Percutaneous core needle biopsies comprise the most common type of breast specimens in current practice. The indications for such biopsies include palpable and nonpalpable breast lesions. The majority of these biopsies are performed with the aid of imaging modalities, such as mammogram, ultrasound, or MRI (Figs. 5.1 and 5.2). The operator is usually a breast radiologist or a surgeon. Neither sample adequacy check nor diagnostic evaluation is requested on such samples. However, documentation of certain pertinent information at the time of gross examination is critical for the reasons provided below. It is therefore important that the handling of this sample is discussed separately in this book.

The gross evaluation of core needle biopsies is very simple and similar to other small biopsy specimens. However, the final pathology report on these samples cannot be reliably completed in the current standard of practice without certain pieces of information. The pathology report on these samples requires correlation with findings on imaging studies that triggered the biopsy, in addition to the clinical presentation and clinical breast examination. The physician who performs the biopsy is responsible for the final correlation. The CAP and the American Society of Clinical Oncology (ASCO) guidelines recommend using these core biopsies for the assessment of predictive biomarkers, if the sample contains breast carcinoma. In order to comply with this recommendation, core biopsy samples are subjected to time to fixation and fixation length stipulations (see more details in Chap. 6).
A radiologist typically performs the biopsies triggered by an abnormal mammogram. The indications include mass, density, distortion, and calcifications. The most important initial step is to get all the necessary information about the clinical examination and imaging studies so that the pathologist can document the information required to perform radiologic–pathologic correlation. This is best accomplished at the time of specimen accession and gross examination. It may be useful to aid the physicians to collect and document all the useful clinical information on the pathology requisition. A sticker or preprinted area on the specimen requisition can help remind the submitting physician to provide relevant

**Figure 5.1** Mammogram with a spiculated mass. This diagnostic mammogram shows a discrete, spiculated density measuring 8 mm, characteristic of invasive cancer.

**Radiologic–Pathologic Correlation**

A radiologist typically performs the biopsies triggered by an abnormal mammogram. The indications include mass, density, distortion, and calcifications. The most important initial step is to get all the necessary information about the clinical examination and imaging studies so that the pathologist can document the information required to perform radiologic–pathologic correlation. This is best accomplished at the time of specimen accession and gross examination. It may be useful to aid the physicians to collect and document all the useful clinical information on the pathology requisition. A sticker or preprinted area on the specimen requisition can help remind the submitting physician to provide relevant
clinical information and the indication for the biopsy (Table 5.1). The best way to get the physicians and their staff to fill these out is by educating them about the importance of this information to generate the report that meets their expectations allowing them to perform the final clinicopathologic correlation.

**TABLE 5.1** A template like this embedded in the specimen requisition form assists the submitting physician to record useful clinical and radiologic information for the pathologist.

<table>
<thead>
<tr>
<th>Specimen laterality: Right or Left</th>
<th>Location: o’clock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance from the nipple: _____cm</td>
<td>Type of lesion: Mass/density/distortion</td>
</tr>
<tr>
<td>BIRADS classification:</td>
<td>Size of the lesion: _____cm</td>
</tr>
</tbody>
</table>

clinical information and the indication for the biopsy (Table 5.1). The best way to get the physicians and their staff to fill these out is by educating them about the importance of this information to generate the report that meets their expectations allowing them to perform the final clinicopathologic correlation.

**GROSS EXAMINATION OF CORE BIOPSIES**

For stereotactic biopsies performed for calcifications, the radiologists typically x-rays the cores to make sure the calcifications are present in the removed tissue. The radiologists then have different options to draw pathologist’s attention to the core identified as harboring the calcifications (Figs. 5.3 and 5.4). The cores may be placed in a separate specimen container, which is labeled as
**Figure 5.3** One of the methods to segregate cores containing calcifications. After removing the cores for calcifications on the mammogram, the radiologist images the core. This is one of the methods where the cores are separated into a specific chamber to identify the ones with the calcifications. Note a cluster of calcifications in the cores present in 3 and 6 o’clock compartments.

**Figure 5.4** Radiograph of the breast cores for a mass. The cores with the mass, which appear as gray-white areas versus yellow fat, are in 3 and 6 o’clock compartments.
“cores with calcifications” or they may be placed in a tissue cassette, which is itself placed in the specimen container. Some places use petri-dish-like containers with several compartments and may place the cores containing the lesion in a specific chamber (Fig. 5.5).

