In-vitro Toxicology Testing Market Assessment, By Product and Services [Consumables, Assays, Equipment, Software, Services], By Toxicity Endpoint & Test [ADME, Skin Irritation, Corrosion, Sensitization, Genotoxicity, Cytotoxicity, Ocular Toxicity, Organ Toxicity, Phototoxicity, Dermal Toxicity, Others], By Method [Cellular Assays, Biochemical Assays, In Silico Models, Molecular Toxicology Assays, Ex vivo Models], By Technology [Cell Culture, High Throughput, Toxicogenomic, Molecular Imaging], By End-user [Pharmaceuticals and Biopharmaceuticals, Cosmetics and Household Products, Food Industry, Diagnostics, Chemicals Industry, Others], By Region, Opportunities and Forecast, 2017-2031F

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Report description:

Global in-vitro toxicology testing market is projected to witness a CAGR of 10.11% during the forecast period 2024-2031, growing from USD 14.22 billion in 2023 to USD 30.73 billion in 2031. The market has experienced significant growth in recent years and is expected to maintain a strong pace of expansion in the coming years. In-vitro toxicology testing enables testing of various chemicals, drugs, cosmetics and many other products in a controlled environment such as a laboratory. This step in the earlier stages of development is mandatory to know the toxicity of any chemically made substance so that it is not harmful for the consumers. This test evaluates the safety of any chemicals, drugs, or cosmetics without subjecting them to any animals or

humans.

The in-vitro toxicology testing market is witnessing growth driven by many factors directly affecting the pharmaceutical, chemical and cosmetics industries. Increasing regulatory analysis and stringent safety evaluations imposed by governmental bodies worldwide are the main factors fueling the growth of this huge market. These measures make industries and players in its market comply with strict regulations and enable them to follow a procedure that ensures the safety of the product. Additionally, advancements in technology such as high-throughput and 3D models, organ-on-a-chip models, have proven to offer much more reliable and accurate results in less times. It has given the market confidence to function, hence supporting its growth. Strategic partnerships between industry giants to develop different technologies and drugs is driving the market growth.

For instance, in June 2023, a global manufacturing partner of pharmaceutical, biotech, and nutraceutical markets, Lonza announced its decision to acquire Synaffix which focuses on commercializing its clinical-stage technology platform for developing antibody-drug conjugates.

Rising Demand for Assessment of New Drugs and Chemicals

The growth of in-vitro toxicology testing market is fueled by increasing demand for safety assessments of new drug and chemicals. These assessments are driven by stringent regulatory requirements mandating comprehensive toxicity evaluations. In-vitro testing is cost-effective and efficient and saves us from the old methods such as animal testing and provides us with quick and more accurate insights for our product. Technological advancements like that of high-throughput screening and organ-on-a-chip models have given us the freedom to not rely on unethical methods such as that of animal-testing. These new models have been proven to enhance the predictive accuracy and relevance of assays.

Moreover, rigorous safety assessments have become increasingly important throughout the drug development process following the increased safety concerns for high-profile drug withdrawals. In-vitro testing offers cost and time efficiencies and supports the pharmaceutical and biotechnology industries' robust growth by facilitating the development of safer and more effective therapeutic agents to address the increasing prevalence of chronic diseases and aging populations.

In October 2022, Thermo Fisher Scientific Inc. announced that they will expand operations in Kentucky to help customers by delivering life-changing medicines to patients. The current facility includes central lab and biomarker services, providing biopharma consumers with high-quality lab work to boost drug development. It has helped the company expand its diagnostics business across various regions in the world and helped increase its global presence.

Technological Advancements

Many newly developed technologies have been introduced to this market to enhance the predictive accuracy and relevance of assays. Models such as high-throughput screening, 3D cell culture, and organ-on-a-chip have enabled reliable toxicity assessments giving us the platform to be able to not rely on traditional models like that of animal testing models. These advanced models allow stimulation of complex physiological processes and organ interactions, while providing a more human-relevant understanding of drug toxicity. Additionally, integration of AI with these models improves the data interpretation and analysis which is helpful in identifying any potential toxicological risks. Automation and robotics have revolutionized the procedure of in-vitro toxicology testing by enabling high-throughput screening of a large number of compounds simultaneously.

