allowing maximum doses of ~125% (SRS) using both fixed field IMRT and VMAT techniques.

**Material and Methods**: A systematic literature search was undertaken to assess pelvic re-irradiation outcomes and cumulative dose constraints for organs at risk including bowel, bladder and rectum were derived. Dosimetric assessment was undertaken for 10 patients treated for recurrent gynaecological cancer assuming prior pelvic radiotherapy of 50 Gy (EQD2). Plans were produced to deliver 30 Gy in 5 fractions using ICRU-fixed, ICRU-VMAT, SRS-fixed and SRS-VMAT techniques. Doses to GTV, PTV and OAR were compared and conformity index measured for each technique.

**Results**: All 50 plans met the planning objectives for PTV and GTV coverage. PTV volume ranged from 10 - 99 cc (mean 38 cc). Mean GTV dose with ICRU-fixed and ICRU-VMAT was 30.1 Gy; with SRS-fixed and SRS-VMAT it was 30.4 Gy, increasing the EQD2 to 40 Gy to 48.4 Gy. Conformity index was ICRU-fixed 1.19, ICRU-VMAT 1.10, SRS-fixed 1.04 and SRS-VMAT 1.05. All bladder and rectal targets were met for all plans except one patient with bladder involvement. The dose limiting structure was bowel with mean Dmax 27 Gy (range 13-33 Gy), D2cc 21 Gy (13-30), D5cc 17 Gy (7-27) and no significant differences between techniques. Dose targets were exceeded for 3 patients with no correlation to PTV volume, only proximity of GTV to bowel.

**Conclusion**: Re-irradiation is a valuable option for treating sidewall recurrence and can be delivered within acceptable dose constraints with both normalisation techniques. SRS type normalisation increases mean GTV doses by 21% (EQD2) compared to ICRU normalisation without increasing OAR doses. Using our proposed bowel tolerances of Dmax 31 Gy, compared to ICRU normalisation without increasing OAR type normalisation increases mean GTV doses by 21% (EQD2).

**EP-1709**

**Comparison of IMRT and VMAT plan quality for hypofractionated post-mastectomy chest wall irradiation**

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**Purpose and Objective**: Volumetric Modulated Arc Therapy (VMAT) is a novel variation of Intensity Modulation Radiotherapy (IMRT) which allows to deliver dose during the beam rotation. The purpose of this technique is treatment time shortening, what may be crucial especially due to a risk of intrafraction motion. On the other hand not only the treatment time but also a plan quality should be taken into account. The aim of this study was to compare VMAT hypofractionated post-mastectomy chest wall RT plans with IMRT plans.

**Material and Methods**: Plans for seventeen patients with post-mastectomy chest wall radiotherapy were selected for the study. The clinical target volume included chest wall and internal mammary nodes. The prescribed dose (PD) were: 40.05 Gy delivered in 15 fractions (5 - left side; 3 - right side) and 40.5 Gy delivered in 15 fractions (4 - left side; 5 - right side). For each patient IMRT and VMAT plans were generated. The dose distribution was prescribed to the mean dose to the CTV. The comparison was made on the basis of: the volume of CTV and PTV which receives 90% and 95% of prescribed dose, the volume of the ipsilateral lung which receives 20 Gy or more (VL20), the mean dose to the ipsilateral lung, the volume of the heart which receives 20 Gy or more (HV20), the mean dose to the heart, the total volume of both lungs which received 20Gy (VLB20) and 30 Gy (VLB30) or more, the mean dose to the both lungs, the maximum dose to the spinal cord and the number of monitor units (MU) per single fraction. For statistical analysis, the Wilcoxon matched-pairs signed-ranks test was used.

**Results**: All treatment plans fulfilled dose volume constraints for CTV, PTV and OAR regardless of the technique used. There was no statistically significant difference in dose distribution in CTV, PTV and OAR (p > 0.05). VMAT plans resulted in a statistically significant lower number of MU (p=0.041 for PD = 40.05Gy and p=0.043 for PD = 40.50Gy). The number of MU was on average 1363 ± 221 MU and 764 ± 132.6 MU for IMRT and VMAT plans, respectively when the plans with PD of 40.05Gy were analyzed. Similar results were obtained for plans with PD of 40.50 Gy (on average 1010 ± 57.4 MU vs 775 ± 76.7 MU for IMRT and VMAR respectively).

**Conclusion**: VMAT in comparison with IMRT technique improves efficacy of plan delivery for equivalent plan quality. The decreased number of monitor units allows to deliver a single fraction faster, so it to reduce the probability of intrafraction motion.

**EP-1710**

**Use of FFF beams for SBRT treatments: impact of the size of the PTV**

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**Purpose or Objective**: Flattening filter free (FFF) beams are most frequently utilized for treatments where higher fraction doses need to be delivered, including hypofractionated stereotactic body radiation therapy (SBRT). There are various treatment modalities now available for SBRT: conventional static fields, dynamic conformal arc (DCA) or Volumetric Modulated Arc Therapy (VMAT). In the present study, we wanted to obtain some criteria for a conscious choice of the employment of FFF beams and the choice of the DCA or RA technique depending the size of the PTV.

**Material and Methods**: Treatment planning was carried out using version 11 of Eclipse (Varian, Palo Alto, CA, USA) with Analytical Anisotropic Algorithm (AAA). All plans were designed for a Varian TrueBeam STx linear accelerator (Varian Medical Systems) equipped with a high definition Millenium multi-leaf collimator (HDMLC). Twenty four PTVs from 1.52 cm3 to 445.24 cm3 were studied. For each PTV, DCA and VMAT plans were prepared utilizing two flattened photon beam of 6 MV (6FFF) and 10 MV (10FFF) and two unflattened beams of nominal energy 6 and 10 MV (6FFF, 10FFF). For a meaningful comparison, all DCA and RA plans satisfied 100% of the prescription dose to at least 98% of the PTV. Parameters such as conformity index, gradient index, healthy tissue mean dose, organs at risk DVH, number of monitor units, beam on time (BOT) were used to quantify obtained dose distributions. A Friedman and spearman’s rho test were performed in order to establish statistical significance.

**Results**: The data indicate no significant differences between conformity with flattened beams and those using unflattened beams for VMAT technique. For DCA technique, it is notable that 6FFF tends to be slightly better than 6FF beams and even for large volumes. As PTV volume increases, 10FFF is less suitable for DCA technique and forward planning becomes more challenging and inappropriate. The MUs in the FFF plans were always greater than in FF plans. Dose to healthy tissues were reduced for all PTV sizes for FFF beams, except for the DCA 10FFF for large PTV volume. The BOT for FFF beams is much lower. DCA was found to be more appropriate for small PTV and VMAT for median and large PTV. The MUs were significantly different between techniques. VMAT plans generated larger number of MU compared to DCA.

**Conclusion**: The plans developed with flattened and unflattened beams look very similar in terms of conformity index. FFF beams provide a better sparing of OAR except for...