Summary

DWI in cancer prostate

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Prostate cancer is one of the most common malignancies in elderly men. The prevalence of prostate cancer is so high that it could be considered a normal age-related phenomenon The lifetime probability of developing prostate cancer is one in six. It ranges from asymptomatic to rapidly progressive systemic malignancy but most prostate cancers grow slowly, and early detection can lead to a complete cure.

The diagnosis of prostate cancer is based mostly on the results of ultrasonography (US)-guided transrectal biopsy. Because of the low accuracy of US for prostate cancer detection and localization, a random biopsy is usually performed instead of a targeted biopsy. However, a random biopsy has several disadvantages as cancer located outside the routine biopsy site may be missed. In addition, there may be difficulty in determining the site of a previous biopsy when repeating biopsy in a patient with a previous negative result and continuously high prostate-specific antigen levels. For these reasons, an imaging modality is needed that allows the accurate detection and localization of prostate cancer, as well as local staging, guidance of biopsy, and adequate follow-up after treatment with intensity-modulated radiation, cryosurgery, or ablation with high-intensity focused ultrasound.

A major goal for prostate cancer imaging is more accurate disease characterization through the synthesis of anatomic, functional, and molecular imaging information. Other important goals include evaluating response to therapy to allow earlier cessation of ineffective therapies

Conventional MRI of the prostate relies on morphologic changes within the prostate to define the presence and extent of cancer ,Although T2-weighted MR imaging has been used widely for the pretreatment work-up of prostate cancer, the technique is limited by unsatisfactory sensitivity and specificity for cancer detection and localization ,it is also not sensitive in detecting cancer in regions other than the peripheral zone of the prostate.

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To improve the diagnostic performance of MR imaging in evaluations for prostate cancer, various other techniques have been applied. These include dynamic contrast material–enhanced MR imaging, diffusion-weighted imaging, and MR spectroscopy.

The MRI workup for prostate cancer detection should include a morphologic (T2WI) and a functional imaging technique especially DWI.

DCE MRI help in clarification of benign sources of low-signal-intensity foci that mimic cancer, such as post biopsy hemorrhage, prostatitis, calcification, and treatment effects, that were observed on T2-weighted MR images. Yet DCE MRI for cancer localization was technically limited in that only a single slice or at best a few slicers were used based on the findings of T2-weighted images

MRS imaging has shown very promising results, being a method of obtaining metabolic biochemical information from a series of voxels placed over the prostate gland

DW imaging using different b values and ADC map increase sensitivity and specifity of cancer prostate detection , localization,staging and assessment of radiotherapy and increase conventional MRI sensitivity in detecting local recurrence after treatment.

3T MR machines gives better quality in DW imaging as well new sequences help improve the technique and reduces its artifacts. However till now no standard protocol for DWI in prostate is set and also no consensus regarding the results and values at which cancer could be confirmed in prostate.

In conclusion : DWI is an advanced Functional MRI technique recently applied in prostate cancer investigations . it add value to routine MRI imaging in detections , staging and grading of prostate cancer as well as evaluation of treatment and follow up for local recurrence. Improvement in hardware and software of MR machines further improve the DWI and enforced its use in cancer prostate yet further investigations and studies needed to standardize the technique and solidify the results obtained.