The adoption of stringent guidelines, standardized protocols, and regulations ensure consistency and reproducibility across assays, strengthening their acceptance by regulatory agencies and pharmaceuticals. It underscores the importance of in-vitro testing in the early stages of drug development and ensures the market of in-vitro toxicology testing is driven by expansion of its applications during pre-clinical trials and drug screening. Thermo Fisher Scientific launched the first of 37 CE-IVD- marked real-time PCR assay kits in April 2023 for infectious diseases. These assays were available in countries recognizing CE marking for use with the CE-IVD marked QS5 Dx, a diagnostic testing platform compliant with the EU's new in-vitro medical devices regulation framework.

Dominance of Cell Culture Technology

In-vitro toxicology testing market is experiencing robust growth due to advancing cell culture technology. The advancements in cell culture technology are driving the in-vitro toxicology testing market with its ability to provide predictive, demonstrative, and reliable results while toxicity screening of a wide range of chemicals, including nanomaterials and airborne materials. The advancements have enabled the expansion of the toxicology testing market as it involves using cells and tissues grown and maintained in controlled environments inside laboratories. Toxic properties of any drug or chemical can be examined easily.

For instance, Xenobiotics can be examined at the basic level of cell without involving the interplay of complex physiological systemic effects. Cellular assays can be easily integrated with technology such as high throughput formats or 3D formats enabling faster screening of large numbers of compounds for potential toxicity. The level of efficiency and accuracy is important on a large scale for pharmaceutical industries, biotechnology companies, or any company developing chemically related substances.
On November 17, 2023, the University of Texas MD Anderson Cancer Centre and Toppan Holdings signed a research collaboration agreement to assess Toppan Holdings' cell culture technology to advance personalized medicine and drug screening initiatives. During the three-year partnership, patient-derived tumor tissue will be used to produce in vitro "cancer patient avatars" utilizing Toppan Holdings' exclusive 3D cell culture technology, Invivoid. The avatars will be given anticancer medications, and the therapeutic usefulness of this technique for determining medication efficacy will be evaluated.
North America Will Dominate In-vitro Toxicology Testing Market Share
North America is anticipated to dominate the global market share over the forecast period in the in-vitro toxicology testing market. Due to the rising burden of chronic diseases and population in North America, healthcare-related engagement is increasing, which encourages more R&D of drugs and vaccines. North America is experiencing a significant increase in different diseases that can be treated or managed with drugs.
For instance, about 2.4 million Canadians have a heart disease according to a report by Canadian Institute for Health Information updated in June 2022. According to a report by Spotlight on Heart failure published in 2022, more than 100,000 Canadians are likely to be diagnosed with heart failure each year. North America, being a hub of healthcare and pharmaceutical companies expedites innovation and product launches which enables growth in research and development activities. Evotec announced in February 2023 about the relocation of its subsidiary, Cyprotex US, LLC, from Watertown to Framingham, U.S. It was done to expand the new facility to enable faster turnaround times.
Future Market Scenario (2024 – 2031F)
Increasing prevalence of various chronic diseases is the biggest reason behind the growth of in-vitro toxicology testing market. For management and treatment of diseases a lot of R&D is required to develop a drug with high clinical efficacy. Rapidly developing healthcare and biotechnological forums present an evergreen opportunity for the global in-vitro toxicology testing market value to grow and multiply manifolds. The scope of the market extends beyond pharmaceutical industry. Scientists, biotechnologists, healthcare professionals, and other healthcare professionals in the industry are dedicated towards introducing advanced technologies and modern diagnostic techniques which will contribute towards market growth.
For instance, Eurofins Scientific in January 2023, expanded its presence in India with the establishment of a new, fully equipped, state-of-the-art laboratory campus in Hyderabad. The lab is aimed at supporting pharma and biotechnology companies in the domain of synthetic organic chemistry, analytical R&D, bioanalytical services, in vivo pharmacology safety toxicology, and formulation R&D.
Key Players Landscape and Outlook
Several companies are expanding their business by planning and adopting new strategies. Companies are forming strategic partnerships to increase their presence in different geographies. Product launches, distribution agreements, mergers and acquisitions, and investments, and partnerships are some of the strategies being followed by leading pharmaceutical and biotechnology companies.
Agilent Technologies (US) acquired e-MSion (US) in March 2023. Through this acquisition, they plan to integrate the e-MSion's ExD cell into portfolio of advanced workflows, instruments, and analytical solutions for biotherapeutic characterization and development.
In August 2023, Evotec announced its partnership with STORM, the world's leading small RNA molecule modifying enzyme drug discovery company. They aimed to present the discovery of STORM's leading clinical candidate, STC-15. STC-15 is a highly selective, orally bioavailable, and RME inhibitor for METTL3, which was developed by both STORM and Evotec.

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