groups of patients, classified according to the UICC/TNM risk stratification and the results of first follow-up testing.

Methods: The study population comprised 111 patients referred for rhTSH testing. All had undergone first follow-up testing after thyroid hormone withdrawal [off-T(4)] within 1 year of ^{131}I ablation. Negative first follow-up testing was defined as Tg < 2 ng/ml and no neck uptake on ^{131}I diagnostic whole-body scan. Sixty-eight patients had stage I thyroid cancer and negative first follow-up testing (group I), 17 had stage I disease and positive first follow-up testing (group II), and 26 had stage II-IV disease (group III). RhTSH stimulation was performed an average of 4 years after first follow-up testing.

Results: diagnostic scanning with ^{131}I after rhTSH was negative in all patients of group I. In group II stimulation with rhTSH showed residual Tg in six patients and residual ^{131}I uptake in the thyroid bed in two patients, but anybody from these patients had signs of disease progression. Four patients from group III (15.4%) had a positive rhTSH test result, and this was suggestive of disease progression in at least two cases.

Conclusion: The first follow-up testing is essential for prognostic classification after ^{131}I ablation of thyroid cancer. In stage I patients, undetectable Tg and negative ^{131}I scan 1 year after ablation define a large population of subjects who have a very low risk of recurrence and who do not require further rhTSH stimulation tests. Periodic rhTSH stimulation tests appear useful in higher-risk thyroid cancer patients.

1014 POSTER

Pre-operative staging with Positron Emission Tomography (PET) in patients with pelvic recurrence of rectal cancer

I.F. Faneyte[1], R.C. Dresen[1], M.A.L. Edelbroek[2], G.A.P. Nieuwenhuijzen[1], H.J.T. Rutten[1]. [1]Catharina Hospital, Surgery, Eindhoven, The Netherlands; [2]Catharina Hospital, Nuclear Medicine, Eindhoven, The Netherlands

Background: The treatment of pelvic recurrences of rectal cancer is primarily surgical. The substantial morbidity and mortality of such resections warrant stringent patient selection. Recent literature reports PET to be of additional value to CT for the detection of metastases in colorectal cancer patients.

Methods: In a series of 37 pelvic recurrences PET findings were evaluated retrospectively. Comparison was made to CT and MRI findings. It was analyzed whether PET had been decisive in clinical decision-making or could have been so.

Results: Thirty-two patients had 37 rectal cancer recurrences. PET findings differed from CT and MRI in 13 cases (35%): seven PET scans showed lesions that were not seen with CT or MRI. PET scans were negative in six lesions detected by CT or MRI. PET findings led to changes in management in seven recurrences (19%). Four futile operations were (or could have been) averted based on information from PET scans (11%). Three PET scans were false positive.

Conclusions: In a selected population with pelvic rectal cancer recurrences, PET had additional value to conventional imaging, mainly in detecting lymph node metastases. PET thus had significant impact on selection of patients fit for curative surgery.

1015 POSTER

Analyzing the effects the quality of the images contained in a CT data set has on the accuracy of an automated fusion computer programme for the purposes of Image-Guided Radiation Therapy (IGRT)

S. Merrick, J. Wong. Morristown Memorial Hospital, Radiation Oncology, Morristown – NJ, USA

Background: Does the quality of images taken from different technologically advanced CT scanners decreases a computer's ability to accurately determine daily organ movement using an automated fusion process during IGRT.

Materials and Methods: 70 CT data sets were taken from 10 prostate cancer patients during the course of IMRT treatment with IGRT. The two CT scanner models used were an old 1997 scanner and a new 2006 scanner. The IGRT process uses computer software that possesses an automated and manual fusion tool, which aligns a planning CT set with daily treatment CT sets. The initial planning CT is obtained for the purposes of creating the physics treatment plan. The daily treatment CT scans are for obtaining precise prostate locations just prior to the radiation treatments so that interfractional organ movements can be measured and corrected. After the computer performs an initial automatic fusion of the two data sets, the final precise organ shifts are found using a manual registration tool. Two methods were created to test the accuracy of the computer's automated fusion. The first method uses an initial planning CT from the old scanner and fuses it with 5 different daily treatment CT sets from the newer model for each patient. The automated fusion results were then compared to the final organ shifts obtained from the manual registration. The second method's process was repeated for the same patients, except the initial planning CT used was also taken from the newer scanner.

