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Editors' Desk

Dear professional colleague, researcher, and student friends!

I hope your contributed information through this magazine will open a new platform for the awareness among the scientific community as well as common man to update the knowledge on the current topics of research interest.

Friends! The world is witnessing a paradigm shift in drug development and drug delivery research. More challenges are coming day by day to find a solution for new diseases, which we are facing after COVID-19. We must be ready and equipped with all such laboratory facilities and continuously involve with such research activities to get the outcomes to combat any such type of novel upcoming diseases

The editorial board is also thankful to all contributors for sparing their time in collecting the valuable information and sharing with us for releasing this issue. At the same time, we are expecting your support in the form of your contribution to release subsequent issues for the benefit of scientific community and public at large.

With good wishes and regard,

S. C. Dinda

(Editor-in-Chief)

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Green Tea and Its Potential Health Benefits: A Short Review

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Introduction

Green tea is a widely favoured beverage that is consumed extensively on a global level. The Camellia sinensis plant exhibits a wide array of tea variations, encompassing, yet not restricted to, green, black, and Oolong. Green tea's health benefits for humans have been shown via extensive research [1]. A large number of studies investigating the possible physiological benefits associated to polyphenolic chemicals contained in green tea were conducted between 2006 and 2021. The annual global production of tea leaves is approximately 2.5 million tons, with green tea accounting for approximately 20% of this total [2].

Several types of cancer, including those of the stomach, lungs, esophagus, colon, mammary glands, mouth, kidney, pancreas, and small intestine, have been linked to green tea's use, suggesting that it may reduce cancer risk [3]. Green tea, and to a lesser extent black and Oolong teas, have been shown in several epidemiological studies and clinical trials to reduce the risk of a variety of chronic diseases [4]. There is a wealth of evidence supporting the long-held belief that drinking green tea has health benefits [5,6]. Proteins constitute approximately 15-20% of the dry weight of the substance, with enzymes representing a substantial proportion. Amino acids, comprising 1-4% of the dry weight, include threonine, tryptophan, glycine, glutamic acid, serine, tyrosine, leucine, valine, theanine, lysine, aspartic acid, and arginine. The composition of the substance in question consists of approximately 5-7% water, dry weight (5% to 7%) carbohydrates like pectins, sucrose fructose, glucose, and cellulose, and 5-10% dry weight minerals and trace elements including magnesium, zinc, nickel, calcium, iron, manganese, molybdenum, selenium, phosphorus, sodium, chromium, cobalt, strontium, copper, potassium, aluminum, and fluorine. An assortment of additional chemical compounds, such as pigments (e.g., carotenoids, chlorophyll), xanthic bases (e.g., theophylline, caffeine), and volatile molecules (e.g., alcohols, aldehydes, esters, hydrocarbons, lactones), are also found in minimal amounts. Several studies were conducted to identify the minerals found in tea leaves and tea infusions [7], owing to the significance of these minerals. Methylxanthines, namely theobromine, caffeine, and theophylline, constitute approximately 3-4% of the average composition of fresh leaves [8]. Numerous contemporary scientific and medical investigations have provided evidence indicating that green tea possesses chemo-preventive properties, as well as exhibiting antibacterial, antiviral, antifungal, and antiproliferative effects [9].

Utilization green tea

Green tea as mouth wash

Herbal plant products from India's rich biodiversity have been shown to have substantial medical value. Green tea's antibacterial and antioxidant properties make it an appealing addition to regular

dental hygiene routines for the prevention of periodontal disease. Dental plaque has long been suspected as a crucial component in the development of gingivitis. Gingival disease may progress to periodontitis if left untreated. Without prompt treatment, periodontitis may spread and affect the rest of the gum and bone that support the teeth (the periodontium) [10]. Green tea's primary components include phosphoenol and flavonoids, especially catechins [11]. Epigallocatechin (EGC), Epicatechin (EC), Epigallocatechin Gallate (ECG), and Epigallocatechin Gallate (EGCG) are the most common catechins in green tea. The efficacy of mouthwashes in reducing plaque and gingival inflammation is comparable, given the synthetic nature, high cost, and significant side effects associated with commercially available mouth rinses, which limit their usage.

Green tea in obesity

Obesity and overweight have emerged as significant medical concerns in developed nations, posing a substantial threat to the well-being of a considerable portion of the population. Diseases including heart diseases, higher blood pressure, diabetes that is not controlled by insulin, breathing problems, joint pain, and several types of cancer are all made worse by obesity [12-14]. The catechins in tea, and especially EGCG, have been studied for their potential to combat obesity and diabetes. Interest in tea's potential effect on diabetes and obesity has increased recently. The tea catechins, particularly EGCG, had been observed to possess anti diabetic and anti-obesity properties [15]. Theoretical increases in thermogenesis and fat-burning have prompted many to recommend green tea as a helpful weight-loss herb [15, 16]. Interest in studying how drinking tea affects weight and blood sugar levels has increased. The consumption of tea, particularly catechins such as EGCG, has been observed to possess potential anti-obesity and antidiabetic properties [15].

Activity of green tea in breast cancer

Breast cancer refers to the uncontrolled growth of epithelial cells within the lining of the breast's ducts or lobules, resulting in a malignant condition. Among female cancers, breast cancer is by far the most common [17]. Recent studies have shown promising results for the health advantages of green tea, notably its anticancer qualities [18]. Animal studies had shown that some elements in green tea may help treat and even prevent breast cancer. There has been a lot of effort put into trying to figure out the underlying molecular and cellular pathways. Green tea has been shown to have anticarcinogenic properties in breast cancer research [19].

Activity of green tea in liver cancer

The liver is a crucial metabolic organ that produces and breaks down a broad range of physiologically vital chemicals, including proteins, lipids, and carbohydrates. Hepatocellular carcinoma (HCC), liver cirrhosis, and fatty liver are only few of the liver illnesses whose rates of incidence have been shown to rise over the last several decades. In terms of mortality rates, hepatocellular carcinoma (HCC) ranks 3rd globally and is the most prevalent primary hepatic malignancy [20]. Several studies have looked at whether or not drinking green tea might help lower the chances of getting liver disease. A lower risk of developing hepatitis, HCC, liver cirrhosis, fatty liver disease, and chronic sickness has been linked to green tea use. Consuming green tea was associated with a significant protection against liver disorders. Chronic

use of tea catechins may help reduce the risk of acquiring obesity- and diabetes-related type II complications, as well as cardiovascular disease [21].

Activity of green tea in skin

Green tea polyphenols may have photoprotective qualities, as demonstrated by in vivo and in vitro research performed on animals and people. Photoaging, melanoma, and nonmelanoma skin malignancies are all caused by prolonged exposure to the sun's UVB rays and these polyphenols may one day be employed as pharmacological agents to protect the skin from these diseases. However, more human clinical studies are required to confirm these results [22].

Activity of green tea as antioxidants

Thanks to its high antioxidant content, green tea has quickly become a trendy neutraceutical. Cell damage may be caused by reactive oxygen species (ROS) such peroxyl radicals, superoxide, singlet oxygen, peroxynitrite, and hydroxyl radicals, however antioxidants may prevent this. To put it simply, oxidative stress is the damage done to cells as a result of an imbalance between ROS and anti-oxidants [23]. Catechins exhibit potent antioxidant properties both in vivo and in vitro. Furthermore, the presence of specific vitamins and minerals in green tea serves to enhance its antioxidant capacity [24]. Catechins, found in green tea, have been demonstrated in in vivo studies to potentially boost total plasma anti-oxidant activity [25-26]. Oxidative stress arises from an imbalance between the levels of antioxidants and ROS, which subsequently leads to cellular damage [27]. Catechins, along with other anti-oxidant nutrients like vitamin C, vitamin E, and enzymes like catalase and superoxide dismutase, have been proposed as a potential defensive mechanism against these disorders [28].

Activity of green tea in hypertension

Green tea's antioxidative and vasodilatory properties have been the subject of a number of randomized controlled trials and observational research examining the tea's a long-lasting impact on blood pressure. Meta-analyses of observational data show a statistically significant inverse association between green tea consumption and the incidence of cardiovascular diseases such stroke, coronary artery disease, and myocardial infarction [29-31]. Obesity is a major risk factor in developing hypertensions, and it significantly worsens the cardio-vascular morbidity and mortality related to hypertension, as shown by several studies [32–34]. Observational studies on humans have shown a striking negative relationship between green tea intake and cardio-vascular illnesses. However, meta-analyses and systematic reviews of randomized controlled trials (RCTs) have shown inconsistent findings regarding the impact of green tea on blood pressure [35-37]. In many nations, tea is one of the most popular drinks, yet its popularity may range from very high to very low. Catechins and flavonols are two types of antioxidant polyphenols that may be found in high concentrations in green tea [38, 39]. Additionally, research has demonstrated that tea extract possesses vasodilator properties [40-42]. All of these factors contribute to green tea's beneficial effect on cardiovascular health [43-45]. Therefore, it is promising and needs additional exploration that green tea may have an effect on risk variables related with cardiovascular diseases, such as blood pressure.

Conclusion

Green tea is one of the most widely drank beverages worldwide. Green tea drinkers were shown to have reduced risks of obesity, hypertension, and breast cancer in one research. It also acts as a barrier to keep moisture in and harmful substances out of the skin. It is used as a mouthwash because of the antimicrobial and antioxidant benefits it provides. It's a free, naturally occurring resource that helps with those health problems up above, plus it saves money in the process. The advancement of more precise and responsive methodologies, coupled with the utilization of more representative models, alongside the identification of reliable predictive bio-markers, will contribute to a more comprehensive comprehension of the interactions between green tea and endogenous systems, as well as other exogenous factors. The facilitation of future research in the field can be achieved through developing bio-markers for the consumption of green tea.

