converted to nutrient rich soil BOOSTER called vermicompost. It is well known that vermi compost contains nutrient which are essential for the well being of plants. Next to the humus formation and its transfer in the course of earthworm's movements the latter affect the soil structure making it more suitable for penetration of root system. These creatures get through the soil in their motion and assist by making passages that facilitate the circulation of air and water toward plant roots. This natural process minimizes the use of chemical fertilizers hence making farming to be more friendly to the environment. Farmers use earthworms because they are an inexpensive method of maintaining good soil condition. They must be protected since they have potential to be of significance in our lives. All in all, earthworms are nature's own additives to the soil since they have the ability to maintain agricultural lands productive and fertile.

**~Kadeeja Mehana k
1st year BSc Biotechnology**

EMBRACING HOPE IN THE SHADOWS

In the depths of shadows cast,
When storms of doubt seem unsurpassed,
A tender voice breaks through the night,
Reminding us that hope takes flight.

Each tear we shed, each weary sigh,
Is met with strength that won't deny.
For though the path may twist and bend,
The journey's not where troubles end.

Like flowers bloom through winter's chill,
Resilience grows with patient will.
In every struggle, every fall,
There lies the strength to rise through all.

So take a breath, and hold it near,
The dawn will come, dispelling fear.
For in your heart, a fire glows,
A promise that the world still flows.

Embrace the dawn, let shadows fade,
For in the light, new dreams are made.
You'll find your way, though roads may sway,
Remember, dear one, it will be okay.

**~Nada Jamal
1st year MSc biotechnology**

BIOSENSORS AS MONITORS

Biosensors are analytical devices that combine a biological component with a physicochemical detector to measure the presence or concentration of substances, such as glucose, toxins, or pathogens. The biological component, such as enzymes, antibodies, or nucleic acids, interacts with the target analyte, leading to a measurable signal that is often electrical, optical, or thermal. These devices are widely used in medical diagnostics, environmental monitoring, food safety, and bioprocess control.

New Inventions in Biosensors:

Recent advancements in biosensor technology focus on enhancing sensitivity, portability, and real-time monitoring. Innovations include,

wearable Biosensors: These are integrated into smartwatches, patches, or contact lenses for continuous health monitoring, such as glucose levels in diabetics or electrolyte balance in athletes.

Nanotechnology-Enhanced Biosensors: Nanomaterials, like graphene and gold nanoparticles, are used to improve the sensitivity and specificity of biosensors, allowing for the detection of extremely low concentrations of analytes.

CRISPR-Based Biosensors: Leveraging CRISPR gene-editing technology, these biosensors can detect specific DNA sequences, making them powerful tools for diagnosing genetic diseases or detecting pathogens with high accuracy.

Biosensor Paper-Based Biosensors: Affordable and easy to use, these disposable biosensors are designed for point-of-care diagnostics, particularly in resource-limited settings, and can detect diseases like malaria or COVID-19.

These innovations are pushing the boundaries of biosensor applications, making them more accessible, efficient, and adaptable to various fields.

**~Shahma Mohammed
2nd year BSc. Biotechnology**

Revolutionizing Antibiotic Production

Fermentation is a centuries old technique that has revolutionised the production of antibiotics and thereby transforming the pharmaceutical industry. The bioprocess called fermentation harnesses the power of microorganisms to convert raw material into life saving drugs such as antibiotics. Antibiotics are largely produced through the process of fermentation.

Antibiotic production was revolutionised by Alexander Flemming in 1928. Fermentation enables large scale production of antibiotics with reduced production cost when compared to chemical synthesis. It helps produce antibiotics with high purity, reducing risk of contamination. Fermentation is a vital bioprocess in the production of antibiotics. Ongoing research and development aims to improve fermentation techniques to ensure a ready supply of antibiotics to combat bacterial infections

**~ Arsh A Rasheed
1st year bsc biotechnology**

AlphaFold AI: A Paradigm Shift In Protein Structure Prediction"

AlphaFold, developed by DeepMind is a ground-breaking fully artificial intelligent system that has transformed biology due to its capacity of accurately predicting protein folding and 3d structures from its amino acid sequence. It is this innovation that clears one of the greatest challenges in molecular biology, whether influencing medicine, biochemistry, and manifold scientific investigation sorely.

