

DEPARTMENT OF BIOTECHNOLOGY



Unfold

STUDENTS' CORNER

ISSUE #1 | AUG 2024



Shots by Ruqayyah
BSc. 1st year



Unfold

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Messages

From the Dean

Dear Students,
Welcome to the very first edition of 'Unfold', dedicated to the vibrant and dynamic students of the Department of Biotechnology. Unfold reflects your voices, interests and achievements, showcasing the diverse tapestry of the student community.

This Students' corner serves as a platform to express yourselves, offering a space where academic insights meet personal reflections, and the rigorous pursuit of knowledge embraces with the richness of student life.

It features a range of articles that span academic topics, lifestyle pieces, event coverage and more, capturing the essence of what it means to be the part of this extraordinary department.

As you navigate the academic journey, remember that your growth here encompasses more than just intellectual development. It is about building relationships, exploring new horizons and preparing for challenges and opportunities that lie ahead.

My best wishes for the success of this excellent initiative for Unfolding the potential of extraordinary students.



**Prof. Mohammad
Zahid Ashraf**
(FNA, FASc, FNASc, FAMS)

*With Profound Regards,
Prof. M. Zahid Ashraf
Dean - Faculty of Life Sciences*



Prof. Meetu Gupta
(FNASc)

From the Head

Dear Students,

It is my pleasure to present to you the first issue of our student magazine “**Unfold**”. This publication is a testament to the hard work, creativity, and intellectual curiosity of our talented students. The Inaugural edition of this magazine marks the beginning of a new chapter

in our Department, one that transcends the boundaries of biotechnology to embrace the diverse perspectives, experiences, and interests of our student.

Biotechnology is a field that constantly evolves, pushing the boundaries of what is possible and finding innovative solutions to some of the world’s most pressing problems. Our students are at the forefront of this exciting journey, engaging in groundbreaking research, exploring new ideas, & contributing to a vibrant academic community. In this issue, you will find a diverse array of articles, research highlights, and personal stories that showcase the breadth and depth of our Department’s activities. From cutting-edge research to exploring lifestyle topics, each piece reflects the dedication and passion that our students bring to their studies.

I would like to extend my heartfelt gratitude to all the contributors and the editorial team for their unwavering commitment and hard work in bringing this magazine to life. Their efforts not only highlight the academic and research achievements of our department but also inspire and inform our broader community. As you read through these pages, I hope you will be as impressed and inspired by the work of our students as I am. Their achievements are a source of pride for our department and a glimpse into the promising future of biotechnology. I am confident that it will grow to become an integral part of our identity, helping us to connect, inspire, and support one another in new and meaningful ways.

Thank you for your continued support and engagement with our department. Together, we can continue to foster a culture of excellence, innovation, and collaboration. I look forward to seeing how each of you will help this flourish and carry on the legacy in the issues to come.

Best Wishes

Prof. Meetu Gupta

Head-Department of Biotechnology

Department Of Biotechnology

About

The Department of Biotechnology, now a part of Faculty of Life Sciences was established originally in the year 2008 under the Faculty of Natural Sciences, with an aim to foster the next generation of biomedical researchers through classroom (teaching) and laboratory training for students, graduate researchers and postdoctoral fellows.

Vision

To impart the latest knowledge in the field of Biotechnology and equip the students with advance experimental skills to shape them to become distinguished scientists/academicians/entrepreneurs to serve the society, country and humanity at large; and to develop leadership qualities.

Office Administration

- **Mr. Mohd Afzal Khan** - Student dealing
- **Mr. Mohd Faheem Naqvi** - Administrative dealing
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ASSISTANT PROFESSOR

Guardians of the Immune System: CAR-T Cell Edition

Dilnawaz Jafri
(M.Sc Biotechnology 2nd Year)



Introduction

In the field of cancer treatment, surgery, chemotherapy, and radiation therapy have long been the primary methods used to combat the disease. However, the landscape of cancer treatment has undergone a significant transformation in recent years with the emergence of new categories of therapies. Targeted therapies, such as *imatinib* (Gleevec) and *trastuzumab* (Herceptin), have revolutionized the treatment of cancer by specifically targeting molecular changes in cancer cells. Additionally, Immunotherapy, which harnesses the power of the immune system to fight tumors, has emerged as a fifth pillar of cancer treatment. Immune checkpoint inhibitors, such as *pembrolizumab* and *nivolumab*, have shown remarkable success in treating various types of cancer.

One form of immunotherapy that has generated significant excitement among researchers and oncologists is **CAR T-cell therapy**.

What is CAR T-Cell Therapy ?

It is often referred to as a "**Living Drug**" as it involves the use of a patient's own T cells to combat cancer. CAR T-cell therapy involves collecting T cells (plays crucial role in the immune response by directly killing infected cells) from a patient and re-engineering them in the laboratory to express **Chimeric Antigen Receptors** (CARs) on their surface.

CARs

- synthetic molecules that recognize & bind to specific proteins/antigens, found on the surface of cancer cells.
- consists of different domains
- play a role in recognizing and binding to tumor antigens
- transmit signals into the T cells.



The specific composition of the CAR can affect the overall function of the CAR T cells.

Currently, FDA-approved CAR T-cell therapies target antigens such as **CD19** and **BCMA**, which are commonly found on B cells. These therapies have shown tremendous success in the treatment of blood cancers, including lymphomas and leukemia.

Successful?

CAR T-cell therapy has achieved remarkable success in the realm of hematological malignancies.

Acute Lymphoblastic Leukemia (ALL)

In clinical trials, it has induced complete remission in its patients & has completely revolutionized the treatment landscape for children and adults diagnosed with ALL, providing a glimmer of hope where previously there was little.

Aggressive Lymphomas

Patients with diffuse large B-cell lymphoma, who were once considered untreatable, have achieved remarkable responses to CAR T-cell therapy



Challenges

Limited long-term survival rate

Studies have indicated that less than half of patients treated with CAR T-cell therapy achieve long-term survival

High cost of CAR T-cell therapy

The current price of CAR T-cell therapy exceeds \$450,000, making it financially inaccessible for many patients.

Heterogeneity of Solid Tumors

Solid tumors present unique obstacles, such as physical barriers preventing CAR T cells from reaching tumor cells and immune-suppressive microenvironments.

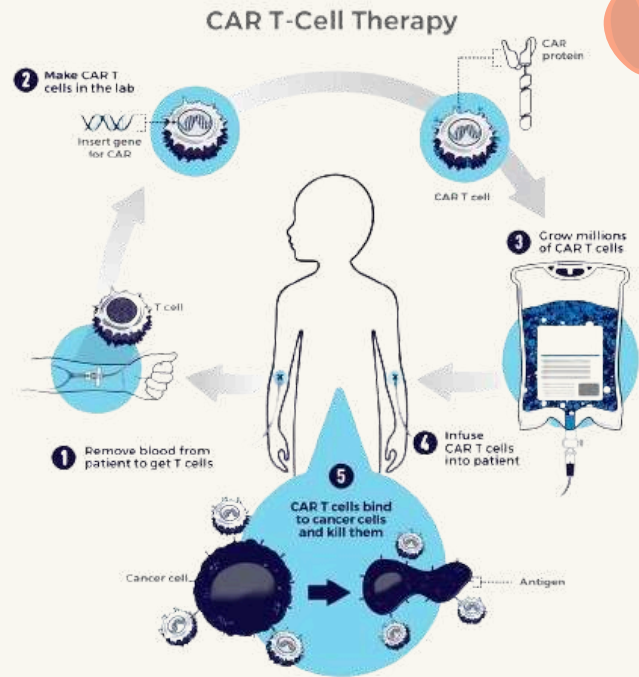
Side effects

Cytokine release syndrome (CRS)

- Most common and serious side effect.
- CRS occurs when infused T cells release a large number of cytokines
- Fevers, low B.P. & potential fatal complications.
- Considered as an "on-target" effect of CAR T-cell therapy, indicating that the therapy is actively engaging the immune system.
- Treatment by *tocilizumab*, a drug that blocks the activity of IL-6, a cytokine involved in CRS.

Neurologic toxicity

- manifest as confusion, seizures, and impaired speech.
- Immune-effector Cell Associated Neurotoxicity Syndrome (ICANS), is still not fully understood.
- Steroids, such as *dexamethasone*, are currently the primary treatment option for severe ICANS.



Advancements

Two approaches are being widely adapted by researchers to overcome the physical barriers presented by Solid Tumors :

1. **Armored CAR-T Cells** secrete specific cytokines and molecules to navigate the immune-suppressive microenvironment of solid tumors
2. **Antigen Specific Targeting** are subject to investigation in CAR T-cell therapies by targeting antigens found on solid tumors, such as B7-H3 and GD2.

To develop off-the-shelf CAR T-cell therapies, Scientists are also making use of gene-editing techniques such as:

CRISPR

They modify the T-cells from healthy donors to express CARs that can target specific antigens. It poses potential to make treatment more accessible and reduce manufacturing time.

Researchers are actively exploring the use of CAR T-cell therapy in combination with other treatment modalities, such as immune checkpoint inhibitors, to enhance the effectiveness of the therapy.

