with mutated lung adenocarcinoma. We evaluate the use of computed tomographic guided (CT-guided) core needle biopsy for assessment of EGFR gene mutation in the patients with advanced lung adenocarcinoma who failed the chemotherapy with the correlation to the responses to gefitinib.
Materials and Methods: Between August 2005 and January 2006, 17 patients with histologically proved advanced lung adenocarcinoma who had failed chemotherapy were enrolled in the study. All fresh specimens obtained from the target cancers by CT-guided core needle biopsy were sent frozen for DNA analysis (EGFR mutation) before the treatment of gefitinib (250 mg/day). The mutant and non-mutant groups were correlated to the responses on the basis of RECIST criteria measured by computed tomography (mean interval days on 61 after gefitinib therapy) and clinical assessment (on 194 days after gefitinib therapy). The early response was recorded to positive when the biopsy target cancers were documented to partial response (>30% of tumour size reduction) under the RECIST criteria and the clinical assessment were either based on clinical presentation, chest film or CT.
Results: Nine male and 8 female patients (mean age = 58 years old; age range = 41 to 78) were enrolled in this study. Twelve patients (70%) exhibited EGFR mutations were classified to mutant and 5 were nonmutant. Fifteen patients (12 mutant and 3 nonmutant patients) finally received gefitinib therapy and 2 nonmutant patients refused gefitinib treatment. The overall early responses rates were counted to 73.3% (11/15), with 91.6% (11/12) for mutant group and 0% for nonmutant group. However, the overall clinical assessment of response resulted 80% (12/15), with 100% for mutant group and 0% for nonmutant group. Both responses were statistically significant with p values less than 0.01.
Conclusion: CT-guided core needle biopsy for EGFR mutation analysis is feasible for planning targeted therapy on lung adenocarcinoma. Presence of EGFR mutation is an independent predictor of gefitinib response.

1007 POSTER

Treatment of malignant vena cava syndrome with large self-expandable nitinol stents

S. Heye, G. Maleux. *U.Z. Gasthuisberg, Radiology, Leuven, Belgium*

Background: More than 85% of cases of superior vena cava syndrome (SVCS) and are due to an underlying malignancy. The exact incidence of malignant inferior vena cava syndrome (IVCS) is not known, but both and IVCS and SVCS represent a severe complication of some malignancies. Radiation therapy and chemotherapy are effective but may require 2−4 weeks for relief of symptoms. Endovascular stenting may cause rapid symptom relief and does not interfere with the subsequent application of radiotherapy, chemotherapy or both. In literature most of the stenting procedures are done with either balloon-expanding or self-expanding stainless steel stents or self-expanding stents made of cobalt-chromium alloy, but little data exists on the use of nitinol stents. The goal of our study was to retrospectively evaluate safety, feasibility and outcome of large self-expandable nitinol stents to treat malignant venous stenosis.
Material and Methods: From May 2005 to November 2006, 27 patients (20 men, 7 women) with malignant disease and superior/inferior vena cava syndrome underwent endovascular treatment using Zilverstents (William Cook, Bloomington, IN, USA).
Results: Technical and radiological success was 100%. All patients who underwent SVC stenting (20/20) had immediate relief of symptoms. Five of the 7 patients (71%) with stenting of inferior vena cava/iliac vein stenosis had relief of symptoms within 1 week.
Fifteen patients (56%) died during follow-up (mean: 4.5 months, range: 2 days – 14 months) due to progressive malignant disease.
Early stent thrombosis (within 24h) occurred in 2 patients (7%). One patient died two days later, the other underwent successful fibrinolysis and additional stenting.
Instent stenosis with/without recoil occurred in 6 patients (22%). Therapy consisted of PTA alone in one, additional Zilverstent placement in two and placing a balloon-expandable stent (Express Vascular, Boston Scientific, Nanterre Cedex, France) in the Zilverstent in three patients.
Conclusion: The use of large self-expandable nitinol stents for treatment of malignant venous stenosis is safe and efficacious. Recurrent symptomatic stenosis/occlusion can be treated by additional stenting, preceded by fibrinolysis if necessary.

