

# **Fluorescent In Situ Hybridization Probe Market - Global Industry Size, Share, Trends, Opportunity, and Forecast, 2018-2028 Segmented By Technology (Q FISH, FLOW FISH, Others), By Type (DNA, RNA (mRNA, miRNA, Others)), By Application (Cancer Research, Genetic Diseases, Others), By End-Use (Research, Clinical, Companion Diagnostics), By Region, By Competition Forecast & Opportunities, 2018-2028F**

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## **Abstracts**

Global Fluorescent In Situ Hybridization Probe Market has valued at USD 859.62 million in 2022 and is anticipated to project impressive growth in the forecast period with a CAGR of 6.50% through 2028. The Global Fluorescent In Situ Hybridization (FISH) Probe Market refers to the industry that produces and distributes FISH probes, a crucial tool in molecular biology and genetics research. FISH probes are used to visualize and locate specific DNA sequences within cells or tissue samples. They play a pivotal role in applications such as cancer diagnosis, genetic disease analysis, and basic biological research.

### **Key Market Drivers**

#### **Advancements in Genomic Research**

Advancements in genomic research have revolutionized our understanding of genetics, enabling breakthroughs in disease diagnosis, treatment, and prevention. One of the key technologies driving progress in this field is Fluorescent In Situ Hybridization (FISH),

which allows researchers to visualize and locate specific DNA sequences within cells. As genomic research continues to evolve, so does the demand for FISH probes, making them a pivotal component of the Global FISH Probe Market. The sequencing of the human genome marked a monumental achievement in the field of genomics. It provided researchers with a comprehensive map of our genetic makeup, comprising over 20,000 protein-coding genes. However, understanding the functions and interactions of these genes requires tools like FISH probes to visualize their activity within cells. As genomics delves deeper into gene function, the demand for FISH probes increases. Genomic research has been instrumental in identifying genetic mutations that cause diseases. Whether it's rare genetic disorders or common ailments like cancer, researchers are increasingly using FISH probes to pinpoint specific mutations within the genome. This has significant implications for diagnosis, prognosis, and targeted therapies, driving the need for more advanced FISH probes.

Advancements in genomics have ushered in the era of personalized medicine. By analyzing an individual's genetic profile, clinicians can tailor treatments to a patient's unique genetic makeup. FISH probes play a critical role in this process by helping identify specific genetic markers and abnormalities. As personalized medicine gains traction, so does the demand for FISH probes that enable precise genetic analysis. Genomic research has revealed the genetic underpinnings of complex diseases like Alzheimer's, diabetes, and heart disease. Investigating these conditions often requires an in-depth understanding of genetic variations and gene expression patterns. FISH probes provide researchers with the tools to study these complexities at the cellular level, advancing our knowledge of disease mechanisms and potential therapeutic targets. The pharmaceutical industry heavily relies on genomic research to discover new drug targets and develop precision medicines. FISH probes are essential in validating potential drug targets by confirming the presence or absence of specific genetic markers in cellular models. This accelerates drug development and fuels the demand for FISH probes in research and development. Both academic research institutions and clinical laboratories benefit from advancements in genomics. Researchers in these settings use FISH probes for a wide range of applications, from studying basic biological processes to diagnosing genetic disorders. As research expands and diversifies, so does the market for FISH probes.

## Cancer Diagnostics and Research

Cancer, a formidable adversary in the realm of global health, continues to challenge researchers, clinicians, and healthcare systems worldwide. The battle against cancer is waged not only in treatment but also in understanding the intricate genetic mechanisms driving the disease. In this fight, Fluorescent In Situ Hybridization (FISH) probes have

