

Factors affecting dose distribution in Hepatocellular carcinoma in cases treated by 3 Dimensional Conformal Radiotherapy (3DCRT)

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Abstract

Introduction: The dose distribution of 3DCRT planning depends on number of beams, geometry of target volume, number and tolerance of surrounding organs at risk (OARs).

Aim: To study the interacting effects of target volume, OAR geometry and planning parameters on the resulting dose distribution in the target volume and OARs for 3DCRT plans for patients with advanced non metastatic hepatocellular carcinoma (HCC). It also aims at identifying which combination of these factors influencing the dose volume parameters and dose distribution and the selection of beam number among patients with HCC.

Methods: CT studies of 30 patients with unresectable HCC were planned using different number, direction and energy of photon fields. The volume and length of planning target volume (PTV), volume of whole and healthy liver and the ratio of the volume of PTV to whole liver volume were calculated. Linear regression was used to identify which combination of the anatomic factors influences the dose distribution and selected beam number.

Results: The favorable factors for optimum plan were small target volume 369cc, short target length 8cm and small PTV/ liver volume 16.8 and healthy liver volume 2183cc-3631cc and the use of multiple beams which is limited by volume of PTV, PTV/ liver volume ratio (small) and site of tumor (left lobe).

Conclusion: 3DCRT dose distribution is strongly dependent not only on geometrical relationship between target and critical organs but also on number of beams used. The size of the effect varies with all factors together. I declare that there is no conflict of interest with any inancial organization regarding the material in this manuscript.