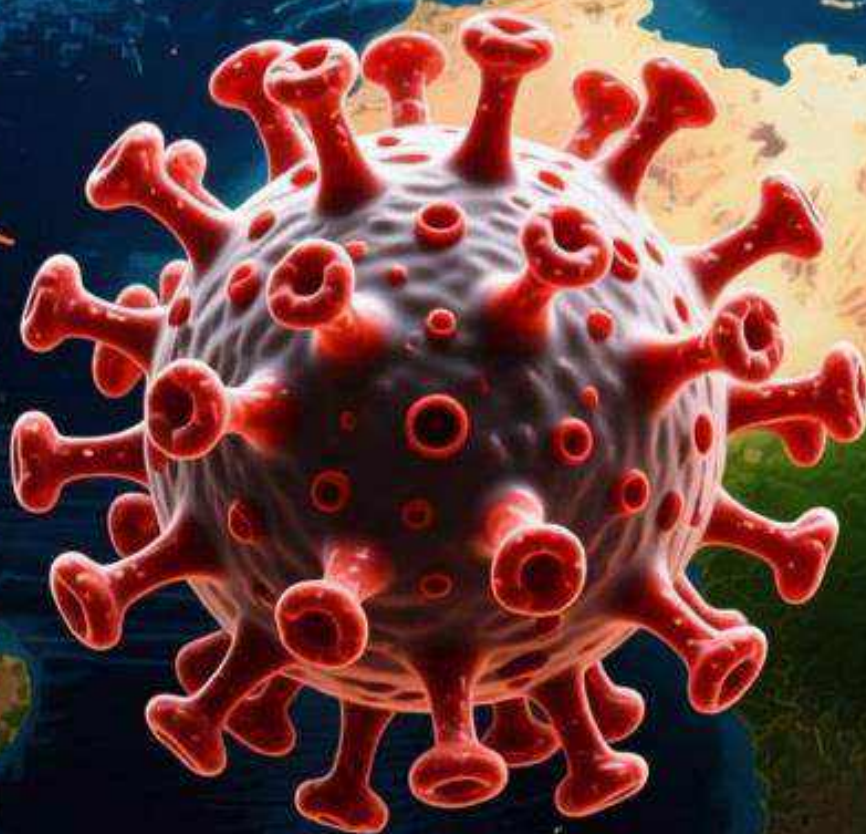


mi^{et}

Biotaction

Reaching New Horizons..

**HEALTH CARE
&
MEDICAL BIOTECHNOLOGY**



MIET BIOTECHNOLOGY SOCIETY, MEERUT

2023-2024

Biotaction

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Departmental Vision

To be a leading department in the country imparting biotechnological education and problem solving skills to the budding biotechnocrats capable of meeting emerging challenges in the area of inter-disciplinary education and industries.

Departmental Mission

1. Educating young aspirants in the field of biotechnology and allied fields to fulfill national and global requirements of human resource.
2. Generating trained man-power with advanced techniques in order to meet the professional responsibilities.
3. Imparting social and ethical values in graduates for Progressive attainment at social level.

Program Educational Objectives (PEOs)

The Biotechnology Department of Meerut Institute of Engineering & Technology, Meerut produces graduates with a strong foundation of scientific and technical knowledge and who are equipped with problem solving, teamwork, and communication skills that will serve them throughout their career. The specific program educational objectives are:

PEO1: Pursue career as biotechnocrats in core and allied biotechnological fields all over the world.

PEO2: Undertake advanced domain research and development in the field of translational research, in a sustainable, environment- friendly and inventive manner.

PEO3: Become an entrepreneur to meet the expectations and demand of modern industrial technologies and health care system.

PEO4: Carry out professional leadership roles in industries as well as academics with a commitment to continuous learning.

PEO5: Serve the society as a bonafide global citizen with strong sense of professional responsibility and ethics.

Program Specific Outcomes (PSOs)

1. An ability to apply biotechnology skills (including molecular & micro biology, immunology & genetic engineering, bioprocess & fermentation, enzyme & food technology and bioinformatics) and its applications in core and allied fields.
2. An ability to integrate technologies and develop solutions Based on inter disciplinary skills.

Message from
Chairman



Shri Vishnu Saran
B.E. (Mechanical)

To burn always with this hard gem like flame, to maintain this ecstasy, is success in life.

It's a feeling of pride for me that the MIET Biotechnology Society is coming up with the new edition of magazine **BIOTACTION**, which is going to explore the technical and creative talent of our students. We in MIET have always supported intellectual and technical growth in all the distinct spheres of life. The publication of this magazine is an example of the same, and for sure it showcases talent, innovation and dedication of our students who deserve to excel and achieve the zenith. I wish my students good luck in their current academic endeavors and their future and professional careers. I congratulate the entire Biotechnology Society for the excellent effort of bringing out **BIOTACTION**.

Message from
Vice-Chairman

It is a moment of great satisfaction to witness the Department of Biotechnology presenting yet another edition of its magazine **BIOTACTION**. The magazine reflects the intellectual curiosity, creativity, and scientific vision of our students, which we at MIET always strive to encourage. Every edition stands as a symbol of their perseverance and commitment to excellence. I appreciate the efforts of the faculty and students for nurturing such a culture of innovation and teamwork. My best wishes to all for the continued success of **BIOTACTION** and future academic endeavors.



Shri Puneet Agarwal
B.Tech. (IIT BHU), PGDM (IIM A)

Message from Director



Prof. (Dr.) Sanjay Kr. Singh
B. Tech. (E&T), M. Tech. (E&C),
Ph.D. (VLSI Design)

“Dreams set the course, and determination paves the way.”

There are no limits to what you can achieve; the possibilities are as vast as your vision. MIET fosters a healthy, creative, and intellectually vibrant environment, empowering young minds to grow into responsible and progressive citizens of our nation. It is with great pride that I welcome the new edition of **BIOTACTION**, the Biotech magazine of the MIET Biotechnology Society. I sincerely applaud the initiative and hard work of our Biotechnology students in bringing this magazine to life. May this platform continue to inspire curiosity, share knowledge, and open new horizons for learning and innovation in the times ahead.

I am pleased to see the Department of Biotechnology bringing out the new issue of **BIOTACTION**, which captures the spirit of innovation and learning among students. Initiatives like this magazine provide a platform for students to express their ideas, enhance their technical understanding, and connect academics with real-world perspectives. It also reflects their readiness to take on professional challenges with confidence and creativity. I congratulate the MIET Biotechnology Society for this commendable effort and wish them great success in their academic and career journeys ahead.

Message from Director-Placement



Ms. Akanksha Agarwal
PGDBM

Message from Dean Academics



Dr. Sanjeev Singh
M.Tech., Ph.D. (IIT BHU)

The magazine **BIOTACTION** stands as a vibrant reflection of the Department of Biotechnology dedication to academic innovation, creativity, and research excellence. It is heartening to see our students and faculty come together to showcase ideas that bridge science and imagination.

Such initiatives not only highlight the intellectual strength of the department but also encourage a spirit of inquiry, teamwork, and continuous learning among students. I extend my best wishes to the entire editorial team for this commendable effort and look forward to many more inspiring editions ahead.

Dear Students,

I am elated to present the new issue of the MIET Biotechnology Society official magazine: **BIOTACTION**. In today's world, it is extremely important, especially for students, teachers as well as entrepreneurs in the field of biotechnology to be fully aware of the recent developments in the biotechnological arena. Biotechnology offers the widest range opportunities in the present global scenario. Therefore, **BIOTACTION** is an effort from the MIET Biotechnology Society towards increasing the knowledge-base of its readers.

I hope the exposure that **BIOTACTION** provides is helpful in generating interest, increasing awareness and spreading the message to the Society.

My sincere best wishes to all.

Message from HoD



Dr. Avinash Singh
M.Tech., Ph.D.

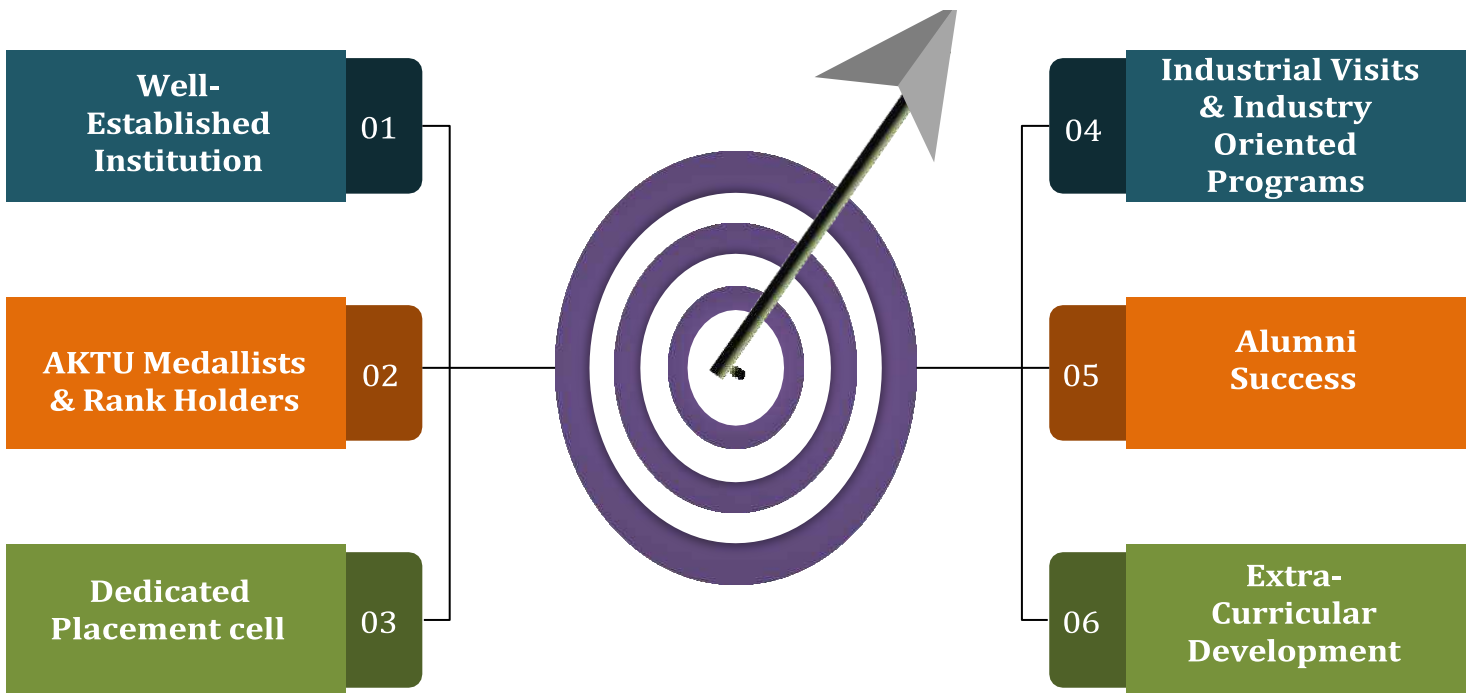
Table of Contents

Editorial Board	i
Departmental Vision, Mission, PEOs, PSOs	i
Message from Chairman	ii
Message from Vice-Chairman	ii
Message from Director	iii
Message from Director-Placement	iii
Message from Dean Academics	iv
Message from HOD	iv
1. About the Department	1
2. Why Biotechnology at MIET?	1
3. Biotech Breakthroughs: The Future of Healthcare is Here	2
4. CRISPR-Cas9: A Genetic Revolution in Health Care	4
5. Stem Cell Therapy: Regenerating Hope in Modern Medicine	5
6. The Smart Bandage Revolution: Enhancing Chronic Wound Management	7
7. Medical Biotechnology : Revolutionizing Healthcare	8
8. The Hidden Code: Unlocking the Mysteries of Junk DNA in Medical Biotechnology	10
9. Medical Biotechnology and Healthcare Intersection Transforming Patient Care	12
10. Personalized Medicine: Tailoring Treatment to the Individual	13
11. Wearable Biotechnology Devices: Real-Time Health Monitoring	14
12. Bioprinting Organs: A Revolution in Transplant Medicine	16
13. Summer Trainings & Industrial Visits	18
• Summer Training	18
• An Educational Field Visit to Barapullah Drain Treatment Plant, New Delhi	19
• A Research Exposure Visit to CSIR– IGIB, Delhi	20
• A Science & Technology Exposure Tour to IISF at DBT-THSTI, Haryana	21
14. Events Organized	22
• Orientation Program	22
• Teacher’s Day celebration	23
• Engineer’s Day Celebration	24
• Unveiling the Next Edition of the Department Magazine	25
• Biotech Sambandh	26
• Expert Lecture on 3D Bioprinting	27
• Alumni Meet	28
• Guest lecture on “Guidance on Career Opportunities in Abroad”	29
• National Young Girl Child Day Celebration	30
• BIOQUORUM	31
• Project EXPO 2024	32
• Alumni Interaction Session	33
15. Student Achievements	34
16. Placement	35
17. Opportunities after B. Tech in Biotechnology	36

About the Department

Premier & Oldest Department	<ul style="list-style-type: none"> ❖ One of the Premier Department in Education & Research in Uttar Pradesh. ❖ Established in 2001 and is one of the oldest Departments in state offering graduate and post graduate Engineering degrees in Biotechnology.
NBA Accreditation	<ul style="list-style-type: none"> ❖ First NBA Accredited Department in the Institute ❖ Four Times NBA Accreditation (B.Tech. Biotechnology); 2008, 2014, 2017 & 2024
State of the Art Laboratories	<ul style="list-style-type: none"> ❖ State-of-the-Art Laboratories provide advanced facilities for cutting-edge research and practical learning.
Experienced and Qualified Faculty	<ul style="list-style-type: none"> ❖ Doctorate from (IITs/NITs/CSIRs)

Why Biotechnology at MIET?



Biotech Breakthroughs: The Future of Healthcare is Here

The discipline of medical biotechnology, which has seen tremendous breakthroughs over the years and is transforming the healthcare industry, combines biological science with medical research and technology. In the early 1970s, scientists successfully spliced genes from one organism into another using a technique called recombinant DNA, which marked the beginning of the field of medical biotechnology. An entirely new era in the medical business began with this discovery, which made it possible to produce therapeutic proteins and vaccines on a huge scale. Medical biotechnology is concerned with the research and development of pharmacological and biological diagnostics that aid in both the management and prevention of human diseases utilizing living cells and cell components. The vast majority of medical biotechnologists are employed in research or development facilities. With an emphasis on creating more potent and inexpensive treatment options, the medical biotechnology market continues to expand in tandem with the demand for novel treatments. We are all aware of the significance and great applicability of biotechnology, the field that gave rise to the cutting-edge methods utilized to create the highly anticipated COVID-19 vaccine, and this current epidemic is an excellent illustration. In addition to developing vaccines faster than ever before, biotechnology will be crucial in meeting the complex issues of future generations.

