

THE *Life* SCIENCES TIMES



Issue 02 | February 2024

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From the CEO's Desk



Dear Friends,

It gives me immense pleasure to bring to you the second edition of our newsletter 'The Life Sciences Times.' The Indian Pharma, Biotech & Life Sciences industry is a global powerhouse contributing to the nation's growth. It makes me proud that Abdos Life Sciences is a part of that growth trajectory and will be contributing its share to help the Indian pharmaceutical industry reach a staggering USD 130 billion value by 2030. I am sure our brand values of precision, reliability, responsiveness, innovation, sustainability, relationships and most importantly, your support will guide us in achieving this.

In this edition, we bring to you the latest research undertaking related to the life sciences and biotech sector, information on new products, event coverages, industry know-hows, global meets, distributor and channel partner meets and a lot more.

I am sure you would enjoy reading this newsletter and am extremely hopeful that you would extend your wholehearted support. Please send in your inputs and help us make this initiative a huge success.

Happy reading!

Thanks
Shrey Agarwal
CEO, Abdos Life Sciences

Industry Speak

Trace Metal Free Centrifuge Tubes – Maxi RCF™

Abdos always follows a very methodical approach to any new development, addition, and improvement of a product. Similarly, while being the leader in manufacturing centrifuge tubes, a very specific application and a regulation gave Abdos a chance to manufacture a highly appreciated Centrifuge Tube, Maxi RCF™.

Classification	Heavy Metals	Guidelines
Class 1	Arsenic (As), Cadmium (Cd), Mercury (Hg), and Lead (Pb)	Must be evaluated under all circumstances.
Subclass 2A	Cobalt (Co), Nickel (Ni), and Vanadium (V)	They should be evaluated and/or included in risks-based assessments due to their ubiquity, relative toxicity, and likely occurrence in drug products.
Subclass 2B	Gold (Au), Thallium (Tl), Palladium (Pd), Platinum (Pt), Iridium (Ir), Rhodium (Rh), Ruthenium (Ru), Osmium (Os), Selenium (Se) and Silver (Ag)	
Class 3	Antimony (Sb), Barium (Ba), Lithium (Li), Chromium (Cr), Copper (Cu), Tin (Sn), and Molybdenum (Mo)	Relatively low toxicity by oral administration but requires assessment if delivered through the parenteral or inhalational routes.
Unclassified	Boron (B), Iron (Fe), Zinc (Zn), Potassium (K), Calcium (Ca), Sodium (Na), Manganese (Mn), Magnesium (Mg), Tungsten (W), and Aluminum (Al)	Low inherent toxicity and regional regulations



Problem Identification – ICP-MS Applications and Relation to the Centrifuge Tubes

For more than a century, the United States Pharmacopeia (USP) has operated under a procedure known as General Chapter 231 - Heavy Metal. But on January 1, 2018, The United States Pharmacopeia (USP) officially abandoned the general chapter 231 - Heavy Metals due to its lack of specificity and ability to accurately quantify individual inorganic elemental impurities. The wet chemical methodology of general chapter 231 - Heavy Metals was abandoned in favor of a more sophisticated quantitative instrumental technique with chapters 232 - Elemental Impurities-Limits and 233 - Elemental Impurities-Procedures, which define the limits and procedure in screening for elemental impurities that may be present in drug products.

The FDA released a Guidance for the Industry that clarifies the testing requirements with regard to elemental impurities in new drug applications and abbreviated new drug applications.

USP 233 - Elemental Procedures offers the option of using Inductively Coupled Plasma with Optical Emission Spectroscopy (ICP-OES) or Mass Spectrometry (ICP-MS). From then, Inductively Coupled Plasma Mass Spectrometry (ICP-MS) is a widely used analytical technique in Pharmaceutical Industry for analyzing multi-elemental impurities (specifically Trace/Heavy Metals) in active/approved pharmaceutical ingredients (APIs) and synthetic drugs. The ICP-MS is a highly sophisticated and precise analytical system that can detect metals at deficient concentrations, as low as 1ppq (one part per quadrillion) to 1ppb (one part per billion).

