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India's Push for True Self-Reliance in Molecular Biology

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Modern biotechnology's most visible achievements like diagnostic breakthroughs, genomic sequencing platforms, and biologic therapeutics, rest on a less visible but equally critical foundation: an extensive ecosystem of enzymes, reagents, and kits that supply research laboratories, diagnostic centres, pharmaceutical companies, and biotechnology firms. Every PCR test, every genomic sequencing run, and every biologic drug candidate depends on this upstream supply chain, even though these products rarely attract the same attention as the therapies and diagnostics they enable.

In India, this segment of the life sciences industry is entering a period of significant transformation. Over the past decade, advances in molecular diagnostics, genomics, precision medicine, and biopharmaceutical development have driven substantial growth in demand for molecular biology reagents and enzymes. COVID-19 acted as a major catalyst for this shift, exposing the extent of India's dependence on imported enzymes and diagnostic components while highlighting the strategic importance of developing indigenous manufacturing capabilities.

India's molecular biology enzymes, reagents, and kits market is now recognised as one of the fastest-growing segments within the broader life sciences industry, and market estimates vary depending on methodology and scope.

According to Grand View Research, the sector was valued at approximately $615 million in 2025 and is projected to exceed $1.5 billion by 2033, representing a compound annual growth rate of more than 12 per cent. IMARC offers a more expansive estimate, placing the market at nearly $885 million in 2024, with projections reaching $2.4 billion by 2033. While the two estimates differ in absolute terms, both point to the same underlying trend: sustained double-digit growth driven by structural changes in India's healthcare and life sciences landscape.

A related but distinct segment, diagnostic enzymes, is also expanding rapidly, expected to grow from approximately $171 million in 2025 to nearly $378 million by 2033, more than doubling in size over the period.

The Demand Equation: Forces Reshaping Consumption Patterns

Several converging trends are fuelling demand across India's molecular biology reagents and enzymes market, spanning diagnostics, genomics, and biopharmaceutical manufacturing.

Molecular Diagnostics

Over the past several years, molecular diagnostics has moved from a specialised laboratory function to a mainstream component of clinical healthcare delivery. As **Dr Chandrasekhar Nair, Executive Director and Chief Technology Officer of Molbio Diagnostics,** explains, "Demand for molecular testing in India changed permanently after COVID. The capacity built during the pandemic has now transitioned into routine use. PCR has become a standard tool for diagnosing TB, hepatitis, HPV, and a growing range of infectious diseases, while oncology and genetic testing are expanding rapidly. Testing has also moved closer to the patient, rather than being confined to a handful of laboratories in metropolitan cities."

Each of these applications depends on a defined set of specialised enzymes and reagents: Taq polymerase, reverse transcriptase, ligases, and nucleases among them, as well as broader reagent systems that support nucleic acid extraction, amplification, and downstream analysis. However, Dr Nair points to a deeper issue underlying this growth: "The more difficult question is what goes into these kits. A PCR test may carry a Make-in-India label, but the polymerases, reverse transcriptase, probes, and extraction chemistry are still largely imported. This is the level at which true self-reliance must be achieved: in the enzymes, reagents, and raw materials, not just in the final assembly of kits."

He adds, however, that the groundwork for this shift is already underway: "The encouraging part is that the foundation already exists. C-CAMP's InDx programme has shown promise, and facilities like AMTZ in Visakhapatnam, with a focus on indigenisation and backward integration, are helping bring down the cost of entry. The next phase of growth will depend on strengthening this foundational layer so that India can manufacture the building blocks itself and move towards genuine self-reliance."

Genomics

The genomics revolution represents an equally powerful growth driver for the sector. As **Dr Venkataswamy Eswarachari, Associate Vice President of Lab Operations at MedGenome Labs,** explains, "Over the past decade, genomics has moved beyond research studies into wider clinical applications in the areas of oncology, reproductive health, rare disease testing, infectious disease surveillance, and population-scale health initiatives. Clinicians, researchers, and patients are increasingly recognising the value of genomics in enabling earlier diagnosis, improved disease risk assessment, and more personalised treatment decisions. Advances in technologies have also reduced sequencing costs making testing affordable and driving broader adoption."

He continues, "Today, there are large-scale initiatives aimed at understanding genetic diversity, disease susceptibility, and population health. National initiatives such as the Genome India Project, increased funding for biotechnology research, and the establishment of genomics-focused centres are strengthening the country's genomics ecosystem. Private providers, biotechnology companies, and research institutions are creating demand for molecular biology tools and workflow solutions. There is growing interest in multiomics increasing the need for specialised enzymes, library preparation kits, automation solutions, and next-generation research tools. All these combined are generating significant demand for high-throughput sequencing platforms, consumables, and advanced tools."

