DIAGNOSTIC PATHOLOGY

ORAL PRESENTATION

Virtual slides in diagnostic pathology

Klaus Kayser[1], Stephan Borkenfeld[2], Jürgen Görtler[3], and Gian Kayser[4]

Background

The development and implementation of virtual slide technology which is the transformation of complete glass slide images into a digitized matrix has left its childhood. So – called slide scanners of several companies are commercially available and already frequently used for various applications, especially education. What is the potential impact of this technology on tissue – based diagnosis (surgical diagnostic pathology)?

Present stage

The scanning procedure is commonly based upon a patchwork system either in line or area attachment. An acquired image amounts several GB in size; the scanning time reaches 1 min/slide. Image handling and processing require specific soft ware assistance that includes image compression, image notifications, and image analysis. In principle, virtual slides can be analyzed and interpreted by pathologists (human diagnosis), and/or by automated image information detection systems (automated screening and diagnosis). Fast image transportation, individual image visualization adjusted to the individual pathologist, and high performance viewers contribute significantly to the pathologists' acceptance of virtual slide diagnosis. They require algorithms that are different from automated diagnosis systems. Image quality analysis and standardization, search for the "significant areas of view", automated magnification adjustment, as well as texture analysis, object segmentation and structure derivation are prerequisite for "automated diagnostic systems". Although most of these compartments are already fully developed or in their test phases (see, for example www.diagomx.eu) general accepted standards are still missing for both human interaction or automated diagnosis. They still have to be implemented into the pathologists' routine workflow.

Perspectives and conclusion

Image acquisition time and image size {compression, (distributed) storage, handling and transportation} are the main handicaps of virtual slide technology at present. The development of a new generation of faster scanners and algorithms for distributed (Gird embedded) image handling, and adequate image analysis systems will probably enhance the application of virtual slides (virtual microscopy) in routine diagnosis.

Author details
[1]UICC-TPCC, Institute of Pathology, Charite, Berlin, Germany
[2]DiagnomX, Walltrop, Germany
[3]IBM Germany, Stuttgart, Germany
[4]Institute of Pathology University Freiburg, Freiburg, Germany

Email: Klaus.kayser@charite.de