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NO. 1, 2025

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Renewable Energy: Exploring Discoveries and Innovations

By Mark Miller

From wave energy to solar panels, there's a lot that's "new" in renewable energy. Read on for a snapshot of the projects contributing to the transformation of energy from fossil fuels to renewable resources and processes.

Catching Waves

Oregon State University's PacWave project is testing ways to transform wave energy into electrical currents. The *Washington Post* article "This seaside town will power thousands of homes with waves" reports that, according to Matthew Grosso, a director at the U.S. Department of Energy, sufficient energy is generated by the waves off U.S. shores to power a third of the country's homes. Harnessing this power would require tools like rotating cylinders, bobbing buoys, and undulating cables set in motion by the surf. PacWave provides a proving ground for developers to try out their devices with the capability to support up to 20 converters and a maximum output of 20 megawatts.

Fighting Emissions with Emissions

According to the article "Earth, Water, and Fire: How Farmers, Fisherman, and Firefighters Are Embracing Renewable Energy," published by EARTHDAY.ORG, farmers are looking to transform cow manure into biogas through anaerobic digestion. This process accelerates the release of biogas from decomposing cow manure by sealing it in airless, heated tanks. The harvested biogas contains methane that can power machinery or be turned into fertilizer. In both cases, the process reduces methane emissions, the second-largest greenhouse gas contributor.

Battery Breakthrough

Lithium nickel oxide (LiNiO₂) is a promising cathode material to help lithium-ion (Li-ion) batteries achieve longer life. This is explained in the article "Breakthrough research overcomes key obstacle to longer-lasting Li-ion batteries for EVs," published by *Interesting Engineering*. The problem is that LiNiO₂ breaks down after numerous charging cycles. Dr. Kyeongjae Cho, a professor of materials science and engineering at the University of Texas at Dallas, and fellow researchers have found out why.

By analyzing atomic-level processes of LiNiO₂ during the final charging phase, they discovered that LiNiO₂ atoms undergo a chemical reaction that causes destabilization and cracking. To stop this, they're introducing positively charged ions to reinforce the LiNiO₂. According to the article, a lab is being set up to explore the commercial potential of batteries using the strengthened LiNiO₂.

Greener Resource Reclamation

Argonne National Laboratory in Lemont, Illinois, is developing sustainable and scalable electrochemistry methods to separate and reclaim critical materials for renewable energy. By leveraging the relationship between electricity and chemical reactions, the lab is recovering materials such as lithium in ways that reduce carbon emissions. These methods also offer improvements in efficiency and the purity and yield of recovered materials. For example, using bipolar membrane electrodialysis to convert lithium salts to battery-grade lithium hydroxide (LiOH) could streamline the production process of LiOH.

Capturing Carbon at the Source

An article published by *Gasworld*, "Mitico secures \$4.3m to support two carbon capture pilot projects," reveals that the California company plans to deploy two projects in 2025 and will "demonstrate early market validation" of its technology.

Mitico's solution collects and purifies carbon dioxide at the source after combustion. It's designed for gases emitted from boilers, turbines, and industrial processes. The technology uses a potassium carbonate-based sorbent to capture CO₂, offers storage and tracking capabilities, and it can capture 95 percent of CO₂ emissions, said the *Gasworld* report.

Solar-Battery Synergy

More mature renewable energy ventures are also underway. An article published by *Energy Global*, "Enel North America begins operations solar and battery plant in Texas," reports that the U.S. and Canadian energy provider has activated its Estonian solar and storage operation. This hybrid plant combines 202 megawatts of solar photovoltaic power with a 104-megawatt battery energy storage system. The facility can deliver approximately 499 gigawatt-hours of electricity annually, enough to satisfy the needs of 46,000 U.S. households.

The Fisher Scientific channel provides a comprehensive range of products to support renewable energy research and production. Visit fishersci.com/clean-energy or fishersci.ca/clean-energy to explore solutions for battery, biomass and biofuel, solar and wind energy applications, and more.

Mark Miller is a Thermo Fisher Scientific staff writer.

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Honeywell Hydranal NEXTGEN Coulomat A-FA/C-FA KF Reagents

As the EV market grows, so does the need for precision in manufacturing Li-ion batteries, particularly in managing electrolyte water content through techniques like Karl Fischer titration.

Ensuring the quality and safety of these batteries is critical to the success of the EV market. Honeywell Hydranal NEXTGEN Coulomat A-FA/C-FA Reagents for Karl Fischer titration are an essential tool in the quality control of Li-ion battery electrolytes. They offer several key benefits, including:

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- Improved accuracy and precision
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The advertisement features a woman with dark hair, wearing a blue top, smiling. To her right is a person wearing a full-body white Tyvek protective suit, including a hood, goggles, and gloves. The person is holding a small vial. The background is a blue sky with a red diagonal stripe. The DuPont logo and the text "Tyvek Forward Together" are visible at the top. At the bottom, a red banner contains the text "Visit fishersci.com/dupont to learn more."/>

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N 820 G	Rotary Evaporation, Degassing, Fluid Aspiration, Centrifugal Concentration, Vacuum Oven, Gel Drying	6 mbar	20 L/min.	Yes	Yes	13-880-905
N 840 G	Rotary Evaporation, Filtration, Centrifugal Concentration, Vacuum Oven	6 mbar	34 L/min.	Yes	Yes	13-880-906

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Selecting a Flow Cytometer for Your Lab

Selecting the right flow cytometer for your research lab is a critical decision that can significantly impact your experimental workflow and results. With several options available, understanding your specific research needs and the features of different instruments is essential. This guide outlines the key steps to help you make an informed choice.

Step 1: Define Your Research Needs—What Are Your Specific Requirements for a Flow Cytometer?

First, you'll need to consider your primary research applications and the types of samples you'll be analyzing. Then, determine the parameters and number of fluorescence channels required for your experiments. If high-throughput sampling capabilities are necessary, consider accessories like the BD CSampler Plus Loader for the BD Accuri Cell Analyzer C6 or the High Throughput Sampler (HTS) for the BD FACSymphony A1 Cell Analyzer.

