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Clinical impact of personalized dosimetry for SIRT of liver cancers

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Selective Internal Radiation Therapy (SIRT) using 90Y loaded microspheres is used for liver cancers from many years. Despite good clinical results in early phase studies, the 3 randomized trials in locally advanced hepatocellular carcinoma (HCC) failed to demonstrate any improvement of overall OS in comparison with sorafenib. However, no specific dosimetry endpoints were implemented in those trials. In the last decade, many studies have evaluated dosimetry of SIRT using either a simulation based dosimetry (99mTc-MAA based) or a post procedural based one (90Y based). The goal of this lecture is to recall SIRT concept of liver cancers, present the dosimetry approach used, confounding factors, as main clinical results described with 90Y loaded resin or glass microspheres. With MAA based dosimetry the tumor threshold dose allowing for a response is 100-120 Gy for resin microspheres and between 205-257 Gy for glass microspheres. Significant impact of the tumor dose on overall survival is reported with both devices. Dosimetry data are also available about safety, but with a larger range of normal liver tolerated doses values due to numerous confounding factors. The clinical impact of personalized dosimetry has been recently confirmed in a multicentre randomised study in HCC patients demonstrating a doubling of the response rate of and an improvement of OS of 150% while using personalised dosimetry. Based on those results, international expert group recommendations for personalised dosimetry have been provided. Even if technical dosimetry improvements are still awaited, personalised dosimetry use has to be generalized for clinical practise and in trial design.

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