1008 POSTER

Dynamic contrast-enhanced ultrasonography (DCE-US) with quantification for the early evaluation of metastatic renal cancer treated with tyrosine kinase inhibitors

L. Bouaita[1], N. Lassau[2], S. Koscielny[3], L. Chami[2], A. Plantade[1], C. Massard[1], B. Benatsou[2], J. Pellier[2], A. Roche[2], B. Escudier[1]. *[1]Institut Gustave Roussy, Departement de Médecine, Villejuif, France; [2]Institut Gustave Roussy, Departement d'Imagerie, Villejuif, France; [3]Institut Gustave Roussy, Departement de Biostatistique, Villejuif, France*

Background: To determine the best quantitative parameters of dynamic contrast-enhanced ultrasonography (DCE-US) for predicting the early functional response to tyrosine kinase inhibitors (TKI) in patients with metastatic renal cancer.
Materials and Methods: Twenty-five patients with metastatic renal cancer, treated with (TKI) (sorafenib and sunitinib) were prospectively followed up by DCE-US, with primary objective to predict response to therapy.
DCE-US examinations were performed using contrast agent (Sonovue, Bracco) and perfusion (VRI: Vascular Recognition Imaging) and quantification softwares (CHI-Q: Contrast Harmonic Imaging Quantification, Toshiba) using raw linear data recorded over 3 minutes.
A qualitative analysis was performed based on the percentage of contrast uptake on the recorded video. Seven quantitative parameters characterizing tumor vascularization were calculated after modelizing contrast uptake curves. DCE-US was performed before treatment, after 2 weeks, 2 months and every 2 months. Changes in tumor vascularisation will be compared to best response obtained on CT scan performed every 2 cycles.
Results: To date, 17 patients have been followed up at baseline and after 14 days of treatment, and 11 by DCE-US and CT scan at 2 months. Seven patients had clinical benefits (stable disease and partial response) and 4 patients were non responders at 2 months. Preliminary data showed a dramatic decrease in qualitative and quantitative parameters in patients treated with TKI.The median variation in the decrease in contrast uptake at 14 days was 60%. The median decrease in blood volume represented by the peak intensity (PI) and the area under the curve (AUC) was more than 80%. The median decrease in blood flow represented by the sloap of the wash-in was more than 80%. The wash-out AUC decreased by 86%. However, due to the low number of patient with available data, the power of the study was extremely low and correlations between the wash-in AUC, the mean transit time (MTT), the time to peak intensity and response to treatment were not significant. Updated results involving all the patients will be presented during the meeting.
Conclusion: DCE-US with quantification based on raw linear data points out different parameters characterizing tumor vascularization modified during TKI treatment. Correlation with clinical results will be presented.

1009 POSTER

Additional FDG PET-CT in week 5−6 of radiotherapy for patients withNSCLC as a means of dose escalation planning

C. Gillham[1], D. Zips[2], F. Pönisch[1], C. Evers[2], N. Albomaali[1], K. Zöphel[3], J. Steinbach[4], J. Kotzerke[5], T. Herrmann[1], M. Baumann[6]. *[1]OncoRay: Centre for Radiation Research in Oncology, Medical Faculty Carl Gustav Carus University of Technology, Dresden, Germany; [2]OncoRay: Centre for Radiation Research in Oncology, Radiation Oncology Medical Faculty Carl Gustav Carus University of Technology, Dresden, Germany; [3]OncoRay: Centre for Radiation Research in Oncology, Nuclear Medicine Medical Faculty Carl Gustav Carus University of Technology, Dresden, Germany; [4]OncoRay: Radiopharmacy Research Centre, PET Centre, Dresden-Russendorf, Germany; [5]OncoRay: Radiopharmacy Research Centre, Nuclear Medicine: Carl Gustav Carus University of Technology Dresdenh & PET Centre: Rossendorf, Dresden and Russendorf, Germany; [6]OncoRay: Centre for Radiation Research in Oncology, Experimental Centre and Radiation Oncology Medical Faculty Carl Gustav Carus University of Technology, Dresden, Germany*

Aims: To detect a reduction in disease volume during radical radiotherapy for non-small cell lung cancer (NSCLC) using PET-CT and to determine whether this would facilitate dose escalation.
Methods: Ten patients with localised inoperable NSCLC were prospectively enrolled. Each received conformally planned radiotherapy to a dose of 66 Gy/33# over 6.5 weeks using 6−15 MV photons and prescribed to the 100% isodose. PET-CT imaging was performed just prior to and following 50 or 60 Gy. Target volume definition was performed by one senior radiation oncologist with the help of a senior radiologist and nuclear medicine physician. For all patients and at both time points CT and PET-delineated gross tumour volumes were generated (GTVCT, GTVPET). A composite GTV was then created (GTVCT+PET) and 15 mm added in all planes to form