If you're currently using shared instruments or outsourcing your flow cytometry work, or you find yourself waiting for instrument availability or requiring access to the core during off-hours, a dedicated instrument can offer benefits such as increased availability, reduced scheduling conflicts, cost savings, and personalized settings.

Step 2: Evaluate the Features of Each Flow Cytometer

The BD Accuri C6 Cell Analyzer is compact with a small footprint, offers intuitive software, and provides automated QC, making it suitable for various research applications. It is equipped with two lasers and supports four colors with the option to add a BD CSampler for automated high-throughput sampling.

The BD FACSymphony A1 Cell Analyzer is a premium benchtop analyzer with cutting-edge technology that can support up to 16-color immunophenotyping. It uses BD FACSDiva Software for a streamlined workflow from system setup to data acquisition and analysis. You may also consider adding an optional high throughput sampler (HTS) for automated sampling from multiwell plates.

The BD FACSMelody Cell Sorter is an automated four-way cell sorter. It features BD FACSDiva Software, which is easy to learn and use with minimal training. It is also ideal for research labs that need high-purity sorting and rely on reproducible results, and the fixed flow cell and reusable nozzle eliminate the need to purchase daily consumables. This affordable solution allows in-house cell sorting, which saves money on outsourcing. It is well-suited for genomics applications, too, enabling efficient and cost-effective sequencing through precise cell sorting and its user-friendly functionality.

Step 3: Decide Between a Cell Analyzer and Cell Sorter—Do You Need to Analyze Cells, Sort Cells, or Both?

Cell Analyzer

- Analyzes cells stained with fluorescent markers
- Classifies cells into different groups
- No cell recovery: cells are directed to a waste container after analysis

Cell Sorter

- Analyzes cells based on their fluorescence properties
- Classifies and physically separates cells into different groups

- Allows for the recovery of specific cell populations for further analysis, including genomic sequencing, in-vivo experiments, or analyzing cell function in downstream experiments

Step 4: Finalize Your Choice—Which Flow Cytometer Best Aligns with Your Needs?

The BD Accuri C6 Cell Analyzer is suitable for simple experimental needs, cell counting, live/dead analysis, and four-to-six color experiments.

The BD FACSymphony A1 benchtop analyzer is a great solution for labs that want to achieve outstanding results in multicolor flow cytometry, with experiments ranging from four to 16 colors and minimal challenges. While researchers performing downstream experiments on specific cell populations will find the BD FACSMelody Cell Sorter an ideal, easy-to-use flow cytometer.

Following these steps can help you select the right flow cytometer for your lab. If you have further questions or need additional information, contact your local Fisher Scientific sales representative.

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Fermentation Fundamentals: The Science of Sourdough Bread

By Sierra McConnell

Breadmaking is one of the more persnickety science experiments you can conduct in the kitchen, but sourdough adds a few extra layers to the process. What better way to engage in a rewarding culinary endeavor than a multi-day process that ends with something delicious to eat?

Why Is This Bread Different from All Other Breads?

What makes sourdough, well, sourdough? Of course, there's the tang and texture, but the key difference is what makes the bread rise.

In traditionally baked breads, like challah or brioche, yeast is used as a leavening agent, providing lift to the dough as it proofs and bakes. The yeast ferments sugars into carbon dioxide and ethanol. The ethanol evaporates during baking, leaving more subtle flavor compounds than a sourdough starter. The carbon dioxide, however, causes the bread to rise.

In sourdough bread, yeast is still technically part of the recipe, but it comes in the form of a starter—a concoction made of flour and water that's mixed and fermented for at least a week.

Sourdough Starter Chemistry

A sourdough starter is a thriving community of microorganisms, primarily composed of lactic acid bacteria and wild yeasts. These microbes work together in a symbiotic relationship, each playing a crucial part in fermentation.

To develop a starter, water and flour are combined in equal amounts in a container and covered overnight. The starter must then be “fed” daily, which means discarding a portion of the starter and adding fresh water and flour. Five to 14 days later, the starter will be bubbly, have that distinct sourdough smell, and float when dropped into water.

While there are myriad sourdough recipes online, they all have the same basic instructions: Mix a well-fed sourdough starter with water, salt, and flour. Cover with a towel and leave it in a warm place for about 12 hours or overnight. After the dough has risen, some recipes will call for a “stretch and fold” technique, while others will require traditionally kneading the dough. One of these methods is required to strengthen the gluten in the dough. Next, shape it however you like and let it rise again for another couple of hours. Score with a sharp knife, dust with flour, and bake in a pre-heated Dutch oven. Resist the urge to cut into it right away, though. It needs to rest for a few hours and should only be cut when completely cool. Once it's ready, dig in!

Is Sourdough Healthier Than Other Bread?

It depends on your definition of “healthier.” Research has shown that the fermentation in the sourdough starter helps prevent sudden increases in blood sugar by lowering the bread's glycemic index, which slows the absorption of sugar in the bloodstream.

Sourdough is also naturally lower in phytic acid, which is often found in traditionally baked bread and blocks the body from absorbing minerals like zinc and potassium.

Research has even shown that people with a gluten sensitivity can eat sourdough without any of the unpleasant side effects they encounter with other breads.

Sourdough is more than a culinary staple. It's a living laboratory with implications that extend far beyond breadmaking.

Innovative Applications in Food Science

Researchers are exploring how they can apply the principles of microbial fermentation in sourdough to other areas of food science, such as:

- Developing new fermented foods with enhanced nutritional profiles
- Creating natural preservatives for food products
- Improving the taste and texture of gluten-free baked goods
- Investigating the potential probiotic effects of sourdough microorganisms on gut health

Sourdough is more than a culinary staple; it's a living laboratory with implications that extend far beyond breadmaking. As researchers delve deeper into the science of sourdough, they uncover possibilities for improving food, health, and our understanding of microbial communities.

Sierra McConnell is a Thermo Fisher Scientific staff writer.

