

things, but in seeing familiar things in new ways" - Alexander Fleming

WHAT'S INSIDE ?

About IMS Ghaziabad (University Courses Campus) 3

1		10000
	Director's Desk	4
/		100
	Editorial Board	5
	Editor's Message	6
		11
~	Science Record Broken in 2023	7
/		1
See.	Articles	11
		1
X	Events	54
	A DECEMBER OF STREET, STRE	
<i>.</i>	Amazing Scientific Facts	66
~	Crossword Puzzle	69



IMS Ghaziabad University Courses Campus stands as a beacon of academic brilliance and innovation, offering an unparalleled educational experience in the bustling hub of Ghaziabad. Renowned for its cutting-edge curriculum and dynamic learning atmosphere, the institution provides a rich blend of theory and practical exposure across a variety of undergraduate and postgraduate programs. Our state-of-the-art campus, equipped with modern technology and resources, serves as the perfect environment for fostering intellectual curiosity, creativity, and leadership.

A standout feature of our institution is the robust Biosciences Department, which is dedicated to advancing research and innovation in the life sciences. With modern laboratories, experienced faculty, and opportunities for hands-on research, the department provides students with deep insights into the world of biotechnology, microbiology. Beyond academics, IMS is a vibrant community where cultural, social, and professional growth are nurtured, preparing students to be visionary leaders and innovators in an ever-evolving global arena.



Dr. Arun Kumar Singh DIRECTOR IMS Ghaziabad (University Courses Campus)

A Word From Director

It gives me great pleasure to introduce the latest edition of KYOTOS, our annual magazine dedicated to the Biosciences Department. This magazine is a testament to the innovation, enthusiasm, and academic curiosity that drive our institution and its students. At IMS Ghaziabad (University Courses Campus), we are committed to fostering an environment where science and technology intersect with creativity and critical thinking. KYOTOS offers a glimpse into this dynamic world, showcasing recent advancements in biosciences, groundbreaking research, and the exciting events and activities that have taken place over the past year. Our goal is to cultivate future-ready professionals who are not only equipped with the latest knowledge but are also capable of making meaningful contributions to the field of biosciences and beyond. This magazine serves as a platform for our students and faculty to share their insights, ideas, and discoveries, reflecting the passion and dedication that define our academic community. I congratulate the Editorial Team for their earnest commitment to creating a visual and informative experience for all. Hope this issue serves as a reflection of the commitment management, faculty, staff strives for, in creating the Institute as a nurturing habitat for its students.

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EDITOR'S MESSAGE

We are extremely delighted and ecstatic to share this year's e-magazine. We sincerely thank the efforts of the entire team especially our tiny superstars(students). The e-magazine focuses how technology efficiently delivers new stories to our desktops, laptops and mobile devices, magazines are all about context—how ideas and images are presented in relation to one another and within a larger point of view. It explores a range of biological sciences, from the disorderly laws of gene editing to the anarchy of the microbial world. Additionally, it includes a wide range of material, including articles, science trivia, quizzes, achievements, and school of biosciences activities. Magazines are about trust and partnership, we, the editors, will strive always to keep you engaged.

"Coming together is a beginning. Keeping together is progress. Working together is success." – Henry Ford.

The editorial board members' honest assistance made it possible to complete the monumental undertaking of editing our school e-magazine. Although having talent is admirable but the real test is the capacity to recognize talent in others. I'm incredibly grateful to our esteemed Director, (Dr.) Arun Kumar Singh, General Secretary and Treasurer, CA (Dr.) Rakesh Chharia and (CA) Vidur Chharia for giving us the duty of serving as and on the Editorial Board. We send our warmest greetings to each and every reader, and we sincerely hope that this memento will win your praise for being an important contribution to the exploration of the mysterious realm of science.

Science Record Broken in 2023

The year 2023 was a remarkable one for science and technology, as many records were broken and discoveries were made. Here are some of the highlights of the year that pushed the boundaries of human knowledge and innovation.

India's Chandrayaan-3 made on a shoe sting budget of \$75m (£60m) was the first mission to reach the lunar south pole – an unexplored region where reservoirs of frozen water are believed to exist. This mission detected Sulphur on the surface of the moon and showed that lunar soil is a good insulator.



Sunniest place on our planet



Chandrayaan-3 reaches moon

Altiplano plateau in Chile's Atacama Desert gets hit with an average of 308 watts of sunshine per square meter — the most intense sunlight recorder on our planet. At times, solar radiation exceeded 2,000 watts per square meter, eclipsing the amount of sunshine expected on Venus!





Al comes around

Nothing short of technological watershed artificial intelligence (AI) finally went mainstream. ChatGPT became viral in 2023, surprising users with its ease of use and vast knowledge. In the tech industry a frantic race has started to take the pole position in the new "generative AI" marketplace heralded by ChatGPT

We have known Homo Sapiens came into being in Africa, and most of our evolution occurred there in last half million year. In 2023 a study of University of Pennsylvania showed that the tiny amount of Neanderthal DNA in present Africans had entered the *Homo sapiens* roughly 250,000 years ago at Eurasia, this means that we had left Africa multiple times, and quite earlier than previously thought of.



Africa and US



Hottest year

2023 was the hottest year till date. Warmer seas and atmosphere led to events that brought death and destruction at a shocking rate. In Libya, 10,000+ people died when a flood swept a city. Fires ravaged Greek islands and Canadian forests. Tropical Cyclone Freddy battered communities in east Africa. UK is revolutionizing a biotechnology therapy for sickle cell disease and beta thalassaemia. These debilitating diseases mostly affect black populations and people in the southern Mediterranean, Middle East, south Asia, and Africa respectively. UK regulator has approved the Crispr–Cas9 genome-editing tool called Casgevy which now can be used for treatment of diseases. The approval signifies a much needed move towards healthcare equity by including overlooked groups.





Therapy - sickle cell disease and beta thalassaemia Crispr

Discovery of a group of drugs known as glucagon-like peptide-1 (GLP-1) receptor stimulants has become pathbreaking. These GLP-1 drugs have now been licensed as weight-loss medicines. Wegovy, the poster child of these medicines works by decreasing blood glucose levels and making people feel full quickly when eating. Wegovy also found to reduces the risk of strokes and heart attacks.

A environmental disaster is unfolding rapidly this days. Research team led by Stanislas Rigal analyzed data on 170 bird species and came to conclusion that the main bird killer is agricultural intensification. Heavy use of pesticides and fertilisers, which also deprive birds of food, directly affect their health; thereby directly causing a huge biodiversity crisis.



Biodiversity crisis due to herbicides and pesticides

A black hole of 13.2 billion light-years from Earth discovered is now the most distant, most ancient supermassive black hole observed. The ancient black hole dates to when the universe was 470 million years. Since this black hole boasts about the same heft as its galaxy, researchers think the this may have formed through the collapse of a massive gas cloud. This can help us determine how universe's first generation of black holes were born.



Oldest black hole



Asteroid bits and earths origins.

Researchers in 2023 showcased the ability to cultivate structures that is close to early post-implantation human embryos, using pluripotent stem cells. This emphasized the ability of stem cells to self-organize into relevant tissues. However these stem cellbased embryo models, while promising, aren't equivalent to natural embryos. An important test i.e implantation into a womb, remains difficult, with 99% of cultured aggregates failing to resemble a human embryo. Also, ethical considerations and the need for improved efficiency will be required before using these models.

NASA's OSIRIS-REx probe got completed in 2023. It delivered rock and dust samples from the asteroid Bennu in the Utah desert. It is likely Bennu may hold clues about our earth's formation and life. Preliminary analysis revealed proof of water and carbon content. Now OSIRIS-REx goes on another asteroid visit, scientists are studying the Bennu sample, anticipating revelations about our planet's past.



Stem cell based embryo models

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OUT



Deceptive Advertising: Navigating What's Beneath the Wrapper

Prateek Tyagi School of Biosciences IMS Ghaziabad (University Courses Campus)

In a consumer-manufacturer relationship the buyer is the most vulnerable. Lack of specialized information and proper, display in the nourishment chain contribute significantly to this apathetic situation in current system. Better communication is much needed between consumer and manufacturer Nourishment products need to display accurate- characteristics of the product's and relenent warnings related to any conceivable dangers to consumers' security and wellbeing.

Nourishment producers have the obligation to guarantee nourishment security but also to provide satisfactory data to the buyer; if it is the consumers' right to be educated, at the same time it is also the manufacturers' obligation to illuminate.



Fig.1: Glamorized unhealthy junk food to attract customers

The comprehension of the data transmitted in the nourishment names constitutes the obligation to advise. When the shopper is not getting a handle on the data accurately, the producer is falling flat in their obligation. It is not as it were the need of data that can be biased, but deceiving and/or over the top data can bring burden to the shopper as well. For case, the need of wording communicating that the item has no sugar even if it has 0.5g of sugar might cause an insulin spike in diabetic patient, the same goes for sodium and fat claims. Thus, the consumer who made the choice not to ingest sugar will be consuming it involuntarily. One of the best ways to be to completely ignore claims on the front of the packaging. Front labels try to lure you into purchasing products by making health claims. In fact, research shows that adding health claims to front labels makes people believe a product is healthier than the same product that doesn't list health claims — thus affecting consumer choices

However, recent events have shed light on the detrimental consequences of misleading advertising practices, prompting a closer examination of regulatory frameworks in India. From the Supreme Court's landmark decision in the case of *Indian Medical Association v. Union of India (2022)* to the scrutiny faced by the nutraceutical industry, the pressing need is to have robust legal provisions and execution of the same

Misleading Advertising Tactics

Health claims on packaged food are designed to catch your attention and convince you that the product is healthy but the reality is often different. Most of the time, the manufacturer who is advertising a aggressive claims of delivering of a appealing product, is actually focused on increasing sales and thereby earning profit. "Real", "Fat-Free", "Sugar-Free", "100% Natural", "Keto" are some of the examples of the claims carelessly used in food labels to enhance product appeal. Here are some of the most common claims — and what they mean:



Fig.2: False label claims to mislead customers

Light- These items are supposed to decrease either calories or fat. A few items are basically watered down in the product and then classified as light. Consumer need to check carefully to see if anything has been included instep- like sugar

Multigrain- The catchy phrase tells consumers about a healthy product . Product that contains more than one sort of grain. However the simplistic definition hides the fact that most product contains refined grains which is not a healthy as multigrain supposed to be. Natural- This does not effectively mean item is sourced from nature.

Organic- Natural sugar is still sugar. Some items are actually heavy in sugar. The reality that they don't have included sugar doesn't cruel they're solid. Sugar substitutes may also are found to added.

Low-fat- This name more often than not implies that the fat has been decreased. However mostly it's found to be misleading.

Gluten-free-Gluten-free items essentially mean it doesn't contain wheat, spelt, rye, or grain. However numerous gluten-free nourishments found with doses of fats and sugar.

