



Teaching Providers,
Reaching Women

BREAST IMAGING MODALITIES

	DESCRIPTION	ADVANTAGES	DISADVANTAGES
MAMMOGRAPHY	The standard 1st imaging modality for women age 30 and over	Widespread availability Reasonably good accuracy, particularly in non-dense breasts Inexpensive	Radiation exposure (albeit small amounts) Limited specificity Limited sensitivity, particularly in dense breasts
ULTRASOUND	Targeted ultrasound very useful for palpable or mammographic findings Delineates cystic from solid, and many benign solid abnormalities from malignancies Screening ultrasound controversial due to low positive predictive value of findings	Widespread availability Good sensitivity Inexpensive	Limited specificity, particularly screening Very operator dependent
MRI	MRI using dedicated coils, done prior to and following injection of non-iodinated contrast	Excellent sensitivity and specificity Largely independent of breast tissue density	Expensive MRI limitations of weight and body size Cannot be performed in patients w/pacemakers Cannot be performed in open units Least comfortable for patient (prone on a raised platform), although no breast compression
MR SPECTROSCOPY	Addition to a standard MRI exam where one also evaluates the chemical composition of lesions	May improve specificity of lesion evaluation resulting in less false positive cases	Currently seems to work with predominantly larger (>1cm) lesions, which are not the main cause of false +'s and -'s No large multicenter trials yet available, thus still considered investigational

TOMOSYNTHESIS	Mammography which takes multiple angled images	Potentially decreases # of callback exams from screening studies May slightly improve lesion detection particularly in women with dense breasts	Standard mammography images must also be obtained, due to difficulty with calcification detection Increases radiation dose by factor of 2-3, but still well within safety standards Takes much longer for radiologist to interpret (50-100+ images vs. 4) No current reimbursement
THERMOGRAPHY	Detects heat emitted from cancers Newer equipment and software has not been validated with any good trials	No radiation or breast compression	Randomized studies reveal very poor sensitivity Lesions which are detected are typically large FDA issued a health warning 6/11 advising against use of breast thermography ACS and ACR have policies strongly discouraging these exams
POSITRON EMISSION MAMMOGRAPHY (PEM)	Nuclear Medicine: PET scan but with dedicated detectors for the breast	Early studies suggest slightly better specificity than MRI Can be performed on any size patient and in those with pacemakers	Radiation dose to the breast up to 20 times that of mammography Small lesion detection difficult but improving Study takes 2-3 hours (including injection)
BREAST SPECIFIC GAMMA IMAGING (BSGI)	Nuclear Medicine: Uses Sestamibi with dedicated detectors for the breast	Early studies suggest slightly better specificity than MRI Can be performed on any size patient and in those with pacemakers	Radiation dose to the breast up to 20 times that of mammography Small lesion detection difficult but improving Study takes 1-2 hours (including injection)
CT LASER MAMMOGRAPHY (CTLM)	Mammography using lasers rather than x-rays, with cross-sectional imaging like CT	No radiation	* Not yet approved in the USA Accuracy not yet proven
CONTRAST ENHANCED SPECTRAL MAMMOGRAPHY (CESM)	Mammography with IV contrast, uses varying energy levels (like DEXA scans) for lesion detection	Can be performed on any size patient and in those with pacemakers Similar radiation dose as mammography Upgrade to current digital equipment	Patient gets IV contrast injection * Not yet approved in the USA Accuracy not yet proven