Peace of Mind That You're Always Prepared:

An Educational Series on the Value of Routine PM Service

Part 7: Coverslipping

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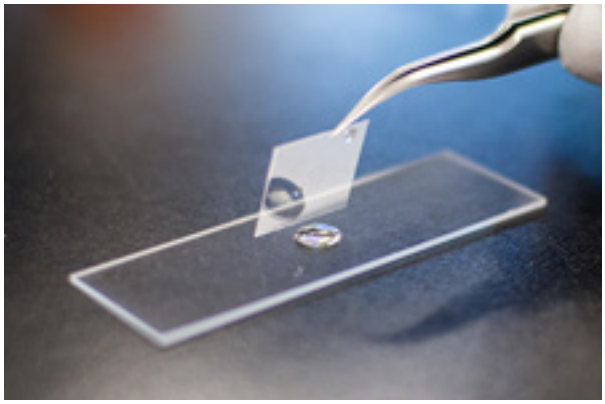
The final step in preparing a microscope slide for observation under a light microscope is to apply a coverslip, sometimes referred to as a coverglass. Coverslips are applied to stained tissue sections to both preserve the stained sections and to prevent damage to the tissue section.



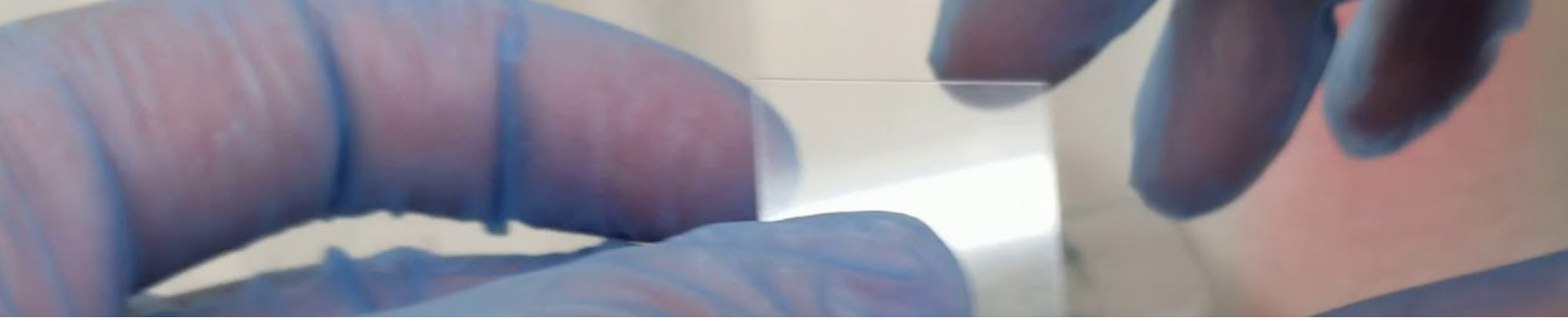
Application of a coverslip also includes the use of a synthetic resin (i.e. coverslipping media) which serves to act as a "glue" to hold the coverslip in place on the microscope slide. When microscopy was first developed in the late 1600's and early 1700's, the only coverslipping medium available was water. This method worked well for the immediate viewing of specimens but was not permanent. Later as the science of histology evolved, Canada fir balsam was used as a permanent mounting medium and is still available today. Currently there are many sources of synthetic resins available to histologists for coverslipping.

The main consideration in choosing a synthetic mounting medium is ensuring that the refractive index of the medium is equal to 1.50 to 1.55. Refractive index refers to how much a ray of light is bent as it travels through a medium, as compared to it traveling in a vacuum. The refractive index of hematoxylin and eosin (H&E) stained tissue sections is equal to 1.54, thus the mounting medium chosen for use should have the same refractive index value.

Most laboratories have automated coverslippers to apply coverglass to stained slides. This is an improvement over the "good old days" of coverslipping by hand. Xylene and xylene substitutes can be hazardous to laboratory personnel, such that automation of this task is safer for histologists. Also, hand coverslipping is a repetitive motion, and automation can help to prevent the development of repetitive motion syndrome in laboratory personnel.

Automated coverslippers consist of robotic equipment that can apply mounting medium and a coverglass sequentially to each stained microscope slide retrieved from a slide rack. The final stained and coverslipped slide is then deposited into a rack for drying. It is an amazing process to watch from start to finish. Almost all histologists have performed manual coverslipping, such that they can appreciate the very close tolerances required for the successful automated operation of such a task.

Automated coverslippers must be maintained by laboratory personnel on a daily basis. Glass coverslips must be loaded into the supply hopper. Broken coverslips must be removed from the interior work area. Conversely, there are coverslippers that use rolls of coverslipping tape which must be re-supplied. Likewise, coverslipping medium must be replenished when necessary.



Automated coverslippers must also be inspected and maintained at least annually, as the tolerances are so close within the machine, that they must be confirmed and calibrated on a regular basis. If this procedure is ignored, the laboratory runs of the risk of a coverslipper "crash" which may damage valuable microscope slides.

The vendor service technician will examine all mechanical moving parts for evidence of wear and replace any that are in need. The interior area will also be "deep cleaned" to remove any bits of broken glass or debris.

All applicable tolerance ranges within the equipment will be checked and calibrated to ensure smooth operation and flow of slides through the coverslipper. Additionally, the coverslipper may be attached to an automated slide stainer through a "transfer station" unit. This is an additional piece of close tolerance equipment which enables transfer of the slide rack from the stainer to the coverslipper. A preventative maintenance on the transfer station will help to prevent a "crash" of an entire slide rack, which may have serious consequences. Similarly, the final step of the automated coverslipping process – delivering each slide into a slide rack for drying – must be performed smoothly and consistently, with no "crashes' which may damage the final slides. From this point forward, the slides are ready for drying and delivery to the office area.

The automated stainer, transfer station and coverslipper are all sources of reagent vapors. Another important aspect of the preventative maintenance is to ensure that this equipment is properly ventilated. The vendor service technician will check to make certain any on board exhaust fans are operating to specification. The technician should also check the installation and expiration dates of any filters that are in use inside the equipment, as they may need to be changed out as well. The proper and timely preventative maintenance of the automated slide stainer, transfer station and coverslipper will ensure a smooth workflow through the laboratory and help to provide a safe working environment for laboratory employees.

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Clifford Chapman has over 40 years experience managing both private reference and teaching hospital pathology laboratories in the Boston area, including Massachusetts General Hospital, Pathology Services, Children's Hospital Boston, and StrataDx.

He also has over 25 years experience presenting lectures, workshops, teleconferences and webinars at the local, regional and national level for the Massachusetts Society for Histotechnology, Region I Histology and National Society for Histotechnology.

Clifford is a specialist in histological techniques, quality management, laboratory workflow and laboratory safety. He is an author and co-author of over thirty scientific publications, including his most recent book "Dermatopathology Laboratory Techniques". Clifford is currently the Technical Specialist at StrataDx and works as a consultant at Medi-Sci Consultants.