the planning target volume (PTV). No correction for organ movement was incorporated and no elective nodal irradiation performed. Each of the different volumes were compared before and after 50−60 Gray. Two plans were then created and compared: 78 Gy delivered to the initial PTV and 66 Gy to the initial PTV with a 12 Gy boost to the post 50/60 Gy PTV.
Results: All patients (mean age 64 years) had stage III disease (4 IIIA and 6 IIIB). There were 4 squamous cell and 6 adeno-carcinomas. After 50/60 Gray the GTVCT, GTVPET, GTVCT+PET and PTV reduced by a mean of 22%, 43%, 30% and 22% respectively. The delivery of 78 Gray to the initial PTV could have been safely achieved in 4/10 patients. Of these delivering treatment in two phases would have substantially spared normal tissue in 2 patients. In the remaining 6 patients, delivering 78 Gray to the initial PTV would have exceeded normal tissue constraints and no benefit was seen when planned in 2 phases.
Conclusions: The PTV, consequent on changes seen on PET-CT, reduces during a course of radical radiotherapy for NSCLC. Such a reduction permits dose escalation in a subset of patients and may lead to improved therapeutic outcomes.
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1010 POSTER

Positron emission tomography and computed tomography in detection of pelvic recurrence in patients with rectal cancer

V. Nemtsova. *Kharkov Medical University, Oncology, Kharkov, Ukraine*

Objective: The aim of this study was to assess diagnostic accuracy of combined positron emission tomography (PET) and computed tomography (CT) in detection of pelvic recurrence in patients with rectal cancer who underwent abdominoperineal or anterior resection.
Methods: Fifty-four patients were included (31 males and 23 females). Fourteen patients underwent abdominoperineal resection and 40 underwent anterior resection with an anastomosis in the pelvic region before referral for PET/CT. Pelvic sites of fluorine-18 fluorodeoxyglucose (FDG) uptake were rated separately on PET and PET/CT images as benign or malignant on the basis of shape, location, and intensity of fluorine-18 FDG uptake (1−2 = benign and/or physiologic, 3 = equivocal, 4−5 = malignant). Altered pelvic anatomy and presence of presacral abnormalities were examined with CT. Pelvic recurrence was confirmed with histologic analysis or clinical and imaging follow-up. Sensitivity, specificity, positive and negative predictive values, and accuracy of PET and PET/CT in the detection of pelvic recurrence were compared with lesion- and patient-based analyses by using the chi(2) test. Clinical relevance of PET/CT assessment was determined.
Results: Of 76 pelvic sites with increased fluorine-18 FDG uptake, 39 were determined as malignant. Sensitivity, specificity, positive predictive value, negative predictive value, and accuracy for differentiating malignant from benign fluorine-18 FDG uptake in the pelvis were 97%, 95%, 91%, 96%, and 94% for PET/CT and 81%, 64%, 75%, 73%, and 72% for PET, respectively. The physiologic fluorine-18 FDG uptake in displaced pelvic organs was the most common cause for false-positive interpretation of PET findings. Presacral CT abnormalities were present in 25 (46.3%) of 54 patients, and 5 (20%) abnormalities were malignant. PET/CT was used to distinguish benign and malignant presacral abnormalities with a sensitivity, specificity, positive predictive value, and negative predictive value of 100%, 97%, 86%, and 100%, respectively. PET/CT findings were clinically relevant in 24 (45%) of all patients.
Conclusion: PET/CT is an accurate method in the detection of pelvic recurrence in patients with rectal cancer after surgical removal of rectal cancer.

1011 POSTER

The effects of tumour volume coverage on the assessment of vascular activity following radiotherapy in human non-small cell lung cancer using dynamic contrast enhanced computed tomography

Q.S. Ng[1], V. Goh[2], H. Mandeville[3], J. Milner[3], M.I. Saunders[3], P.J. Hoskin[3]. *[1]National Cancer Centre, Department of Medical Oncology, Singapore, Singapore; [2]Mount Vernon Cancer Centre, Paul Strickland Scanner Centre, Middlesex, United Kingdom; [3]Mount Vernon Cancer Centre, Marie Curie Research Wing, Middlesex, United Kingdom*

