

## EP-1941

### Assessment of variation in planning benchmark case for ABC-07 trial of liver SBRT

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#### Purpose or Objective

Quality assurance of radiotherapy clinical trials ensures protocol compliance and robustness of outcome data. Benchmark cases are used to assess consistency of outlining and planning by different centres, and provide feedback before a centre starts recruitment. For a complex technique such as liver SBRT, it also facilitates sharing of best practice and supports centres with less experience.

**Material and Methods:** The planning benchmark case was a large (6cm) cholangiocarcinoma with target and organ-at-risk contours already outlined. This case was sent to all centres interested in joining the ABC-07 multicentre phase II trial (Addition of stereotactic body radiotherapy to systemic chemotherapy in locally advanced biliary tract cancers; CRUK A18752; Sponsor University College London). Centres were asked to produce a plan with prescription dose of 50Gy in 5 fractions, having PTV coverage D95% > 95% (optimal, 90% mandatory) and mean liver dose < 13Gy. If this was not possible, the prescription dose was reduced to 45Gy in 5 fractions and mean liver dose limit increased to 15Gy.

**Results:** 14 cases were submitted, covering a range of planning systems and treatment platforms. 5/10 VMAT, 1/1 IMRT and 0/3 Cyberknife plans were able to cover 95% of the PTV with ≥90% of 50Gy, whilst maintaining the mean liver dose below 13Gy, as shown in the table.

Modality (prescription dose)	Number of centres	D95% (% of 50 Gy)	Max (D0.1cc) (% of PD)	Mean liver dose
VMAT (50Gy)	5	44.9 - 48.2 Gy (90 - 96%)	103 - 117%	12.7 - 12.9 Gy
IMRT (50Gy)	1	48.2 Gy (96%)	106%	12.8 Gy
VMAT (45Gy)	5	42.6 - 45.0 Gy	103 - 126%	12.9 - 14.9 Gy
Cyberknife (45Gy)	3	42.7 - 44.9 Gy	114 - 129%	14.6 - 15.0 Gy

**Conclusion:** Achieving the planning objectives for this case was challenging and only 5/12 centres submitted an optimal plan. The other 7 centres are repeating the exercise after feedback on what was achievable with similar equipment. Achieving the optimal plan for this case involved reduced conformity of medium doses in order to spare other parts of the liver, and thereby reducing the total mean liver dose. This approach is contrary to typical Cyberknife planning, so it may not be the optimum treatment platform for these cases, although it is possible that differences between technologies and centres were accentuated by this large and challenging case, and may be reduced for smaller lesions. All patients treated within this trial will be prospectively reviewed, which will further inform this question.