Chernobyl Fungus:
A type of black fungus found in the Chernobyl nuclear reactor actually feeds on radiation, and researchers are studying it for potential cancer-fighting properties.

In Conclusion,

CAR T-cell therapy has transformed the landscape of cancer treatment, offering hope to patients who previously had limited options.

The gutfather: Nurturing your Inner Health

Ashwani Singh, M.Sc. Biotechnology (2022-24)



Introduction - 'Our Second Genome'

Trillions of bacteria, viruses, yeasts, protozoa, and fungi—at least as many as the number of human cells in our bodies and weighing approximately four pounds—inhabit the intestinal tract.

Collectively known as the **gut microbiome**, these microbes help us metabolize nutrients and protect us from harmful bacteria and toxins.

Our gut microbiome is bigger than the average human brain and liver, containing at least 150 times more genes than the human genome thus often referred to as the “**Second Genome**” within humans.

What does it do?

We are filled to the brim with microbes, which form microbiomes on our skin, in our mouths, lungs, eyes, and reproductive systems. *"It's a vital organ in your body and you need to look after it. If you do that, it will look after you,"* says Professor Tim Spector, an epidemiologist at King's College London.

Gut microbes do things the gut can't do, liberating or synthesizing nutrients from food, especially from plants and their polyphenols, living off non-digestible substrates, producing thousands of metabolites – useful chemicals –and making vital short-chain fatty acids that are involved with immunity, with keeping the gut and colon healthy, with moderating the body's inflammatory responses and with the metabolism of glucosezyme to cut the DNA apart, which disables the viruses.

What your meal should look like!!

In India, the recommended daily intake of dietary fiber for optimal gut health is approx. 30 grams, yet average consumption often falls below this mark, typically ranging from 10 to 20 grams per day. This shortfall is largely attributed to shifts towards modern dietary patterns that favor low-fiber, ultra-processed foods, often high in sugars and fats and chemicals like monosodium glutamate (MSG), a common food additive that enhances flavor. The phrase “**Eat breakfast like a king, lunch like a prince, and dinner like a beggar**” encapsulates the critical importance of our dietary intake that shapes a healthy diversity of the gut microbiome often referred as “**Eubiosis**” in technical terms. Eating a substantial breakfast sets the tone for the day. A hearty morning meal provides the energy and nutrients needed to kickstart your metabolism after the overnight fast, fuel your body and brain, and help maintain stable blood sugar levels.



The 2005 Nobel Prize in Physiology or Medicine was awarded to two Australian scientists, Barry J. Marshall and J. Robin Warren, for their discovery of the bacterium *Helicobacter pylori* and its role in gastritis and peptic ulcer disease

A well-balanced **breakfast** includes whole grains, lean protein, healthy fats, and fruits or vegetables. For **lunch**, the idea is to eat a nutritious meal, but not as heavy as breakfast. It should be enough to sustain energy levels through the afternoon without causing sluggishness. This meal can include a mix of protein, carbohydrates, and healthy fats, such as a balanced plate of lean meat or plant-based proteins, whole grains, and plenty of vegetables.

Dinner should be the lightest meal of the day. Eating a lighter dinner is not only beneficial for weight management but also for gut health. A smaller meal in the evening reduces the load on the digestive system before bedtime, allowing the gut to rest and recover. Choosing easily digestible foods and avoiding heavy fats and complex carbohydrates can prevent disruptions to the gut microbiome overnight, promoting better sleep and overall well-being.

Happy Gut..Happy Life!



One of another frontiers for gut microbiome exploration is its relationship with our brain, something the new fields of *nutritional psychiatry* and *psychobiotics* are digging into. We already know the gut has its own nervous system, the enteric nervous system, and contains 100m neurons. We also know the **gut-brain axis**, via the vagus nerve, shoots neurotransmitters produced within the gut around the body and to the brain by modulating neurotransmitter production, circadian rhythms, immune responses, and neuroinflammation, the microbiome influences our ability to sleep well and think clearly..

Maintaining a healthy gut microbiome through dietary and lifestyle choices can therefore be an essential strategy for enhancing sleep quality and cognitive performance, highlighting the interconnectedness of our gut and brain health.

Some of the association that we see between healthier diets and better brain health could be because microbes are producing some psychoactive substances like short chain fatty acids (SCFAs) from our diet to help stabilize our mood and cognition. The more fibre you eat, the more substrates the microbiome has available. And the better off we're going to be, psychologically. I think that's incredible medicine that can help us to heal within.

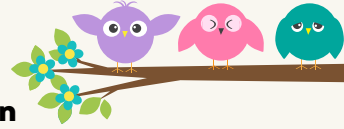
Conclusion

As a budding researcher, I firmly believe that the science of the gut microbiome presents immense opportunities to contribute to various research studies addressing different disorders, ultimately leading to significant translational advancements in human health and well-being. Imbalance of the normal gut microbiota (Dysbiosis) have been linked with gastrointestinal conditions such as inflammatory bowel disease (IBD) and irritable bowel syndrome (IBS), and wider systemic manifestations of disease such as obesity, type 2 diabetes, Neuro-degeneration and atopy. The microbiome is associated with everything, pick a disease, it's associated. The microbiome is like a convergent science – you have to be an ecologist, a geneticist, a bioinformatician, a clinician and an epidemiologist, to try to make sense of it.



A-Z Rules for Happy Life

Mohd Luqman
B.Sc Biotechnology (1st Year)



Always Trust God.
Be Open for Knowledge
Can Achieve Anything
Don't Blame Others
Enjoy the Life
Friendships You Must Treasure
Guard Against Enemies
Hope for the Best
Irresponsibility Should be Removed
Jealousy is not Good
Kindness to Everyone.
Learn to Love & Forgive
Make New Friends but Don't Forget the Old.

Never Give Up Your Goal
Oppose the Wrong
Patience as a Good Virtue
Quieten Your Mind When it is Angry
Remember God in Happiness & Sorrow.
Save Money for Future
Truthfulness
Use Time Wisely
View Everything Positively
Willingly Help Others
Xerox Your Good Attitudes
You'll be the Master of your Desires
Zeal for What you do



MD Aala
B.Sc Biotechnology (2nd Year)

Universe & Us

*My Blood is Just like the Sea-Saline & life giving,
My Heart-the Earth, following Rhythms,
Reason for my Living,
My Soul- the Sun, Steady, Strong;
Source of all that there is.
The hair on my head like the leaves on a tree,
The pores on my skin;
the grains of sand on our land,
The love in my heart; the glimmer of the stars
I can't contain in my hands.
The cells in my body are like the people that
have come & gone,
At this moment some are dead,
some living & some born.
There are soldiers, nurses, teachers,
learners in me & around me.*

*Some kill to live some live to die some just be.
A single cell is the reason for the most
beautiful miracle of birth.
A single cell can lead to the terror of cancer &
make known its worth.
Just as Humans have a choice, cells have a code.
It is upon us to choose to be
the poison or the antidote.
It is a tragedy & a mystery,
Why we search ourselves in history;
Why we doubt our capabilities &
depend on other energies,
I've learnt we must believe infinitely cause,
We are the reflection of the Universe &
Universe is in Us.*

DNA & Delusions: The Genetic Mysteries of Schizophrenia

Kamran Azher (B.Sc Biotechnology 2nd Year)



Introduction

Can anyone see a thing which is not present in reality?

Can anyone hear a voice that has no source or observable cause?

The answer to these is an obvious NO.

But, this is not true in the case of Schizophrenia.

Schizophrenia is a severe disorder that interferes with the person's ability to think, feel, behave and perceive reality. Along with hallucinations, symptoms include delusion, psychosis, thought disorder, and speech and movement disorder. The afflicted person also exhibits negative symptoms such as loss of motivation, limited emotional expression, decreased social interactions and experience of pleasure and participation in daily life activities. It is estimated that 1% of the world population and 0.8% of the Indian population suffer from schizophrenia.

Knowledge Gap and Challenges In Schizophrenia Research

Schizophrenia, despite being a serious illness and a high suicide rate, continues to receive limited attention in terms of research and awareness. The reasons behind this are lack of literacy, invisibility of symptoms, stigma, discrimination and cultural influence. In academia, the complexity of the brain, subjectivity of symptoms, difficulty in diagnosis, lack of biomarkers, polygenicity, interdisciplinary nature and resource allocation etc. limits the researchers from unveiling the pathophysiological and molecular basis.

Of Course, our understanding has advanced but still many aspects remain unknown. But the good thing is that now we know what is unknown and to what extent.

Uncovering the Genetic Risk Factors

The GWAS studies revealed that SNPs, CNVs and rare variants contribute to the aetiology of schizophrenia. But, the genetics alone don't confer the phenotypes. Many epigenetic hypotheses and models have been also proposed to explain the phenotypes.

Diving into the Receptors & Epigenetics

ZNF804A gene

- Most statistically significant genetic association with SCZ
- Regulates the gene involved in cell adhesion
- Crucial role in neurite formation, neural migration
- Development of dendritic spines

MHC locus (Chromosome 6)

- Brain development
- Glutamate receptor signalling
- Synaptic plasticity.

