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Real Time PCR Market - Global Industry Size, Share, Trends, Opportunity, and Forecast, 2018-2028 Segmented By Product (Reagents & Consumables, Instruments, Software & Services), By Application (Clinical Diagnostics, Research, Forensic), By End-User (Hospitals and Diagnostic Centers, Pharmaceutical, CROs and Biotechnology Companies, Research Laboratories and Academic Institutes, Forensic Laboratories), By Region and Competition

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Abstracts

Global Real Time PCR Market has valued at USD 4.33 Billion in 2022 and is anticipated to project impressive growth in the forecast period with a CAGR of 4.56% through 2028. Real-time polymerase chain reactions (PCR) are molecular biology laboratory techniques that build upon the principles of PCR. In the fields of clinical and veterinary diagnostics, as well as food safety, real-time PCR has gained significant recognition as a well-established technology for detecting, quantifying, and identifying various microbial agents. While the PCR principle may seem straightforward, it is crucial for creators and users of this technology to be aware of specific concerns associated with quantitative PCR (qPCR).

These concerns include the accurate use of terminology and definitions, a comprehensive understanding of the PCR principle, challenges related to data interpretation and presentation, as well as limitations of qPCR in different microbial diagnostic applications. Parameters that are vital for describing qPCR performance also need to be taken into consideration. Furthermore, in real-time PCR, there are two commonly used techniques for detecting PCR products. The first technique involves

non-specific fluorescent dyes that intercalate with any double-stranded DNA. The second technique utilizes sequence-specific DNA probes, which are oligonucleotides labeled with fluorescent reporters. These probes enable detection only after hybridization with the complementary sequence. By addressing these intricate details, researchers and practitioners can ensure the accurate and effective use of real-time PCR in their respective fields, contributing to advancements in molecular diagnostics and microbial analysis.

Key Market Drivers

Rising Incidences of Different Diseases and Genetic Disorders

A study conducted by the Journal of the Royal Society Interface reveals a significant rise in disease levels since 1980. It indicates that nearly 30% of diseases are responsible for a staggering 80% of outbreaks, highlighting the urgent need for effective disease prevention and management strategies. Furthermore, genetic disorders have become increasingly prevalent in recent times, posing a major challenge to global healthcare systems.

According to the World Health Organization (WHO), genetic disorders now account for over 28% of hospital admissions and are a leading cause of childhood mortality, contributing to almost 50% of childhood deaths. These statistics underscore the critical importance of prenatal diagnosis and carrier testing for genetic disorders. In this context, quantitative polymerase chain reaction (qPCR) have emerged as the preferred techniques for accurate and reliable genetic testing. qPCR has long played a pivotal role in diagnosing diseases by investigating bacteria and viruses, while dPCR, although still an emerging technology, has demonstrated its ability to enhance the detection of extremely precise gene mutations.

The advancements in real-time PCR technologies have propelled the market forward, opening up new possibilities for improved disease diagnosis, genetic screening, and personalized medicine. As researchers continue to uncover the complexities of the human genome, the demand for innovative PCR solutions is expected to grow, leading to further advancements in the field. Overall, the findings of the study emphasize the pressing need for continued research, innovation, and collaboration in the realm of disease prevention and genetic testing. By staying at the forefront of scientific developments, we can strive to mitigate the impact of diseases and genetic disorders, ultimately improving global health outcomes.

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Increasing Application in Clinical Diagnostics

The increasing application of real-time polymerase chain reaction (PCR) in clinical diagnostics is expected to significantly boost the demand for this powerful molecular biology technique. Real-time PCR, also known as quantitative PCR (qPCR), allows for the accurate and rapid detection and quantification of DNA and RNA sequences. Real-time PCR is widely employed for the diagnosis of infectious diseases, genetic disorders, and various types of cancers. Its high sensitivity and specificity make it an indispensable tool for detecting pathogens, genetic mutations, and oncogenes in clinical samples. As the need for accurate and timely disease diagnosis continues to grow, so does the demand for real-time PCR. Real-time PCR is instrumental in monitoring the effectiveness of treatment regimens, such as antiviral therapies or cancer treatments. Clinicians can track viral load reductions, measure residual disease levels, and assess treatment responses in real-time, leading to better-informed clinical decisions.