So, while using such a sophisticated system for a critical application, any product used for keeping, storing, or transferring the samples can create problems while generating false results, including the Centrifuge tubes, which most manufacturers don't bother about, where avoiding heavy metals becomes a big task. Therefore, most of the centrifuge tubes available in the market are unsuitable and not recommended for ICP-MS applications.

Solution to the Problem

Keeping the concentration of trace metals lower than 1 ppb is the only solution to the problem, as the trace metals become non-toxic at much lower concentrations. But achieving this is a significant task that required Abdos much research while selecting & testing different plastic raw materials, experimenting with different formulations, using finer mold machinery for manufacturing the final product, and testing trace metals at every stage.

The Abdos Maxi RCF centrifuges confirmed <1ppb (part per billion) ICP-MS detection levels for 19 metals, including, Zinc, Iron, Copper, Manganese,

Aluminium, Silicon, Nickel, Vanadium, Phosphorous, Cobalt, Chromium, Lithium, Selenium, Cadmium, Mercury, Arsenic, Lead, Boron & Silver. This makes Maxi RCF very different from the centrifuge tubes available in the market and suitable for ICP-MS experiments.

Maxi RCF tubes are manufactured using high-purity virgin USP Class VI Medical grade polypropylene, conforming to US FDA 21 CFR, free from natural rubber and heavy metals that also support higher RCF of 20,000 RCF, making it compatible with higher centrifugation applications.

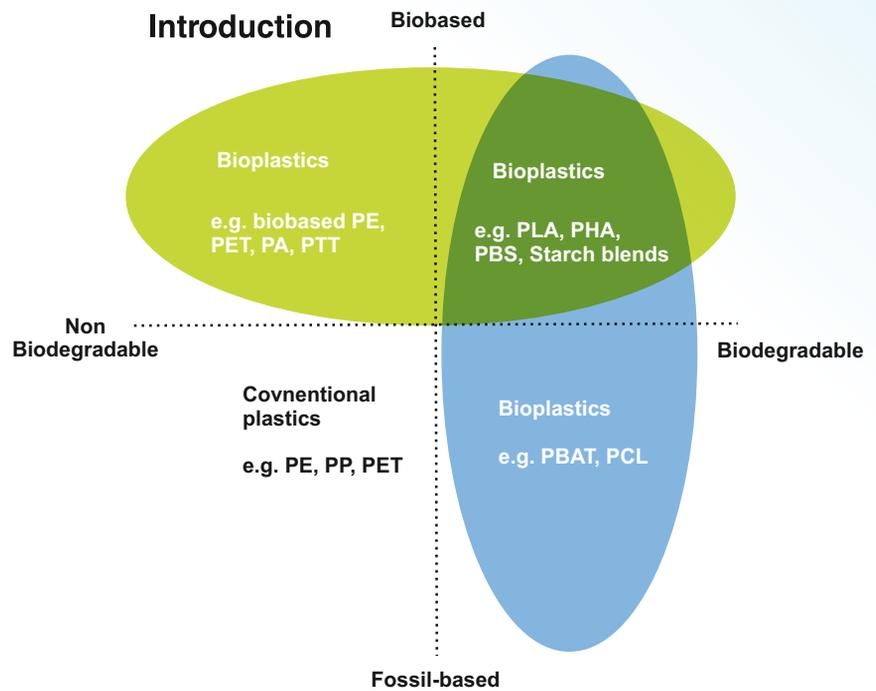
Bioplastics Revolution: Transforming Plants to Plastics for a Sustainable World

Plastic pollution has become one of the most pressing environmental challenges of our time. The over-reliance on traditional petroleum-based plastics has led to widespread pollution of oceans, landfills, and natural habitats. As a response to this crisis, Bioplastics offers a promising solution to reduce our dependence on fossil fuels and mitigate the environmental impact of packaging materials.



