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Digital Pathology Market - Global Industry Size, Share, Trends, Opportunity, and Forecast, 2018-2028F Segmented By Product Type (Scanners, Software, and Storage & Communication Systems), By Application (Disease Diagnosis, Teleconsultation, Drug Discovery, Training & Education), By End User (Pharmaceutical & Biotechnology Companies, Hospitals and Clinics, Academics Institutes & Research Laboratories), By Region and Competition

https://marketpublishers.com/r/D886FB44F322EN.html
Date: September 2023
Pages: 185
Price: US$ 4,900.00 (Single User License)
ID: D886FB44F322EN

Abstracts

Global Digital Pathology Market was valued at USD 0.93 billion in 2022 and is anticipated to project robust growth in the forecast period with a CAGR of 10.19% through 2028. Digital pathology is a specialized field that focuses on extracting data from digitized specimen slides. By utilizing computer-based technology and virtual microscopy, digital pathology enables the acquisition of image-based information. This innovative approach has significantly enhanced the efficiency, workflow, and revenue of pathology labs worldwide. Through the conversion of glass slides into digital counterparts, users can effortlessly manage, share, view, and analyze them on a computer monitor. Digital pathology finds applications in various areas, including primary disease diagnosis, diagnostic decision support, intraoperative diagnosis, diagnostic consultation, resident and medical training, peer review, manual and semi-quantitative immunohistochemistry (IHC) review, and clinical research. Its implementation has led to improved laboratory efficiency and faster diagnostic results. With growing support from the education sector, drug development, tissue-based research, and disease diagnosis, digital pathology is rapidly gaining recognition as an essential and proven technology in the healthcare sector.

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Key Market Drivers

Enhanced Lab Efficiency

Digital pathology enhances efficiency by reducing turnaround time, lowering costs, and delivering comprehensive details to users with subject-matter expertise. Enhancing laboratory results is crucial as physicians and patients rely heavily on them for disease diagnosis and treatment. Digital pathology allows for rapid and remote access to pathology images, enabling faster collaboration among healthcare professionals. Pathologists and experts can review cases and provide consultations without the constraints of physical distance, potentially leading to quicker diagnosis and treatment decisions. Traditional pathology involves preparing and transporting physical slides, which can be time-consuming and costly. With digital pathology, there is a reduction in expenses related to slide production, shipping, storage, and retrieval. The increasing demand for accurate, efficient, and prompt laboratory results is fueling the growth of the digital pathology market.

Rapid Technological Advancements

Rapid advancements in digital pathology systems are anticipated to fuel market growth. Digital imaging, computerization, robotic light microscopy, and fiber optic communications all play a significant role in this expansion. Whole slide imaging, a technique with numerous advantages over conventional light microscopes, is projected to positively impact the market. Moreover, the development of microarrays and a wide range of predictive models, such as hybrid models and API algorithms, is anticipated to further accelerate market growth for digital image analysis. The increasing preference for computer-aided diagnosis, which integrates image processing, physics, mathematics, and computational algorithms, facilitates efficient disease detection and enables the assessment of anatomical structures of interest, disease progression, and risk assessment.

Rising Use of AI In Healthcare

The utilization of AI in healthcare is on the rise, with a growing focus on enhancing patient care quality through the integration of AI in different healthcare services, including pathological diagnosis. AI algorithms can analyze large volumes of pathology images quickly and accurately. They can assist pathologists in detecting abnormalities, identifying patterns, and providing more precise diagnoses, ultimately leading to faster

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treatment decisions and improved patient outcomes. AI can help mitigate human errors and variability in pathological diagnosis by providing objective and consistent analyses. This is especially valuable for complex cases where subtle features might be missed. By integrating patient data with AI insights, pathologists and clinicians can tailor treatment plans to individual patients, optimizing therapeutic approaches and minimizing unnecessary interventions. Consequently, artificial intelligence (AI) facilitates streamlined primary care processes and automation, enabling physicians to prioritize patients with more critical conditions. Additionally, AI solutions in the healthcare industry are progressively adopting a more human-centered approach.

Increasing Prevalence of Cancer

According to the World Health Organization, there were an unprecedented 9.6 million deaths and 18.1 million new cancer cases recorded worldwide in 2018. The increasing aging population and sedentary lifestyles globally are contributing to the rising number of cancer cases. The UN organization predicts that the number of older persons will reach nearly 2.1 billion by 2050. Preclinical research using animal models and clinical trials plays a vital role in determining the safety and efficacy of drugs. Digital pathology offers multiple benefits, such as reducing the risk of error, storing drug data, integrating data into electronic health records (EHRS), and assessing patient reactions to specific medications. The global digital pathology industry is experiencing growth due to the increasing focus on drug development and drug discovery research and development, leading to a rise in clinical and preclinical trials. The demand for faster diagnostic tools for chronic diseases like cancer and the need to enhance workflow productivity are driving factors. Additionally, the growing geriatric population, which is more susceptible to chronic conditions, is expected to further increase the demand for advanced technical diagnostic procedures.

Key Market Challenges

High Cost of Digital Pathology

The high cost of digital pathology and the low adoption rate in emerging and underdeveloped countries present obstacles to the market's growth. Augmenting addresses this challenge by offering a modular hardware platform with integrated digital pathology software applications, helping to keep costs low. Implementing digital pathology systems requires significant upfront investment in scanners, storage infrastructure, and software solutions. The expenses associated with digitizing slides, maintaining digital archives, and training personnel can be substantial, especially for

small laboratories or healthcare facilities with limited budgets. Furthermore, integrating digital pathology into existing laboratory workflows and the need for IT support and infrastructure upgrades can pose challenges for some organizations.