The increasing application of real-time PCR in clinical diagnostics reflects its versatility and precision in disease detection, monitoring, and personalized medicine. As healthcare systems continue to prioritize accurate and efficient diagnostic tools, the demand for real-time PCR is expected to rise, with the technology playing a pivotal role in improving patient care and outcomes.

Rising Demand for Personalized and Precision Medicines

The rising demand for personalized and precision medicines is poised to significantly increase the demand for real-time polymerase chain reaction (PCR) technology. Real-time PCR, also known as quantitative PCR (qPCR), is a vital tool in tailoring treatments to individual patients and ensuring the efficacy of personalized medicine approaches. Personalized medicine relies on the characterization of an individual's genetic profile to select the most appropriate treatment. Real-time PCR is instrumental in genetic profiling by accurately quantifying specific DNA or RNA sequences associated with disease susceptibility, drug responses, or treatment monitoring. Real-time PCR is essential for diagnosing and monitoring infectious diseases, including viral load quantification and the detection of drug-resistant strains. Tailoring antiviral treatments and antibiotics based on individual patient responses is a hallmark of personalized medicine in infectious disease management.

The rising demand for personalized and precision medicines is intrinsically linked to the increasing use of real-time PCR technology. Its ability to provide accurate, rapid, and quantitative genetic information makes real-time PCR an indispensable tool for tailoring

treatments to individual patients and optimizing therapeutic outcomes in the era of personalized medicine.

Technological Advancements and Applications in Drug Development

Technological advancements and applications in drug development are expected to drive a substantial increase in the demand for real-time polymerase chain reaction (PCR) technology. Real-time PCR, also known as quantitative PCR (qPCR), plays a pivotal role in various aspects of drug development, offering precise and efficient molecular analysis. Real-time PCR is used to validate potential drug targets by quantifying the expression levels of specific genes or proteins in disease pathways. This information helps researchers identify and prioritize promising targets for drug development, increasing the efficiency of early-stage research.

Identifying biomarkers associated with drug responses, toxicity, or disease progression is crucial in drug development. Real-time PCR enables the sensitive and accurate measurement of biomarker expression, aiding in the selection and validation of relevant biomarkers for clinical trials. Real-time PCR is used for high-throughput screening of potential drug compounds to identify lead candidates. It can also be employed for drug profiling, evaluating how drugs impact specific cellular processes or gene expression patterns, streamlining the drug development pipeline.

Real-time PCR helps evaluate the potential safety concerns associated with drug candidates. It can detect off-target effects, assess the impact on normal cellular functions, and identify potential adverse events, ensuring safer and more effective drug development. Technological advancements and applications in drug development are enhancing the role of real-time PCR as a fundamental tool for molecular analysis. Its precision, speed, and versatility are essential in accelerating drug discovery, optimizing drug development processes, and enabling personalized medicine approaches, all of which contribute to the increasing demand for this technology in the pharmaceutical industry.

Key Market Challenges

High Cost of Instruments

The equipment and tools required for conducting PCR tests, particularly qPCR equipment, are often on the higher end in terms of cost. According to multiple sources, the price range for dPCR or qPCR machinery can vary from $15,000 to well over

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$100,000, depending on the specific model and features. This significant investment is not limited to the initial purchase alone. There are also ongoing expenses to consider, such as the annual operational costs of cyclers and the cost of universal probe mastermixes.

These hidden costs can accumulate over time and pose challenges to market growth, especially in both developing and developed economies. The considerable financial implications associated with acquiring and maintaining the equipment may deter potential users or limit accessibility, hindering the expansion of PCR testing in various settings.

