

# 1 Optimising digital pathology workflow

## How to get the most out of your digital pathology cockpit?

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Digital pathology is taking over from conventional microscopy rapidly. Our way of thinking changed only a little in pathology diagnostics over the last 100 years.

The development of the digital cockpit enabled us to work differently, but the elements of technology and the workflow needs to be aligned well to provide maximum efficiency.

The workstation setup, slide viewer and the peripherals are the first step in setting up the ideal workplace. Taking into consideration the digital technology advances and change methodology in assessment of the slides highlighted the need to change some of the working practices to suit the new enhanced workflow.

The appropriate use of display technology enhances our diagnostic ability, but also taking image acquisition to the next level enable us to change workflow and practice, together with increasing speed and capacity.

The digital working practice however has some challenges and unexpected consequences – we will discuss the effect of fatigue and continuous computer/screen working, as well as the potential mitigation.

Finally – diagnostic thinking has changed significantly in the recent years, and will look through the transformative effect and interaction of digital pathology with pathology diagnosis making process.





## **Whole Tissue Imaging- Whole Block Imaging- Whole Slide Imaging - Whole Cell Imaging**

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Evaluating the whole tissue which resected from a patient and correlating to in-vivo imaging information in cellular level and the molecular testing results would be very helpful to understand the patient condition, and the disease, especially developing AI application. However, technically, it is extremely difficult. If we add new imaging modality in between steps, it could be possible. We have adopted a micro-CT as a device for new modalities, Whole Tissue Imaging (WTI) and Whole Block Imaging (WBI). Adding WTI and WBI into WSI, it can provide more details information about a patient and disease.

Over 2800 samples were scanned (fresh tissue samples; fixed tissue samples; FFPE block samples including whole mount blocks) since February 2017.

The micro-CT imaging system was a custom-built micro-CT scanner (3DHitech, Hungary). The highest voxel resolution was 1.0 mm/voxel. Re-constructed imaging data was then visualized and analyzed by using commercially software and in-house application. Prior to clinical studies, we have established all necessary standard operating procedure such as material handling, scanning protocol and imaging assessment per organ and per application. After scanning, 1-350 H&E slides from one block were prepared for image assessment and AI development

WBI and WTI with micro-CT of entire resected tissue's information, pathologists can evaluate tissue in 3D, seeing critical pathological changes anywhere in the tissue, in a clinical setting. We have confirmed that WBI can improve current WSI based 3D imaging; WBI and/or WTI can reveal additional information beyond what can be ascertained from the H&E in pathology diagnosis in all investigated organ systems.

WBI and WTI using micro-CT have huge potential in future medicine. Combining WSI, AI, deep learning, and WBI/WTI-micro-CT imaging technology, new lifesaving and life-extending clinical guidelines for many diseases can be established. New generation of micro-CT has "nano" resolution. In near future, the combination of advanced WSI technologies and in-vivo-WTI-TBI-WSI-WCI correlation will take important roles in clinical and research.