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Sustainable Precision: Helping Ensure DNA Integrity with Low DNA Binding Snap Cap Microcentrifuge Tubes

The integrity of DNA samples is paramount in molecular biology and genomic research. Every step of sample preparation, storage, and analysis can influence experimental outcomes, so choosing lab consumables is crucial for maintaining high-quality results.

One key choice is selecting microcentrifuge tubes, which requires considering factors like DNA binding, sample recovery, and sustainability.

Thermo Scientific Low DNA Binding Snap Cap Microcentrifuge Tubes are designed to address these concerns, offering scientists a solution for preserving sample integrity while reducing environmental impact. With advancements in tube materials, researchers can now make more responsible choices without compromising performance.

DNA Integrity: The Role of Low DNA Binding Tubes

DNA loss due to adsorption on labware surfaces is a well-documented issue that can significantly affect yield and reproducibility. Traditional plastic microcentrifuge tubes often bind nucleic acids, reducing recovery and skewing downstream analyses.

Thermo Scientific Low DNA Binding Microcentrifuge Tubes are engineered to minimize this interaction, helping ensure

that DNA remains in a solution and is fully recoverable for further processing. The benefits of these tubes include:

- **Maximized Sample Recovery:** Low-binding technology significantly reduces the retention of DNA on tube walls, allowing for more accurate quantification and reliable results
- **Preserved DNA Integrity:** By preventing DNA loss and degradation, these tubes help maintain the purity and stability of nucleic acid samples
- **Improved Reproducibility:** Consistent sample recovery ensures uniformity in experimental conditions, reducing variability between replicates

Sustainability in the Lab: The Biobased Resin Advantage

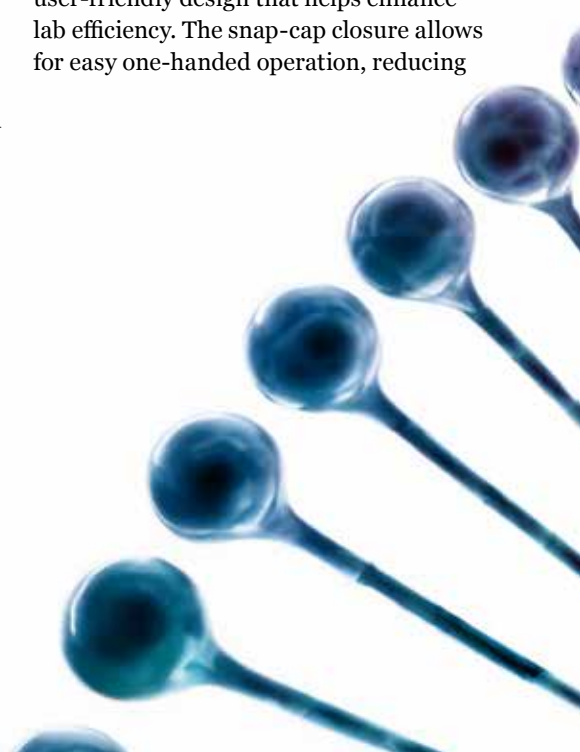
While scientific progress is essential, sustainability remains a critical priority for laboratories worldwide. Microcentrifuge Tubes from the Sustain Series address this need by incorporating biobased resin, which is derived from renewable resources. This innovation reduces the reliance on fossil-fuel-derived plastics, contributing to lower carbon emissions and a smaller environmental footprint.

Key sustainability benefits include:

- **Renewable Material Source:** Using biobased resin decreases dependence on petroleum-based plastics, supporting a more sustainable supply chain
- **Reduced Carbon Footprint:** Manufacturing processes using bio-based materials generate fewer greenhouse gas emissions than conventional plastic production
- **Same High Performance:** Despite the shift to sustainable materials, these tubes maintain the same durability and chemical resistance as traditional polypropylene tubes

Enhancing Laboratory Efficiency with Snap Cap Convenience

Beyond DNA integrity and sustainability, snap cap microcentrifuge tubes offer a user-friendly design that helps enhance lab efficiency. The snap-cap closure allows for easy one-handed operation, reducing



handling time and minimizing the risk of contamination. Additionally, these tubes are designed to withstand centrifugation at high speeds, helping ensure secure sample containment during critical steps in DNA preparation and analysis.