Fruit-flavored- Many prepared nourishments have a title that alludes to a characteristic flavor, such as strawberry yogurt. Be that as it may, the item may not contain any natural product — as it were chemicals outlined to taste like fruit.

Zero trans-fat- This state implies "less than 0.5 grams of trans fat per serving." In this way, if serving sizes are misleadingly little, the item may still contain trans-fat.

The dark side of sugar free claim

Food manufacturers use this to their advantage by purposely adding many different types of sugar to their products to hide the actual amount.

•In doing so, they can list a healthier ingredient at the top, mentioning sugar further down. So even though a product may be loaded with sugar, it doesn't necessarily appear as one of the first three ingredients. beet sugar, brown sugar, buttered sugar, cane sugar, caster sugar, coconut sugar, date sugar and confectioner's sugar. Syrup like carob syrup, high-fructose corn syrup, honey, agave nectar, malt syrup. Other added sugars like lactose, corn sweetener, dextran, malt powder, ethyl maltol, fructose, fruit juice concentrate, galactose, glucose, disaccharides, maltodextrin, and maltose. Company used these names to make consumer believe that the packet do not contain any sugar but its alternative which are on healthier side the names mentioned in the list are an indicator that the product is high in added sugar.

In addition to outlining regulatory requirements, the Food Safety and Standards (Advertising and Claims) Regulations, 2018, also specify penalties for non-compliance. Rule 13 stipulates that any person advertising or party to the publication of non-compliant advertisements shall be penalized as per Section 53 of the Food Safety and Standards Act, 2006. The amount of fine for non-compliance with advertising regulations can extend up to ten lakh rupees. This provision underscores the seriousness of adhering to advertising regulations and the consequences of misleading consumers. To maintain strategic distance from distortion customer a and perplexity. it's critical for producers to convey clear, brief, and straightforward data. Bundles ought to not contain expressions or realistic outlines that are misrepresentative. The producer cannot announce in the bundle restorative properties that the nourishment does not contain. For illustration, a few sorts of butter announce to have properties that offer assistance piece cholesterol indeed in spite of the fact that they contain canola oil, which is known to have negative impacts on cholesterol. In this situation, in arrange to fulfill the obligation of illuminating buyers, the butter producer would have to freed of that claim of blocking cholesterol or include a take note of the impacts of canola oil utilization.

Conclusion:

By following to law maintaining honesty and accuracy business can thrive with consumers viable usage of approved labels with genuine product composition and warnings we can ensure wellbeing and well-being. Eventually, the onus lies on companies to prioritize moral promoting strategies, in this manner cultivating a culture of astuteness and responsibility in the industry.

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Hope for Leukemia Cancer Patients (CLL)

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Leukemia is a cancer that affects the bone marrow, lymphocyte system, and other blood forming tissues. In adults, there are mainly two types of acute blood cancer. One is ALL (Acute Lymphocytic Leukemia), and the other is AML (Acute Myeloid Leukemia). AML is more common in adults; other than acute leukemia, there is a chronic blood cancer called CLL (Chronic Lymphocytic Leukemia). CLL patients have massive number of lymphocytes and it will reduce the amount of haemoglobin and platelets which is harmful for the body. Life expectancy is decreased. Although it is incurable but can be controlled with medication. The MRD (Measurable residual disease) is known as remaining cells of cancer in patients even after the treatment. New treatments and trials are being adopted to completely destroy cancer cells.



Fig.1: Lymphocytic leukemia

The innovative research by the New England Journal of Medicine and the 65th Annual Meeting of the American Society of Hematology (ASH) in San Diego, the trial conducted by the University of Leeds has been recognized as a revolutionary study. According to a phase III trial, patients with the most common form of adult leukemia, if treated individually, live longer and can be cured. Adult patients treated by a combination of cancer growth-blocking drugs for varying lengths of time. Patients were given cancer growth blocker drugs at different times depending on how their disease was responding to the drugs.

The majority of patients who were treated with a new combination of drugs found improved health over prior treatments and had no detectable leukemia in their blood The new treatment Is far better than the previous treatment. However, the trial has discovered that treatment can be done without a routine bone marrow test, which can be painful for patients. In the new trial, patients were treated with chemotherapy, immunotherapy, and cancer growth blocker drugs.

Two cancer growth inhibitors are tested in the FLAIR Trail 3rd: -

- Ibrutinib Also known by the brand name Imbruvica
- Venetoclax Also known by the brand name Venclexta, Combinedly called 1+V treatment.



Fig.2: Measurable Residual Disease treated with Ibrutinib-venetoclax or FCR

Clinical Trial

The goal of the FLARE researchers was to find out whether the I+V treatment was better than or more effective than FCR for CLL patients based only on regular blood sampling and bone marrow tests. Through regular blood and bone marrow tests, researchers are able to find out over time what effect the I+V treatment is having on each patient and hence the duration of I+V treatment can be reduced or increased according to each patient.

FLAIR Trail was started in 2014 and the trial was started with 1509 patient. They are divided into four categories. Two of the categories were examined in the FLAIR trial: out of which 263 patients were treated with usual treatment called as FCR (Fludarabine cyclophosphamide and rituximab) and 260 patients were treated with I+V (Ibrutinib - venetoclax). Cancer is more common in men, that is why almost three-fourth of the patients were men. The average age of patients was 60. 34 of such patients died during the treatment, of which 25 were on FCR and only 9 on I+V.After the treatment, 87 patients were faced with the growth of cancer cells, out of which 75 were on FCR and only 12 on I+V treatment.

The period of each patient's I+V treatment might be customized according to their stage of cancer. I+V treatment destroys the cancer cells present in the patient's blood. When the number of cancer cells becomes so low, the patient can't show any symptoms. According to the results, more survival is expected in ibritinib-venetolex compared to FCR.

Conclusion:

In this trial, Ibrutinib-venetoclax was found better than FCR as it is progression-free survival. Result of survival of CLL patients is also high in I+V treatment. The I+V treatment seems more personalized. The researcher now expects that the patients with CLL may accept this more significant therapy strategy as it becomes more useful than the previous one



Fig.3: Progression free survival

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Wait!! Fingerprints Aren't Unique After All!!?

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Fingerprints have long been regarded as the ultimate identifier, unique to each individual like a personal signature. Fingerprint biometrics play a crucial role in digital authentication and forensic science. However. the assumption underlying their effectiveness is unproven, asserting that no two fingerprints, even from distinct fingers of the same individual, are identical. This flaw renders them ineffective in cases where the presented fingerprints differ from those on record. However, recent research led by Gabe Guo, a scholar from Columbia University, employing advanced artificial intelligence (AI), challenges this conventional wisdom. This ground-breaking discovery





suggests that fingerprints might not be as unique as we once thought. The research demonstrates a confidence level exceeding 99.99% that fingerprints from diverse fingers of the same individual exhibit remarkably strong similarities. In this article, we will delve into the details of Gabe Guo's research, exploring the methodology, key findings, and the potential implications for the field.

Gabe Guo, from Columbia University, embarked on a journey to unravel the mysteries of fingerprint uniqueness. Using cutting-edge AI technology, Guo sought to investigate the prevailing assumption that each fingerprint is entirely distinct, even between different fingers of the same individual. Guo's research methodology was both innovative and meticulous. Leveraging AI algorithms, he designed a comprehensive study to analyse fingerprint patterns in depth. The study focused on extracting detailed fingerprint representation vectors, a process that goes beyond traditional minutiae analysis. To ensure the credibility of the findings, the research rigorously controlled for various factors that could influence the results. This included considerations for sensor modality, a critical aspect of fingerprint analysis that can introduce variability. Contrary to long-standing beliefs, Gabe Guo's research revealed a surprising outcome. The data suggested that fingerprints from different fingers of the same individual shared notable similarities. The confidence level in these similarities surpassed 99.99%, indicating a level of resemblance that challenges the conventional assumption of fingerprint uniqueness. In essence, this discovery suggests that the widely accepted notion – that no two fingerprints are alike, not even from the same person – may need to be reconsidered. Guo's findings have ignited a revaluation of the core principles that underpin fingerprint analysis.

One of the key insights from Guo's research pertains to ridge orientation, particularly in areas near the centre of the fingerprint. This aspect emerged as a significant factor influencing the observed similarities between fingerprints. Traditional methods often focus on minutiae, the small ridge details, but Guo's work underscores the importance of considering the broader ridge patterns.



Fig.2: Feature similarity analysis

Guo's findings challenge the existing emphasis on minutiae and offer a new perspective on how ridge orientation could play a pivotal role in fingerprint analysis. This shift in focus has the potential to reshape the way forensic experts approach the examination of fingerprints.

As with any ground-breaking research, Gabe Guo's work has faced scrutiny and critiques within the scientific community. Some scholars argue that the study's sample size and diversity may limit the generalizability of the findings. Larger and more varied datasets are suggested to ensure that the observed similarities are not exclusive to specific populations or conditions. While critiques are a natural part of the scientific discourse, they also highlight the need for ongoing research and refinement. Guo's work has opened a dialogue within the scientific community, encouraging further investigation and exploration.

Gabe Guo's research has sparked varied reactions within the scientific community. Experts in biometrics, forensic science, and AI are actively engaging with the profound implications of this discovery. Some view it as a revolutionary shift, urging a reassessment of current forensic protocols, while others remain cautious, emphasizing the importance of additional validation and replication studies. Prominent figures in the field, inspired by the potential impact on AI-driven forensic tools, have called for collaborative efforts to refine existing technologies. This collaborative spirit underscores the shared commitment within the scientific community to advance our understanding of fingerprint analysis.

The potential redefinition of fingerprint uniqueness has far-reaching implications for forensic science. If fingerprints are not as unique as once believed, it prompts a reconsideration of their role in criminal investigations. The traditional reliance on fingerprints as incontrovertible evidence may need to be tempered with the newfound knowledge.

One of the most significant implications of Guo's research is the potential enhancement of forensic investigation efficiency. In specific scenarios, leveraging the observed similarities in fingerprints could lead to a near two-order-of-magnitude increase in investigative efficiency. This revelation challenges established protocols and methodologies, demanding a revaluation of how fingerprint evidence is interpreted and utilized in legal proceedings. As the scientific community grapples with the implications of Gabe Guo's research, the future of fingerprint analysis stands at a crossroads. The intersection of AI and forensic science opens new avenues for exploration and innovation.

As the scientific community grapples with the implications of Gabe Guo's research, the future of fingerprint analysis stands at a crossroads. The intersection of AI and forensic science opens new avenues for exploration and innovation. Guo's work serves as a catalyst for further research, sparking interest in refining AI-driven forensic tools and methodologies. The potential redefinition of fingerprint uniqueness does not diminish the importance of fingerprints in investigations but rather refines our understanding of their role. If fingerprints are not universally unique, emphasis may shift towards developing more advanced and nuanced techniques that consider the context and specificities of each case.

