Clinical, Food & Beverage, Pharma

The Next Era of Microbiology

Cultivating a culture you can trust

Our Mission in action

At Thermo Fisher Scientific, we are committed to enabling our customers to make the world healthier, cleaner and safer. Supporting microbiologists in their pursuit of discovery is core to this Mission. From advancing antibiotic resistance monitoring to upholding food safety to improving the production and quality assurance of pharmaceuticals, our tools have aided microbiology leaders in their essential work since 1924.

From base peptone formulations to pre-prepared media and beyond, our products meet rigorous standards of quality, consistency and control. Serving a global network of customers within all sectors, our offerings—under brands Thermo Scientific™, Oxoid™ and Remel™—form an essential part of the Thermo Fisher Scientific specialty diagnostics portfolio. Our legacy of microbiology expertise reflects a demonstrated history of adapting to evolving industry and customer needs. Now more than ever, customers require high-quality microbiology products that are versatile, reliable and offer strong value. Through investments in new, state-of-the-art manufacturing facilities, we are enhancing our ability to deliver premium products that meet the highest industry standards.

Our dedicated team is committed to unlocking a new era of microbiology excellence, empowering our customers to diagnose infectious disease, combat foodborne illness, and ensure drug manufacturing microbial safety.

Today's State of Play

In just 150 years, rapid advances in microbiology have revolutionized how we study microbes, detect bacterial contamination and safeguard human health. While culture media is often the foundation of many microbiology workflows, historical breakthroughs in rapid testing methods demonstrate that this field is continuously evolving.

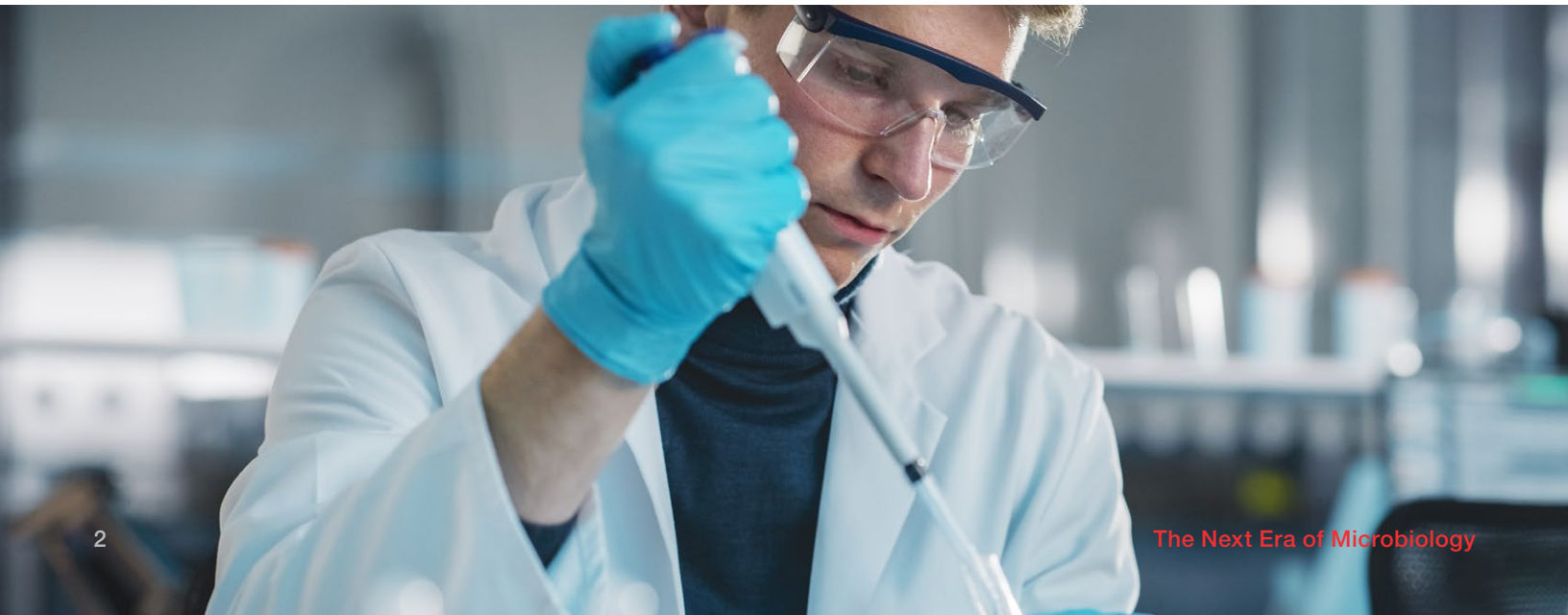
Today, microbiology approaches another point of transformation. Technological innovations—including artificial intelligence (AI) and advanced automation—offer microbiology leaders an opportunity to raise the bar for speed, efficiency and precision in testing.