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Substitution of Animals in Clinical Research and Development: An Approach towards Organ-on-a-chip Technology

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Animal testing has been a long-standing practice in drug research and development. However, there are many ethical concerns surrounding this practice, and there is growing evidence that animal models do not always accurately predict how drugs will behave in humans. Organ-on-a-chip technology is a promising new approach to accelerating drug discovery and development and could help reduce or even eliminate the need for animal testing.

Organ-on-a-chip (OOC) systems are modern technologies that mimic the structure and function of human organs. They can be used to study the effects and toxicity of drugs on individual organs as well as the interactions between different organs. OOC is a new and rapidly developing field in biomedical engineering. These devices are made of microfluidic chips, which are small, transparent, and flexible devices that contain networks of tiny channels. The channels are filled with a culture medium that allows cells to grow and interact with each other in a way that mimics the environment of a real organ.

Fig. 1: Traditional in vitro models vs. latest organ-on-a-chip (OOC) technology workflow

Many different types of OOCs have been developed to mimic different organs. Some of the most common types include:

Lung-on-a-chip: This type of OOC mimics the structure and function of the human lung. It can be used to study how the lung responds to different pollutants, allergens, and drugs.

Liver-on-a-chip: This type of OOC mimics the structure and function of the human liver. It can be used to study how the liver metabolizes drugs and toxins.

Kidney-on-a-chip: This type of OOC mimics the structure and function of the human kidney. It can be used to study how the kidney filters blood and removes toxins.

Heart-on-a-chip: This type of OOC mimics the structure and function of the human heart. It can be used to study how the heart pumps blood and responds to different stresses.

Intestine-on-a-chip: This type of OOC mimics the structure and function of the human intestine. It can be used to study how the intestine absorbs nutrients and breaks down food.

Here are some of the potential benefits of organ-on-a-chip technology:

- Increased accuracy and reliability of drug testing: OOCs can provide a more accurate and reliable way to test the safety and efficacy of new drugs than traditional animal models. This is because OOCs can more closely mimic the environment of a real organ, and they can be used to study the effects of drugs on individual cells and tissues.

- Improved understanding of disease mechanisms: OOCs can be used to study the mechanisms of disease in a more detailed and controlled way than is possible in animal models. This can help researchers develop new treatments and cures for diseases.

- Reduced reliance on animal testing: OOCs have the potential to reduce the reliance on animal testing in drug development and medical research. This is a major ethical and scientific advance, as animal testing can be cruel and unreliable.

But it still has some drawbacks. These include:

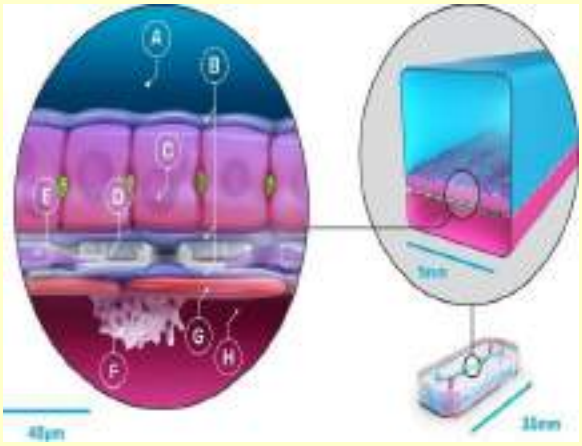

Fig. 2 Diagrammatic presentation of Liver-Chip: Primary human hepatocytes (C), extracellular matrix (B), porous membrane (D), upper parenchymal channel (A), human liver sinusoidal endothelial cells (G), Kupffer cells (F), stellate cells (E), lower vascular channel (H)

- **Surface effects:** The small size of the chips means that surface effects can dominate the volume effects and absorption data. This can lead to problems with the accuracy of the results.

- **Cell viability:** It can be difficult to maintain cell viability in the small, confined spaces of the chips. This can limit the length of time that experiments can be conducted.

- **Reproducibility:** The results of experiments on organ-on-a-chip devices can be difficult to reproduce. This is due to several factors, including the variability of the cells used and the difficulty of controlling the chip's environment.

- **Economical value:** The cost of developing and manufacturing organ-on-a-chip devices is still relatively high. This limits their availability to research institutions with large budgets.

Overall, organ-on-a-chip technology with computational methods has the potential to revolutionize modern drug research by providing a more accurate, cost-effective, and ethical way to study the effects of drugs. This could lead to significant improvements in the safety and efficacy of new drugs, and it could also help reduce the number of animals used in drug testing. However, there are still some challenges that need to be addressed before it can be widely used.

Keywords: Organ-on-a-chip (OOC), Biomedical Engineering, Research and Development

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TWIK-related Acid Sensitive K+ (TASK-1) Inhibition as a Potential Therapy for Atrial Fibrillation

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The most frequent sustained heart fibrillation is sinus arrhythmia. A fast but irregular heartbeat is known as atrial fibrillation (AF). There is an urgent need for innovative treatment methods because the efficacy of current pharmacological and interventional therapies against atrial fibrillation is still unsatisfactory. The potential for the production of cardiac arrhythmias is a significant drawback of the anti-AF medications on the market. New therapeutic option

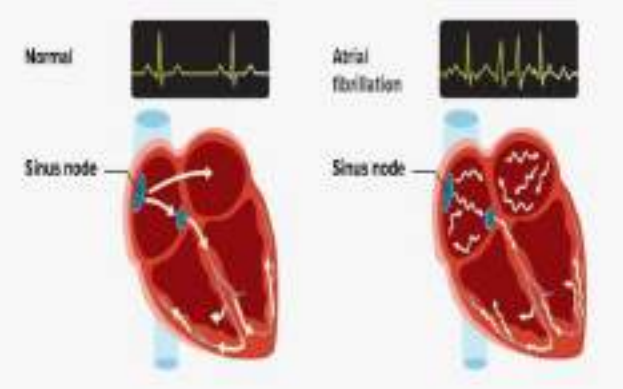

Fig 1: Atrial Fibrillation

To encourage re-entry and the continuation of the arrhythmia, increased atrial repolarizing K+ currents and shortening of refractoriness are two basic hallmarks of electrical restructuring linked with atrial fibrillation.The K2P channel family member K+ channel-related acid-sensitive K+ channel-1is expressed only in the atrium. In individuals with persistent atrial fibrillation, increased functional expression of atrial-selective [K(2P)3.1] encourages AP duration reduction. By atrial anti-TASK-1 genetic manipulation, TASK-1 expression and function in atrial tissue were inhibited,

enabling rhythm regulation. The KCNK3 gene's product, TASK-1, is a two-pore domain potassium channel (K2P), which is expressed in the kidneys, placenta, and lung. It controls the resting membrane potential and aids in artery relaxation. TASK-1 is a leak channel, in contrast to many other potassium channels, yet it is extremely sensitive to pH changes within the physiological range. Other physiological and pharmaceutical stimuli that affect TASK-1 include G proteins, lipids, activators including volatile anaesthetics, and inhibitors A1899 and ML365. Many of these stimuli's mechanisms of action are still not well understood. With a pseudo-tetrameric transmembrane domain and an extracellular cap domain that is shared by members of the K2P family, TASK-1 assembles as a homodimer.

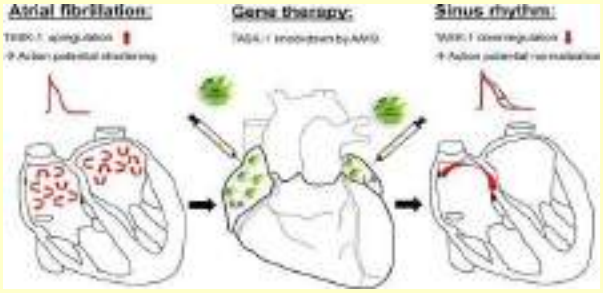

Fig 2: TASK-1on AF and Gene Therapy

Anti-TASK-1 altered the TASK-1, causing the APD to be prolonged and the TASK-1 ion flow to decrease. It has no ventricular side effects. Doxapram was shown to be a powerful anti-TASK-1. A common CNS method through which transmitters cause delayed excitation is inhibition of "leak" potassium (K+) channels. It is demonstrate that in hypoglossal motoneurons (HMs), TASK-1, a two pore domain K+ channel, offers a significant leak K+ current and a target for neurotransmitter regulation. In motoneurons, including HMs, TASK-1 mRNA is abundant. HMs produce a K+ current with pH- and voltage-dependent characteristics that are very similar to those of the cloned channel. Serotonin, norepinephrine, substance P, thyrotropin-releasing hormone and 3,5-dihydroxyphenylglycine, a group I metabotropic glutamate receptor agonist, all completely blocked this pH-sensitive K+ channel. In HEK 293 cells that coexpress TASK-1 and the TRH-R1 receptor, the neurotransmitter action was completely recreated and given the neuromodulatory mechanism extensive prevalence and patterns of expression.

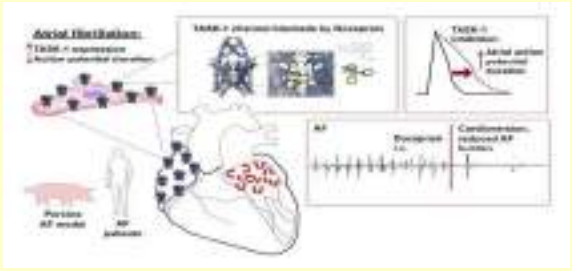

Fig 3: Effects of Doxapram (TASK-1 Blockers) on Heart

Benefits are anticipated for individuals with persistent atrial fibrillation that is characterized by elevated TASK-1 levels. Coronary discomfort and a fast or irregular pulse are the main adverse effects of Anti-TASK-1. Heartbeat regulation is achieved by selective atrial inhibition of TASK-1 K+ channels. Anti-TASK-1 therapy has the potential to enhance and individualize existing atrial fibrillation care.