Gabe Guo's research has profound implications for the future of the field. The idea that fingerprints may not be entirely unique challenges the foundational principles we've learned. It prompts us to question, explore, and adapt our methodologies in light of evolving knowledge. Guo's work highlights the dynamic nature of scientific inquiry, where discoveries can reshape our understanding of fundamental concepts. The collaborative efforts and critiques that follow such revelations underscore the collective commitment to advancing knowledge and improving the reliability of forensic evidence.

In essence, Gabe Guo's research serves as a beacon, guiding us towards a more nuanced and sophisticated understanding of fingerprint analysis.

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CAR-T Immunotherapy: key Treatment for Malignant Hematological Conditions

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The treatment of cancer has changed dramatically in recent years with the development of CAR-T cell therapy. A novel approach of treatment targets and eliminates cancer cells by means of the patient's immune system. The early trailblazers in this sector are Kymriah (tisagenlecleucel) and Yescarta (axicabtagene ciloleucel), the first two CAR-T treatments licensed for specific kinds of leukaemia and lymphoma in both children and adults.



Fig.1: CAR-T cell attacking foreign particles

The acronym CAR-T stands for Chimeric Antigen Receptor T-cell therapy. T cells are specialist immune cells that can identify and destroy foreign intruders. CAR-T therapy involves altering a patient's T cells in the lab to express an artificial receptor, known as the CAR, on their surface. This receptor is intended to recognize and bind to a particular protein found on cancer cells. Once attached, CAR-T cells unleash a targeted attack, killing cancer cells while leaving healthy ones relatively unscathed.

Children and young adults (aged up to 25) with refractory or relapsed B-cell precursor acute lymphoblastic leukaemia (ALL) are supposed to get treatment by this approach. All is an aggressive cancer of the white blood cells, and Kymriah provides new hope for individuals who have not responded to traditional treatments. Kymriah offers a potential lifeline for patients whose illness has returned or has not responded to earlier treatments. Yescarta, on the other hand, is specifically intended for: Adult patients with recurrent or refractory large B-cell lymphoma (LBCL), such as DLBCL, PMBCL, or transformed follicular lymphoma. CAR T-cell treatment is a kind of care where T cells from the patient are engineered in a lab to attach to and destroy cancer cells. In this process a tube carries blood from the patient's arm vein to an apheresis machine (not shown), which separates the white blood cells—including T cells—and returns the remaining blood to the patient. Next, the T cells in the lab are given the gene for a unique receptor known as a chimeric antigen receptor (CAR). After being cultivated in a lab, millions of CAR T cells are infused into the patient.



Fig.2: Process of CAR-T cell in cancer therapy

Co-stimulatory signalling domains have been added to newer generations of CAR T cells to improve their ability to produce more T cells after infusion and survive longer in the circulation. These receptors are "synthetic molecules, they don't exist naturally," explained Carl June, M.D., of the University of Pennsylvania Abramson Cancer Canter, another leader in the cellular therapy field. After the revamped T cells are "expanded" into the millions in the laboratory, they're then infused back into the patient. If all goes as planned, the CAR T cells will continue to multiply in the patient's body and, with guidance from their engineered receptor, recognize and kill any cancer cells that harbour the target antigen on their surfaces. The CAR T-cell therapies approved by FDA to date target one of two antigens on B cells, CD19 or BCMA. While Kymriah and Yescarta have shown great promise in clinical studies and in real-world applications, it is important to recognize that CAR-T therapy is still in its early phases. One of the most difficult hurdles is the complicated manufacturing process, which involves removing, altering, and expanding a patient's T cells outside the body. This can take many weeks, possibly delaying treatment for patients in critical condition. Furthermore, CAR-T therapy can cause serious adverse effects, including cytokine release syndrome (CRS), a systemic inflammatory response, and immune effector cell-associated neurotoxicity syndrome (ICANS), which can harm the nervous system. Careful patient monitoring and care are required to reduce these potential risks.

The Future Of CAR-T Therapy: Despite the limitations, CAR-T continues treatment to have enormous potential. Researchers are continuously looking for ways to improve production processes, eliminate side effects, and broaden the scope of this therapy to treat different types of cancer. Furthermore. CAR-T cells are being coupled with other therapeutic methods. such as checkpoint inhibitors. to potentially increase their efficacy.



Conclusion:

Fig.3: CAR-T Cells: engineering immune cells to treat cancer

CAR T cell therapy represents a revolutionary approach in cancer treatment, harnessing the power of the immune system to target and destroy cancer cells with remarkable precision. As we conclude our exploration of CAR T cell immunotherapy, it becomes evident that this innovative treatment modality holds immense promise for the future of oncology and patient care. By genetically modifying T cells to express chimeric antigen receptors (CARs), this therapy enhances the immune system's ability to recognize and eliminate cancer cells, leading to potent and durable anti-tumour responses. Numerous clinical trials and real-world experience have demonstrated the efficacy of CAR T cell therapy in patients with refractory or relapsed cancers, achieving remarkable response rates and long-term remissions in some cases.

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Archaeogenetics: Future Potential and Challenges.

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Archaeogenetics hints to the application of the methods of atomic populace hereditary qualities to the study of the human past. This may involve:

1. The investigation of DNA recouped from archeological remains, i.e. antiquated DNA;

2. The investigation of DNA from present day populaces (counting people and residential plant and creature species) in arrange to consider human past and the hereditary bequest of human interaction with the biosphere; and

3. The application of measurable strategies created by atomic geneticists to archeological data.



Fig.1: Formation of South Asian ancestral components

History:

The field of hereditary inquire about has seen extreme changes since James Watson and Francis Crick discovered the twofold helix structure of DNA in 1953 (Watson and Crick 1953). Thirty year later spearheading field of antiquated DNA was born in mid 1980s, with the extraction and sequencing of DNA from the quagga, a terminated South African equid, together with the extraction of DNA from an Egyptian mummy test (Pääbo 1985; Higuchi et al. 1984). Prior endeavors at DNA extraction were shockingly thwarted by the need of suitable innovation to permit researchers to recognize between endogenous antiquated DNA

(known as aDNA) and exterior sources of DNA defilement (Skoglund et al. 2014).One of the key advances in hereditary the improvement of PCR (polymerase chain response) innovation, has permitted geneticists to intensify hereditary fabric for investigation (Jobling and Hurles 2012, 95129). Through progressive for the field of hereditary qualities, PCR did have genuine issues for the consider of old DNA, duplicating not as it were the surviving antiquated DNA but moreover any sullying DNA from other exogenous sources present within the test (Ginolhac et al. 2011). For this reason, numerous prior reports of DNA extraction from antiquated examples, and all reports from examples over a million of years say dinosaur DNA (Pääbo et al. 2004) – have been broadly expelled intensification of present-day contaminants (Rizzi et al. 2012). Contamination has also remained a major issue, with Cooper and Poinar (2000) Contamination control is a top priority of numerous specialists within the field. Also they recommended a list of guidelines to be taken after, such as having an separated work zone and an exterior lab.

Population Genetics:

Both cutting edge and old DNA can be utilized to analyze past populace plummet and relocation. By watching the previously mentioned changes within the hereditary code, which are acquired, analysts have been able to analyze huge scale populace movements, and create speculations as to how vagrants interbreed with nearby populaces. Most outstandingly this was utilized to explore the out of Africa hypothesis of how anatomically cutting-edge people begun and relocated from Africa (Veeramah and Pound 2014). This demonstrate was afterward extended upon, with extra examinations proposing a level of hereditary breeding between non-African people and other species of hominin, such as Neanderthals and Denisovans (Huerta-Sánchez et al. 2014; Sankararamanetal.2014). Much inquire about within the past decades has centered on the beginnings and relocation of ancient populaces (Brandt et al. 2013; Pinhasi et al. 2012; Raghavan et al. 2013; Ralph and Coop 2013; Skoglund et al. 2012), with a specific center on whether the spread of rural and other innovations associated with the Neolithic way better fits into the previously mentioned social or demic models of dissemination. Related work has centered on both analyzing the hereditary spread of antiquated human populaces (Pickrell and Reich 2014) and the hereditary signature of the tamed creatures that went with them (Cai et al. 2014; Larson et al. 2007), in arrange to test and create modern relocation hypotheses. Without a doubt, as hereditary sequencing costs decrease, more large-scale population analysis will come up to forecast future trends.

Analysis of Organic and Inorganic Ancient Material:

There is additionally much potential for hereditary investigate to be connected to the recognizable proof of natural remains in archeological artifacts, both through the distinguishing proof of already obscure fabric inside artifacts. natural and through distinguishing diminutive hereditary data in natural tests. A number of later thinks about have effectively it can be overseen to extricate old DNA from natural materials, such as original copies (Poulakakis et al. 2007) and cereal grains (Fernándezetal.2013), in an endeavor to distinguish the species and conceivable beginning. Of specific note is the recuperation of old DNA from natural fabric contained inside non-organic fabric such as rock instruments (Shanks et al. 2005; Shanks et al. 2004) and ceramics (Foley et al. 2012).

Due to the destitute conservation of natural fabric over time, archeologists are frequently confronted with an deficient picture as to how precisely old people connected with natural fabric that comprised a expansive portion of the world around them.

By identifying miniature natural remain in artifacts and natural tests, the field of archaeogenetics is progressively permitting for more educated investigation in the interaction between both human and fabric culture, and human and non-human species

Challenges in Using Archaeogenetics Research:

In spite of the fact that hereditary investigate has seen tremendous progresses over time, there are still numerous challenges analysts confront to arrange accurate source of data (Gilbert et al. 2005). The challenge is now not SO much in how extricate the information. but in how vou such huge sums of natural information are computationally taken care of (Flicek and Birney 2009; Li and Homer 2010;





Treangen and Salzberg 2011). In any case, issues of defilement are still -and likely will continuously stay -a concern, and legitimate convention to dodge defilement, both at afterward the unearthing and DNA sequencing stage, may be a step to the generation of solid information. This incorporates arrangement of the provenance of the test (Gilbert et al. 2005), the evasion of abundance dealing with of any archeological artifacts or natural remains, and the wearing of sterile gloves amid taking care of (Roberts and Ingham 2008). Appropriate provenance of an archeological example is especially vital, as more seasoned defilement from artifacts and remains uncovered decades or centuries earlier to examination may display comparable DNA harm designs as endogenous antiquated DNA. This more seasoned defilement can restrain aDNA screening methods rely that on analyzing specific harm designs in antiquated DNA in arrange to accurately differentiate between endogenous old DNA and present day defilement (Jobling and Hurles 2012). Fitting moral contemplations moreover got to be taken when working with tests from living human creatures, utilized within the investigate of past popular relocations; discussion and legitimate activity has occurred from inappropriate utilization of hereditary information is investigate for which the givers did not donate earlier assent (Reardon and TallBear 2012). CA NEWLINE CA Indeed, presently a requirement for archeologists is to familiarize themselves with genetic investigate, in arrange to be able to fundamentally evaluate which inquire about is up to standard, so that archeologists can make the choice as to when the annihilation of irrecoverable archeological fabric expended within the DNA extraction handle is approved.