Moreover, as organizations across sectors increasingly prioritize sustainability and environmental stewardship, minimizing waste and resource consumption has become a key area of focus.

Given the profound impact of microorganisms on individuals, communities and the environment — microbiology is rightfully termed the "heart of health."

Continued progress in this field is essential. Perhaps nothing underscores this more than the rapid rise of drug-resistant pathogens, which could contribute to nearly 40 million deaths by 2050.[1]

This challenge is just one among many facing microbiology leaders. From clinical diagnostics to pharmaceutical production and quality assurance to food and beverage safety, microbiology is at the core of the world's most vital industries. All sectors will play a role in shaping its future.



Core challenges in microbiology

Global laboratory talent shortages

As microbiology testing demands continue to rise, the global supply of skilled laboratory professionals remains insufficient to keep pace with these applications. In the United States, clinical laboratories require upwards of 25,000 additional workers, and in the United Kingdom, shortfalls are even more severe, with a need for 700,000 technicians across sectors by 2030.[23]

This shortage is driven, in part, by academic programs shifting focus toward more application-based sciences, often at the expense of foundational disciplines like microbiology. In any case, fewer graduates entering the workforce pose a critical threat to laboratory productivity. And with less staff equipped with specialized training and expertise in microbiology, skilled talent shortages may also impact testing reliability. This trend could exert untold impact on patient outcomes and food safety.

Compounding the issue, economic uncertainty—expressed through rising supply costs and fluctuating demand—pressures labs to deliver more with fewer resources. These financial constraints limit investments in new equipment and inventory, intensifying operational challenges.

> “Within the next 20 to 30 years, multidrug-resistant pathogens could become the leading cause of death worldwide.”
>
> **Federico Pea,** MD
> Professor and pharmacology clinical lead