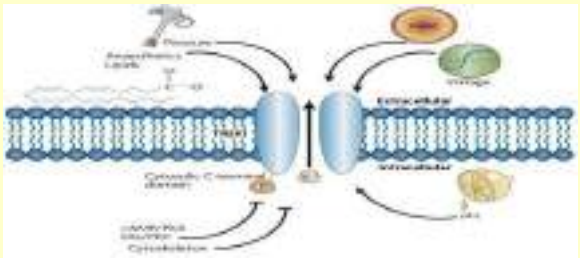

Fig 4: Regulation of TASK-1 by different Mechanism

Keywords: Atrial Fibrillation; TASK-1; Action Potential; K+ Channel, Therapy

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A Review on Microsponge: A New Approach of Novel Drug Delivery System

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INTRODUCTION

Microsponge system is the polymeric system which consists of porous microsphere. They are tiny sponge like spherical particles which consist of uncountable interconnecting voids within non- collapsible structure with a large surface. Through this surface area the drug is released in a specific targeted area in our body in a specific period of time. The microsponges size range is 5-300 micron in diameter and it's 25 squares are have typically 250000 pores and an internal spore structure is 10 feet in length which provide the total pore volume is about 1mg/g for intensive drug retention (1).

Since Microsponge are the reservoir type of system that also effectively deliver large number of substances like emollients, fragrances, anti-inflammatory as well as anti-microbial and anti-fungal etc. in a control rate (2).

ADVANTAGES OF MICROSPONGE AS TARGETED DRUG DELIVERY

i. Improve bioavailability of the drug substance.
ii. Improve the safety and efficacy of targeted drug delivery system.
iii. Drug can be applied in the specific target organ.

CHARACTERISTICS OF MICROSPONGE

a) Microsponges show good compatible with various vehicles and ingredients.
b) Microsponges are non-toxic, non-mutagenic, non-irritating and non-allergenic.

c) Microsponges have high entrapment efficiency.

APPLICATION OF MICROSPONGE

The various application of Microsponge is as follows

1. Topical drug delivery: The drug substance is entrapped in microsponge which is used in various dosage forms like powder, gel, cream for topical use.
2. Oral drug delivery: Now days the oral route of drug delivery of microsponge is improve. The oral route of this drug delivery is non-toxic, safe & easy to administration of the drug. Microsponge improves the solubilization rate of hydrophobic drugs which are administered in oral route. (3)
3. Bone and Tissue Engineering: When polymethyl methacrylate power and methyl methacrylate monomer solution mixed with the two-dispersion substance. Basic Fibroblast Grown Factor is added in the porous system which release the drug in prolonged manner to the sub-cutis of mouse that given angiogenic effect (4).
4. Long Lasting Colour Cosmetics: The colour substance which entrapped in microsponge is used in various colour cosmetics like lipstick to make them long lasting after one time use (5).

MICROSPONGE IN CONTROL DRUG DELIVERY SYSTEM

Microsponge is a modern approach of novel drug delivery system where the drug substance is entrapped in Microsponge and release the drug in controlled way. Microsponges deliver the drug in regular time interval and effectively respond to other stimulation during administration and release time. This system is effectively used in topical route to deliver the drug substance (6).

For this Control release, microsponges increase the stability of drug substance and reduce the side effects. So, we say, to the control administration of the drug, Microsponge is a great approach in modern era for controlled drug delivery and day by day its use is increase in modern medical field to improve the administration of the drug in our body (7).

LIST OF MARKETED PRODUCTS USING THE MICROSPONGE DRUG DELIVERY SYSTEM: (8)

Product Name	Content	Uses	Manufacturer
Retin-A-Micro	0.1% and 0.04% Tretinoin, methyl methacrylate glycol dimethacrylate, Aqueous gel base.	Improves skin discoloration because of aging and also improves skin smoothness, Reduces the skin wrinkles and lines.	Biomedic, Sathya
Dermalogica Oil Control Lotion	Niacinamide, Zinc gluconate, Yeast Extract, Caffeine, Biotin, Salicylic Acid, Exantis Chlorantha Bark Extract.	Reduces the oiliness nature in our skin(face).	John and Ginger Dermalogical Skin Care Product.
NeoBenz® Micro	Benzoyl peroxide, methyl methacrylate / glycol	Use as an anti-bacterial.	Intendis Inc. Morristown NJ07962 USA
Ultra Guard	Dimethicone	Use as Skin Protectants to reduce skin irritation, skin rashes etc.	Scott paper Company

DISCUSSION

There is various drug delivery system in modern medical science but Microsponge is a special type of porous system which deliver the drug sustain. In this delivery system the drug is entrapped in microsponge and reduce the side effect, maintain proper delivery of drug, improve stability,

spreadability etc. (9) Drugs which are entrapped in microsponge are effectively used as anti-acne, anti-inflammatory, anti-fungal, anti-bacterial etc. So, we overall say that microsponge is one of the important developing drug delivery systems in present time and its future aspects in very innovative and useful for common people for effectively drug delivery purpose. (10)

CONCLUSION

In this modern era, the medical and medicine science are invented & developed new creative ways to deliver the drug substance in small duration of time. They also evaluate that the new delivery system must have low adverse effect, enhance stability and spreadability etc. Microsponge is one of the modern drug delivery systems of this era which reduce side effect and increase stability or spreadability. Basically, In Microsponge, Drug substances are entrapped which sustainly release the drug in a specific period of time. This microsponge technology is used in the preparation of cosmetics, OTC skin-care products, prescription product etc. It is delivered the drug through topical, oral and bio-pharmaceutical drug delivery. This system shows non-toxic, non-mutagenic effect also. So, because of these properties, Microsponge have a rising field in the modern medicine delivering science.

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A Review on Pharmacological and Nutritional Profile of Krill Oil

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INTRODUCTION

Small crustaceans known as krill are present in the world's oceans but are most prevalent in the northern (Arctic) and southern (Antarctic) polar waters. They share a family with animals, including crabs, lobsters, and shrimp. More than 80 distinct krill species are recognized. The Antarctic krill, known scientifically as Euphausia superba, can be fished since it inhabits vast swarms and swims in open water. Krill move in massive swarms spanning six kilometers, containing up to one million individuals per cubic meter[1].Krills are pelagic, shrimp-like marine crustaceans that belong to the Malacostraca phylum. They are extremely small (about 1-2 cm or up to 6-15 cm), live in vast swarms, and eat phytoplanktons. Particularly in Antarctica, they can be found in big flocks[2]. According to reports, the Antarctic Ocean is home to the greatest krill biomass in the world, with an estimated 300 million metric tons[3].Euphausiasuperba, a species of krill, is used to make krill oil. It contains a new flavonoid that is similar to 6, 8-di-C-glucosyl luteolin and contains 40% phosphatidylcholine (PLs), 30% eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), astaxanthin, vitamins A and E, and other fatty acids. Choline, glycerophosphate, and the fatty acids EPA and DHA, which are metabolized to astaxanthin and a flavonoid similar to 6, 8-di-Cglucosyl luteolin, respectively, appear to be the main components of krill oil[4]. Krill oil has a high concentration of (n-3) fatty acids, similar to fish oils. Krill oil differs from fish oils in that a large portion of the (n-3) fatty acids are present as phospholipids rather than in the form of triacylglycerol or fatty acid ethyl esters (like those found in Omacor/Lovaza). Phospholipids are the fundamental components of human cell membranes and act as the "gatekeepers" of cells by maintaining healthy cell membranes. The relationship between phospholipids and long-chain (n-3) fatty acids may help fatty acid molecules pass through the intestinal wall more easily, increasing their bioavailability and ultimately enhancing the (n-3):(n-6) ratio [5]. The study and promotion of krill and krill oil for health benefits, including the management and treatment of conditions like hyperlipidemia, chronic inflammation, arthritis, and premenstrual syndrome (PMS) complications, have both increased noticeably in recent years[6,7]. The focus of the krill oil study has been on the amount and type of polyunsaturated fatty acids present, particularly eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). Eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), both parts of fatty acids in the omega-3 family, are necessary for metabolism. Traditional supplements for increasing omega-3 fatty acids in the human diet have included fish oil. According to reports, krill oil is far more efficient in delivering EPA and DHA; as a result, one may experience advantages similar to those of fish oil with much lower dosages[8].

EXTRACTION

The impact of pressure, temperature, and extraction time on krill oil was evaluated. Higher extraction pressure and temperature were found to yield the maximum oil. While the EPA and DHA content of the oil obtained through supercritical carbon

dioxide (SC-CO2) extraction was higher and was more stable, the acidity and peroxide value of the resulting krill oil was lower than that of the oil obtained through hexane. The krill oil extracted at 25 MPa and 45° had the highest astaxanthin production [9].

NUTRITIONAL PROFILE

A high-performance liquid chromatography-electro spray tandem mass spectrometry was used to clarify the phospholipids in krill oil [10]. The total number of phospholipids containing choline was 69, and the estimated concentration of phosphatidylcholine in the oil was 34 g/100 g. These findings support the existence of long-chained, highly unsaturated fatty acids and the complexity of the phospholipid composition of krill oil. Marine carotenoid pigments known as astaxanthin have strong antioxidant, anti-inflammatory, anti-tumour, anti-obesity, and insulin sensitivity potential. In insulin-resistant mice fed a high-fat, high-fructose diet, the mechanisms behind the insulin-sensitizing actions of astaxanthin were examined. Long-term astaxanthin administration has increased insulin sensitivity in obese mice by lowering oxidative stress, lipid buildup, proinflammatory cytokines, and activating post-receptor insulin signalling[11].