Moreover, the costs associated with PCR testing go beyond the equipment itself. Additional expenses can arise from sample preparation, consumables, reagents, and the need for skilled personnel to operate and maintain the equipment. All of these factors contribute to the overall cost and complexity of implementing PCR testing in different healthcare settings. As the demand for PCR testing continues to rise, efforts to address these challenges are crucial. Finding ways to reduce costs, increase affordability, and streamline the process can help make PCR testing more accessible and widespread, ultimately benefiting healthcare systems, researchers, and patients alike.

Emergence of Alternative Technologies

The emergence of alternative technologies is expected to exert downward pressure on the demand for real-time polymerase chain reaction (PCR) technology in specific applications. While real-time PCR remains a powerful and widely used molecular biology tool, several alternative methods and technologies have gained prominence in recent years, offering unique advantages and cost-effectiveness in certain contexts. NGS technologies have advanced rapidly and can now provide quantitative information on gene expression, genetic variations, and pathogen detection. In some cases, NGS can replace real-time PCR for gene expression profiling and mutation analysis, reducing the need for separate quantitative PCR assays. The CRISPR-Cas technology has been adapted for diagnostic purposes, enabling highly specific and sensitive nucleic acid detection. CRISPR-based assays offer an alternative to real-time PCR for target amplification and detection.

While these alternative technologies are making strides in specific niches, it's important to note that real-time PCR still offers advantages in terms of versatility, quantification, and assay design flexibility. The choice of technology often depends on the specific

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research or diagnostic needs, and real-time PCR is likely to remain a crucial tool in many molecular biology and diagnostic laboratories despite the emergence of alternatives.

Key Market Trends

Integration with Automation and Robotics

The integration of real-time polymerase chain reaction (PCR) with automation and robotic systems holds significant promise in increasing efficiency and reducing user-dependent variability across various fields, particularly in clinical diagnostics, high-throughput screening, and large-scale research projects. Automated real-time PCR systems are designed to execute tasks with a high degree of precision and consistency. Robots can accurately dispense reagents, mix samples, and perform thermal cycling, minimizing human errors and ensuring reproducibility of results. This is especially crucial in clinical diagnostics, where accuracy is paramount.

Automated systems can handle a large number of samples simultaneously, significantly increasing throughput. This is particularly valuable in high-throughput screening applications, where hundreds or thousands of samples need to be processed quickly, such as in drug discovery, genomics, or epidemiology studies. Automated systems often incorporate sample tracking and data management software, ensuring full traceability of samples throughout the PCR process. This feature enhances data integrity, minimizes the risk of sample mix-up, and simplifies record-keeping, which is vital in clinical diagnostics and regulatory compliance.

Digital PCR Integration

Integration of digital PCR capabilities into real-time PCR platforms will provide researchers and clinicians with more precise absolute quantification of nucleic acids, enhancing its utility in applications requiring high sensitivity and accuracy. Digital PCR enables the partitioning of a sample into thousands or millions of individual reactions, each containing a single target molecule or none at all. By counting the number of positive partitions, researchers can determine the absolute quantity of the target nucleic acid with exceptional precision. This reduces variability and improves the reliability of quantification, especially for low-abundance targets.

The integration of digital PCR capabilities into real-time PCR platforms represents a significant advancement that empowers researchers and clinicians with a powerful tool

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for absolute quantification of nucleic acids. This technology enhances sensitivity and accuracy, making it well-suited for applications demanding precise measurements and reliable results, ultimately advancing scientific research and clinical diagnostics.

Segmental Insights

Product Insights

The consumables and reagents segment dominated the revenue share in 2022, primarily due to the increased demand for early disease detection. Numerous reputable companies manufacturing PCR consumables and reagents have also contributed to this. Moreover, the extensive utilization of consumables and reagents and the expanding demand in healthcare, research, and other fields further bolster the segment's significant market share. Additionally, the segment is projected to maintain its leading position throughout the forecast period.