Eduard Einstein: The second son of renowned physicist Albert Einstein, Eduard was diagnosed with schizophrenia in his early 20s. Despite his illness, he was known for his intellect and interest in psychiatry

Deviation from the optimum activity of these receptors and other pathways leads to positive, negative and cognition complications. Beyond the genetic realm, the epigenetic study revealed that cannabis abuse, social exclusion, lead causes higher genetic susceptibility to develop SCZ.

Emerging Therapies and Clinical Outcomes

Current antipsychotic medications achieve complete remission of symptoms in only 15–25% of affected individuals with adverse side effects. Given many of these difficulties, recent years have seen renewed interest in drug repurposing

Some of the **widely tested targets** are:

- **Nicotinic ACh receptor** - encoded by CHRNA3 and CHRNA4
- **NMDA receptor** - GRIN2A, GRIN2B & GRIN1
- **AMPA receptors** - GRIA1 and GRIA4

Emerging targets, despite having strong genetic evidence, are under-represented under clinical trials are:

- **Calcium receptors** (CACNA1C, CACNB2)
- **Mitochondrial complex 1 'NADH dehydrogenase'** subunits (NDUFA13, NDUFA2, NDUFA4L2)

Interestingly, several anti-cancer drugs such as **Herceptin** and **PI3Kδ inhibitors** have also shown antipsychotic efficacy.

Concluding Insight and Future Outlook in Schizophrenia Research

In the present scenario, genetic research into schizophrenia and other psychiatric disorders is very limited. However, it is genetics that will provide a fundamental understanding regarding the molecular pathogenesis of SCZ. And, as a result of this, rationally designed and effective treatment will be developed. Identifying the loci and gene is indeed an achievement but this is not adequate, rather, it is merely the beginning.

The current status of schizophrenia research requires a **multifaceted approach**. Rather than solely sequencing the genome, integrating genomics with other omics, employing novel technologies for gene measurement, manipulation, and editing, developing innovative analytical and bioinformatics tools, and gaining insights into **gene-gene & gene-environment** interactions are required for achieving a comprehensive understanding of the underlying biological mechanisms and ultimately discovering effective treatments for schizophrenia

Logic Puzzle: Lab Equipment Placement



You have four pieces of lab equipment: a centrifuge, a PCR machine, a spectrophotometer, and a microscope. Each piece of equipment must be placed in one of four labs. The PCR machine cannot be placed in the same lab as the spectrophotometer. The centrifuge must be placed in the same lab as the microscope. The microscope cannot be placed in lab 3. How should you place the equipment?

Answer-



Societies & Clubs

By The Editor



Based on startups, innovation, and transforming ideas into reality for students to explore and develop their entrepreneurial skills, offering mentorship, resources, and networking opportunities.



Based on Social entrepreneurship, community service, and problem-solving students to create social, economic, and environmental impact.



Based on consultancy and problem solving that provides pro bono services to nonprofits and social enterprises.

Other Clubs (TJR, GDSC, TRS, etc)



There are other clubs as well catering to different interests and fields such as **The Jamia Review** for aspiring writers and critics & plenty others which are mainly based in FET (Faculty of Engineering and Technology) like **Google Developer Student Clubs (GDSC)**, **IEEE** (electrical and electronic engineering) & **The Robotics Society (TRS)**

Students' Life Saver



Aims to make science education accessible and engaging, encouraging learners to explore, experiment, and expand their knowledge in a hands-on manner. It harbors some of our very own M.Sc students as TAs:

Dilnawaz Jafri, Ashwani Singh & Musharraf Parwez



NPTEL, a joint initiative by the IITs & IISc. It offers high-quality, certificate courses which are particularly popular, helping learners gain recognition for their skills and knowledge. These are available online for free.



Provide high-quality educational resources for PG students. It offers e-content is developed by Subject Matter Experts comprised of Nation-renowned top faculties. The material for PG students is also pretty helpful to UG students as well



Initiative by the Massachusetts Institute of Technology (MIT) to make its world-class educational resources accessible to learners worldwide. Provides vast repository of course materials, including lecture notes, assignments, exams, and multimedia content.



How Plants protect their DNA in Space?

Insha Anas & Syed Adnan (B.Sc Biotechnology 2nd Year)



Introduction

The 2019 NASA Twins Study on Identical twin astronauts Scott and Mark Kelly revealed intriguing biological changes. Scott, who spent a year on the International Space Station (ISS) during his mission, experienced lengthened telomeres. However, after returning to Earth, his telomeres shrank (shortened).

A study was conducted by Shippen & Borja which concentrated on telomere maintenance in ISS-grown **Arabidopsis thaliana** plants (Nature Communications) In order to better address agricultural concerns on Earth and prepare for long-duration missions in the future for the plant responses in spaceflight,

- Potential extra-telomeric functions for telomerase (a controversial idea in the field)



The first plant grown on the ISS was Arabidopsis thaliana, which was part of an experiment to study how plants grow in microgravity and how space conditions affect their genetic expression and overall development.



Unexpected Findings- A Celestial Survival Strategy

Space-grown seedlings showed enhanced telomerase activity, however, unlike their human counterparts, **the plants did not show changes in telomere length.**

This was surprising, as organisms like humans and *Caenorhabditis elegans* (transparent nematode) exhibit telomere lengthening in space. The real surprise was the significant increase of telomerase activity (the enzyme that lengthens telomeres) without corresponding telomere lengthening. This is unexpected because, in human cells telomere length and telomerase activity are typically linked.

Implications

- Primary role of enhanced **Telomerase** activity under space conditions is not to elongate telomeres but rather to **stabilize** them & **protect DNA** from damage.
- Indicates a balance between telomere attrition due to DNA damage and the restorative action of telomerase.

Comparing Humans & Plants

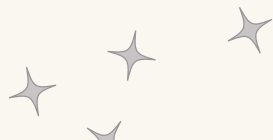
In Humans, it is more of a **Stress Response** rather than a 'True Protective Effect' as the telomere lengthening in space which occurs due to microgravity environment or altered cell division rates later resulted in Post-Flight shortening.

Meanwhile For Plants, Increased Telomerase activity in microgravity might be a protective response to ensure DNA stability under stress.

Conclusion

This discovery could change our understanding of how plants & perhaps even other organisms adapt to space environments.

As NASA scientist Dr. Gioia Massa aptly puts it, "Growing plants in space is not just about the food. It's about the psychological benefit of having something green & growing to take care of."



Caffeine's Molecular Mastery: How a Tiny Molecule Powers Your Day"

Altaf Shaikh (B.Sc Biotechnology 2nd Year)

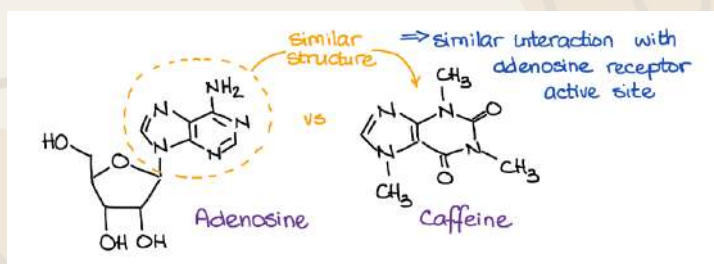


Introduction -

Caffeine may be small, but it packs a powerful punch. It's the most consumed Psychoactive compound. Discover the intricate molecular mechanisms that allow this common compound to boost your energy, enhance your focus, and even improve your mood

Molecular Mechanism of Caffeine's Effect on Cognitive Functions

Caffeine's ability to enhance cognitive functions such as attention, memory, and reaction time primarily involves its interaction with **adenosine receptors**. Caffeine structurally resembles adenosine, a molecule in the brain that promotes relaxation and sleepiness. Because of this structural similarity, Caffeine acts as a '**Competitive Inhibitor**' of adenosine receptors, particularly the A1 and A2A receptors. Caffeine binds to the adenosine receptors without activating them. Since it competes with adenosine for these receptor sites, it blocks adenosine from binding. This prevents the sedative effects typically induced by adenosine, such as drowsiness and relaxation. Since caffeine is a competitive inhibitor, its effects are reversible. Once caffeine is metabolized by the body (primarily by the liver enzyme CYP1A2), adenosine can again bind to its receptors, restoring its normal function and promoting relaxation and sleep.



Adenosine Receptors and Their Normal Function

Adenosine:

Adenosine is a neuromodulator in the brain that promotes sleep and relaxation by inhibiting neuronal activity. It's binding to adenosine receptors slows down brain activity and promotes drowsiness.

Adenosine Receptors:

There are four types of adenosine receptors:

A1, A2A, A2B, and A3.

The **A1** and **A2A** receptors are particularly important in caffeine's effect.

A1 Receptors:

- Widely distributed throughout the brain.
- Crucial role in promoting sleep
- Inhibit neurotransmitter release
- Calming effect

A2A Receptors:

- primarily found in the basal ganglia
- regulates Dopamine & Glutamate (motor control & cognitive functions)
- Activation of A2A receptors leads to inhibition of Dopamine D2 Receptors leading to reduced dopaminergic signalling.

