

Oxidative Stress Assay Market worth \$2,190.56 million by 2030 - Exclusive Report by 360iResearch

The Global Oxidative Stress Assay Market to grow from USD 961.61 million in 2022 to USD 2,190.56 million by 2030, at a CAGR of 10.83%.

PUNE, MAHARASHTRA, INDIA, November 9, 2023 /EINPresswire.com/ -- The "[Oxidative Stress Assay Market](#) by Product & Service (Consumables, Instruments, Services), Test Type (Antioxidant Capacity Assays, Enzyme-Based Assays, Indirect Assays), Technology, End-user, Indication - Global Forecast 2023-2030" report has been added to 360iResearch.com's offering.



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The oxidative stress assay is a bioanalytical method to evaluate the balance between reactive oxygen species (ROS) production and the antioxidant defense mechanisms within biological systems. These assays are essential for understanding oxidative stress's role in cellular processes, disease progression, and treatment efficacy. Oxidative stress assay is crucial in understanding oxidative stress, a significant contributor to pathological conditions such as neurodegenerative diseases, cardiovascular disorders, cancer, and aging processes. The constant generation of ROS through cellular metabolic activities and their interaction with cellular components cause harm to proteins, nucleic acids, and lipids, leading to cell dysfunction or cell death, significantly increasing the need for oxidative stress assays. Moreover, the rising prevalence of chronic diseases associated with oxidative stress has increased the demand for

robust diagnostic tools that enable early detection and treatment guidance. However, high costs associated with advanced diagnostic technologies and the lack of standardized protocols across various assay platforms result in inconsistent results, significantly impeding the adoption of oxidative stress assays. In addition, the growing demand for in vitro diagnostics and point-of-care testing technologies presents a vast potential for expanding the application of oxidative stress assays in clinical settings. Developing portable, easy-to-use devices integrated with advanced detection systems can streamline early diagnosis and enable faster therapeutic interventions. Combining machine learning algorithms and artificial intelligence (AI) into these assay platforms facilitates a greater understanding of complex disease mechanisms and helps identify novel therapeutic targets.

Test Type: Increasing demand for antioxidant capacity assays

Antioxidant capacity assays evaluate the overall capacity of a specimen to scavenge free radicals and other reactive species, providing an understanding of the total antioxidant potential. The need-based preference for these assays lies in their ability to evaluate various antioxidants, including hydrophilic and lipophilic compounds. Enzyme-based assays measure the activity of specific antioxidant enzymes that play crucial functions in maintaining cellular redox balance. These assays are preferred when researchers aim to investigate particular enzymatic pathways or determine the effect of various interventions on enzyme activity. Indirect assays are employed to evaluate oxidative stress by measuring by-products generated during oxidation processes, which are helpful when direct detection is difficult due to low concentration or reactivity concerns with target molecules. Reactive oxygen species-based assays are designed to detect specific ROS molecules directly. The researchers prefer them to determine the levels of individual ROS species under various experimental conditions.

Technology: Emerging popularity of Enzyme-linked Immunosorbent Assay (ELISA)

Chromatography is a widespread separation technique used that quantifies and identifies endogenous or exogenously added ROS markers such as lipid peroxidation products, glutathione, and other antioxidants. Enzyme-linked immunosorbent assay (ELISA) is an enzyme-based test that utilizes specific antibodies to measure oxidative stress biomarkers in biological samples with high sensitivity and selectivity. The significant advantage of ELISA is its simplicity, fast processing time, and adaptability to high-throughput screening. Flow cytometry is a powerful multi-parameter technique used to measure oxidative stress at the single-cell level using fluorescent dyes that react with ROS or other cellular markers. This technology offers high-throughput and real-time analysis of multiple parameters such as ROS levels, mitochondrial potential, and cell viability. High-content screening (HCS) is an advanced imaging-based method that combines fluorescence microscopy with automated image acquisition and analysis to monitor oxidative stress in living cells. Researchers can assess multiple endpoints simultaneously with this technology, such as ROS production, antioxidant responses, and cell morphology changes, contributing to higher content information. Label-free detection technologies, including surface plasmon resonance (SPR), bio-layer interferometry (BLI), or electrochemical methods, offer non-invasive alternatives to quantify oxidative stress biomarkers without the need for fluorescent labels. These techniques provide real-time monitoring of

molecular interactions and allow for studying functional activity directly in their natural state. Microscopy techniques such as confocal, electron, or atomic force microscopy are used to visualize intracellular ROS production and localization.

