Data of all cases diagnosed at East Kent Hospitals NHS Trust were collected retrospectively from April 2009 to March 2010.
Results: There were a total of 15 cases in East Kent Hospital NHS trust, UK over the period of one year which is a significantly high number as compared to previous years,the current population being 614,576. All of them were male. Median age was 74 years and median survival from diagnosis was 8.9 months. All of them had histological or cytological confirmation and 85% had documented evidence of definite or probable exposure to asbestos. There were seven cases that were treated with chemotherapy and 6 patients had advanced malignancy and received radiotherapy and 2 patients with advanced malignancy had palliative treatment only. No patient had radical surgery and there was minimal difference in relative survival between men with localised and non-localised disease stage.
Conclusion: In Great Britain, where asbestos use continued later than many other countries, the peak is anticipated to occur later between 2011 and 2115. Between 1981 and 2000, North East England and South East England were the areas with the highest standardised mortality ratios. Cancer networks, especially those with primary care trusts with high incidence, need to be aware of this disease and ensure that risk reduction strategies and services are in place to assist these patients. More research is needed to understand the interrelationships of prognostic factors, treatment choices and survival, and to determine the best care and support for these patients and their families.

9040 POSTER

Development of an Innovative Method to Simulate Lung Motions

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Background: One of the possibilities to improve the accuracy of lung radiotherapy is to improve the understanding of the individual lung motion of each patient. Indeed, using this knowledge, it becomes possible to follow the evolution of the Gross Tumour Target or Clinical Target Volume defined by a set of points according to the lung breathing phase. Currently, only the 4D-scanner allows to know the motion (in ten breathing phases) but it is not without temporal and spatial uncertainties and biases.
Material and Methods: We present an innovative method to simulate the positions of points in a person's lungs for each breathing phase. Our method, based on an Artificial Neural Networks (ANN), allowed us to learn the lung motion of five different patients and to then simulate it accurately for three other patients using only beginning and end points. The training set for our ANN consisted of more than 1100 points spread over ten breathing phases (from 4D-scanner) and five patients on a specific area of the lungs. The points were defined on healthy tissue by a medical expert.
Results: Two studies were made. For each patient tested, 500 to 600 points have been computed in 50 to 80 ms using a Dual Core 2100 MHz processor. The first one consisted to compare the motion of points measured by 4DCT and computed by the ANN in healthy tissue. We obtain an average accuracy of 1.5 mm while the spatial resolution is $1\times1\times2.5$ mm3 − the temporal uncertainty is not quantifiable because we can not know the displacement measured by the 4DCT for the point. The second one consisted to select points around non small cell tumour and gave the same results.
Conclusion: In addition of the possibility to compute the motion in real-time, the first results are very promising and open the perspective to design an ANN capable of simulating motions using a 3D-scans as inputs: this will allow to improve the dosimetric report for diagnostic and a description of motion more realistic without artifacts from 4DCT. In addition, the accuracy of the method and its coverage (whole lung areas) will be improved even more using more data.