The gross examination should state that a specimen radiograph is available. The cores should be counted and measured, along with their nature as fatty or fibrous (Fig. 5.6). It is useful to document the number of cores submitted in each cassette. The tissue cassettes containing the targeted cores should be clearly identified in the gross description of the specimen. These steps help the pathologist performing the microscopic evaluation. It is the responsibility of the pathologist issuing the report on these specimens to document the histologic findings that correspond to the lesion seen on the imaging study (Figs. 5.7 and 5.8).
**FIGURE 5.6** Gross appearance of breast cores. These cores were obtained using 11-gauge biopsy needles. The two cores on the left are from the area of mass lesion obtained by stereotactic method (seen in Figs. 5.4 and 5.5). The other two cores were obtained using ultrasound guidance.

**FIGURE 5.7** Core biopsy performed to evaluate calcifications. This is the histologic finding and correlation to the radiograph shown in Fig. 5.3. The microcalcifications are associated with columnar cell lesion of breast.
TISSUE PROCESSING OF BREAST CORES
The use of large gauge needles during stereotactic-guided core biopsies results in relatively thick specimens, which can be quite fatty. It is not a good idea to process these kinds of breast biopsies with other biopsy samples, such as GI or skin biopsies. In fact, some of the biopsies samples obtained in this fashion can be up to 3-mm in diameter, which pushes the limits of tissue thickness that can be optimally processed in the biopsy cycle of conventional and any cycle of the microwave tissue processors (see Fig. 5.6). Some of these samples may need to be sliced in half to bring the thickness to within the recommended limits.

MICROTOMY GUIDELINES FOR BREAST CORES
It is important to create and follow specific microtomy protocols for these needle biopsy specimens. These guidelines for the histotechnologist are typically captured on the tissue cassettes. This can be accomplished by a variety of methods, such as placing a preprinted paper in the cassette with instructions about the number and sequence of tissue section levels. This information

Figure 5.8 Core biopsy performed to evaluate a mass. This sample was obtained to assess a suspicious mass on mammogram and ultrasound. It shows a high-grade invasive ductal carcinoma, correlating to the mass seen in the imaging studies.
can be printed on the cassette directly from the laboratory information system or by using barcodes. Most laboratories follow the published guidelines while some develop their own methods to cut enough sections for H&E stained slides to ensure the lesion is represented in histologic sections, minimizing recuts, and delays. This is especially true for the core needle biopsies performed for calcifications. For such specimens, the laboratory may choose to obtain additional sections upfront on cores shown by specimen radiograph to contain the calcifications. All these pieces of information need to be captured at the time of gross examination and documented in the gross description.

The objective of the microscopic examination of the cores is to identify the histologic changes that explain the radiologic findings. To achieve this goal, pathology laboratories use different protocols for sectioning the tissue blocks. It is difficult to recommend a specific method; however, these basic principles should be kept in mind. First, care should be taken at the time of embedding tissue specimen in paraffin block to ensure all the cores are separated (nonoverlapping) and are in a single plane for microtomy. Second, the block should be gently trimmed and then leveled to provide histologic sections from different depths of the cores for histologic evaluation. Third, ideally a fixed protocol of 4–5 H&E levels, at least 25–50 microns apart should be prepared. Fourth, the interpreting pathologist should review all the available information, including radiology reports at the time of microscopic examination, in order to issue a comprehensive pathology report.

Breast ultrasound is the most common way to further characterize the nature of a density or mass identified on mammogram. Ultrasound-guided biopsies are much easier to perform and are currently the method of choice to sample both the solid as well as complex cystic lesions. On the other hand, MRI-guided biopsies are relatively difficult and more time consuming to perform and are reserved for lesions seen only on the MRI and cannot be located by the second look, focused ultrasound of the area. Again, the pieces of information required to assess these types of core needle biopsies are the same as those for stereotactic biopsies.

Finally, the time to fixation and fixation duration needs to be recorded in the pathology report. This information is only needed if the diagnosis of malignancy is made on core needle biopsy. However, from a practical point of view, it is not possible to ask the gross room staff to make a judgment to record this information in selected cases. Therefore, it is a good idea to capture this information on all types of breast specimens. These requirements are discussed in the next chapter.