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Opinion Article

Enhanced Techniques for Computational Digital Pathology

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DESCRIPTION

Digital pathology is the process of digitizing glass slides using a whole-slide image scanner, and it involves examining the digital images using an image viewer, typically on a computer monitor or mobile device. An image viewer works similarly to the traditional standard light microscope, enabling pathologists to move slides around in the same way. Although the primary viewing functionality has not altered significantly, digital pathology has significantly improved the productivity, workflow, and financial performance of pathology labs. It is possible to take a complete image of a glass slide using high-throughput, automated digital pathology scanners in fluorescent or strong field lighting at a magnification similar to a microscope. The use of specialized digital pathology software packages enables digital slide network sharing. Additionally, the interpretation and quantification of biomarker expression within tissue sections might be aided by the use of automated image analysis methods. The rapid development of Whole-Slide Imaging (WSI) technology has made it possible to fully integrate digital pathology into pathology workflows, improvements in software applications, LIS/LIMS interfaces, and high-speed networking.

Pathologists may engage, assess, and cooperate quickly, remotely, transparently, and consistently appreciate the digital pathology, which boosts productivity and efficiency. In the long run, Computer-Assisted Diagnosis (CAD), personalised care, and improved translational research may all be part of the future of digital pathology.

One of the biggest benefits of digital pathology as many ways to improve the productivity in short and long term:

Improved analysis

Digital pathology offers improved analysis. It allows for calculations to be used for computerized slide analysis, which is objective, rapid, and accurate. It also allows researchers momentary access to previous related cases as well as data storage for long-term predictive analytics.

Reduced turnaround times

- Quicker access to digital slide archives
- Saves time on retrieval, data matching, and organization
- Speeds up access to samples and improves turnaround time versus manual reviews, especially in complex cases

More innovation

- Big data allows pathologists to become more specialized
- Enables the expansion of practices to larger geographic areas
- Improved training and teaching resources are delivered

Improved productivity

Productivity is one of the main benefits that have helped advanced pathology gain popularity. It does this in more ways. Firstly, it improves workflow by enabling wide-scale collaboration, offering central storage of data and easy access, minimizing the need for outsourcing, and facilitating automation.

Better patient outcomes

A role of pathologists is to establish a diagnosis for a patient in light of their tissue tests, surrendering a basic choice to a solitary individual, or gathering. Diagnosis in this way is vulnerable to human error, even if the person reviewing the samples is an expert; they are still not immune from human error.

Digital pathology is progressively utilized by large biopharmaceuticals and top Clinical Research Organizations (CROs) to streamline out drug improvement processes in disclosure, pre-clinical and clinical preliminaries. Particular opportunity exists for the potential future use of digital pathology for quantitative analysis of emerging companion diagnostics and novel theranostics. Opportunity may become especially relevant with the advent of assays which are difficult to discern with the human eye, like multiplex, or markers which display diffuse staining qualities across different cell compartments of which, for example, only one might be clinically important. The increasing complexity of such tests is driving the improvement of digital pathology arrangements with cutting edge high-throughput image catch (bright field, fluorescent or multispectral) coupled with pattern recognition to morphologically identify relevant tissue types and individual cellular compartments followed by the ability to quantify intensity of staining.

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