Understanding bioplastics

Bioplastics are a class of polymers derived from renewable resources, such as plants, algae, and bacteria, as opposed to traditional plastics that are derived from non-renewable fossil fuels. These materials share some properties with conventional plastics, such as versatility and durability, but offer distinct advantages when it comes to their environmental impact. Bioplastics are biodegradable, compostable, and have a reduced carbon footprint, making them a more sustainable choice for packaging and other applications.



Types of bioplastics

Poly-Lactic Acid (PLA) is one of the most widely used bioplastics. It is derived from renewable sources, such as corn starch, and has various applications, including packaging films, containers, and disposable cutlery. Poly Hydroxyl Alkanoates (PHAs) are biodegradable bioplastics produced by bacterial fermentation of renewable feedstocks. They can be tailored for specific applications, including packaging, agricultural films, and medical products.

Starch-Based Bioplastics (SBP) are typically blended with other biopolymers to improve their mechanical properties. They are commonly used for packaging materials, bags, and disposable food containers.

Poly Ethylene Terephthalate (PET) from bio-based monomers is a widely used plastic in the beverage industry. Recently, advancements in industrial biotechnology have enabled the production of PET from bio-based monomers derived from plant sugars, reducing its reliance on fossil fuels.

Industrial biotechnology and the bioplastics revolution

Industrial biotechnology plays a crucial role in the development and production of bioplastics. Key areas where biotechnology is driving the bioplastics revolution include: Microbial fermentation for bioplastic production involves microbial fermentation. Bacteria are genetically engineered to produce biopolymer precursors, which are then harvested and processed to create bioplastics. Through metabolic engineering, industrial biotechnologists can enhance the microorganisms' ability to produce large quantities of biopolymer precursors efficiently. Enzymatic catalysis for bioplastic synthesis where enzymes act as natural catalysts in various bioplastic synthesis processes. They enable the conversion of renewable feedstocks into monomers, which are then polymerized to form bioplastics. Industrial biotechnology is instrumental in optimizing enzymatic reactions, increasing their efficiency, and reducing production costs. Sustainable feedstock development where industrial biotechnologists are continuously working on developing sustainable feedstocks for bioplastic production. By focusing on non-food sources and waste materials, such as agricultural residues and food waste, the environmental impact of bioplastics can be further minimized.

The advantages of bioplastics in packaging

Reduced carbon footprint one of the most significant advantages of bioplastics is their reduced carbon footprint compared to conventional plastics. As bioplastics are derived from renewable resources, their production emits

fewer greenhouse gases, contributing to mitigating climate change. Biodegradability, and compost ability. Many bioplastics are biodegradable, meaning they can be broken down by natural processes into harmless substances over time. Some are also compostable, providing a valuable source of nutrients for the soil when properly processed in industrial composting facilities. Reduced dependency on fossil fuels by shifting to bioplastics, we can reduce our reliance on fossil fuels, conserving these valuable resources for other essential applications and reducing the environmental impact associated with fossil fuel extraction and processing.

Challenges and outlook

While the bioplastics revolution holds immense promise, several challenges need to be addressed for broader adoption and impact:

Cost Competitiveness: Currently, bioplastics tend to be more expensive to produce than conventional plastics. Wider adoption and scale-up in production can lead to cost reductions, but ongoing research and technological advancements are crucial to achieving cost competitiveness.

End-of-life management: For bioplastics to realize their environmental potential fully, proper end-of-life management is essential. Composting facilities and waste management infrastructure need to be developed and expanded to accommodate biodegradable and compostable bioplastics.

Consumer awareness and education: Educating consumers about the benefits and appropriate disposal methods of bioplastics is critical.

