

course the time of exposure, among other factors. The possibility that many of these cases may have received antemortem antibiotic therapy makes prospective studies today problematic.

How might we account for the three cases reported by Gerston and Gafoor which contained viable organisms? For the reasons previously stated, the body of literature does not allow us to rule out the possibility that formaldehyde solutions are only partially effective in killing the tubercle bacillus. It is quite possible that some organisms of the species may well be resistant to this alkylating agent, possibly due to the lipid content of the organism's cell wall. We would be correct to question whether the grossing of the study's samples was adequate to allow the formalin complete access to the tubercle lesions contained within. We have all seen examples of large tissues immersed in formalin appearing to have unfixed areas when they were later cut down. Lastly, the challenges of successful TB therapy effectively illustrate how the body's inflammatory reaction leads to the isolation of the organism. The accumulation of living and dead macrophages, bacteria, and tissue cells in the area of infection contribute to the formation of the tubercle. Over time, a thick fibrous capsule may form around the tubercle, walling it off through the development of a granuloma that may contain necrotic material; often, this material is rich in lipid which may challenge the penetration of an aqueous fixative like formalin.

The scant body of literature makes it impossible to confirm or rule out anecdotal reports that the tubercle bacillus may resist the action of formaldehyde. Clearly this is an area that warrants further controlled study. In the absence of hard data, it would be prudent to exercise standard precautions when working with formalin-fixed tissues which may potentially harbor this organism.

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A Revolution in the Making at the NSH Convention

Gilles Lefebvre, Managing Editor

The 2002 NSH Convention in Long Beach, California was a resounding success. A record-breaking crowd attended this year's NSH, not only for a first-rate educational program, but also for great activities. The main ballroom of the Queen Mary ship was the setting for the Sunday night banquet which offered a glimpse of the past splendors of a very romantic era. The clement weather allowed for the preceding cocktail hour to take place on the rear deck of the ship, providing a very picturesque view of Long Beach across the bay. Many people also took advantage of the unique venue to visit the various parts of this wonderful ship.

The Convention Center exhibit floor provided the attendees with a surprise preview of the Histology Laboratory of the future. Upon entering the exhibit hall, nobody could ignore the giant video wall located at the front of the Sakura Finetek booth.

This wall of light and sound invited everybody to discover two innovative instruments currently in the final stage of development at Sakura: the Tissue-Tek® Continuous Rapid Processor and the Tissue-Tek® AutoTEC™ Automated Embedding System. These two revolutionary instruments will dramatically reduce the turnaround time of specimen preparation in the histopathology laboratory. It will now be possible to process, review, and sign off most cases in the same day they are received. The Tissue-Tek® Continuous Rapid Processor is capable of processing up to 120 specimens per hour (Fig. 1). One basket of up to 40 cassettes can be loaded about every 20 minutes. The system consists of 1 loading station, 4 reagent retorts, and 2 unload stations.

A combination of a novel reagent system, patented microwave technology, and traditional vacuum infiltration technology is used to produce results that are comparable to or better than traditional processing. The proprietary reagents do not involve formalin or xylene, although the method is compatible with formalin-fixed tissues. The total volume of reagents used is reduced by about 80% as compared to the traditional method. Also, retort cleaning cycles are not necessary. Reagents are presented ready-to-use in disposable 1-gallon containers. The Tissue-Tek® Continuous Rapid Processor method¹ is based on a blend of very gentle reagents performing fast and efficient fixation, dehydration, clearing, and impregnation. Precisely controlled mechanical and thermal actions ensure optimal, standardized processing. Because there is less

variability in this method, results are more consistent. Biopsies and larger specimens can be run at the same time. The gentler process preserves DNA, RNA, and proteins in the block when specimens are processed fresh or pre-fixed in the Tissue-Tek® proprietary nucleic acid-safe fixative.

The Tissue-Tek® AutoTEC™ Embedding System is capable of embedding up to 120 specimens per hour, automatically (Fig. 2). Four magazines of up to 34 cassettes each can be loaded at a time. More can be added as the robotic system removes them from the loading station, allowing for continuous operation



Fig. 1. The Tissue-Tek® Continuous Rapid Processor operates at a rate of up to 120 specimens per hour and still provides results with morphology and staining characteristics similar to overnight processing.



Fig. 2. The Tissue-Tek® AutoTEC™ Embedding System uses the unique Tissue-Tek® Paraform® Cassette System to offer total automation of the embedding process at a peak rate of 120 blocks per hour. The throughput is not degraded even if only biopsy specimens are embedded.



Fig. 3. Biopsy and Standard Paraform® Cassette System.

throughout the day. The magazines can be used as baskets directly from the tissue processor. The Tissue-Tek® AutoTEC™ senses each cassette and automatically differentiates between biopsy and standard size cassettes. Each cassette is then placed in the proper size base mold, paraffin is precisely dispensed and then cooling is activated to form a block. The cassette is then moved to one of the four output doors. The doors can be detached from the system and used as convenient holding trays during sectioning.

Total automation of the embedding process is possible thanks to the patented Tissue-Tek® Paraform® Cassette System (Fig. 3). This sectionable cassette system is a true innovation in cassette design. It makes tissue preparation simpler and faster by at least 50% as compared to current techniques. The grossed specimen is inserted into the cassette and frame with the proper orientation. The lid is pushed down to secure the specimen between the lid and the cassette bottom, ensuring that orientation is preserved. Processing is then performed without the need to change the programs. After processing, the cassettes are embedded by the Tissue-Tek® AutoTEC™ Embedding System. Each cassette is automatically pushed down in a base mold. There is no need to open the cassette and handle the tissue. Orientation is preserved inside the special

Paraform® sectionable cassette and there is no paraffin to trim around the cassette prior to sectioning. The Paraform® material has sectioning characteristics similar to paraffin. It allows the user to section right through the cassette bottom without artifacts and without damage to the blade. The Paraform® material does not pick up stain and does not interfere with microscopic examination.