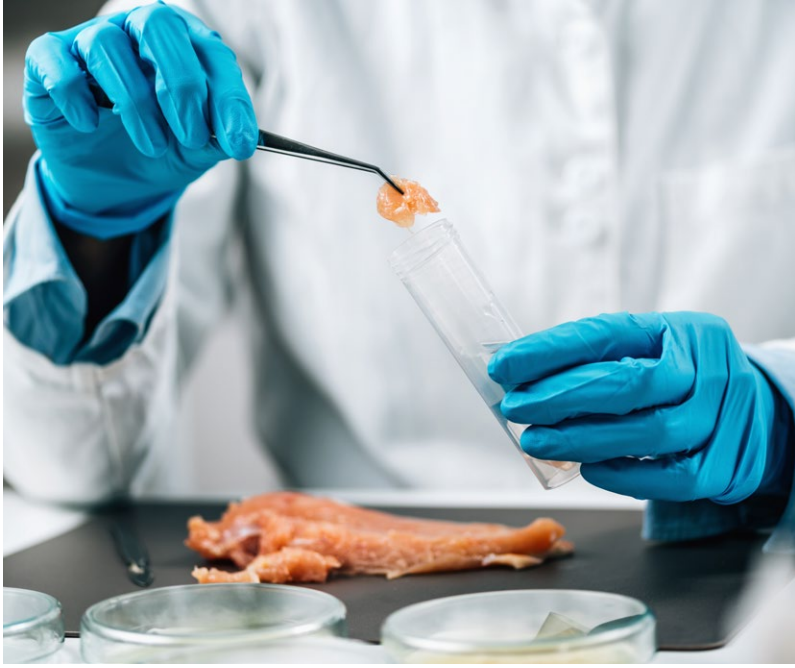
The rise of antimicrobial resistance

Fueled by the overuse of antibiotics in healthcare, agriculture and other settings, as well as human-animal interactions, antimicrobial resistance (AMR), is a critical public health concern. Worldwide, AMR is responsible for an estimated 1.27 million deaths each year and cases remain on the rise as new mutations produce treatment-resistant strains.[4]

Clinical laboratories are at the forefront of detecting and screening AMR bacteria in samples. To accelerate antimicrobial susceptibility testing (AST), they need reliable, flexible culture media and automated solutions that reduce time-to-detection and ensure reproducibility.

As government agencies, researchers, and industry leaders join forces to combat the emergence and spread of AMR, the clinical sector will play a pivotal role in helping stakeholders better understand resistance patterns.

> As new treatment regimens for drug-resistant tuberculosis, Mr. Derek Armstrong, International Laboratory Coordinator for the TB Research Center at Johns Hopkins University, emphasizes the importance of innovation and collaboration:
>
> “The fight against TB is not something that one lab or one group can solve. By adopting advanced antimycobacterial testing methods like the Sensititre plates* and collaborating across agencies, we can identify emerging resistance patterns and coordinate effective responses. The inclusion of new drugs on these testing platforms allows us to provide comprehensive insights.”
>
> ** For research use only. Not for use in diagnostic procedures.*



Food safety and globalized supply

Each year, foodborne illnesses result in nearly 600 million cases of disease and 420,000 deaths globally.[5] Pathogens and biological contamination in food supplies are central to this burden and represent a major risk to global food safety.

For food and beverage manufacturers, reducing contamination starts with identifying harmful microbes. However, as bacteria like *E. coli* or *Salmonella* mutate and adapt to favorable environmental conditions, traditional testing methods may fail to detect new variants. Food safety labs must adapt more effective solutions to accurately identify new strains, protecting public health and restoring consumer trust.

Further, with increasingly complex global supply chains, laboratories also need adaptable testing methods suited to various regions and settings. Prepared media is one solution that offers greater testing efficiency by eliminating the need for labor-intensive steps like weighing and autoclaving, while reducing storage demands—an important benefit for smaller labs.

Chromogenic media further streamline the identification of both pathogenic and non-pathogenic organisms, enabling faster and more reliable detection of emerging variants. In addition, polymerase chain reaction (PCR) testing enables rapid,

Evolving drug safety and manufacturing demands

Catalyzed by the COVID-19 pandemic, pharmaceutical manufacturing has undergone profound industry transformation. From accelerated approvals to expanded outsourcing, the change over the last five years sets a new standard for accelerated drug production and increased manufacturing capacity.

Today, pharmaceutical manufacturers are under pressure to produce sterile pharmaceuticals, vaccines and biotechnology products more rapidly, while meeting evolving regulatory and quality assurance standards. Concurrently, market dynamics are shifting, with rising demand for personalized medicine, chronic disease treatments and therapeutics for aging populations.

To meet growing demands, microbiologists require streamlined testing solutions supporting consistency and confidence in results. In addition, regulatory bodies such as the Food and Drug Administration (FDA) and European Medicines Agency (EMA) are increasing scrutiny, making robust quality control (QC) more essential than ever.

The next stage of innovation

AI will play a critical role in new testing innovation, helping microbiologists interpret results and make diagnostic decisions. In landmark studies, AI models trained on bacterial datasets matched expert assessments with over 95% accuracy. With continued development, AI may enable microbiologists to analyze test results faster—a powerful solution for overcoming talent shortages and resource limitations.