Background: Volumetric dynamic contrast enhanced computed tomography (CT) can be used to quantify whole tumour vascular function and has been shown to improve measurement reproducibility compared to conventional single level techniques. We aim to determine if whole tumour assessment provides a more representative evaluation of the tumour vascular changes following radiotherapy in lung cancer.
Methods: Following ethical approval and informed consent, 16 patients (9 males, 7 females) with non-small cell lung cancer (mean tumour size 7.6 cm; range 4.9 to 11.8 cm) receiving palliative radiotherapy underwent volumetric dynamic CT examinations. Using 16-detector CT, multiple sequential volumetric acquisitions encompassing the entire tumour were acquired after IV contrast infusion. Median values of tumour blood volume (BV; mL/100 mL) were measured for the whole tumour, and multiple contiguous 10 mm tumour slices, Scans were performed twice at baseline, and once after two fractions (9 Gy total dose) of radiotherapy. Mean vascular changes after radiotherapy were compared using Bland-Altman 95% limits of agreement, derived from the two baseline scans, and paired t-testing.
Results: At baseline, mean BV was 6.2 ml/100 mL and 5.8 ml/100 mL with whole tumour and 10 mm level measurements respectively. With whole tumour measurement, mean BV increased by 21.5% (paired t-test, $p = 0.025$) after two fractions of radiotherapy, which was greater than the 95% limits of change. With 10 mm tumour measurement, BV change was spatially variable: 8 of the 16 patients had significant changes in BV (paired t-test, $p < 0.05$) after radiotherapy, of which, only 4 patients had changes greater than the 95% limits of change. The remaining 8 patients demonstrated variable BV changes depending on the tumour slice position where the measurements were taken from, these changes were within the 95% limits of change and were not significant on paired t-testing ($p > 0.05$).
Conclusion: Tumour vascular changes after radiotherapy are spatially heterogeneous. Conventional single level imaging techniques might not provide an accurate depiction of these changes. When assessing tumour vascular changes following therapy, whole tumour volumes should be evaluated if possible.

1012 POSTER

Imapct of FDG-PET/CT imaging in staging and treatment planning for radiotherapy pf head and neck carcinoma

M. Krengli[1], L. Deantonio[1], D. Beldì[1], G. Loi[2], M. Brambilla[2], E. Inglese[3]. *[1]University of Piemonte Orientale, Radiotherapy, Novara, Italy; [2]Hospital Maggiore della Carità, Medical Physics, Novara, Italy; [3]Hospital Maggiore della Carità, Nuclear Medicine, Novara, Italy*

Background: The use of ^{18}F-fluorodeoxyglucose positron emission tomography (FDG-PET) has recently gained interest in radiation oncology in relation to a potential improvement of tumour staging, and a better delineation of the target volume.
The present study aims to analyze the impact of FDG-PET fused with computed tomography (CT) images for the staging and the treatment planning of patients with head and neck carcinoma candidates for primary radiotherapy (RT).
Materials and Methods: From November 2004 to June 2006, 22 patients affected by head and neck carcinoma were enrolled into an institutional FDG-PET/CT imaging protocol: 6 oropharyngeal, 6 hypopharyngeal, 4 nasopharyngeal, 2 oral cavity, 2 laryngeal, 2 paranasal sinus tumors. Patients candidates for combined radio-chemotherapy or RT alone underwent PET/CT and CT simulation for staging and treatment planning purposes.
The “Gross Tumor Volume” (GTV) was contoured first on CT simulation images (CT-GTV), and then on PET images (PET-GTV). Other additional volumes were considered: the composite volume “CT-GTVand PET-GTV”, the volume identified by PET but not by CT (PEToutCT), the volume identified by CT but not by PET (CToutPET), and the average mismatched volume between the two image modalities (CT & PET).
Results: Based on PET/CT, changes in TNM categories and clinical stage occurred in 8/22 patients (36%) and 6/22 patients (27%), respectively. The difference between the mean CT-GTV (20.0 cc, standard deviation 17.8 cc) and PET-GTV (17.2 cc, standard deviation 16.8 cc) was not statistically significant at Wilcoxon test ($p = 0.2$). The mean value of PEToutCT volume was 27% of the CT-GTV. The PEToutCT volume resulted $\geqslant$10% larger than the CT-GTV in 13/22 patients (59%). Based on PET/CT information, the CTV was modified in 4/22 patients (18%).
Conclusions: PET/CT fusion images had a relevant impact on tumor staging leading to a change of TNM categories in 36% and clinical stage in 27% of cases. The GTV identified by PET/CT accounted for 27% of CT-GTV.

1013 POSTER

Periodic stimulation tests in different groups of thyroid cancer patients

I. Fedotova, V. Nemtsova. *Kharkov Medical University, Oncology, Kharkov, Ukraine*

Purpose: Recombinant human thyrotropin-TSH (rhTSH) is used to increase radioiodine uptake during imaging of thyroid cancer. Recurrences are frequent in thyroid cancer patients and long-term follow-up is therefore necessary. In this study we evaluated the yield of rhTSH stimulation in three