Conclusion: Our results confirm the validity of PCXMC with rotational module also for particular geometrical conditions; patient dose can be evaluated based on patient equivalent diameter.

EP-1619
Ovaries and uterus Equivalent dose to in patients treated for Hodgkin Lymphoma with mediastinal RT
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Purpose or Objective: Hodgkin’s lymphoma (HL) is one of the most curable types of cancer. Most HL patients are young (average age of 32 years); long-term side effects of the treatment are becoming increasingly important. Infertility after treatment could have a high psychosocial burden for young patients. More, HL is one of the most common malignancies diagnosed during pregnancy. The aim of the present study is to measure dose to ovaries and uterus, during supra-diaphragmatic radiotherapy performed with different techniques (3DRT, IMRT, VMAT and helical IMRT-Tomotherapy®).

Material and Methods: Dose measurements were performed using the plans of four different female patients, in reproductive age. The patients have been treated with chemotherapy and mediastinum irradiation (isocenter dose 30 Gy). An adult anthropomorphic Alderson Rando phantom (Rando phantom) was utilized for woman simulation. For each patient the Rando phantom TC-scan was matched with the PET/CT. Doing it, an approximate patient-specific isocenter position on the Rando phantom and a relative position of ovaries and uterus in terms of phantom slices were identified. Treatment planning images and diagnostic whole body PET/CT were fused by means of Velocity AI 3.0®. Calcium fluoride thermoluminescent dosimeters, TLD-100, were used for dose measurements, 5 TLDs were used for every measurement. Patient’s treatment was simulated in 4 different techniques: 3DRT, IMRT, VMAT and helical IMRT-Tomotherapy®. To compare the results paired T student test was used.

Results: The equivalent doses to left ovary, right ovary and uterus, were respectively 16 mSV (range 5-19), 10 mSV (range 8-14) and 9 mSV (range 7-12) with 3DRT techniques; 15 mSV (range 7-23), 11.5 mSV (range 6-17) and 13 mSV (range 6-18) with IMRT; 14 mSV (range 6-23), 14 mSV (range 9-20) with VMAT and 15 mSV (range 44-70), 50mSV (range 40-72) and 56 mSV (range 33-67) with helical Tomotherapy®. Helical Tomotherapy® doses were significantly higher than the other three (p=0.008 for all three tests). IMRT results were significantly higher than VMAT and 3D (p=0.023 and 0.0004 respectively). VMAT and 3D results are not statistically different one from each other (p=0.42).

Conclusion: All the techniques give a dose to ovary and uterus below 30 mSV. This is the dose considered safe in terms of deterministic effects on embryo or foetus and with a relatively low risk of stochastic effect. Helical Tomotherapy® and IMRT give higher gonads dose as compared to other techniques. The implications of these data may be relevant also for patients in the very early stages of their pregnancy.

EP-1620
Accuracy of cone beam computed tomography while decreasing dose to patient
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Purpose or Objective: The main interest was to decrease the localization CBCT scan dose in lung area since the dose deposited by CBCT contributes fully in increasing low dose volume in lung which is arguably the main indicator of radiotherapy induced pneumonitis and fibrosis. Several scanning protocols with decreasing dose were investigated to confirm that the localization accuracy is not reduced.

Material and Methods: In this work it was investigated how do physical scanning parameters - voltage, current and time - affect the automatic image registration of the localization CBCT using XVI 4.5 system from Elekta. A CATHPHAN 504 phantom was used for image quality measurements and an anthropomorphic phantom PBU-50 was used to verify localization accuracy. 21 scanning protocols with decreasing dose and two different automatic registration algorithms (Grey value and Bone) were analysed in lung area. Deliberate shifts with different size and direction were introduced. Image quality of acquired scans was analysed using modular transfer function (MTF), uniformity and low contrast visibility. Relative scan dose was measured with centered Farmer chamber.

Results: It was found that CBCT system is rather insensitive to the size (max 20 mm) and direction of the deliberate shift of the phantom. Precision of the correction shifts were within 0.5 mm that is in the limit of estimated uncertainty. It was observed that the MTF was insensitive to physical scanning parameters and much more dependant on image reconstruction protocol parameters. Uniformity improved and low contrast visibility decreased while lowering dose of scanning protocol. The CBCT system under investigation showed excellent precision for positioning the phantom even while dose of scanning protocol was reduced ~90%. On the other hand – low contrast visibility decreased and would most likely limit the amount of dose reduction to acceptable level that is still to be determined.

Conclusion: This work showed that CBCT is a very accurate localization method even in conditions where scanning dose was decreased ~10% of initial dose. It is necessary to further assess the suitability of new low dose protocols qualitatively to develop acceptable clinical scanning protocols as well as to investigate possibility to improve reconstruction protocols.

EP-1621
Automated extraction and management of radiotherapy imaging dose data
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Purpose or Objective: To construct a data warehouse of radiotherapy imaging performance data by automatically extracting CT and CBCT acquisition and dose information from the hospital PACS and ARIA oncology management