Breast MRI and Computer Aided Diagnosis

Jeong Seon Park, MD, PhD.
Hanyang University Hospital

Recently, there has been rapid increase per year in the number of breast MR studies performed in Korea. Dynamic contrast enhanced magnetic resonance mammography is a well-established method in the diagnosis of invasive breast cancer with a sensitivity near 100%. Distinction between benign and malignant lesions in MRI is possible by evaluating their morphology and enhancement pattern. A strong initial signal increase followed by a plateau or washout curve is regarded as indicative of malignancy, whereas a slow initial enhancement and a persistent curve type are thought to be associated with benign lesions.

However, overlapping enhancement features exist, corroborating the need for additional morphological descriptors for differential diagnosis of breast lesions. The overlap of kinetic features with benign lesions is especially distinct in less aggressive, noninvasive cancers. Furthermore, the number of acquired image is 700-1,000 per one breast. Reading the large number of acquired MR images in a reasonable amount of time also becomes more important as the number of studies increases. Computer-aided image management and analysis have the potential to impact each of these obstacles, providing tools to improve the diagnostic accuracy (particularly through improved specificity), consistency, and efficiency of breast MR image interpretation.

The application of MR based imaging methods depends on various automated
image processing. The combination of techniques for preprocessing, quantification and visualization of datasets is necessary to achieve fast and solid assessment of valuable parameters for diagnosis. Computer Aided Detection or Diagnosis (CAD) algorithms have allowed radiologists to regain efficiency while maintaining optimized acquisition techniques. Currently, several commercial CAD systems for breast MR were launched and many prototypes have been developed.

Automated software programs should contribute to the field of breast MRI by providing more objective and detailed information regarding MR examinations and lesions. In this way, software programs may be able to help direct improvements in scan protocols more rapidly than reviewer studies or other methods of subjective assessments of image quality. These programs may decrease heterogeneity of interpretations across radiologists of varying levels of experience in breast MR interpretations. Finally, these types of programs have the potential to decrease the amount of time required for image processing and interpretation. Additional studies are being performed to evaluate more clearly the ability of software programs to address challenges that delay more widespread dissemination of breast MRI in appropriate clinical populations.

REFERENCES


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