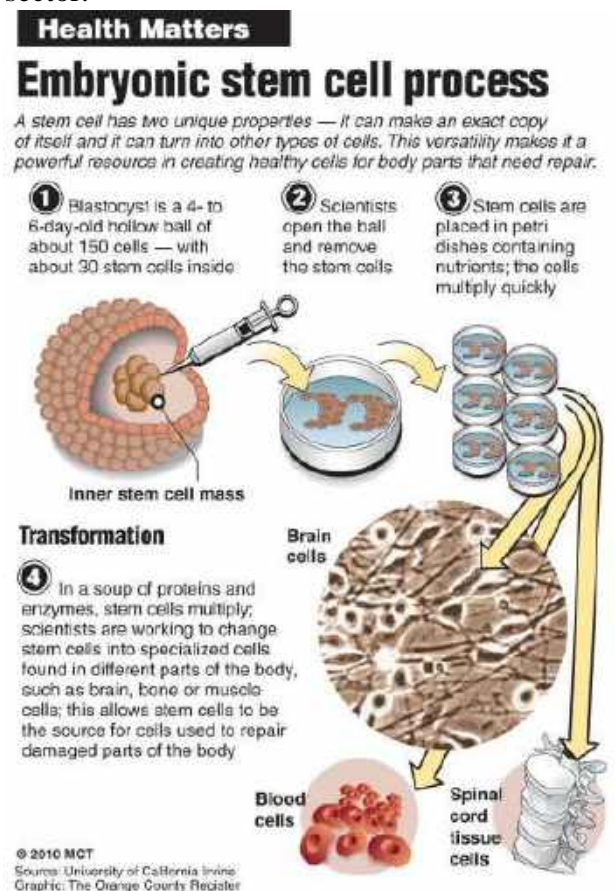
Particular instances of the most recent medical innovations accessible today, to potential approaches for controlling the expenses resulting from research and development:

Recombinant DNA Technology: The technique of altering genetic material from numerous sources in order to create distinctive genetic combinations is known as recombinant DNA technology. With the use of this technology, it has recently become possible to engineer and manipulate genes to produce desired proteins, creatures, and traits. Recombinant DNA technology has made it possible to produce vaccinations, human growth hormone, and insulin, among other medications, for the healthcare sector.

Human Genome Project (HGP): The Human Genome Project (HGP) is an international endeavor that successfully discovered, archived, and made publicly available the genetic sequences present on nearly every chromosome in the human body, collectively known as the human genome. Between 1990 and 2003, the Human Genome Project (HGP) provided basic information to scientists about the three billion base pairs of adenines (A), thymine (T), guanine (G), and cytosine (C) that make up human genomic DNA.

CRISPR Technology: CRISPR technology, a relatively recent advancement in recombinant DNA technology, permits precisely controlled targeting and removal of genes within human cells. Segment of the viral DNA have been integrated into the bacterium's genome within the CRISPR sequence, which forms the basis of the CRISPR technology, which depends on the adaptive bacterial immune mechanism.

Stem Cell Research: The astonishing capacity of stem cells to regenerate themselves and differentiate into a range of specialized cell types is well known. The two main types of stem cells are adult stem cells, which come from the somatic tissues of fetuses or adults, and embryonic neural stem cells (ESCs),



which come from the inner cell mass (ICM) of blastocyst embryos. Regenerative medicine (RM), which attempts to replace, engineer, or regenerate human cells, tissues, or organs, is currently being researched by researchers using stem cells' potential.

Medical biotechnology's uptake and development have the potential to revolutionize the healthcare industry by enhancing patient outcomes and spurring economic growth. Medical biotechnology can alleviate the burden on healthcare systems and increase productivity by developing novel therapies for common public health issues including malnourishment and infectious infections.

The AstraZeneca COVID vaccine, developed by Sarah Gilbert's team at the University of Oxford to combat the COVID-19 pandemic, is one prominent example. Naturally, India, which has long been referred to as the "Pharmacy of the World," is leading these initiatives. On January 16, 2021, the nation began the greatest vaccination campaign in history, using two "Made in India" vaccinations to combat the COVID-19 pandemic. During the campaign's initial phase, 300 million high-priority recipients—mostly healthcare and sanitation professionals, the elderly, and those with significant illnesses—who are especially susceptible to the pandemic are receiving vaccinations. India has vaccinated more over two million individuals against COVID-19 in the first eleven days of the campaign, more quickly than any other country. One of the two vaccines currently in use in India is called Covishield, and it was created by Oxford University and AstraZeneca. It is manufactured by Serum Institute of India, a Pune-based company that is the largest vaccine manufacturer in the world. The second is entirely indigenous, Covaxin, and is created and produced in Hyderabad, India, by Bharat Biotech, an Indian pharmaceutical firm.



(Source: https://www.indembassyhanoi.gov.in/speeches_detail/?id=64)

in healthcare is not only a scientific account but also a tale of innovation, change, and a dedication to improving human health. The rapidly evolving biotechnology trends promise to keep on making breakthroughs and pushing the envelope of what is feasible in the field of healthcare as we navigate the future. In order to ensure that the groundbreaking impact of biotechnology continues to build a healthier and more resilient global community, scientists, researchers, and healthcare professionals from all around the world are collaborating together to spearhead this ongoing journey.

A new era of healthcare technology has been established by the commercialization of biotech products, which has redefined the methods for diagnosis, treatment, and prevention. These developments enhance patient outcomes and give hope for a time when diseases that were formerly thought to be incurable may be controlled or even cured. Encouraging and financing biotechnology research and development is essential as the sector develops further. More healthcare issues could be resolved by the upcoming generation of biotech products, improving chances for people all across the world. The industrialization of biotech goods is a sign of optimism for a happier, are more likely more resilient future as well as a business venture.

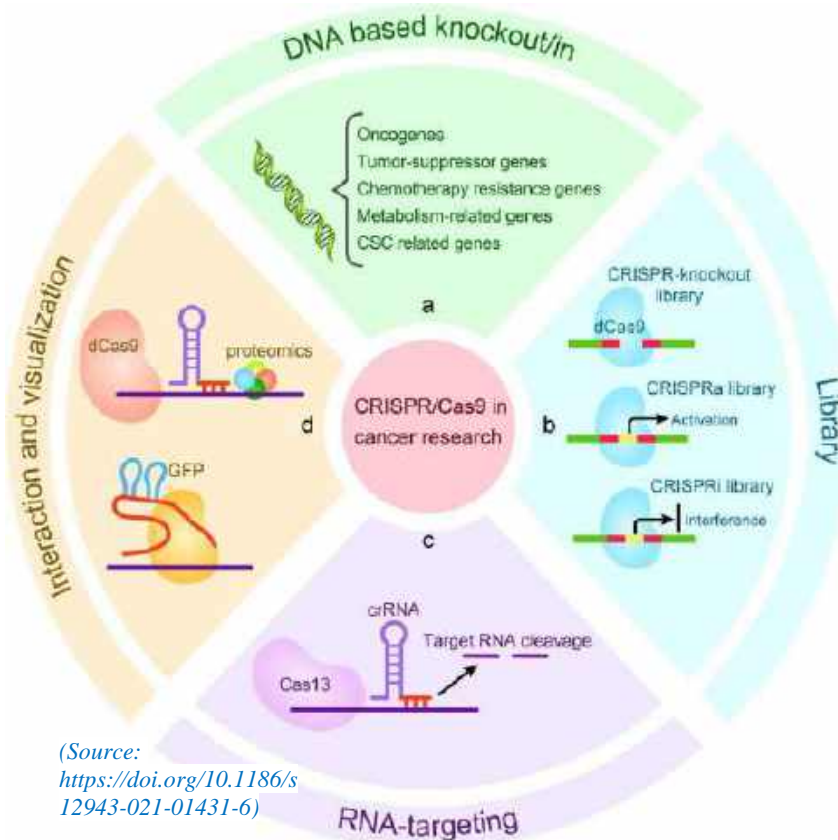
In conclusion, the evolution of biotechnology in healthcare is not only a scientific account but also a tale of innovation, change, and a dedication to improving human health. The rapidly evolving biotechnology trends promise to keep on making breakthroughs and pushing the envelope of what is feasible in the field of healthcare as we navigate the future. In order to ensure that the groundbreaking impact of biotechnology continues to build a healthier and more resilient global community, scientists, researchers, and healthcare professionals from all around the world are collaborating together to spearhead this ongoing journey.

CRISPR-Cas9: A Genetic Revolution in Health Care

In the rapidly evolving world of biotechnology, few discoveries have created as much excitement and potential as CRISPR-Cas9. Often described as “molecular scissors,” this groundbreaking gene-editing tool has fundamentally changed the way scientists approach genetic diseases, cancer, and even viral infections. Unlike traditional therapies that treat symptoms, CRISPR-Cas9 targets the very **root cause of diseases** by enabling precise modification of DNA sequences, opening doors to cures once thought impossible.

The CRISPR-Cas9 system was originally discovered as a natural defense mechanism in bacteria, where it helps detect and destroy invading viruses. Scientists quickly realized that this bacterial system could be

repurposed for human genetics. The technique uses a **guide RNA (gRNA)** to locate a specific DNA sequence, while the **Cas9 enzyme** cuts the DNA at the targeted site. The cell’s natural repair mechanisms then either disable the faulty gene or insert a corrected sequence, allowing precise and controlled gene editing. One of the most promising applications of CRISPR-Cas9 is in **genetic disorder therapy**. Conditions such as sickle cell anemia and beta-thalassemia, which are caused by single-gene mutations, have been successfully treated in experimental studies. By editing stem cells from patients and reintroducing them into the body, scientists can restore normal gene function, effectively offering a potential cure rather than just symptom management.



(Source:
<https://doi.org/10.1186/s12943-021-01431-6>)

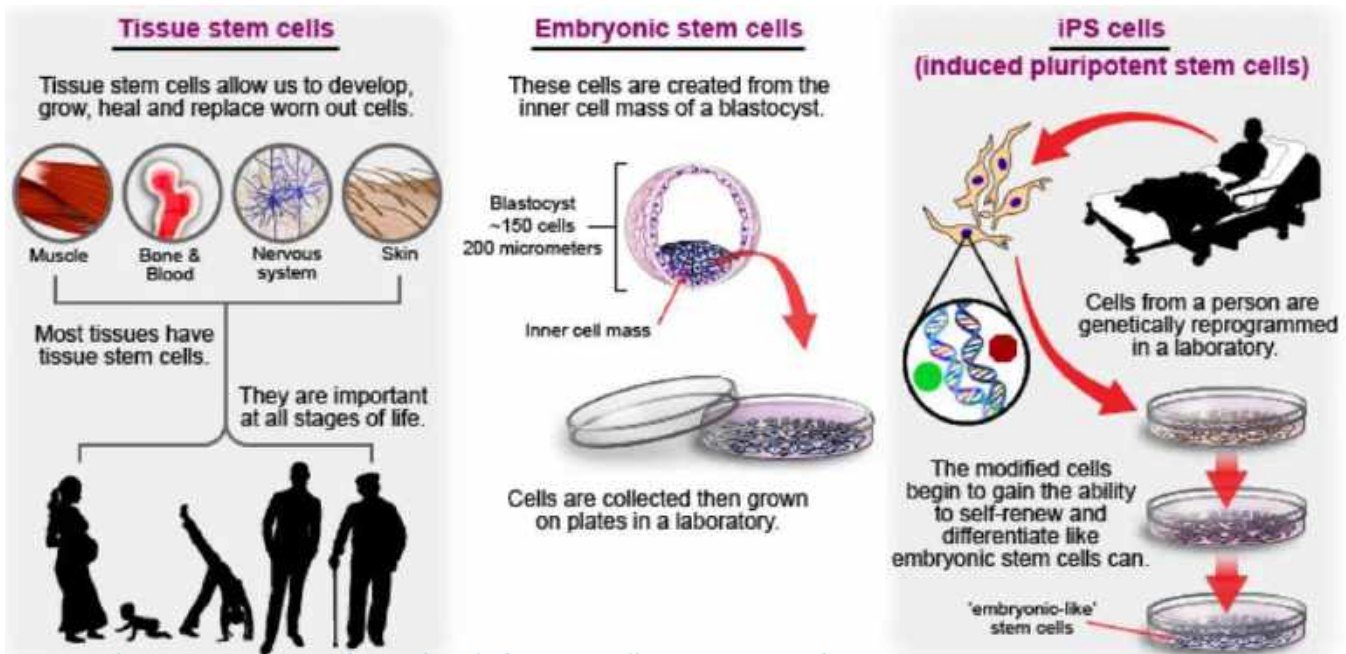
CRISPR is also making waves in **cancer research**. It allows scientists to identify genes that drive tumor growth and test targeted therapies. In infectious disease research, CRISPR shows promise in targeting viral DNA in diseases like HIV and hepatitis, providing hope for treatments that were previously unattainable. While CRISPR-Cas9 is revolutionary, it is not without challenges. Off-target edits, unintended mutations, and ethical concerns—especially regarding germline editing that could affect future generations—require careful regulation and oversight. The scientific community emphasizes responsible use, clinical trials, and global ethical frameworks to ensure safety and equity in its applications. It exemplifies the shift from reactive treatment to **precision and preventive care**, allowing researchers to not just fight disease but fundamentally change the way we understand and manipulate genetics. For biotechnology students, CRISPR represents both a tool and an inspiration—a demonstration of how innovation can transform lives, offering hope for a future where many genetic diseases may finally become curable.

Stem Cell Therapy: Regenerating Hope in Modern Medicine

Stem cell therapy has emerged as one of the most transformative innovations in modern health care. Unlike traditional treatments that often focus on alleviating symptoms, stem cells offer the unique potential to repair, regenerate, and even replace damaged tissues, addressing the underlying causes of disease. This capability positions stem cells at the forefront of regenerative medicine, which seeks not merely to treat illness but to restore normal function and improve quality of life.

Stem cells are remarkable because they possess two defining properties: self-renewal and potency. Self-renewal allows them to divide and produce identical copies over long periods, while potency determines their ability to differentiate into specialized cell types. Embryonic stem cells are pluripotent and can form almost any type of cell in the human body, making them invaluable for research and regenerative applications. Adult stem cells,

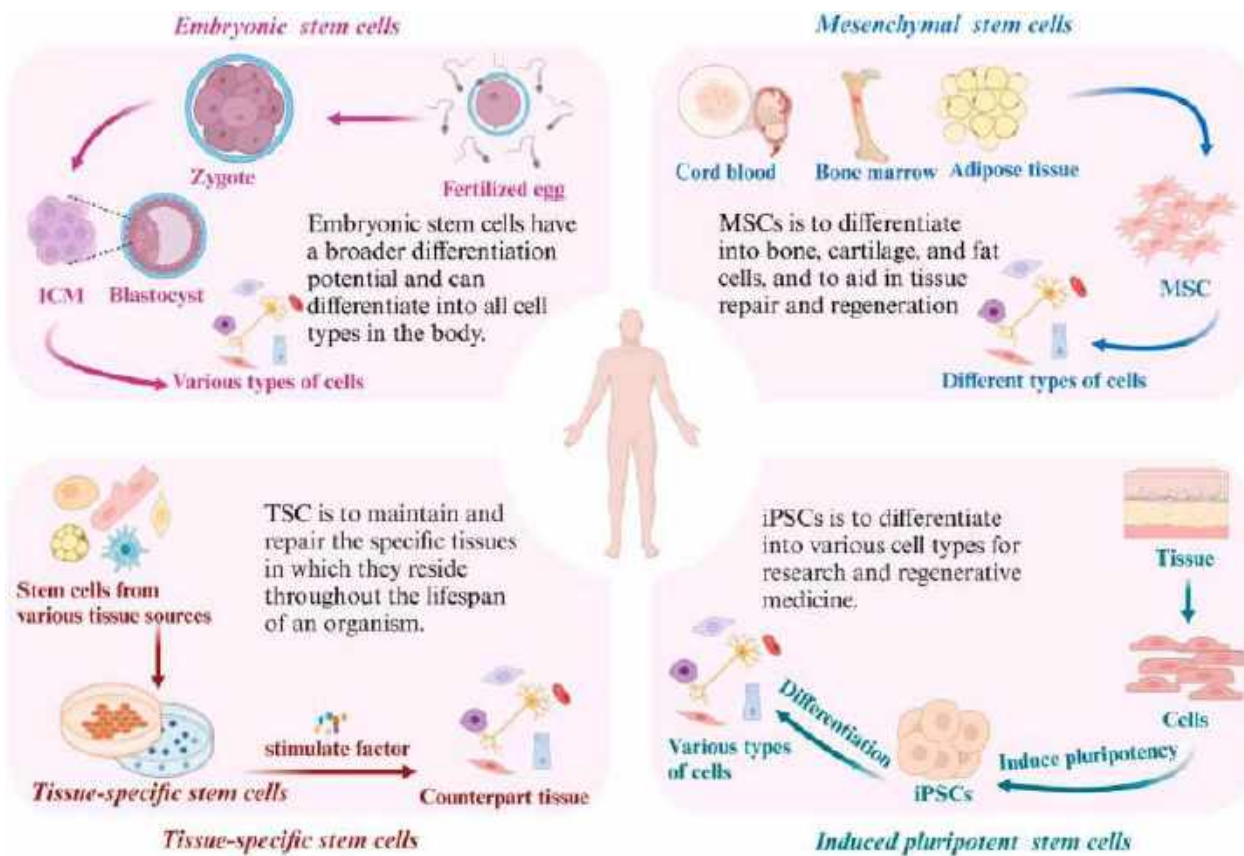
found in tissues such as bone marrow, adipose tissue, and blood, are multipotent and capable of forming



a limited range of cell types, yet they have already proven life-saving in clinical treatments such as hematopoietic stem cell transplantation. Induced pluripotent stem cells, or iPSCs, are adult cells that have been reprogrammed to regain pluripotency. iPSCs bypass the ethical concerns associated with embryonic stem cells and can be derived from the patient's own cells, significantly reducing the risk of immune rejection.

