

PERSPECTIVE OF DIGITAL PATHOLOGY FOR ROUTINE HISTOPATHOLOGY AND CYTOLOGY LABORATORIES IN GENERAL HOSPITALS

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Introduction

Digital Pathology (DP) implies Whole Slide Imaging (WSI) and is referred to as Telepathology. Instead of traditional glass slide sample analysis under a microscope, computer monitors and particular software are used. High-resolution images are stored on the cloud or servers and can be shared for real-time consultations or work remotely. DP can be applied to cytology as well. In general hospitals, histopathology and cytology laboratories are often integrated due to a staff shortage. To provide healthcare service, glass slides are frequently sent to the specialist in other hospitals.

Aim

- To evaluate the implementation of Digital Pathology (DP) in general hospitals.
- Analysis of technical requirements.

Methods

- Review of literature references.
- Trial period of DP in General County Hospital in Pozega.

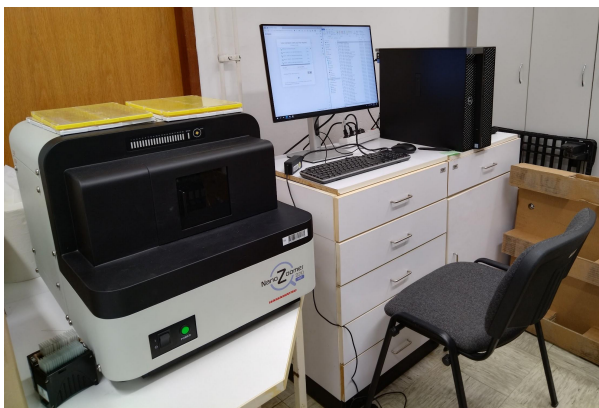


Figure 1. DP working unit including whole slide scanner system, computer and viewing software.

Results

- WSI is an additional step in the process of slide preparation for analysis.
- Once a glass slide has been scanned, the image is final.
- WSI requires high-quality slide images to avoid
 - glass slide artefacts
 - immunohistochemistry (IHC) misexpression
 - reduced fluorescence in situ hybridisation (FISH) signals
- The importance of glass slide quality mainly refers to ER, PR, Her-2 and Ki-67 scoring in terms of avoiding non-specific antigen-antibody binding that causes background staining and artefacts caused by poor coverslipping slides technique that can potentially interfere with interpretation.

