



Digitalisation of routine histology laboratory processes: sign-out, immuno-histochemistry, education

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Abstract

Background: Virtual microscope technology became widely available in the last years. The digitalisation of histology laboratories are entering now a new routine phase. Results from large scale clinical and technical trials are needed to show the pros and cons of the application of this new technology in a routine setting.

Materials and methods: Virtual microscopy application fields were identified in a middle sized university pathology department (<400 slides / day). All produced slides (altogether appr. 5200/month) were scanned after one month of the sign-out date on optical microscopy (OM) and represented to the staff pathologist after digitalisation on a high-throughput scanner (Mirax-Scan, Zeiss, Germany) in digital microscope (DM). Immunohistochemistry analysis was supported by special scoring program. Diagnostic concordance was defined between optical and virtual microscopy diagnosis using the kappa statistics. Education room was equipped with PC-s (45) instead of the microscopes and an annotated education material was introduced (www.pathonet.com). Acceptance was questioned on standard form. Archive samples for demonstration purposes were digitised by a manual scanner (Mirax Desk).

Results: The kappa value was 0.96 between the two methods. Significant clinical errors were not found on DM. Automated slide loading and identification, high throughput evaluation was generally accepted by the staff pathologist. Mechanical errors in the loading could be reduced by using a dedicated slide loading technology. Immunohistochemistry, FISH analysis, TMA evaluations needed a lower capacity scanner (6-10 slides) but a higher resolution with fluorescence illumination and multichannel digital slide and corresponding evaluation quantification viewer. Correlation between DM based scoring to OM one was $r=0.94\%$. Education became more interactive, highly visited. It raised deeper visual impression and understanding due to the common view and exchangeable slide control features of the educational software tools.

Conclusions: Slide scanning, dispatching and visualisation technology is available today for routine use in histology laboratories having <400 slides/day. The diagnostic concordance between the OP and VM is high. Acceptance of VM is very good in staff pathologists. Students favour DM based education to the OM one.