Part 2 – Surgery
Methods of Intra-operative Margin Assessment

Breast conserving surgery with radiation has been shown to be as effective as mastectomy in the treatment of stage I and II breast cancer. The goal of lumpectomy is to achieve negative surgical margins, which has been shown to improve disease free survival. In patients who have positive margins after initial resection there is a high likelihood of finding residual disease, some report numbers as high as 50% resulting in ipsilateral breast tumor recurrence. The amount of volume resected in an initial surgery to remove a mass is less than the amount of tissue needing to be re-excised if a second surgery is indicated to obtain negative margins often resulting in an unfavorable cosmetic result. Therefore, appropriate assessment of surgical margins is a vital component of a successful surgical outcome.

There are different approaches that have been proposed to assess surgical margins depending largely histological type, size of tumor, and whether there is a palpable mass or not.

(“FIG. 1. Processing of breast specimens.” from Cabioglu et. al.)
There are several techniques that have been used to assess intra-operative margins including ultrasound and intra-operative pathology. Ultrasound is used in pre-surgical planning in guiding core-needle biopsies as well as placement of localizing wires prior to surgery for non-palpable masses. However, ultra-sound can also be used in the operating room to locate and fully non-palpable lesions without utilizing pre-operative guiding techniques described above. A new device based on radiofrequency spectroscopy, which measures and quantifies the response of malignant and normal cells has been recently developed. Although its clinical utility has been studied and it provides surgeons with real-time assessment of intra-operative margins its use is not yet widespread.

The gold standard for assessing intra-operative margins is pathology of which frozen section is the most widely used method. However, several studies have documented the inadequacy of frozen sections to determine margins largely secondary to artifact.

Cytology or “touch prep” is another method that examines all 6 sides of a specimen proving to be more reliable and less time consuming than frozen section. A disadvantage to touch prep is that it can only detect the presence of positive margins but cannot provide information about how close a margin is (ie, 1mm vs 1cm) which is not ideal from an oncologic standpoint. Another method is intra-operative shaved margin analysis in which the tumor is removed with the goal of excising at least 1cm of normal breast tissue around all margins. Next, normal breast tissue is shaved circumferentially from each margin and examined via frozen section without examination of the excised specimen.

All of the methods are utilized with the objective to obtain negative margins at the initial tumor excision to improve outcomes. Intra-operative margin assessment regardless of the technique requires multidisciplinary effort between surgeons, pathologists and radiologists.