

The value of 1H MRS positive voxels percentage in the detection and localization of prostate cancer

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PURPOSE: To investigate the value of 3D 1HMRS positive voxels percentage for the prostate cancer detection and location on the basis of sextant.

METHODS AND MATERIALS: Sixty-five patients (mean age 71.44 ± 6.37 years, range 51-88 years) with biopsy proved prostate peripheral cancer were retrospectively evaluated in this study. The prostate peripheral zone was divided into 6 regions (left/right bottom, middle and tip). According to the pathological results obtained by ultrasound guided systemic biopsy, the locations of the prostate cancerous region were marked as one or more of the sextants. Three hundred and sixteen of 390 available sextants were covered at 3D MR spectroscopic imaging: 167 cancerous sextants and 149 noncancerous sextants. The 3D MR spectroscopic imaging was performed with a 1.5T MR imaging system (twinspeed, GE Medical Systems). Positive voxel was defined as voxel with a ratio of choline plus creatine to citrate of greater than 0.86. The percentage of positive voxels in each sextant was calculated and ROC curve was protracted to determine the Optimal Operating Point (OOP) for the cancer detection with positive voxels percentage.

RESULT: For the sextants in which positive voxels percentage were lower than 0.33, only 12.69% (17/137) were proved cancerous sextant in later biopsy; for the sextants with positive voxels percentage between 0.33 and 0.66, 55.67% (17/30) were proved cancerous sextant; for the sextants with positive voxels percentage larger than 0.66, 89.26% (133/149) sextants would be proved cancerous sextant in system biopsy. According to the ROC analysis, the OOP was determined and interpreted at 0.62 with higher sensitivity and specificity. The area under ROC curve (A_z) was 0.804. If cancerous sextant was defined as sextants in which the positive voxels percentage larger than 0.62, the sensitivity, specificity, positive predictive value, negative predictive value and accuracy for tumor detection were 71.42%, 81.12%, 85.62%, 83.37% and 77.93%, respectively.

CONCLUSION: Positive voxels percentage is a promising method for the prostate cancer detection and location before system biopsy, and it may be a good guidance for the later biopsy.

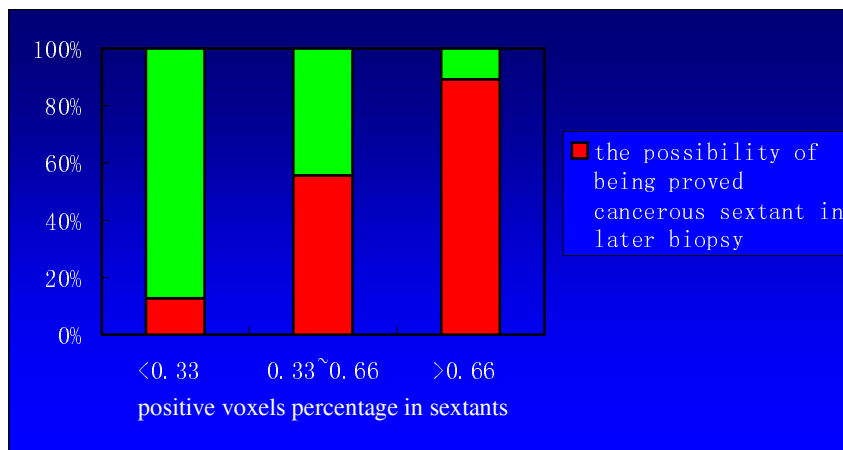


Fig 1: With the increase of positive voxels percentage in sextants, the possibility of being proved cancerous sextant in system biopsy increased.

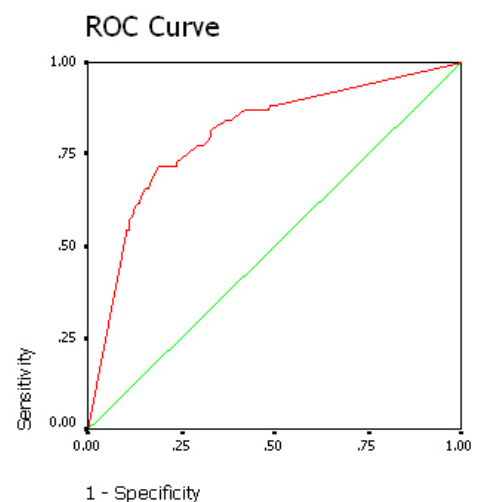


Fig 2: ROC curve for the cancerous sextant detection with positive voxels percentage, A_z was 0.804.