In health care, stem cell therapies have already shown remarkable success. Hematopoietic stem cell transplantation is routinely used to treat leukemia, lymphoma, and other blood disorders, effectively replenishing the patient's damaged or diseased bone marrow and restoring normal blood and immune system function. Cardiac tissue regeneration is another area of intense research. Following a heart attack, damaged cardiac muscle is usually replaced by scar tissue, which cannot contract effectively. Mesenchymal stem cells and cardiac progenitor cells are being investigated for their ability to regenerate functional heart tissue, improve cardiac output, and reduce the risk of heart failure. Stem cells also hold immense promise in treating neurodegenerative diseases such as Parkinson's, Alzheimer's, and spinal cord injuries. Neural stem cells have the potential to differentiate into neurons and glial cells, restoring damaged neural networks and improving cognitive and motor function. Additionally, stem cells are being explored for orthopedic applications, including repairing cartilage, bone, and ligaments in conditions like osteoarthritis and traumatic injuries, accelerating recovery and restoring mobility.

Recent advances in tissue engineering and 3D bioprinting have further expanded the potential of stem cells in health care.



Scientists are now able to combine stem cells with biomaterials to construct functional tissues, such as skin, cartilage, and bone, with the long-term goal of developing lab-grown organs.

(Source: <https://doi.org/10.1016/j.heliyon.2024.e35836>)

Using a patient’s own cells for these applications minimizes the risk of immune rejection and offers hope for addressing organ shortages worldwide. Despite these promising developments, stem cell therapy faces significant challenges. Controlling stem cell differentiation to ensure the formation of the desired cell type, preventing tumor formation, and achieving consistent therapeutic outcomes remain major areas of research. Immune rejection can still occur with donor-derived cells, and ethical considerations surrounding embryonic stem cells continue to spark debate. Additionally, the high cost of stem cell treatments and personalized regenerative therapies limits their accessibility.

Looking to the future, stem cell therapy has the potential to transform health care from a reactive practice into a proactive, restorative one. Advances in personalized regenerative medicine using patient-derived iPSCs, gene-edited stem cells to correct genetic defects, and integration with bioengineering technologies such as bioprinting and organ-on-chip systems are likely to expand the scope of clinical applications. As stem cell research progresses, it promises to shift medicine from merely managing symptoms to truly regenerating tissue and reversing disease, offering hope to millions of patients worldwide. For biotechnology students, this field represents a unique convergence of research, innovation, and clinical impact, providing opportunities to contribute to a future where medicine can heal, restore, and regenerate life.

The Smart Bandage Revolution: Enhancing Chronic Wound Management

Smart bandages are innovative dressings that improve healing through technology and have transformed wound treatment in recent years. These coming-generation treatments provide targeted medication delivery, regeneration support, and real-time monitoring to manage the problems that are associated with chronic wounds such as diabetic foot ulcers, pressure ulcers, and venous leg ulcers. In contrast to traditional dressings, smart bandages adjust according to the change in wound condition, reducing the number of consultations required and saving healthcare costs while significantly enhancing the treatment of chronic wounds.

The integration of advanced sensors in smart dressings has led to a major advancement in wound care. Temperature sensors, like flexible metallic resistive and conductive ink-based ones, take the wound's temperature to detect any indications of inflammation or infection. Oxygen sensors measure oxygen saturation to assess hypoxia in wounds and provide healing environments. pH sensors trace the acidity of the wound environment and provide real-time monitoring of infection or healing using color changes or electronic data. In

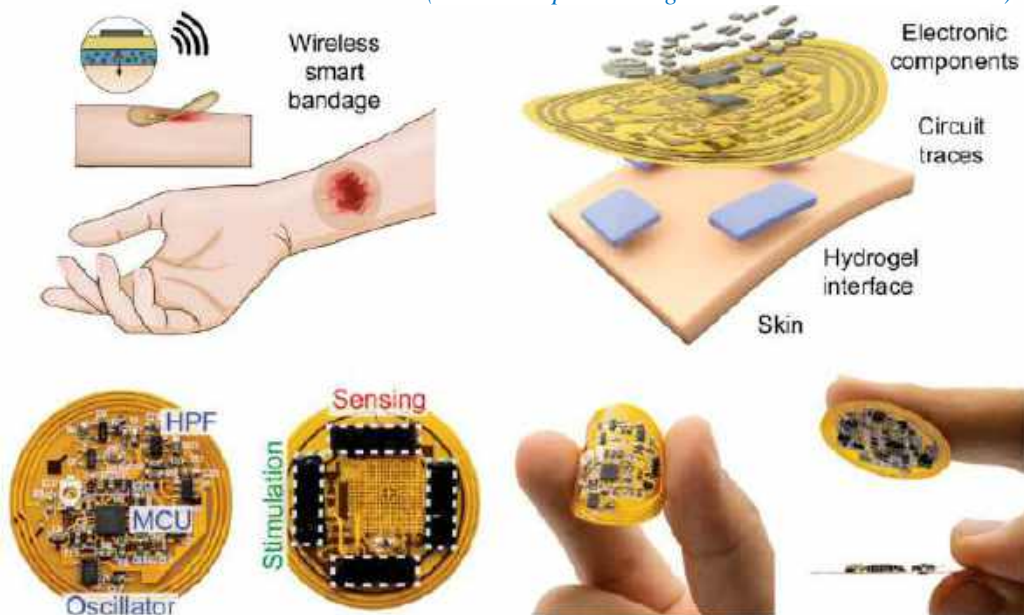
(Source: <https://doi.org/10.1038/s41587-022-01528-3>)

addition to this, advancements also include the use of multiwall carbon nanotubes in nanocomposites such as poly(styrene-*b*-(ethylene-co-butylene)-*b*-styrene), which are used to monitor complex wounds like venous leg ulcers (VLUs) and diabetic foot ulcers (DFUs). These sensors have a high sensitivity and are also cost-effective, despite concerns about the potential toxicity of carbon nanotubes.

Novel drug delivery technologies allow for

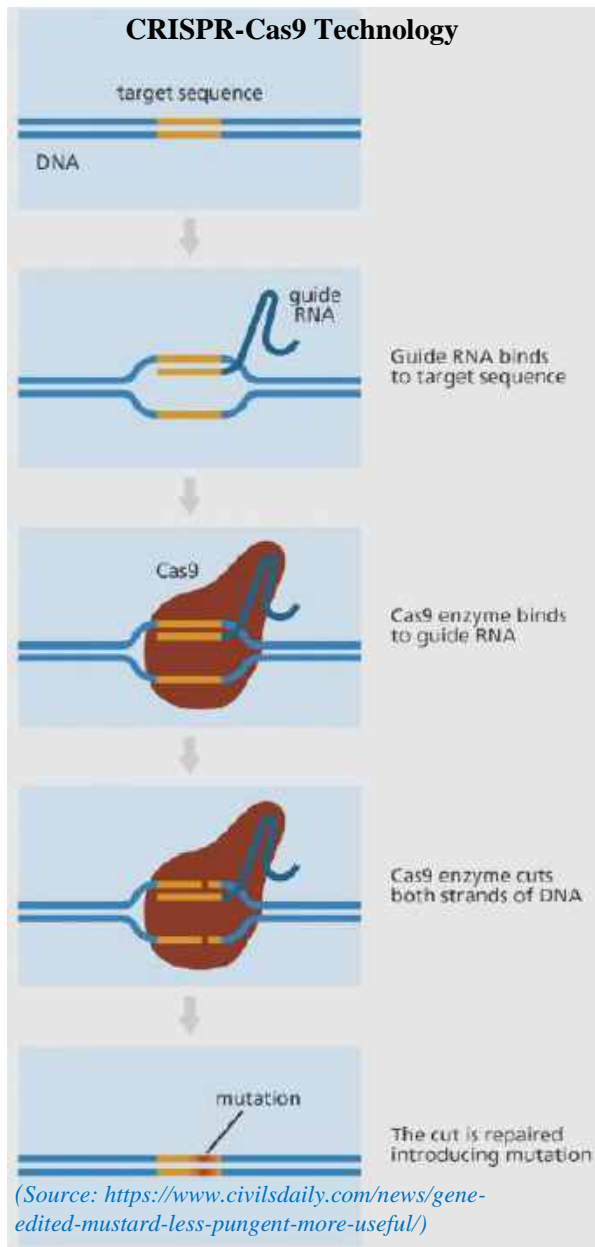
accurate and flexible medicine administration, which improves treatment outcomes even further. Modern pumping systems use tiny, integrated pumps to direct medication directly to the wound, unlike traditional methods that administer medications at a set pace. Iontophoresis uses electrical currents to enhance medication penetration into the skin, whereas thermal systems use polymers that react to temperature changes to release drugs in response to heat. Targeted medication distribution can be achieved with minimally invasive microneedles, and hydrogel-based devices ensure a steady flow of medication that maintains wound hydration.

In conclusion, treating wounds like pressure sores and diabetic ulcers is still quite a difficult task. Even though medication delivery and monitoring have improved, targeted treatments and more precise biosensors are still needed. Subsequent advancements have to concentrate on creating drug release control systems and sensors that identify the particular biomarkers. Additionally, automated bandages and telemedicine may enhance wound treatment.



Medical Biotechnology : Revolutionizing Healthcare

Medical biotechnology, an innovative fusion of biology and technology, has emerged as a powerful tool in the fight against diseases and the advancement of healthcare. This field leverages living cells and cellular materials to develop diagnostic tools, therapeutic products, and preventive measures that enhance human health. As we stand on the brink of unprecedented medical breakthroughs, it's essential to explore how medical biotechnology is shaping the future of medicine.



As healthcare systems strive to meet the evolving demands of an ever-changing landscape, biotechnology emerges as a pivotal force driving transformative advancements. The integration of biotechnological platforms in diagnostics, including advanced imaging techniques and liquid biopsies, is transforming the early detection and monitoring of diseases, ushering in an era of proactive and personalized healthcare. The interconnectedness of biotechnology with artificial intelligence and data analytics is explored, highlighting the synergistic potential in unlocking intricate patterns within vast datasets to inform more precise and effective healthcare strategies.

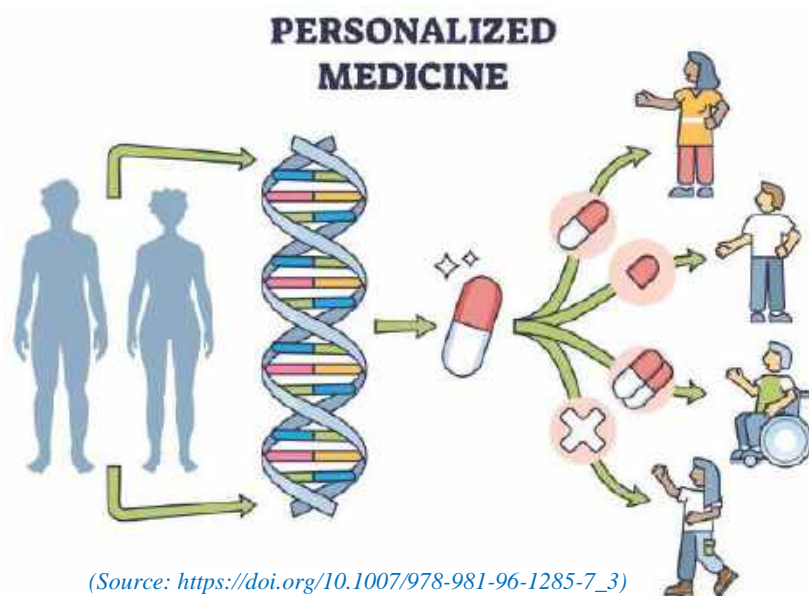
Regenerative medicine is a rapidly growing field that seeks to restore, replace, or regenerate damaged tissues and organs using a variety of approaches, including cell therapy, tissue engineering, and gene therapy. Gene therapy, such as CRISPR-based approaches, is being used to target genetic disorders, such as sickle cell anaemia and cystic fibrosis, with promising results. Stem cell therapy, in the form of hematopoietic bone marrow transplantation and umbilical cord stem cell transplantation has been used to treat a variety of diseases including immunodeficiency syndromes such as SCID and certain types of leukemias. Tissue engineering approaches are being developed to replace damaged or diseased organs using 3D printing, such as the liver, pancreas, and heart. The development of regenerative medicine has the potential to transform the treatment of many diseases and injuries, providing hope for patients with conditions that are currently considered untreatable.

A rapidly developing technique called gene editing could revolutionise medicine by enabling researchers to change cells genetic makeup. CRISPR-Cas9 technology, a revolutionary gene-editing tool, allows precise modification of DNA sequences. In healthcare, CRISPR is employed for gene therapy, functional genomics, and the correction of genetic mutations. Its potential for treating genetic disorders, such as sickle cell anaemia and cystic fibrosis, showcases the transformative impact of this biotechnological tool. Monoclonal antibodies, produced using biotechnological methods, have become essential therapeutic agents in healthcare. These antibodies are designed to target

specific proteins involved in diseases, such as cancer or autoimmune disorders. Monoclonal antibody therapies have shown remarkable success in areas like cancer treatment, immune modulation, and inflammatory diseases.

Medical Biotechnology has revolutionized molecular diagnostics, allowing for the identification and analysis of genetic information at the molecular level. Techniques such as polymerase chain reaction (PCR), gene sequencing, and nucleic acid amplification have become integral to diagnosing genetic disorders, infectious diseases, and certain types of cancers. Techniques like positron emission tomography (PET), single-photon emission computed tomography (SPECT), and magnetic resonance imaging (MRI) are enhanced by biotechnological tracers. These tracers, often tagged with biomolecules, enable the visualization of specific molecular targets, facilitating early detection and characterization of diseases.