Conclusion

Industrial biotechnology is playing a pivotal role in the bio-plastics revolution, driving innovation in sustainable packaging solutions. As the negative impact of traditional plastics on the environment becomes increasingly evident, bioplastics offer a viable alternative that aligns with the principles of a circular economy. With continued advancements in industrial biotechnology, the widespread adoption of bioplastics has the potential to shape a greener future, reducing plastic pollution and supporting the transition to a more sustainable and environmentally conscious society. It is up to consumers, businesses, and policymakers to embrace this revolution and collectively contribute to a more sustainable world.

Nano-tubes-based Brain Targeted Drug Delivery System:

A step toward improving bioavailability and drug enhancement at the target site

Parul Mittal, Senior Researcher

Division of Cyclotron and Radiopharmaceutical Sciences, Institute of Nuclear Medicine and Allied Sciences, Delhi, India, Department of Zoology, Delhi University, Delhi, India



Nanotechnology is very useful for targeting drug delivery across the brain. The development of nanoparticles with unique features can be helpful for the treatment of CNS-based disorders. Carbon nanotubes (CNTs) are becoming exemplary for brain-targeted drug delivery due to their small size, large surface area, good bioavailability, low toxicity, and

ability to be modified. These spatial features enable them to penetrate the blood-brain barrier and efficiently deliver the drug inside the CNS. CNTs (**Figure 1**) are also used as a therapeutic agent since they possess neuro-regenerative activity, which makes them very useful for the treatment of neuro disorders.

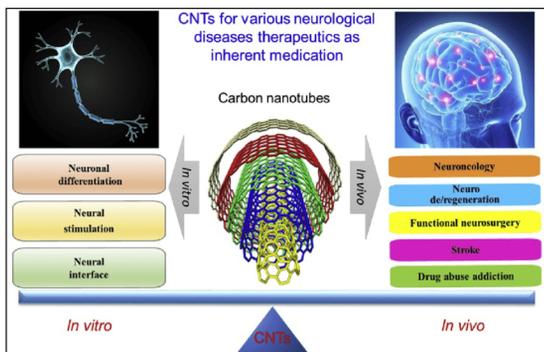


Figure 1. Schematic illustration of applications of carbon nanotubes in neurological diseases both in vitro and in vivo (Xiang et al., 2020).

Source: Image reproduced with permission Xiang, C. et al., 2020. Biomimetic carbon nanotubes for neurological disease therapeutics as inherent medication. *Acta Pharmaceutica Sinica B. Chinese Pharmaceutical Association and Institute of Materia Medica, Chinese Academy of Medical Sciences*, 10 (2), 239–248.

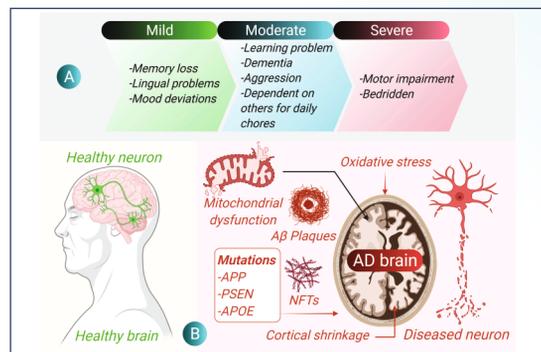


Figure 2. Image reproduced with permission Faiyaz, M. et al., 2021. Nanomaterials in Alzheimer's disease treatment: a Comprehensive review. *Frontiers in Bioscience - Landmark*, 26 (10), 851–865.

Carbon-based nanomaterials are promising nanocarriers for the delivery of anti-cancer drugs for cancer therapy and drugs for neuropathologies (Figure 2). The unique properties of CNTs make remarkable progress in improving the drug delivery system. The toxicity of CNTs is of less concern due to their biocompatible nature, which can be modified by

controlling various parameters of CNTs. Conjugation of CNTs with functional groups can make them biocompatible, which can be used as an efficient biocompatible contrast agent for imaging or biosensors. This can increase the lifetime of the drug within the body and allow the drug enhancement at the target site.

