Teaching with Digital Pathology
Using Aperio Digital Pathology for Seminar Teaching in Continuing Professional Education

BACKGROUND
The Edinburgh Dermatopathology and Haematopathology Tutorials are two-day learning seminars, held annually in Edinburgh, Scotland since 2010 and 2012 respectively. They are highly-regarded continuing education events, which attract delegates from around the world, primarily consultants and senior academic researchers, with a mix of general pathologists and subspecialists in hematopathology and dermatopathology.

The Tutorials are designed to provide a practical approach to specialist topics in hematopathology and dermatopathology, with expert speakers presenting a variety of unusual and challenging cases in their areas of specialty. The aim is to update delegates on a broad range of problem areas pertinent to hematological malignancy or skin pathology diagnostics, and equip them to take a practical approach towards resolving diagnostic dilemmas they may encounter in routine practice.

THE CHALLENGE
Due to the focus on practical case discussion, the courses cater to a limited number of participants each year in order to provide the best interactive experience for all delegates. Demand for the Tutorials has continued to rise, with delegate numbers increasing from 50 in 2011 to 80 in 2015, as well as a waiting list for places most years. Initially, glass slides and microscopes were used to present the cases. However, the logistics of using microscopes became ever more challenging. Challenges included sourcing instruments and materials for all delegates, storing microscopes both before and after the Tutorials, selecting a venue with sufficient space for the instruments, as well as additional time required for set up and breakdown. The decision was made to trial digital pathology as a potential replacement for glass.

The Tutorial organizers, Dr. John Goodlad and Dr. Thomas Brenn, invited Leica Biosystems to demonstrate a digital pathology system to delegates at the 2011 Dermatopathology Tutorial. The organizers decided that digital pathology was an optimal platform for delivering the course content, as well as removing the logistical challenges of using microscopes, and allowing for greater flexibility in choosing a venue. Other vendors were considered, however on the basis of image quality, an agreement was reached with Leica Biosystems to provide digital pathology services.

GOING DIGITAL
Digital pathology was first implemented for the Edinburgh Haematopathology Tutorial in 2012, and the following year its use was extended to the Dermatopathology Tutorial. In advance of each year’s Tutorials, the speakers send their glass slides, a mix of hematoxylin and eosin (H&E) and immunohistochemistry (IHC) staining, to the Leica Biosystems office in Dublin, Ireland for...
digitization. Currently an Aperio AT2 scanner is used to capture digital images of the slides at 40x magnification. Typically there are 100 – 200 slides for each Tutorial per year, so the 400 slide capacity and 98% first time success rate of the Aperio AT2 are advantageous in performing the scanning efficiently. The digital slides are uploaded to a cloud hosting server managed by Leica Biosystems, where they are made available for viewing via Aperio eSlide Manager software, along with limited case data. Original glass slides are then returned to the speakers by courier service.

Access to the images and data is provided for the delegates a number of weeks prior to each Tutorial, allowing them to review and familiarize themselves with the year’s cases in advance of the live sessions. During the Tutorials themselves, Leica Biosystems representatives are typically on-site to assist with any challenges, for example due to lack of familiarity with digital pathology software, and to answer any questions the delegates may have. Following the Tutorials, the speaker presentations are made available through the digital pathology software in PDF format, and access to the digital cases remains open for a month. The ability for all delegates to view the same slides from multiple remote locations, before, during, and after the course, is a key advantage of using digital pathology for continuing professional development.

Feedback from participants on the quality of the digital images and usability of the system has been favorable, even in users with limited digital pathology experience. An on-site survey of delegates at the 2015 Tutorials found that 64% of those who responded did not use digital pathology in their work, with a further 11% using it only occasionally, e.g. during external quality assurance (EQA) schemes. Of the respondents, 81% had a positive or very positive impression of the Aperio digital pathology system used at the Tutorials, including a number of comments from non-digital pathology users that emphasized its ease of use.

Because access to the hosted cloud server relies on consistent internet access, there have been some challenges around wireless network connectivity at the Tutorial venues. However Leica Biosystems and the organizers have typically been able to work through these in cooperation with the venue. Overall, the organizers have found the introduction of digital pathology to be very successful, and 2016 will see the fifth concurrent year of using the Leica Biosystems digital platform to support the Edinburgh Tutorials.

CONCLUSIONS:
Digital pathology brings a number of benefits to seminar teaching. The ability for delegates to access slides remotely via the web has huge practical advantages, enabling materials to be made available for pre-work as well as for review after the session. Use of digital slides means that all of the delegates at a course can view slides simultaneously during teaching and discussion sessions, and provides easy access to rare or limited materials. It also simplifies logistics, as in the case of the Edinburgh Tutorials, where instead of the organizers needing to source large numbers of microscopes, the delegates can view the slides on their own laptop or tablet device. For seminar speakers, digital pathology provides an easy way to present case materials to a group via a computer connected to a projector or large screen, and also reduces concerns about precious glass slides being lost or broken during practical sessions. For the Edinburgh Dermatopathology and Haematopathology Tutorials, implementation of digital pathology has facilitated opening the course to larger numbers of delegates, and provided course attendees with longer-term and more in-depth access to course materials.

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Dr. Goodlad is Head of Hematopathology at Western General Hospital, Edinburgh, as well as a member of the Dermatopathology Specialist Team and an Honorary Senior Lecturer. His routine and referral diagnostic practice, and research interests, center on hematological malignancy, with a particular interest in skin lymphoma. Dr. Goodlad regularly lectures at national and international departmental meetings and courses.

Dr. Brenn is Consultant Dermatopathologist and Head of Dermatopathology at Western General Hospital, Edinburgh, and Honorary Senior Lecturer at the University of Edinburgh. His referral practice reflects his clinical and research interests, related predominantly to the pathology of cutaneous soft tissue tumours, skin adnexal tumours as well as melanocytic tumour pathology. Dr. Brenn is actively involved in clinical as well as translational research and particularly enjoys teaching dermatopathology to a wide range of audiences at national and international meetings.

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