



## Radiologic assessment of liver metastases

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### ABSTRACT

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Liver metastatic disorders usually occur in patients with stomach, pancreas, breast, colon, and lung and etc tumor. About 30 percent of patients die because of malignancies, have liver metastases. Liver imaging examination is a fundamental preclinical test to predict patient's prognosis and is required to monitor treatment. Despite recent advances in radiologic examination, liver metastases are still remaining as a challenge in human oncology. It seems that US is a reliable alternate for CT scan in metastases detection. CT scan should be considered in patients are highly suspension for liver metastases, who have normal or undetermined US findings. The aim of this study was a brief review of radiologic assessment in liver metastases.

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## Introduction

In the year 2000, about 10 million cases were registered with new onset cancer in all part of the world and 6 million deaths happened due to malignancy. In USA, 1.5 million cancers are being diagnosed annually. In 2003, more than 1500 patients died each day because of cancers. Malignancies are the second most common cause of death all around the world (cardiovascular diseases are the first one). Most common type of malignancies in men are prostate, lung and

colon cancers and in women are breast, lung and colon. It is estimated that prostate, lung and colon cancers are responsible for half of deaths caused by malignancy each year in USA (1).

Epidemiologic studies showed that annually 30000 deaths happened in Iran. Fifty-two percent of malignancies occur in men and the most common type is gastric malignancy (2).

Most malignancies invade liver. Live

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metastases have a crucial role in patients' prognosis and choosing treatment method. and in women are breast, lung and colon. It is estimated that prostate, lung and colon cancers are responsible for half of deaths caused by malignancy each year in USA (1). Epidemiologic studies showed that annually 30000 deaths happened in Iran. Fifty-two percent of malignancies occur in men and the most common type is gastric malignancy (2).

Most malignancies invade liver. Live metastases have a crucial role in patients' prognosis and choosing treatment method.

In blood circulation, liver filtrates the blood of all organs. Most cancers spread through blood because malignant cells could immigrate to liver and lead to secondary tumoral formation (1).

#### **Liver metastasis measurements**

Liver metastases might not cause any clinical manifestations, but finding them is very important for patient staging and treatment. Abdominal pain, jaundice and abnormal liver function tests might happen in some patients. Radiologic examinations are useful such as ultrasound (US), computed tomography (CT) scan, magnetic resonance imaging (MRI) and positron emission tomography (PET) (3). Radiologic examinations are important to locate the mass for further diagnostic measurements such as liver biopsy (4).

Despite recent advances in radiologic examination, liver metastases are still remaining as a challenge in human oncology. Liver radiologic evaluation is essential to prevent unnecessary surgeries in patients who suffer from cancer. Liver imaging examination not only is a fundamental preclinical test to predict patient's prognosis, but also is required to monitor treatment (5).

#### **CT scan**

CT scan was invented in 1972 by Hounsfield and this modality was promoted to multidetector helical CT (MDCT) in recent years. MDCT obtains 64 slices each time, so it could enhance liver and malignant tissue. With dual-phase imaging, hypervascular liver lesions could be identified (6).

Image quality and lesion appearance in CT scan depend on its vascularity, central necrosis or calcification. Melanoma, renal cell carcinoma, neuroendocrine malignancies and sarcoma metastases appear as a hypervascular lesion (1).

#### **Ultrasound**

US could be the first radiologic test for patients suspected to liver metastases. Real-time ultrasound is a rapid and noninvasive method to screen patients. Some metastases appear hypoecho and others hyperecho in US. Mixed echogenicity and calcifications are suggestive for metastases (7). It seems that abdominal US was not sensitive and specific enough for liver metastasis detection in past years (4), but recent studies, in which accuracy of US was compared with other imaging methods, showed that US could be used as a screening test in patients suspected to liver metastases. In Table 1 ultrasound accuracy is compared with other imaging modalities.

**Table1.** Ultrasound accuracy is compared with other imaging modalities

<b>Author Reference</b>	<b>Publication year</b>	<b>CT scan sensitivity</b>	<b>US sensitivity</b>
<b>Moghanlo (2)</b>	2004	96%	81%
<b>Bauditz (8)</b>	2008	50%	67%
<b>Albrecht (9)</b>	2003	94	98
<b>Kayalaap (10)</b>	2011	81%	69%

### **Magnetic resonance imaging**

MRI is performed with contrast for detecting liver metastases. It seems that MRI sensitivity and specificity are similar to CT scan. Contrast agent which has been used in recent year is gadolinium (11).

### **Positron Emission Tomography**

2-deoxy- 2-[18F]fluoro-D-glucose (FDG-PET) becomes more common in recent years because it localizes metastasis and anatomic changes. PET is useful in elderly population to monitor treatment, detect relapse and staging (11).

### **Discussion**

Liver metastatic disorders usually occur in patients with stomach, pancreas, breast, colon, lung and other tumors. About 30 percent of patients, who die from malignancies, have liver metastases (1).

A type of radiologic examination should be performed in patients before treatment, particularly in preoperative phase. Purposive radiologic evaluations such as US and CT scan are necessary to chose the best therapeutic method and determine the prognosis (1).

Advances in imaging technology lead to improve image quality and accuracy. US is an available test with an acceptable sensitivity in liver metastases. Since US is an operator- dependent modality, its usage is limited in USA for detecting liver metastases (11).

Doppler ultrasonography can be an efficient method in vascular lesions. Intraoperative ultrasound (IOUS) is an accurate method in operation room and could be used as a complementary method to clinical examination at surgery site. Laparoscopic US (LUS) is an accurate alternative for CT scan (12).

Ultrasound is an operator-dependent modality and it is easy to use and can be

performed at bed side or operation room. It is time-saving method and recent studies showed that it was accurate enough for detecting liver metastases. CT might be the first choice for liver metastasis detection. It could provide information of liver and other probable extrahepatic sites for metastases, but CT scan is not sensitive to detect ascites. CT scan sensitivity and specificity varies from 50 to 100 percent based on contrast usage and patient suspension. CT scan with contrast is very sensitive for liver metastases, but its usage in patients with low glomerular filtration rate (GFR) is limited. Some studies recommended that CT scan should be limited to cases with high tumor marker levels such as CAE (5).

MRI with gadolinium contrast is also accurate in detection of liver metastases, but this method is time-consuming and expensive and not available everywhere. FDG-PET is useful when origin of metastases is known and the primary tumor should be FDG-PET (11).

### **Conclusion**

The radiologic examination for liver metastases is influenced by various issues such as patient's condition, available facilities and expert radiologist within hospital. Nevertheless, it seems that US is a reliable alternate for CT scan in metastasis detection and it could be considered as a screening test. CT scan should be considered in patients who are highly suspension for liver metastasis and who have normal or undetermined US findings.

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### Conflict of Interest

The authors declare no conflict of interest.

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