KRILL OIL COMPOSITION

On a weight-to-weight (w/w) ratio, krill oil contains roughly 25% more omega-3 fatty acids than fish oil [12]. About 40% of krill oil comprises phospholipids, primarily (phosphatidylcholine) PC [13]. It is thought that the binding of omega-3 fatty acids to the PC is a factor in the health advantages of krill oil. A minor quantity of astaxanthin, a fat-soluble carotenoid that serves as an antioxidant, is also present in krill oil[14]. Dark reddish-orange in hue, astaxanthin probably adds to the pinkish coloring of the local krill [15]. The astaxanthin pigments also help give commercial krill oil its dark red hue. Krill are incapable of synthesizing astaxanthin endogenously, much like all other animals. As a result, krill must consume astaxanthin in their diet. The initial source of astaxanthin has been identified as various types of algae. Astaxanthin levels in krill oil produced commercially are around 100 ppm w/w [16].

MECHANISM OF ACTION

Eicosanoids (prostaglandins, prostacyclins, leukotrienes, and thromboxanes) are produced as part of the inflammatory response, which is modulated by omega-3 fatty acids [17]. In the lipoxygenase metabolic pathway, omega-3 fatty acids face off against cyclooxygenase and arachidonic acid (an omega-6 fatty acid) [18]. Prostaglandin H2 (PGH2) is converted from arachidonic acid by PGH2 synthase [19]. PGH2 is then converted to thromboxane A2 via thromboxane synthase. Thromboxane A2 is a pro-inflammatory lipid; therefore, inflammation is reduced when omega-3 fatty acids displace arachidonic acid. Omega3 fatty acids have been referred to as anti-inflammatory compounds. However, a more appropriate description is that they are less inflammatory than arachidonic acid and other omega-6 and omega-9 fatty acids. When arachidonic acid is present, thromboxane A2 is produced. When omega-3 fatty acids are the predominant form, less inflammatory forms of leukotrienes and prostaglandins are produced [20].

BIOLOGICAL ACTIVITIES

Krill oil as Cardioprotective

Eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), long-chain

omega-3 polyunsaturated fatty acids, have been linked to a lower risk of cardiovascular disease in cohort studies and randomized clinical trials [21]. DHA and EPA are major constituents of krill oil. The metabolic and cardiovascular effects of EPA and DHA are well known and include lowering triglyceride and very low-density lipoprotein cholesterol levels when provided in sufficient dosages and reducing blood pressure [22,23].

Treatment of Premenstrual Syndrome (PMS)

Neptune Krill oil is more effective than fish oil for treating dysmenorrhea and emotional premenstrual symptoms. It can significantly lessen the physical and emotional symptoms of premenstrual syndrome. Long-chain omega-3 fatty acids and phospholipids work together to greatly ease the passage of fatty acid molecules through the intestinal wall, boosting their bioavailability and, eventually, enhancing the omega-3:omega-6 ratio [24]. Membrane fluidity, greatly influenced by phospholipid molecules, may actively contribute to controlling emotional symptoms. The results of this experiment suggest that Neptune Krill oil may have a favorable benefit to the risk profile for PMS [25].

Neuroprotective Properties of Krill Oil

Several medical authorities have long recommended the consumption of marine fish and general seafood as a long-term nutritional intervention to preserve mental health, hinder neurodegenerative processes, and sustain cognitive capacities in humans. It is well known that EPA and DHA play a role in fetal development. Since they provide fluidity for cell membranes and serve as precursors for signalling molecules. Omega-3 fatty acid supplementation increases and improves cognitive performance and may lower the chance of developing Alzheimer's disease, according to numerous human studies. Both fish and krill oil may help to keep working memory sharp and to oxygenate important brain regions. As a result, they could aid in preventing or delaying the onset of memory-related illnesses like Alzheimer's [26,27].

Arthritis and Inflammation

Krill oil supplementation prevents the development of experimental rheumatoid arthritis. Compared to a control diet without EPA and DHA supplements, krill oil consumption and a supplemented diet dramatically lowered the arthritis scores and hind paw swelling. In comparison to the control, the krill oil diet showed less synovial layer hyperplasia and inflammatory cell infiltration into the joint. Hyperplasia and the overall histology score decreased when both fish oil and krill oil were added to the animals' diets [28].

Renoprotective effect

The development of renal failure in rats has been linked to the common kidney abnormalities of nephrocalcinosis. Rats' renal health was assessed after consuming krill protein concentrate for 4 weeks, and the results were compared to casein. According to tissue analysis, rats fed the protein concentrate exhibited lower urinary n-acetyl glucosaminidase levels and less microtubular calcium deposition than rats fed casein. In rats administered krill protein concentrate instead of casein, there was a propensity for higher glomerular filtration rates, decreased proteinuria, and higher urine output. It is anticipated that krill protein concentrate will prevent early kidney damage and lessen the risk of nephrocalcinosis [29].

Cancer management

Krill oil is claimed to be efficient in inhibiting many types of cancer, viz., colon, breast, and skin. The effects of krill oil on human colon cancer cells SW480 was evaluated by (3-(4, 5-dimethylthiazol-2-yl)-5-(3- carboxymethoxyphenyl)-2-(4-sulfophenyl)-2Htetrazolium) MTT method[30]. Time-dependent inhibition of cell growth suggested the cancer prophylaxis potential of krill oil. The possible inhibitory effect of astaxanthin against inflammation-related mouse colon carcinogenesis and dextran sulfate sodium (DSS)-induced colitis was investigated in mice. At week 20, its use dramatically reduced the risk of colonic mucosal ulcers, dysplastic crypts, and colonic cancer. Astaxanthin-feeding suppressed the expression of inflammatory cytokines, including nuclear factor (NF)-kB, (TNF)-α, and interleukin (IL)-1β; it also inhibited proliferation and induced apoptosis in the colonic adenocarcinomas. When fed at a 200 ppm dose, it significantly inhibited the development of induced colitis. It also lowered the NF-kB protein expression and the inflammatory cytokines' mRNA expression, including IL-1β, IL-6, and cyclooxygenase (COX)-2[31].The results suggested that dietary astaxanthin suppresses colitis and its-related colon carcinogenesis partly by inhibiting the expression of inflammatory cytokines and proliferation.

CONCLUSION

Krill oil possesses various biological activities and has considerable potential to be utilized in several useful applications. However, many studies to search krill oil bioactivities do not provide detailed molecular mechanisms. It is hard to explain how exactly it exerts different activities. Therefore, future research should be directed towards understanding the molecular level details, which may provide insight into the unrevealed molecular level functions of the constituents of krill oil and help to accelerate the future applications of krill oil.

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A Review: Indole derivatives as Anti-microbial activities

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Introduction

Antimicrobial resistance is used as a definition of drug resistance, which occurs when microorganisms such as bacteria, viruses, fungi, and parasites withstand a drug that was intended to cure the infections. In recent years, the rise of drug-resistant microbial pathogens has become a major global concern, for that urgent need for the development of novel antimicrobial agents. Amongst them indole derivatives are the important class of compounds with significant antimicrobial potential.The structural features of indole derivatives, such as the presence of the indole ring, aromatic substituents, and various functional groups, contribute to their antimicrobial activity via multiple mechanisms. Moreover, indole derivatives have shown synergistic effects when combined with existing antibiotics, making them valuable candidates for combination therapy. Some derivatives inhibit the growth of microbial pathogens by targeting essential enzymes or interfering with vital metabolic pathways, while others disrupt cell membrane integrity or modulate membrane permeability. This review aims to provide a comprehensive overview of the current state of research on indole derivatives as antimicrobial agents.

Chemistry of Indole

Indole is an aromatic, heterocyclic, organic compound has the molecular formula C 8H 7N.

It has a bicyclic structure, consisting of a six-membered benzene ring fused to a five-membered pyrrole ring.
Indole is a colourless solid having a pleasant fragrance in highly dilute solutions. It melts at 52.5° C (126.5° F).

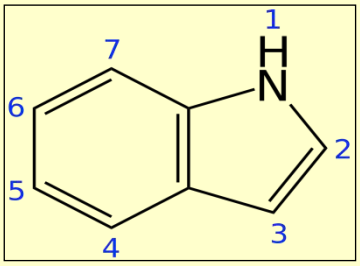

Fig 1: structure of Indole

Antimicrobial activity of Indole derivatives

Indoles are a class of heterocycles possessing diverse biological activities, such as anticancer, antibacterial, and antiviral. An indole derivative possesses strong antibacterial activity against the tested Gram-positive bacteria, including MRSA(methicilin-resistant staphylococcus aureus)and VRE(Vancomycin-resistant Enterococci). The biological assay showed that all the synthesized compounds showed good activity towards Gram Positive Staphylococcus aureus and inactive towards Bacillus megaterium.

Some Other Indole derivatives found to have Antimicrobial activity:-

Table 1: Name of some other Indole derivatives found to have Antimicrobial activity

SL. No	**Compound Name**
1	N-(4-fluorobenzyl)-N-(1-(1-methyl-1H- indole-2-carbonyl)piperidin-4-yl)methanesulfonamide
2	Methyl 4-((N-(1-(1-methyl-1H-indole-2-carbonyl)piperidin-4 yl)methylsulfonamido)methyl)benzoate
3	N-(1-(1-methyl-1H-indole-2-carbonyl)piperidin-4-yl)-N-(pyridin-3-ylmethyl)methanesulfonamide
4	N-((4-bromothiophen-3-yl)methyl)-N-(1-(1-methyl-1H-indole-2-carbonyl)piperidin-4-yl)methanesulfonamide
5	N-(1-1-methyl-1H-indole-2-carbonyl)piperidin-4-yl)-N-(pyridin-4-ylmethyl)methanesulfonamide

Antimicrobial activity of 1,3,4-oxadiazole as an Indole derivative

1,3,4-oxadiazole indole derivative which has been synthesized from 1 and 2 napthol, have been widely studied for their antimicrobial activity. These compounds contain promising antibacterial, antifungal, and antiparasitic properties. The antimicrobial activity of 1,3,4-oxadiazole indole derivatives can be attributed to their structural features and mode of action. 1,3,4-oxadiazole nucleus against Gram-positive and gram negative bacteria using ampicillin as the drug.
Several research studies showed that antimicrobial potential of 1,3,4-oxadiazole indole derivatives against various microorganisms, including both Gram-positive and Gram-negative bacteria, fungi, and parasites.

