and procedures, and that the picture being presented to them is an accurate and clear representation of tissue elements within. The histotechnologist must strive not only to perform analyses, but also to create a perfect picture, demonstrating and highlighting, or eliminating, structures that might be misidentified as pathogenic organisms.

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Tools to Facilitate and Standardize Grossing

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Grossing, a term that refers to examination and dissection of surgical specimens, along with preparation of sections from those tissues requiring processing, is the initial step in the practice of surgical pathology. While textbooks and manuals of surgical pathology teach about the sampling of specimens, they are silent regarding the dimensions of individual tissue slices, other than to suggest a thickness of 2 to 4 mm. Unfortunately, it is not an uncommon practice to place as much tissue as will fit into a specific size cassette. Although this liberal approach to grossing

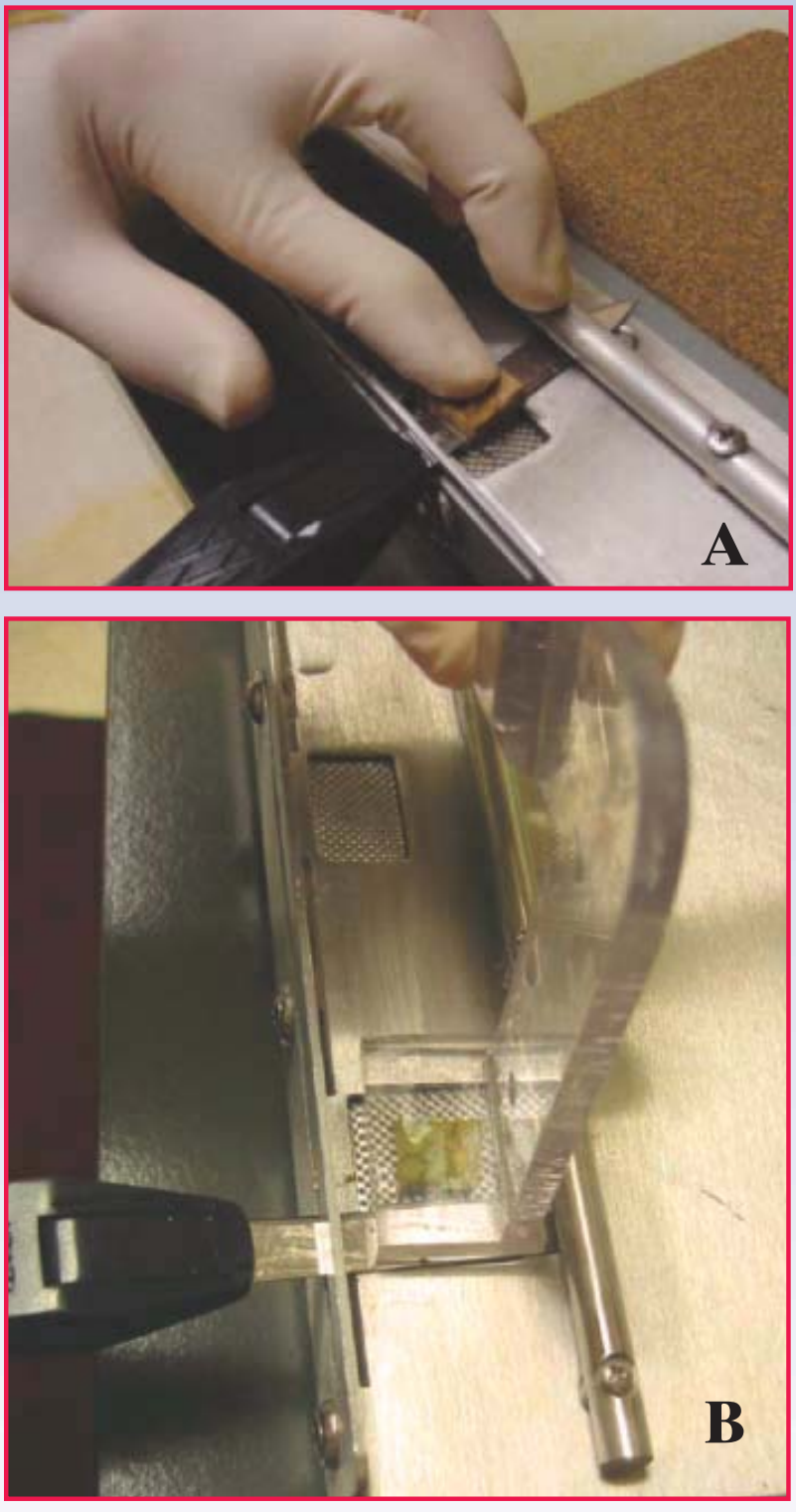

Fig. 1. These photos show slicing of tissue that is held in place by either A) index finger, or B) plastic holder.

