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Imaging of Hepatic Metastases

CT and MR imaging of hepatic metastases has developed rapidly within the last decade. CT has profited most from the introduction of multislice scanning with better spatial resolution and better definition of hepatic perfusion phases while MRI has seen the introduction of various new contrast agents and vast improvements in acquisition technology that allow for breath-hold acquisitions and higher spatial resolution.

Nevertheless, the evaluation of patients with suspected hepatic metastases still poses a number of problems: detection of lesions is hampered by the fact that small metastases are more common than large ones. A pathologic-anatomic study found that for every metastasis larger than 1cm there are 1.6 metastases smaller than 1 cm in colorectal carcinomas and up to 4 small metastases in other primary tumors (such as breast cancer). At the same time there is an increased awareness that many small lesions detected by imaging are benign, even in patients with known primaries. Schwartz found that only 20% of liver lesions smaller than 1.5cm were actually malignant in patients with known cancers (1).

For this reason, lesion detection is only one side of the coin. Lesion differentiation, especially in small lesions, becomes increasingly important but frequently is impossible: imaging with ultrasound, CT or MRI often yields unspecific results and nuclear medicine techniques are unable to detect the lesion because of its size, while biopsies may be extremely difficult, again due to lesion size. At least at present, many small lesions will remain undetected or will not be able to be classified as benign or malignant. This general problem is also reflected in the quite opposite approaches of oncologists and surgeons. While the latter regard a 'solitary' liver metastasis as potentially resectable, the former see it as an expression of a systemic spread of the malignant disease that cannot be cured by local ther-

apy alone. Like always, there is some truth to both approaches. Surgical resection has been shown to be effective and improve survival of selected patient groups (e.g. colorectal metastases) but chemotherapy is also gaining an increasingly important role in certain entities (e.g. breast cancer, colorectal cancer). In the future we will probably see combined approaches of local and systemic therapy which will make it less important to find and differentiate miniscule hepatic lesions.

Imaging, however, assumes increasing importance in planning complex surgical procedures and in follow-up of treatment. Especially multislice CT with its 3D imaging capabilities will allow for planning of individualized surgical approaches. 3D segmentation of the liver tissue as well as vascular mapping provide an excellent roadmap for the surgeon. Semi-automated size measurements as well as perfusion measurements will help in quantifying response to various types of treatment. While such applications are currently being introduced into clinical practice, MRI and CT already enjoy a prominent role in the diagnostic workup of patients with liver metastases.

This issue of Imaging Decisions provides insight into state-of-the-art techniques for CT and MRI. It also includes information about how nuclear medicine techniques can be used to detect and characterize certain types of liver metastases. Finally it provides a glimpse of the future by demonstrating how individualized surgical planning can be performed based on MDCT data sets.

1. Schwartz LH, Gandras EJ, Colangelo SM, *et al.* Prevalence and importance of small hepatic lesions found at CT in patients with cancer. *Radiology* 1999; **210**: 71–74.

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