# Digital Pathology During a Pandemic

We would like to share our experience on digital pathology in a pandemic. Since the WHO declared COVID-19 pandemic, strict social distancing, self-isolation, and home office measures were introduced.[1] Although pathology workload decreased during the pandemic, many pathology departments worldwide were left battling to maintain their service. As we have run a complete routine remote digital pathology services since 2013, only minor adjustments were needed to be made in that regard. Our laboratory information management system (LIMS) has been fully integrated with the scanner as the one-access working station, including a desktop computer with two 23" displays or a laptop EliteBook 840 (Hewlett-Packard).[2]

Laboratory and administrative staff were divided into two teams working together every other day. This has led to an increased turnaround time for some samples but was partly compensated by the decrease in the overall specimen influx. Normally, we scan about half of the slides daily, including routine slides for one pathologist working 100% from home and all slides for our regular multidisciplinary team (MDT) meetings. Instead, we scanned all slides daily during the pandemic in an attempt to minimize the contact between the staff. Before the start, our IT department has tested all software and hardware involved for increased scanning input and storage. As there was a need to increase input from home offices, additional virtual private network (VPN) connections were also created to cope with the demand. Slides were routinely scanned at ×20 using the AT Turbo scanner (Aperio) and stored permanently. Following our previous study, we were considering to scan all minute diagnostic biopsies with queries of malignancy at x40 instead, further improving turnaround.[2]

Pathologists were encouraged to work from home were possible to secure distance and reduce the danger of infection. During March and April 2020, additional 1–2 pathologists interchangeably assessed routine cases remotely from their homes. Pathologists working from hospital offices avoided unnecessary contact and were able to stay confined to their office during business hours. Regular intradepartmental consultation services, reporting sessions with pathology trainees, and local MDT meetings were also digital (Skype for business) using the hospital's IT network. All members of the MDT could connect in from their designated offices.

Chairs were removed from the staff room, and frequent disinfections of working surfaces were introduced. Departmental face-to-face meetings were canceled and replaced by regular, detailed e-mail updates from the departmental head to all employees. The use of upgraded personal protective equipment and precautions concerning aerosol-generating procedures have been implemented as recommended by the Health Directorate, autopsy room included. Although minor, adjustments made to secure continuity of our service during the pandemic would not be sufficient without digital pathology solutions already in place. Attempts to resolve multiple logistical, legal, and administrative issues, while maintaining social distancing, could have been potentially overwhelming.

Pathologists working from home experienced only minor network problems, largely in the early days of the pandemic, due to the sudden surge in numbers of home office working hospital medical staff, without affecting our turnaround. Stable network speeds, fully integrated LIMS, technical reliability, working flexibility, and larger displays (e.g., home TV connected to the laptop) contributed again to the overall satisfaction with remote reporting; especially working flexibility irrespective of pathologist's personal circumstances at home.[2] Apart from one laboratory staff being quarantined for 2 weeks, after arriving from the pandemic affected region, no other stuff has tested positive or suffered illness during this period. A turnaround stayed the same comparing with the one before the pandemic.

By the end of April 2020, due to the easing of implemented measures to fight the pandemic, hospital clinics and general practices have started to normalize and our workload was increasing since. New measures to maintain social distance in this transitional period included reduction of numbers of microtomes per room. We will resume our normal service within the next three weeks and will continue with scanning of all slides and permanent storage of digital images on a regional server, with instant access for the pathologist, until a new workflow is being established. No issues in access or increased costs for the hospital have been reported during this period. Details on the future workflow remain to be agreed upon through our regional project on digital pathology, with expected implementation in 2021. Briefly, the plan is instant access for 60 days, followed by remote access storage, reducing the cost. A complete evaluation of costs and effectivity will be provided within the first 5 years.

As we previously reported, digital pathology has improved organization and execution of our pathology service through remote reporting, instant access to slides, shorter diagnostic and nondiagnostic time, shorter turnaround, increased productivity, improved working flexibility, and better ergonomics.[2] Building on this, some novel approaches to provisions of pathology services have emerged, e.g., consolidation of grossing services to one hospital site or region, interconnected multiple off-site remote pathologist offices, rotational presence of pathologists on-site, where applicable. Its multiple advantages may have also affected decisions by some oversight organizations concerning digital pathology in the pandemic. Royal Philips and Leica Biosystems have hence received enforcement discretion from the US Food and Drug Administration, allowing pathologists to use their technology to work

remotely during the COVID-19 pandemic.[3] Royal College of Pathologists has similarly outlined recommendations in its new guidance.[4] We expect that experiences from this pandemic may also lead to the swifter implementation of digital pathology solutions in general.

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## Conflicts of interest

There are no conflicts of interest.

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