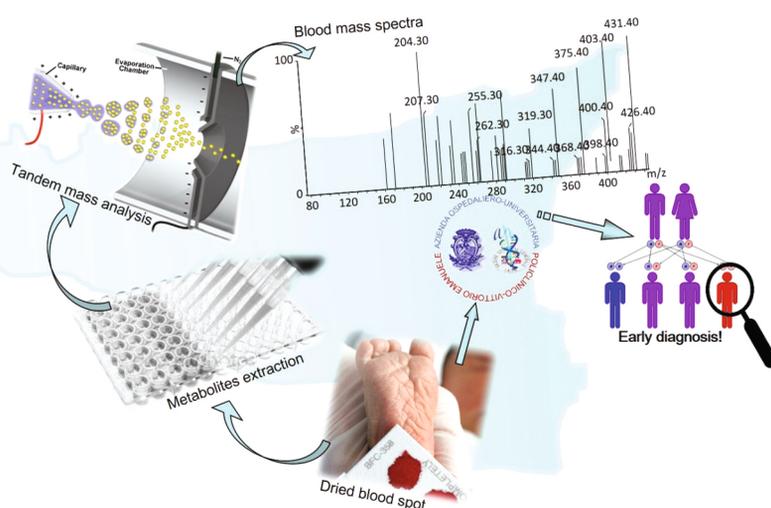
External Guest Column

New-born Screening by Liquid Chromatography-tandem Mass Spectrometry: A Future Perspective in India

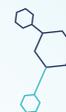
Dr. Abhik Banerjee, Zonal Technical Chief, Regional Reference Laboratory, Apollo Diagnostics, Kolkata, West Bengal

Source: *Journal of Applied Biochemistry & Laboratory Medicine* (2023) 04(01)/JABLM_04

Newborn screening (NBS) is the screening of babies shortly after birth for a list of congenital disorders that can cause serious problems for the baby if not recognized and treated early. NBS has the potential to identify the risk of certain diseases before the appearance of clinical symptoms. Babies with these diseases can appear normal at birth, but irreparable harm such as permanent brain damage, growth retardation, sepsis or death can happen with the onset of clinical symptoms. Early detection of these disorders may save valuable lives as well as the high economic burden on society leading to a healthy future.



Source: *Int. J. Neonatal Screen*, 2018, 4(2), 12; <https://doi.org/10.3390/ijns4020012>



Abdos in Global Space

A Spectacular “AmpQlear”- PCR Product Line Launch at MEDICA 2023, Dusseldorf, Germany

The anticipation surrounding the launch of a new product is nothing short of electrifying. This sentiment was palpable at our recent Product Launch at MEDICA 2023, Dusseldorf, Germany where a ground-breaking PCR product line - **AmpQlear** made its debut, captivating the attention of industry experts and consumers alike. The unveiling marked a significant milestone in ABDOS's journey and promised to reshape the landscape of the PCR Consumable market.

MEDICA Fair, renowned for showcasing cutting-edge products and fostering global collaboration, provided us with an ideal platform for the grand reveal of the AmpQlear – PCR Product Line.

Individual PCR Tubes, 8-strip Tubes, and caps - are all part of the **AmpQlear** line. Produced in ISO Class 8 clean rooms, we guarantee that there are no measurable quantities of Bacterial DNA, Human DNA, RNA, Pyrogen, ATP, DNase, RNase, or PCR inhibitors in our AmpQlear range, and we adhere to IVDR certification.



Product Differentiator

AmpQlear™

AmpQlear
Advanced & Innovative PCR Range

At Abdos Life Sciences, we understand the demands of the scientific community, where the result of an experiment has an equal dependency on its Product Quality.

We constantly strive to provide a cutting-edge, best-in-class Laboratory Product Range. As a result of our dedication, we have enhanced the features of our PCR product line, AmpQlear™, making it the ideal option for all qPCR and Real-Time applications.