Of concern the truth that genuine feedback has been leveled is at much earlier antiquated DNA inquire about (Gilbert et al. 2005). For example, Roberts and Inham (2008) famous critical issues within the quality of paleopathology papers, watching that out of distributed 65 old DNA papers between 1993 and 2006 that endeavored to distinguish antiquated pathogens, 45% of them failed to allude to whether an confined antiquated DNA research facility had been utilized within the inquire about, 90% did not talk about exhuming strategies of tests, and only 12% of papers detailed autonomous replication of their comes about as recommended by Cooper and Poinar (2000). Of note is the reality that not one detailed paper overseen to follow totally all defilement criteria. It is additionally vital that archeologists familiarize themselves with which fabric is reasonable for genetic extraction. Hereditary corruption could be a process, happening due to a number of natural variables such as temperature and stickiness (Smith et al. 2003), and DNA is additionally accepted to outlive way better in certain bones and remains than in others (Campos et al. 2012). CA_NEWLINE_CA In spite of the fact that test sizes required for testing are frequently little, DNA extraction still includes costs, both in terms of the physical harm done to archeological remains and the money related costs included in test extraction. For this reason, much research is right now being embraced to create criteria for which tests ought to be utilized in DNA extraction, researchers are presently able to recognize the tests which are still likely to contain hereditary fabric, in arrange to maintain a strategic distance from pointless squander. Educated archeologists, mindful of the employments and challenges of hereditary inquire about are needed presently more than ever, both in order to form the right choices as to which tests, if any, are practical for DNA extraction, which these tests are at that point utilized to particular archeological investigate questions. In arrange reply to be able to legitimately utilize hereditary inquire about, archaeologists must create a basic eye to the of distribution including hereditary investigate legitimacy any in an archeological setting (Gilbert et al. 2005), and whether they have adequately outlined their research try to appropriately control for outside contamination hazards.

Conclusion:

In conclusion, advance forecasts of expanding innovative capacity at a lower taken a toll, in conjunction with testing strategies, and novel unused applications for archaeo-genetic investigate in analyzing non-organic fabric. is likely to before long make hereditary inquire about an progressively fundamentally component of archeological investigate. We are entering an energizing as the total of genetic technology and large-scale, low-cost genetic sequencing is still to be fully uncovered.

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Plastic Pollution: Microbial Degradation Of Plastic Waste

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Plastics are robust, inexpensive, lightweight, long-lasting, and resistant to erosion. Researchers have documented a number of negative effects that plastic has on the environment and human health. In addition to the growing issue of improper trash disposal and landfilling, burning plastic releases dioxins and carbon dioxide, which contributes to pollution and global warming. The usage of efficient microorganisms intended for the biodegradation of biodegradable synthetic polymers is becoming more and more important as the commonly utilized methods for disposing of plastic waste proved to be ineffective in managing plastic trash. Because the biodegradable polymers can break down both organic and inorganic materials, including as lignin, bounce, cellulose, and hemicelluloses, they are made to break down quickly by bacteria.

Microbes like bacteria, fungus, and actinomycetes degrade both manufactured and organic polymers. Just 17 genera of bacteria and 9 genera of fungus are known to be capable of decomposing polyethylene at this time. Microbiological oxidation or hydrolysis of plastics utilizing microbial enzymes results in the metabolic process' chain cleavage of the big complex polymer releasing small molecular monomers. The microbial species associated with the materials that were found degrading were to include bacteria, fungus, actinomycetes species. and the saccharomonospora genus. A number of parameters, such as the presence of water, carbon temperature, redox potential, & energy supply, affect the microorganism's growth. Both of exoenzymes and endoenzymes produce microorganisms that adhere to the surface of the big molecular substrate and split into tiny pieces. A recent study found that a wide range of bacteria produce degrading enzymes. Microorganisms perceive polymers as an important source of organic compounds. Effective microorganisms intended for the biological degradation of refractory to synthetic polymers are becoming more and more important as conventional plastic disposal techniques like recycling, incineration, and landfilling have been shown to be insufficient for managing plastic waste.

Techniques Used For The Analysis Of Plastic Biodegradation

Monitoring the rate of CO_2 evolution, O_2 uptake, changes in the chemical and physical properties of the polymer, and the rate at which organisms proliferate can all be used to determine how biodegradable a polymer is. The following factors warrant the use of multiple tests when assessing plastic degradation.



Fig.1: A general illustration of plastic breakdown due to microbes

1. Additives, including plasticizers, may leak and cause weight loss.

2. If the polymer's low molecular weight component degrades without longer chains degrading, carbon dioxide generation may ensue.

3. The durability of plastic may be impacted by the removal of additive or very little modifications to its chemical composition. There are numerous methods for determining the kind and extent of deterioration.

According to research, CO2 gas is one of the main byproducts released when polythene biodegrades. In the smoke produced during the film extrusion of LDPE, which is the extrusion coating process, ketones, aldehydes, and carboxylic acids were detected. Utilizing polythene to be a carbon source,

Rhodococcus rubber (C208) generate proteins and polysaccharides.



Fig.2: Techniques for evaluation of plastic degradation

Conclusion:

Waste plastic biodegradation is a cutting-edge field of study that offers solutions to numerous environmental issues. The literature on bacteria utilized in the biological degradation of plastic trash is included in this review. The majority of plastic wastes are broken down by microbes. The research on the subject suggests that the following strategies could be used in biodegradation investigations of plastics in deposited soil in order to improve the biological degradation of plastic trash. We cannot meet our daily demands without plastic, that much is certain. However, due to its harmful effects, a competitive technique for secure disposal must be developed, and other materials such as blended and starch-based plastic must be investigated. Despite the abundance of reports showcasing the potential of microbes that break down plastic, none of them have been shown to have any real-world applications. For this reason, it is imperative to identify effective organisms and create technologies that can efficiently break down plastic without harming the environment.

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Smart Choices for a Greener Tomorrow: Exploring Bio-Based and Biodegradable Polymers in Smart Food Packaging

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Food packaging has a crucial function in modern food industry, since it contributes to preserve food products quality and guarantee food safety during its shelf-life. Traditional food packaging has four basic functions: protection and preservation, containment, communication and marketing, and convenience. Packages are used to protect the product from spoilage and damage brought about by environmental factors, such as microbes, insects, light, heat, oxygen, water vapor, smells, dirt, dust, etc. They can take different shapes and sizes to hold food products, with the aim of improving logistical efficiency. They communicate with the consumer by means of written texts (the ingredients list, nutritional facts, preparation instructions, etc.) and the brand logo.

For about five decades, plastic packages have been widely used by the food industry due to their advantageous characteristics. They are economical, functional, light and very versatile, since they can be rigid (bottles, jars, boxes, cases), thermoformed (food trays) or flexible (woven mesh, multilayer, films). Therefore, they have replaced other traditional materials such as glass, metals (aluminium, laminated, tinplate and steel), paper and cardboard, until representing recently 37% of food packaging materials. This massive use has caused serious environmental problems worldwide, because most of these materials derive from petroleum, are non-degradable and during their manufacturing and disposal they pollute the environment. The development of new eco-friendly packages along with innovative packaging concepts is changing the market. The use of biodegradable and renewable materials represents a great alternative to protect the environment and give economic value to underutilized products or industrial waste materials. In this sense, bioplastics have begun to gain prominence. According to the European Bioplastics Organization, they are defined as plastic materials that are either biobased (partly or entirely) or biodegradable, or feature both properties. "Biobased" means that the material or product is derived from biomass and "biodegradable" means that it can be biological degraded down to base substances such as water, carbon dioxide, methane, basic elements, and biomass by living organisms that are available in the environment. Thus, bioplastics can be classified into three main groups:

(i) biobased but non-biodegradable plastics such as bio-polyethylene (Bio-PE), bio-polyamide (Bio-PA), bio-polyethylene terephthalate (Bio-PET), bio-polytrimethylene terephthalate (Bio-PTT), bio-polyurethanes (Bio-PU), biopolypropylene (Bio-PP);

(ii) plastics that are biodegradable and based on fossil resources, such as poly butylene adipate-coterephthalate (PBAT), polybutylene succinate-co-butylene adipate (PBSA), polyvinyl alcohol (PVA), polyglycolic acid (PGA), polycaprolactone (PCL); and (iii) plastics that are both biobased and biodegradable. This last group include: polymers directly extracted from biomass such as polysaccharides (e.g., starch, cellulose, chitin, etc.) and proteins (e.g., collagen, gelatin, casein, whey, soy protein, zein, wheat gluten, etc.);

whose further modification can produce additional valuable biobased materials such as cellulose acetate, cellulose acetate butyrate, cellulose acetate propionate, cellulose nitrate, regenerated cellulose, carboxymethyl cellulose, lignocellulosic products, chitosan, etc.); polymers produced by chemical synthesis using renewable biobased monomers, such as polylactic acid (PLA), a biopolyester polymerized from lactic acid monomers produced by fermentation of carbohydrate feedstock; and polymers produced by microorganisms or genetically modified bacteria such as polyhydroxyalkonoates (PHA) like polyhydroxybutyrate (PHB) and polyhydroxyvalerate (PHV) and bacterial cellulose.

Smart Packaging Concepts

Smart packaging is a broad term that describes new packaging concepts, most of which can be classified in one of two main categories: active or intelligent packaging.

-An active package as the that modifies one the condition of packaged foods extend shelf-life to or safety improve its or sensorial properties, keeping its quality Sometimes this is achieved by the intrinsic properties of the polymer and others adding some specific additives in the packaging material or in the headspace in order to attain a better package yield. In this sense, the European Community regulation defines active materials and components as



Fig.1: Schematic diagram of active and intelligent packaging concept

those aimed at extending shelf-life or keeping or improving the condition of packaged foods, designed to deliberately incorporate components that release or absorb substances toward or from the packaged foods and the environment surrounding the foods (Framework Regulation on Food Contact Materials 1935/2004 and 450/2009, 2020). Although bioactive packaging can also be considered in this category, they have another purpose that is to provoke a direct and positive impact on consumers' health through the generation of healthier packaged foods. Active agents can be incorporated into the packaging material, coated on its surface, or also inside certain elements associated with the package, such as bags, labels, pads, bottle caps instead of being applied directly on foods, in order to meet the desired objective with lower concentrations, thus limiting undesired flavours and smells to foods.