1,3,4-oxadiazole indole derivatives have shown significant antibacterial activity against both drug-resistant and susceptible strains of bacteria. They have been effective against organisms such as Staphylococcus aureus, Escherichia coli, and Salmonella species. These compounds inhibit bacterial growth by targeting essential cellular processes or enzymes, disrupting the integrity of the bacterial cell wall, or interfering with bacterial DNA replication.

Antifungal Activity

Indole derivatives have demonstrated potent antifungal activity against a range of pathogenic fungi, including Candida species and Aspergillus species. They can inhibit fungal growth and proliferation by disrupting the fungal cell membrane, interfering with fungal cell wall synthesis, or inhibiting key enzymes involved in fungal metabolic pathways.

Conclusions

The article has summarized the pharmacological activities of Indole derivatives and 1,3,4 oxadiazole as anti-microbial activities.
Various synthetic drug molecules contain an indole nucleus as a part of their structure and it helps in affixing drugs to the residues of the binding with targets site. There is a shortage of preclinical and clinical data of recently synthesized indole derivatives with anticipates diversified therapeutic action and strong antimicrobial adequacy. For this activities, indole has attracted the attention of researchers in the discovery of novel chemical entities. These chemical entities may be safer and effective drugs for various ailments. So it is proved that indole displays a diverse spectrum of antimicrobial activities.

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FRESH WATER SNAIL MUCUS; A POTENTIAL HEPATOPROTECTIVE AGENT

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Introduction

Snail mucus is a clear, slimy substance that is produced by snails. It is made up of a complex mixture of glycoproteins, peptides, and other compounds. Snail mucin is a popular ingredient in many skin care products. It is available in a variety of forms, including creams, lotions, serums, and masks. When choosing a snail mucin product, it is important to look for one that is high quality and made with pure snail mucin.

Figure:1 Shows the applications of snail mucins

Structural variation of Musin

Structural variation of Musin can occur in several ways, including:

- Deletions: This is the loss of a portion of the Musin gene. Deletions can range in size from small (a few nucleotides) to large (multiple exons).
- Duplications: This is the presence of an extra copy of a portion of the Musin gene. Duplications can also range in size from small to large.
- Inversions: This is a reversal of the order of nucleotides in a portion of the Musin gene.
- Translocations: This is the movement of a portion of the MUSIN gene to a different location in the genome.

Structural variation of Musin can have several effects on the gene's function. Deletions or duplications that affect the coding region of the gene can lead to the production of a truncated or non-functional protein. Inversions or translocations can disrupt the gene's regulatory regions, leading to changes in the level or timing of Musin expression.

The clinical consequences of structural variation of Musin vary depending on the size and location of the variant. Small deletions or duplications that do not affect the coding region of the gene may be asymptomatic. However, larger deletions or duplications, or variants that affect the gene's regulatory regions, can lead to a variety of disorders, including intellectual disability, autism spectrum disorder, and congenital heart defects.

The frequency of structural variation of Musin in the general population is not well known. However, some studies have found that deletions and duplications of the Musin gene are relatively common, occurring in about 1 in 1,000 people.

Table 1: Mollusca species whose mucin have been applied in various sectors for biomedical or biotechnology applications

Mollusca Species	Common Name	Applicable Sector	Uses
Helix aspersa 	Garden Snail	Cosmetics	Skin Care, Cancer Treatment, Topical Antibiotic
Archachatina marginata 	Banana Rasp Snail	Antimicrobial Pharmacology Wound Healing	Antibiotic, Drug delivery, Medication
Achatina fulica 	Kalutara Snail	Antimicrobial Pharmacology wound care	Antibiotic, Drug delivery, Medication
Arion subfuscus 	Dusky Arion	Medical Equipment	Surgical Glue
Helix pomatia 	Burgundy Snail	Personal care	Shampoo
Tikoconus costarricanus 	*T. costarricanus*	Biotech	Adhesion and Lubricant

Snail Mucus as Antimicrobial agent

Snail mucin has been shown to have antimicrobial properties against a variety of bacteria, including Staphylococcus aureus, Pseudomonas aeruginosa, and Escherichia coli. The antimicrobial activity of snail mucus is thought to be due to several factors, including:

- **Mucins:** Mucins are glycoproteins that are found in the mucus of many animals, including snails. Mucins have some properties that make them effective antimicrobial agents, including their ability to bind to bacteria and disrupt their cell walls.
- **Antimicrobial peptides:** Snail mucus also contains several antimicrobial peptides, which are short proteins that can kill bacteria.
- **Enzymes:** Snail mucus also contains a few enzymes, such as lysozyme, which can break down the cell walls of bacteria.

The antimicrobial activity of snail mucus has been shown in a number of in vitro studies, but there is limited evidence to support its use as an antimicrobial agent in humans. However, some studies have shown that snail mucus can be effective in treating skin infections, such as acne and eczema.

Here are some of the potential benefits of using snail mucin as an antimicrobial agent:

- It may be effective in treating a variety of skin infections, including acne and eczema.
- It may be less irritating to the skin than some traditional antibiotics.
- It may have other beneficial effects on the skin, such as improving wound healing and reducing inflammation.

However, it is important to note that there is still limited evidence to support the use of snail mucin as an antimicrobial agent.

Snail Musin as anti-tumor agent:

Snail mucin has been shown to have some potential as an anti-tumour agent in vitro and in animal studies. However, more research is needed to confirm these findings and to determine the optimal dosage and formulation for use in humans.

Here are some of the studies that have investigated the anti-tumor properties of snail mucin:

- A study published in the journal "Anticancer Research" in 2012 found that snail mucin was effective in inhibiting the growth of human breast cancer cells in vitro.
- A study published in the journal "Oncotarget" in 2016 found that snail mucin was effective in inhibiting the growth of human colon cancer cells in vitro.
- A study published in the journal "Cancer Letters" in 2017 found that snail mucin was effective in inhibiting the growth of human melanoma cells in vitro.

In addition to these studies, there have also been a number of animal studies that have shown that snail mucin can be effective in reducing the size of tumors. For example, one study found that snail mucin was

effective in reducing the size of tumors in mice with breast cancer.

Snail Musin as wound healing agent:

Snail mucin has been shown to have some potential as a wound healing agent in vitro and in animal studies. However, more research is needed to confirm these findings and to determine the optimal dosage and formulation for use in humans.
Here are some of the potential benefits of using snail mucin as a wound healing agent:

- It may reduce inflammation.
- It may form a protective film on the skin, which could help to prevent infection.
- It may be less irritating to the skin than some traditional wound healing treatments.

However, it is important to note that there is still limited evidence to support the use of snail mucin as a wound healing agent.

Here are some of the ways that snail mucin may help with wound healing:

- **It may help to reduce inflammation:**

Inflammation is a natural part of the wound healing process, but it can also slow down healing. Snail mucin contains compounds that have anti-inflammatory properties, which may help to reduce inflammation and speed up healing.

- **It may help to promote the growth of new skin cells:**

Snail mucin contains growth factors, which are proteins that help to stimulate the growth of new skin cells.

- **It may help to protect the wound from infection:**

Snail mucin contains antimicrobial properties, which can help to protect the wound from infection. This can help to prevent complications and speed up healing.

- **It may help to keep the wound moist:**

Keeping a wound moist is important for healing. Snail mucin is a humectant, which means that it attracts water to the skin. This can help to keep the wound moist and promote healing.

Conclusion

Snails are found in nearly everywhere in the world, and the difference in environmental changes around the whole world creates a define difference in the constituents of the specific mucin of the snails of a specific species. Snail mucin have different biochemical and biotechnological prospectus. There are still some questions left to identify the properties of the mucin of snail. This prospective demonstrates the high yield eventuality of snail mucins, and by exercising an adaptable relative omics channel, we can more understand these unique proteins, and their profitable natural and chemical Properties.

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Microbes in Human Welfare

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Introduction

Microorganisms or microbes are those unicellular or rarely multicellular organisms that cannot be seen in naked eyes. It is seen under microscope only. The term "Microbe" is derived from a Greek word "Bios" which means life. So, Microbes = Micro (Tiny) + Bios (Life) = Tiny lives.

Microbes may be disease causing (Pathogens) or non-pathogenic. Microbes are the most populated organism of the world. They are present in each and every corner of the world including air, water, on surface of an exposed or unexposed object and even in inside our body and body surface. Microbes plays a vital role in our life. We use microbes and microbial derived products in our daily life. They can live in both aerobic and anaerobic condition depending upon the characteristics of the microbe.

Fig: Rod shaped bacteria under microscope

Contribution of microbes in science

Though microbes have a number of negative effects causing many diseases (Pathogens) including tuberculosis, meningitis etc, there are also a large number of helpful microbes without which needs will remain unfulfilled. Starting from morning to night, we are using microbes or microbes derived products to meet various needs. Some of the daily life contributions of microbes are listed below:

- **Microbes in daily household**

1. Curd: Milk is converted to curd by adding a little amount of curd to it. This curd consists of bacteria called Lactobaccilus and Lactic acid bacteria (LAB), which is responsible for carrying out this reaction to convert curd from milk. LAB also increases the amount to vitamin B12, therby increasing the nutrient value of milk.

2. Cheese: Cheese is formed by partial degradation of of milk by certain bacterial reaction. For example, in case of Swiss cheese production by bacterium called Propionii Sharmanii results in formation of small holes due to production of Co2. Roquefort cheese is formed by ripening fungi called Penicillium roqueforti

3. Dough: These are prepared by fermenting particular microbes for particular production. Bread is the most common example of dough. Bread is prepared by fermenting the bacteria named Saccharomyces cerevisiae (Baker's yeast).

