

FNA OR CORE NEEDLE BIOPSY?

Which is better, fine needle aspiration (FNA) biopsy or core needle biopsy (CNB)?

The answer depends on the patient's clinical presentation and the information sought. In some situations one type of needle biopsy may be preferable over the other, and in other cases, both types of biopsies performed consecutively may be clinically appropriate. Proponents of CNB go so far as to state that breast cancers cannot be reliably diagnosed by FNA. This is simply not true, and is not supported by the literature. FNA, when performed and interpreted by an experienced clinician, is comparable and complementary to CNB, and for some applications FNA is preferable.

There are many differences – both technical and clinical – between FNA and CNB. Information provided below is intended to offer guidance to the clinical provider as to the advantages of one sampling technique over the other.

Needle Gauge

In general, FNA biopsies are done with needles that are 23 gauge or smaller. In some institutions, such as the Outpatient Cytopathology Center, fine needle biopsies are performed using needles 25 gauge or smaller. CNB is usually performed with 12 gauge to 18 gauge needles in order to obtain a large, visible core of tissue.

Comparison of Sampling

Since FNA biopsy uses a narrow gauge needle, the needle can be directed into different areas of the mass (see adjacent diagram). This is particularly advantageous in tumors that are not homogeneous or have a large stromal component. Since FNA uses such a fine needle, the needle can be redirected slightly with each excursion. Thus, tissue is sampled in more than one plane with FNA, whereas only a single plane is sampled with a CNB.

DeMay made a comparison of sample size obtained by FNA biopsy versus CNB. His data showed that FNA “sees” 10

times more tissue than a CNB. This is due to the multiple pass ability of the fine needle into different areas of the tumor as well as the fact that *all* of the tissue aspirated is placed on a microscope slide to be analyzed. This is in comparison to a CNB that can only take a sample in one plane, and then only a fraction of the that material is analyzed when it is sectioned by a microtome.

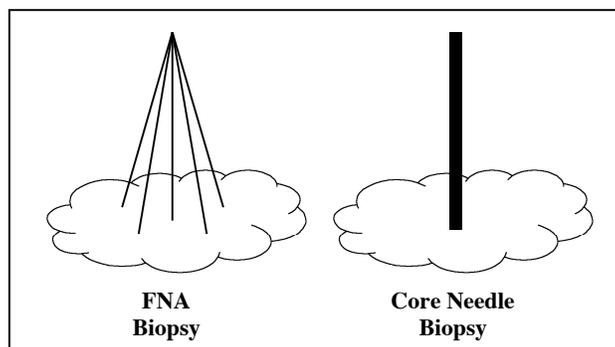
DeMay also analyzed the efficacy of FNA versus CNB in the sampling of sclerotic tumors (that is, tumors with a lot of dense stromal tissue in addition to the malignant cells). FNA selectively sampled more tumor cells and fewer benign stromal cells. This is because FNA preferentially and selectively samples the soft epithelial (tumor) tissue leaving much of the stroma behind. Therefore, even though visible tissue fragments cannot be seen on FNA specimens, the absolute number of diagnostic cells available for analysis is abundant.

Genetic Testing

Recent studies reveal FNA is an excellent method of obtaining cells for microarray transcriptional profiling studies that allow for genomic study of breast carcinoma. A study by Symmans comparing FNA to CNB as sampling methods for transcriptional profiling showed FNA samples to have a purer representation of the transcriptional profile from tumor cells. The mean percentage of each cell type from each sample technique was as follows: 80% tumor cells in FNA samples versus 50% tumor cells in CNB; 15% lymphocytes in FNA versus 20% in CNB; 5% stromal cells in FNA versus 30% stromal cells in CNB. Thus, as our need for extracting RNA from tumor cells for genomic studies increases, FNA should play an important role in the genetic work-up of breast cancers.

Breast Lesions

In the realm of breast masses, there is much controversy as to



which is the preferable biopsy technique: FNA or CNB. As with tumors elsewhere in the body, FNA is comparable and complementary to CNB, and for some applications FNA is preferable.

In order to look at the published literature regarding FNA of the breast, lesions must be categorized as a 1) palpable mass, 2) non-palpable mass, or 3) mammographic microcalcifications.

A study from M.D. Anderson Cancer Center compared FNA to CNB cytology in the diagnosis of palpable breast carcinomas. FNA cytology proved to be a more sensitive procedure for the detection of malignancy in palpable breast masses. Specificity of both FNA and CNB was 100%. However, the sensitivity was higher for FNA than CNB (97.5% vs. 90%, $p < 0.004$). There was a higher rate of sampling errors using CNB.

A recent study published in *Cancer* (Westenend, 2001) made a direct comparison of FNA and CNB in the evaluation of nonpalpable breast masses. In 286 breast lesions (cysts and microcalcifications without soft tissue mass were excluded), the same operator performed both ultrasound guided FNA and CNB in the same session. Histologic follow-up was collected and, for those lesions not excised, the results of the most recent mammogram were used. In this study, FNA and CNB were comparable for most parameters. They did equally well for sensitivity (88% vs. 92%), positive predictive value for malignancy (99% vs. 100%), and inadequate rate (7% vs. 7%). However, there were statistical differences for the specificity, CNB 90% and FNA 82%. The authors concluded that combining the findings of both FNA and CNB results in an increase in the absolute sensitivity and a decrease in the inadequate rate for cancers. In short, FNA and CNB were complementary.

Core biopsy cannot reliably diagnose the presence of invasion in breast carcinoma. Studies have reported that 20-33% of tumors diagnosed as *in-situ* by CNB in fact show invasion on

the fully-excised specimen. The therapeutic implication is that, in some instances, surgery planning with regard to axillary lymph node dissection may not be accurate based on the CNB diagnosis of DCIS.

Targets for FNA biopsy

Almost any palpable mass can be sampled by FNA. Routinely, Outpatient Cytopathology, we aspirate masses in the breast, thyroid, lymph nodes, salivary gland and soft tissue. Masses as small as a few millimeters in size provide a suitable target. Skin lesions without a soft tissue component cannot be effectively aspirated and need to be sampled by a punch, shave or excisional technique.

Non-palpable masses that can be visualized by ultrasound are also good candidates for aspiration biopsy. The FNA needle can be guided into the masses using ultrasound, thus assuring that the mass is sampled.

Complications

Fine needle aspiration biopsies are usually no more traumatic than a venipuncture. Pain is minimal and no further care is needed after the biopsy. When doing a core needle biopsy, a small incision is made into the skin to accommodate the larger needle size. With CNB, hematomas, bruising and post biopsy pain are common.

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COMPANY PROFILE

OUTPATIENT CYTOPATHOLOGY CENTER (OCC) is an independent pathology practice that specializes in performing and interpreting fine needle aspiration biopsy specimens. OCC is accredited by the College of American Pathologists. The practice was established in 1991 in Johnson City, Tennessee. Patients may be referred for aspiration biopsy of most palpable masses as well as for aspiration of non-palpable breast and thyroid masses that can be visualized by ultrasound. OCC is a participating provider with most insurance plans. Our referral area includes patients from Virginia, West Virginia, North Carolina, South Carolina and Georgia.

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