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SPECIAL ARTICLE

2005 Guidelines for ultrasonic diagnosis of breast diseases regarding the mass image-forming types

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Ultrasonic diagnostic criteria in medicine provide physicians and sonographers using this modality with the basic information for diagnosis. The method of diagnosis as well as the expressions and terminology used in describing diagnostic findings have played important roles in forming the common understanding needed in diagnosis, research, and education.

We would like to announce that we have revised the ultrasonic diagnostic criteria for breast diseases (established November 30, 1988) and have taken into consideration the new 2005 Guidelines for Ultrasonic Diagnosis of Breast Diseases. The new guidelines are published below.

There are three main revisions:

1. The term "Diagnostic Criteria" has been deleted from the title and replaced with "Guidelines for Ultrasonic Diagnosis."
2. Breast lesions are categorized into mass image-forming lesions and non-mass image-forming lesions. In the new guidelines, the description of mass image-forming lesions has been revised.
3. An explanation of tissue characterization has been added.

Ultrasonographic features of breast lesions

Ultrasonic findings and their location on a benign-to-malignant continuum were summarized on Table 1.

Tissue characterization and ultrasonographic diagnosis

In diagnosing breast diseases, it is necessary to assess the tissue characteristics (basic echoic features). It is also desirable to refer to the tissue condition (intensity of echoes).

Guidelines for assessing tissue condition

Intensity of posterior echoes

Posterior echoes depend on the attenuation of ultrasound caused by the lesion and reveal the tissue characteristics inside the lesion. The intensity of posterior echoes is classified into three levels by comparing it with the surrounding echo intensity at the same depth. The three levels are accentuating, no change, and attenuating or deficient. Generally, lesions with high cellularity tend to accentuate and lesions with abundant fibrous tissue or calcifications tend to attenuate or become deficient. Table 2 shows some typical cases.

Intensity of internal echoes (echo level)

The intensity of internal echoes is classified into five levels based on the echo intensity of subcutaneous fat, which is the standard. The five levels are anechoic (free), extremely low, low, equal, and high. Internal echoes are stipulated by reflection, back scattering, and the level of attenuation. Homogeneous masses, such as cysts, that do not show any reflection or scattering are echo free. The internal echo of solid tumors that are highly homogenous, such as medullary carcinoma and malignant lymphoma, tends to be extremely low. The internal echo of lesions that show high reflection and scattering, such as mucinous carcinoma and lipoma, tends to be equal or high. The internal echo of lesions with minute tissue and scarce scattering, such as scirrhous carcinoma, tends to be extremely low or low. The echo of fibroadenoma tends to be low or equal. Table 3 shows some typical cases.

Table 1. Ultrasonic findings and their location on a benign-to-malignant continuum

Findings	Benign ◄——► Malignant	
Shape	Round · Oval/lobulated	Polygonal / Irregular
Border		
Definition	well defined	ill defined
Irregularity	smooth	rough
Halo	absent	present
Gland surface	continuous	interrupted
Internal echoes		
Homogeneity	homogeneous	heterogeneous
High-echo spot	coarse	micro/small
Compressibility	easily deformed	nondeformable
Depth/width	small	large
Vascularity	avascular/hypovascular	hypervascular

Compressibility, visually assessed by the degree of deformation caused by applying external pressure to the tumor
Depth-width ratio (DW ratio, D/W) is defined as the depth of the lesion divided by the width of the lesion. The largest part of the lesion is used in measuring the DW ratio. In the image, the width runs parallel to the skin and the depth crosses the width vertically. The DW ratio does not include the echogenic halo and is measured only in the hypoechoic part of the lesion
Threshold is 0.7 (Exception: the smaller the lesion, the larger the DW ratio of benign lesions such as cysts becomes; therefore, it cannot be used for masses ≤1 cm)

Table 2. Tissue characteristics and conditions and posterior echoes

Posterior echoes	Benign	Malignant
Accentuating	cyst, fibroadenoma, papilloma, phyllodes tumor	solid-tubular ca, mucinous ca, medullary ca, intracystic papillary ca, malignant lymphoma, squamous cell ca
No change	fibroadenoma, sclerosing adenosis, lipoma	papillotubular ca, tubular carcinoma
Attenuating or deficient	old fibroadenoma, complex cyst, scar, sclerosing adenosis, silicon granuloma, fat necrosis	scirrhous ca, invasive lobular ca

Table 3. Tissue characteristics and conditions and internal echoes

Internal echoes	Benign	Malignant
Anechoic	cyst	medullary ca, malignant lymphoma
Extremely low	sclerosing adenosis	medullary ca, malignant lymphoma, scirrhous ca, solid tubular ca
Low	fibroadenoma, papilloma	papillotubular ca
Equal	papilloma, fibroadenoma	mucinous ca, papillotubular ca
High	lipoma, panniculitis	mucinous ca

Reference

Kato Y, Ueno E, Kawauchi A, et al. Threshold value of depth width ratio (D/W) in the breast ultrasonogram. J Med Ultrasonics 2002;29(Suppl):S450.