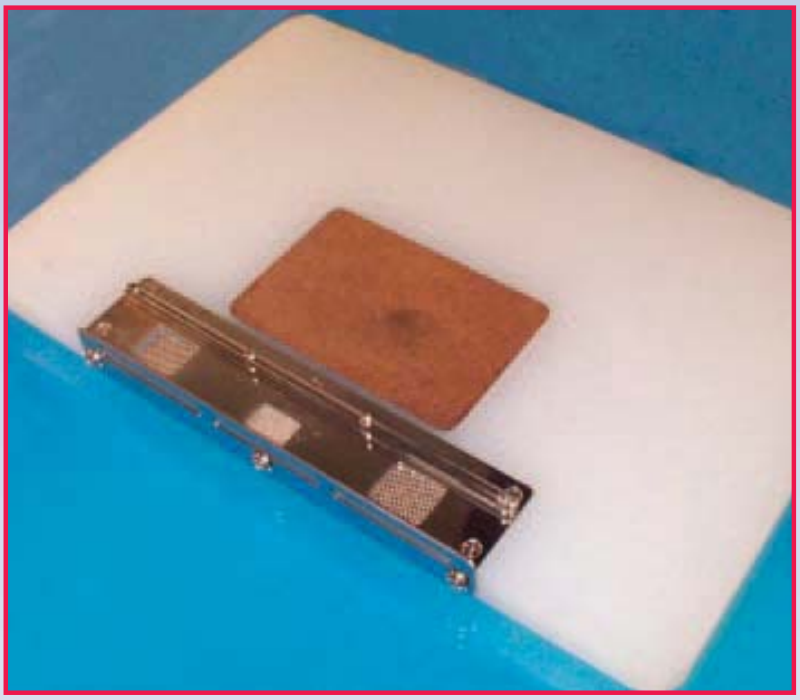

Fig. 2. Grossing board with slotted metal plate and knife-guiding assembly.

Fig. 3. Tissue sample obtained as illustrated in Fig. 1.

may have been permitted by conventional processing methods lasting 12 hours or longer, it fails with rapid tissue processing now done by microwave-based methods and by shortened conventional assays. The requirement to adjust the length of the processing cycle according to the thickness of tissue sections is discussed in publications of microwave-based methods such as Visinoni et al,[1] and Willis and Hinshew.[2] Conversely, Morales and associates advanced the notion of standardizing tissue sections to accommodate the processing cycle in microwave methods.[3]

Appropriate tools are required to obtain proper slices of tissue for processing and are essential to standardization of tissue sections, but grossing tools created specifically for pathology are rare. A review of the literature and MEDLINE searches for "grossing tools" or "pathology tools" failed to yield a single reference. There are, however, several publications about the birth and evolution of surgical instruments that have evolved with the advances of surgical ingenuity and its demands. It has been customary to use the same instruments developed for the practice of surgery for grossing. It is a tradition, passed on from one generation to the next, with poor results and no standardization in grossing the tissue.

During the course of developing and implementing an automated microwave-based rapid tissue processing system at the University of Miami/Jackson Memorial Hospital, the need to standardize the dimensions, and particularly the thickness of tissue sections, became readily apparent. To that end, we created two tools that greatly facilitate grossing, not only for microwave-based methods, but also in conventional tissue processing. These tools are illustrated in Figs. 1-5.

Fig. 4. These photos show slicing of bowel with the assistance of the grossing tool: A) sliding the blade against the outer surface of the tines; B) slice of tissue occupying gap between tines.