One of the most significant and challenging tasks for a product of the small size of a PCR tube is to ensure even wall thickness from every side, and we were able to accomplish it with the aid of our state-of-the-art machinery and meticulous material selection. Our AmpQlear™ range achieved exceptional **Uniform Wall thickness, ensuring even thermal transfer and homogenous reaction conditions, producing better results.**

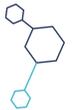


The innovatively designed caps have achieved **Ultra-Optical Clarity** with cutting-edge Diamond Polished molds and carefully chosen polypropylene resins that are internally combined into precise ratios to produce the best performance qualities.

AmpQlear™ Individual PCR tubes have a **Unique Face Shield feature** that allows easy opening and **lowers the risk of contamination**. No sample evaporation or loss occurs during cycling thanks to the Innovative cap design's simple opening and closing mechanism.



Product of the Quarter



Abdos BIOFILL Bottle Top Filtration - The Last Line of Defense against Cell Culture Contamination

The New Generation Vacuum Filtration System

- For Clarification, Filter sterilization and Mycoplasma elimination of solutions containing Heat-Labile components. Useful in Sensitive, Lab applications such as stem cell & mammalian cell culture applications
- The **BIOFILL Bottle-top Filtration system** is a very efficient single-use, disposable filtration system for sterile media preparation. It combines a low protein binding **PES filter** unit with a receiver for processing and storing volumes of 250ml, 500ml & 1000ml in a receiver flask in a ready-to-use format.
- The complete system is composed of a Polystyrene filter funnel and receiver & a secure grasp design for easy handling.

Features & Benefits:

BIOFILL PES membrane offers the fastest flow rates and low protein binding to minimize absorption and protein loss which affect downstream processing performance. The easy tear-open pouch and convenient label designs make storing, opening, and tracking your devices easy & efficient. This product is often single-use and disposable and available in a range of pore sizes (0.45|0.22|0.1) microns.

Application:

1. **0.45 microns** is used for clarification of cell lysates and removal of suspended solids from moderately turbid, aqueous solutions.
2. **0.22 microns** filter is used for sterile filtration of protein solutions such as enzymes & cell culture media that are heat labile and get denatured when subjected to heat.
3. **0.1 microns** filter is used in the elimination of mycoplasma contamination during cell culture.





Action Station

Abdos Participation at MEDICA 2023, Düsseldorf, Germany

Düsseldorf - At the heart of MEDICA, The largest 4 days event - MEDICA eyed by the entire medical fraternity across the globe, successfully ended recently at Dusseldorf with another record-breaking edition - MEDICA 2023 {13 to 16 November at Dusseldorf, Germany}. The show which has become a synonym of the finest annual display of Medical Goods, Innovation, Techniques and everything related to medical, once again proved itself as one of the best Medical products & services shows in the world for the Medical industry.

ABDOS Life Sciences' presence was a comprehensive showcase of its latest and Innovative product lines. Expert demonstrations from Product Managers and live presentations highlighted the unique features, functionalities, and benefits of each Product.

Team ABDOS were on hand to engage with visitors, answer questions, and forge connections with potential clients, partners, and collaborators.



Events Participated & Organised

CPHI PMEC 2023 Exhibition



Abdos Labtech connected with global Pharma community at CPHI PMEC 2023 exhibition (Booth 14.A40) held in India Expo Center, Greater Noida. Your participation, enthusiasm, and engagement made this event an incredible success as well as a platform for making many new connections and strengthening relationships. This year's event was characterised by an atmosphere of innovation and collaboration. Abdos showcased its 'innovative might' by launching AmpQlear PCR consumables range. We thank all our stakeholders, and we promise to deliver the improved version of each product YOY.

Channel Partners Visit to Manufacturing Plant, Roorkee (UK)

Abdos Labtech invited its premier channel partners to witness the might of state-of-the art infrastructure for its manufacturing facility located in Roorkee, Uttarakhand. Business-cum-fun trip included the immersive sessions and witness of exquisite Ganga Aarti in Haridwar. Later, interaction of channel partners with the Director inside the facility further strengthened the CEO circle, which is aimed to expand and grow the business exponentially.