Liquid biopsies, a non-invasive diagnostic approach, leverage biotechnological tools to analyze circulating biomarkers in bodily fluids such as blood or urine. This includes circulating tumor DNA (ctDNA), microRNAs, and proteins shed by tumors. The detection of these biomarkers through biotechnological methods allows for early cancer detection, monitoring treatment response, and assessing minimal residual disease.



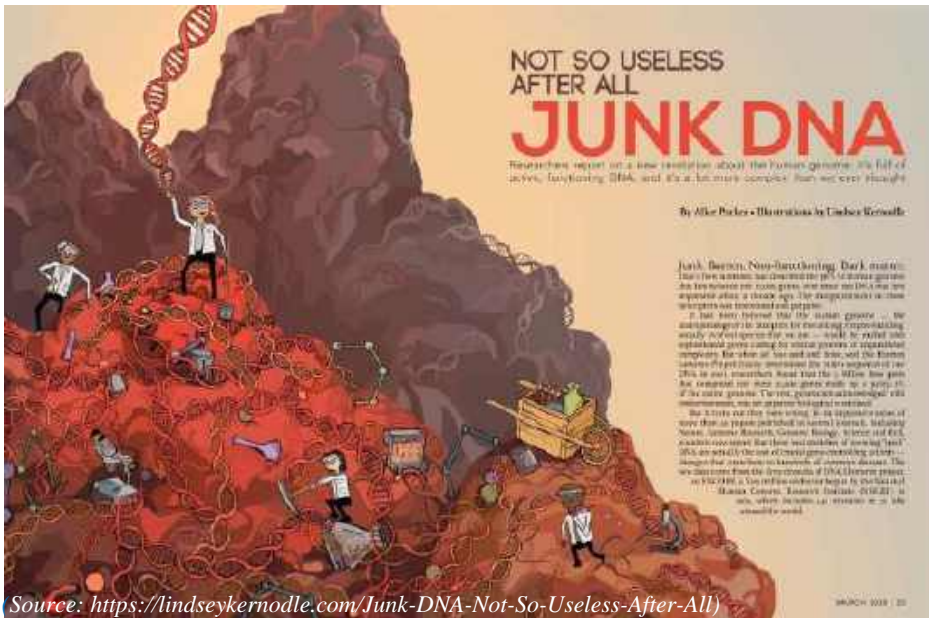
(Source: https://doi.org/10.1007/978-981-96-1285-7_3)

The convergence of biotechnology, artificial intelligence (AI), and data analytics marks a transformative era in healthcare, offering unprecedented opportunities for precision medicine, diagnostics, and therapeutic innovations. Biotechnology and AI synergize in the realm of precision medicine, particularly in genomics. AI algorithms analyze vast genomic datasets, identifying patterns and variations that inform personalized treatment strategies. This synergy enables clinicians to tailor interventions based on an individual's genetic makeup, leading to more effective and targeted therapies.

In the relentless pursuit of advancing healthcare, biotechnology has emerged as a driving force, reshaping the landscape of medical science on a global scale. The journey through the realms of biotechnology in healthcare has unveiled a multitude of transformative trends that span diagnostics, precision medicine, therapeutic innovations, and collaborative research initiatives. Biotechnology's transformative power in healthcare extends far beyond scientific achievements; it resonates in the very fabric of patient care and medical advancements. In conclusion, the role of biotechnology in healthcare is not merely a scientific narrative but a saga of transformation, innovation, and a commitment to advancing human health. As we navigate the future, the evolving trends in biotechnology hold the promise of continued breakthroughs, pushing the boundaries of what is possible in the realm of healthcare, ensuring that the transformative power of biotechnology continues to shape a healthier and more resilient global community.

The Hidden Code: Unlocking the Mysteries of Junk DNA in Medical Biotechnology

The Human genome is made up of 3.42 billion nucleotides packed in 23 pairs of chromosomes. Most mammalian DNA is of similar size — the mouse (*Mus musculus*) has 3.45 billion nucleotides, and the cow (*Bos taurus*) 3.65 billion, coding for a similar set of genes. Exceptions exist, such as the bent-winged bat (*Miniopterus schreibersi*) with a smaller genome of 1.69 billion nucleotides, and the red viscacha rat (*Tympanoctomys barrerae*) with a larger genome of 8.21 billion. Among vertebrates, the maximum diversity in genome size is seen in fishes.



Source: <https://lindseykernodle.com/Junk-DNA-Not-So-Useless-After-All>

Interestingly, all animals contain a large amount of DNA that does not encode body-building or reaction-catalysing proteins. In humans, only 2% of DNA codes for proteins. The remaining noncoding region (over 95%) was long termed “selfish DNA” or “junk DNA” as it seemed functionless. For years, this noncoding material was unexplored, but later studies revealed that repetitive elements (STRs) are not useless — they act as hotspots for genetic recombination and help regulate gene expression. They interact with the local genome and improve adaptability. Genomes are dynamic systems where new functional

parts emerge, and old ones vanish. Thus, nonfunctional DNA can evolve into useful DNA. The term “exaptation”, coined by Stephen Jay Gould and Elisabeth Vrba, describes how genetic elements can gain new functions regardless of their original role. With growing genomic data, we now realize the significance of noncoding DNA. Even years after decoding the Human Genome under the HGP, new genomic elements continue to be discovered, marking a golden era of studying the noncoding genome (DNA & RNA).

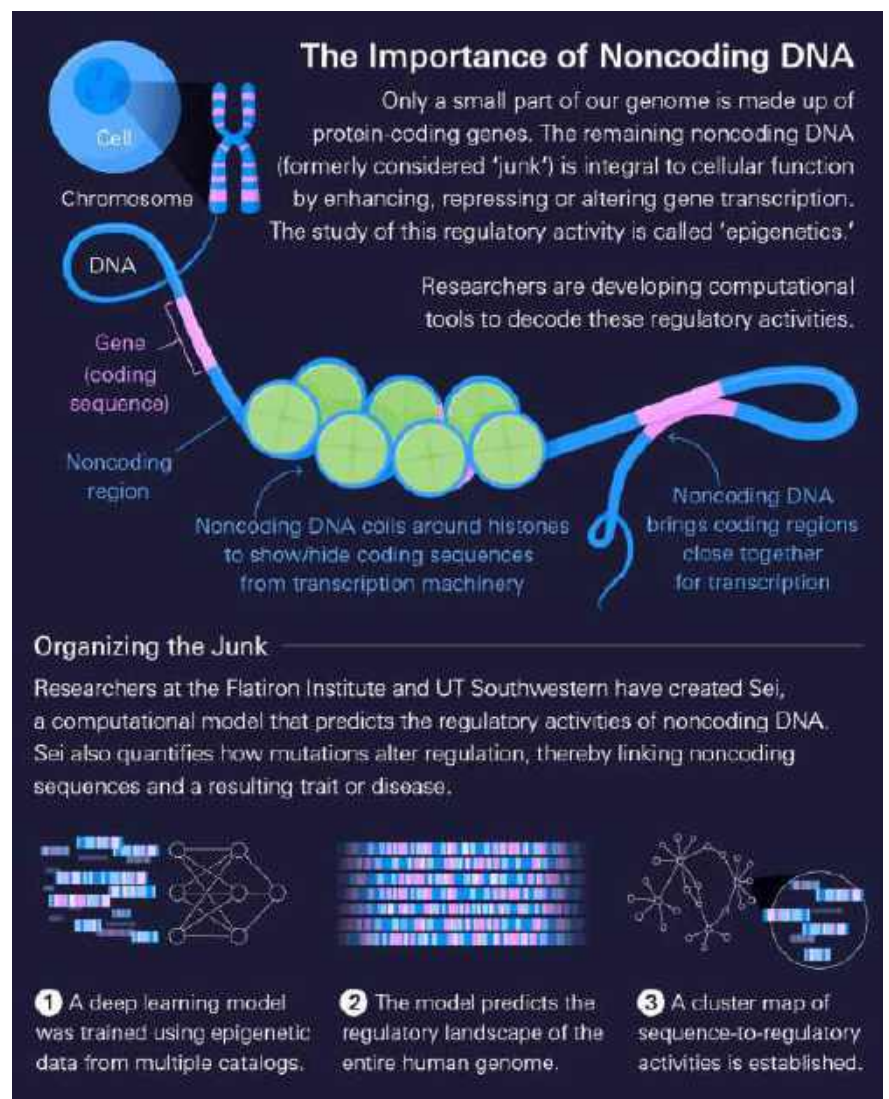
Key Role in Speciation: Earlier considered “genomic junk,” satellite DNA now appears essential in cells. It collaborates with proteins to keep chromosomes together in the nucleus. Research suggests that species differences in satellite DNA organization may explain why hybrids often fail. In *Drosophila melanogaster*, removing the ‘prod’ protein (which binds satellite DNA) caused chromosomes to scatter into micronuclei, leading to death. Interestingly, this satellite DNA sequence was absent in a close relative, suggesting species-specific satellite DNA evolution. If a satellite sequence is vital for one species but not another, it indicates that different species evolve unique DNA-protein systems. Since satellite DNA helps maintain chromosomes, such differences may cause reproductive incompatibility. Thus, each species develops its own strategy to keep up with frequent satellite DNA mutations — when mismatched during crossbreeding, chromosomes become scattered, affecting fertility and survival.

Key Role in Gene Expression: The human genome contains about 5% STR regions (Short Tandem Repeats). Since the 1980s, scientists have observed how changes in these repetitive DNA fragments influence gene expression. STRs interact with transcription factors, which control protein-coding genes. Researchers found that STR sequences near motifs greatly affect transcription factor binding — up to 70 times variation — influencing which genes are activated. This shows STRs have a major regulatory role in gene expression.

Understanding Polygenic Disease Expression: By studying how noncoding regions affect transcription factor binding, researchers can understand polygenic diseases. Variations in STRs among individuals cause differences in gene expression, linked to diseases like Crohn's disease, cancer, schizophrenia, and autism. Genome-wide studies have long connected STR changes to disease risk, and current research aims to clarify how these repeats contribute to disease development and inheritance.

There are a lot of unresolved concerns regarding non-coding DNA strands, including whether it is truly just worthless waste or something more valuable. At least some of it has proven to be crucial for biological processes. Beyond the issue of its utility (or lack thereof), however, scientists are starting to figure out how noncoding DNA can serve as a genetic resource for cells and a breeding ground for novel genes. Since the coding genes provide the blueprints for building proteins, which govern the majority of body functions, scientists have understood that despite its

name, "junk DNA" actually plays an important role. Some noncoding regions of the genome, including areas that were previously regarded as "junk," appear to control the expression of those genes. Advancements in genomic technology, particularly in the last two decades, have significantly altered how scientists interpret noncoding DNA and RNA. Even though these non-coding regions do not include information about proteins, evolution has occasionally modified them to serve various purposes. As a result, it is becoming more apparent how the various groups of "junk" serve their respective purposes, to the extent that they do. These and numerous other examples show that repeating sequences are not "junk" but rather crucial and essential parts of eukaryotic genomes. It can be said that evolution is too clever for giving this crucial knowledge without endangering the embodiment of biological mechanisms. In the future, researchers may become less and less likely to refer to any noncoding sequences as useless because there are so many other, more accurate ways to categorize them at this time. The best way for the field to move forward is to remain open-minded while evaluating the peculiarities of noncoding DNA and RNA and their biological significance. People need to "take a step back and realize that one person's trash is another person's treasure," as the saying goes.



(Source: <https://www.lucyreading.co.uk/project/decoding-junk-dna/>)

Medical Biotechnology and Healthcare Intersection Transforming Patient Care

Medical biotechnology, a burgeoning field at the intersection of biology, medicine, and technology, is revolutionizing healthcare as we know it. By harnessing the power of living organisms and cutting-edge engineering, this discipline is delivering groundbreaking solutions that promise to transform patient care, reduce healthcare costs, and improve overall quality of life. One of the most significant impacts of medical biotechnology lies in personalized medicine. Advancements in genomics have enabled scientists to decode the human genome, paving the way for tailored treatment plans based on individual genetic makeup.



(Source: https://www.linkedin.com/posts/johnny-andrew-b5b603233_us-activity-7219562558003847168-0glq)

This precision medicine approach not only enhances treatment efficacy but also minimizes side effects. Moreover, gene editing technologies like CRISPR have opened up new possibilities for curing genetic diseases by precisely modifying DNA. Regenerative medicine is another area where medical biotechnology is making remarkable strides. By leveraging stem cells and tissue engineering, researchers are developing innovative methods to replace or repair damaged tissues. This holds immense promise for treating conditions like Parkinson's disease, diabetes, and spinal cord injuries. Additionally, Immunotherapy, which harnesses the body's immune system to fight diseases like cancer, has shown promising results.

Beyond these breakthroughs, medical biotechnology is also improving diagnostics, enhancing therapies, and increasing efficiency in

healthcare delivery. Biomarkers and advanced imaging techniques enable earlier and more accurate disease detection, while cutting-edge treatments like CAR-T cell therapy offer new hope for patients with previously incurable diseases. Furthermore, automation and artificial intelligence are streamlining clinical processes, reducing costs, and minimizing errors. As medical biotechnology continues to evolve, the future holds even more exciting possibilities. Artificial intelligence is poised to play a crucial role in optimizing treatment plans and predicting patient outcomes. Point-of-care diagnostics will bring rapid testing and treatment closer to patients. Advancements in gene therapy will expand the range of treatable diseases, and synthetic biology will create novel therapeutics and vaccines.

The synergy between healthcare and medical biotechnology is undoubtedly transforming the way we approach patient care. With continued research and development, we can anticipate a future where diseases are prevented, detected early, and treated effectively, leading to better health outcomes and a higher quality of life for people worldwide.

Shraddha & Vishakha
Batch: 2021-2025

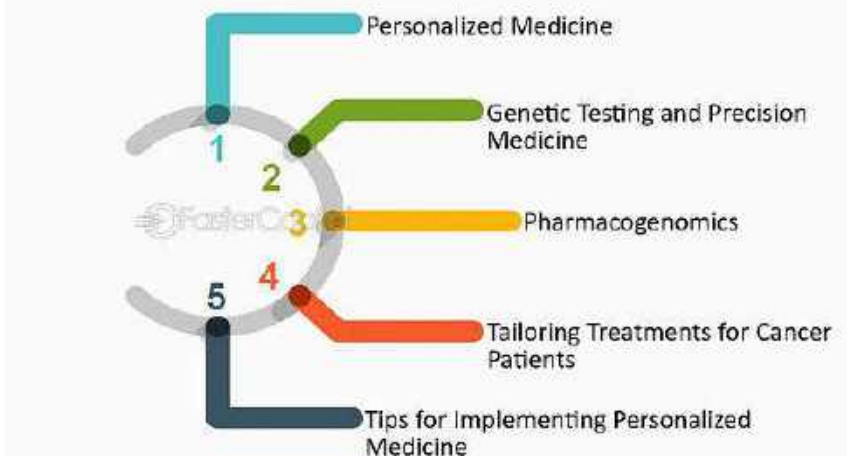
Personalized Medicine: Tailoring Treatment to the Individual

The era of one-size-fits-all medicine is fading, giving way to personalized medicine, an approach that tailors treatment to each patient’s unique genetic, metabolic, and physiological profile. By focusing on individual differences, personalized medicine improves outcomes, minimizes side effects, and shifts health care from reactive treatment to proactive prevention.

