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Imaging of hypoxia in colorectal cancer and gastroesophageal cancer with positron emission tomography

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Purpose: Hypoxia in colorectal cancer (CRC) and gastroesophageal cancer (GEC) decreases tumour responsiveness to radio and chemotherapy leading to cancer progression and poor prognosis. This is the first study to utilise [18F]FAZA hypoxia radiotracer in patients with CRC and GEC.
Methods: Six patients (mean age 68±8 years, 2 males and 4 females) with CRC and 4 patients diagnosed with GEC (mean age 65 years, 3 males and 1 female) were included in the study. [18F]FAZA was synthesised at the John Mallard Scottish PET Centre. After injection with 370 MBq of [18F]FAZA, PET/CT images with 60 min dynamic scan were acquired. In addition, 15 min static scans 2 hr post injection were performed. 3D PET images were reconstructed iteratively using an ordered subset expectation maximization (OSEM) method and fused to the corresponding low-dose CT images. [18F]FAZA uptake parameters including maximum standard uptake value (SUVmax), tumour-to-muscle ratio (T/M), tumour-to-bowel ratio (T/B) and volume of interest (VOI) were measured.
Results: 4 out 6 patients with CRC (66%) showed clear uptake of [18F]FAZA in the primary tumour. The mean tumour SUVmax was 2.2±0.91 (range 1.12 - 3.71). The tumour SUVmax was significantly higher compared with muscle and bowel ($t(5) = 3.11$, $P=0.03$), ($t(5) = 3.08$, $P=0.03$), respectively. However, tumour SUVmean didn't differ significantly compared with muscle and bowel ($t(5) = 2.41$, $P=0.06$), ($t(5) = 2.46$, $P=0.06$) respectively. The mean tumour to muscle ratio (T/M) ratio was 1.89±0.64 (range 1.10 - 2.87), while the mean tumour to normal bowel (T/B) was 1.92±0.64 (range 1.08 - 2.74). However, [18F]FAZA did not accumulate in any of the tumours found in patients with GEC.
Conclusions: [18F]FAZA PET/CT imaging is suitable and feasible for detecting CRC hypoxic tumour regions with image quality that can be used in clinical practice.

Technical Track

Nuclear Applications and Radiation Processing

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