emerged as indispensable tools. Cancer is a disease characterized by genetic mutations and alterations. FISH probes enable clinicians to detect these genetic abnormalities with precision. They help diagnose cancer types, classify tumors, and assess the aggressiveness of the disease. As cancer diagnostics become increasingly personalized, the demand for FISH probes, which aid in pinpointing specific genetic markers, continues to rise. Cancer researchers seek to identify biomarkers that can predict a patient's prognosis and response to treatment. FISH probes are instrumental in this quest. They allow researchers to study the genetic markers associated with a patient's tumor, helping to tailor treatments and predict outcomes. As personalized medicine gains prominence, the demand for FISH probes for biomarker identification intensifies. Cancer is notorious for its heterogeneity, with different regions of a tumor displaying distinct genetic profiles. FISH probes enable researchers to explore this heterogeneity by examining individual cells within a tumor. This ability to study genetic variations at a cellular level provides crucial insights into tumor evolution and drug resistance, driving the need for advanced FISH probe technology. The era of targeted cancer therapies relies heavily on a deep understanding of the genetic mutations driving a patient's cancer. FISH probes are vital in identifying these mutations and guiding treatment decisions. As more targeted therapies are developed, the demand for FISH probes to assess patient eligibility and monitor treatment efficacy continues to grow. After cancer treatment, monitoring for minimal residual disease (MRD) is critical. FISH probes help track the presence of cancer cells with specific genetic markers that may indicate disease recurrence. The ability to detect MRD early is invaluable for timely intervention, boosting the demand for FISH probes in cancer monitoring. The pharmaceutical industry relies on rigorous clinical trials to develop new cancer treatments. FISH probes play a pivotal role in validating drug targets and assessing the effectiveness of experimental therapies. As the pace of cancer drug development accelerates, the demand for FISH probes in clinical trials and drug development continues to rise.

### Growing Prevalence of Genetic Disorders

Genetic disorders are a diverse group of diseases caused by inherited genetic mutations. As our understanding of genetics advances, so does our awareness of the prevalence of these conditions. Genetic disorders can affect individuals of all ages and backgrounds, making their diagnosis and management a critical aspect of modern healthcare. The prevalence of genetic disorders is on the rise worldwide. Advances in medical genetics have allowed for more accurate diagnosis and detection of genetic conditions, leading to an increase in reported cases. From rare diseases to more common disorders like Down syndrome, the growing awareness of genetic disorders

has created a pressing need for reliable diagnostic tools. Timely diagnosis is crucial for managing genetic disorders effectively. FISH probes enable clinicians and genetic counselors to identify specific genetic abnormalities with high precision. Early detection through FISH probes allows for proactive interventions, such as genetic counseling and targeted treatments, improving patient outcomes and quality of life. Prenatal and neonatal screening programs aim to identify genetic disorders in newborns or fetuses. FISH probes are integral to these screening efforts, as they can detect chromosomal abnormalities such as trisomies, which can lead to conditions like Down syndrome. As screening programs expand globally, so does the demand for FISH probes. Genetic testing has become more accessible, with individuals and families increasingly opting for genetic analysis to understand their risk of inheriting or passing on genetic disorders. FISH probes are essential tools for laboratories conducting these tests. The growing demand for genetic testing, including carrier screening, contributes to the expansion of the FISH Probe Market. Genetic research and counseling services are on the rise, driven by the growing understanding of genetic disorders. Researchers and genetic counselors rely on FISH probes to study specific genetic abnormalities and provide informed guidance to patients and their families. The expanding role of genetic counseling in healthcare amplifies the need for FISH probes. In addition to diagnosis and counseling, FISH probes play a role in therapeutic development. Researchers use these probes to study genetic targets for potential treatments, including gene therapies and precision medicine approaches. As the pharmaceutical industry explores genetic solutions for various disorders, the demand for FISH probes in drug development increases.

### Expanding Biotechnology and Pharmaceutical Sectors

The fields of biotechnology and pharmaceuticals have seen an unprecedented surge in innovation and growth in recent years. Central to this expansion is the increasing reliance on advanced molecular tools, such as Fluorescent In Situ Hybridization (FISH) probes. These probes enable researchers and professionals to visualize and understand genetic information at the cellular level. The biotechnology and pharmaceutical industries are at the forefront of developing novel drugs and therapies. FISH probes play a pivotal role in this process by helping researchers validate drug targets and assess cellular responses to experimental compounds. As drug discovery becomes more reliant on genomics and personalized medicine, the demand for FISH probes intensifies. Identifying viable drug targets is a crucial step in the drug development pipeline. FISH probes enable researchers to study the expression and localization of specific genes or genetic markers in disease-related pathways. This information is instrumental in confirming the relevance of potential drug targets,

