

Production and Use of an Open Access Film to Demonstrate the Preparation of Histological Sections.

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ABSTRACT

Students of histology are often unaware of how the tissue sections they use are made. This separation from reality becomes even greater when digital microscopy is used for teaching. We describe the making and use of a short, 12 minute, film demonstrating the preparation of tissue sections for histology and histopathology. The aim of this film is to demonstrate the basics of the techniques used in histological tissue section preparation rather than an instructional video. The film is freely available on the University of Bristol You tube site (<https://www.youtube.com/watch?v=PafHxS5bq9A>) and has had over 42,000 hits worldwide since it was uploaded in April 2013 including over 18,000 in the last year. The film has received many favourable comments from viewers.

Keywords: Histology, tissue processing, film, teaching.

INTRODUCTION

Histology or ‘tissue structure and function’ is generally taught in undergraduate and professional programmes using sections of fixed and stained tissue on glass microscope slides using light microscopes or increasingly using digital technology through virtual microscopy.^[1,2] Either way the preparation of this tissue is not generally taught to students who therefore may be mystified as to where these sections come from. In addition the use of digital microscopy further removes the reality of what sections are in terms of size for example. In biomedical sciences at the University of Bristol we mostly teach histology using digital microscopy.^[1]

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We have previously demonstrated the techniques used to prepare histology slides in our histology preparation lab. This involved taking approximately 10 students at a time during a practical class to show them the processes in action. However this was disruptive in the class and

became unmanageable with increased student numbers (class sizes of up to 150). To retain the teaching of how tissue sections are prepared we produced a short video to illustrate the process from tissue fixation through embedding, sectioning and staining.

The aim of the film was to provide students with the context in which histology sections are produced rather than to provide a step by step instructional video. Instruction on how to prepare histological sections would require a much more in depth hands on approach.

The film was produced by a commercial film company with expertise in educational videos (Beeston Media, Bristol). The content was defined by the authors who also participated in the filming. The total cost of production was £2,500. Filming took one day to complete with post hoc editing by Beeston Media. The film is 12 minutes long and includes a short introduction describes how we teach histology in Bristol^[1] to students of medicine, dentistry and veterinary science (2.5 minutes). This is followed by footage of the processes of fixation, embedding, sectioning, staining and cover slipping being undertaken and has captions to describe the process, it therefore does not rely on audio [Figures 1 & 2].

The film is embedded in our digital microscope platform (Digital SlideBox (DSB) software (SlidePath Ltd, Leica Biosystems, Dublin, Republic of Ireland) and students are instructed to view it as part of their preparation for their first introductory

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histology class, it is then available for them to watch at any time. An on-line quiz which forms part of the practical assessment for the veterinary science students via our dynamic lab manual developed at Bristol (eBiolabs, University of Bristol, UK and Learning Science, Bristol, UK)

which includes questions on the content of the film. This encourages viewing of the film by the students. The film has also been uploaded onto the University of Bristol You tube site for open access.^[3]