These active compounds are added to release or absorb substances to/from the packaged food or its surrounding environment, or to make changes in food composition or organoleptic features, as long as these changes adjust to current regulations. These active agents may migrate (partially or completely) through gradual diffusion into the food or headspace, or act only when the food is in direct contact with the packaging. The nature of active agents can be diverse, including organic acids, enzymes, bacteriocins, fungicides, natural extracts, ions, ethanol, polyphenols, protein hydrolysates, etc.

Type of AP	Ingredients/Substances used	Application	Function
O2 absorbing	Powdered iron oxide, ascorbic acid, glucose oxidase-glucose	Dried fruits, potato chips, fruit tortes, nuts	Inhibit lipid oxidation, mould growth and discolouration
CO2 absorbing /emitting	Activated charcoal, iron powder-calcium hydroxide, ferrous carbonate-metal halide	Fruits, vegetables, ground coffee and cheese	Absorbs CO ₂ produced to prevent package swelling
Moisture absorbing	Silica gel, diatomaceous earth	Dry products, fruit and vegetables	Control moisture
Ethylene absorbing	Activated charcoal, silica gel, zeolite, Fuller's earth	Whole and MP fruits and vegetables	Control fruit & vegetable ripening
Antimicrobial releasing	Sorbates, benzoates, propionates, silver salts, ethanol, peroxide, sulfur dioxide	Fruits, vegetables dry apricots, bakery products and cheese	Inhibit microbial growth
Antioxidant releasing	BHA, BHT, TBHQ, ascorbic acid, tocopherol	Ready-to-eat dry cereals	Inhibit lipid oxidation

Fig.2: Types of Active Packaging

An intelligent package as the packaging system capable of carrying out intelligent functions, such as detecting, registering, locating, communicating and applying scientific logics, in order to ease decision-making, extend shelf-life, improve safety and quality, provide information and warn of possible problems. The European Community Framework Regulation (Framework Regulation on Food Contact Materials 1935/2004 and 450/2009, 2020) acknowledges them as those materials and objects that control the state of packaged foods or the environment surrounding them. These systems, which are attached as labels or incorporated or printed on the food packaging material, offer better possibilities to check product quality, track critical items and provide more detailed information during all the food supply chain (storage, transport, distribution and sale). They can also inform about product history such as storage conditions, composition of headspace, microbial growth, etc.

Intelligent packaging systems can be classified into three main categories: indicators, sensors and data carriers:

(i) Indicators. They supply immediate information (visual, qualitative, or semi-quantitative) about food through a colour (or colour intensity) change or by dye diffusion. They report a change in the product or its environment (for example, temperature, pH) through visual changes, such as time-temperature indicators (TTI), oxygen indicators, comfort indicators and freshness indicators.

(ii) Sensors. They are devices used to detect, locate, or quantify energy or matter, sending a detection signal or measurement of a physical or chemical property captured by the device. They can detect small molecules of pollutants, pathogens, allergens, or adulterants in food matrixes.

Sensors are more complex than indicators since they are formed by a receptor that transform the chemical or physical signal into energy, and a transducer that turns that energy into an analytic signal. Commonly, they are gas sensors (for example, for nut respiration products, microorganism metabolites, gases in the headspace of the container) or bio-sensors (used for example in the detection of pesticides in fruits and vegetables).

(iii) Data carriers. They are new devices that provide information or control the flow of products, particularly appropriate for big productions such as supply chains. Compared with indicators and sensors, they do not provide quantitative or qualitative information. They are used for identification, automation, traceability, anti-theft prevention or forgery protection. The most important devices in the packaging industry are radiofrequency identification (RFID) labels, bar codes and QR code (Quick Response).

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HIV Community Level Education And Prevention

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Forty years ago, on June 5, 1981, the Centers for Disease Control's Morbidity and Mortality Weekly Reported 5 cases of Pneumocystis pneumonia in gay men, that ushered the HIV/AIDS pandemic. Today we have about 75 million HIV infections and 32 million deaths. The AIDS epidemic is about 40 years old. It seems to be the humanity's greatest disaster also a success in scientific research at the same time to turn a immunosuppressive disease into a chronic infection where a potential virus may be tolerated by medication and the uniformity can be maintained .The research effort has been wide, but the results may vary. On the other hand, there is failure to eradicate the disease, the failure to produce a vaccine and the problems of social injustice persist around HIV. Many queries in HIV/AIDS research were resolved during the first two decades of its discovery, and the priorities of the field justifiably turned to the implementation of these advances. Many recent implementations have included a better understanding of the epidemic, better identification of infected persons, , education and wider use of preventive anti- HIV drugs in exposed uninfected persons, and maintenance of commitment to the countries in greatest need, especially in Africa.

HIV is still considered as a major health challenge and estimates show about 1.5 million new cases, 10.2 million untreated ones (out of 37.7 million), and 680,000 deaths related to AIDS 2020 worldwide (Acquired Immunodeficiency Syndrome).



Fig.1: HIV infection prevalence per 1000 uninfected population across various countries

In India, HIV testing, prevention, and treatment services are supported by the government. AIDS represents Acquired Immune Deficiency (AID)-induced clinical Syndrome (AIDS) that are characterized by Kaposi's sarcoma and Pneumocystis carinii pneumonia (PCP) which are associated with compromised innate immunity and decreased CD4 T lymphocyte count, and even a progressive failure of the immune system in AIDS patients that allows life-threatening infections and disease to propagate.

The HIV infections are the one that spreads from non-human primates to humans around the 1900s. HIV is a complex retrovirus of the lentivirus family. Retroviruses have the special characteristics that they carry their genetic material as single-stranded RNA (ssRNA) along with all the necessary elements that hijack the genetic machinery of a target cell that replicates by itself.

The major types of HIV infection include HIV-1 and HIV-2. Most HIV infections correspond to HIV-1 which is also represented as more pathogenic than HIV-2. If HIV-1's is left untreated the mortality rate is over 95%. HIV-1 is an enveloped retrovirus with two copies of an ssRNA genome, that enters the host through mucosal surfaces.

The predominant routes of HIV-1 transmission include sexual transmission, percutaneous, and through perinatal. About 90% of new HIV infections are ascribe to sexual transmission worldwide, with most infected population being women. People having HIV have increased rates of comorbidities which can raise the risk of severe COVID-19 disease if exposed to SARS-CoV-2. Tuberculosis (TB) remains a leading cause of morbidity and mortality among people living with HIV.

People who inject drugs have high risk for HIV virus. Antiretroviral therapy (ART) is a effective preventive method in which HIV patients are treated with a combination of drugs that target different steps of the HIV replication process. This method has proven as highly effective and being able to slow down the progress of the infection, but often comes along with various side effects and requires the patient's life-long adherence to the therapy to avoid mutations against drug resistance of the virus. It is observed that HIV / AIDS can only be suppressed, not relieved permanently.

There are five main classes of HIV-1 ARTs, which target different virus proteins: (i) nucleoside/ nucleotide reverse transcriptase inhibitors (NRTIs), (ii) non-nucleoside reverse transcriptase inhibitor (NNRTIs), (iii) protease inhibitors (PIs), (iv) integrase inhibitors (INIs or INSTIs) and (v) entryinhibitors.

Combination of ART is the current standard for HIV treatment. When used daily, ART effectively controls HIV progression and prevents the development of AIDS. In 2019, approximately 26 million people had access to antiretroviral therapy, representing 68% of all infected people.

The shock-and-kill is another treatment procedure that aims to eliminate the reservoir through repeated trials with several latencing reversing agents (LRAs) that showed induction of viral RNA production in patients. Broadly neutralizing antibodies (bNAbs)- based vaccines naturally produce bNAbs 2 - 4 years post-infection . HIV bNAbs, these are the antibodies that effectively neutralize commonly circulating HIV subtypes by binding to highly conserved regions of the virus .CCR5-delta 32 homozygous stem cell transplantation is a milestone for HIV-infected individuals treatment.

The application of CRISPR-Cas editing to target and inactivate integrated viral genomes has shown positive results in several in vitro preclinical studies. Mostly direct gene therapy approach is to inactivate or eradicate the integrated provirus DNA from the host genome. HIV infection can cause changes having the possibilities of developing specific symptoms from the acute to advanced stage of AIDS.

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Genomics Of Foodborne Pathogens For Microbial Food Safety

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Whole genome sequencing (WGS) has been broadly used for detailed characterization of foodborne pathogens. These genomes includes diverse species such as Salmonella, Escherichia coli, Listeria, Campylobacter, etc. that provides great insight into the genetic make-up of these pathogens. Various government agencies, industry and academies have developed new strategies in food safety using WGS approaches that involves outbreak in detecting and characterizing, source tracking, determination of major cause of a contamination event, profiling of virulence and pathogenicity attributes, antimicrobial resistance monitoring, quality assurance for microbiology testing's are some of these strategies. Power of combining geospatial information on pathogen strains with genomic information for the attribution of particular genotypes during outbreaks and other contamination events with global economies and the daily import and export of foodstuffs, traditional tracebacks may take weeks to accomplish and contaminated foods may remain on the shelves for consumers to purchase, for this a large recalls of uncontaminated food may be used in order to prevent illnesses.

Current and the future WGS-based approaches for food safety: short-read and long-read technologies and the ever-increasing portability of WGS instrumentation and new detection methods are advanced, larger bulkier equipment with lasers and cameras are being shrunk or replaced creating small mobile sequencing devices. FDA is one of the major organization plays a crucial role in testing and evaluating mobile devices for future use in the field with the goal of getting critical decision based on WGS data into the hands of specialist so that actionable decisions can be made onsite. A recent outbreak in the strain of Salmonella isolated from tuna, carried a novel genetic island that contains a unique arsenic resistance operon. This can highlights the evolutionary capability where the selective advantages were conferred for survival, persistence and even growth within food matrices and in the environment. Long read technologies allows researchers to understand all of the genes and their order in the organisms. Many other genes that shows resistant to heavy metals and other chemicals are likely present in foodborne pathogens. Pathogens are now becoming more tolerant or more resistance to quaternary ammonium chloride compounds, biocides, chlorine, heavy metals, antibiotic drugs, heat, salts, and acid. Through the integration of long-read sequence data and transcriptomic data, we were able to identify genes and genomic cassettes capable of granting adaptive advantages to foodborne and environmental pathogens. While WGS has advanced precision and speed of source tracking, a physically pure isolated culture is still required and thus the approach remains totally linked with time frames for pathogen recovery The quasi- metagenomics (qMGS) approach has been well characterized for detection of Listeria monocytogenes from contaminated ice cream and has been shown to reduce the time currently required for trace-back in half. WGS allows for large amounts of RNA-seq to be collected in the environment or in foods, and allows for numerous biological replicates to access.



Fig.1: Missing Sequence data leads to gaps in genome coverage and limits variant detection

A number of studies has addressed transcriptomes of foodborne pathogens that are inoculated onto the actual food products. Advancement of new RNA-seq methodologies, such as the application of dual RNA-seq, for accessing both host and pathogen transcriptomes simultaneously, and a combination of omics tools, such as metabolomics, meta transcriptomics, etc. to obtain a functional profile of a microbial community, will reveal the genetic interactions between foodborne pathogens and their food matrices, which can be used to develop better prevention strategies, and become novel methods for evaluating disinfection and biocontrol methods.