In addition, advanced and emerging testing methods, such as genetic testing and rapid AST, have the potential to address microbiology's top challenges.

But technological transformation extends beyond the benchtop. Industry 4.0—or the new standard for microbiology manufacturing driven by end-to-end automation, interconnected networks, and intelligent systems—will be key to scaling global microbiology operations.

In the coming years, innovation in microbiology will redefine standards for quality, accuracy and productivity, revolutionizing patient care, advancing public health and powering the production of novel treatments. Partnership with future-forward microbiology solution suppliers like Thermo Fisher Scientific will enable clinical laboratories, food and beverage manufacturers and pharmaceutical manufacturers to thrive in this new era.

Cultivating confidence through global partnership

> "With Thermo Scientific's methods, we have managed to reduce costs and overhead, as well as simplify training. People are prone to making mistakes and one of the best things about Thermo Scientific's workflows is that they are intuitive and straightforward by nature, enabling us to reduce human error."
>
> **George Owen,**
> General Manager Westward Laboratories

At Thermo Fisher Scientific, we understand the pressures our customers face to deliver high-quality products and services in today's competitive landscape. To help customers meet evolving consumer demands or improve clinical outcomes, we offer more than microbiology products—we provide the expertise, technical support and industry-validated tools that empower labs, hospitals, manufacturers and public health agencies to stay ahead of the curve.

Our customer-first approach is underscored by the following:

- **Time-honored expertise:** For over a century, we have served the global microbiology community thriving through change as partners in progress. From initiating the early commercialization of peptones to advancing antibiotic susceptibility testing, this legacy of discovery informs our depth of knowledge and has empowered us to thrive through change.
- **Dedicated partnership:** We work closely with customers to align testing outcomes with long-term organizational goals. As many of our team members are former laboratory professionals themselves, our partnership is informed by a deep understanding of your environment and the complex issues you face.
- **Reliable delivery:** With 2.3 million product lines shipped yearly, our global distribution network spans 230 countries and 13 manufacturing facilities. Driven by in-house peptone production, we have control over the entire prepared media production cycle, offering customers a hedge against supply chain fluctuations.
- **Global footprint:** Serving a global network of over 600,000 customers, our solutions are tailored to address the unique challenges, regulatory requirements and market demands of clinical diagnostics, food and beverage safety testing and bio/pharmaceutical sterility and quality control.

Positioned for continued growth

Thermo Fisher is making strategic investments to enhance the technical and operational capabilities of our global manufacturing network. These actions are designed to meet rising demand for high-quality microbiology solutions across diverse industries.

To support our customers closer to where they are, we have 13 sites focused on microbiology solutions and providing support globally, ensuring there's a regional hub to support all major markets.

We recently invested $20 million to enhance our facility in Lenexa, Kansas, USA. Upgrades at the Lenexa site include production area enhancements to accelerate the development of in-demand tools and supplies such as dehydrated culture media, diagnostic kits and prepared media. The site now features a fully upgraded preparation area and clean rooms.

Guided by a comprehensive facility audit, this initiative implemented targeted improvements to optimize energy efficiency, reduce production costs and enhance speed-to-delivery.

We have also invested $50 million in state-of-the-art expansions at our facilities in Basingstoke, Hampshire (UK) and Wesel (Germany). These upgrades strengthen our in-house peptone production capabilities, fortifying a strong, reliable source of supply to support long-term growth projections in Europe.

In total, our US and UK expansions support a **40%** gain in overall manufacturing capacity.

To achieve Industry 4.0, these sites and others across our global network integrate industry-leading automation technologies, including sensors, robotics and advanced connectivity software, across all areas of the production lifecycle. With increased automation, we expect to see a significant reduction in the need for manual interventions, thereby minimizing contamination risks and human error. In many of our facilities, raw materials now move from production lines to warehouses without ever touching human hands.

