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# Blurred margins to fight recurrent cancer

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## Résumé

**Introduction:** Pre-treatment image guidance and intensity modulated radiation therapy allowed for decreasing margins for the planning target volume and sharper dose gradients for better sparing of sensitive healthy organs. However, the number of patients who present with recurrence of previously radiation treated cancer is not decreasing in spite of all improvements in technology. In a search for possible reasons, we investigated the correlation between a broad range of patient specific data, radiation therapy parameters and treatment outcomes for liver cancer patients.

**Methods:** Selected patient information was collected from 195 liver cancer patients treated at our centre. Outcome information included survival, disease recurrence, and blood work. All radiation therapy planning parameters were included in the analysis [1]. Patients were split into two almost equal groups: rotational delivery (RD) and fixed beam delivery (FB). Predictive models were created using Cox regression for both survival and recurrence data.

**Results:** Predictive model has been developed for liver cancer patients treated with radiation therapy. Even with almost twice the average GTV size, the RD group showed comparable survival and time to recurrence as the FB group. Our data suggest that sufficient dose to the healthy tissue around the tumour improves disease free survival if rotational delivery of radiation is used: Figure 1. Only parameter describing normal tissue irradiation V24 had a significant positive effect on disease free survival (DFS) for the rotational delivery group with a hazard ratio (HR) of 0.495.

**Conclusion:** In order to prevent disease recurrence, some (optimum to be determined) radiation dose is needed to kill the spread of cancer cells outside the planning target volume. Rotational delivery creating dose splash in all directions does it better than fixed beams.

References:

Vickress J, Lock M, Lo S, Gaede S, Leung A, Cao J, Barnett R, Yartsev S. A multivariable model to predict survival for patients with hepatic carcinoma or liver metastasis receiving radiotherapy. *Future Oncol* 2017;13(1):19-30.

Figure 1: Kaplan-Meier curves for recurrence free survival split across the median hazard ratio for patients treated with rotational delivery with different values of V24. This effect is absent for the FB delivery.

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