Coffee Time

Antagonism of A1 Receptors:

- Caffeine binding to A1 receptors results in an overall increase in neuronal activity, alertness and promoting sustained attention.

Antagonism of A2A Receptors:

- By antagonizing A2A receptors, caffeine enhances dopaminergic activity, which can improve mood, reduce fatigue, and enhance motor performance. It indirectly increases the release of Dopamine (pleasure, reward & attention) and Glutamate (synaptic plasticity, learning & memory) by activating Dopamine D2 Receptors.
- This enhances dopaminergic signalling in the prefrontal cortex which leads to Increased Dopamine levels that improves Attention and Focus.
- This interaction also explains the potential therapeutic benefits of caffeine in Parkinson's disease, where dopaminergic neurons are compromised.

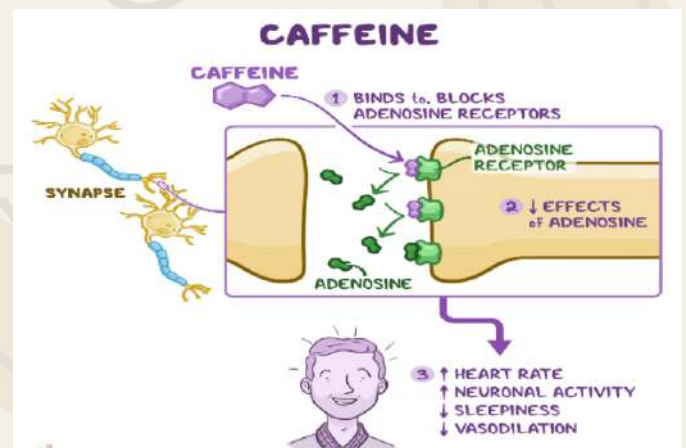
Other Effects:

- Improved **Long-Term Potentiation (LTP)**: This is critical for forming long-term memories.
- **Faster Neurotransmission** by blocking adenosine receptors, caffeine exerts quicker response times. This is particularly evident in tasks requiring quick decision-making and motor responses.

These beneficial effects on brain connectivity were not observed with caffeine alone, indicating that the full experience of drinking coffee plays a significant role in enhancing alertness and cognitive readiness.

Caffeine v/s Sleep:

In a world where brain doesn't take counter measures against Caffeine's working, you would be Sleep-deprived for days/weeks which would eventually lead to perpetual wakefulness. This would end up in life-threatening consequences such as organ failure or severe neurological impairment.



But all the caffeine in world won't help you avoid sleep as it is Important for brain, which eventually takes counter measures against the Caffeine's action.

Now the question is how does the brain sense the "abnormalities" created by caffeine and what are the counter measures, so that you get a goodnight's sleep.

How the Brain Detects Deviation from Normal Function Due to Caffeine Blockade ?

The brain is highly adaptive and sensitive to changes in its internal environment. When caffeine blocks adenosine receptors, this deviation is detected through several mechanisms:

1. **Increased Neuronal Activity:** The brain senses heightened neuronal firing rates and increased release of excitatory neurotransmitters.
2. **Intracellular Signalling Changes:** Elevated cAMP levels and altered calcium levels signal that adenosine receptors are blocked.
3. **Feedback Mechanisms:** Monitoring of neurotransmitters release (Increase in Dopamine & Glutamate) and informs the brain of the deviation. Brain also detects this through changes in receptor activation patterns and adjusts receptor expression accordingly.

4. **Genetic and Epigenetic Responses:** Changes in gene expression and epigenetic modifications help the brain adapt to and compensate for the blockade as well as Prolonged changes in neuronal activity can lead to epigenetic modifications, which alter the expression of genes involved in maintaining homeostasis.

These detection mechanisms trigger compensatory responses that restore balance and maintain homeostasis in the brain despite the ongoing presence of caffeine.

Brain's Counter-Mechanisms to the Blockade of A1 and A2A Receptors by Caffeine

- **Upregulation of Adenosine Receptors:** Brain increases the number of A1 and A2A receptors to compensate for the reduced adenosine signalling caused by caffeine's antagonism.
- **Increased Adenosine Production** can help to counteract the blocking effect of caffeine on its receptors
- **Changes in Dopamine and Glutamate Signalling:**
 - ▶ The brain might Downregulate Dopamine receptors (especially D2 receptors) to reduce the sensitivity to dopamine and balance neurotransmission.
 - ▶ Modulation of Glutamate Receptors: Similar to dopamine receptors, the brain may adjust the sensitivity of glutamate receptors (NMDA) and helps to prevent excessive excitatory neurotransmission, which could lead to neurotoxicity.
- **Tolerance Development:** Tolerance to caffeine's effects develops over time with regular use. This is a result of Neuroadaptation, where the brain's compensatory mechanisms become more efficient. As a result, the stimulatory effects of caffeine diminish, requiring higher doses to achieve the same effect.

These adaptations help maintain neural homeostasis and mitigate the prolonged effects of caffeine on the brain.

Implications for Research and Drug Development

Development of Caffeine Analogs:

- **Targeted Drugs:** By studying how caffeine interacts with adenosine receptors and other neural pathways, researchers can develop more targeted drugs that provide the cognitive benefits of caffeine without its potential side effects, such as anxiety or disrupted sleep.

Neuroprotective Strategies:

- **Brain Health Supplements:** Understanding caffeine's neuroprotective mechanisms can contribute to the development of dietary supplements aimed at maintaining brain health and preventing neurodegenerative conditions.

Conclusion

Think- Sleep, Cognitive functions and Alertness are Results of nothing but just very complex Interplay of Signalling mechanisms, if they can be controlled and modulated Scientists can cure various diseases, increase cognitive functions and much more. So understanding of such mechanisms at our level is necessary for future research.



Intricate levels of Thinking

Altaf Shaikh , B.Sc. Biotechnology (2nd year)

Introduction -

Understanding the way, we think and learn is crucial for mastering any subject, and **Bloom's Taxonomy** provides a powerful framework to explore this process. Developed by educational psychologist Benjamin Bloom in 1956, this model breaks down learning into six distinct levels, each representing a more complex stage of thinking. Whether you're solving a math problem, analysing a piece of literature, or creating an original work, Bloom's Taxonomy helps you navigate through these intricate levels of thought.

1. Remembering

The "Remembering" level involves recalling or retrieving previously learned information. It is the most basic level of cognition, where students are expected to recognize and remember facts, terms, basic concepts, or answers.

Key Cognitive Processes: Memorizing, Recalling & Identifying

2. Understanding

Involves comprehending the meaning of information and explaining concepts. At this level, students go beyond simple recall & demonstrate their grasp of the material. The best way of doing this is teaching the material to yourself and others.

Key Cognitive Processes: Explaining, Describing & Summarizing

3. Applying

The "Applying" level involves using knowledge in new situations, solving problems by applying facts, rules, concepts, and ideas. You have to think about the best way possible to tackle the problem and an understanding of combinations of concepts is necessary.

Key Cognitive Processes: Implementing, Executing & Solving

4. Analyzing

Involves breaking down information into components, understanding its structure, and seeing the relationships between parts. Students must differentiate and organize information to understand the underlying principles. Preparing mind maps can help students to do this

Key Cognitive Processes: Differentiating, Organizing, Attributing, Comparing

5. Evaluating

Involves making Judgments based on criteria and standards, assessing the value or effectiveness of ideas, materials, or solutions. This level requires critical thinking and the ability to form and justify opinions. Asking questions like *why this matters?*, *what's the best solution?* can help in this level

Key Cognitive Processes: Critiquing, Judging & Justifying

6. Creating

The highest level in Bloom's taxonomy, involving the generation of new ideas, products, or ways of viewing things. Often requiring innovation & original thought, In this level you are creating an answer for something that you don't think a proper answer exists in your knowledge already, you are Identifying a gap and creating a potential answer.

Key Cognitive Processes: Designing, Constructing & Planning





Let's dive into Bloom's Taxonomy with a topic we all remember from elementary school—photosynthesis. We'll see how simple questions can evolve into complex, critical thinking challenges.

1. Remembering

What is the chemical equation for photosynthesis?"

This question asks students to recall the basic chemical equation: $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$. It requires no deeper understanding, just the ability to remember and reproduce the equation.

2. Understanding

Explain why sunlight is essential for the process of photosynthesis.

This question requires students to understand the role of sunlight in photosynthesis. They might describe how light energy is used to convert CO_2 & H_2O into $\text{C}_6\text{H}_{12}\text{O}_6$ & O_2 highlighting the importance of light

3. Applying

If a plant is placed in a room with red light, how will its rate of photosynthesis be affected, and why?"

Requires students to apply their knowledge of photosynthesis and the absorption spectrum of chlorophyll. They need to recognize that red light is absorbed effectively by chlorophyll, so the rate of photosynthesis would likely be high compared to plants under other light conditions. This demonstrates their ability to apply theoretical knowledge to a specific scenario.

4. Analyzing

Analyze the effects of varying carbon dioxide levels on the Calvin cycle during photosynthesis?"