Furthermore, the escalating prevalence of chronic conditions and the growing adoption of PCR technology have heightened the demand for consumables and reagents. Moreover, the pharmaceutical and healthcare industries' increasing acceptance of technological advancements and intensified research and development activities will create substantial opportunities in this market throughout the projected period.

Application Insights

The clinical segment accounted for the largest revenue share in 2022 due to several factors. These include the growing prevalence of diseases like cancer, infectious diseases, and diabetes, as well as the high precision of testing methods. Additionally, the commercialization of reagents for diagnostics, efficient disease diagnosis, monitoring, and treatment, and the added benefits in disease detection contribute to this. For example, in April 2019, Thermo Fisher Scientific Inc. introduced the QuantStudio 6 & 7 Pro RT-PCR Systems, which incorporate features like facial identification, voice assistant, and RF identification. Similarly, in April 2023, Thermo Fisher Scientific launched 37 CE-IVD-marked real-time PCR assay kits for different infectious diseases for its QuantStudio Dx series of instruments. Compared to existing PCR technologies, it offers highly automated workflows with significantly faster time-to-result, increased multiplexing, and greater throughput flexibility.

On the other hand, the forensic segment is expected to exhibit the fastest growth rate during the forecast period. The segment's growth is driven by the increasing utilization

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of novel techniques in forensic applications such as DNA typing, genetic fingerprinting, and DNA testing. Furthermore, advancements in existing technologies for preparing the library for forensic DNA typing from challenging samples contribute to the growth of this segment.

Regional Insights

North America accounted for the largest market share in 2022 and is projected to experience impressive growth during the forecast period. The United States plays a key role in driving the North America market, investing billions of dollars annually in medicines, new technologies, healthcare professionals, and facilities to enhance healthcare. In 2020, the increased rate of investment in medical and health R&D contributed to the overall growth rate of health spending in the U.S.

In 2018, North America led the regional segment due to the introduction of new systems and test kits by PCR manufacturers. Thermo Fisher Scientific Inc., for instance, launched VetMAX MastiType in September 2018, a qPCR-based test package designed to rapidly detect mastitis pathogens in milk stocks. Furthermore, the strong presence of leading PCR producers and the growing demand for rapid diagnostic testing in this region will drive regional growth in the forecast period.

During the forecast period, Asia Pacific is expected to witness the highest CAGR. The region's patient pool is projected to expand due to the high prevalence of chronic and infectious diseases and increasing patient awareness of early diagnosis, thereby driving the market growth of PCR products.

Key Market Players

Thermo Fisher Scientific, Inc.

Bio-Rad Laboratories, Inc.

F. Hoffman-La Roche Ltd.

Abbott Laboratories Inc.

Agilent Technologies, Inc.

Becton Dickinson and Company

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Enzo Life Sciences, Inc.

Promega Corporation

Biom?rieux S.A.

Cole-Parmer Instrument Company Llc

Report Scope:

In this report, the Global Real Time PCR Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

Real Time PCR Market, By Product:

Reagents & Consumables

Instruments

Software & Services

Real Time PCR Market, By Application:

Clinical Diagnostics

Research

Forensic

Real Time PCR Market, By End User:

Hospitals and Diagnostic Centres

Pharmaceutical

CROs and Biotechnology Companies

Research Laboratories and Academic Institutes

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Forensic Laboratories

Real Time PCR Market, By Region:

North America

United States

Canada

Mexico

Europe

France

United Kingdom

Italy

Germany

Spain

Asia-Pacific

China

India

Japan

Australia

South Korea

South America

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Brazil

Argentina

Colombia

Middle East & Africa

South Africa

Saudi Arabia

UAE

Kuwait

Turkey

Egypt

Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the Global Real Time PCR Market.

Available Customizations:

Global Real Time PCR market report with the given market data, Tech Sci Research offers customizations according to a company's specific needs. The following customization options are available for the report:

Company Information

Detailed analysis and profiling of additional market players (up to five).

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