What is alphaFold ?

Proteins are macromolecules that play a wide variety of roles in organisms' cells, tissue and organs. Their function are mainly defined by their three dimensional conformation and this is governed by the sequence of amino acids of the proteins. Nevertheless, determining the structure of a polymer that a linear chain of amino acids forms is a very challenging task that has been an accomplished goal in the field for many years now. AlphaFold is a deep learning system, a form of artificial intelligence, which utilized deep learning to predict the three dimensional structures of proteins with high accuracy. The system was constructed using large data sets of know protein structures and sequences in order to teach the system how natural protein folding occurs. DeepMind's work, which uses artificial intelligence to predict protein structures, has been called another science milestone since this challenge has remained unsolved for half a century.

How does it work?

AlphaFold predicts the structure of proteins using neural networks with regards to the physics and biology of protein folding. The AI system uses an amino acid sequence as input and then provides a very accurate estimate on the structural conformation of the protein.

Conclusively, it can be stated that instead of being a tool, AlphaFold AI is the key to the change of perspectives in biological sciences. With such ability to accurately forecast the protein folds, influences molecular biology of life, including in drug design, biotechnology among others.

~ **Insaf Shamsudheen**
1st year BSc biotechnology

Engineered bacteria: Revolutionizing Industries and Sustainability

Engineered bacteria are microorganisms that have been genetically modified to perform specific functions or produce particular substances. These microscopic wonders have the potential to revolutionize various industries, from biofuel production to bioremediation, and even create nutritional supplements. Engineered bacteria have a wide range of applications across various industries. They can be used to produce biofuels, such as ethanol, butanol, and biodiesel, offering a sustainable alternative to fossil fuels. Additionally, engineered bacteria can be employed in bioremediation, cleaning pollutants and toxic chemicals from the environment, restoring ecosystems, and promoting sustainability. In the nutrition and supplements sector, engineered bacteria can produce vitamins, amino acids, and other essential nutrients, enhancing food quality and human health. Furthermore, engineered bacteria can improve crop yields, disease resistance, and nutrient uptake in agriculture, transforming food production and security. These versatile microorganisms have the potential to revolutionize multiple industries and promote a more sustainable future. Engineered bacteria offer several advantages. They grow rapidly, produce high yields, and can be cultivated using flexible methods. Most importantly, they are renewable, eco-friendly, and reduce greenhouse gas emissions, making them a clean, efficient, and sustainable solution. Engineered bacteria offer a clean, efficient, and sustainable solution for various industries and environmental challenges. As research continues, their potential applications and benefits will grow, transforming our world.

~ **Dilna fathima**
2nd year biotechnology

Women in Stem Cell and Regenerative Medicine

Women have played an essential yet often underappreciated role in the advancement of stem cell research and regenerative medicine. Their contributions have helped shape our understanding of how cells develop, regenerate, and can be manipulated for therapeutic purposes. From pioneering fundamental discoveries in stem cell biology to leading breakthroughs in clinical applications, these scientists have not only overcome historical barriers in STEM but have also paved the way for future generations.

Stem cell research has undergone dramatic evolution over the past few decades. Early studies on embryonic development and cell differentiation set the foundation for later advancements in induced pluripotent stem cells (iPSCs), adult stem cells, and regenerative therapies. Women scientists have been at the forefront of many of these developments, playing key roles in expanding the field's potential to treat conditions such as cancer, neurodegenerative diseases, and organ failure.

1. Dr. Ann Tsukamoto

Co-patented the process for isolating human blood-forming stem cells, a breakthrough in bone marrow transplantation.

2. Dr. Shinya Yamanaka and Dr. Kazutoshi Takahashi's Team - Dr. Keiko Takahashi

Dr. Yamanaka is credited with discovering induced pluripotent stem cells (iPSCs), researchers like Dr. Keiko Takahashi played key roles in refining these methods.

~ **Arshina . EK**
2nd MSc general biotechnology

GALLERY



SAFI PTA MERIT DAY



DISTRIBUTION OF TISSUE CULTURED BANANA SEEDLINGS FROM SAFI



MAGIC MILLET



Care Home Visit