This question asks students to break down the relationship between CO_2 concentration and the Calvin cycle. They need to understand how CO_2 is fixed into organic molecules and how varying levels of it would influence the efficiency and output of the Calvin cycle. This requires them to analyze how one factor (CO_2 concentration) impacts a specific part of the photosynthesis process.

5. Evaluating

Evaluate the potential impact of increased atmospheric CO_2 on plant photosynthesis and global food production

This question asks students to assess how rising CO_2 levels might affect photosynthesis rates, considering both the short-term benefits (e.g., enhanced photosynthesis) and long-term consequences (e.g., climate change effects on agriculture). They must weigh the pros and cons and justify their evaluation with scientific reasoning. This involves synthesizing knowledge from different areas (photosynthesis, climate science, agriculture) to form a well-reasoned judgment.

6. Creating

Design an experiment to test the effects of different wavelengths of light on the rate of photosynthesis in aquatic plants."

This question challenges students to create a complete experimental setup. They must design an experiment that includes selecting appropriate plant species, choosing and controlling variables (such as light wavelength and intensity), and determining how they will measure photosynthesis rates (e.g., oxygen production). This involves creative thinking and the ability to integrate various aspects of scientific knowledge into a coherent plan.

By applying the first three levels anyone can easily pass through the academics as a successful student and crack most exams as they are mostly based around these 3 skills. From further levels starts higher order thinking, these requires more mental effort and are difficult to perform, so they can make a person think that they are getting slower and are not as effective but that's not true. This phenomenon is called **Misinterpreted-effort Hypothesis**.



Here's another Set of questions from a Topic you might be familiar with from reading the previous article

Level 1 What are the primary molecular targets of caffeine in the brain?

Analyze the potential impact of chronic caffeine consumption on memory and cognitive function over time

Level 4

Level 2 Explain how caffeine's antagonism of adenosine receptors contributes to increased alertness

Evaluate the effectiveness of caffeine as a cognitive enhancer compared to other stimulants, considering its molecular interactions

Level 5

Level 3 - How would caffeine's effect on adenosine receptors influence your ability to retain information during a study session?"

Design an experiment to investigate how different doses of caffeine affect memory retention in a controlled study

Level 6

So, next time you face a problem, pause and consider what skills it's really asking of you. Then, approach it with the right mindset, and you'll find your way to the solution more effectively.

Murphy's Law of Labs: If It Can Go Wrong, It Will—With Style



By Anonymous

- If an experiment works, something has gone **wrong**
- When you don't know what you're doing, **do it neatly**
- Experiments must be reproducible, they should **fail the same way** each time
- First draw your curves, then **plot your data**
- **Experience** is directly proportional to **equipment ruined**
- Always keep a record of **your data**, it indicates that you have been working
- To do a lab really well, have your **report** done well in advance
- If you can't get the answer in usual manner, start the answer and **derive the question**
- In case of doubt, make it sound **convincing**
- Do not believe in **miracles**, rely on them
- **Team work** is essential, it allows you to blame someone else
- All **unmarked beakers** contain fast-acting, extremely toxic poisons
- No experiment is a complete **failure**. At least it can serve as a negative example
- Any delicate and expensive piece of glassware will **break** before any use can be made of it.



Decoding the Student Dilemma: Crafting a Stellar SoP

By The Editor

Introduction

The Statement of Purpose or SoP, a common dilemma faced atleast once in every student's life before they could apply for Higher studies, Internships, Training Programs, etc... which is why, it is impeccable for a UG/PG student to learn how to craft a solid SoP

The Difference:

Statement Of Purpose/Research Statement/Personal Statement

Statement of Purpose

An SoP outlines your academic and professional goals, reasons for pursuing a particular program or course, and how the program aligns with your future plans.

Personal Statement

This provides insights into your personal background, experiences, influences, and motivations that have shaped your character and aspirations.

Research Statement

This outlines your research interests, experience, and proposed research agenda (for academic positions or research-oriented programs). It should be technical, but should be intelligible to all members of the department, including those outside your subdiscipline.

In simpler terms,

The SOP – “What I can do and be for your University, and why you should believe my words.”

The Personal Statement – “What kind of person I am and what would make me an attractive member of your community.”

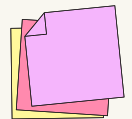
The Research Statement – “What are my research interests (in-depth) and what I can bring to the table”.



What must be included?

There is no specific format for SOP, it all comes down to what the Institute you're applying to is asking for, but there are certain elements which are common in almost all of them.

1. Brief Introduction and academic interests:



-Provide simple background information on your area of interest and how it became of particular interest to you.

2. Describe your academic background, preparation, and training:

-Any skill you have learnt, relevant work or internship experience or any research you conducted

If there were challenges, don't be afraid to mention what you learned from them. This shows persistence and resilience in the face of adversity- these are also things they are looking for!

3. Show them you are making an informed decision by

-How their program aligns with your short-term and long-term goals

-Describing why you are a good fit for the program and why the program is a good fit for you.

Unless otherwise noted, your statement should not exceed 1,000 words

Nature's Alchemy: The Biomimicry Adventure

Mohd. Luqman (B.Sc Biotechnology 1st Year)



The Need & Idea

Biomimicry is the imitation of the models, systems and elements of nature for the purpose of solving human problems. The goal is to create products, processes and policies-new ways of living - that are well adapted to life on Earth over the long haul. "The **core idea** is that the problems we are facing have already been solved by Nature's consummate engineers - the Animals, Plants, & Microbes. After billions of years of R&D, failures, fossils & what surrounds us is the secret to survival."

One of the early examples of biomimicry was the study of birds to enable human flight

Wright Brothers Breakthrough

Succeeded in flying the first heavier than aircraft in 1903, derived inspiration from observation of pigeons in flight

Velcro

The most famous examples of Biomimicry was invented in 1941 by Swiss engineer *George de Mestral*, he first got the idea for this new material form the burrs that were often stuck to his dog 's hair

Solar Powered Spy Plane

Inspired by bats, this device is powdered by the Sun, Wind & Vibrations and it's features "quantum dot solar cells" that are twice as effective as current Photovoltaic's.



Recent Developments

1) Mimicking Spider Silk:

Spider silk is often cited as one of the strongest biological materials in the world, By mimicking how a spider spins silk at room temperature, Spintex creates high-performance, sustainable textiles that are 1,000 times more efficient than an equivalent synthetic fibre.

2) Diatoms:

Aquammodate has developed a bio-inspired method to stabilise aquaporins to make use of their extraordinary features in water purification and treatment processes.

3) Soliome :

Sunscreen is often thought of as our sun savior, but the use of toxic chemicals has many unintended consequences to our oceans sensitive organisms like coral. Soliome has created a novel sunscreen inspired by compounds that naturally concentrate in the lens of the human eye to absorb UVA and UVB radiation. Safe, Affordable, and Environmentally friendly sunscreen.



Biomimetic Robot Fish:

The SoFi robotic fish, developed by MIT, mimics the movement of real fish to study marine life without disturbing it



Honey, I Edited the Genes!

Mohd Kaif Niyazi (B.Sc Biotechnology 1st Year)

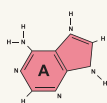


Introduction

CRISPR stands for 'Clustered Regularly Interspaced Short Palindromic Repeats' and Cas9 (CRISPR Associated protein 9). It is a genome editing technique for which **Emmanuelle Carpenter & Jennifer Doudna** won the 2020 Nobel Prize in Chemistry.

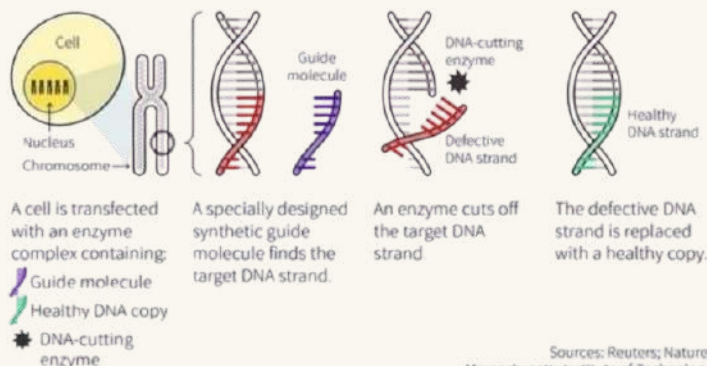
Origin

CRISPR-Cas9 was adopted from a naturally occurring genome editing system in bacteria. The bacteria capture snippets of DNA from invading viruses and use them to create DNA segments known as CRISPR arrays. The CRISPR arrays allow the bacteria to "remember" the viruses. If the viruses attack again, the bacteria produce RNA segment from the CRISPR arrays to target the DNA of viruses. The bacteria then use Cas-9 or a similar enzyme to cut the DNA apart, which disables the viruses.