Indication: Expanding use of oxidative-stress-assay for detecting respiratory diseases

Oxidative stress is consequential in cancer development and progression, as it can induce DNA damage, leading to genetic mutations. Need-based preferences for cancer research include detecting reactive oxygen species (ROS), assessing antioxidant capacity, and evaluating specific biomarkers, including glutathione or malondialdehyde. In cardiovascular diseases (CVDs), imbalanced redox homeostasis contributes to endothelial dysfunction, inflammation, and plaque formation. Assays measuring nitric oxide (NO) production or lipid peroxidation are essential for CVD research to understand the underlying disease mechanisms better. Chronic hyperglycemia in diabetes increases oxidative stress, causing tissue damage and complications such as neuropathy, nephropathy, and retinopathy. Oxidative stress is implicated in conditions such as asthma, idiopathic pulmonary fibrosis (IPF), and chronic obstructive pulmonary disease (COPD). Key preference areas in this field include assays for measuring ROS production in bronchial epithelial cells or detecting biomarkers related to oxidative lung injury.

End-user: Penetration of oxidative-stress-assay in pharmaceutical and biotechnology companies

Academic research institutes primarily use oxidative stress assays to investigate the function of reactive oxygen species (ROS) in various diseases, including cancer, neurodegenerative disorders, and cardiovascular diseases. Clinical laboratories are essential in diagnostics and personalized medicine, which require oxidative stress assays to evaluate patients' antioxidant status, assess drug efficacy, or monitor treatment outcomes for conditions associated with oxidative stress. Contract research organizations (CROs) provide research outsourcing services to pharmaceutical and biotech companies while maintaining cost efficiency without compromising quality standards. Oxidative stress assays play an important role in preclinical studies conducted by CROs to assess drug safety and efficacy by monitoring ROS levels with the potential to cause cellular damage during drug development. Pharmaceutical and biotechnology companies heavily invest in research and development to discover innovative therapeutics targeting oxidative stress-related diseases.

Product & Service: Rising demand for consumables across end-use sectors

Consumables for oxidative stress assays include reagents, kits, enzymes, probes, and other materials required to detect and measure oxidative stress markers. Academic research institutes and clinical laboratories require high-quality consumables for oxidative stress assays that cost-effectively produce accurate results. Instruments used in oxidative stress assays include microplate readers, spectrophotometers, fluorometers, luminometers, flow cytometers, and high-content screening systems that sensitively detect oxidative stress biomarkers. Oxidative stress assay services involve outsourcing research projects to contract research organizations (CROs) or core facilities offering assay development, validation, sample testing, data analysis, and interpretation services. Researchers prefer service providers with expertise in oxidative stress

assays and a proven track record of successful projects to ensure reliable results.

Regional Insights:

In the Americas region, increased awareness and research on reactive oxygen species (ROS), the rising prevalence of chronic diseases, and growing investments in developing advanced oxidative stress assays have raised the adoption of oxidative stress assays in the region. Various academic institutions have extensively studied oxidative stress in disease progression and aging. The presence of manufacturers such as Thermo Fisher Scientific, Inc. and Merck KGaA focus on collaboration activities to expand its mass spectrometry portfolio, thereby strengthening its position in the oxidative stress assay market. The Asia-Pacific (APAC) region witnessed rapid oxidative stress assay market growth due to expansive economic development across emerging nations such as India and China. China and Japan have established themselves as key players in the oxidative stress assay market with strong R&D investments and the presence of key manufacturers such as Abnova Corporation and Fujifilm Wako Pure Chemical Corporation. Europe's oxidative stress assay market significantly developed in the EMEA region due to its strong presence of pharmaceutical and biotechnology companies and government funding for research projects. The European Union (EU) countries actively invest in oxidative stress assay development due to the rising incidences of chronic disorders and an aging population. Regulatory harmonization across EU member states has enabled a streamlined approach towards product approvals and innovation support. The Middle East is witnessing significant growth due to improving healthcare infrastructure, while Africa's emerging focus on non-communicable diseases presents opportunities for future market expansion.

FPNV Positioning Matrix:

The FPNV Positioning Matrix is essential for assessing the Oxidative Stress Assay Market. It provides a comprehensive evaluation of vendors by examining key metrics within Business Strategy and Product Satisfaction, allowing users to make informed decisions based on their specific needs. This advanced analysis then organizes these vendors into four distinct quadrants, which represent varying levels of success: Forefront (F), Pathfinder (P), Niche (N), or Vital(V).

Market Share Analysis:

The Market Share Analysis offers an insightful look at the current state of vendors in the Oxidative Stress Assay Market. By comparing vendor contributions to overall revenue, customer base, and other key metrics, we can give companies a greater understanding of their performance and what they are up against when competing for market share. The analysis also sheds light on just how competitive any given sector is about accumulation, fragmentation dominance, and amalgamation traits over the base year period studied.