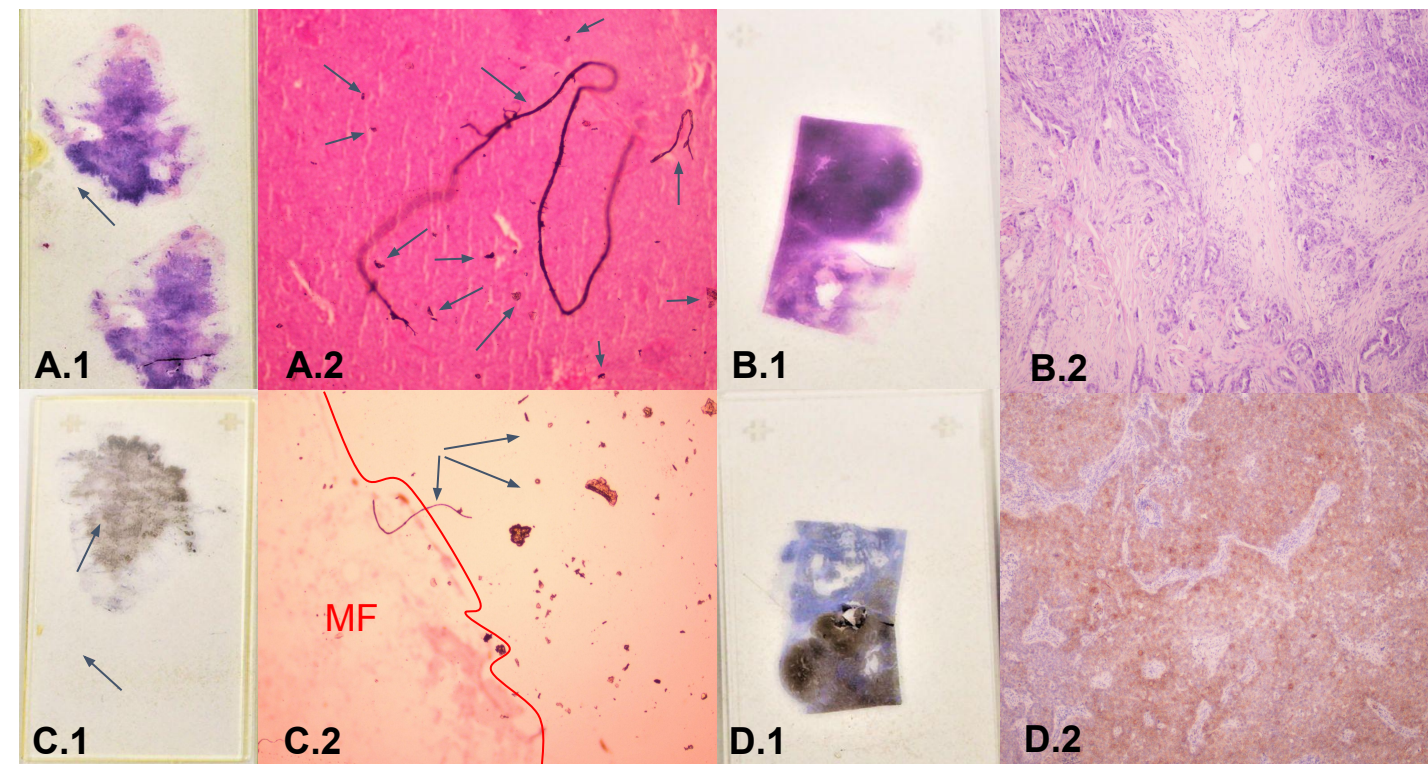
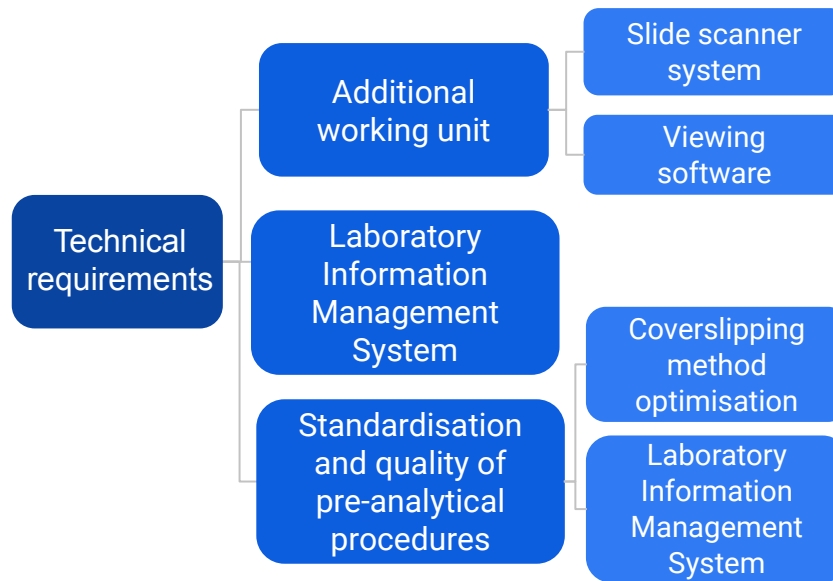


Figure 2. Images of slides covered with the two different techniques - manual glass technique - A.1, C.1 (Canada balsam), and automated film technique - B.1, D.1 (Tissue-Tek Film Automated Coverslipper, Sakura). Breast tissue covered with glass method disclosing air bubble and accumulation of Canada balsam - A.1 (HE staining), C.1 (Her2/neu, DAB Chromogen). Artefacts caused by contamination with air particles and dust during manual glass covering technique - A.2 (HE staining; magnification x40). Automated misfocused (MF) breast tissue due to artefacts (gray arrows) on manually covered glass - C.2 (Her2/neu, DAB Chromogen; magnification x40). Automated focused breast tissue on automated film coverslipping technique - B.2 (HE staining; magnification x40), D.2 (Her2/neu, DAB Chromogen; magnification x40).

Conclusion

Database creation can ensure traceability to all clinical information of one patient and remote slide analysis. Due to a lack of cytology and pathology specialists as well as cytoscreeners, DP can ensure remote work and reduce turnaround time (TAT). Data cloud storage security and costs are a great challenge. Implementation of DP in routine work of general hospitals demands standardisation of pre-analytical procedures and quality control.