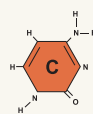
Mechanism of Action

This mainly consists three steps- **Recognition**, **Cleavage** and **Repair**. The CRISPR-Cas9 system involves two main components: the guide RNA (gRNA) and the Cas9 protein (DNA cutting enzyme). The gRNA is designed to match the target DNA sequence, guiding the Cas9 protein to the specific location for gene editing. Cas9 acts as molecular scissors, making precise cuts in the DNA. The cell's natural repair mechanisms then kick in, allowing researchers to introduce desired changes.



CRISPR Babies?

In 2018, Chinese biophysicist He Jiankui claimed to have created the world's first gene-edited twins using CRISPR technology to disable the **CCR5 gene**, which is linked to HIV infection. While this raised the tantalizing possibility of using gene editing to enhance human abilities—potentially creating so-called "**superhumans**"—the experiment was met with widespread condemnation. The scientific community highlighted the ethical dilemmas and potential risks. This incident underscores the urgent need for strict ethical guidelines and further research before we can safely explore the limits of gene editing in humans.



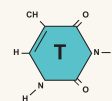
CRISPR's Accidental Discovery:

The CRISPR-Cas9 system was discovered almost by accident. Scientists studying the immune system of bacteria stumbled upon the mechanism that would later become one of the most powerful gene-editing tools in biotechnology.



India's Work on CRISPR

In India, CSIR's Institute of Genomics and Integrative Biology have indigenously developed a CRISPR-based therapeutics solution for sickle cell anemia, which are now being readied for clinical trials.



Revolutionising Health-care : Biosimilars

Hafi Afzal
(B.Sc Biotechnology 1st Year)



The Need

The high cost of prevailing pharma drugs & medicines has made it financially difficult for many patients. However, the availability of biosimilars, which are priced lower than the original biologics, offers high-quality and enables the access to High quality Health-care

Expert Opinion

The '**Interchangeable**' status of biosimilars with pharmaceutical drugs; given by the US FDA, instills confidence in biosimilars which can lead to a faster and wider adoption of biosimilars of various drugs such as Insulin biosimilars & thereby help in controlling Insulin expenditure.

This is especially important for patients who might otherwise practice non-adherence or rationing of life-saving insulin. Education, support, and awareness are crucial to ensuring that Interchangeable biosimilars gain wider acceptance.

Biosimilars are used to treat autoimmune disorders, cancers, genetic disorders, and diabetes. While biosimilars are not 'bio-identicals' due to potential **Post-Translational Modifications** like glycosylation, sialylation, phosphorylation, acetylation, or amidation, they are considered **therapeutically equivalent** to the original biologics. This equivalence means there are no clinically significant or meaningful differences in efficacy and safety, including immunogenicity.

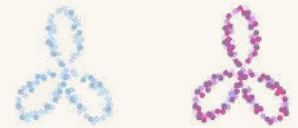
Immunogenicity Studies

Immunogenicity

- Development of Anti-Drug Antibodies (ADAs) against the biosimilar.
- Induced by Protein structure, Glycosylation patterns, manufacturing and downstream process impurities, etc...

To assess immunogenicity considerations between the Biosimilar and the Reference Biologic, the following parameters should be observed:

- Frequency of ADA Development
- Relative Antibody Levels
- Drug-Specific ADAs



Biosimilars



Inflectra

- Biosimilar of : Remicade
- Treatment of Autoimmune disease (Rheumatoid Arthritis)

Zarxio

- Biosimilar of : Neupogen
- Helps in Chemotherapy & WBC production

Ogivri

- Biosimilar of : Herceptin
- Treat HER2-positive breast cancer and metastatic gastric cancer.

Truxima

- Biosimilar of : Rituxan
- Non-Hodgkin's lymphoma, chronic lymphocytic leukemia, Rheumatoid Arthritis.

Effortless Learning: Simple Strategies

Mohd Saif Khan (B.Sc Biotechnology 2nd Year)



Ain't we all Learning?

We're often taught what to study, but rarely how to study—and worse, we're pushed to adopt inefficient methods that stifle true learning. But what if we approached learning in a way that aligns with how our brains work best?

Enter the **SADA** method, a simple yet powerful approach to enhancing retention and understanding.

S: Spaced Repetition

Forget cramming! Spaced repetition involves reviewing information at increasing intervals, which leverages the brain's natural forgetting curve. By revisiting material just before you're about to forget it, you reinforce memory and extend retention. Think of it as giving your brain a chance to "reset" and strengthen your recall.



A: Association

Our brains don't store information in isolated chunks. Instead, knowledge is interconnected. By linking new information to what you already know, you create a web of understanding that makes recall easier. Associating new facts with existing knowledge helps integrate them into your mental framework, making them easier to retrieve later.

D: Desirable Difficulty

We often seek shortcuts, but real learning thrives on challenge. If a topic feels too easy, delve deeper or explore related subjects to find a stimulating level of difficulty. Conversely, if something seems too tough, break it down and master the basics first. Balancing difficulty keeps you engaged and promotes deeper learning.



A: Active Recall

Instead of passively reviewing notes, actively test yourself on the material. This technique involves retrieving information from memory, which strengthens neural connections and enhances long-term retention. Asking yourself questions and trying to recall details without looking at your notes reinforces your learning and solidifies your understanding.

The Neuroscience behind Learning



Synaptic Plasticity



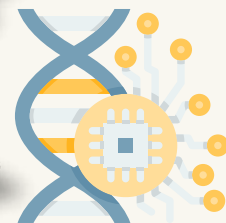
When we encounter new information, the neurons involved in processing this information become active and form new synaptic connections, a process known as **synaptic plasticity**. Synaptic plasticity involves two key mechanisms: **Long-Term Potentiation (LTP)** and **Long-Term Depression (LTD)**. LTP strengthens the connections between neurons that are frequently activated together, making it easier for these neurons to communicate and enhancing memory retention. In contrast, LTD weakens connections that are rarely used to prune unnecessary information from brain.

Essentially, each time we revisit or use learned information, we reinforce these neural pathways, making them more **stable & efficient**. When we focus intently on new information and revisit it periodically, our brain is more likely to consolidate this information into long-term memory. This process reflects the brain's remarkable ability to adapt and reorganize itself in response to new experiences, a concept known as **Neuroplasticity**.

By understanding and leveraging these mechanisms—such as through SADA—we can optimize our learning strategies, aligning them with how the brain naturally encodes and retrieves information.

Artificial Intelligence for Drug Discovery

Lubna (M.Sc Biotechnology 1st Year)



Introduction

Drug discovery is adapting to novel technologies such as data science, informatics, and Artificial Intelligence (AI) to accelerate effective treatment development while reducing costs and animal experiments. AI is transforming drug discovery, as indicated by increasing interest from investors, industrial and academic scientists, and legislators.

The Drug Discovery Process

Drug discovery is a systematic scientific process that aims to identify, design, and develop novel therapeutic agents to cure, ameliorate, or prevent diseases and medical conditions. Drug discovery is often called a pipeline, which suggests a unidirectional transition from hit/lead to candidate and marketed drug, supported by basic and clinical research.



AI Implementations:



AI is transforming drug discovery across various stages. In disease diagnosis, AI contributes to fields such as dermatology, tuberculosis, Alzheimer's disease, diabetes, hypertension, and cancer by enhancing medical imaging analysis, pathology interpretation, clinical pharmacology, and drug repurposing efforts, including those for COVID-19. Furthermore, **Nosology**, the classification of diseases, benefits from AI-driven resources like the Mondo Disease Ontology, which helps in creating more comprehensive and accurate disease classifications.

In the realm of drug discovery, AI plays a crucial role in understanding drug indications and therapeutic intent, though challenges remain, particularly in accurately capturing off-label uses. AI-driven tools like knowledge graphs (KGs) are increasingly used for target identification, enabling the integration and analysis of complex biological data to pinpoint potential therapeutic targets.

AI-Driven Drugs: Case Studies

AI's influence on drug discovery is well illustrated by AI-driven drugs like **DSP-1181** and **DSP-0039**:



DSP-1181:

- This drug is a potent and long-acting agonist of the 5-HT_{1A} receptor, a subtype of serotonin receptors that modulate mood, anxiety, and cognition.
- By activating this receptor, DSP-1181 has the potential to treat anxiety disorders and depression, offering benefits such as reduced dosing frequency due to its long-acting properties.
- The AI-driven development of DSP-1181 involved analyzing vast datasets to optimize the compound's potency, selectivity, and pharmacokinetics.

DSP-0039:

- This compound acts as a dual agonist of the 5-HT_{1A} receptor and an antagonist of the 5-HT_{2A} receptor (another serotonin receptor) with no activity at the dopamine D₂ receptor.
- This unique profile makes DSP-0039 a promising candidate for treating neuropsychiatric disorders like schizophrenia, where modulation of serotonin pathways is critical.
- AI facilitated the design of DSP-0039 by integrating various sources of pharmacological, genetic, and clinical data, optimizing its efficacy and safety profile.

AI is increasingly pivotal in drug discovery, enhancing various stages from disease diagnosis to target identification. While challenges such as data quality and model validation persist, careful management and the integration of human expertise are essential. Looking forward, the combination of AI with traditional approaches promises to revolutionize drug discovery, optimizing processes and improving outcomes for patients worldwide.