Celebrating our Journey with Abdos!

Reflecting on our journey with Abdos since 2015, it has been a remarkable experience marked by shared values, a dedication to innovation, and a relentless pursuit of excellence. From the inception of our partnership, Abdos has consistently demonstrated a commitment to producing high-quality laboratory products that meet and exceed industry standards. This commitment has played a pivotal role in our shared success and the positive impact we've had on the scientific community.

The trust instilled by Abdos' products has been a cornerstone of our journey, and we continue to evolve and innovate, pushing the boundaries of what is possible in the world of laboratory equipment. As we navigate the evolving landscape of science and technology, Abdos is poised to lead the way, setting new standards and redefining the possibilities within our industry.

Their commitment to research and development will drive the creation of cutting-edge solutions that empower scientists and researchers to make groundbreaking discoveries in future.

Wishing Abdos Life Sciences all the very best for the years to come!

Priyanka Doshi | Director

D. Haridas & Co.

A Unit of Advance Labs Scientific Pvt. Ltd.

A Partnership Fueled by Quality, Collaboration, and Vision

The synergy between Abdos and DHC has been very special. Together we are able to deliver not only for the excellent products but we also expand our combined customer reach, reinforcing our commitment to excellence and customer satisfaction.

At the heart of our collaboration is a shared commitment to delivering products of the highest quality. Abdos' unwavering dedication to precision, reliability, and performance has not only met but surpassed the expectations of our customers. By joining forces, we have been able to provide a broader range of solutions to our customers, catering to their diverse needs and contributing to advancements in scientific research and discovery.

The vision encompasses not only the delivery of exceptional products but also a dedication to sustainability, ethics, and social responsibility. In collaboration with Abdos, we aim to continue pushing the boundaries of what is possible in the laboratory equipment industry. Looking ahead, our vision for the future is rooted in the pursuit of excellence and innovation.

We express our gratitude to the Abdos community for their unwavering support and commitment. Together, we look forward to a future filled with innovation, collaboration, and shared success.

Sumeet Doshi | Director

D. Haridas & Co.

A Unit of Advance Labs Scientific Pvt. Ltd.

Be Vocal For Local

"Having a Make in India manufacturer that you can trust and rely on is incredibly indispensable in such a volatile laboratory plasticware industry and we feel happy that we are associated with Abdos Labtech. They have good product portfolio with ever expanding SKUs to an ever-changing marketplace. The global standard packaging and product quality makes Abdos stand apart among other global payers in the marketplace.

Gaurav Chopra (SG Enterprises), New Delhi



Upcoming Events

ABDOS Participation in Analytica Munich 2024, Germany (April 9-12)

As the industry's most important marketplace, Analytica brings together scientists, entrepreneurs and users from all over the world. This attractive target group is one of the reasons why **ABDOS Life Sciences** exhibits at the world's leading trade fair every year.

From: April 9 – 12, 2024

Visit us in Hall A3, 208

Have the opportunity to:

1. **Discover Innovation:** A vast array of laboratory products and solutions designed to enhance research and scientific advancements.
2. **Networking:** Connect with technical expert team from ABDOS, and peers to exchange ideas & forge collaborations.
3. **Hands-On Demonstrations:** Experience hands-on demonstrations of ABDOS state-of-the-art laboratory Product lines.
4. **Product Launch:** Get a sneak peek at the newest product launch and innovations.



We are looking forward to meeting you at our booth and engaging in productive discussions.

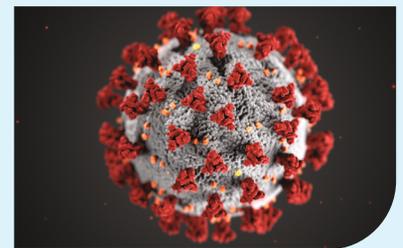
Important Facts

2023 in Biology – Significant Scientific Stories

Covid-19 entered a new phase

Though, to many people, COVID-19 faded into the background this year, the disease remains a problem as the vaccine response has lagged. As of now, the administration allowed the coronavirus public health emergency to expire, leading the virus to be treated like other respiratory ailments.

