E-catherina, Beta-catenina) in locally advanced rectal cancer patients candidates to neoadjuvant treatment.
Materials and Methods: 28 consecutive $_cT_3$ rectal cancer patients were prospectively studied with PET-CT and inmunohistocheministry in the biopsy specimen from staging rectocolonoscopy (8 molecular variables). All patients had conventional imaging systems for initial staging including pelvic MRI and endorectal ultrasound.
Results: PET-CT dimensions of the primary lesions ranged from $27\times22\times29$ to $59\times54\times81$ mm (median $37\times34\times40$ mm). Extra-rectal metastatic disease was detected in 6 studies (5 pelvic N+ and 1 N+/M+ liver). SUVmax ranged from 3.7 to 17.1 (median 8.6). Molecular IHC global distribution was: Ki67 28/28 (20%-90%); cox-2 24/28 (5%-100%); p53 18/28 (5%-100%); EGFR 9/28 (2%-60%); VEGFR 28/28 (30%-100%); cerb-2 6/28 (5%-100%); E-catherina 26/28 (60%-100%); betacatenina citoplasmic 28/28 (80–100%); betacatenina; nuclear 28/28 (20%-100%). There were no identical IHQ profiles or SUVmax values among the complete cohort of patients. EGFR was not expressed with SUVmax inferior to 5.2 (median value for the subgroup 10.7).
Conclusions: $_cT_3$ rectal cancer is an heterogeneous molecular disease when evaluated by molecular imaging and inmunohistochemistry at the time of initial staging. Multiparametric correlations may be used to guide biotarget oriented neadjuvant treatment decisions.

2107 POSTER

Imaging assessment of the in vivo metabolic-vascular relationship of primary colorectal cancer by integrated 18-FDG PET/Perfusion CT – feasibility and validation with immunohistochemical markers of angiogenesis and hypoxia

V. Goh[1], A.M. Groves[2], M. Rodriguez-Justo[3], M. Shastry[2], A. Engeldow[4], R. Shortman[2], R. Endozo[2], S. Halligan[5], P. Ell[2]. *[1]Mount Vernon Cancer Centre, Paul Strickland Scanner Centre, Northwood Middlesex, United Kingdom; [2]University College Hospital, Institute of Nuclear Medicine, London, United Kingdom; [3]University College Hospital, Department of Pathology, London, United Kingdom; [4]University College Hospital, Department of Surgery, London, United Kingdom; [5]University College Hospital, Specialist Radiology, London, United Kingdom*

Background: Integrated 18-FDG PET/Perfusion CT evaluation of the *in vivo* metabolic-vascular relationship may provide insight into tumour biology at primary colorectal cancer staging. The aim was to its feasibility and to assess how the metabolic-vascular relationship relates to angiogenesis and hypoxia.
Materials and Methods: Following IRB approval, 26 patients (15 male, 11 female, mean age 66.8 years) with suspected colorectal adenocarcinoma underwent integrated 64-MDCT/PET (VCT Discovery, GE Healthcare) staging. FDG PET (190 MBq tracer IV; 60 minute uptake; 2D acquisition) was followed by Perfusion CT (50 mls Omnipaque 350 mg/mL; 5 mL/s IV; 120 kV; 60mAs, 8x5 mm collimation). Standardized uptake value (SUV_{max} and SUV_{mean}); vascular parameters (blood flow, blood volume, permeability surface area product); and the flow-metabolic ratio (BF/SUV_{mean}) were noted. Following surgery and immunohistochemical staining (CD 105, VEGF, and GLUT-1) of matched histological sections, correlation between PET, Perfusion CT and histopathological features were assessed using Spearmann rank correlation.
Results: 17/26 underwent surgery alone: pStage I (3); pStage II (4); pStage III (5); Stage IV (5). Mean (SD) whole tumor SUV_{mean} and SUV_{max} were 12.6 (6.6) and 21.3 (9.2) respectively. Mean (SD) whole tumor blood flow, blood volume and permeability surface area product were 82.1 (38.4) ml/min/100 g tissue, 5.94 (1.97) ml/100 g tissue, 13.2 (5.63) ml/min/100 g tissue respectively. There was a positive correlation between SUV_{mean} and BF ($r = 0.47$; $p = 0.05$), BV ($r = 0.5$; $p = 0.04$); and PS ($r = 0.56$; $p = 0.02$); and between SUV_{mean} and CD105 ($r = 0.70$, $p = 0.002$). There was no significant correlation between BF and CD105 ($r = 0.45$, $p = 0.07$). The flow- metabolic ratio (BF/SUV_{mean}) correlated negatively with VEGF ($r = -0.57$, $p = 0.02$) but not with GLUT-1 ($r = 0.22$, $p = 0.38$).
Conclusion: Integrated 18-FDG PET/Perfusion CT is feasible. Flow and metabolism appear coupled in colorectal cancer. The higher the flow-metabolic ratio, the lower VEGF expression suggesting these tumors may be less angiogenic.

