Surgical Grossing of Tissue: Use the Best Tools to Keep the Quality High and Safety Risks Low

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In order to produce finished microscope slides of optimal quality in the histology laboratory, one must begin at the beginning. After receipt and accessioning of a specimen, the first stop in the laboratory is at the surgical grossing station. It is here that trained grossing technicians and pathology assistants open specimen containers and determine how the specimens are to be cut, if at all, into suitable sizes and orientations. Different colored inks may be applied to alert both the histologist and the pathologist to certain orientations.

Inking may be applied to indicate to the embedding histologists which aspect of the tissue should be "embedded up / down", or to simply add contrast to the specimen to make the embedding task easier. Inking of surgical margins for the pathologist are of primary importance as these landmarks will be used to determine spread / containment of cancer cells, among other diagnostic aspects.

The tools used by surgical grossing personnel are simple – but they must be effective and safe to use. The blades used for specimen preparation are called by many names: single edged blades, "prep" blades, scalpel blades, trimming blades, grossing blades, etc. However, they all have the same purpose: to enable the surgical grossing personnel to cut the biggest and smallest tissues sharply, concisely and cleanly – while keeping personnel safe when loading, using and unloading these blades.

Surgical grossing blades come in many types, sizes and configurations. This is good news, because the specimen type received by the laboratory will dictate the types of blades to be used. Reference laboratories that receive skin biopsies will utilize a very different blade than a teaching hospital that receives mostly large tissues and entire organs. The information contained in this article will help you to determine what the best blades are for your laboratory.

Firstly, surgical grossing blades are mostly made from either carbon steel or stainless steel. Which

one should you use? That depends.

Carbon steel is made from analloy (mixture) of carbon (usually less than 2%) and iron. A blade made from carbon steel will be sharp and stay sharp for a time – the cutting edge does not dull quickly. However, carbon steel can rust and is brittle – which must be taken into consideration. However, these blades can be very effective when used during certain grossing procedures.

Stainless steel is an alloy of chromium (10-30%) and iron. A stainless-steel knife edge will not rust and is not brittle, which allows the edge to withstand increased pressures during the cutting process. A stainless-steel blade is easily used in combination with formalin and buffer solutions, which will not cause the edge to dull or corrode. The final determination of which blade material to use will depend upon your laboratory's specific procedures and the personal preference of the surgical grossing personnel, combined with the additional information in this article.

Once the composition of the blade is determined, the next major consideration is: what type of configuration of knife blade / handle should be used?

Blades used for surgical grossing of tissue specimens exist in many different configurations: from a simple single edge razor blade to combination blade / handle systems of various sizes. For small biopsies. (i.e. skin, liver, renal, etc.), many laboratories utilize a single blade system. That is, the lab will decide on a type of "single edge blade" with or without an appropriate holder. The danger of using a simple single edge blade with no holder is obvious: it is easier for surgical grossing personnel to put "the wrong side down" and commence to cutting the specimen with the cutting edge pointed up, against the grosser's finger. The result is very serious in terms of (a) the physical cut to the finger and (b) the possibility of an exposure to a bloodborne pathogen. This scenario can be avoided by purchasing any one of the many "single edge blade holders" offered by vendors. Care must be taken while loading the blade into the holder. The use of forceps is recommended for this task.



Many laboratories use single edge "surgical blades" which are the exact blades used by surgeons who perform the operations in which tissues are obtained. These are usually sterile, individually packaged blades which fit onto an appropriately sized scalpel handle. These blades can be used "free form" without the handle – but the same safety concerns discussed above can arise. Instead, it is safer to use a matched set of (a) a certain sized scalpel blade, matched with (b) the corresponding sized handle. As above, forceps should be used for the loading / unloading of the blade into / out of the handle.

Some scalpel blades will fit into a plastic handle, into which the blade can be retracted. While this may be a safety feature, it does provide the opportunity for tissue fragments and ink residue to be retracted with the blade, thereby causing possible contamination during the grossing of subsequent specimens.

Some scalpel blades come with a permanently attached handle. The handles can be made of plastic (disposable) or a more permanent material that can be sterilized and used again. Different sizes are available, along with different shapes that may offer ergonomic advantages. "Finger scalpels" come with the blade attached to a holder easily grasped between the thumb and forefinger. However, this small handle is "close to the action" and may be less safe than using a full handle.

While scalpels with handles appear to be safer than the single edge blade choice, there are blades made specifically for surgical grossing. These may be described as "prep blades" or "trimming blades". Since these blades are made specifically for performing the surgical grossing of tissue specimens, the blade quality and safety of use is vastly improved over single edged / scalpel alternatives.

The trimming / prep blades themselves are usually more durable / last longer and have a specific procedure whereby they are locked into the handle. Thus, changing out blades is usually safer for the grossing personnel. The handles themselves usually come in different configurations to ensure ergonomic comfort for the user. Also, many of the handles are made of materials that can be autoclaved to provide cleaning and sterilization of the handle for additional usage.

The final choice of surgical grossing blades will ultimately be determined by user safety, comfort and results of the tissue appearance in the final microscope slide. Tissues edges should be sharp not torn or frayed. Margin inks should be sharp and in place – not "dragged through" the tissue, resulting in smearing of the ink. The surgical grossing of the tissues in your laboratory depends upon the tools that the grossing personnel use. They should be the best tools for your laboratory.

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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.

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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

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