Dual-phase (18)F-fluorocholine PET/CT to detect locoregional recurrence of prostate cancer: comparison between each time point of imaging and a summation scan.

Tong AK, Zhang ZX, Zaheer S, Yan XS.

Abstract

OBJECTIVES: Prostate carcinoma is a major health problem, and routine imaging shows only modest results in detecting and restaging clinically localized prostate cancer recurrence. Recent studies have shown promise of radiolabeled analogues of choline for positron emission tomography (PET) scans in patients of biochemical recurrence and that sequentially incremental Fluorocholine (FCH) uptake is associated with malignancy, whereas decreasing tracer activity suggests a benign aetiology. However, this pattern of tracer uptake has not been fully validated, and no standardized (18)F-Fluorocholine ((18)F-FCH) scan protocol is in place yet. This study aimed to better define the role of dual-phase (18)F-FCH PET/computed tomography (CT) imaging using retrospective masked reading focusing on detection of locoregional recurrence/metastasis in patients with biochemical failure after definitive local primary treatment.

METHODS: A total of 32 subjects were enrolled during the period 04/2010 to 05/2014 with histologically proven prostate cancer that was treated with curative intent and had biochemical recurrence. Early scans and delayed imaging of the pelvis were graded separately by blinded readers. Final evaluation using the combination of information from dual-phase studies as a "summation scan" was also performed. Maximum standardized uptake value was computed using regions of interest constructed over focal hyperactivity. Calculations were performed using Statistical Product and Service Solutions, Version 20 for Windows. A composite reference consisting of histopathology, correlation with other imaging, or serum prostate specific antigen (PSA) trend with clinical follow-up of at least 6 months was used to determine the true disease status of the patient.

RESULTS: Early-phase pelvis imaging sensitivity and specificity were calculated to be 73.1% and 90.9%, respectively. Late-phase pelvis imaging sensitivity and specificity were 80.8% and 100%, respectively. Summation scan sensitivity and specificity were 76.9% and 100%, respectively. The odds ratio of having recurrent disease with an uptrend of SUVmax on dual-phase imaging was 33.3. The optimal cutoff value of PSA was 1.85ng/mL with 80% sensitivity and 62.5% specificity.

CONCLUSIONS: Single late-phase FCH PET/CT imaging is a reliable scan modality which can detect sites of disease at low levels of PSA which still fulfil the criteria of biochemical recurrence. This will allow clinicians to identify sites for potential biopsy or start locoregional treatment.
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