2108 POSTER

Comparison FDG-PET/CT findings of head and neck cancer after preoperative radiotherapy with pathological findings

J. Yokouchi[1], H. Shinjo[2], N. Takada[3], T. Tomoda[3], T. Nakamura[3], N. Fuwa[3], T. Gokan[1], H. Sakuma[4], A. Konno[5], K. Hamada[1]. *[1]Showa University Hospital, Radiology, Tokyo, Japan; [2]Southern TOHOKU General Hospital, Radiology, Koriyama, Japan; [3]Southern TOHOKU General Hospital, Radiation Oncology, Koriyama, Japan; [4]Southern TOHOKU General Hospital, Pathology, Koriyama, Japan; [5]Southern TOHOKU General Hospital, Head and Neck Surgery, Koriyama, Japan*

Background: Positron emission tomography (PET) using [^{18}F] fluorodeoxyglucose (FDG) has been suggested to improve the accuracy in identifying subclinical local or regional disease for head and neck cancer after radiotherapy. Furthermore, the introduction of combined PET and CT provides more accurate tumor localization. The purpose of this study is to analyze a correlation between findings of FDG-PET/CT for head and neck cancer patients after completion of radiotherapy and pathological findings of viability of cancer cells.
Methods and Materials: The study population consisted of 23 patients with head and neck cancer who were evaluated with FDG-PET/CT after completion of preoperative radiotherapy. Primary tumor sites included nasal cavity/paranasal sinuses (11), oropharynx (6), hypopharynx (2), oral cavity (2), larynx (1), unknown (1).
Results: There were 9 patients with viable cancer cells, including 7 primary and 2 neck region. All of them had abnormal PET/CT findings, too, though there contained remarkable false positive cases.
Conclusions: The sensitivity of PET/CT for head and neck cancer patients after completion of radiotherapy was so high to regard abnormal high FDG accumulation as the possibility of existence of viable cancer cells. But it is necessary to consider false positive cases often among the patients.

Pathological findings	FDG-PET/CT findings		
	Abnormal	Normal	Total
Viable cell (+)	7/2	0/0	7/2
Viable cell (−)	8/7	8/14	16/21
Total	15/9	8/14	23/23

primary site/neck region

2109 POSTER

Comparison of 18FDG PET/CT scan and bone scintigraphy in detecting bone metastasis in nasopharyngeal squamous cell carcinoma

M. Abouzied[1], A. Al-Sugair[1], M. Elsebaei[2], N. Alrajhi[2]. *[1]King Faisal Specialist Hospital and Research Center, Department of Radiology/Section of Nuclear Medicine, Riyadh, Saudi Arabia; [2]King Faisal Specialist Hospital and Research Center, Department of Radiation Oncology, Riyadh, Saudi Arabia*

Purpose: To evaluate the accuracy of FDG PET/CT and Bone scan for the diagnosis of bone metastases in patients with nasopharyngeal squamous cell carcinoma (NPSCC).
Methods & Materials: 125 patients with NPSCC have been identified in our database that had 18F FDG-PET/CT study. Of whom 88 patients (54 males and 34 females; age range 15–100 years) have met our inclusion criteria; biopsy proven NPSCC, bone scan and PET/CT within 30 days. Comparison was done on a lesion-by-lesion analysis. Additionally, the metabolic activity of the identified bone lesions was measured using the maximum Standardized Uptake Values (SUV max). CT bone window was used to describe the structural changes, whether lytic, sclerotic or mixed type. Biopsy, MRI, MDCT, and the clinical course of the patients were our references.
Results: PET/CT identified 77 lesions in 11 patients, compared to 42 lesions identified by bone scan in 11 patients as well. Additionally, PET/CT also detected distant metastases in 3 patients involving liver, lung, adrenal glands and lymph nodes. Each modality missed one patient with biopsy confirmed bone metastases (false negative). Therefore, PET/CT and bone scan were equally true positive in 11 patients. PET/CT was true negative in 76 without false positive readings, while bone scan was true negative in 73 patients and false positive in 3. The overall sensitivity, specificity, NPV and PPV of PET/CT and bone s0can was 91.6% vs. 91.6%, 100% vs. 96%, 98.7% vs. 98.6% and 100% vs. 78.5% respectively. Morphologically, 51.9% of the true lesions (40/77) had no structural changes by CT, one third were lytic 30% (23/77), 15% (12/77) were sclerotic and only 2 lesions that had mixed lytic/sclerotic. The corresponding mean SUV max was 5.4, 7.7, 6.7, and 7.8 respectively.