The Pearls of Introspection

By Hafi Afzal
(B.Sc Biotechnology 1st Year)

In a world filled with self-help books, meditation apps, and life coaches, there's an age-old practice that has quietly been the unsung hero of personal growth: introspection. Picture this: you, sitting in your favorite chair, pondering the meaning of life while sipping on a cup of chamomile tea.

Introspection often promises those glorious "aha!" moments where everything suddenly makes sense. You connect the dots, see the bigger picture, and revel in the brilliance of your own mind. Except, more often than not, those moments turn out to be more like "huh?" moments. You're left wondering if your epiphany was truly groundbreaking or just a byproduct of too much caffeine.



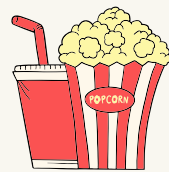
Introspection is the key to self-awareness. It involves taking a step back from the hustle and bustle of life to reflect on our experiences, decisions, and emotions. Through introspection, individuals gain valuable insights into their own behavior and motivations, paving the way for personal development.

- Step 1: Find a quiet spot
- Step 2: Take a deep breath
- Step 3: Ask yourself questions
- Step 4: Reflect on your experiences
- Step 5: Be kind to yourself
- Step 6: Write it down
- Step 7: Practice regularly

Introspection is your personal adventure into the fascinating world of you. It's simple, fun, and can bring you closer to understanding yourself in a way that makes you feel more connected and confident. So, grab your mental flashlight, take a deep breath, and enjoy the journey!



Popcorn Picks & Page-Turners



By The Editor

Laapata Ladies

A sweet one, but it's sour too!! Unapologetically message-y, it is a vibrant and quirky film that explores the lives of four women in a small Indian village, blending humor and social commentary with a touch of whimsical fantasy.

When do women get lost? Only when they want to!



Shutter Island

Are you ready to uncover the truth—or get lost in the shadows? With its haunting atmosphere, masterful storytelling, and a plot filled with twists and turns, Shutter Island keeps you on the edge of your seat, deciphering a mystery that is as much about the human mind as it is about the island itself.

Typewriter



Typewriter is a spine-tingling ride through the eerie corridors of a haunted house, where ghost stories aren't just bedtime tales—they're terrifyingly real. A spooky, fun-filled binge that'll make you think twice before turning off the lights! It keeps you hooked with its unpredictable twists that leaves you questioning everything you thought you knew. Will you dare to find out what happens when you start typing?

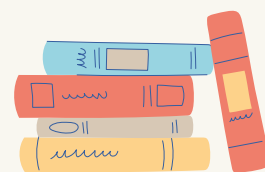


Crime and punishment

Crime and Punishment by Fyodor Dostoevsky is a literary masterpiece that plunges deep into the human psyche, exploring the thin line between morality and madness. It challenges you to ponder the nature of guilt, redemption, and the complexities of the human condition. Are you ready to journey into the darkest corners of the human mind and question what you might find there?

CRIME
AND
PUNISHMENT

"Mesmerizingly good... the best, truest translation of Dostoevsky's masterpiece into English."
—STEVE DONOGHUE.



Riddles & Trivia

Zeenat Fatima
(B.Sc Biotechnology 1st Year)



I can be good, but i can be bad.
You'll find me wherever you go.
who am i?



What grows only upwards
and never comes
downwards?

What runs but cannot
walk?

I've been called the storage tank by
those with little taste
I'm a sack filled with water,
Food,enzymes and waste.

Often referred as Father of Biology, Aristotle's philosophy and scientific thought had a profound influence on many fields. Which of these concepts, later disproven, did he advocate?

- A. Theory of Relativity B. Law of Segregation
C. Germ Theory of Disease D. Spontaneous Generation

Barbara McClintock won the Nobel Prize for her discovery of what genetic phenomenon in maize?

- A. Genetic Recombination B. Gene Expression regulation
C. Transposons (Jumping genes) D. Pseudogenes

Which of the following modifications is commonly associated with gene silencing?

- A. Acetylation of histones B. Phosphorylation of histones
C. Methylation of DNA D. Ubiquitination of histones

Which method is most commonly used to create a comprehensive catalog of all expressed genes in a cell population?

- A. ChIP-Seq B. RNA-seq
C. FISH D. Western Blotting

Rosalind Franklin's X-ray diffraction images, especially the famous "Photograph 51," were pivotal in providing evidence for which scientific discovery?

- A. DNA Composition B. RNA function
C. DNA Helical structure D. Protein Structure

Which of the following best describes a pseudogene?

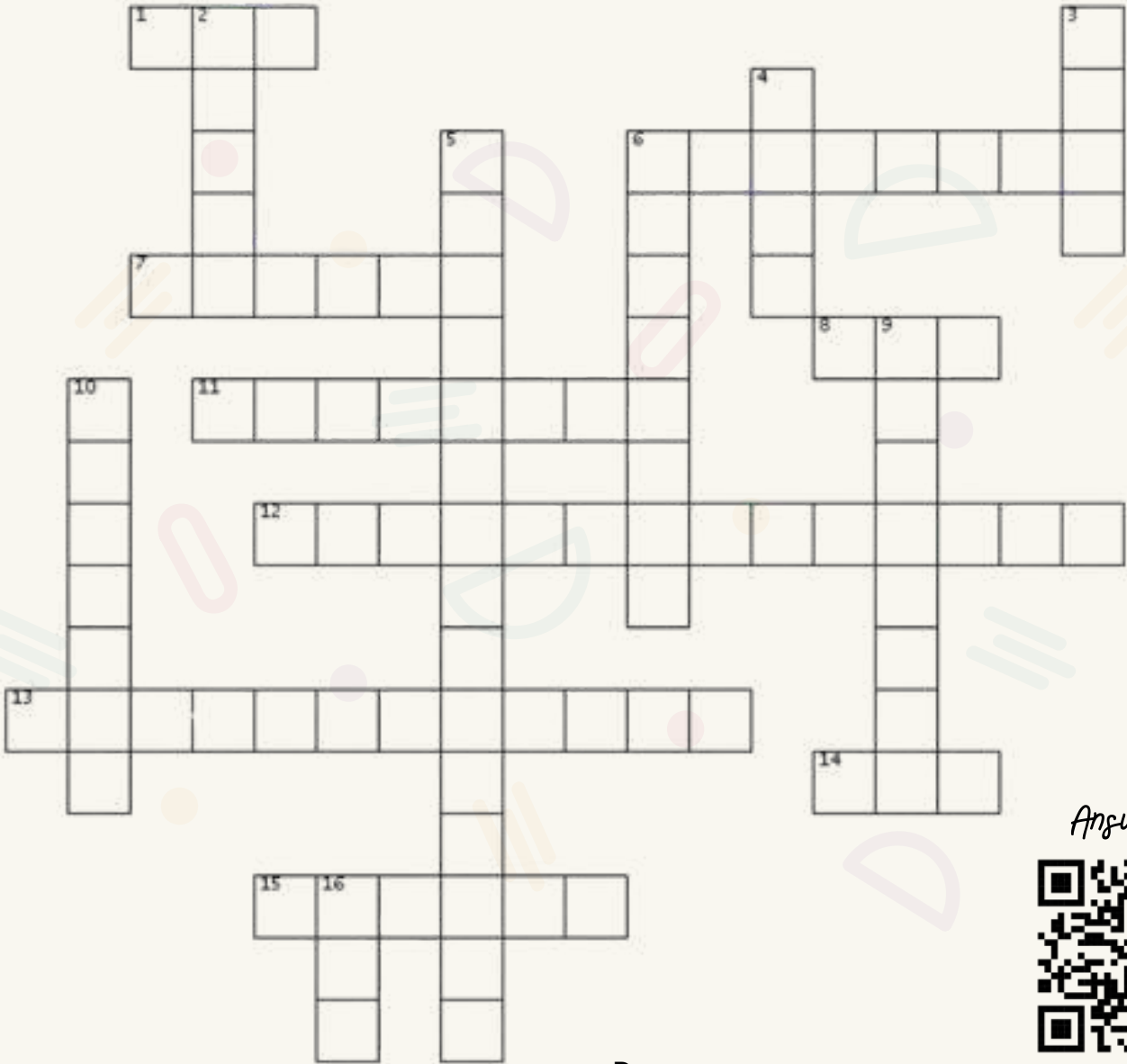
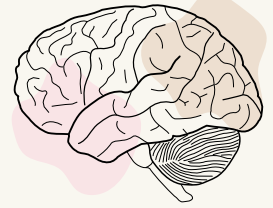
- A. A gene that has been silenced by DNA methylation but can be reactivated.
B. A non-functional sequence of DNA that resembles a functional gene but has accumulated mutations preventing its expression.
C. A functional gene that is only expressed under specific environmental conditions.
D. A gene that encodes a protein involved in the regulation of other genes.