- **Microbes in Industry:**

1. Antibiotics: These are the group of medications that uses microorganisms for production to inhibit the growth or destroy microbes. Penicillin is the first antibiotic discover by Alexender Flemming by fermenting the bacteria named as Penicillium notatum.

2. Fermented beverages: Formation of various beverages is done by fermenting cereals and fruit juices in presence of Saccharomyces cerevisiae. Production of different type of alcoholic drink depends on the type of processing for preparation. For

example, Wine and beer are produced without distillation whereas brandy, rum and whisky is produced by distillation.

3. Enzyme production: Some of the important enzyme produced industrially by the action of some microorganisms. Lipase is produced by yeast by undergoing submerged fermentation. Streptokinase is produced by streptococcus.

4. Acid and alcohol production: Citric acid is produced industrially by the action of Aspergillus niger, Butyric acid is produced by the help of a bacterium known as Clostridium butylicum, production of lactic acid by Lactobacillus, acetic acid production of acetobacter aceti.

- **Microbe in sewage treatment:** Sewage is the waste water that is excreted out. Sewage treatment is done to avoid the mixture of contamination before it is being disposed to natural bodies. Heterotrophic microbes in digester of sewage treatment plant, anaerobically digest those microbes that produces harmful gasas like methane,carbon-di-oxide etc.

- **Production of biofertilizer:** Bacteria like rhizobium, azobacter helps to enrich the nutrient quality of the soil. Cyanobacteria also acts as biofertilizer by fixing atmospheric nitrogen and increasing soil fertility.
- **Production of biogas**

Conclusion

Over centuries, microbes being of the most vital part of our life, contributing towards science and society. The helpful microorganisms should be preserved properly for our welfare. Starting from homemade food to industrial products and uses of biofertilizer in-case of chemical uses which make it eco-friendly, all are contributions of microbes. Microbes are also responsible for preparations of medications like antibiotics, sewage treatment, biogas production that is used as a source of energy in rural areas. So, microbes are in diverse uses of human being, science and the society.

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Events Conducted

1. On 28th August,2023, Guest Lecture on **"Current Trend, Scope and Career Opportunities in Pharmacovigilance and Clinical Research".** Organized by School of Pharmacy, The Neotia University, in association with Institution Innovation Council, TNU, conducted at SB-III Seminar Hall (TNU). Two resource persons from Industry, Mr. Gurpreet Singh, Vice President, Freyr Solution, United Kingdom and Dr. Tarunjot Singh, Director, Stenos Health, Chandigarh India, Delivered their scientific lecture on relevant topics on Pharmacovigilance and clinical research.

2.On **5th September-2023**, the students of the School of Pharmacy, The Neotia University enthusiastically celebrated **Teachers' Day**. The ceremony honoured the committed faculty members of the department along with the Vice-Chancellor of The Neotia University Prof. Biswajit Ghosh, Registrar Dr. Manish and other staff members of the University. A compelling cultural presentation displaying the various talents of the Pharmacy department brought the event to a joyful conclusion. It was a day of thanks giving and fellowship that served as a reminder to every one of the crucial roles played by the teachers in forming the minds of the next generation. The students were appreciated by the dignitaries for their arrangements and involvements in making the program a grand success.

3. On **6-8th September, 2023**, School of Pharmacy, The Neotia University organized a **Three days skill development training program** for their 4th year B. Pharm students. The program was conducted by **Rubicon Skill Development Pvt. Ltd**., The expert trainers were Ms. Neha Agarwal from Rubicon, while training she focused on writing CV, self-introduction as well as on how to excel the interviews. Near about 85 students participated in the program.

4. On **21st September, 2023**, "**National Pharmacovigilance Week-2023**", on the theme "Boosting Public Confidence in Pharmacovigilance", was celebrated at the campus of School of Pharmacy, The Neotia University with different activities. The event was organized by School of Pharmacy, TNU in association with Institution's Innovation Council, TNU. The invited guests were Dr. Soumen Mukherjee, Dean, School of Health Sciences, TNU and Dr. Manish, The Registrar of TNU. The inaugural functions started with lightening the lamp and Ganesh Vandana. Prof. S. C. Dinda, Convenor-cum Dean, School of Pharmacy in his key note address emphasized on the implementation of Pharmacovigilance in the health care systems.

5. On **25th September-2023**, **School of Pharmacy**, The Neotia University in association with **Institution's Innovation Council, TNU** celebrated '**World Pharmacists Day-2023**'in its campus. The celebration started with an "**Educational Pharma Rally**" organized by School of Pharmacy in association with NCC and NSS wing of The Neotia University. Two distinguish guests Mr. Bimal Chandra Bhandari, the Senior Drug Inspector, Directorate of Drugs Control, Govt. of W. B., as Guest of Honor and Mr. Supreme Saha, Deputy Superintendent NM, Diamond Harbour Govt. Medical College & Hospital, as the Chief Speaker delivered talk on theme "Pharmacists Strengthening Health Systems". Venue: Udaysankar Multipurpose Hall, TNU.

6. A four days **Faculty Induction Program** was organized by School of Pharmacy, TNU in association with Institution Innovation Council, TNU from 7th to 12th February-2024. At the beginning Dr. Manish, the Registrar of the University inaugurated the program with an inspiring speech on importance of faculty induction program and pedagogy in teaching & learning process. Prof. S. C. Dinda, Dean of Faculty presented a plenary lecture on "Innovation Pedagogy for Effective Learning".In 2nd day Prof. Sankhadip Bose delivered a lecture on "Classroom Management &Situation Handling", and Dr.Somsubhra Ghosh delivered on "How to improve the teaching learning process". On the 3rd day Prof. Biswajit Ghosh, Vice Chancellor of the University interacted with the faculty members and presented a plenary lecture on "Imparting Upcoming Education: Challenges & Opportunities". On the 4th day Dr. Arghya Kusum Dhar presented on "Examination and Evaluation Pattern of the University" and Prof. S. C. Dinda presented on the topic "Outcome Based Education Vs Blooms Taxonomy" and how to practice in teaching and evaluation process.

7. On 5th March, 2024, School of Pharmacy, The Neotia University organized a Grooming program for their 3rdyear B. Pharm students. The program was conducted by SPJIMR, Mumbai, a renowned Management Institute of our country. Ms. Gurpreet Kaur & were present during the session. They focused on group discussion as well as on how to excel the interviews. Near about 33 students participated in the program.

8. On 6th March 2024, School of Pharmacy, The Neotia University in association with Institution Innovation's Council (TNU), Pharmacy Council of India, and "Indian Association of Pharmaceutical Scientists and Technologists", Kolkata, celebrated the birth anniversary of Prof. M. L. Schroff **"PHARMA ANVESHAN-2024"**, as per the directives of PCI & conducted a Nation Seminar. A MOU was signed, virtually, between Rubicon Life skills development & The Neotia University, on that day.

9. On **21st March-2024**, one Guest Lecture on " **INTELLECTUAL PROPERTY RIGHTS: CAREER IN IP**", being organized by School of Pharmacy, TNU in association with IIC, TNU and Indian Association of Pharmaceutical Scientists and Technologists, Kolkata at TNU to which Prof. Umesh V. Banakar from USA address the gathering. Near About 133 faculty members including students of TNU/NITMAS participated in the program.

10. On24thApril-2024,oneGuest Lecture on "**Expectations and Challenges: Sensitizing the Young Budding Professionals**", being organized by School of Pharmacy, The Neotia University, at 2nd floor Admin building, meeting room. **Mr. Saikat Biswas, General Manger & Global Head – Life Sciences & Medical Devices; Digital Operations, Wipro Ltd., Kolkata,** delivered his lecture to the B. Pharm students. There was an question –answer & interactive session at the end of this program. Near About 100 students & faculty members of TNU/NITMAS participated in the program.

11. On **17th May-2024**, one Guest Lecture on **"INTELLECTUAL PROPERTY RIGHTS IN INTERNATIONAL ARENA**", being organized by School of Pharmacy, TNU in association with IIC, TNU to which Prof. Umesh V. Banakar from USA address the gathering. Near About 30 faculty members including students of TNU participated in the program. A MOU was signed, between Goa-Center of excellence Intellectual Property(G-CEIP) in association with Goa College of Pharmacy(GCP)& The Neotia University, on that day.

Student's Achievement

1. B.Pharm**4th year** student **Nilesh Naskar** has been awarded the **Chancellor's Medal** for the overall Best Performance in the year of 2023.

2. B.Pharm**4th year** student **Nilesh Naskar** has been awarded **University Gold Medal** for securing first position in order of merit, under the programme of Bachelor of Pharmacy in the year of 2023.

3. B.Pharm**4th year** student **Nilesh Naskar** won **" BEST STUDENT AWARD 2023" from APP 2nd Indo-Brazilian International Conference 'CUWTPS-2023'** organized by APP Karnataka State Branch and APP Brazilian International Branch at School of Pharmaceutical Sciences, VISTAS, Pallavaram, Chennai, Tamilnadu in collaboration with APP Analytical Chemistry Division on 11th day of August 2023, in the commemoration of 'International Youth Day 2023'.

4. B.Pharm**4th year** student **Subhra Prasad Chakraborty** attended **GPAT examination** and secured **99 rank** among **whole India**.

5.B.Pharm**4th year** student **Subhra Prasad Chakraborty** attended **NIPER examination** and secured **38 rank among whole India.**

6. B.Pharm**4th year** student **Puspendu Singh** Attended **GPAT examination** and secured **7094 rank** among whole **India**.

7. B.Pharm**4th year** student **Pritam Kapat** Attended **GPAT examination** and secured **2118** rank among whole **India**.

8. B.Pharm**4th year** student **Sandipan Das** presented a poster and secured **THIRD POSITION** on the theme entitled **"ADVANCED THERAPEUTICS FOR LIFE-THREATENING AND CHRONIC DISEASES"** in the 1st NATIONAL CONFERENCE ORGANISED BY DEPARTMENT OF PHARMACEUTICAL TECHNOLOGY , JIS UNIVERSITY on 19-20 SEPTEMBER , 2023.

