Role of MR DWIBS sequences for the evaluation of neoplastic breast disease

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**Purpose**

To investigate the role of diffusion-weighted MR imaging with background body signal suppression (DWIBS) for the evaluation of neoplastic breast disease.

**Methods and Materials**

90 patients underwent MR examination with a 1.5 T device and a dedicated 4-channel coil by using morphological STIR and TSE T2 sequences, dynamic THRIVE T1-weighted sequences after contrast material injection and DWIBS \((b_0 = 0 \text{ s/mm}^2, \ b_1 = 1000 \text{ s/mm}^2)\). DWIBS images were analyzed by two expert blinded radiologists, searching for the presence of breast lesions and calculating the relative ADC value. A value of ADC \( \leq 1.44 \times 10^{-3} \text{ mm}^2/\text{s} \) was considered suspicious for malignancy. This analysis was then compared with dynamic images and histological findings, considered as the reference standard. Sensitivity, specificity, diagnostic accuracy, positive predictive value (PPV) and negative (VPN) were calculated. The inter-observer agreement was assessed by using Cohen's kappa \((k)\) test.

**Results**

In 56/90 (62%) patients, DWIBS sequences indicated the presence of breast lesions, 19 (34%) with ADC values of >1.44x10\(^{-3}\) mm\(^2\)/s and 37 (66%) with ADC of \#1.44x10\(^{-3}\) mm\(^2\)/s. The comparison with the dynamic and histological examinations showed 25 malignant (Figs. 1-2) and 12 benign lesions (Fig. 3). DWIBS sequences obtained sensitivity, specificity, diagnostic accuracy, PPV and NPV values of 100, 82, 87, 68 and 100%, respectively. The agreement between the two readers was almost perfect \((k = 0.85)\).

**Images for this section:**
**Fig. 1:** Transverse DWIBS (A) and contrast-enhanced dynamic THRIVE (B) sequences from a 44-year-old patient affected by invasive ductal carcinoma. The lesion appears hyper-intense in DWIBS sequences with ADC values $< 1.44 \times 10^{-3} \text{ mm}^2/\text{s}$ and corresponding hyper-vascular inhomogeneous lesion in dynamic images.

**Fig. 2:** ADC map of the same case of Figure 1 (invasive ductal carcinoma) showing low ADC value in the site of lesion.
**Fig. 3:** Transverse T2 (A) and DWIBS (B) sequences from a 52-year-old patient. Multiple breast cysts show hyper-intensity signal in Dwibs sequences with ADC values of $1.44 \times 10^{-3}$ mm$^2$/s. Corresponding images in T2 sequences show liquid signal.
Conclusion

DWIBS sequences can be proposed in the MRI protocol for the study of the mammary gland and represent an accurate diagnostic complement, although not yet able to avoid the use of histological typing.

References

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