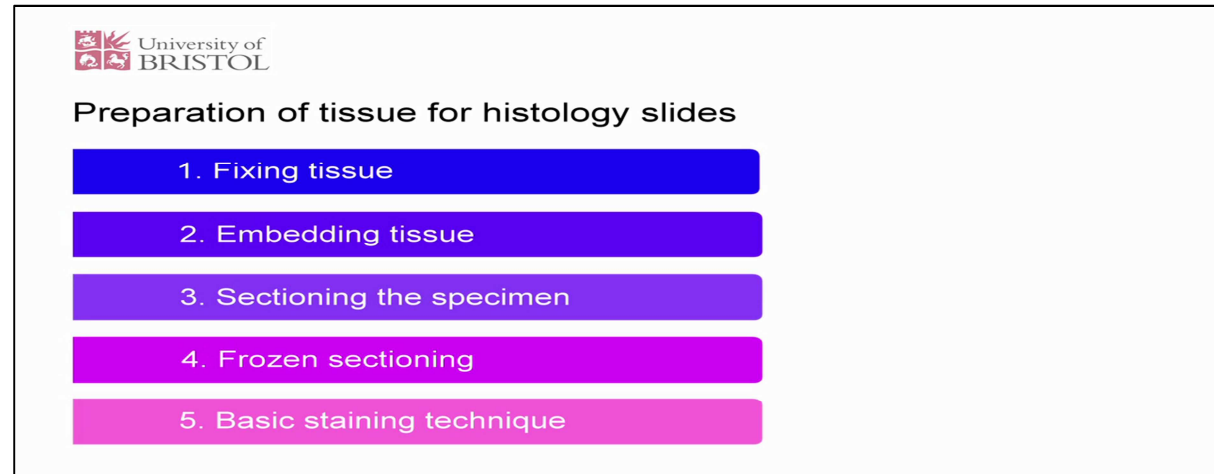


Figure 1: Screenshot from film to show the stages of processing covered in the film. This shot is repeated for each section with the next step to be illustrated highlighted.

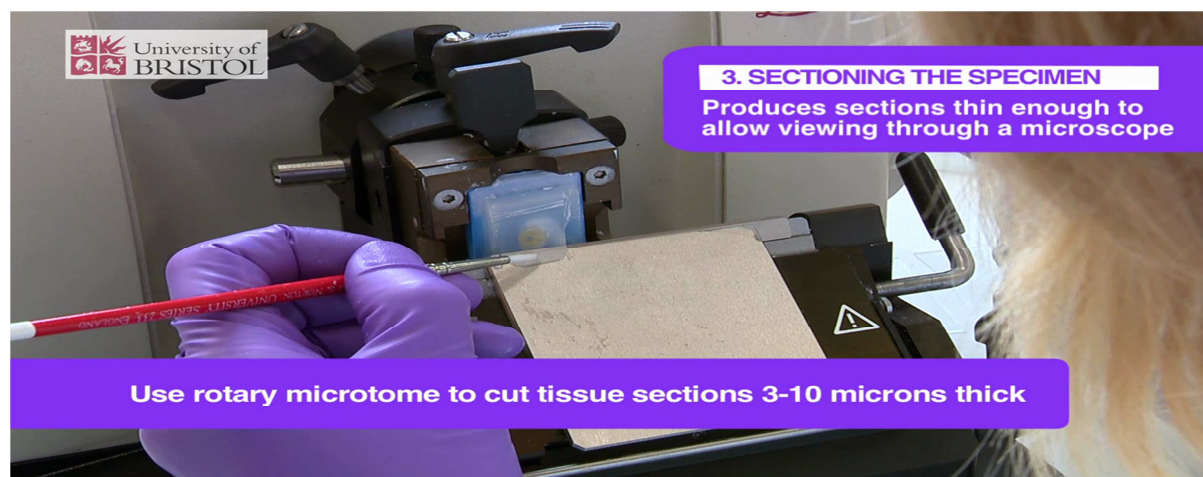


Figure 2: Screenshot from the part of the film showing the use of a microtome in tissue sectioning along with the descriptive caption.

DISCUSSION

Bristol students report that viewing the film increases their understanding of 'what histology is' and where the material they use comes from. Students do well in the assessment questions relating to the content in the film, with 100% of the veterinary science students in the current academic year (2016-17) correctly answering a question on the order of stages in preparation of histological sections in an on-line test. The film has also provided a useful tool during practical training in histological techniques for new researchers, project students and been used as part of out-reach activities with local schools.

The video has been available on the University of Bristol You tube site since April 2013 and has had considerable traffic and favourable comments. It is the second most viewed film on the University of Bristol's You tube site. Tracking the views (8th November 2016) demonstrated that there have been 42,316 views in total with 18,719 in the last 12 months. Thus indicating its continuing relevance and popularity. Average view time is approximately 5 minutes, evidence to demonstrate that the film is being viewed for a substantial period in each viewing. In total it has attracted 329 likes versus 5 dislikes and many positive comments. Instead of;

• Not enough in depth histology vids on You tube.. This is a great one!

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- Thank you :), now I understand the whole process.
- Thank you so much, my 46 pages of my lecture presentation just turn into a few understandable pages...Thank you.....
- Was always wondering how they obtained and fixed such tiny sections during my Histo classes! Thanks guys!

The global traffic to the film identifies the 5 most popular countries in terms of 'watch time' are USA (18%) UK (9%) India (7.4%) Australia 4,8%) and Canada (4%) indicating that this video has a wide audience.

These data provide substantial evidence that techniques films of this nature are a useful method of illustrating techniques to students and also potentially demystifying them to a wider audience.

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