The intentional release of microbial hazards into the environment food supply and livestock poses significant threats to public health. Such actions might have the capacity to cause high mortality, and panic among the public. Whole genomic data might provides investigators to insight the likelihoods that becomes an outbreak is natural and can be deliberated by assisting in the determinations such as, signs of genetic manipulation, mutational impartiality, geographical pattern impartiality, antimicrobial resistance, and the genes needed to fabricate the unusual presence of toxin.



Fig.2: sequencing for improving food safety

A global view for WGS in food safety microbiology

FDA is works with numerous organizations such as the World Health Organization, Food and Agriculture Organization,. Pan American Health Organization and Global Microbial Identifier meet and develop guidance documents aimed at the implementation of WGS for foodborne disease surveillance within developing and middle-income countries for Food safety Management. The major goal of FDA is to build an inter-connected database of microbial genomes that serves as a resource to improve the response and prevention of foodborne diseases, by characterizing drug susceptibility, to address antimicrobial resistance, and involves in the identification and response of emerging pathogens.

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From Neurobiology To Therapeutics: Navigating The Landscape Of Alzheimer's Disease

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Alzheimer's disease is a neurological condition that adversely affects the brain which results in the death of brain cells, causing a decline in thinking skills and memory of affected individuals. According to the National Centre for Health Statistics Alzheimer's dementia ranked fifth from 2002 to 2018 and fourth in 2019 to 2020 and fifth in 2021 for women & was seventh dementia from 2016 to 2019, The eighth in 2020 and ninth in 2021 for men. Alzheimer's cognitive is a progressive condition, in which the symptoms got worsen overtime.



Fig.1: Alzheimer disease and its pathogenesis

The key symptoms of Alzheimer's Disease include: memory loss, cognitive deficits, recognition problems, personality or behavior changes. The stages of Alzheimer's disease ranges from mild to serve. The scale ranges from state of mild impairment to moderate impairment before eventually reaching serve cognitive decline.

The development of novel and efficient therapeutic agents is o challenge, because of difficulties in performing clinical trials to study the effects of drugs on cognitive progression, since clinical benefits must be demonstrated in terms of cognitive performance. New and effective therapeutic agents that are under development include beta-site amyloid precursor protein cleaving enzyme I(BACE-I), glycogen synthase kinase type 3 (GSK-3ß). monoamine oxidase inhibitors (MAOs) phosphodiesterases, and the human monoclonal anti-amyloid antibody.

Current Strategies to Improve the Treatment of Alzheimer's Disease

The nose to brain delivery route is a useful and non-invasive pathway for the direct delivery of drugs info The brain which make if more effective. The nasal cavity and the CNS are connected together anatomically by the olfactory nerve of the olfactory region, which enables the director delivery of drugs to the brain. The olfactory region is considerably the most important region for nose-to- brain delivery that involves the mechanism of paracellular diffusion and intracellular absorption into the neurons of olfactory region. Olfactory nerve pathway and Trigeminal nerve Pathway are the routes of direct delivery from nose-to-brain. The indirect drug transport occurs in the respiratory region and includes a counter-current exchange of drugs in the bloodstream that may deliver high concentrations to the BBBs.

The nano-emulsions and nano-structured lipid carriers (NLC) has been a promising strategy to improve AD treatment. NLC offers various advantages over other nano-systems, as these nano-systems involves biocompatible and biodegradable components. such as physiological lipids and other GARS excipients. Nano-emulsions has been used for drugs transport and has been great relevance in targeted and controlled drug delivery. There are two types of lipid nanoparticles, which are the solid lipid nanoparticles (SLN) that contain particles with a lipid matrix composed of a single solid lipid that has a highly organized inner structure, and the NLC that has a disorganized inner lipid matrix formed by a mixture of solid and liquid lipids. The disarrangement in the lipid matrix of the NLC caused by the liquid lipid allows a higher encapsulation efficiency and low expulsion of the encapsulated drug during storage.

Preclinical trials on SLN and NLC for nose-to-brain delivery reveals that Pioglitozone is often an antidiabetic drug with a potential use in AD treatment to treat multiple targets. However, pioglitazone's failure in clinical trials has been associated with poor BBB penetration and peripheral adverse effects. According to the analysis of (ANOVA). the variance **R**2 values obtained for particle size (0.9807)and ZP (0.9890)showed that the design was adequate dependent for responses.



Fig.2: Direct and indirect pathways for drug delivery for alzheimers disease.



Fig.3: Structural differences between SLN and NLC

Antioxidants tests represents a higher antioxidative activity for memantine-loaded nano-emulsions then a placebonano-emulsions. In the extracellular-based transport route, intranasally administrated substance first crosses the junction between the olfactory neuron and olfactory bulb or intranasally administrated substances are transported along the terminal nerve. This route enables the direct and fastest way of administering the drugs into the brain. This route can facilitate rapid movement of drugs into the brain, within only a few minutes to 30 minutes to reach the olfactory epithelium. The intracellular transport-based route is a relatively slow process utilizing axonal transport, and takes hours for intranasally administration of substance to reach the olfactory bulb.

Although these systems have an advantage over traditional methods, as it is rapid, non-invasive and convenient method. It avoids drug degradation in the gastrointestinal (GI) tract, first-pass metabolism allowing enhanced bioavailability, rapid drug adsorption via highly vascularized mucosa and easy to administered. Some of the major limitations of nano-emulsion method are: the elimination of drug substances from nasal cavity due to mucosal clearance, nasal congestions may also arise due to allergic conditions, mechanical loss of dosage may occur due to improper administration techniques and one of the major limitations is that the mechanism of drug transport are still unclear.

Conclusion:

Nasal administration allows the direct delivery of drugs from nose to brain by avoiding crossing the Blood Brain Barrier (BBB). Several strategies have been implemented to improve the absorption. Recent preclinical studies have shown that nano-emulsions and NLC, and Their respective in situ hydrogels, are highly promising approaches for improving the bioavailability of drugs used to treat AD in the brain using nasal administration. However, there is the lack of uniformity in understanding the factors that involves in the drug delivery system. The factors involve in formulations' characterization, particularly the nano-system's physicochemical properties. Thus, these lipid-based nano-systems plays on important role in the management of Alzheimer's disease for future aspects and improves the quality of life of patients.

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Weapons Of Early Rise Could Be Neanderthal Genes

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Circadian rhythm or body clock related link has been found between neanderthal and modern human genes. When the whole world struggles to escape the drowning sleep in the morning, descendants of neanderthal are completely awake and it's all thanks to their ancestors. In the journal Genome Biology and evolution, a new article published recently states that the reason some people are able to wake up early in the morning naturally could be due to genes they are carrying from around tens of thousands of years ago.

Early humans are supposed to be originated in Africa and later on they migrated to Eurasia. In Eurasia, neanderthals used to reside and they were completely adapted to the cold and dark weather. After arrival of early human in Eurasia, mating between them and neanderthals took place. To this day the ripple effects of their mating do exist. About 1.4 % of neanderthal DNA exist in modern human who are not from African origin.

28 circadian genes were identified containing variants with potential to alter splicing in archaic (CLOCK, PER2, RORB and RORC) and 16 circadian genes likely divergently regulated between present day humans (UL. Biobank) and archaic hominins, including RORA.

To simplify we can say that the ancestral protein was S-TIM which stands for short TIM and it used to get degraded by light. Then at the 5', there came the insertion of G nucleotide in Europe and thus a start codon was started which started producing long TIM that is L-TIM. This new L-TIM had short affine with cryptochromes which led to changes in photosensitivity



Fig.1: Human and archaic-specific fixed variants enriched in circadian regulatory, promoter, and gene regions.

Circadian regulatory, promoter, and gene areas are concentrated in fixed variations unique to humans and archaea. When compared to variations that are not fixed in circadian regulatory elements (Fisher's exact: OR = 1.25, P=8.39e-4) and gene regions (Fisher's exact: OR=1.84. P=7.06e-12) human-specific fixed variants are considerably enriched.

Similar enrichment is seen in promoters; however, Fisher's exact test yielded a larger P-value because to the small number of variations (OR = 121, P = 0.65). Similar to this, variations unique to archaic are enriched in gene areas (Fisher's exact. OR = 1.13, P=0.023) and circadian regulatory regions (Fisher's exact OR 116. P6.15e-5), and the promoters exhibit a similar pattern (Fisher's exact test: OR. 109. P 0.63). The counts of fixed variants observed in each type of element are indicated by the numbers in parenthesis. "In general, it seems that having a faster running clock leads people and other organisms to be earlier risers and have an easier time adapting to seasonal variation," says John Capra, an evolutionary and computational geneticist. In Africa there were shorter nights and longer days due to its tropical location but when early humans migrated to Eurasia, they faced longer nights and shorter days. Only the offsprings of neanderthal were able to accommodate themselves easily because of their neanderthal DNA.

When humans evolved in tropical Africa, the day lengths were on average 12 hours long. Maslin tells magazine Guardian. Hunter gatherers spend only 30 percent of their awake time collecting food, so 12 hours is loads of time. But the farther north you go, the shorter and shorter the days get in winter when food is particularly scarce, so it makes sense for Neanderthals and humans to start collecting food as soon as there is any light to work by. The DNA of modern human which was taken to compare with Neanderthal was of UK people from UK biobank. Compared to the region where AMH evolved before leaving Africa, the Eurasian settings where Neanderthals and Denisovans lived for several hundred thousand years are situated at higher latitudes with more variable photoperiods. By analyzing genetic variation that emerged independently in the archaic and AMH lineages following their split approximately 700 Ma, we were able to identify genetic diversity distinct to each lineage in the circadian genes, their promoters, and the distal regulatory elements that flank them. We discovered that in every class of functional region, variations particular to humans as well as archaic species are observed more frequently than predicted. This finding implies that pressure was placed on circadian-related variation in both groups even though they evolved independently over hundreds of thousands of years in different environments. We discovered a large number of archaic-specific variations that are probably going to affect circadian gene splicing by utilizing sequence-based machine learning techniques.

There are a few restrictions to take into account when evaluating our findings. Firstly, it is difficult to measure the complexity of traits with a significant behavioral component (such as chronotype) and to deduce the variation in those traits solely based on genomic information. However, we think that by concentrating on the molecular features (splicing and gene regulation) of genetic regions relevant to circadian biology, alongside GWAS-based correlations, we provide more evidence for the chronotype divergence between modern humans and archaic hominins. Secondly, we also observe that the variations in these genes tend to be linked to a range of symptoms since circadian rhythms are important to many biological systems. Therefore, it's also possible that selection affected characteristics unrelated to chronotype that were impacted by circadian variation.