Conclusion

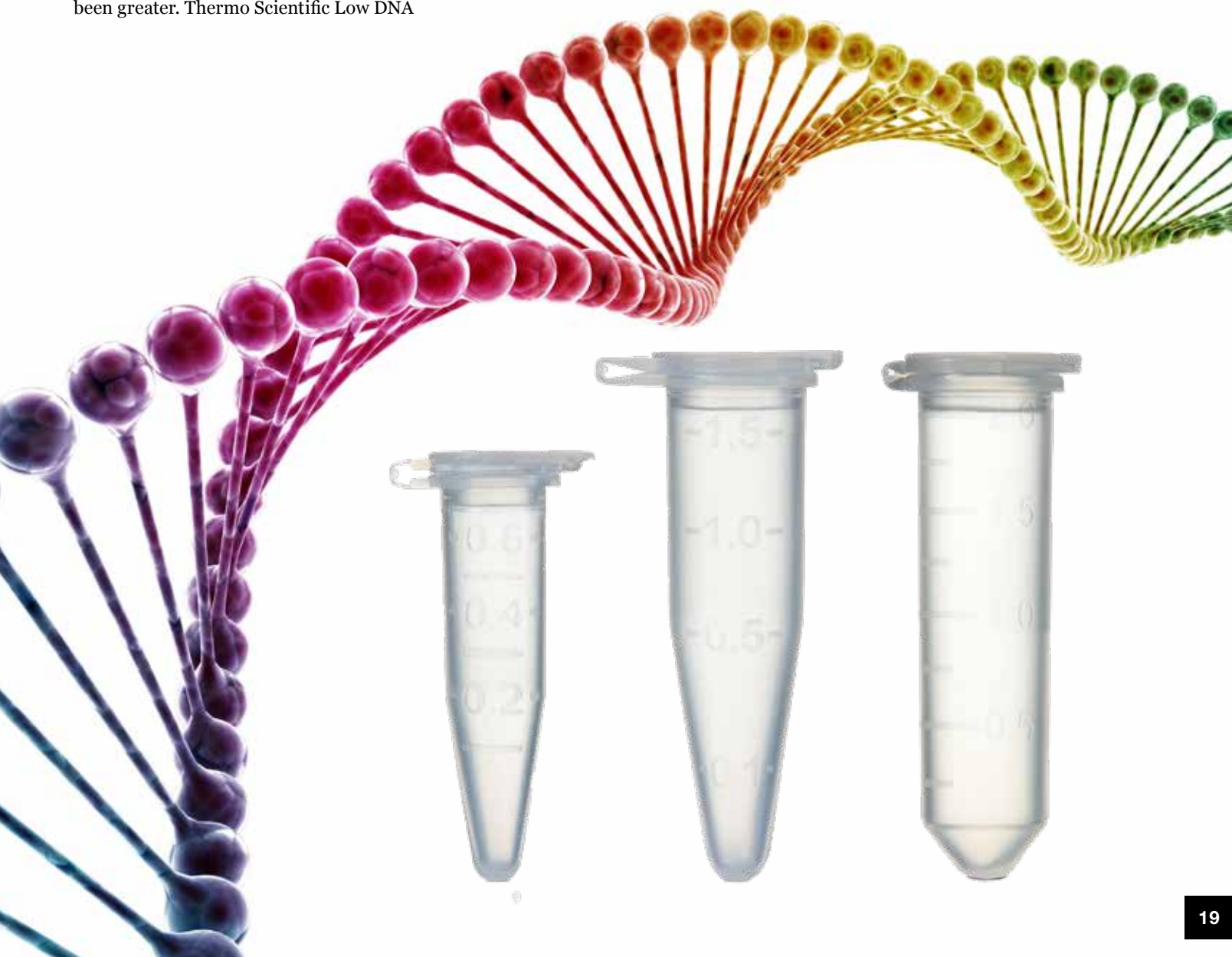
The demand for high-quality, low-binding microcentrifuge tubes that support DNA integrity and sustainability has never been greater. Thermo Scientific Low DNA

Binding Snap Cap Microcentrifuge Tubes, including the Sustain Series, provide researchers with a solution that aligns with their scientific and environmental goals. By reducing DNA loss, achieving high sample recovery, and incorporating biobased resin materials, these tubes support precision in research and environmental responsibility.

As laboratories advance genomic discoveries, making conscious choices about the lab consumables you purchase can lead to more reliable results and a more sustainable future.

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07-000-276	127263-2DG	4 mL, External Thread, Round Bottom



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FEATURED ARTICLE

The Journey from Discovery to Production

Supporting Your Drug Development

By Kylie Wolfe

Taking an idea from the research and discovery phase through commercialization and production is no small task. It requires your undivided attention and dedication, as well as a reliable and supportive partner to help you reach the finish line with fewer obstacles.

Whether you're working on cell and gene therapies, mRNA therapies, or vaccines, having secure and consistent access to the products you need is critical—and the Fisher Scientific channel can serve as your trusted resource.

Essential Products and Services

Your production process relies on access to cleanroom supplies, chemicals, consumables and equipment, and so much more. Having essential products readily available through the Fisher Scientific channel ultimately gives you the time, flexibility, and confidence needed to accomplish any task. It helps you eliminate inefficiencies, stay focused, and get to the production stage faster.


“We work very closely with our customers to help them nurture their molecule along their pathway to get to commercialization in the quickest way possible,” said Mike Nicolazzo, Senior Director and General Manager of Production Products and Services for the Fisher Scientific channel.

Over the last few years, we expanded our product offering across categories that matter to you and now have a complete line of single-use bottle assemblies, additional products like cleanroom socks, and a broader facility safety and maintenance category. These changes help us cater to the unique needs of research and production facilities.

“We work very closely with our customers to help them nurture their molecule along their pathway to get to commercialization in the quickest way possible.”

But we know it takes more than just products to keep your projects moving in the right direction. Our team is also focused on improving laboratory safety and efficiency and providing management solutions, safety trainings, and compliance support. These services help you keep operations running smoothly while creating a safe and productive work environment.

Traceability and Trust

To support your regulatory requirements, we offer the SureTRACE and SureTRACE+ programs, which highlight products with traceability documentation and an enhanced quality guarantee. Products are marked with the shield icon  on fishersci.com to help you make the right selection and maintain the integrity of your production workflow.

With the SureTRACE program, you can identify these products, access certificates for assigned lot numbers, and receive change notifications for relevant products. Through this program, we place an emphasis on getting you the products you need with the right quality checks in place—and that includes sourcing from supplier partners who have committed to our quality agreement.

The SureTRACE+ program provides support from dedicated specialists who are ready to help with inventory planning, single-lot management, warehousing, and more. Through this program, you're assigned a personalized business manager who serves as a point of contact for your questions, as well as a dedicated customer care specialist team to help with on-time delivery. Our team also leads you through the “plan, prepare, protect” process to understand your needs, build your system, and protect critical orders and deliveries, providing both assurance and value.

Productivity and Innovation

The scientific landscape is constantly evolving, and that makes enhancing productivity and innovation a priority throughout your workflow and beyond the lab. To support you, we offer vending, operational productivity, and GMP storage services, as well as FDA, EPA, and OSHA compliance services that help you meet global industry regulations. Assessments and trainings can also help you meet health, safety, and cleanroom standards for critical environments and address hazards and hygiene.

To help maximize your operational productivity, Unity Lab Services provides end-to-end services through a network of support personnel. These services include comprehensive inventory management, order and asset management, vending solutions, chemical services, and more—all to lend a hand during research, scale-up, and production.



continued from page 23

The Journey from Discovery to Production

Supporting Your Drug Development

In addition to these services, we're continuing to innovate and create differentiated technologies. As you push the boundaries of drug development, we'll be here to provide the tools that give your therapies a leading edge. This includes our dedication to more sustainable practices and products, which support the global push for greener operations and your own sustainability goals.