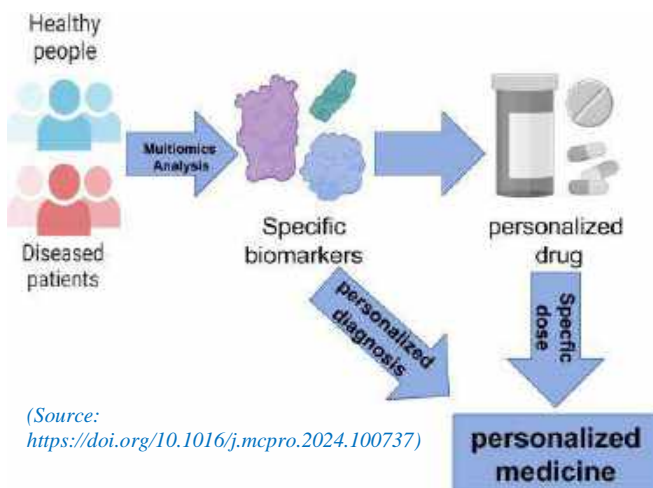
At the core of this approach is genomic sequencing, which reveals genetic variations that influence disease risk and drug response. By decoding a patient’s DNA, clinicians can identify predispositions to cancer, cardiovascular disorders, diabetes, and other conditions, allowing for early intervention. In pharmacology, pharmacogenomics guides drug selection and dosing. For example, variations in genes such as *CYP2C9* or *VKORC1* determine how patients metabolize blood-thinning drugs like warfarin, helping doctors avoid adverse effects while maximizing efficacy.

In oncology, tumor genetic profiling enables targeted therapies, including Trastuzumab for HER2-positive breast cancer and EGFR inhibitors for specific lung cancers. These drugs precisely attack cancer cells while sparing healthy tissue, marking a significant improvement over traditional chemotherapy. The integration of AI and bioinformatics accelerates personalized medicine by analyzing vast genomic datasets, predicting treatment responses, and simulating outcomes, paving the way for preventive care.

Tailoring Treatments to Individual Patients



(Source: <https://medium.com/mr-plan-publication/personalized-medicine-2-0-ais-role-in-tailoring-treatments-2f2592cdd49c>)



(Source: <https://doi.org/10.1016/j.mcpro.2024.100737>)

Beyond cancer, personalized medicine is being applied to neurodegenerative disorders, metabolic syndromes, and infectious diseases. Genomic studies during the COVID-19 pandemic helped explain why some individuals developed severe symptoms while others remained asymptomatic, guiding more effective clinical decisions. Challenges remain in ensuring genetic data privacy, reducing costs of sequencing, expanding access to advanced diagnostics, and developing skilled professionals. Regulatory frameworks must ensure safe, ethical, and equitable use of genomic information.

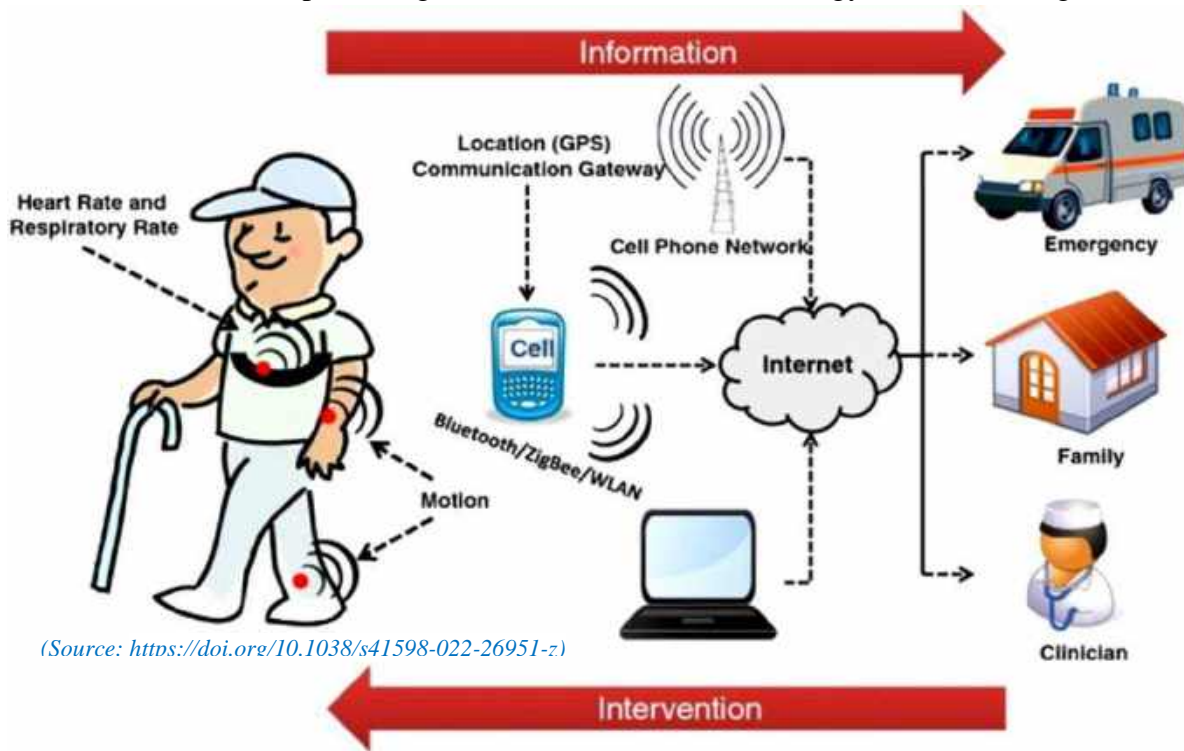
Personalized medicine promises a future where treatments are tailored not only to genetics but also to lifestyle, environment, and individual physiology. Advances in CRISPR, stem cell therapies, wearable health monitors, and AI-driven analytics are making this vision increasingly attainable. Treatments will become precise, patient-centered, and more effective, transforming health care into a system designed for the individual’s unique biological blueprint

Harshi Jain & Akshaya Prakash
Batch: 2020-2024

Wearable Biotechnology Devices: Real-Time Health Monitoring

In recent years, the fusion of biotechnology and digital technology has given rise to wearable health monitoring devices, transforming the way we manage personal health. Once limited to simple pedometers or heart rate monitors, modern wearables are now capable of continuously tracking a wide array of physiological parameters in real time, offering insights into our health that were once only available in clinical settings.

These devices range from smart watches and fitness bands to advanced biosensors embedded in patches or clothing. They can monitor heart rate, blood pressure, blood oxygen levels, glucose concentration, sleep patterns, hydration, and even biochemical markers in sweat or interstitial fluid. By collecting continuous streams of data, wearables provide a dynamic picture of a person’s health, rather than a static snapshot from a single doctor’s visit. One of the most promising areas of wearable biotechnology is continuous glucose monitoring (CGM) for



(Source: <https://doi.org/10.1038/s41598-022-26951-z>)

diabetic patients. Traditional glucose testing requires finger-prick blood samples at specific times, which can be inconvenient and provide only intermittent data. CGMs, however, continuously measure glucose levels through minimally invasive sensors, alerting patients and physicians to hyperglycemia or

hypoglycemia events in real time. This enables personalized treatment plans and more precise insulin dosing, improving patient outcomes and quality of life.

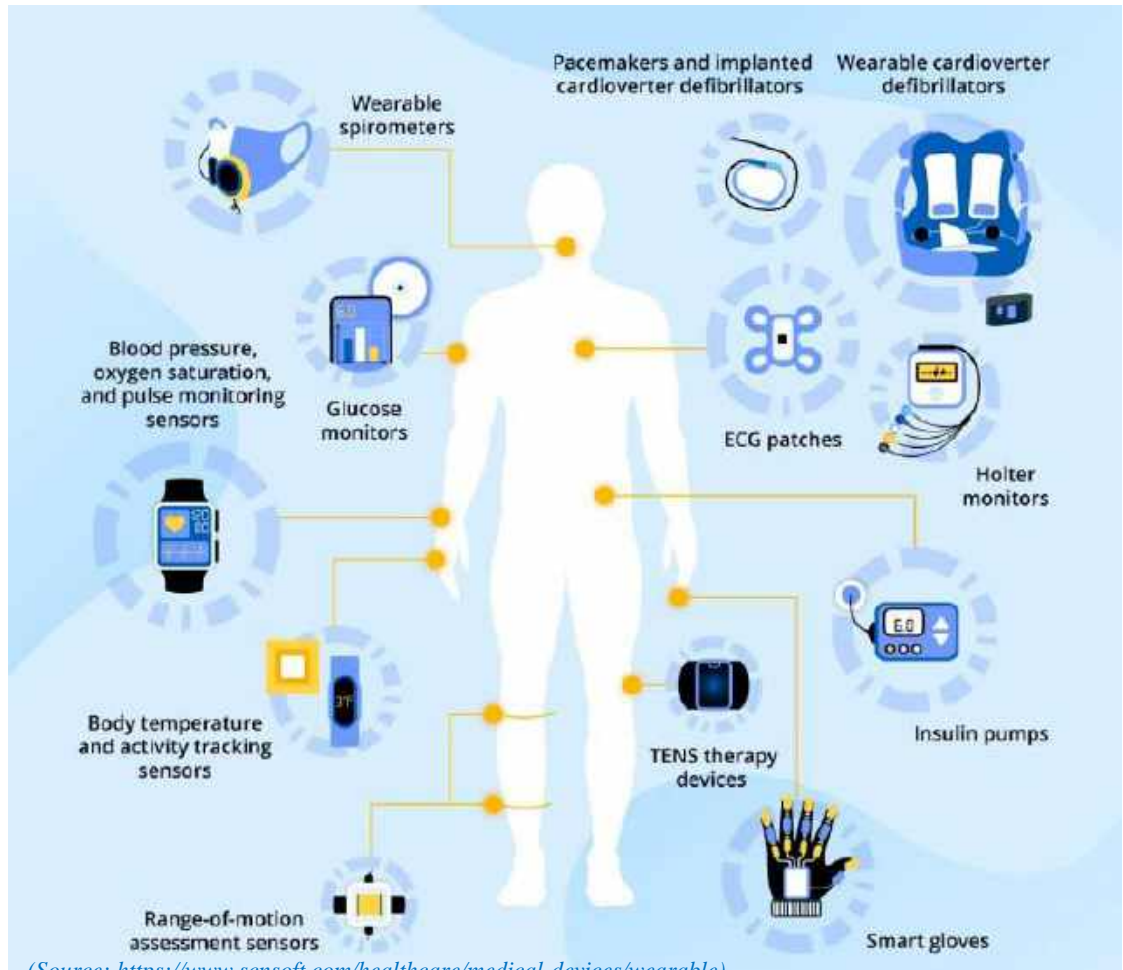
Similarly, cardiac monitoring devices such as ECG patches and smart watch-based sensors can detect irregular heart rhythms, atrial fibrillation, and early signs of cardiac events. These wearables allow physicians to intervene before conditions escalate, reducing hospitalizations and potentially saving lives. Some devices can even transmit data directly to a clinician’s dashboard, enabling remote monitoring and telemedicine, which is especially valuable in rural or underserved areas. Advances in biochemical sensing are also expanding the capabilities of wearable devices. Sweat and interstitial fluid sensors can measure electrolyte balance, lactate, cortisol, and other biomarkers, providing insights into hydration, stress, fatigue, and metabolic conditions. This is revolutionizing not only patient care but also preventive health and fitness optimization, allowing users to adjust diet, exercise, and lifestyle in real time.

The integration of artificial intelligence (AI) and machine learning enhances the functionality of wearables. AI algorithms analyze vast amounts of data to identify patterns, predict health events, and offer personalized

recommendations. For example, an AI-enabled wearable could detect subtle changes in heart rate variability or sleep patterns, predicting an impending illness before symptoms appear. This predictive capability shifts health care from reactive treatment to proactive, preventive care, empowering individuals to manage their own health.

Despite their potential, wearable biotechnology devices face challenges. Data privacy and security are major concerns, as continuous health monitoring generates highly sensitive personal information. Accuracy and calibration of sensors are critical for reliable measurements, and the cost of advanced devices may limit accessibility.

Additionally, integration into existing health care systems requires standardized protocols and regulatory oversight to ensure safety and efficacy. The future of wearable biotechnology is highly promising. Emerging innovations include implantable sensors, smart clothing, and nanosensors capable of detecting diseases at a molecular level. Combined with

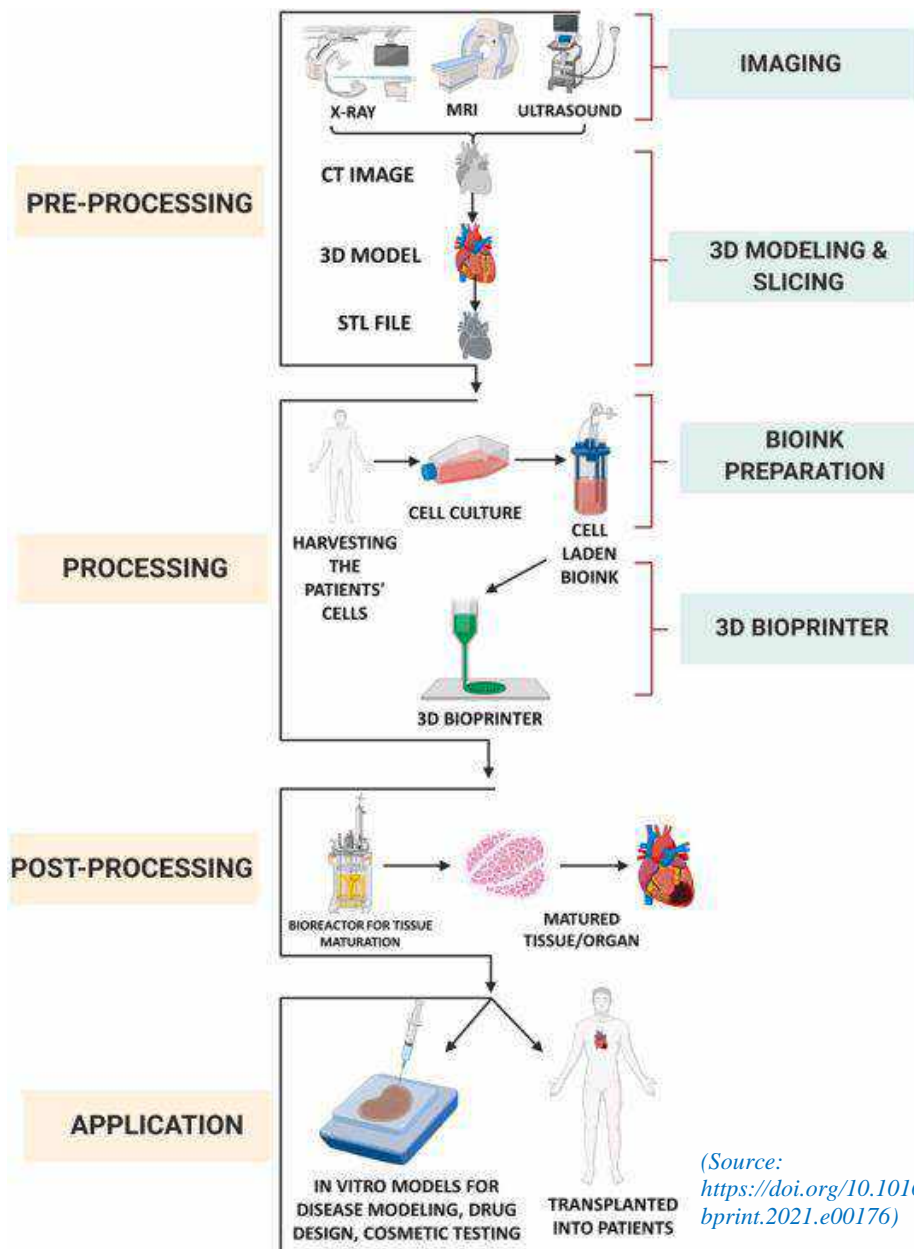


telemedicine and cloud-based health analytics, wearables are expected to play a central role in personalized, preventive, and precision health care. They are no longer mere fitness gadgets—they are becoming essential tools for managing chronic diseases, optimizing wellness, and even predicting serious health events.