Key Company Profiles:

The report delves into recent significant developments in the Oxidative Stress Assay Market,

highlighting leading vendors and their innovative profiles. These include Abcam PLC, Agilent Technologies, Inc., AMS Biotechnology, Arbor Assays Inc., Assay Genie, Bio-Rad Laboratories, Inc., Bio-Techne Corporation, BioAssay Systems, Biomedica Medizinprodukte GmbH, BPS Bioscience, Inc., Callegari Srl, Cayman Chemical Company, Cell Biolabs, Inc., Cytex Biosciences, Inc., Eagle Biosciences, Inc., Enzo Biochem, Inc., Ethos Biosciences, Inc., Geno Technology Inc., Genox Corporation, Helvetica Health Care Sàrl, Hycult Biotech Inc., Kamiya Biomedical Company, Labstat Inc., Merck KGaA, Oxford Biomedical Research, Inc., Promega Corporation, Qiagen N.V., Thermo Fisher Scientific, Inc., Vivid Microscopy, LLC, and ZenBio, Inc..

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Market Segmentation & Coverage:

This research report categorizes the Oxidative Stress Assay Market in order to forecast the revenues and analyze trends in each of following sub-markets:

Based on Product & Service, market is studied across Consumables, Instruments, and Services. The Consumables is further studied across Kits and Reagents. The Consumables commanded largest market share of 48.19% in 2022, followed by Instruments.

Based on Test Type, market is studied across Antioxidant Capacity Assays, Enzyme-Based Assays, Indirect Assays, and Reactive Oxygen Species-Based Assays. The Enzyme-Based Assays commanded largest market share of 37.26% in 2022, followed by Antioxidant Capacity Assays.

Based on Technology, market is studied across Chromatography, Enzyme-linked Immunosorbent Assay, Flow Cytometry, High-Content Screening, Label-Free Detection, and Microscopy. The Enzyme-linked Immunosorbent Assay commanded largest market share of 33.43% in 2022, followed by Chromatography.

Based on End-user, market is studied across Academic Research Institutes, Clinical Laboratories, Contract Research Organizations, and Pharmaceutical and Biotechnology Companies. The Clinical Laboratories commanded largest market share of 32.12% in 2022, followed by Contract Research Organizations.

Based on Indication, market is studied across Cancer, Cardiovascular Diseases, Diabetes, and Respiratory Diseases. The Cardiovascular Diseases commanded largest market share of 30.12% in 2022, followed by Cancer.

Based on Region, market is studied across Americas, Asia-Pacific, and Europe, Middle East & Africa. The Americas is further studied across Argentina, Brazil, Canada, Mexico, and United States. The United States is further studied across California, Florida, Illinois, New York, Ohio, Pennsylvania, and Texas. The Asia-Pacific is further studied across Australia, China, India,

Indonesia, Japan, Malaysia, Philippines, Singapore, South Korea, Taiwan, Thailand, and Vietnam. The Europe, Middle East & Africa is further studied across Denmark, Egypt, Finland, France, Germany, Israel, Italy, Netherlands, Nigeria, Norway, Poland, Qatar, Russia, Saudi Arabia, South Africa, Spain, Sweden, Switzerland, Turkey, United Arab Emirates, and United Kingdom. The Europe, Middle East & Africa commanded largest market share of 39.68% in 2022, followed by Americas.

Key Topics Covered:

1. Preface
2. Research Methodology
3. Executive Summary
4. Market Overview
5. Market Insights
6. Oxidative Stress Assay Market, by Product & Service
7. Oxidative Stress Assay Market, by Test Type
8. Oxidative Stress Assay Market, by Technology
9. Oxidative Stress Assay Market, by End-user
10. Oxidative Stress Assay Market, by Indication
11. Americas Oxidative Stress Assay Market
12. Asia-Pacific Oxidative Stress Assay Market
13. Europe, Middle East & Africa Oxidative Stress Assay Market
14. Competitive Landscape
15. Competitive Portfolio
16. Appendix

The report provides insights on the following pointers:

1. Market Penetration: Provides comprehensive information on the market offered by the key players
2. Market Development: Provides in-depth information about lucrative emerging markets and analyzes penetration across mature segments of the markets
3. Market Diversification: Provides detailed information about new product launches, untapped geographies, recent developments, and investments
4. Competitive Assessment & Intelligence: Provides an exhaustive assessment of market shares, strategies, products, certification, regulatory approvals, patent landscape, and manufacturing capabilities of the leading players
5. Product Development & Innovation: Provides intelligent insights on future technologies, R&D activities, and breakthrough product developments

The report answers questions such as:

1. What is the market size and forecast of the Oxidative Stress Assay Market?
2. Which are the products/segments/applications/areas to invest in over the forecast period in the Oxidative Stress Assay Market?

3. What is the competitive strategic window for opportunities in the Oxidative Stress Assay Market?
4. What are the technology trends and regulatory frameworks in the Oxidative Stress Assay Market?
5. What is the market share of the leading vendors in the Oxidative Stress Assay Market?
6. What modes and strategic moves are considered suitable for entering the Oxidative Stress Assay Market?

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