A Trusted Partner

Having a consistent partner bolsters your success from the early stages of discovery through all the steps that follow. It's an important aspect of scientific advancement and innovation because, with a reliable partner by your side, you're able to focus your time and attention on your research, development, scale-up, and production.

"Every step of your journey, you have a partner that can help guide you," said Nicolazzo. The Fisher Scientific team can help you with the logistics of inventory management and operational challenges, like compliance solutions, making it possible to keep your production workflow moving.

With a partner who understands your business needs, such as the ins and outs of developing, producing, and manufacturing critical technologies and treatments, you can go the distance for patients and consumers alike.

Growing Together

By addressing your production complexities, providing choice and convenience to simplify your purchases, and meeting your requirements for quality and access, we're able to provide essential solutions that help you and your team get important products to market.

"The Fisher Scientific channel wants to partner with you on your clinical journey so we can grow alongside you and provide you with unparalleled support from molecule to medicine," said Nicolazzo.

With a partner that understands your business needs...you can go the distance for patients and consumers alike.

No matter your industry, we're here to empower researchers like you to maximize the efficiency and effectiveness of your endeavors—all in the pursuit of scientific excellence and a brighter future.

For more information about the essential production products and services that the Fisher Scientific channel can offer, visit fishersci.com/production.

Kylie Wolfe is a Thermo Fisher Scientific staff writer.



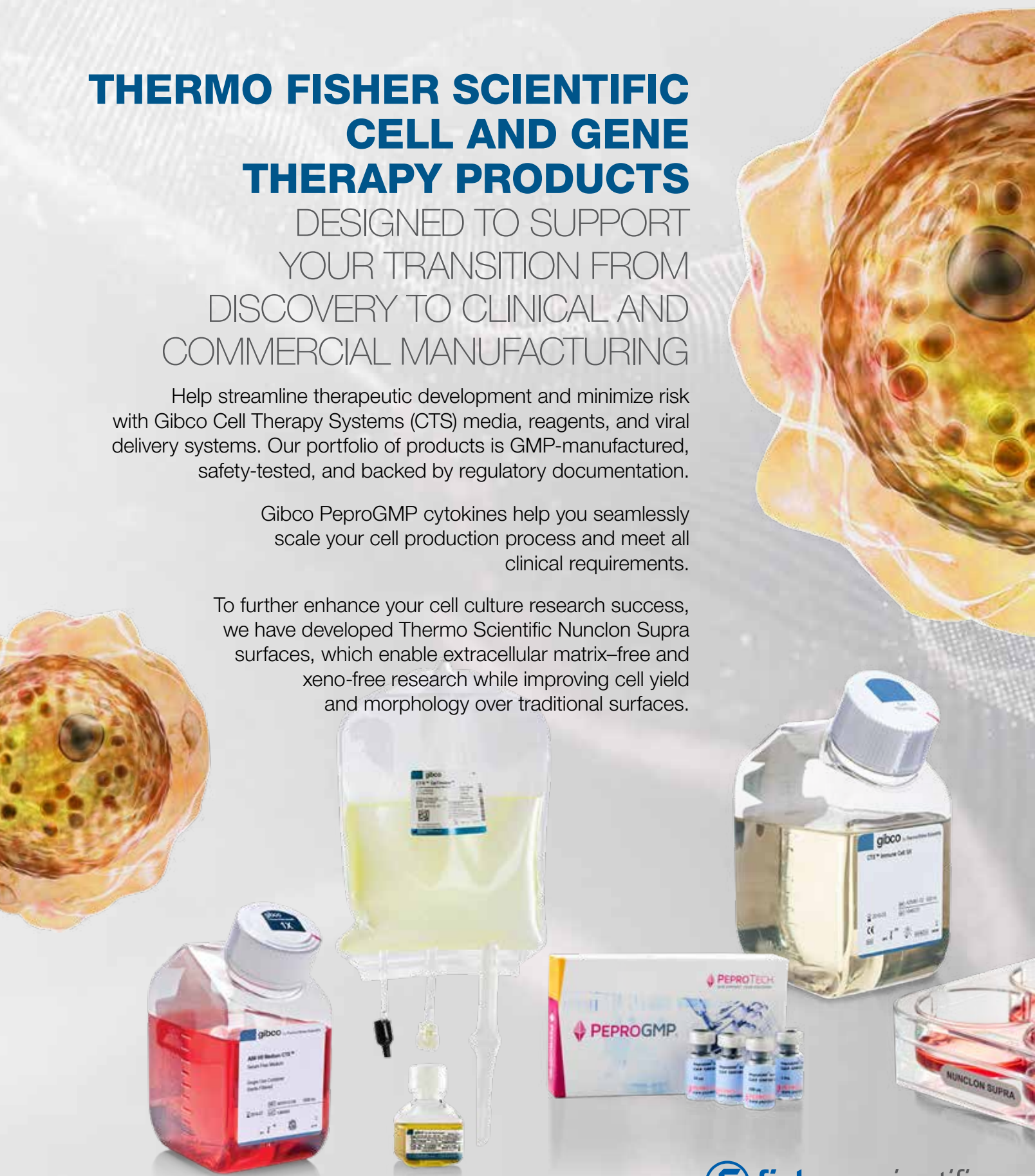
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Ready-to-Use Bioprocessing Bottles:

Enhancing Manufacturing Workflows, Safety, and Cost of Ownership

By Robert Popilock

Specific market trends are increasing the adoption of Ready-to-Use (RTU) glass packaging. For bioprocessing and pharmaceutical fill and finish entities, this adoption may help address operational challenges.

RTU is a term that commonly references the condition of primary packaging components prepared to strict regulatory standards. This includes removing particulate matter, microorganisms, and endotoxins and sterilizing in secondary packaging for direct entry into the aseptic drug filling core.

RTU packaging is a well-established solution for pharmaceutical fill and finish applications. RTU preparation has experienced rapid adoption by compounders and clinical and commercial small-batch packagers of sterile injectable drug products. This is driven by the need to accelerate development, simplify workflows, reduce risk, and improve operational costs.