There is no doubt that these two instruments, along with the Paraform® Cassette System, will have a profound impact on the operation of the histology laboratory. For the first time, specimens can be processed, embedded, sectioned, and stained within 2 hours, without sacrificing quality and with no changes in microscopic morphology. The ability to prepare specimens continuously and to use significantly less reagents will have a positive effect on turnaround times, efficiency, operating costs, and better patient care. Both instruments are currently going through clinical trials. Full market release is expected by late 2003.

Reference

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Comparative Usefulness of Standard and Microwave-assisted Tissue Processing Methods

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Introduction

The steps used to prepare specimens for histology are well known and illustrated in Fig. 1. Tissue processing, which includes dehydration, clearing,

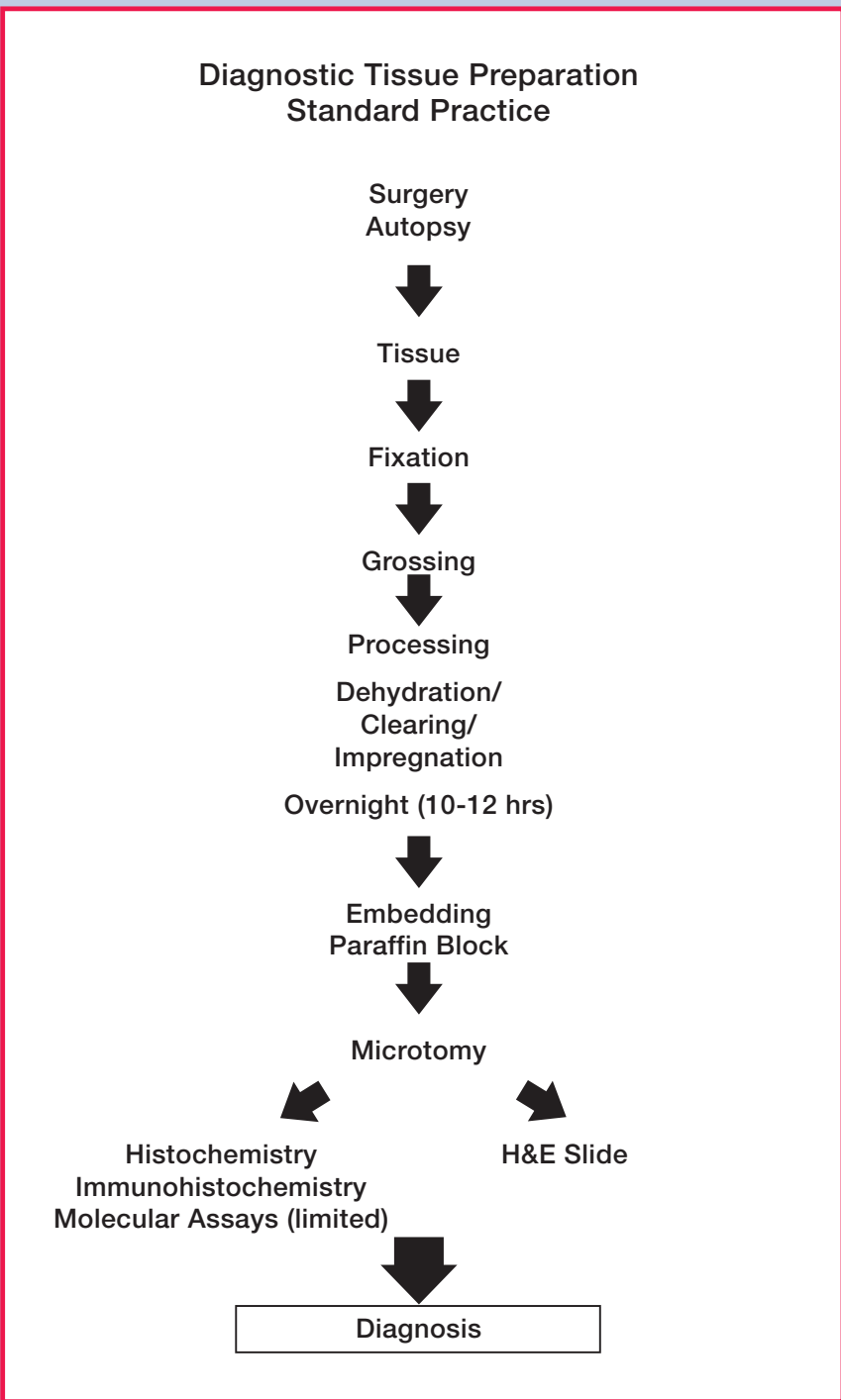


Fig. 1. This figure shows the steps required to prepare H&E stained slides from fresh tissue obtained following surgery or at the autopsy table.

and impregnation, is the lengthiest of these steps. It lasts 10 hours or longer, and is the major bottleneck in the workflow of histopathology laboratories. Typically after grossing, the samples are held in their respective cassettes for overnight

processing and embedded, sectioned, stained, and coverslipped in batches the next day. Batches of microscope slides are presented to the pathologist for review and diagnosis at the earliest, 1 day after grossing the specimen. This has been customary