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Nanorobotic In Orthodontics

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Nanorobots are theoretical microscopic devices measured on the scale of nanometer. They would work at the atomic, molecular and cellular levels of perform both the medical and industrial fields.

Nanotechnology in orthodontics involves the application of Nano scale material and technique to enhance the diagnostic, treatment and overall oral health. Orthodontics robot allow painless Process of brightening rotating and vertical repositioning





and rapid tissue repair. Also it helps to align and straighten uneven size of teeth and increase their durability. Nano robot synthesize teeth and manipulate tissue. In this article the orthodontics research is examined with different fields robotic dental assessment. YOMI is the first and only FDA cleared robotic system for dental surgery. YOMI, this system consists of robotic arm which is guided by the clinician all time a tracking arm that connect to the patient, this device helps dentist place implants with a high degree of precision safety and efficiency.

Current approaches of orthodontics

Orthodontics manually bend the wire to achieve proper positioning of teeth using a robot with accurate posture control capabilities . This can increase the safety and efficiency of the archive bending. Some techniques/robots include: Moto man UP6 robots-which optimizes the bending properties and progress. LAMBDA system-bend only order bend in the XY plane.

Nano robots are helpful in dental implants as well as maxillofacial surgery for accelerating healing and promoting osseointegration. The system includes surgical robots with optical surgery navigation system for grinding bone surface and planning orthogenic surgery where robotic surgical techniques are used.





Physical therapy aims to prevent movement dysfunction correct which commonly interferes with eating talking and chewing individual with TMD., With use of robotics less therapist attention is required to deliver the same therapy. Dentifrice mechanical serves multiple function in oral hygiene through variety of agents. Dentist use robots, toothpaste and mouthwash that can be used to



Fig.3: Nanorobotics in orthodontics

destroy pathogenic bacteria and plaque or elsewhere in oral cavity. These Nano devices can reach a place where brushing and flossing are difficult also they can be deactivated if swallowed

A humanoid full body patient simulation system was tested in 2018 to find out whether a robotic patient was more realistic for the student to familiarize with real patient especially for Risk Management. Another robotic educational equipment described in the literature is the Robotutor to demonstrate tooth cleaning technique to patient. Robotics system for forming feature in orthodontics aligner introduced in 2011. This robotic system comprises a control panel applied and controlled by the controlling system for 3D positioning of an aligner. A heating station controlled by selectively healing. A CPU running CAD software is part of control system allowing to create feature of an aligner.

A robot equipped with a skull to investigate the influence of head movement to the accuracy of 3D imaging was proposed Robotic Technology was successfully found to help in the management of younger children by helping them to go with dental anxiety and stress through the use of robotic Technology physiologically disfraction techniques.



Fig.4: Various Nanomaterials used in prosthodontic treatment

Conclusion:

In the field of orthodontics a new generation of data driven robotically assisted medicine process is developing. This hold great promise and have reached received lot of attention in the orthodontic field. Arch bending robot, robot for diagnosis and management have also been widely researched area in the last few year% On the other hand automatic alignment protection robot and patient robot in orthodontics need more scientific data before being used in the future

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3D Bioprinting: Printing Organs And Tissue For A Healthy Future

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Humans frequently experience tissue injury, organ / tissue failure and degeneration, but the body's capacity to regenerate itself is largely inadequate to handle this trauma. The conventional approaches to treating these illnesses rely on tissue or organ transplantation, which is contingent upon the availability of a donor, which can be difficult to come by and has a risk of immune response-related graft rejection. Successful organ transplant recipients also require continuous immunosuppression to prevent acute and chronic graft rejection, which is harmful to their health. Regenerative medicine and tissue engineering are two quickly developing fields that aim to address these problems. One of the most cutting-edge methods used in this field of tissue engineering is additive manufacturing. It integrates biological concepts with material science principles to create the foundation for organs and tissues. 3D bioprinting is an extended application of AM that entails layer-by-layer construction of a tissue or organ through a bottoms-up methodology. By depositing materials and cells in a certain way, 3D bioprinting seeks to replicate the original cellular architecture in some way, potentially restoring the proper structure and functionality of intricate tissues. The principle of bioprinting is based on biopolymers and stem cells, which are primarily employed as bioinks (much like ink for any printer) and put into the 3D printer, are the foundation of the bioprinting concept. The 3D printer then prints a 3D organ (the printer's output) using the ink. Real organs and 3D organs are essentially the same. These 3D-printed organs can be utilized for clinical trials of novel medications in vitro or in vivo as organ transplants. Biomaterials, sometimes referred to as bioinks and found in both natural and synthetic forms, are the fundamental building blocks of bioprinting. As long as bioinks and biological systems meet, any human tissue or organ can be expanded, replaced, or restored at any point in time. 3D bioprinting has ushered in a new age in bioengineering and the biomedical sciences by creating autologous organs and tissues tailored to each patient. It has been discovered that 3D bioprinting, a quickly developing technology, has numerous uses in tissue engineering, regenerative medicine, and disease research. The world's organ shortage as well as the increasing resistance to evaluating cell patterning for the creation of novel tissues and the development of better disease models may be addressed by 3D bioprinting. Its unparalleled capacity to deposit layers upon layers of various biomaterials, stem cells, and biomolecules in a precisely controlled spatial distribution. Using a computer-aided design (CAD) model of the structure, bioprinting is a quick prototype method for creating complicated organ and tissue architectures by directly writing living cells and biomatters layer by layer. By using this approach, 3D products with exact placement and architectural control (such as shape, pore geometry, interconnectivity, etc.) may be produced, allowing for the creation of highly reproducible and repeatable tissue/organ models that closely resemble the human body.

The bioprinting approach is a fantastic manufacturing procedure and a potent tool in tissue engineering and regenerative medicine for the production of complicated multiscale structures because of its excellent advantage in accurate cell positioning and patterning capacity. One way to mimic the structural and metabolic complexity of living tissue/organs is to co-print several cell types made of different materials adjacent to one other on a specific location.

One of the best examples of a 3D bio printed organ is a lung model that was made by a research team at POSTECH. The model was made using four human alveolar cells, and it was able to mimic the structure of hollow grapes. The alveolar membrane, which is a carrier of oxygen and carbon dioxide, was made of three layers that were each only 10 micrometres thick.

3D Bioprinting Strategies

In the process of bioprinting, a complex tissue or organ is created layer by layer using three sets of steps: Figure 2.

Pre-processing: It basically entails imaging the tissue/organ structure with X-ray, computed tomography, or magnetic resonance imaging methods. Following imaging, CAD software is





used to create a 3D blueprint and segmental 2D pictures are created by tomographic reconstruction for layer-by-layer production. The 3D model is then sent to the printer to be printed after being

translated to Standard Triangle Language (STL) format. Processing: During the processing phase, patient primary cells are harvested, cultured, and expanded ex vivo to create bio-ink. Afterwards, a bio printer is used to produce the 3D structure. Post-processing: During post-processing, the printed structure is cultivated in a bioreactor for maturation. Subsequently, the printed organ is either implanted into the patient's body or used for drug/cosmetics testing, in vitro illness modelling, or both.





Fig.3: Application of 3D printing

Application

By creating in vitro models for drug testing on animals, 3D bioprinting can reduce the need for these drawnout and costly clinical trials, potentially saving pharmaceutical companies billions of dollars. By enabling patients to receive customized organs manufactured from their own cells and reducing the likelihood of organ rejection, bioprinting can save lives. The only thing patients need to do is wait for the printed organ or tissue.



Fig.4: Components of 3D printing

Challenges and recent advancements in bio printed organs and tissue

As stated in the recent research article a number of challenges remain to be overcome and more study is required in order to print complex tissue or organs for use in real life. Nonetheless, the integration of neuronal and vascular networks in 3D-printed structures presents the biggest obstacle. There are still several challenges that need to be addressed before it can be widely adopted in clinical settings. These challenges include the need for better bioinks, the development of vascularization techniques, and the ability to mimic the complex architecture of native tissues. Safety problems, such as the difficulty in studying the safety of 3D printing because it may incorporate stem-cell technology and the use of patient cells for replication. The high cost of the process. The stability and natural shape of the organs. Technical challenges, such as the need to develop new bioprinting techniques and materials and obtaining ethical approval from governments for human organ culture and proper utilization. Such as the main challenges of skin regeneration are poor vascularization, lack of hair follicles, and other skin supplements. Some researchers are concentrating on repairing skin appendages, such as hair follicles, sweat glands, and melanocytes

In addition, to replicate the natural skin niche, terminally differentiated cells must be collected and insulated before printing. Future developments in the field of skin tissue engineering will require the advancement of biodegradable films. Many patients suffer from end-stage kidney disease or organ failure in the modern era. As a result, kidney transplants are the most common organ transplanted worldwide. The adult human kidney is a multicellular, extremely complex organ with around 20 distinct cell types. A million nephrons or so make up each human kidney. Kidney printing was previously accomplished using robotic bio-fabrication of 3D functional living macro-tissues and spheroids building organ structures employing tissue as blocks. The intrinsic tissue micro-architecture must be replicated layer by layer, which takes longer due to its increased complexity and component count. Human pluripotent stem cells are currently being used to differentiate into kidney cells and other cell types, which subsequently self-organize into cellular aggregates that mimic the structure and function of human kidneys, in an effort to produce human kidney organoids. Compared to kidney organoids made by hand, the final nephron count could be considerably higher using an extrusion-based pluripotent stem cell bioprinting method. Scaling up the number of nephrons in the 3D-printed kidney, which serves as the functional unit for fluid purification, is still a difficulty. To increase the compatibility of printed tissues, future research will probably concentrate on printing more complex structures with extra traits and cell kinds, including blood vessel or nephron connections.

Conclusion:

3D bioprinting is a promising technology for the future of tissue and organ transplantation. It has the potential to overcome the limitations of traditional transplantation methods, such as the shortage of donor organs and the risk of rejection. However, there are still some challenges that need to be addressed before 3D bioprinting can be widely used in clinical settings. These challenges include the need for more biocompatible and printable materials, the development of better techniques for printing complex tissues and organs, and the establishment of protocols for long-term storage and transportation of bio printed tissues and organs. It is expected that 3D bioprinting will go from structural resemblance to practical functionality. Complete organ regeneration will be made possible by advancements in 3D bioprinting and related technologies in the future, which has enormous potential for organ transplantation with few issues.

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EVENTS

From engaging workshops and insightful seminars to thrilling performances and community gatherings, there's something for everyone.