The strong adoption of RTU packaging for pharmaceutical fill and finish applications suggests RTU bottles for bioprocessing applications to be a fast follower.

RTU Glass Bottles for Bioprocessing: Rising Opportunities

Bottle-based CCS components are mostly used for the preparation and storage of highly complex biologics, including high-value APIs. Such containers typically consist of Type I borosilicate glass, exhibiting a low extractable profile, excellent chemical resistance and barrier properties, and transport durability. DWK Life Sciences DURAN Bottles are the market-leading packaging solutions. They have been specifically designed as a biotech and pharmaceutical Good

Manufacturing Practice (GMP) in-process and packaging container system, meeting the regulatory compliance and quality control standards required for the safe storage and transport of HP/APIs.

DWK Life Sciences, as a leader in bioprocessing bottle solutions, has extensive experience in providing RTU services for bottles. Their flexible platform helps enhance and mitigate risks within biopharmaceutical workflows. DWK offers various processing services, each with regulatory certification:

- **Washing or Particulate Cleaning:** Subvisible particles are removed using purified water or Water for Injection (WFI), IPA wash, and HC wash to achieve specific Total Organic Carbon (TOC) levels. Washed bottles are certified according to USP <788> and EP 2.9.19 for microscopic particle counts.
- **Depyrogenation:** Endotoxins are removed to meet acceptable limits defined by regulatory bodies. This process involves dry heat treatment in an ISO 7 cleanroom using a GMP ISO 5 oven with HEPA-filtered air. Bottles are certified according to USP <85> and EP 2.6.14 for bacterial endotoxin reduction, with a maximum of 0.25 EU/mL.
- **Sterilization:** The final step in processing involves sterilization via steam, gas, or radiation, performed in the bottle's secondary packaging configuration. This process ensures compliance with USP <71> and EP 2.6.1, which defines acceptable Sterility Assurance Levels (SAL) of 10^{-6} for direct entry into aseptic environments.

DURAN RTU bottles are complimented with RTU closures that help ensure system-level compliance to regulatory standards for the sterile manufacturing and safe delivery of drug products.



Partnering with an RTU Expert

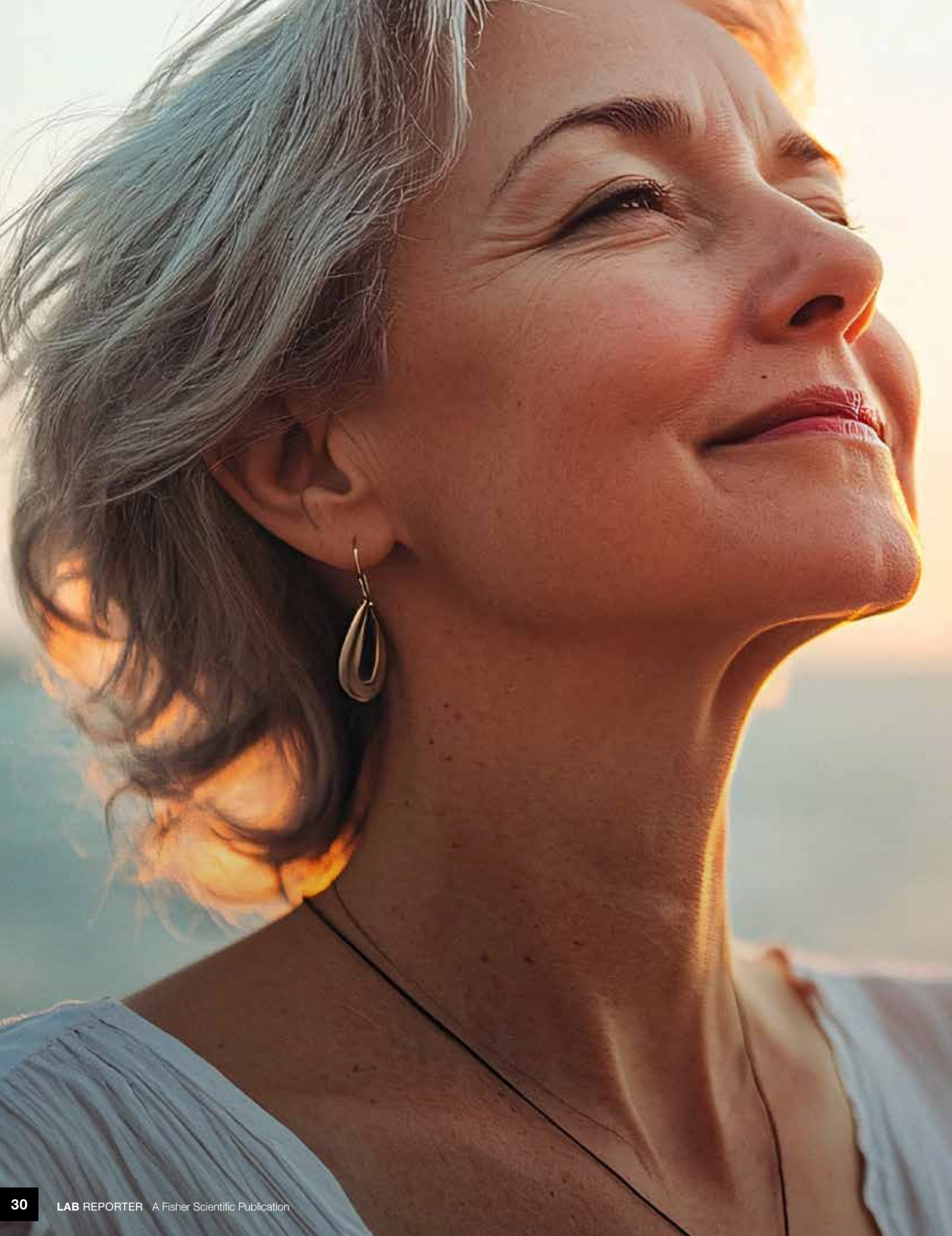
To enhance operational flexibility and meet stringent regulatory guidelines, the Fisher Scientific channel has partnered with DWK Life Sciences to provide RTU bioprocessing bottles. This collaboration offers several key benefits:

- **Reduced Complexity:** DURAN RTU bottles are pre-prepared for direct entry into the aseptic fill area, eliminating the need for costly inline processing while improving operational efficiency.
- **Reduced Risk:** RTU components undergo validated processes and meet global regulatory standards, reducing the risk associated with handling and processing.
- **Increased Efficiency:** RTU components can be processed, packaged, labeled, and analyzed to meet specific operational needs, streamlining manufacturing workflows.
- **Simplified Sourcing:** RTU bottles and container closure systems simplify the supply chain, providing critical compatibility and reducing sourcing complexity.

