UNDER THE MICROSCOPE

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WHAT IS A FROZEN SECTION?

Being around pathologists and working in the laboratory you may have heard the words “frozen section”, and wondered what it meant. So here is a brief educational piece that will hopefully enlighten you!

In most routine instances when tissue is biopsied during surgery, it is placed in a specimen container filled with formalin fixative and then sent to the lab. Once processed overnight, the glass slides with the tissue section are interpreted by the pathologist microscopically. Once the pathologist determines the diagnosis, a pathology report is issued which is reviewed by the clinician.

Frozen section on the other hand is a very unique method of processing tissue and has an average turnaround time of only 20 minutes from the time the tissue is received by the pathologist and diagnosis conveyed to the clinician. Frozen section is usually done during a surgical procedure while the patient is under anesthesia, and is requested by the operating physician as part of intraoperative decision making when a rapid diagnosis is needed to aid in further management of the surgery they are performing.

Frozen section has been an integral part of the pathology practice since the early 1900s and is an essential skill for the practicing pathologist. The development of the cryomicrotome or popularly known as the cryostat in 1959, revolutionized the frozen section technique. The cryostat is a refrigerated box containing a microtome (steel blade) devise. The temperature inside the cryostat ranges from about −20° to −30° Celsius. The pathologist processes the tissue by freezing it with frozen aerosol sprays and cuts it within the cryostat. Intra and intercellular water of the tissue sample is frozen to produce a hard matrix to enable slicing of the tissue. The sliced tissue sections are transferred on to a glass slide and are then stained. The stained slides are then reviewed under the microscope for an immediate diagnosis by the pathologist who generally accomplishes this within 20 minutes. The diagnosis is then immediately relayed back to the surgeon who then proceeds with the surgery based on what the pathologist has conveyed back to them.

Some of the appropriate indications for a frozen section include:

1. Intraoperative diagnosis that will make a difference to the procedure performed (e.g. whether the lesion is benign or malignant is very important to the operating surgeon, as this will decide the type of operative procedure or further sampling that they have to make).
2. To confirm whether sufficient tissue is present to make a definitive diagnosis (e.g. frozen section is sometimes utilized to ascertain whether enough representative tissue is obtained before the tissue is sent for routine pathology diagnosis).
3. Primary diagnosis when there is no preoperative diagnosis.

4. Staging of cancer, if this is not possible by other means.
5. Surgical margin status (e.g. surgical margins for skin tumors such as basal cell carcinoma and squamous cell carcinoma sometimes need to be assessed for best cosmetic results).
6. Unexpected findings (e.g. surgery is being performed for a scheduled procedure like an appendectomy and the surgeon unexpectedly discovers a mass in another location, the diagnosis of which may change the surgical management).

The common denominator of the above list is that the results will determine further conduction of the surgical procedure.

General Contraindications include:

1. Need for the surgeon to know the results as soon as possible even though the diagnosis will not change further course of surgical management.
2. Curiosity on part of the surgeon or patient.
3 Small lesions that could be destroyed by freezing.
4. Specimens in which the orientation could be distorted.
5. Melanocytic lesions or suspected melanocytic lesions.
6. Primary diagnosis of malignant and benign skin lesions.
7. Primary diagnosis of breast masses.
8. Bony tissue that cannot be cut without prior decalcification (softening process) of the tissue.

Limitations include:

1. Discordant diagnosis due to sampling.
2. Diagnosis deferred to permanent section (e.g. special studies needed).
3. Misinterpretation due to freezing artifact.

In all of the above three instances further surgical or clinical follow up may be needed.

To conclude, intraoperative frozen sections are not your routine permanent sections, however play an extremely vital role in patient care, and are a valuable asset to the conduction of surgical procedures and diagnosis. So the next time you hear the word frozen section you will know for sure that it is not referring to a frozen treat!