expediting the research process. The quest for personalized medicine, which tailors treatments to individual patients based on their genetic profiles, relies heavily on advanced molecular tools like FISH probes. These probes help identify genetic markers associated with diseases, allowing clinicians to make more informed decisions regarding treatment options. As personalized medicine gains traction, the demand for FISH probes continues to grow. Cancer remains a significant focus for both the biotechnology and pharmaceutical sectors. FISH probes are essential in studying genetic abnormalities associated with various cancers. They aid in identifying suitable drug targets and monitoring treatment efficacy. With the emergence of targeted therapies in oncology, the demand for FISH probes for research and clinical applications is on the rise. Biomarkers are essential indicators of disease presence, progression, or treatment response. The biotechnology and pharmaceutical sectors heavily rely on FISH probes to identify and validate biomarkers. These probes help researchers explore the genetic underpinnings of diseases, facilitating the development of diagnostic tests and prognostic tools. Both preclinical and clinical studies in the biotechnology and pharmaceutical sectors benefit from the precision and accuracy of FISH probes. These probes assist in evaluating the safety and efficacy of experimental treatments, ensuring that only the most promising candidates advance to the clinical trial phase.

### Key Market Challenges

#### Competitive Market Dynamics

Competition in the FISH Probe Market is fierce, with several major players and numerous smaller companies vying for market share. This competition can lead to price wars and pressure on profit margins. Differentiating products becomes crucial in this environment.

#### Pricing Pressures

The cost of FISH probes, especially for research and diagnostics, can be a significant barrier for many laboratories and healthcare facilities. Balancing quality and affordability are challenging, as cheaper probes may compromise accuracy and reliability.

#### Regulatory Hurdles

FISH probes used in clinical applications are subject to stringent regulatory oversight to ensure patient safety and test reliability. Meeting these regulatory requirements, such as

FDA approvals, can be a complex and time-consuming process.

### Variability in Testing Standards

The lack of standardized protocols for FISH testing can lead to variability in results between laboratories. This can hinder the broader adoption of FISH probes in clinical diagnostics and research.

### Key Market Trends

#### Expanding Applications in Non-Invasive Prenatal Testing (NIPT)

Non-invasive prenatal testing (NIPT) is revolutionizing prenatal care by allowing the detection of fetal chromosomal abnormalities through a simple blood test. FISH probes are becoming increasingly important in NIPT, enabling the identification of specific chromosomal disorders. The expansion of NIPT applications is expected to drive down the demand for FISH probes.

#### Single-Cell Analysis and Spatial Genomics

Advances in single-cell analysis and spatial genomics are opening new frontiers in understanding cellular heterogeneity and tissue architecture. FISH probes are critical tools for visualizing gene expression at the single-cell level and mapping gene activity within tissues. The integration of FISH technology into these emerging fields is anticipated to be a significant trend.

#### AI and Automation in FISH Analysis

Artificial intelligence (AI) and automation are poised to streamline FISH analysis. AI algorithms can assist in image analysis, reducing human error and accelerating the interpretation of FISH results. Automation in FISH workflows will enhance efficiency, making these techniques more accessible and cost-effective.

#### Multiplex FISH

Multiplex FISH allows the simultaneous detection of multiple DNA targets within the same sample. This technology is gaining traction in cancer research and diagnostics, where it can identify a broader range of genetic markers in a single assay. As multiplex FISH becomes more refined and accessible, its adoption is expected to rise.

## Segmental Insights

### Technology Insights

Based on the category of Technology, the FLOW-FISH segment dominated in terms of revenue in 2022 and is projected to exhibit the most rapid growth throughout the forecast period. This is driven by the increasing demand for genomic profiling among healthcare professionals. Flow FISH testing can automatically analyze over 10,000 cells within approximately 10 minutes. This approach not only enhances testing efficiency and standardization but also delivers significantly higher repeatability compared to traditional manual FISH testing, as it examines 20 to 100 times more cells. FLOW-FISH allows for the study of individual cells at a genetic level while concurrently capturing other cellular characteristics.

This is especially crucial in fields like cancer research and immunology. The growing incidence of chromosomal disorders is driving the market's demand for this product. The technique is consistently being adopted for diagnosing Dyskeratosis congenita, which is the first hereditary disorder associated with telomere maintenance impairment. This condition is rare but is typically prevalent among patients with bone marrow failure. Furthermore, the increasing prevalence of genetic disorders is fueling the need for the development of advanced clinical diagnostic procedures. Nevertheless, the high cost associated with this technology is expected to hinder the market's growth.