Contact your Fisher Scientific sales representative to learn more about DWK Life Sciences DURAN RTU bottles and how they can help you improve workflows, reduce risk, and meet TOC objectives.

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Timing Matters: What the New Science of Menopause Reveals

By Dawn Patton Mangine

As women live longer, a greater percentage of their lives will be spent in their menopausal years—nearly 40 percent. Menopause and the transition leading up to it, called perimenopause, can cause significant health changes. As estrogen production declines, people experience irregular menses, night sweats and hot flushes, insomnia, brain fog, and weight gain, among other detrimental effects. Once past menopause, which is diagnosed when a woman ceases to have menses for 12 months, more serious health conditions, such as dementia, heart disease, and osteoporosis, can arise.

While menopause is usually the natural result of aging, it can also be the result of certain surgeries, cancer treatments, or drug treatments. The good news is that researchers are discovering new ways to better protect the overall health of people experiencing perimenopause and menopause.

Research, Past and Present

Doctors began treating menopause symptoms in the 1940s with a combination of estrogen and synthetic progesterone (progestin). This changed in 2002, when a report from the Women's Health Initiative (WHI), a long-term national health study in the United States, showed troubling results. This report indicated that hormone replacement therapy (HRT) had adverse health outcomes, including increased risks for heart attack, breast cancer, dementia, and stroke.

However, further examination of the results provided new insights into HRT, as explained in "The Women's Health Initiative Randomized Trials and Clinical Practice," a review published in *JAMA*. Women from the study who started HRT ten years or later after menopause and those taking combined hormones had the worst outcomes. In contrast, women taking only estrogen showed lowered risk for heart disease and decreased rates of breast cancer.

They also discovered that the timing of what is now called menopausal hormone therapy (MHT) impacted long-term health, with the most effective treatment starting in early menopause or before age 60. They concluded that MHT delivered at the right time protects heart, bone, and brain health.

In addition, the follow-up study indicates more effective treatment depends on the types of hormones and how they are administered. For example, bioidentical hormones in lower doses may further reduce risks, as well as using estradiol transdermal patches or creams instead of oral medications. The effects of post-menopausal treatment with progesterone and testosterone are also being studied.

More research is needed to identify the full extent of the benefits and risks of long-term MHT.

Extending Fertility to Extend Life

Another exciting frontier in women's healthcare includes attempts to extend the life of ovaries, which are primarily responsible for producing estrogen. Research titled "Short-term rapamycin treatment increases ovarian lifespan in young and middle-aged female mice," published in *Aging Cell*, revealed that rapamycin, an oral immunosuppressant drug approved to prevent organ-transplant rejection, slows the aging of ovaries in mice.

Two researchers at Columbia University intend to study the effects of rapamycin on human ovaries, too. Their work is published in the article "The Validating Benefits of Rapamycin for Reproductive Aging Treatment." As of 2024, Yousin Suh, a professor of reproductive sciences and genetics and development at Columbia, and Zev Williams, an associate professor of women's health and the chief of reproductive endocrinology and infertility at Columbia University Irving Medical Center, were recruiting for a study they hope will include over one thousand women ages 35 to 45.

Suh says early indications from a small human study suggest the drug can decrease ovary aging by nearly 20 percent, which would extend fertility, delay menopause, and increase lifespan by 9 to 14 percent. She reports that early participants have described improved health, memory, and energy levels.

Scientists are also studying the effects of slicing and freezing pieces of ovaries to preserve ovarian function, as explained in the *American Journal of Obstetrics & Gynecology* article "Modeling delay of age at natural menopause with planned tissue cryopreservation and autologous transplantation." Although this method is more invasive, reimplanting frozen ovarian tissue has restored fertility in some patients who have undergone chemotherapy. In theory, freezing ovarian tissue when a woman is younger and reintroducing it years later could extend fertility and stave off menopause.

Embracing the Change

Although menopause is inevitable, by extending fertility or replacing decreasing hormones, one's latter years can be improved through timely therapeutic interventions. By reassessing past research and undertaking new studies, the hope is that perimenopause and menopause symptoms will be better understood, treated, and prevented and help all women enjoy longer and healthier lives.

Dawn Patton Mangine is a Thermo Fisher Scientific staff writer.

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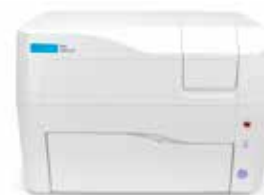
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Alcohol's Buzzkill: New Industry Trends and Cancer Research

By Kelley Northam

Last Call for Alcohol?

Have you visited a brewery or bar recently? You may have noticed some new non-alcoholic menu options. The availability of non-alcoholic beers, wines, and mocktails is on the rise. The CNBC article “As booze alternatives take off, more nonalcoholic drink makers promote health benefits as the next buzz” reports that, according to data from NCSolutions, more than 40 percent of Americans planned to consume less alcohol in 2024. This data also notes that 61 percent of respondents from Generation Z (people born between 1997 and 2012) planned to drink less. In fact, according to the consumer insights and data company, Numerator, Gen Zers over 21 consume the least amount of alcohol compared to all other generations.

Since more people of all ages are drinking less, the demand for non-alcoholic beverages, also known as functional beverages, is growing. In fact, the global functional beverage market is projected to reach \$249.5 billion by 2026, according to 2022 research by Euromonitor cited by CNBC. Functional beverages include products like probiotic soda, kombucha, and enhanced water, and advertise health benefits like improved digestion, increased energy, and stress relief.