GENESIS - 2023

School of Biosciences, IMS Ghaziabad (University Courses Campus) organized **GENESIS-2023**, on the occasion of **NATIONAL SCIENCE DAY** an Inter-Institutional fest on February 24th, 2023. Since many years Genesis has evolved into a scientific platform where the young mind and budding researchers from different institutions of Delhi-NCR, are provided a platform for sharing and learning for novel ideas. "Challenges are gifts that force us to search for a new center of gravity. Don't fight them. Just find a new way to stand." — Oprah Winfrey

This year, keeping in mind the global trends, Genesis 2023 has been themed: Sustainable Development Goals (SDGs) for upholding the future of coming generations. The fest covered a wide range of topics that highlighted cuttingedge science and celebrated the latest advances in technology. While engaging students in open discussions on relevant issues affecting culture and society.



Dr. Arun Kumar Singh, Director of Institute and Head of Department Dr. Surabhi Johari welcomed all the dignitaries. The session was addressed by Prof.(Dr.) Suhel Parvez, Jamia Hamdard New Delhi, who was the chief guest along with Dr. Ganesh Bagler, Guest of Honor, Associate Professor, Infosys Center for Artificial Intelligence Indraprastha Institute of Information Technology Delhi and Mr. Pritesh Singh Bhatia, Associate Director, Jubilant Biosys Limited as guest of





The day was an opportunity for IMSians to celebrate the social, economic, cultural and political achievements of women in overall globe. Dr. Shashi Singh, CEO, Consortium of women entrepreneurs of India, Ms. Ruchi Ratna, AGM, NTPC, Ms. Viashavi Sinha Bhasin, MD, Soonya Farms, Ms. Gulesh Chauhan UBER, India were the guests on this occasion. Dr. Arun Kumar Singh, Director and Professor at IMS Ghaziabad University Courses

Campus welcomed them by giving them saplings and mementos.

Digital all: Innovation and Technology for Gender Equality

International women's day celebration



PHOENIX -2023 PRE INDUCTION PROGRAM



Guest of Honour :

- Captain Bhaskar Bhattacharya Ex MD, Vivanza Biosciences Ltd
- Mr. Sharad Verma Sales Director-India & South Asia, HOYA Surgical Optics
- Mr. Ajay Singh Head- Modern trade, Cipla Pvt. Ltd

School of Biosciences of IMS Ghaziabad (University Courses Campus) organized a Pre-Orientation program "Phoenix 2023" for new entrants, B.Sc. (H) Biotechnology (batch 2023-2026), B.Sc. (H) Microbiology (batch 2023 – 2026) and M.Sc. Biotechnology (batch 2023 – 2025) on 25th August, 2023 in the college Auditorium. The objective of the session provide was to our young biotechnologist and microbiologist a complete road map of their biosciences journey.



Poster Making Competition

Ozone Day Poster making competition



School of Biosciences. in association with IMS Greens Cell organized a Poster making competition 15th on September 2023 on the occasion of World Ozone Day The students across all the courses were invited to submit Poster on the topic "Fixing the **Ozone Layer and Reducing** Climate Change ". This theme emphasizes the pivotal role of the Montreal Protocol in not only protecting the ozone layer but also mitigating climate change.



The competition received entries from the students of different programs. Farhan BBA first year, Sneha Mittal B.Sc. (H) MB III year, Sakshi, BCA First year, B.Sc. (H) hold I, II, III winning positions respectively. Consolation prizes were received by and Vishakha and Tejas B.Sc.(H) MB II year.

RHYTHM 2023



Music club organised the event "RHYTHM 2023" which provided a platform for emerging vocal talents to showcase their musical prowess. The competition featured a diverse lineup of participants who brought a rich tapestry of musical styles, promising an engaging diverse and competition.

The judging criteria for the competition were meticulously designed to evaluate various facets of each performance. Overall, the event not only celebrated musical talent but also served as an educational forum, promoting growth, collaboration and cultural appreciation within the realm of vocal arts.





SYMPOSIUM

International Symposium-2023, on **27th November 2023** for the first time in Institute. This one-day International Symposium has evolved into a scientific platform where the young mind and budding researchers from different Institutions, organization of Delhi-NCR as well as International are provided a platform for sharing and learning for novel ideas, scientific information and innovative technologies in the form of oral and poster presentations.

This year, keeping in mind the global trends, Symposium 2023 has been themed: "Global global wellbeing" Science for for upholding the future of coming generations. fest wide The covered a range of topics that highlighted cutting-edge science, celebrate the latest advances in science and technology and engage the students in open discussions on relevant issues affecting culture and society.



POSTER PRESENTATION

event provided a platform for the budding bloggers, students to express their novel thoughts and ideas of science and technology in the form of poster presentation where they addressed the various ideas and challenges related to science and technology

ORAL PRESENTATION

A platform for the participants (Faculties/ Research scholars/ Company delegates) to discuss their research and innovation in the field of science & technology and their application.



The International Symposium was honored to have **Dr. S. K. Varshney**, Government of India, DST International as Symposium Chair along with **Dr. Ashwani Sharma** as Keynote speaker, Insight Biosolutions, France and **Dr. Ravi Kumar Chaudhary**, as Keynote speaker, Sanford Burham Prebys Medical Discovery Institute, California USA. Furthermore, the delegates explained the new trends in scientific technology and motivate the students regarding the carrier in science field. They told the importance to conduct these types of events which are helpful in growth & development of students.



"Simbhaoli Distillery Plant (Alcohol Industry)" Hapur

B.Sc.(H) Microbiology Ist year students on Thursday, 18th April, 2024. HOD, Prof. (Dr.) Surabhi Johari guided, a group of 30 students to grab this opportunity to learn the insight of the industry machinery and latest demanding technologies. The faculty member Dr. Swati Tyagi, School of Biosciences accompanied the students.



"Yakul Danone Private Limited," Sonipat

On 11th September 2023 for B.Sc.(H) Biotechnology II nd year (2022-2025) Dr. Umesh and Dr. Priyanka Srivastava, Assistant Professor, School of Biosciences accompanied the student during the visit.



"Amul Plant, Banas Dairy." IMT, Sector 68, Faridabad Haryana

B.Sc.(H) Biotechnology year Ist year students on Friday, 15th September,2023. A group of 45 students got an opportunity to learn the insight of the industry machinery and latest demanding technologies. The faculty members Dr. Rishi Kumar Singh and Dr. Sanghdeep Gautam of School of Biosciences department accompanied students.



"Haldiram Snacks Limited," HITC, Sector-65, Noida

on 28th and 29th August 2023, (Monday and Tuesday) for the students of B.Sc. Microbiology IIIrd Year students. The purpose of the visit was to provide students with real-world exposure to the food processing and manufacturing industry, as well as to familiarize them with the operations and management of one of India's leading snack and sweets companies, Haldirams.





"Yakult Danone India Pvt. Ltd." Food Park, Rai Industrial Area, HSIIDC, Sonipat, Haryana

The faculty members Dr. Tripti Singh and Dr. Meenakshi Raina of School of Biosciences department accompanied students. In this visit students were highly enthusiastic for listening the industrial experts. The presentation was delivered by company expert about Yakult and its manufacturing processes and about the biological processes encompassing the production of the YAKULT, a probiotic drink for a healthy lifestyle.

Coca Cola, Greater Noida

The industrial visit to Coca-Cola provided invaluable insights into the beverage manufacturing industry. Witnessing their state-ofthe-art facilities, commitment to quality, sustainability efforts, and innovative practices was an enriching experience. It enhanced our understanding of the complexities involved in large-scale production and the importance of responsible corporate practices.

The highlight of the visit was witnessing the automated bottling lines and high-tech machinery used for quality checks and packaging. The efficiency and precision of these processes were impressive.









Amazing Scientific Facts

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"Science is magic that works."





Human Body 'C Carbon Content Is Equivalent To Approx. 900 Pencils Human body is made up of several components like carbon, hydrogen, potassium, magnesium, oxygen, etc. According to research studies, the content of carbon inside a body is around 18.5% of mass, this implies on an average the amount of carbon inside a human is about 16kg2. Pencils are made out of only 0.02% carbon, therefore the amount of carbon in human body is enough for making around 888 pencils equivalent to 900 pencil considering slight changes in amount of carbon.

The earth's North Pole are of two types one is magnetic north pole and other is geographical north pole. The geographical pole is a fixed point on earth, where the earth's axis of rotation is present. The magnetic pole is the pole of earth where the magnetic field of earth falls upon pointing vertically downward. The magnetic pole of earth is constantly on change due to constant changes in earth's core.





The longest living animal is the Greenland shark, also named Gury shark or Grey shark, it ranges from 2.4-7m in length and can grow up to 400-1400 kg. It can live for up to 400 years, popularly called 400 years giant monster



Earth Is Getting Slower

The rotational speed of earth is slowly decreasing. The main reason behind it is the tidal effects of moon. Every 100 year the earth is getting slower by 1.7 milliseconds, implying that the earth days centuries ago was only 21.9 hours long. This slow down is occurring because of moon's gravity, as the moon is slowly going away from the earth the speed is decreasing gradually. Although these changes are unnoticeable for humas, their effects will eventually show up after eons.

Human ear and nose bone part made up of cartilage is thought to grow, but the fact is it is totally false. The cartilage is usually thought to be ever-growing, but they actually stop growing after a particular age. As we age the cartilage and skin loose and gives perception of growth s it because of gravity the skin began to drop. So next time you hear their nose tall, you the became know concept behind them.



Human Ear And Nose Grow With Age

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Questions!

Across

3.______is the study of the history of life on earth as based on fossils.

7. Albacore Is a type of_____.

11. A process which occur in a cardiovascular system and refers to the exchange of bicarbonate and Cl across the membrane of RBC?

13.Art of growing dwarfed trees in small pots a technique perfected by the Japanese Is_____.

14. A_____Is an exclusive rightsgranted for an Invention.

15.A unique organism used to production of bulk enzymes?

17. Which algae is used by astronauts in space as food supplements?

19._____is used to measure global solar radiation falling on a horizontal surface.

20. Chunks of rock, most of which are found between the orbits of Mars and Jupiter?

Down

1. Phenomenon which explains the hot water is higher freezing capacity than cold water?

2.A fear of decision is known as_____

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4. Are a series of organic molecule whose structural formula resembles human form

5.Name the type of camel that has two humps?

6. What Is the exact shape of earth?

8. Oldest known fossils representing the beginning of life on earth.

9. Proteins that contain an Inactive enzyme within the cell.

10. Most abundant organic material on the surface of the earth is_____.

12. Radioactive element most commonly detected in human is_____.

16._____cross database search system.

18. The process of an exicted ion decaying into a doubly charged ion by ejection of an electron is called______.

Answers

1. Mpemba Effect 2. Decidophobia 3. Paleontology 4. Nanoputians 5. Bactrian 6. Oblate Spheroid 7. Tuna 8. Cyanobacteria 9. Zymogens 10. Cellulose 11. Chloride Shift 12. Potassium-40 13. Bonsai 14. Patent 15. Aspergillus Niger 16. Entrez 17. Cholera 18. Auger 19. Pyranometer 20. Asteroids