In conclusion, wearable devices represent a paradigm shift in health care, where real-time monitoring, predictive analytics, and personalized interventions converge. They empower patients, enhance clinician decision-making, and herald a new era of preventive and precision medicine. For biotechnology students, wearables exemplify how innovation at the interface of biology and technology can transform lives, offering a glimpse of the future of health care that is continuous, connected, and intelligent.

Bioprinting Organs: A Revolution in Transplant Medicine

Bioprinting organs are one of the most promising advancements in modern medical biotechnology, offering a potential solution to the global shortage of donor organs. Thousands of patients die each year while waiting for suitable transplants, and conventional methods are limited by donor availability, organ compatibility, and the risk of immune rejection. Bioprinting combines three-dimensional printing technology with living cells, biomaterials, and growth factors to create functional tissues and organs tailored to the patient's needs. The process begins with the creation of a digital blueprint of the organ or tissue based on imaging techniques such as MRI or CT scans. This blueprint maps the structure, shape, and internal architecture of the organ, including



blood vessels and other critical features. Specialized bioinks containing living cells, extracellular matrix components, and supportive biomaterials are then deposited layer by layer using advanced bioprinters. Once printed, the tissue is cultured under controlled conditions, allowing cells to grow, differentiate, and organize into functional structures.

Early applications of bioprinting focused on relatively simple tissues such as skin, cartilage, and small blood vessels. Bioprinted skin has been used to treat burn patients, producing grafts that match the patient's anatomy and promote faster healing. Cartilage bioprinting is being explored for joint repair and treatment of osteoarthritis, offering alternatives to prosthetic implants. More complex organs, such as kidneys, livers, and hearts, present greater challenges because they require functional blood vessels, nerves, and supporting structures. Researchers are developing techniques to print vascular networks that can supply oxygen and nutrients to thick tissues, which is

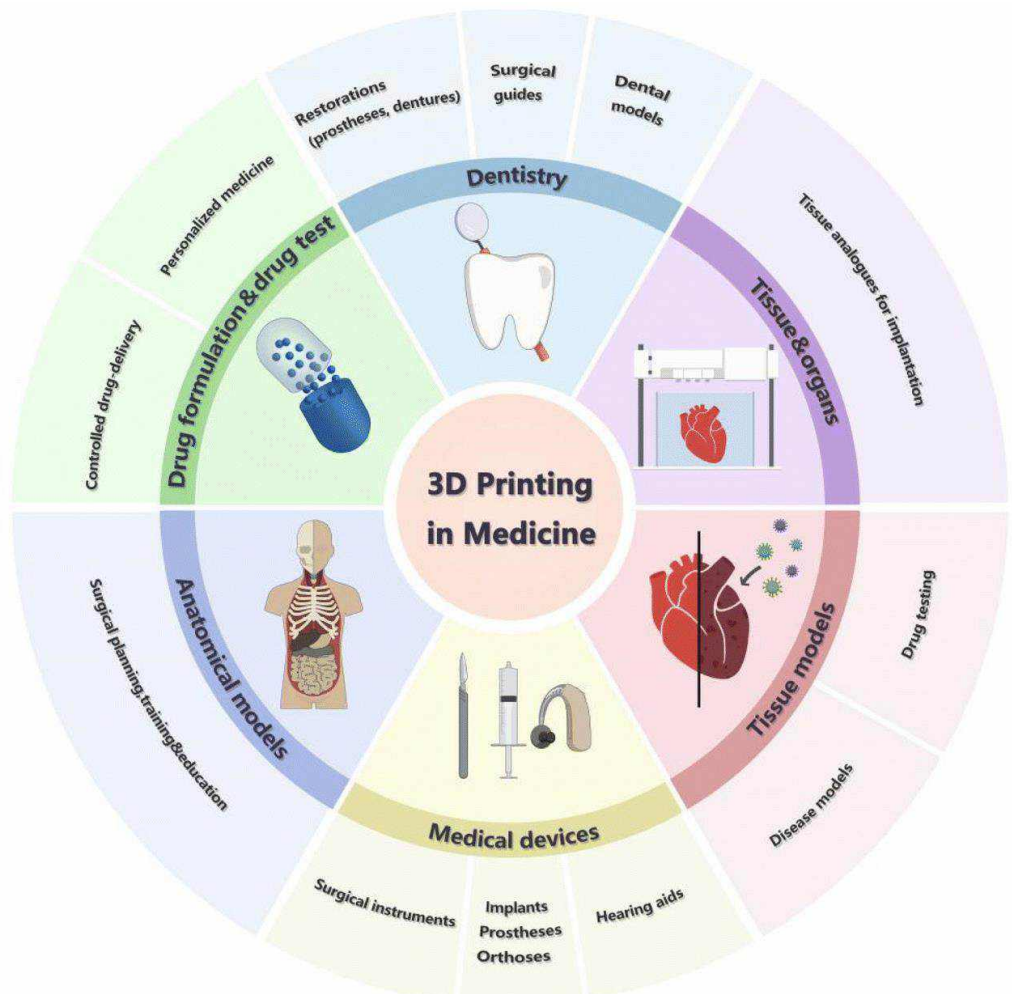
essential for the survival and integration of large bioprinted organs.

One of the most important advantages of bioprinting is the ability to use the patient's own cells to create tissues, minimizing the risk of immune rejection. This approach also eliminates reliance on donor organs, potentially allowing organs to be manufactured on demand. Bioprinted organs can be personalized for size, shape, and cellular composition, increasing the chances of successful transplantation and long-term functionality.

(Source: <https://doi.org/10.1016/j.bprint.2021.e00176>)

Bioprinted tissues are not limited to transplantation applications. They are increasingly used in drug development, toxicity testing, and disease modeling. Traditional animal testing often fails to accurately predict human responses, but bioprinted human tissues provide a more realistic platform for evaluating the safety and efficacy of new drugs. Bioprinted liver tissues, for example, allow researchers to study drug metabolism and potential toxicity, while heart tissue models can be used to test the effects of medications on cardiac function.

Recent advances in stem cell technology have greatly enhanced bioprinting capabilities. Induced pluripotent stem cells can be used to generate patient-specific cell types for printing complex tissues. Growth factors and biochemical cues are incorporated into bioinks to guide proper cell differentiation and tissue formation. Biocompatible scaffolds provide structural support and can degrade as natural extracellular matrix forms, ensuring functional integration with the patient's body. Bioprinting also holds potential for combining multiple organ types into integrated systems, such as liver-kidney or heart-lung constructs, for research and therapeutic purposes. Hybrid approaches that integrate organ-on-chip technology with bioprinting are enabling functional testing of complex tissues before transplantation, helping researchers optimize designs and ensure functionality. Artificial intelligence and computer modeling are increasingly being used to design more precise structures and predict how tissues will behave after implantation.



(Source: <https://www.theatomicmag.com/3d-bioprinting-the-future-of-transplants/>)

Challenges still remain in achieving long-term functionality and scaling up production for clinical use. Maintaining cell viability during the printing process, ensuring proper vascularization, and creating fully functional organs are active areas of research. Regulatory frameworks, standardized bioink formulations, and cost-effective manufacturing methods will be necessary for widespread adoption in health care. Bioprinting organs represents a transformative step in medical biotechnology. It has the potential to end organ shortages, reduce immune complications, and provide personalized solutions for patients. Beyond transplantation, it is reshaping research, drug development, and regenerative medicine. By combining engineering, biology, and clinical knowledge, bioprinting is creating possibilities that were once considered science fiction, bringing patient-specific, functional organs closer to reality than ever before.

Akhil Dhar & Chetanya Jain
Batch: 2020-2024

Summer Trainings & Industrial Visits

Summer Trainings (Batch 2020-24)

S. No.	Roll No.	Name of The Student	Organization
1	2000680540002	Akhil Dhar	Indian Institute of Technology Guwahati
2	2000680540003	Akshaya Prakash	The Energy and Resources Institute, New Delhi
3	2000680540004	Akshita Vishnoi	Panacea Biotec & Forgo Pharmaceuticals, Baddi, H.P.
4	2000680540005	Anu Kaushik	Astron pharmaceuticals Pvt. Ltd., Meerut
5	2000680540007	Avi Singh	Forest Research Institute, Dehradun
6	2000680540008	Ayush Chutani	Indian Institute of Technology Guwahati
7	2000680540009	Chetanya Jain	Arora Foods, Meerut
8	2000680540010	Chhavi Jindal	Indian Institute of Technology Guwahati
9	2000680540011	Drishti Dhall	Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut
10	2000680540012	Harshi Jain	Forest Research Institute, Dehradun
11	2000680540013	Himani Sharawat	Medicamen Biotech Pvt.Ltd, Haridwar
12	2000680540014	Ishi Gupta	Metro Hospital, Noida
13	2000680540015	Ishika Gupta	ICMR, Noida
14	2000680540016	Jigyasa Singh	Meerut Institute of Engineering & Technology, Meerut
15	2000680540017	Mohd Asad Khan	Arora Foods, Meerut
16	2000680540018	Pavitra	Forest Research Institute, Dehradun
17	2000680540020	Raxit Tyagi	Indian Institute of Technology Guwahati
18	2000680540021	Rishu	Gangol Parag Dairy, Partapur, Meerut
19	2000680540022	Sahiba Longiani	Forest Research Institute, Dehradun
20	2000680540024	Shanaya Jain	Forest Research Institute, Dehradun
21	2000680540025	Shishir Tyagi	Panacea Biotec & Forgo Pharmaceuticals, Baddi, H.P.
22	2000680540026	Siddhant Gurjar	Forest Research Institute, Dehradun
23	2000680540027	Siddharth Dhkolia	Lala Lajpat Rai Memorial Medical College, Meerut
24	2000680540028	Simran Siddiqui	Sun Pharmaceutical Industries Ltd., Gurugram
25	2000680540029	Sneha Baliyan	Phoenix Plants Lifesaver Pvt. Ltd., Noida
26	2000680540030	Tejashvi Sharma	Gangol Parag Dairy, Partapur Meerut
27	2000680540031	Vanshika Tyagi	Patanjali, Haridwar
28	2000680540032	Vatsala Upadhyay	Indian Institute of Technology (BHU) Varanasi
29	2000680540033	Yash Jain	Indian Institute of Technology Guwahati

An Educational Field Visit to Barapullah Drain Treatment Plant, New Delhi (21st September, 2023)

B. Tech. 2020-24 & 2021-25

In an era defined by environmental consciousness and a growing need for sustainable solutions, students of B.Tech. V and VII Semester from the Department of Biotechnology visited the Barapullah Drain Treatment Plant, New Delhi, as part of their Environmental Biotechnology course. The visit offered valuable insights into modern wastewater treatment processes, including screening, wetlands, membrane bioreactors, trickling filter, photo-bioreactors, and hybrid anaerobic reactors. It helped students understand the practical applications of sustainable wastewater management and its vital role in environmental protection. The visit proved to be an enriching experience, bridging theoretical learning with real-world applications



**A Research Exposure Visit to
CSIR–Institute of Genomics and Integrative Biology (IGIB), Delhi
(21st September, 2023)**

B. Tech. 2020-24 & 2021-25

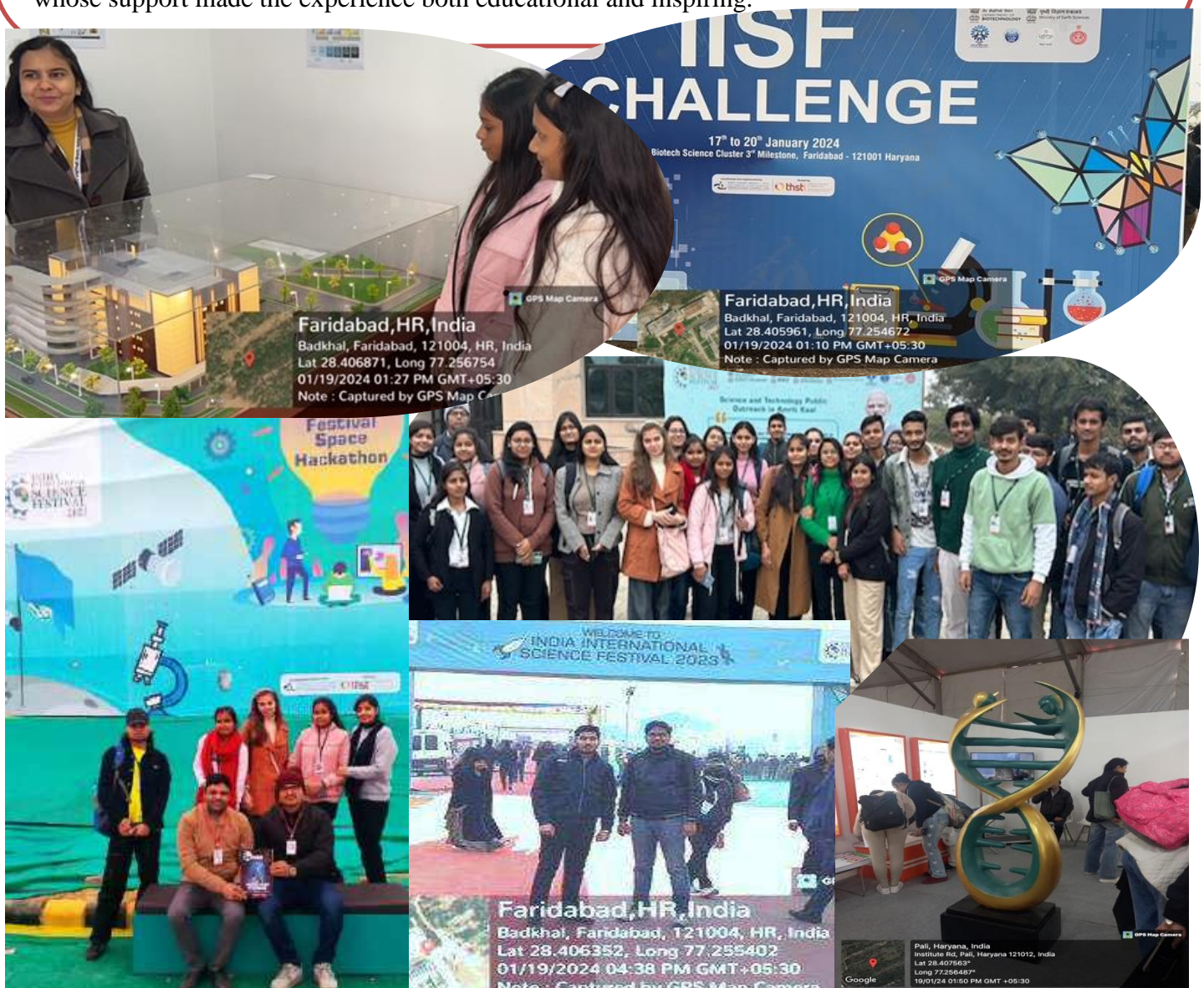
Students of B. Tech. V and VII Semester visited the **CSIR–Institute of Genomics and Integrative Biology (IGIB), Delhi**, a premier national research institute known for its pioneering work in genomics, molecular medicine, bioinformatics, and proteomics. The visit provided a valuable opportunity to link academic learning with real-world research. Students explored advanced facilities such as the Next-Generation Sequencing (NGS) lab, animal testing units, and high-end microscopy and analytical instruments including SEM, TEM, AFM, LC–MS, and FACS. The engaging sessions and demonstrations offered deep insights into cutting-edge biotechnological research. The visit was successfully conducted under the guidance of **Dr. Sachin Kumar Tomar, Dr. Ankesh Pandey, and Dr. Neha Singh**, whose support made the experience both educational and inspiring.