Answers-



Crossword

By The Editor



Answers-



Across

1. A method used to amplify DNA sequences
6. A substance that causes disease
7. A type of protein that speeds up chemical reactions
8. An organism whose genetic material has been altered using genetic engineering techniques
11. The study of heredity and the variation of inherited characteristics
12. A laboratory technique used for separating mixtures
13. A branch of biology that deals with the study of microorganisms
14. Genetic material
15. A tool used to edit genes

Down

2. A sequence of three nucleotides that together form a unit of genetic code
3. The basic physical and functional unit of heredity
4. A type of cell that can differentiate into various cell types
5. A technique used to separate DNA fragments by size
6. An organism that lives on or in another organism and benefits at the host's expense
9. A change in a DNA sequence
10. A large molecule consisting of amino acids
16. The molecule that carries genetic instructions in living things

EVENTS



BioTalks - Dr. Manoj Prasad



Plantation Drive

*Reflecting on our successful
plantation drive to bring us closer
to greener future*



Teachers Day 23'

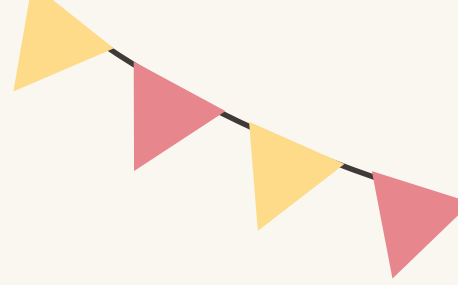


Iftar 23' & 24'

Annual Iftar Feast observed by all the Students, Faculty, Non-Teaching Staff.



103rd Foundation Day



Institutional Visit - NIPCR

*The Students & Professors embarked
on an insightful Institutional Visit to
National Institute of Plant Genome
Research*



Women in Science - Extension Lecture Series

Women's Day Extension Lecture Series featuring distinguished speakers. Dr. Ritu Kulshreshtha from IIT Delhi and Dr. Jyothilakshmi Vadassery from NIPGR shared their insights on their respective Fields of Research



Achievements

MEDHA

Three MSc. Biotechnology students of the Department of Biotechnology, Jamia Millia Islamia (JMI), **Ms. Ayesha Saubia, Mr. Ashwani Singh** and **Ms. Yashika Arora** have been awarded prestigious Bayer Fellowship - "MEDHA" (2022-2023). The Office of Principal Scientific Adviser to the Government of India is facilitating the Bayer Fellowship Program – MEDHA offered by Bayer CropScience Limited. The selected students will receive a monthly stipend of Rs. 20,000 to complete their master's program for two years.

These students were selected based on their academic profile and interview performances from hundreds of applicants.

The fellowship provides financial assistance to deserving students of the society to continue higher studies (Master's and PhD) in the Life-sciences / Biotechnology / Pharma disciplines.

The students will also get an opportunity to visit Bayer's research labs, interact with industry experts, gain exposure and build their knowledge base. The target of the fellowship is to enable the fellows to achieve their short and long-term academic and professional goals.



Mr. Ashwani Singh

M.Sc Biotechnology (2nd Year)



Ms. Ayesha Saubia

M.Sc Biotechnology (2nd Year)



Ms. Yashika Arora

M.Sc Biotechnology (2nd Year)



Star Performers (Batches of 24')



B.Sc

Mohammad Abdullah

- **AIR-76** in **GAT-B**
- **AIR-73** in **IIT-JAM BT** (Selected in **IIT Roorkee**)
- **AIR-5** in **AIIMS M.Sc Biotechnology**
- **AIR-672** in **GATE-BT**
- **215/300** score in **CUET-PG** (Life Sciences)
- Selected in **IISER Bhopal** (M.Sc Biotech)
- Selected in **IISER Thiruvananthapuram** (I-PhD)

Sahil Chawla

- **AIR-37** in **GAT-B**
- **AIR-40** in **IIT-JAM BT** (Selected in **IIT Roorkee**)
- **AIR-14** in **AIIMS M.Sc Biotechnology**
- **AIR-428** in **GATE-BT**
- **219/300** score in **CUET-PG** (Plant Biotechnology)
- **TIFR-JGEEBILS** Qualified

Momina Islam

- **B.Sc Gold Medallist** (Selected in **IIT-Roorkee** under Golden Girls' Scheme)
- **Category Rank - 23** in **GAT-B**
- **AIR-397** in **IIT-JAM BT**
- **Category Rank - 6** in **AIIMS M.Biotech**
- Selected in **JNU M.Sc Life Sciences**

Meraj Siddique

- **AIR-200** in **IIT-JAM BT**
- Selected in **IIT Roorkee**

- **AIR-168** in **IIT-JAM BT**
- Selected in **IIT Roorkee**
- **AIR-75** in **GAT-B**

Ayesha Siddiqui

Batch Toppers

- 1st - Momina Islam**
- MD. Mehran Ali**
- 2nd - Aaeisha Ilyas**
- Afsana Anjum**
- 3rd - Fiza Bee**
- 4th - Mohd. Shahab**



Star Performers (Batches of 24')



M.Sc

Rajneesh Kumar Jha

- AIR-78 in CSIR NET JRF 2023 (Dec)
- DBT-BET JRF Category II

Namra Tasnim

- DBT-BET JRF Category I
- TIFR-JGEEBILS

Dilnawaz Jafri

- AIR-133 in CSIR NET JRF 2023 (Jun)

Suchitra Jena

- AIR-91 in CSIR NET JRF 2023 (Dec)

Zufi Firdaus

- AIR-106 in CSIR NET JRF 2023 (Jun)

Ashwani Singh

- AIR-164 in CSIR NET JRF 2023 (Dec)



Areeba Ahmed

- TIFR-JGEEBILS

Batch Toppers

- 1st - Aisha Noor
- 2nd - Suchitra Jena
- 3rd - Zufi Firdaus
- 4th - Ashwani Singh

Out of 24 Students:

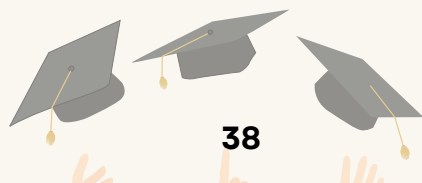
- 18- GATE
- 5 - CSIR UGC NET JRF
- 1 - DBT JRF
- 6 - NET LS
- 2 - JGEEBILS

ALUMNI

Our Alumni exemplify the high caliber of education, exposure & training provided by the Department of Biotechnology. Their success stories are a testament to the Department's commitment to fostering talent that excels on global platforms

Where are they now? (Recent Alumni)

Ms. Nimra Aman	PhD - University of Iowa, USA
Ms. Zoya Qudoos	PhD - McGill University, Canada
Ms. Sanuba Khan	MSc Genomic Medicine - University of Oxford, UK
Mr. Mohammad Faizan Alam	MS Biotechnology - TUM, Germany
Ms. Megha Pandey	MS Biology - TUM, Germany
Ms. Anam Parveen	MS Biology - TUM, Germany
Ms. Nikki Khan	MS Biology - TUM, Germany
Ms. Areeba Shakeel	MS Biology - TUM, Germany
Ms. Shaily Fatma	MS - University of Manchester, England, UK



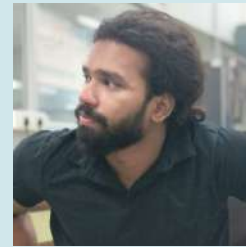
The Team



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Founding Advisor



Rabia Fatima
Content Reviewer

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- Mohd. Luqman for photography in Events
- Mr. Jasimuddin for his assistance in Alumni's data collection
- All the readers, students & the future who shall carry on the legacy

Point of Contacts

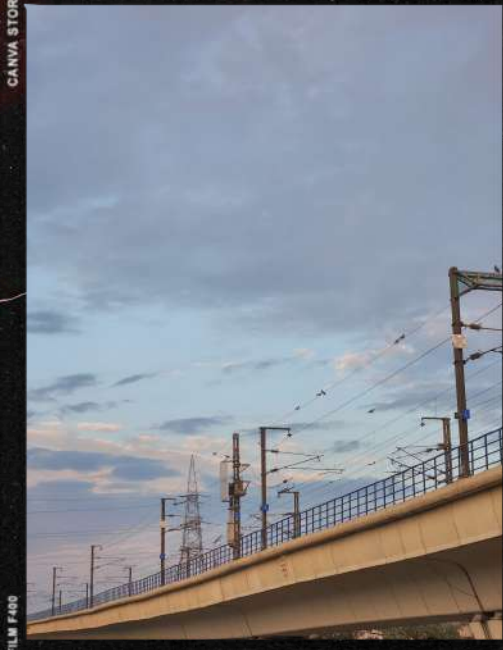
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Syed Khalid Rizvi	8881848551

Bachelors

Syed Adnan	8287064882
Insha Anas	9661006949
Kabeer Khan	7683086041

Shots by Hamza Islam
BSc. 1st year



CANVAFILM F400



CANVA STORIES 400

14

CANVA STORIES

CNV40



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14



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RTRA 40



14



6

Unfold

This Magazine is dedicated to the students of Department of Biotechnology. It serves as a platform for students to express themselves, showcasing articles that span academic topics, lifestyle pieces, event coverage, and more. It Aims to reflect the diverse interests and activities of the students, offering insights into both their academic and personal lives.



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