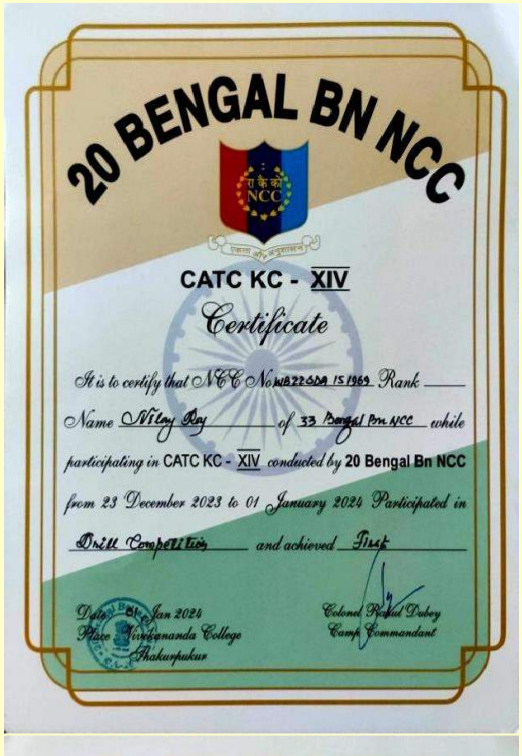
9. B.Pharm**4th year** student **Soumyarshi Mukhopadhyay** presented a poster and secured **THIRD POSITION** on the theme entitled **"ADVANCED THERAPEUTICS FOR LIFE-THREATENING AND CHRONIC DISEASES"** in the 1st NATIONAL CONFERENCE ORGANISED BY DEPARTMENT OF PHARMACEUTICAL TECHNOLOGY , JIS UNIVERSITY on 19-20 SEPTEMBER , 2023.

10. B.Pharm**3rd year** student **Soumyadip Halder** presented a poster and secured **FIRST Position** at the National Seminar with entitled theme **"Pharmaceutical Education & Research: An Industrial Perspective",** jointly organized by CIPT & AHS and APTI, West Bengal State Branch held on 08.03.24 – 09.03.24.

11. B.Pharm**3rd year** student **Santanu Jana** presented a poster and awarded **Best Poster Presentation** in the National Seminar on **"Role of Medicinal Plants to Ameliorate Diabetes and Related Disorders"** organized by SCHOOL OF NATURAL PRODUCT STUDIES, JADAVPUR UNIVERSITY, KOLKATA on 08.03.24 – 09.03.24.

12. B.Pharm**3rd year** student **Pushpendu Gharami** participated in **Drill Competition, Boyonet Drill Competition** and secured **First Position** in both competition conducted by **20Bengal Bn NCC** from 23/12/2023 – 01/01/2024.

13. B.Pharm**2nd year** student **Nilay Ray** participated in **Drill Competition** and secured **First Position** conducted by **20Bengal Bn NCC** from 23/12/2023 – 01/01/2024.


20 BENGAL BN NCC

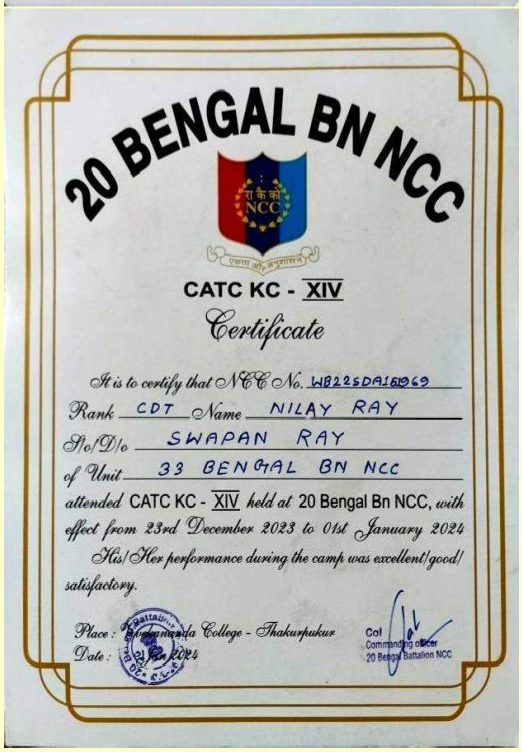
CATC KC - XIV

Certificate

It is to certify that NCC No WB22SDA 15 1969 Rank ____ Name Nilay Ray of 33 Bengal Bn NCC while participating in CATC KC - XIV conducted by 20 Bengal Bn NCC from 23 December 2023 to 01 January 2024 Participated in Drill Competition and achieved First

Date 1st Jan 2024
Place Vivekananda College Thakurpukur

Colonel Rahul Dubey
Camp Commandant


20 BENGAL BN NCC

CATC KC - XIV

Certificate

It is to certify that NCC No. WB22SDA16969
Rank CDT Name NILAY RAY
S/o/D/o SWAPAN RAY
of Unit 33 BENGAL BN NCC
attended CATC KC - XIV held at 20 Bengal Bn NCC, with effect from 23rd December 2023 to 01st January 2024
His/Her performance during the camp was excellent/good/satisfactory.

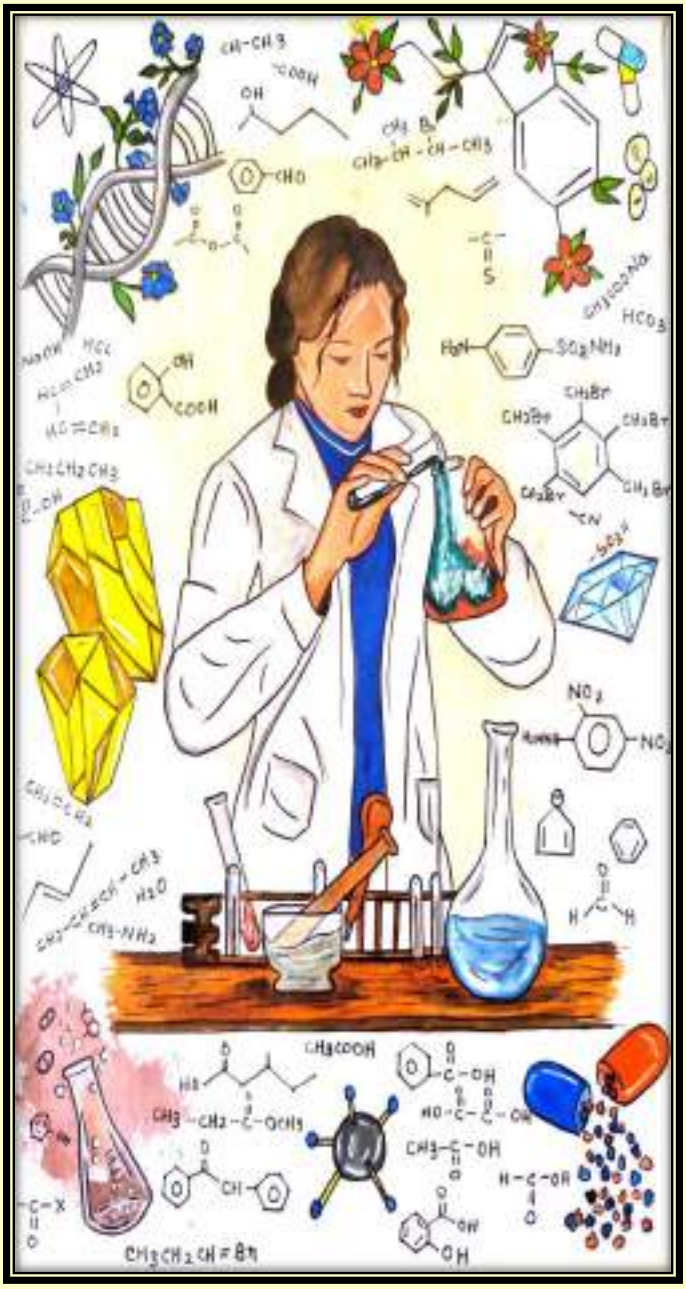
Place : Vivekananda College - Thakurpukur
Date : 2/1 Jan 2024