Results: On average, the first method differed from the final precise calculated organ shifts by 1.32 mm in the right/left direction, 4.47 mm in the superior/inferior direction, and 8.47 mm in the anterior/posterior direction. The average difference that the second method differed from the final calculated organ shifts was 0.40 mm in the right/left direction, 1.51 mm in the superior/inferior direction, and 2.67 mm in the anterior/posterior direction.

Conclusion: The second method's results were significantly closer to the true organ shifts in the anterior/posterior directions by an average of 5.80 mm. Therefore, the automated process was more accurate in determining organ movement when it used CT data sets exclusively from the newer CT scanner with higher quality images. These results are important because anterior/posterior movement is the most crucial aspect for prostate treatment, since the rectum is very radiosensitive and planning margins on the rectal side of the prostate are minimal.

1016 POSTER

Maximum standardized uptake value of FDG-PET in the primary tumor as a predictor of pericolic/-rectal infiltration in colorectal cancer

S. Kim[1], J.S. Yeo[2], S.M. Moon[3], D.Y. Whang[3]. [1]Korea University Anam Hospital, Nuclear Medicine, Seoul, South Korea; [2]Dongguk University International Hospital, Nuclear Medicine, Gyeonggi-do, South Korea; [3]Korea Institute of Radiological and Medical Science, General Surgery, Seoul, South Korea

Background: Pericolic/-rectal infiltration of the primary tumor is a important factor in the planning of therapeutic strategies in patients with colorectal carcinoma (CRC). But it is not easy to detect pericolic/-rectal infiltration by preoperative imaging studies because of small size of lesions.

Purpose: The aim of this study was to determine whether ^{18}F-FDG uptake of the primary tumor is a predictor of pericolic/-rectal infiltration in patients with CRC.

Methods: 137 patients with initial diagnosis of CRC were included this study. All patients underwent preoperative ^{18}F-FDG PET or PET/CT. The pericolic/-rectal infiltration confirmed by postoperative pathology data. Maximum standardized uptake value(maxSUV) was used to interpret ^{18}F-FDG uptake within the primary lesions and best cut-off of maxSUV was determined using ROC analysis. Multivariate analysis was performed with logistic multivariate regression to assess the joint effects and interactions of the variables [age (>60 vs <60), gender (M vs F), histologic grade (well/moderately vs poorly/undifferentiated), histology (adenocarcinoma vs non adenocarcinoma), and max SUV] on pericolic/-rectal infiltration.

Results: Pericolic/-rectal infiltration were found in 57% of patients The best cut-off value for pericolic/-rectal infiltration was maxSUV > 5.5 (AUC 81%). Multivariate analysis showed that maxSUV and histologic grade were independent predictosr for pericolic/-rectal infiltration (P < .001).

Conclusion: Patients with high maxSUV (>5.5) and high histologic grade in the primary lesion had significantly high risk of pericolic/-rectal infiltration. In patients with CRC, ^{18}F-FDG uptake by the primary tumor is a strong predictor of pericolic/-rectal infiltration.

1017 POSTER

4D-CT, 4D-MRI and Linac-integrated 4D Cone Beam CT of the Lung: reproducibility of tumour size and displacement in a respirated ex-vivo system

J. Dinkel[1], J. Biederer[2], C. Thierfelder[3], S. Jetter[1], S. Nill[4], U. Oelfke[4], W. Schlegel[4], J. Debus[5], H. Kauczor[1]. [1]German Cancer Research Center (DKFZ), Department of Radiology, Heidelberg, Germany; [2]University Hospital Schleswig-Holstein Campus Kiel, Department of Radiology, Kiel, Germany; [3]Siemens AG, Siemens AG, Forscheim, Germany; [4]German Cancer Research Center (DKFZ), Department of Medical Physics in Radiotherapy, Heidelberg, Germany; [5]University of Heidelberg, Department of Radiation Oncology, Heidelberg, Germany

Background: 4D imaging is a key to motion-adapted radiotherapy of lung tumors. A hypothetical workflow would use 4D-CT or 4D-MRI for radiotherapy planning and verification with 4D-imaging integrated into the linear accelerator. We evaluated in a respirated ex-vivo system, how size and displacement of artificial pulmonary nodules are reproduced with 4D-CT, 4D-MRI and linac-integrated cone beam CT (CBCT).

Materials and Methods: 4 porcine lung explants inside a chest phantom were prepared with 20 agarose nodules (mean diameters 1.3 to 1.9 cm, range 0.8−3.3 cm), respirated at 8/min. and subject to 4D-CT (collimation