



# Diagnosis of Liver Fibrosis by Ultrasound Elastography in Patients with Chronic Diseases

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### Abstract

The accumulation of lipids in hepatocytes causes hepatic steatosis, or fatty liver disease. When the condition becomes chronic, lobular inflammation develops, and evolves hepatic fibrosis, liver cirrhosis, or hepatocellular cancer can ensue. Early diagnosis is preferred since people who are diagnosed early in the illness stage respond better to treatment. Laboratory testing, imaging, and biopsy can all be used to diagnose and monitor fatty liver disease and hepatic fibrosis. Ultrasound is one of the most effective imaging modalities for identifying and monitoring individuals with liver disease. When there is hardening, fibrosis, or cirrhosis of the liver, ultrasound elastography investigates the degree of deformation of the organ or lesion.

### Keywords

Ultrasonography, Elasticity imaging techniques, Liver imaging

### Introduction

Hepatic steatosis, or fatty liver disease, is caused by the deposition and accumulation of micro vesicular or macro vesicular lipids (usually triglycerides) in hepatocytes, which can reach above 5% of the weight of the liver. Diseases that contribute to metabolic disorders, such as obesity, type 2 diabetes, and hyperlipidemia and other hepatocyte-damaging conditions, such as hepatitis C, as well as drug use and alcohol intake are the main risk factors for the syndrome.

Unlike other liver diseases, nonalcoholic fatty liver disease (NAFLD) is linked to metabolic syndrome, with insulin resistance being one of the major predisposing factors. Increases in the incidence of obesity, type 2 diabetes mellitus, and metabolic syndrome have contributed to the increased incidence of NAFLD, with its prevalence now ranging from 15% to 23% depending on the country [1]. Patients with the chronic form of NAFLD develop lobular inflammation, and the disease can progress to hepatocyte ballooning and fibrosis, conditions collectively known as nephropathy. Patients with the chronic form of NAFLD develop lobular inflammation, and the disease can progress to hepatocyte ballooning and fibrosis, conditions collectively known as nephropathy [2].

Patients with chronic NAFLD experience lobular inflammation, which can progress to hepatocyte ballooning and fibrosis, a condition

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known as nonalcoholic steatohepatitis (NASH). NAFLD progresses to cirrhosis and, eventually, hepatocellular cancer as the fibrosis worsens [3]. The accurate detection of fibrosis and hepatic inflammatory activity is critical for determining the disease's stage and prognosis, as well as treatment planning. Accurate, early detection of liver diseases is preferable since it results in a superior therapeutic response in patients with fatty liver disease who are still in the early stages of the disease. A variety of procedures for examining the liver are available. Ancillary examinations such as laboratory tests, imaging, and biopsy can be used to evaluate and diagnose steatosis and liver fibrosis [4]. Because most patients with fatty liver disease are asymptomatic and show no changes on physical examination, clinical examinations do not allow for early diagnosis of liver abnormalities. Aging examinations include conventional ultrasound, as well as ultrasound-based methods known as transient elastography (TE), point shear wave elastography (pSWE), and two-dimensional shear wave elastography. Strain elastography, a type of quasi-static ultrasound-based imaging, is another example. Strain elastography, on the other hand, is more successful in superficial tissues and is therefore not employed for liver imaging. The technique of magnetic resonance elastography (MRE) can also be used to detect liver fibrosis. In this setting, a liver biopsy is still the gold standard for diagnosing liver diseases. NAFLD is generally suspected or discovered by chance during routine examinations, such as basic abdominal ultrasounds or laboratory testing focusing on liver enzymes [5]. Abdominal ultrasonography is the primary line of assessment because it is affordable and widely available. It should be emphasized; however, that ultrasound has limited sensitivity for detecting steatosis when it affects less than 20% of the liver or in individuals more than 40 kg/m<sup>2</sup>.

When steatosis affects more than 30% of the liver, ultrasound is the easiest diagnostic procedure and produces the best results. It is non-invasive, simple to use, and inexpensive, revealing signs of steatosis in more than 16 percent of healthy non obese persons and nearly 95 percent of obese people who drink alcohol. Elastography is a technique for detecting the propagation velocity of ultrasound waves passing through the liver [6]. As fibrosis advances, the liver tissue stiffens, causing the waves to travel quicker. It is feasible to determine the degree of stiffness and thus the stage of liver fibrosis based on the wave propagation velocity.

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