A Science & Technology Exposure Tour to India International Science Festival (IISF) at DBT-THSTI & RCB Campus, Haryana, (19th January, 2024)

B. Tech. 2022-26

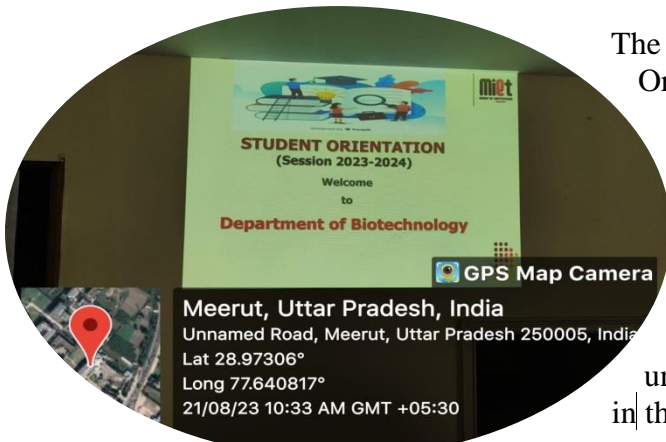
The students of the Department of Biotechnology visited the India International Science Festival (IISF) 2023 on 19 January 2024 at DBT-THSTI & RCB Campus, NCR Biotech Science Cluster, Faridabad, Haryana. The visit provided students a valuable exposure to cutting-edge innovations in biotechnology, life sciences, healthcare, and emerging scientific technologies showcased by premier institutes and industries. Students explored various scientific exhibitions, interacted with researchers, and gained insights into current advancements and government initiatives promoting scientific innovation in India. The tour enhanced scientific curiosity, practical understanding, and motivation towards research and innovation. This enriching experience strengthened students' awareness of scientific opportunities and future prospects in biotechnology and allied fields. The visit was successfully conducted under the guidance of **Dr. Sachin Kumar Tomar, Dr. Ankesh Pandey, Dr. Neha Singh and Dr. Nitika Vats**, whose support made the experience both educational and inspiring.



Events Organized

Orientation Program

The Department of Biotechnology, MIET organized an Orientation Program on **21st August 2023** for B.Tech Biotechnology students to welcome them and introduce them to the department's academic and research environment. The session aimed to acquaint students with the course structure, faculty members, and the wide range of academic, research, and extracurricular opportunities available to them. The program served as a platform to guide students toward holistic growth and to help them understand the resources and support systems that will assist in their academic and professional journey.



Teacher's Day celebration

On 5th September 2023, students celebrated Teachers' Day with great enthusiasm and gratitude. The event included a warm welcome and a cake-cutting ceremony to honor our respected teachers. Faculty members shared inspiring words, motivating students to strive for excellence in their academic journey. Students also expressed heartfelt gratitude, recognizing the vital role teachers play in shaping their learning and future careers. The celebration beautifully reflected the bond between teachers and students, filled with appreciation, respect, and joyful moments.



Engineer's Day Celebration

The Department of Biotechnology celebrated Engineer's Day on 15th September 2023 by organizing "AVINYA" with the theme "Engineering Innovation for a More Resilient World." The event featured exciting competitions including Technical Rangoli, Face Painting, and a Quiz, providing students an excellent platform

to showcase their creativity and scientific ideas. Under the guidance of Dr. Nitika Vats, and with dedicated support from student coordinators, the event witnessed enthusiastic participation and concluded with certificate distribution. The celebration highlighted innovation, teamwork, and the spirit of engineering excellence.

MIET BIOTECHNOLOGY SOCIETY (MBS)
DEPARTMENT OF BIOTECHNOLOGY
ORGANIZING
"AVINYA"
ON THE OCCASION OF 56TH ENGINEER'S DAY
Theme: "ENGINEERING INNOVATION FOR A MORE RESILIENT WORLD"
Participate In!
CERTIFICATION!!

DATE AND TIME
15 SEPT 2023
2:00 pm onwards

VENUE
Dept. of Biotechnology

FACULTY COORDINATOR:
Dr. NITIKA VATS
(Coordinator, MBS)

STUDENT COORDINATOR:
ANU KAUSHIK (IV YEAR)
YASH JAIN (IV YEAR)
ARYAN KAUSHIK (III YEAR)
HARSHIT PAL (III YEAR)

TECHNICAL RANGOLI **FACE PAINTING**
QUIZ



Unveiling the Next Edition of the Department Magazine

The Department of Biotechnology proudly unveiled the new edition of its magazine **"BIOTACTION"** for the academic year 2022–23 on **19th September 2023**. The magazine highlights departmental activities, student participation, and various academic initiatives conducted throughout the year. It showcases student accomplishments, industrial interactions, and departmental events. This edition also emphasizes the spirit of learning, creativity, and scientific curiosity among students. The event marked a proud moment for the department, celebrating teamwork and dedication. The unveiling was well-received and appreciated by everyone present.



एमआईईटी के बायोटेक्नोलॉजी विभाग में मंगलवार को विभागीय पत्रिका बायोटेक्नोलॉजी 2023 का विमोचन हुआ। पत्रिका के संपादक डॉ. सचिन तोमर, निदेशक डॉ. त्रिभुवन सिंह, विभागाध्यक्ष डॉ. अविनाश सिंह ने पत्रिका का विमोचन किया। सो. संस्था



Meerut, Uttar Pradesh, India
 INCUBATION FORUM Meerut Institute of Engineering and
 Technology NH-58, Baghat Rd, Meerut, Uttar Pradesh 250005, India
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 23 11:35 AM GMT +05:30



Meerut, Uttar Pradesh, India
 MIET Incubation Forum, MIET N.H. 58
 Baghat, Meerut Bypass Rd, Meerut
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 Long 77.641333°
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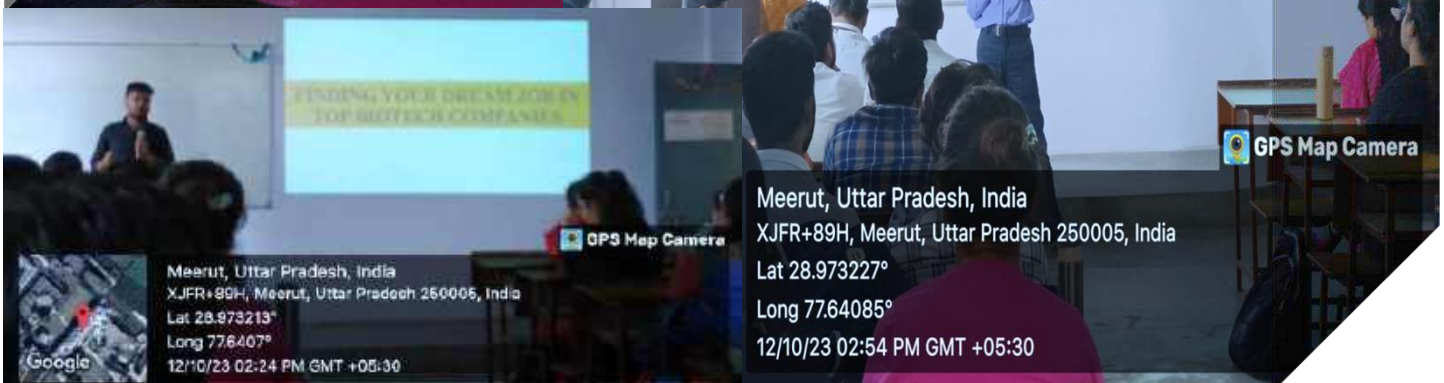
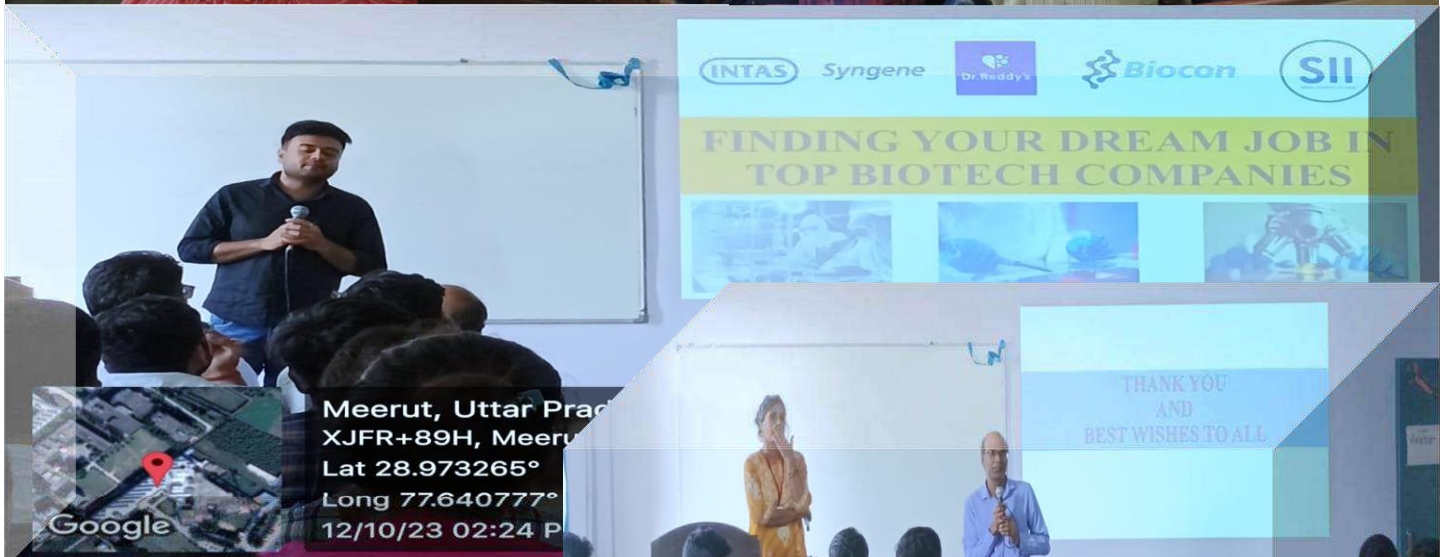
एमआईईटी बायोटेक्नोलॉजी विभाग में मंगलवार को बायोटेक्नोलॉजी 2023 का विमोचन हुआ। डॉ. सचिन तोमर ने कहा कि पत्रिका में जैव प्रौद्योगिकी के बुनियादी विषयों के अलावा नवीन आयामों को शामिल किया गया है। चेरमन विष्णु शरण, वाइस चेरमन पुनीत अग्रवाल, निदेशक डॉ. वृजेश सिंह मौजूद रहे।



Biotech Sambandh

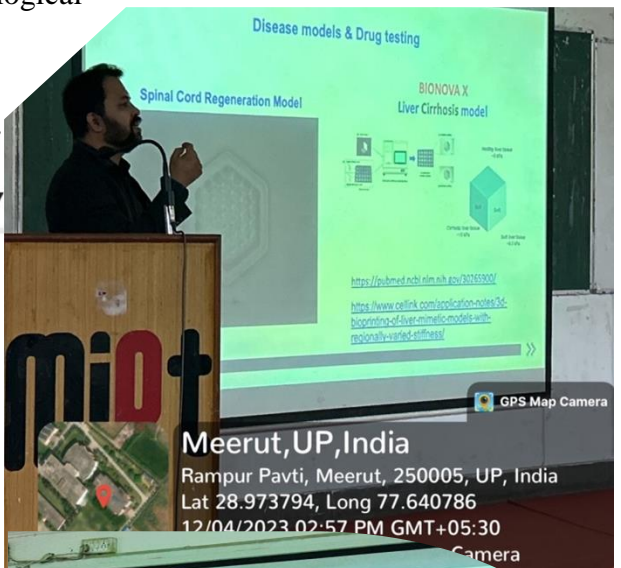
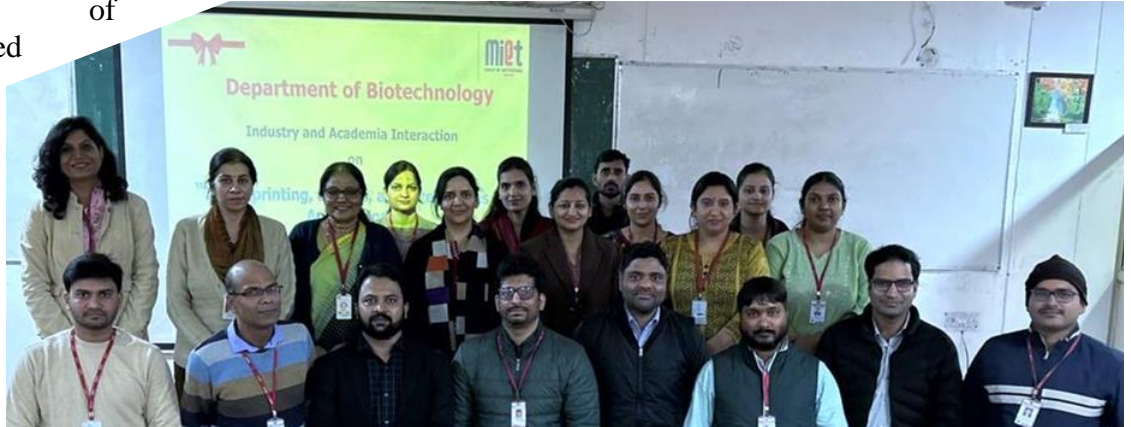


The Department of Biotechnology organized alumni interaction event, “*Biotech Sambandh*” on 12th October 2023. The event aimed to strengthen the bond between alumni and current students by sharing real-world industry experiences. **Mr. Kunal Kapoor** (2021 pass-out), Senior Officer – Quality Control at Indian Immunologicals Ltd., Hyderabad, was invited as the guest speaker. He guided students on career paths, industry skills, and professional growth. The session was informative, motivational, and appreciated by all participants.



