18F-Fluorocholine (18F-FCH) hybrid PET/MRI in the evaluation of men with suspected prostate cancer recurrence following definitive local therapy: a prospective study

Tina W. Zhang 1, Zahra Kassam 2, Irina Rachinsky 3, Cesare Romagnoli 4, David D’Souza 4, Belal Ahmad 5, Varagar Venkatesan 6, Joseph Chin 7, Stephen Pautler 8, John Butler 9, Jonathan D. Thiessen 10, Ashley Lozanski 8, Peter Chung 11, Cynthia Ménard 12, TY Lee 13, Glenn Bauman 14


Corresponding author: Tina W. Zhang, tina.zhang@lhsc.on.ca

Categories: Radiation Oncology
Keywords: 18f-fluorocholine, pet/mri, prostate cancer, recurrence, management, prostatectomy, radiation

How to cite this poster

Abstract

Introduction: Positron emission tomography (PET) with radiolabeled choline analogues has shown promise in detection of prostate cancer (CaP) recurrence after definitive local therapy. 1-2 Magnetic Resonance Imaging (MRI) is increasingly used for CaP staging, and has superior soft-tissue resolution and options for multi-parametric and functional imaging. 3 The simultaneous use of PET and MRI has been enabled by a new generation of hybrid PET/MRI scanners. 5 We designed a pilot study examining the feasibility of hybrid PET/MRI using 18F-FCH for evaluating men with suspected CaP recurrence who were being considered for local salvage therapies after initial radical prostatectomy (RP) or radical radiotherapy (RT).

Materials and Methods: Nineteen men with suspected CaP recurrence and negative conventional restaging (bone scan and computed tomography) being considered for local salvage were accrued: 10 post-RP and 9 post-RT. PET/MRI were acquired as follows: T2W MRI and PET of the pelvis with body-array coil followed by whole-body PET/MRI using 3-5 bed positions (from skull vertex to proximal femora) with simultaneous PET and MRI (Coronal 2-point Dixon 3D-VIBE, axial HASTE T2 and coronal T2 inversion recovery sequences) followed by MR only (DCE and DWI) imaging of the pelvis. A PET/MRI consensus report was generated by joint read by a radiologist and nuclear medicine physician. Questionnaires were completed by the referring physicians prior to and after imaging reports to investigate the clinical impact of PET/MRI.
Results: Median PSA of the 10 post-RP men at the time of PET/MRI imaging was 0.575 (range 0.19-7.77). Seven men had initial Gleason Scores (GS) of 7, and two had GS 8-9. One had no GS available due to prior hormonal effects. Four of 10 post-RP men had lesions detected on PET/MRI; 3 in pelvic nodes and 1 in distant nodes. Most had concordant PET and MRI findings. Change in management occurred in 100% (4/4) with positive PET/MRI and 0/6 with negative PET/MRI. The Influence of PET/MRI on change in management was scored a mean of 1.25 by physicians in questionnaires (scale of 1-5, 1 being high influence). Median PSA of the 9 post-RT men at the time of PET/MRI was 6.0 (range 2.89-11.84). Eight men had initial GS of 7, and 1 had GS 6. Seven of 9 men had lesions detected on PET/MRI; 4 isolated to the prostate, 1 in the prostate and pelvic nodes, 1 in pelvic nodes, and 1 distant. Concordance between PET/MRI findings was less than in the RP cohort. Change in management occurred in 57% (4/7) with positive PET/MRI and 1/2 with negative PET/MRI. The Influence of PET/MRI on change in management was scored a mean of 2.2 by physicians.

Conclusions: 18F-FCH PET/MRI shows promise for men with suspected CaP recurrence following RP or RT. PET/MRI findings had impact on clinical certainty of sites of recurrence and management.