As the disease continues to evolve, the Government says citizens should expect to have a shot available each fall, like the schedule for flu vaccines. But whether people will be receptive to that shot remains to be seen, following the decline in this year's response.



When Cells Touch, Gene Expression Changes

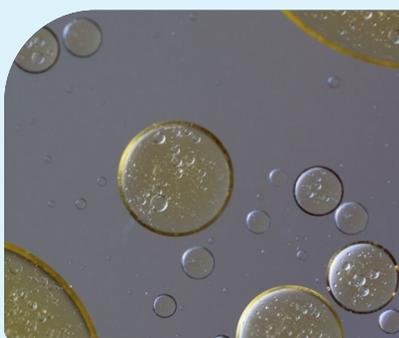


Image credit: Pixabay

Cells in the human body do not behave as individuals; they work together. The genes that are active in cells also depend on where those cells are located, and what they are interacting with, noted study co-author Paul B. Fisher, PhD, a professor at Virginia Commonwealth University.

Gene expression patterns in small cell clusters were assessed, and modelling was used to show how gene activity changed when certain cells were touching.

This approach was used to analyse how cells in the lens of the eye and neural progenitors interact. The results confirmed that this method could accurately identify which genes were activated when these cells made contact.



New Product – CompactPAGE Mini Vertical Electrophoresis

Abdos proudly introduces the innovatively designed Mini Vertical Electrophoresis, CompactPAGE. The new CompactPAGE supports all PAGE and SDS-PAGE applications to be run in mini format, has the widest range of combs & spacer, and comes with fast-casting technology, that ensures leakproof casting setup.

With other vertical systems, the users have to struggle with the leakage and time-consuming casting methodologies, CompactPAGE offers an innovative module that supports casting and running in the same setup and users don't have

to disturb the glass plates once fixed in the module. To ensure that the users have leakproof casting, the system comes with glass spacers attached to the plates and a casting base that requires less effort and force to cast the system. Every part of the system is molded ensuring standardization, stability, and longevity of the system. All this combined makes CompactPAGE the best choice for customers to run any PAGE or SDS-PAGE applications.



Life Sciences: Did You Know?

AI Reveals New Antibiotics

Yue Ma and colleagues from the Chinese Academy of Sciences used machine-learning techniques originally developed for natural language processing to identify antimicrobial peptides encoded by the genome sequences of microbes in the human gut. The algorithm identified 2,349 potential antimicrobial peptide sequences. Of these, 216 peptides were synthesised by chemical methods, and 181 of them were shown to have antimicrobial activity. This is an impressive success rate, which would not have been possible without the aid of AI.

Researchers Fully Sequence the Y Chromosome for the First

The Y chromosome -- has just been mapped out in its entirety. Scientists used advanced sequencing technologies to read out the full DNA sequence of the Y chromosome -- a region of the genome that

typically drives male reproductive development. The results demonstrate that this advance improves DNA sequencing accuracy for the chromosome, which could help identify certain genetic disorders and potentially uncover the genetic roots of others.

2023 Global Heat Wave: July Brought the Hottest Three Weeks Observed So Far

The first three weeks of July 2023 have been the hottest global three-week period so far. Researchers report that the European population's exposure to heat was highest in Italy. Italy reached heat records of more than 40°C. In Germany, about seven million people were exposed to daily maximum temperatures higher than 25°C. In July 2023, extraordinarily persistent high-pressure areas prevailed in the regions affected by the high temperatures where descending air masses contributed significantly to warming and the local development of the heat wave.

Get in touch with us:

+91-11-41081897 | labtech@abdosindia.com | www.abdoslifesciences.com