Regulatory and Standardization Challenges

The adoption of digital pathology is influenced by regulatory requirements and standards that vary across different regions. The validation and regulatory approval of digital pathology systems and software can be a complex and time-consuming process. Additionally, addressing challenges related to data privacy, security, and compliance with patient confidentiality regulations during the transmission and storage of digital pathology images is crucial. Before digital pathology solutions can be used for clinical diagnosis, they often need to undergo rigorous validation processes to demonstrate their accuracy, reliability, and safety. Regulatory authorities in different regions may have varying criteria for approving these technologies. Patient data security and privacy are paramount in healthcare. Digital pathology systems must adhere to strict data protection regulations, such as the Health Insurance Portability and Accountability Act (HIPAA) in the United States and the General Data Protection Regulation (GDPR) in the European Union.

Key Market Trends

Telepathology and Remote Consultation

The increasing adoption of telepathology enables remote diagnosis and consultation, allowing pathologists to collaborate and provide expert opinions without being limited by geographical constraints. Telepathology has gained significant prominence during the COVID-19 pandemic, as it facilitates remote working and minimizes the risk of exposure for pathologists. For instance, pathologists can remotely review and discuss cases with colleagues, participate in multidisciplinary tumor boards, or offer consultations to underserved areas or regions facing a shortage of pathology expertise. The increasing preference for computer-aided diagnosis, integrating image processing, physics, mathematics, and computing algorithms, facilitates efficient disease detection. It also assists in evaluating anatomic structures of interest, quantifying disease progression, and risk assessment, thereby stimulating market growth. Notably, companies like Olympus offer a range of tools for remote slide sharing and image processing, contributing to anticipated market expansion in the upcoming years. In April 2020, Leica Biosystems obtained FDA approval for the Aperio AT2 DX Scanner and Aperio WebViewer, enabling remote diagnosis during the pandemic. Additionally, during this

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emergency, Phillips also received FDA approval for its IntelliSite Pathology Solution, further supporting remote diagnosis.

Analytics Integration of Artificial Intelligence and Machine Learning

The incorporation of Artificial Intelligence (AI) and machine learning algorithms into digital pathology platforms is a significant and emerging trend. AI has the capability to assist pathologists in various tasks, including automated tissue recognition, anomaly detection, biomarker quantification, and disease outcome prediction. These technologies hold great potential in enhancing efficiency, accuracy, and reproducibility in pathology diagnosis. For example, AI algorithms can aid in the automated detection and classification of cancer cells, as well as the identification of specific features in histopathological images.

Segmental Insights

Application Insights

The disease diagnostic segment is anticipated to witness significant growth during the forecast period due to the increasing prevalence of chronic diseases. Digital pathology encompasses a range of technologies for disease diagnosis, including laboratory management systems, digital dictation, dashboards and workflow control, digital image analysis, electronic specimen labeling and monitoring, and synoptic reporting tools. Manufacturers are currently focused on the development of novel and rapid diagnostic techniques. The integration of digital technology enhances every phase of the diagnostic process and facilitates seamless information exchange within and between departments.

End User Insights

The pharmaceutical and biotechnology companies represent the largest portion of global digital pathology demand by end-users. The significant share and rapid growth rate of this segment can be attributed to various factors. These include the increasing utilization of digital pathology in drug discovery studies and drug toxicology research. Additionally, biotechnology corporations leverage digital pathology for the development of biobanking, biopharmaceutical trials, molecular assays, and personalized medicine.

Regional Insights

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North America holds the largest market share attributed to continuous R&D investments, government initiatives supporting technologically advanced systems, growing adoption of digital imaging, and the involvement of prominent players. In North America, the United States emerges as the market leader, driven by companies focusing on digital pathology research and the development of enhanced tools for image analysis. The accelerated use of digital pathology for disease diagnosis, coupled with favorable reimbursement policies in the U.S., is expected to drive regional growth and enhance the standard of cancer diagnosis. The increasing implementation of digital pathology in education and training, along with the integration of AI into digital pathology systems, are key factors propelling regional market growth.

The growth of the European market is fueled by increasing support for digital pathology projects, education, and training programs. Factors such as the rising incidence of cancer, the growing adoption of digital pathology solutions in the United Kingdom, and the increasing number of conferences in Germany also contribute to this growth. Digital pathology involves scanning glass slides to generate virtual images, which, along with clinical data, provide an integrated picture of cancer patients for pathologists. This enables additional diagnostic procedures, including image analysis studies, which are not possible with conventional glass slides. The United Kingdom shows a high adoption rate of digital pathology, with further expansion expected in the coming years. Moreover, pathologists in the United Kingdom express a need for guidance, training, and education on digital pathology solutions. With the increasing incidence of cancer in the United Kingdom, the digital pathology market in the country is projected to expand during the forecast period.

Key Market Players

- 3DHISTECH
- Corista
- Aiforia Technologies Oy
- Akoya Biosciences
- OptraSCAN
- Glencoe Software

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QProscia Inc

Kanteron Systems

Mikroscan Technologies

Report Scope:

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

Digital Pathology Market, By Product Type:

Scanners

Software

Storage & Communication Systems

Digital Pathology Market, By Application:

Disease Diagnosis

Teleconsultation

Drug Discovery

Training & Education

Digital Pathology Market, By End User:

Pharmaceutical & Biotechnology Companies

Hospitals and Clinics

Academic Institutes & Research Laboratories

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Digital Pathology 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
  - Brazil
  - Argentina

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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 Digital Pathology Market.

Available Customizations:

Global Digital Pathology 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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