Diffusion-weighted imaging of breast lesions: Region-of-interest placement and different ADC parameters influence apparent diffusion coefficient values.

To investigate the influence of region-of-interest (ROI) placement and different apparent diffusion coefficient (ADC) parameters on ADC values, diagnostic performance, reproducibility and measurement time in breast tumours. In this IRB-approved, retrospective study, 149 histopathologically proven breast tumours (109 malignant, 40 benign) in 147 women (mean age 53.2) were investigated. Three radiologists independently measured minimum, mean and maximum ADC, each using three ROI placement approaches: 1 - small 2D-ROI, 2 - large 2D-ROI and 3 - 3D-ROI covering the whole lesion. One reader performed all measurements twice. Median ADC values, diagnostic performance, reproducibility, and measurement time were calculated and compared between all combinations of ROI placement approaches and ADC parameters. Median ADC values differed significantly between the ROI placement approaches (p< .001). Minimum ADC showed the best diagnostic performance (AUC .928-.956), followed by mean ADC obtained from 2D ROIs (.926-.94). Minimum and mean ADC showed high intra- (ICC .85-.94) and inter-reader reproducibility (ICC .74-.94). Median measurement time was significantly
shorter for the 2D ROIs (p< .001). ROI placement significantly influences ADC values measured in breast tumours. Minimum and mean ADC acquired from 2D-ROIs are useful for the differentiation of benign and malignant breast lesions, and are highly reproducible, with rapid measurement. ROI placement significantly influences apparent diffusion coefficient of breast tumours. Minimum and mean apparent diffusion coefficient perform best and are reproducible. 2D regions of interest perform best and provide rapid measurement times.

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