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SECTION 1

KEY ASPECTS OF MAMMOGRAPHY PRACTICE

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ANATOMY

The breast (mammary gland) is one of the accessory organs of the female reproductive system (**Figure 1.1**). The adult breasts comprise two rounded eminences situated on the anterior and lateral walls of the chest, lying superficially to the pectoral muscles and separated from them by areolar tissue and fascia. They extend from the second to the sixth ribs and from the lateral border of the sternum to the mid-axillary line. The superolateral part is prolonged upwards and laterally towards the axilla to form the axillary tail. The nipple is a conical projection just below the centre of the breast, corresponding approximately to the fourth/fifth intercostal space.¹

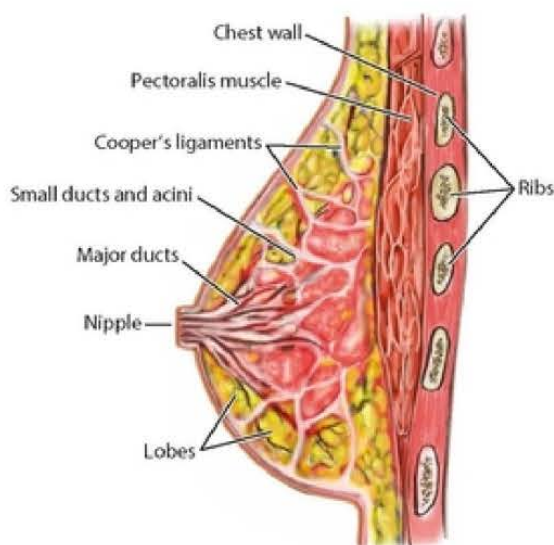


Figure 1.1. Illustration of breast anatomy. (From <https://reference.medscape.com/article/1273133-overview>. Original source: Wikimedia Commons; Patrick J Lynch. Published under CC BY 2.5 license.)

The breast is composed of glandular, fibrous, and fatty tissue. Its size, shape, and consistency vary significantly, depending on the individual's size, shape, and age. Each breast consists of 15–20 lobes, each of which is divided into several lobules. The lobules comprise large numbers of secretory alveoli, which drain into a single lactiferous duct for each lobe, before converging towards the nipple into the ampullae and opening onto the surface. The blood supply is derived from branches of the axillary, intercostal, and internal mammary arteries. Lymphatic drainage from the breast is primarily via the ipsilateral (same) side.

Axillary lymph nodes (**Figure 1.2**) account for approximately 75% of drainage. The remainder drains via the parasternal and abdominal lymph nodes. It is important to understand lymphatic drainage of the breast as this is the primary route by which breast cancer metastasises (spreads to other parts of the body). Imaging of normal and enlarged lymph nodes is frequently included in the mammographic investigation.^{1,2}

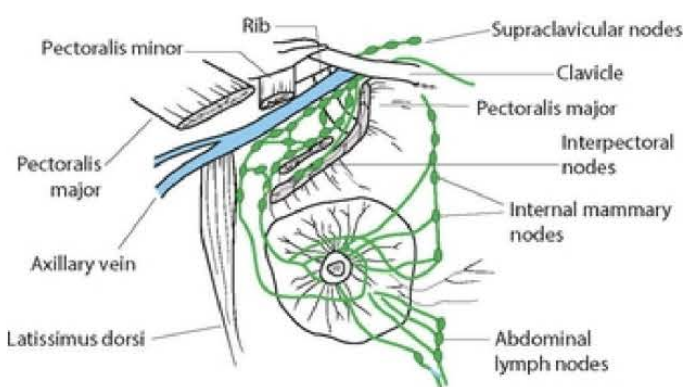


Figure 1.2. Illustration representing lymph drainage. (From <https://www.bmj.com/content/309/6963/1222>. With permission.)

Breast Tissue Characteristics

With increasing age and especially after the menopause (**Figure 1.3a**), the glandular elements of the breast become less prominent and tend to be replaced by adipose tissue (fat). Fat attenuates the X-ray beam less than glandular breast tissue, as a result the fatty breast is darker. Significant disease (which tends to be dense and produce high attenuation or bright areas on the image) is detected more easily. Younger breast tissue (**Figure 1.3b**) is denser (whiter), and the sensitivity (i.e., the ability to detect disease) of mammography in those under 50 years of age is thus reduced. The younger breast is also more sensitive to the adverse effects of ionising radiation. Thus, the reduced sensitivity of mammographic imaging plus the increased radiosensitivity of the breast makes ultrasound the first-line investigation in younger patients, especially less than 35 years of age.^{1,2}

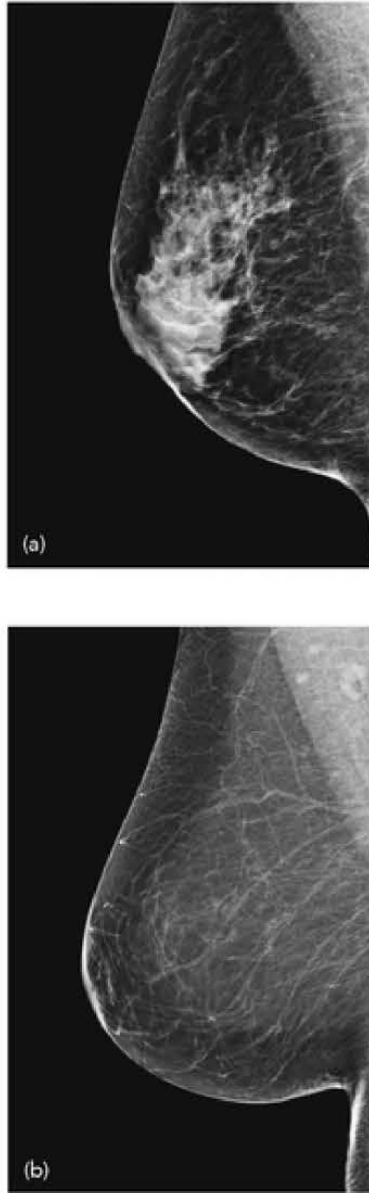


Figure 1.3. Mammography image representing anatomy in (a) younger and (b) older breast tissue. (Reproduced from Whitley et al., 2020.)

Additional Considerations

Mammography is the radiographic examination of the breast tissue (soft tissue radiography). To visualise normal structures and pathology within the breast, it is essential that sharpness, contrast, and resolution are maximised. This optimises, in the image, the relatively small differences in the absorption characteristics of the structures comprising the breast. A low kVp value, typically 28 kVp, is used. Radiation dose must be minimised due to the radiosensitivity of breast tissue.¹⁻³

Notes