Col
Commanding Officer
20 Bengal Battalion NCC

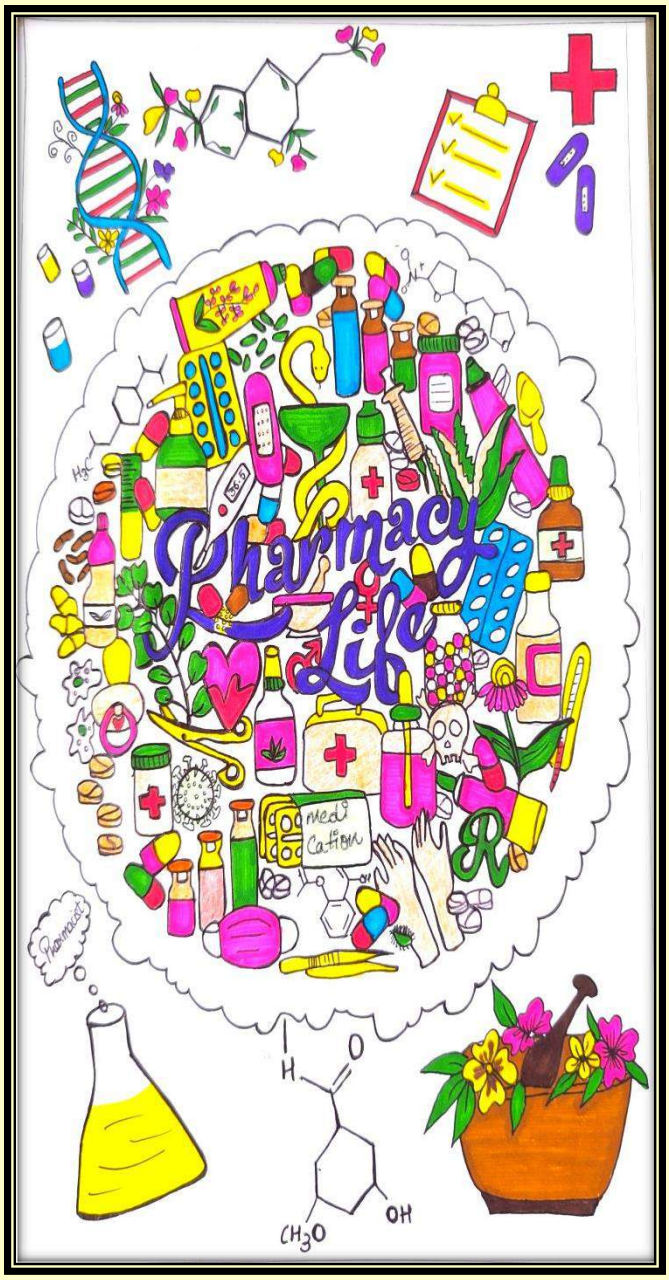
Sports Achievement

Sl No	Events	Student's Name	Position
1	Relay Race (Boys)	Soumin Mondal	2nd
2	400 meter race (Boys)	Jayanta Jana	1st
3	100 meter race (Boys)	Jayanta Jana	2nd
4	100x4 Relay race (Boys)	Jayanta Jana	2nd
5	100x4 mixed Relay race (Boys)	Jayanta Jana	2nd
6	200 meter race (Boys)	Jayanta Jana	2nd
7	Shot Put	Subhendu Manna	3rd
8	Discuss Throw	Subhendu Manna	3rd
9	Shot Put	Mamoleswar Gayen	2nd
10	Discuss Throw	Mamoleswar Gayen	1st

Paintings



Breti Sardar, 2nd Year



Anjali Mishra , 2nd Year

Placement News 2023

S.N	Name	Company
1	Shivam Mishra	Swift Life Sciences Pvt. Ltd.
2	Tanusree Maji	Swift Life Sciences Pvt. Ltd.
3	Ashirbani Sau	Swift Life Sciences Pvt. Ltd.
4	Alik Halder	Swift Life Sciences Pvt. Ltd.
5	Animesh Mondal	Alembik Pharmaceuticals Ltd.
6	Sudin Hazra	Alembik Pharmaceuticals Ltd.
7	Ankita Bairagi	Strassenburg Pharmaceuticals (P) Ltd.
8	Nilesh Naskar	Strassenburg Pharmaceuticals (P) Ltd.
9	SUSOBHAN MONDAL	Holly Cross Research Laboratories
10	DIBYENDU NASKAR	Aurio Pharma Laboratories Pvt.Ltd
11	ABHISHEK SINGHA	Aurio Pharma Laboratories Pvt.Ltd
12	KRISHNENDU MONDAL	Aurio Pharma Laboratories Pvt.Ltd
13	Sayan Singha	Aurio Pharma Laboratories Pvt.Ltd
14	ARUNANGSHU DAS	Macleods Pharmaceuticals Limited
15	RITTICK ROY	Macleods Pharmaceuticals Limited
16	KOUSIK PRAMANIK	Macleods Pharmaceuticals Limited
17	SAYAN MAJI	Macleods Pharmaceuticals Limited
18	TOUMIN KUMAR MONDAL	Macleods Pharmaceuticals Limited
19	SOUMAJIT SINHA	Macleods Pharmaceuticals Limited
20	ANJUSHREE PURKAIT	Macleods Pharmaceuticals Limited
21	SAKIL AHMED	Ashok Medicare
22	SK.SAQLIN AHMED	Fortis Hospital
23	Sanghamitra Rana	Clians Labs Pvt. Ltd.
24	Subhadip Bhowmik	Clians Labs Pvt. Ltd.
25	Pratick Samanta	Clians Labs Pvt. Ltd.
26	Subhadip Bera	Mendine Pharmaceuticals Pvt. Ltd.
27	Jibandeep Samanta	Strassenburg Pharmaceuticals (P) Ltd.
28	Surajit Manna	Cradel Pharmaceuticals Pvt. Ltd
29	Kunal Bera	Cradel Pharmaceuticals Pvt. Ltd
30	Subhankar Maity	Cradel Pharmaceuticals Pvt. Ltd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CAMPUS PLACEMENT NEWS
School of Pharmacy, The Neotia University
Mr. Dibyendu Naskar
Mr. Krishnendu Mondal
Mr. Abhishek Singha
Mr. Susobhan Mondal
Ms. Ankita Dairagi
Mr. Nilesh Naskar
Aurio Pharma Laboratories Pvt. Ltd. Kolkata
Holi Cross Research Laboratories, Kolkata
Strassenburg Pharmaceutical Ltd., Kolkata
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JUNIOR RESEARCH ASSOCIATE
Mr. Subhadip Bhowmik
Ms. Sanghamitra Rana
Mr. Pratick Samanta
CLIANS LABS PRIVATE LIMITED
Hyderabad
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(Recruited as Production Executives)
TNU Family Congratulates You
for your successful career!
Thanks to Macleods Pharmaceuticals Ltd. For choosing TNU as a platform for their recruitment drive!
(Recruited as Quality Control Executive)


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CONGRATULATIONS
Mr. Kunal Bera and Mr. Surajit Manna have successfully cleared the interview by Cradel Pharmaceuticals Pvt. Ltd. and got selected as Trainee Q. A. Chemist and Mr. Jibandeep Samanta was selected by Strassenburg Pharmaceuticals (P) Ltd. and got selected as a Trainee Q. C. Chemist
Batch : 2019-2023
Mr. Surajit Manna
Mr. Kunal Bera
Mr. Jibandeep Samanta
www.tnu.in

Placement News 2024

S.N	Name	Company
1	Barsha Sanphui	Macleods Pvt. Ltd.
2	Sayan Mondal	Macleods Pvt. Ltd.
3	Shweta Kumari	Macleods Pvt. Ltd.
4	Anushree Maji	Macleods Pvt. Ltd.
5	Pritam Mondal .	Macleods Pvt. Ltd.
6	BIKAS MONDAL	Macleods Pvt. Ltd.
7	Anurup Bhattacharjee	Macleods Pvt. Ltd.
8	PRIYAS ROY	Macleods Pvt. Ltd.
9	Kuntal Metya	Macleods Pvt. Ltd.
10	Souvik Das	Macleods Pvt. Ltd.
11	Anik Dutta	Macleods Pvt. Ltd.
12	Nikhil gupta	Macleods Pvt. Ltd.
13	Saranjit Shit	Macleods Pvt. Ltd.
14	Debdut Maji	Macleods Pvt. Ltd.
15	Mamoleswar Gayen	Macleods Pvt. Ltd.
16	Soumyarshi Mukhopadhyay	Macleods Pvt. Ltd.
17	Jayanta Bera	Macleods Pvt. Ltd.
18	Sirshendu Mandal	Pharma Impex laboratories Pvt Ltd.
19	Biswanath Mondal	Pharma Impex laboratories Pvt Ltd.
20	Rahul Kumar Mandal	Pharma Impex laboratories Pvt Ltd.
21	Saikat Mondal	Apollo Pharmacies Ltd.
22	Maudul azad	Apollo Pharmacies Ltd.
23	Abhishek sutradhar	Apollo Pharmacies Ltd.
24	Shabnam Sultana	Apollo Pharmacies Ltd.
25	Souvik Mondal	Apollo Pharmacies Ltd.
26	Partha Pratim Ghosh	Apollo Pharmacies Ltd.
27	Maun Islam	Apollo Pharmacies Ltd.
28	Somnath Maiti	Apollo Pharmacies Ltd.
29	Aditya Bhardwaz	Apollo Pharmacies Ltd.
30	Md Afridizzaman	Apollo Pharmacies Ltd.
31	Amrik Dey	Apollo Pharmacies Ltd.
32	Ayan Das	Apollo Pharmacies Ltd.
33	Avik Roy	Apollo Pharmacies Ltd.
34	Alamgir Halsana	Apollo Pharmacies Ltd.
35	SK Fajal Ahamed	Apollo Pharmacies Ltd.
36	Shuvam Das	Apollo Pharmacies Ltd.
37	Sounil Giri	Apollo Pharmacies Ltd.
38	Dibya Jyoti Mandal	Apollo Pharmacies Ltd.
39	Kahkashan Afreen	Apollo Pharmacies Ltd.
40	Basanta Das	Apollo Pharmacies Ltd.
41	Maharshi Gol	Apollo Pharmacies Ltd.
42	Sk Asif Ali	Apollo Pharmacies Ltd.
43	Mijanul Islam	MedPlus
44	Taofik Ahasan	MedPlus
45	Kausik Giri	MedPlus
46	Md Samim Aktar Molla	MedPlus

47	Sk Abdul Latib	MedPlus
48	Joyprakash Jana	MedPlus
49	Prithwish Kumar Malik	MedPlus
50	Avinandan Mondal	MedPlus

Upcoming Events

Important Links

For corona virus disease (COVID19) Pandemic:
http://www.europeanpharmaceuticalreview.com/
https://www.who.int/emergencies/diseases/novel - coronavirus-2019

https://www.mohfw.gov.in/
https://main.icmr.nic.in/content/covid-19
https://covid.icmr.org.in/

ICH guidelines on Quality of Pharmaceuticals:
https://www.ich.org/page/quality-guidelines

US-FDA guidance for Industry on Q7A GMP: https://www.fda.gov/regulatory-information/search- fda-guidance-documents/guidance-industry-q7a- good-manufacturing-practice-guidance-active-pharmaceutical-ingredients

US-FDA guidance for Industry on Q7A GMP: https://www.fda.gov/regulatory-information/search- fda-guidance-documents/guidance-industry-q7a- good-manufacturing-practice-guidance-active-pharmaceutical-ingredients