MODERN NON-INVASIVE METHODS FOR THE EARLY DIAGNOSIS AND ASSESSMENT OF MORPHOFUNCTIONAL CHANGES IN LIVER DISEASES.

Sadullaeva Laziza Erkinjonovna
Asia International University
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Relevance: The liver is a vital organ that plays a crucial role in the body's metabolic, detoxification, protein synthesis, immunological, and homeostatic processes. In liver diseases of various etiologies—including viral hepatitis, steatotic liver disease associated with metabolic dysfunction, alcohol-related liver injury, and other chronic pathological conditions—functional changes initially develop in the liver tissue, followed by structural alterations. Prolonged pathological processes increase the risk of developing fibrosis, cirrhosis, and hepatocellular carcinoma. Therefore, detecting liver injury before it manifests clinically is a key objective of modern hepatology.

Introduction. Relying solely on clinical symptoms and standard biochemical markers may be insufficient for detecting early changes in liver tissue. A modern diagnostic approach emphasizes the integrated use of laboratory, instrumental, and non-invasive methods for assessing fibrosis. EASL guidelines categorize non-invasive tests into blood-based markers, methods assessing the physical properties of liver tissue, and imaging techniques.

Research objective: To scientifically substantiate the diagnostic value of modern non-invasive diagnostic methods in the early detection and assessment of the severity of morphofunctional changes associated with liver diseases.

Research objectives: To study the key morphofunctional changes associated with liver diseases.

To evaluate the significance of biochemical markers in identifying the early stages of liver damage.

To analyze the diagnostic capabilities of laboratory indices, such as FIB-4 and APRI, in assessing liver fibrosis.

To evaluate the capabilities of ultrasonography in detecting changes in the liver parenchyma, steatosis, and structural alterations.

To study the significance of transient elastography and other elastographic methods in determining liver tissue stiffness.

To analyze the diagnostic capabilities of modern imaging techniques, such as MR elastography.

To compare non-invasive diagnostic results with the findings of morphological examinations—specifically liver biopsies—where necessary.

Research materials and methods. The results of clinical, laboratory, and instrumental examinations of patients with liver diseases are analyzed. Laboratory tests evaluate alanine aminotransferase (ALT), aspartate aminotransferase (AST), gamma-glutamyl transferase (GGT), alkaline phosphatase, bilirubin, albumin, platelet count, and other clinical-biochemical parameters.

Calculated indices such as FIB-4 and APRI can be used for the initial assessment of the probable stage of liver fibrosis. FIB-4 is based on age, AST, ALT, and platelet count, and it is one of the widely used non-invasive assessment tools for identifying advanced stages of liver fibrosis.

Instrumental examinations may include ultrasound, vibration-controlled transient elastography (VCTE/FibroScan), shear-wave elastography, and—where available—**magnetic resonance

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elastography (MRE)**. Elastography assesses liver tissue stiffness; the progression of liver fibrosis is typically associated with increased tissue stiffness.

From this perspective, the early detection of liver fibrosis is a key aspect of assessing morphofunctional changes. According to EASL data, although liver biopsy remains a crucial reference method for the morphological assessment of fibrosis, the use of non-invasive tests is becoming increasingly widespread due to the invasive nature and certain limitations of biopsy.

Conclusion: The early detection of morphofunctional changes in liver diseases is crucial for predicting disease progression and determining treatment strategies. In modern diagnostic practice, the combined use of laboratory biomarkers, calculated indices, ultrasound, elastography, and magnetic resonance elastography enhances the ability to detect liver fibrosis at early stages without the need for invasive biopsy. The WHO also recognizes the utility of ultrasound and elastography in assessing liver fibrosis and monitoring disease progression. Thus, the comprehensive use of non-invasive methods for the early diagnosis of morphofunctional changes in liver diseases represents a promising direction in modern hepatology.

References:

1. European Association for the Study of the Liver (EASL). EASL Clinical Practice Guidelines on non-invasive tests for evaluation of liver disease severity and prognosis – 2021 update. Journal of Hepatology.
2. American Association for the Study of Liver Diseases (AASLD). Noninvasive Liver Disease Assessment. 2026.
3. World Health Organization. Global hepatitis report 2026. WHO, 2026.
4. World Health Organization. Consolidated guidance on hepatitis B and C prevention, testing, treatment, service delivery and monitoring. 2026.
5. World Health Organization. Training Modules on Hepatitis B and C Screening, Diagnosis and Treatment: Non-invasive markers of chronic liver disease or liver fibrosis.

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