But this doesn't mean that your favorite bar won't be packed on a Friday night—many establishments now offer non-alcoholic beverages to appeal to these consumer trends. That said, researchers are still trying to determine the cause of alcohol's decline. According to the Cleveland Clinic article, “Is Generation Z Drinking Less?,” current theories range from increased mental and physical health awareness to increased cannabis use.

Alcohol's Cancer Risk

This decline also coincides with new research on the correlation between drinking alcohol and developing cancer. Referencing a large body of scientific evidence, the U.S. Surgeon General recently published an advisory entitled “Alcohol and Cancer Risk.” Cited in this advisory, the National Cancer Institute (NCI) found that consuming alcohol increases the risk of developing seven types of cancer, including:

- Mouth (oral cavity)
- Throat (pharynx)
- Esophagus
- Voice box (larynx)
- Liver
- Breast (in women)
- Colon and rectum

The NCI also found that the more someone drinks, the higher their risk. This applies to those who only have one drink a day and binge drinkers. According to the NCI, women who have four or more drinks in one sitting and men who have five or more drinks in one sitting are considered binge drinkers.

Another study cited in the advisory, “Alcohol and Cancer: Epidemiology and Biological Mechanisms,” originally published in *Nutrients*, found that there are four main ways alcohol can cause cancer:

- **Acetaldehyde:** Alcohol metabolizes into acetaldehyde in the liver, which can damage DNA
- **Oxidative Stress:** Alcohol causes oxidative stress—in other words, an imbalance of free radicals and antioxidants in the body. Oxidative stress is known to harm DNA, proteins, and cells and cause inflammation
- **Hormone Levels:** Alcohol can cause hormones levels, like estrogen, to fluctuate, changing breast tissue and damaging DNA
- **Carcinogens:** Alcohol alters mouth and throat cells, which allows carcinogens to be more easily absorbed

This new research may be overwhelming and even frightening, since sharing a drink with friends or loved ones has deep cultural and social roots. However, the advisory suggests that awareness is what's key. With this new information, you can take control of your risk by considering if (or how much) you want to drink on a given occasion.

Products for All Pours

Both industry trends and cancer research suggest that alcohol may be on its way out. But functional beverages seem to be picking up the tab.

Whether its cocktails or mocktails, the Fisher Scientific channel is here to help you navigate industry and health trends and serve your beverage testing needs. Visit fishersci.com/food-beverage-testing or fishersci.ca/food-beverage-testing for analysis, safety, and testing products.

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Kelley Northam is a Thermo Fisher Scientific staff writer.

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4 Tips for Staying Focused to Help Improve Your Productivity

By Gina Wynn

In the lab or the office, working with precision and efficiency is essential for producing accurate results and maximizing the company budget. However, frequent interruptions from text or email notifications, for example, can derail these goals for even the most conscientious workers.

The rise of technology has made society increasingly dependent on cell phones, computers, and other devices that connect us to websites and apps designed to make our lives easier. And while they do enable real-time communication and unparalleled access to information, studies show that they may be hijacking our attention spans and productivity and decreasing the quality of our performance.

How to Help Reclaim Your Focus

Depending on the complexity of your task, it can take eight to 25 minutes to regain your focus after an interruption, according to University of California (UC) Irvine research cited in the UC Berkeley article “The Impact of Interruptions.” Task-switching can also affect the quality of your work. UC Irvine data shows that it only takes a 2.8-second interruption to cause you to make twice the number of computer errors.

Here are a few things you can do to help tune out the barrage of distractions you’re exposed to during the day, according to Johan Hari, author of “Stolen Focus, Why You Can’t Pay Attention—and How to Think Deeply Again:”

1. Commit to Tasks in Advance and Stick to Them

To avoid interruptions and task-switching and improve focus, you must first commit to changing your behavior. Plan to turn off the sound on your phone and keep the device in your bag or a locker while you’re at the bench—and stick to your plan. You can also commit to turning off your notifications for email and other workplace communication platforms on your devices and designate times for when you’ll check your messages every day.

2. Seek Out a Flow State

If you have trouble tuning out the distractions preventing you from completing a task, make a conscious decision to regain your concentration. In his book, Hari emphasizes the importance of achieving a flow state when you work, recounting his interview with psychologist Mihaly Csikszentmihalyi, the developer of flow theory.

“This is when you are so absorbed in what you are doing, that you lose all sense of yourself, and time seems to fall away,” Hari

described. You can only achieve flow by monotasking, and it requires all your brain power to be dedicated to accomplishing one goal that is meaningful to you. Flow states can make difficult tasks painless and even pleasurable, and lead to greater productivity.

3. Take Time Away from Social Media

By design, social media aims to hold your attention as long as possible to fix your eyeballs on revenue-generating ads. Social media companies and other tech firms track our demographic information and preferences. This helps them create algorithms for serving up content that suits our interests and evokes emotion to keep us engaged.

Consequently, when we think we’re going to check our feeds for a few minutes, we may end up scrolling through rapidly changing content for hours, which takes a toll on our ability to focus on larger chunks of information.

Take steps to reverse some of this damage by taking periodic long-term breaks from social media. You can announce to your friends when you leave and come back so they know when they can expect to hear from you.

4. Let Your Mind Wander

If you need to run an errand in your building or grab a coffee in the cafeteria, leave your phone behind. It’s important to let your mind wander away from your immediate surroundings during your downtime to connect your past and recent learnings, according to Hari. Try going for a lunchtime walk and give your mind time to roam. You’ll return refreshed and have better ideas.

Be Mindful of Potential Pitfalls

If you feel like your mind isn’t as sharp as it used to be and you find your attention-span waning, don’t despair. Just being conscious of the factors that are working against our ability to think deeply is a step in the right direction. As individuals, we might not be able to control the broader changes taking place in society, but we can control our own efforts to reclaim focus in our personal lives and at work, where precision and productivity are paramount.

Gina Wynn is a Thermo Fisher Scientific staff writer.



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