### Type Insights

Based on the category of Type, the DNA segment secured the largest share of revenue, primarily due to the increasing demand among healthcare professionals for molecular profiling. This growth can also be attributed to the presence of advanced molecular pathology tools that facilitate disease stratification and prognosis for tailored treatment. The market has witnessed the adoption of DNA probes, thanks to the development of cutting-edge diagnostic tools. For example, in July 2023, KromaTiD announced the creation of over 300 telomere, centromere, and gene probes specifically designed for directional Genomic Hybridization (dGH) in-situ DNA assays. Having access to a range of centromere and telomere probes empowers researchers and cytogenetic cores in the academic sector to readily integrate these powerful and advanced assays into their own facilities, all while maintaining cost-effectiveness.

On the other hand, the RNA probes segment is expected to experience the most rapid

growth in the foreseeable future. This is primarily because RNA probes are increasingly used for cancer analysis and possess the ability to distinguish between different subtypes of cancer. Companies such as BioSearch Technologies with their Stellaris RNA probe and Advanced Cell Diagnostics with their RNAscope series are developing novel probes that target disease-specific RNA, particularly for infectious diseases and cancer. Notably, several FISH kits for companion diagnostic applications have received recent approvals, including PATHYVISION HER-2 by Abbott, INFORM HER 2/ NEU probe developed by F. Hoffmann-La Roche (Ventana Medical Systems), and HER2 FISH PharmDx by Dako Denmark.

## Regional Insights

In 2022, North America secured the largest share of revenue, primarily due to several factors. This region's dominance can be attributed to the growing incidence of genetic disorders that lead to birth defects, developmental disabilities, and metabolic syndromes. According to the CDC, in 2022, approximately 3-4% of newborns in the U.S. were born with some form of genetic abnormality, resulting in hospitalization for around 10% of adults and 30% of children. FISH technology is estimated to offer an impressive 98% accuracy in detecting chromosomal aberrations that contribute to genetic abnormalities, further boosting market growth in the region. Additionally, the utilization of these assays in various medical fields, including cancer and genetic disorders, is on the rise and is expected to drive demand. Favorable healthcare reimbursement policies and government initiatives are also anticipated to fuel market expansion.

In contrast, Asia Pacific is projected to experience the most rapid growth in the coming years. This growth is attributed to the presence of supportive government initiatives, increased investments by both the government and key biotechnology manufacturers, and a wealth of untapped opportunities for the development of innovative diagnostics in the region. According to the NCBI, the Chinese government has significantly increased its investment in biotechnology research and development, with funding rising from USD 99 million in 2005 to USD 3.8 billion between 2008 and 2020. The region's rapid growth is further driven by escalating revenue generation in the molecular and cytogenetics diagnostic sectors. Continuous research and development activities in the field of cancer diagnostics, the adoption of novel techniques for molecular-based cytogenetics, and the growing demand for early disease diagnosis and detection all contribute to this growth.

## Key Market Players



Thermo Fisher Scientific Inc.

PerkinElmer Health Sciences Inc

Biodot Inc

New Horizons Diagnostic Corp

Merck KGaA

Agilent Technologies, Inc.

Abnova Corp.

Genemed Biotechnologies Inc

Hoffmann-La Roche Ltd

Oxford Gene Technology Ltd

Report Scope:

In this report, the Global Fluorescent In Situ Hybridization Probe Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

Fluorescent In Situ Hybridization Probe Market, By Technology:

Q FISH

FLOW FISH

Others

Fluorescent In Situ Hybridization Probe Market, By Type:

DNA

RNA

mRNA

miRNA

Others

Fluorescent In Situ Hybridization Probe Market, By Application:

Cancer Research

Genetic Diseases

Others

Fluorescent In Situ Hybridization Probe Market, By End-Use:

Research

Clinical

Companion Diagnostics

Fluorescent In Situ Hybridization Probe Market, By Region:

North America

United States

Canada

Mexico

Europe

Germany

United Kingdom

France

Italy

Spain

Asia-Pacific

China

Japan

India

Australia

South Korea

South America

Brazil

Argentina

Colombia

Middle East & Africa

South Africa

Saudi Arabia

UAE

Kuwait

Competitive Landscape

*Fluorescent In Situ Hybridization Probe Market - Global Industry Size, Share, Trends, Opportunity, and Forecas...*

Company Profiles: Detailed analysis of the major companies present in the Global Fluorescent In Situ Hybridization Probe Market.

Available Customizations:

Global Fluorescent In Situ Hybridization Probe 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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