As previously reported[3] and also described in detail elsewhere,[4] the grossing board permits preparation of uniform tissue slices of the desired thickness. It consists of a board with a slotted metal plate and a track for the knife or surgical blade (Figs. 1, 2). The slots serve as wells for the placement of the tissue and the knife-guiding assembly keeps the cutting blade in place. As the bottom surface of the slots are parallel to the cutting surface, sliding the cutting blade in the track along the surface of the cutting board yields tissue pieces of uniform thickness, which facilitates processing, as well as microtomy. Because the depths of the slots are easily adjusted, sections of desired thickness are obtained. Moreover, the slots can be built large enough to facilitate serial slicing of organs, such as prostate and breast.

While the grossing board greatly facilitates sampling of solid organs and tumors, flat structures such as skin and small tubular organs like the appendix, fallopian tubes, and umbilical cord, are not amenable for its use. For those, we developed another tool that holds the tissue in place to permit sampling of uniform desired thickness. This tool is particularly helpful in grossing organs composed of layers of different structures that slide over each other during sectioning, such as the bowel and gallbladder. Additionally, tissues that are soft and slippery, such as adipose tissue, or fatty tissues, such as breast, are easily handled with this tool. The tool is composed of a handle and a head supporting a double array of four tines (Fig. 5). The gap between the double array of tines is predetermined to accommodate the desired thickness of tissue sections (Fig. 5 inset). As illustrated in Fig. 4, the tissue is held in place while sliding the blade against the outer surfaces of the tool, thus yielding a section of the desired thickness in the gap provided between the double array of tines.

Fig. 5. Grossing tool consisting of handle, tine-supporting head, and double array of tines (inset).

This contrasts with the common practice of holding such tissues with forceps during sectioning, a procedure which produces irregular slices of tissue, varying considerably in dimensions and thickness.

In summary, we describe two tools that allow standardization and greatly facilitate grossing by providing tissue sections consistently uniform in thickness.

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A Technique for Correcting Poorly Processed Paraffin Blocks

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Every histotechnologist is familiar with the frustrations of trying to cut a block that was underprocessed and "mushy" because it was grossed in too thick. In some cases, adjusting the microtome to a thicker setting (6 or 8, or even 10 microns), re-embedding the specimen after squeezing the tissue to remove residual xylene, or freezing with freeze spray, may make it possible to obtain a section. Some of these blocks are so poorly processed, however, that they cannot be cut at all no matter what tricks we attempt in order to get that one section the pathologist needs. When nothing works to obtain a satisfactory section, the tissue must be reprocessed. This is typically a time-consuming, hands-on process.

Histotechs are always looking for a way to automate the process in order to save time and energy. One of the most common techniques is to first melt the block down to remove the paraffin. The tissue is then put back in the cassette, placed in a tissue processor, and run through a purge or cleaning cycle. The tissue emerges with the paraffin and xylene removed and wet with 100% alcohol. Then the tissue is manually run through 95% and then 70% alcohol before it is placed back in formalin and reprocessed with that night's surgical tissues. This works satisfactorily in most cases. However, it does subject the unprotected tissue to hot xylene and hot alcohol which is quite harsh and can cause distortion of the cellular morphology.

Several years ago, the histotechnologists at Sacred Heart Medical Center (Spokane, WA) returned from an NSH symposium with a novel technique for reprocessing tissues that involved far less technical time, and it spared the tissue from the harsh treatment of a purge cycle (see Fig. 1). This procedure involves melting the block down and blotting off the excess paraffin before putting the tissue back in the cassette and placing the cassette directly into formalin for reprocessing with the regular run of tissues for that night. The results are remarkably good with less handling time.

The rationale for reprocessing blocks this way is simple. The portions of the block that were adequately processed initially are spared further dehydration as the remaining paraffin insulates the tissue from the effects of alcohol, which in excess can make some tissues very hard and brittle. The paraffin remaining in this previously processed block is eventually removed in xylene on the processor and the entire sample is then reinfiltrated with new paraffin. The portion of the block that was previously underprocessed is reexposed to the effects of fixative, dehydrant, clearing agent, and then infiltrated with paraffin. When complete, all parts of the block are properly processed and infiltrated, and the block cuts very well. Undoubtedly, part of the reason the tissue processes better the second time around is that it is thinner because some of it was cut away during initial attempts to cut the block.