9041 POSTER

Evaluation of Efficacy of Replanning in Lung Dose in Chest Radiotherapy

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Background: When gross tumour volume (GTV) becomes smaller during chest radiotherapy, we may be able to reduce lung dose and adverse effect on lung by decreasing field size. This study evaluates impact of replannning at 40 Gy on lung dose.
Materials and Methods: We reviewed radiation treatment plannings of patients who started chest radiotherapy between Nov. 2006 and Mar. 2011. We selected patients who met the following requirements:
a. computer tomography (CT) was taken before the start of radiotherapy (first CT) and another CT was taken before 40 Gy (second CT);
b. GTV on first CT was more than 30 cm^3 (nearly 4 cm in diameter);
c. GTV became smaller on second CT.
We made two treatment plans retrospectively with these selected patients. In the first plan, we made fields on first CT from the start to 60 Gy (plan A). In the second plan, we made fields on first CT from the start to 40 Gy and on second CT after 40 Gy to 60 Gy (plan B).
We calculated dose-volume histogram and recorded GTV, planning target volume (PTV) and V20.
(1) We examined the change of V20 between plan A and plan B. We calculated V20 under the following conditions;
(1−1) plan A on first CT, plan B on first CT
(1−2) plan A on second CT, plan B on second CT
(1−3) plan A on first CT, plan B on second CT
(2) We analyzed the relationship between GTV reduction and V20 reduction, and the relationship between PTV reduction and V20 reduction. We calculated V20 under the following conditions;
(2−1) plan A on first CT, plan B on first CT
(2−2) plan A on second CT, plan B on second CT
Results: Eight patients were selected (seven lung cancer patients, one patient with primary unknown cancer). GTV was 33–250 cm^3 (mean 120 cm^3), GTV reduction was 8–136 cm^3 (mean 55 cm^3), and PTV reduction was 19–234 cm^3 (mean 110 cm^3).
(1) The change of V20 between plan A and plan B. On plan B, (1−1) V20 significantly **decreased** by 1.18% ($t = 2.984$, 7df, $p = 0.0204$); (from 15.1% to 13.1%, 8.5% to 7.8%, 34.3% to 30.7%, 7.6% to 7.1%, 5.6 to 5.2%, 18.5% to 18.3%, 9.4% to 8.5%, 30.1% to 28.9%) (1−2) V20 significantly **decreased** by 1.11% ($t = 2.906$, 7df, $p = 0.0228$); (from 18.6% to 16.8%, 9.2% to 8.6%, 37.9% to 34.4%, 9.3% to 9.1%, 5.7% to 5.2%, 23.4% to 23.0%, 12.1% to 11.2%, 34.8% to 33.8%) (1−3) V20 significantly **increased** by 1.63% ($t = -2.630$. 7df, $p = 0.0339$).
(2) The relationship between GTV reduction and V20 reduction, and the relationship between PTV reduction and V20 reduction (2−1) There were correlations between GTV reduction and V20 reduction ($r = 0.772$, $n = 8$, $p = 0.0218$) and between PTV reduction and V20 reduction ($r = 0.844$, $n = 8$, $p = 0.0058$). (2−2) There were correlations between GTV reduction and V20 reduction ($r = 0.753$, $n = 8$, $p = 0.0285$) and between PTV reduction and V20 reduction ($r = 0.819$, $n = 8$, $p = 0.0098$).
Conclusions: When GTV is more than 30 cm^3 and decreases before 40 Gy in chest radiotherapy, V20 can be reduced by replanning on CT before 40 Gy. Reduction of GTV and PTV correlated with reduction of V20. These findings are applicable when V20 is calculated on the same CT, and not applicable when V20 without replanning is calculated on CT before the start of radiotherapy and V20 with replanning is calculated on CT before 40 Gy.

9042 POSTER

Predictive Factors for Acute Esophageal Toxicity in Lung Cancer Treated With Chemoradiotherapy

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Background: The standard treatment for locally advanced lung cancer is chemotherapy and radiation therapy concomitantly. One of the major toxicities due to treatment is the esophageal toxicity. This injury can require hospitalization, or radiotherapy breaks that could lower local tumour control and an unfavorable prognosis of the disease.
Materials and Methods: Between 2009–2010, 66 patients were treated with chemoradiotherapy for lung cancer. Toxicity was scored using the Radiation Therapy Oncology Group (RTOG).
A variety of clinical and dosimetric parameters have been associated with acute toxicity. We analyzed esophageal dose-volume parameters (V15, V30, V40, and V50), and others factors like albumin, prealbumine and glucose at the beginning and the end of the treatment.
Results: Of 66 patients, 65 were evaluated. Of these patients, 42, 16 and 7 had grade 0, 1 and 2 RTOG esophageal toxicity. In a first analysis, the V30 was the most predictive parameter (p 0.002 odds ratio 1.089) for Grade 1 acute esophageal toxicity.
For Grade 2 acute esophageal toxicity, V30 (p 0,052, odds ratio 1.114) and hyperglycemia (p 0,013, odds ratio 1,041) were the predictive factors. However, the nutritional status did not influence the toxicity nor radiotherapy breaks.
Conclusions: In conclusion, our study have suggested that V30 and hyperglycemia are significant parameters associated with esophageal toxicity. Our findings might useful in designing a treatment plan to prevent severe esophageal toxicity.