Liquid Biopsy and Cell and Gene Therapy: Premium Growth Frontiers

Beyond established diagnostic and genomics workflows, certain emerging segments are expected to deliver disproportionate growth. As **Vaibhav Kohli, Vice President of Marketing, Access and Commercial Excellence at Roche Diagnostics,** explains, "The integration of frameworks like the Indian Medical Device Rules (IMDR) is actively reshaping quality standards, pushing the market toward globally validated workflows. While standard diagnostics product lines adapt, Liquid Biopsy in advanced cancer diagnostics and Cell and Gene Therapies (CGT) emerge as the most exponential growth opportunities for premium enzymes, reagents, and diagnostic kits."

He elaborates on the liquid biopsy opportunity: "Liquid biopsy is a surging segment in precision oncology, bypassing invasive procedures. Driven by India's high cancer burden, diagnostic labs are scaling two workflows to track circulating tumour DNA (ctDNA): Next-Generation Sequencing (NGS) Panels, expanding broader multiomics tumour profiling, creating a compounding, consumption-driven demand for high-fidelity extraction reagents, cell-free DNA stabilisers, and library prep enzymes; and Digital PCR (dPCR), powering ultra-sensitive targeted mutation tracking and minimal residual disease monitoring, driving consistent reagent consumption of ultra-pure DNA polymerases and fluorescent probes."

On the CGT front, Kohli notes, "The Indian CGT market is expanding rapidly, headed toward an estimated $1.7 billion by 2027 as domestic giants build localised pipelines, a momentum now heavily reinforced by the newly announced Biopharma SHAKTI scheme (Union Budget 2026-27). This Rs 10,000 crore, five-year initiative acts as a powerful catalyst; by aggressively funding the domestic production of biologics and biosimilars, the government is effectively de-risking and accelerating the country's infrastructure shift."

Biopharmaceutical Manufacturing

The biopharmaceutical sector represents a further major source of demand. India's established leadership in vaccines, biosimilars, and biologics manufacturing requires extensive use of molecular biology tools throughout the drug development lifecycle. Cell line development, gene expression studies, process optimisation, quality control testing, and analytical characterisation all depend heavily on molecular biology reagents, and consumption in this segment is expected to accelerate further as Indian pharmaceutical companies increase investment in biologics and advanced therapy platforms.

Competitive Dynamics: Domestic Capability Building Within a Globalised Supply Chain

India's molecular biology reagents market is increasingly shaped by the interplay between emerging domestic manufacturers and well-established global life sciences companies. While multinational corporations continue to dominate high-end enzyme technologies, Indian firms are steadily building capability across diagnostics, genomics, and reagent manufacturing.

Among domestic success stories, Mylab Discovery Solutions earned national recognition for developing one of India's first indigenous RT-PCR kits during the COVID-19 pandemic, and has since expanded its broader molecular diagnostics portfolio. Molbio Diagnostics has similarly established itself as a leader in point-of-care molecular testing through its Truenat platform, which has gained international recognition for infectious disease detection in resource-constrained settings.

Other established domestic players continue to strengthen India's diagnostics ecosystem through ongoing investment in local manufacturing and product development, including J. Mitra & Co., Yashraj Biotechnology, and Agappe Diagnostics. In the

genomics space, MedGenome has played a significant role in advancing sequencing-based healthcare services and precision medicine applications across the country.

At the same time, multinational companies remain deeply embedded in India's life sciences infrastructure. Thermo Fisher Scientific, QIAGEN, Bio-Rad Laboratories, Roche Diagnostics, Merck Life Science, Agilent Technologies, Illumina, Promega, and Beckman Coulter Life Sciences continue to supply advanced enzymes, sequencing reagents, molecular diagnostic platforms, and laboratory consumables to research institutions and healthcare providers throughout India.

However, the nature of the relationship between India and these global suppliers is evolving. Increasingly, multinational corporations view India not solely as a sales market, but also as a manufacturing and innovation destination in its own right. The expansion of bioMérieux's operations in Hyderabad's Genome Valley, including local production of tuberculosis diagnostic kits and continued investment in research infrastructure, reflects this changing dynamic.

Structural Constraints and Future Trajectory

Despite this progress, meaningful challenges remain. As Dr Nair's observations make clear, India continues to depend on imported high-fidelity polymerases, reverse transcriptase, probes, and extraction chemistry, even where finished kits are manufactured domestically. Developing competitive indigenous alternatives requires sustained investment in protein engineering, fermentation technology, process development, and intellectual property generation.

The long-term outlook for the sector nonetheless remains highly favourable. The emergence of CRISPR-based diagnostics, digital PCR, liquid biopsy technologies, synthetic biology, and cell and gene therapies will continue to generate demand for increasingly sophisticated enzymes and reagents, presenting Indian companies with a significant opportunity not only to reduce reliance on imports, but also to develop globally competitive products and intellectual property of their own.

Toward a New Position in the Global Value Chain

As the market continues to expand, India's molecular biology enzymes, reagents, and diagnostic kits industry is well positioned to become a key enabler of the country's broader biotechnology ambitions. The sector's trajectory reflects a wider transition underway across Indian life sciences: from consumption to innovation, from dependence to capability, and from participation to leadership within the global life sciences ecosystem.

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