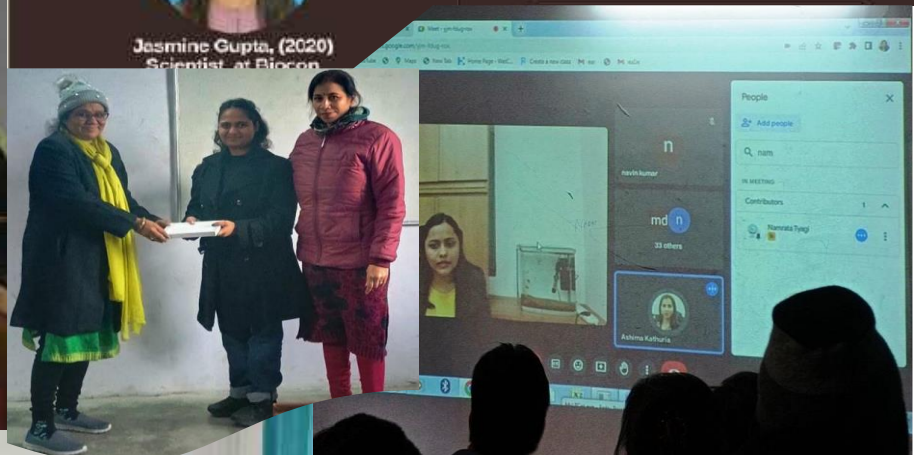
Expert Lecture on 3D Bioprinting

The Department of Biotechnology organized a special expert lecture on 3D Bioprinting on 4th December 2023. The session was conducted by Dr. Prashant Singh Chauhan from ATGC Biotech Private Limited, who shared insights into the role of bioprinting in tissue engineering and regenerative medicine. He explained how emerging bioprinting technologies are enabling the development of artificial tissues and organs. Students gained practical knowledge about this innovative field and its future potential in healthcare. The session was highly informative and encouraged students to explore advanced biotechnological applications.



Alumni Meet

The Department of Biotechnology organized an Alumni Meet on **03rd January 2024**, where distinguished alumni interacted with students and shared their inspiring career journeys. Scholars including Akshay Charan (Ph.D., George Mason University, USA), Chitra Yadav (MS Oxford, Researcher at Cambridge, UK), Prankur Jain (MBA IIM Sirmaur), Udit Narayan (M.Tech JRF, IIT Roorkee), Harshal Kumar (Head R&D, Levram Lifesciences), Jasmine Gupta (Scientist, Biocon Biologics), and Namrata Tyagi (Ph.D., IIT Delhi & Bio-Incubation Manager, AIIMS Delhi) graced the occasion. They shared valuable insights on research, industry opportunities, and higher education pathways. The session motivated students to aim high and excel in their academic and professional endeavors, strengthening the bond between alumni and the department.



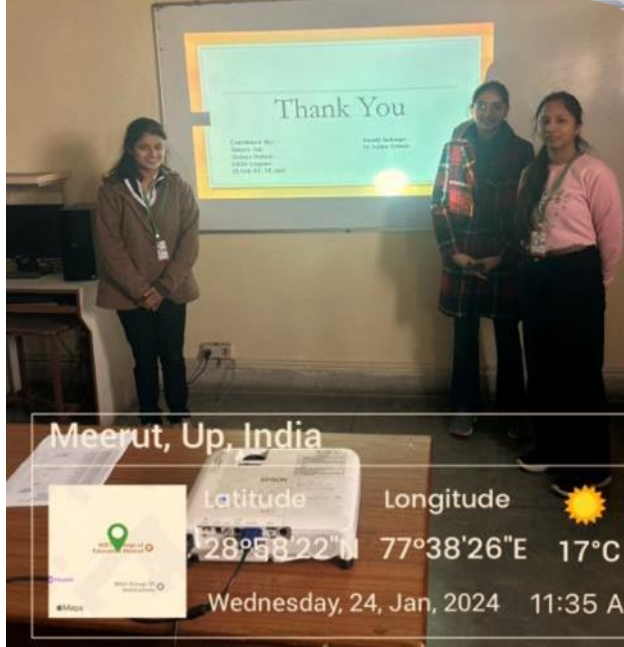
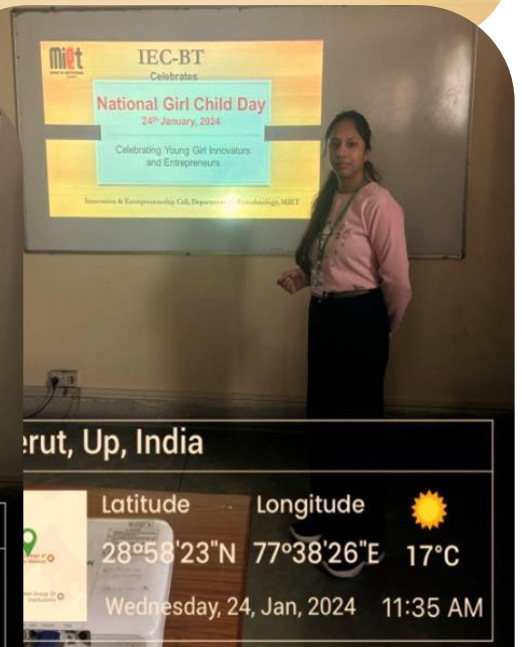
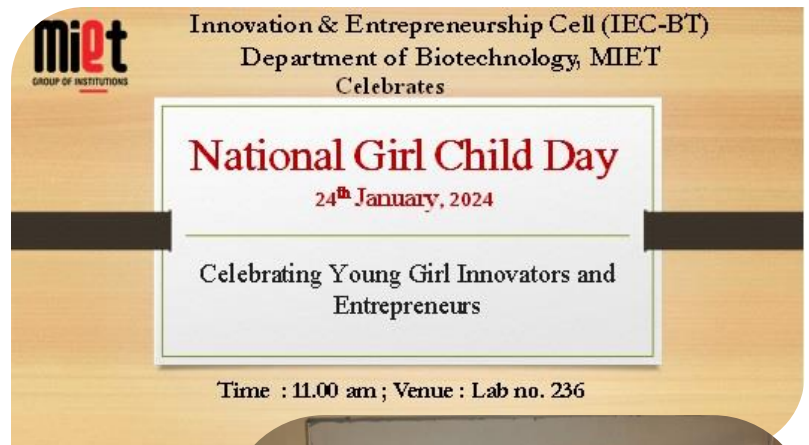
Guest lecture on “Guidance on Career Opportunities in Abroad”

The Department of Biotechnology organized a guest lecture on “Guidance on Career Opportunities in Abroad” on 15th January 2024 by Dr. Chandrabhan Seniya, former faculty of MIET who completed his Ph.D. from the University of Warwick, United Kingdom and is currently associated with VIT Bhopal. Dr. Seniya guided students on pursuing higher studies and career opportunities abroad, covering university selection, scholarships, application process, and skill development. The session was highly informative and motivated students to explore global academic and research avenues.



National Young Girl Child Day Celebration

The IEC-BT cell organized an event on 24th January 2024 to celebrate **National Young Girl Child Day**. The program highlighted the achievements of young girl child innovators and entrepreneurs from India and abroad. B.Tech Biotechnology VII-semester students Ms. Shanaya Jain, Ms. Akshaya Prakash, and Ms. Sahiba Longiani compiled and presented inspiring case studies to the audience. The event witnessed enthusiastic participation from faculty and students of the Department of Biotechnology. The session was coordinated and conducted by Dr. Ashima Kathuria, In-charge, IEC-BT.



BIOQUORUM

MIET BIOTECHNOLOGY SOCIETY (MBS)
DEPARTMENT OF BIOTECHNOLOGY
ORGANIZING

"BIOQUORUM"

ON OCCASION OF 38th NATIONAL SCIENCE DAY

EVENTS :

- **TECH TRAIL**
- **DIGITAL POSTER MAKING**

(THEME : INDIGENOUS TECHNOLOGIES FOR VIKSIT BHARAT)

FACULTY CO-ORDINATOR :
DR. NITIKA VATS
(CO-ORDINATOR MBS)

DATE : 28/02/2024
TIME : 2:00 P.M.
VENUE : ROOM NO. 236

STUDENT CO-ORDINATOR :
ANU KAUSHIK (IV YEAR)
YASH JAIN (IV YEAR)
ARYAN KAUSHIK (III YEAR)
HARSHIT KUMAR (III YEAR)

The Department of Biotechnology and MIET Biotechnology Society (MBS) organized "BIOQUORUM" on the occasion of the 38th National Science Day on 28 February 2024. The event featured engaging competitions including Tech Trail and Digital Poster Making, aligned with the theme "Indigenous Technologies for Viksit Bharat". Students actively participated and showcased innovative ideas reflecting scientific advancements and India's technological progress. The program was coordinated by Dr. Nitika Vats along with student coordinators, ensuring smooth organization and enthusiastic participation. The event successfully encouraged scientific thinking, creativity, and

awareness among biotechnology students.



Project EXPO 2024

The Department of Biotechnology, MIET, conducted *Project EXPO* on **03rd June 2024**, where final-year B.Tech Biotechnology students presented their innovative project work. The exhibition served as an excellent platform for students to demonstrate their research skills, experimental results, and biotechnology-based technological solutions. A panel of faculty members reviewed the projects, focusing on originality, scientific approach, and practical relevance. The event successfully reflected the enthusiasm, inventive mindset, and scientific capabilities of emerging biotechnologists.

**MEERUT INSTITUTE OF
ENGINEERING AND TECHNOLOGY,
MEERUT**
Department of Biotechnology
Project Expo 2024

Event Date & Time:
3rd June, 2024,
09:00AM -05:00 PM

Venue: Department
of Biotechnology,
MIET Meerut

Faculty Coordinators:
Gourav Mishra
Sachin Tomar



Alumni Interaction Session

An interactive and inspiring alumni interaction session was organized by the Department of Biotechnology on 06th June 2024, featuring Ms. **Istuti Gupta**, an esteemed alumna of the department, who is currently pursuing her MS at the **University of Alberta, Canada**. The session provided valuable insights and motivation to the students through her experiences and guidance.

Meerut Institute of Engg. & Technology, Meerut
Department of Biotechnology
is organizing
Alumni Interaction Session

Invited Alumni :
Ms. Istuti Gupta
pursuing MS from University of Alberta, Canada

Event Date & Time :
06th June, 2024
2.00 - 3.00 pm

Venue :
Room No. 236, Department of Biotechnology, Meerut



Student Achievements

AKTU Medalists



Namrata Gurung

Gold Medalist- 2023-24



Arshita Jindal

Silver Medalist- 2023-24

GATE 2024 Rankers



Ayush Chutani

AIR 287; 4th Year



Ishika Gupta

AIR 2188; 4th Year



Vishakha

AIR 2724; 3rd Year



Ritika Gupta

AIR 3388; 3rd Year



Placements

Batch 2020-24 Placement Record			
S. No.	Roll No	Name of the Student	Name of the Employer
1.	2000680540002	Akhil Dhar	Reality Assistant Pvt. Ltd
2.	2000680540003	Akshaya Prakash	M.Tech Vellore Institute of Technology (Vellore)
3.	2000680540005	Anu Kaushik	QnQ Design and Development Pvt. Ltd.
4.	2000680540008	Ayush Chutani	Tata Consultancy Services (TCS)
5.	2000680540009	Chetanya Jain	Reality Assistant Pvt. Ltd
6.	2000680540010	Chhavi Jindal	JKG Biosciences Pvt. Ltd
7.	2000680540011	Drishti Dhall	QnQ Design and Development Pvt. Ltd.
8.	2000680540013	Himani Sharawat	Reality Assistant Pvt. Ltd
9.	2000680540014	Ishi Gupta	Altruist Technologies Pvt. Ltd.
10.	2000680540015	Ishika Gupta	Beroe Consulting India Pvt. Ltd.
11.	2000680540016	Jigyasa Singh	Internet Research Bureau
12.	2000680540018	Pavitra	Reality Assistant Pvt. Ltd
13.	2000680540020	Raxit Tyagi	M.Tech Vellore Institute of Technology (Vellore)
14.	2000680540021	Rishu	Shayam Lal Enterprises
15.	2000680540022	Sahiba Longiani	M.Tech Guru Gobind Singh Indraprastha University
16.	2000680540028	Simran Siddiqui	Reality Assistant Pvt. Ltd/IDS info Tech Pvt. Ltd.
17.	2000680540029	Sneha Baliyan	Beroe Consulting India Pvt. Ltd.
18.	2000680540030	Tejashvi Sharma	Shayam Lal Enterprises
19.	2000680540031	Vanshika Tyagi	Internet Research Bureau
20.	2000680540032	Vatsala Upadhyay	Internet Research Bureau/ Pritam International
21.	2000680540033	Yash Jain	QnQ Design and Development Pvt. Ltd.

mi et *Congratulates* Batch : 2024
 Bright **MIET**ians for being placed in **IRB**
ACCURATE | PRIME | QUICK

JIGYASA SINGH
B.Tech BT

VATSALA UPADHYAY
B.Tech BT

Profile: Trainee-Research Associate

Package: **4 to 5 LPA**

We are proud of you

Akanksha Agarwal
Director (Training & Placement Department)
MIET Meerut

mi et *Congratulates* Department of Biotechnology

Ayush Chutani

Bright **MIET**ian for being placed in

tcs TATA CONSULTANCY SERVICES

We are proud of you...

Akanksha Agarwal
Director (Training & Placement Department)
MIET Meerut

Opportunities after B. Tech in Biotechnology

Food Processing Industry

Biotechnology enhances food processing with innovations in fermentation and preservation.

Research Scientist

Biotechnology offers research opportunities in genetics, healthcare, and environmental innovation.

Intellectual Property & Research Patenting

Biotechnology offers opportunities in intellectual property and research patenting through novel inventions and innovations.

Pharmaceutical Sector

Biotechnology offers opportunities in pharmaceutical sector for drug discovery, development, and biopharmaceutical production.

Production Engineer and Quality Control Analyst

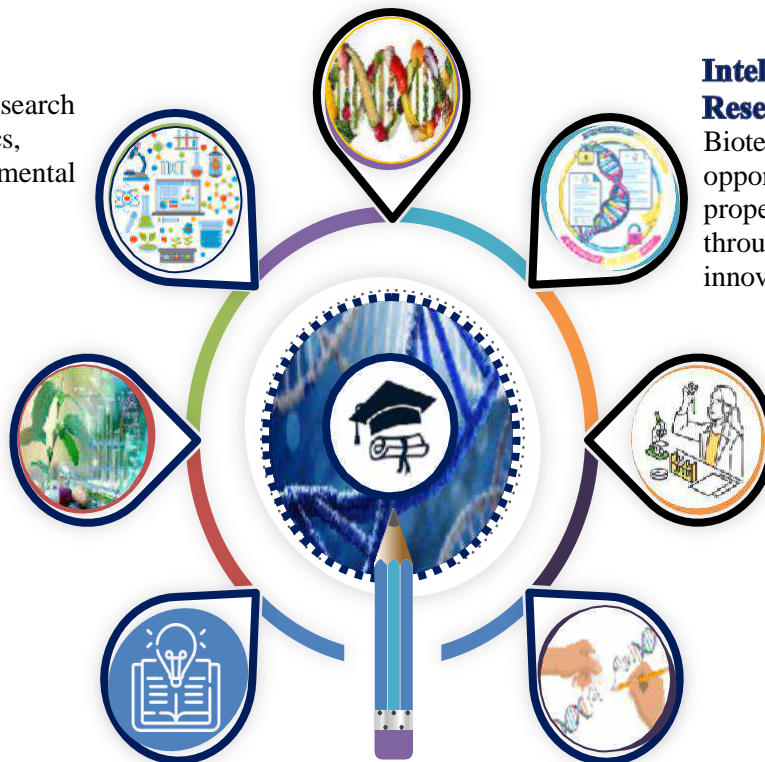
Biotechnology offers opportunities in production engineering and quality control through process optimization and product testing.

Masters & Doctorate in Biotechnology

Master's and Doctorate in Biotechnology advance expertise in biological innovation and research.

Technical Writing

Biotechnology offers technical writing opportunities in creating manuals, research papers, and regulatory documents.





Department of Biotechnology

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