Our commitment to sustainability

Amid these operational updates, we've also committed to supporting sustainability for our customers by delivering environmentally responsible products while maintaining operational excellence. At the heart of our sustainable approach is partnership. Our supply chains provide customers with cleaner, greener products, furthering their own corporate social responsibility initiatives. Across our global facilities, our environmental, health and safety management systems are compliant with the latest environmental standards.

By leveraging process data, we have significantly reduced water usage and cardboard waste, contributing to a **30%** overall reduction in total waste.

Our facility expansions also integrate energy efficient equipment and sustainable technologies.

To fulfill our mission of delivering a comprehensive range of microbiology products across our global network, we have embedded sustainability at the source—partnering with suppliers who prioritize environmental responsibility. Our raw materials, lab equipment and other vital goods are sourced from suppliers that meet rigorous criteria for health and safety, labor practices and environmental stewardship. With enhanced manufacturing capacity for raw materials, we have greater confidence that every stage of our production lifecycle aligns with our environmentally responsible values.

Together, these efforts help drive Thermo Fisher Scientific's long-term sustainability goals, including our commitment to achieving net-zero carbon emissions by 2050.

Building a thriving microbiology culture

Microbiology is at the heart of health, and your dedication inspires us.

Across clinical diagnostics, food and beverage safety and bio/pharmaceutical sterility and quality assurance, today's organizations face increasingly complex challenges driven by a dynamic microbial landscape. These challenges are compounded by rising antimicrobial resistance, globalized supply chains and heightened regulatory scrutiny.

Access to high-quality solutions, including reliable culture media, is essential for managing industry-specific health and safety risks, while advancing diagnosis and treatment.

For more than 100 years, Thermo Fisher Scientific has led the way, offering a broad range of microbiology products, instruments and services to support the evolving needs of our customers worldwide.

Our steadfast commitment to sustainability, strategic capacity expansion and dedicated partnership has made us the partner of choice for microbiology professionals across the globe.

Together, let's cultivate a thriving microbiology culture that supports you today and well into the future.

Discover how we can support your microbiology needs at www.thermofisher.com/trustmicrobiology.

Resources

1. Choose QC products your laboratory can rely on
2. Microbiology and climate change: Building a sustainable future together
3. Our health is all connected: Combatting AMR through One Health
4. The Future of AST: Towards faster results and quicker clinical decisions
5. Thermo Fisher Scientific Supplier Code of Conduct
6. Tailored Delivery Solution

References

1. Naddaf M. 40 million deaths by 2050: toll of drug-resistant infections to rise by 70%. Nature. (2024) https://www.nature.com/articles/d41586-024-03033-w
2. Schlingman, JP. Medical Technologist Demand Exceeds Supply by Large Margin Across the United States as Clinical Laboratories Scramble to Stay Fully Staffed. Dark Daily. (2022) https://www.darkdaily.com/2022/12/12/medical-technologist-supply-exceeds-demand-by-large-margin-across-the-united-states-as-clinical-laboratories-scramble-to-stay-fully-staffed/#:~:text=According%20to%20Forbes%2C%20the%20US,tests%20to%20the%20existing%20workload
3. Nicholls, M. Addressing the critical lack of skilled lab workers. Healthcare in Europe. (2020) https://healthcare-in-europe.com/en/news/addressing-the-critical-lack-of-skilled-lab-workers.html#:~:text='The%20skills%20shortage%20within%20the,of%20collapse%2C'%20Kennerley%20added
4. Salam MA, Al-Amin MY, Salam MT, Pawar JS, Akhter N, Rabaan AA, Alqumber MAA. Antimicrobial Resistance: A Growing Serious Threat for Global Public Health. Healthcare (Basel). (2023) https://pmc.ncbi.nlm.nih.gov/articles/PMC10340576/
5. World Health Organization (WHO). WHO Global Strategy for Food Safety 2022-2030. (2022) https://iris.who.int/bitstream/handle/10665/364638/9789240061200-eng.pdf?sequence=1&isAllowed=y
6. Sabelli C. An AI system helps microbiologists identify bacteria. Nature Italy. (2023) https://www.nature.com/articles/d43978-023-00167-9