

SESSION 2: HEPATOBILIARY CANCER

Role of Stereotactic Body Radiation Therapy (SBRT) in Intrahepatic Malignancies

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Conventional radiation therapy (RT) has played only a minor role in the treatment of primary and secondary malignancies of the liver. This fact is a result of the sensitivity of normal liver tissue to radiation and the risks associated with delivering tumoricidal doses of RT to liver tumors. Previous clinical investigations have shown, however, that due to a general parallel structuring of liver tissue that partial volume irradiation is tolerated by the liver [1]. This allows in some circumstances for the efficacious and safe use of high-dose radiation in the treatment discrete tumor foci in the liver.

Stereotactic radiation therapy- the highly precise and accurate delivery of potent radiation doses- was first developed for the treatment of intracranial lesions. In the 1990s, use of this technology was expanded to extracranial sites, including the liver. This therapy has been called stereotactic body radiation therapy (SBRT) or stereotactic ablative radiotherapy (SABR). SBRT is a promising and effective treatment but its safe delivery is complicated in the treatment of moving tumor targets. Effective and reliable patient immobilization as well as a means for controlling tumor motion are important components of an SBRT treatment plan. Respiratory-induced tumor motion can be dampened with approaches such as abdominal compression or motion can be controlled through gating or breath-hold treatment techniques.

Multiple clinical studies have shown the safety and efficacy of SBRT in the treatment of metastatic foci within the liver as well as in the treatment of hepatocellular carcinoma and intrahepatic cholangiocarcinoma. SBRT treatment courses are short (1-5 fractions) and are usually associated with minimal acute toxicities. SBRT causes minimal delays in the use of systemic therapy in patients with metastatic cancer and may be particularly useful in the treatment of oligometastatic disease states. Radiation efficacy is limited by tumor volume and intrinsic radiation damage repair properties of tumors. The minimally invasive radiofrequency ablation treatment is limited by tumor volume and the heat sink effect [2].

Further clinical study, including randomized comparisons with other non-surgical ablative therapies, will better define the role of SBRT in the treatment of intrahepatic tumors.

References:

- 1) Ben-Josef E, Normolle D, Ensminger WD, et al. Phase II trial of high-dose conformal radiation therapy with concurrent hepatic artery floxuridine for unresectable intrahepatic malignancies. *J Clin Oncol* 2005; 23(34):8739-8749.
- 2) Meyer J, Toomay S. Update on treatment of liver metastases: focus on ablation therapies. *Curr Oncol Rep* 2015; 17(1):420.