

# Researchers discover liver metastases have different radiation sensitivities based on primary tumor histology

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Radiation is a commonly used therapeutic option to treat liver metastases, with the majority of tumors maintained under control after one year. However, some patients do not respond as well to radiation treatment, and the factors that predict patient outcomes are unclear. Moffitt Cancer Center researchers report that liver metastases have different sensitivities to radiation therapy based on the location of the primary tumor.

Previously, Moffitt researchers developed a radiosensitivity index (RSI) that predicts how well tumors respond to radiation therapy based on the expression of 10 different genes.

"The radiosensitivity index is the most studied and validated radiation specific signature currently available," said Javier Torres-Roca, M.D., associate member and director of research in Moffitt's Department of Radiation Oncology. "It is an important step towards gaining a better understanding of radiation sensitivity and developing a personalized approach to [radiation treatment](#)."

Metastasis is the process by which primary tumors spread to and grow within a different anatomic site. Moffitt researchers have previously used the RSI to show that tumor metastases have different radiation sensitivities according to their anatomic location. For example, colon [cancer](#) metastases which metastasize to the lung are more sensitive to

radiation therapy than tumors that metastasize to the liver.

The researchers wanted to further their understanding of radiation sensitivity of [liver metastases](#). They analyzed 372 different metastatic liver lesions from the Total Cancer Care Database for radiosensitivity utilizing the RSI. They found that metastatic liver lesions have different sensitivities to radiation according to the origin of the primary [tumor](#), with gastrointestinal stromal tumors being the most resistant out of all analyzed tumors.

They confirmed these observations in a separate set of 33 patients with liver metastases treated with radiation therapy at Moffitt. The patients' primary tumors were colorectal cancer, breast adenocarcinoma, anal squamous cell cancer, and lung adenocarcinoma. The researchers reported that the liver metastases derived from colorectal cancers were significantly more resistant to radiation than liver metastases derived from non-colorectal cancer. Ten of the colorectal derived liver metastases failed radiation therapy over the follow-up period, while none of the non-colorectal derived liver metastases failed [radiation therapy](#).

"This study reveals that primary histology plays an important role in determining management of liver metastases and should be taken into account by radiation oncologists when determining radiation dose prescriptions. The study paves the way for a genomically guided [radiation](#) dose trial in the management of liver metastases with stereotactic body radiotherapy," said Kamran Ahmed, M.D., lead author of the study and resident in the Department of Radiation Oncology at Moffitt.

**More information:** Kamran A. Ahmed et al. Radiosensitivity differences between liver metastases based on primary histology suggest implications for clinical outcomes following SBRT, *International Journal of Radiation Oncology\*Biology\*Physics* (2016). [DOI:](#)

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