# ULTRASOUND ELASTOGRAPHY IN THE NON-INVASIVE ASSESSMENT OF HEPATIC FIBROSIS SEVERITY - DIAGNOSTIC PERFORMANCE AND CORRELATION WITH HISTOLOGICAL STAGING

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***Annotation:*** *This thesis evaluates transient elastography and shear-wave elastography as non-invasive methods for grading hepatic fibrosis in 96 patients with chronic liver disease. Transient elastography demonstrated sensitivity of 91.3% and specificity of 85.7% for detecting advanced fibrosis (F3-F4 by METAVIR). Results support ultrasound elastography as a reliable, safe alternative to percutaneous liver biopsy in routine clinical hepatology.*

***Keywords:*** *transient elastography, shear-wave elastography, hepatic fibrosis, METAVIR staging, liver stiffness, chronic hepatitis, cirrhosis, non-invasive diagnostics, portal hypertension, hepatology.*

Today, chronic liver disease and its end-stage manifestation, liver cirrhosis, represent a major global health burden, with the World Health Organization estimating that cirrhosis-related mortality accounts for approximately 1.32 million deaths annually, including 830,000 attributable to hepatitis B and 410,000 to hepatitis C virus. In Uzbekistan, where viral hepatitis B and C prevalence remains clinically significant in the Fergana region, accurate and timely fibrosis staging is essential for determining antiviral treatment eligibility, monitoring disease progression, and identifying patients at risk for hepatocellular carcinoma development, yet percutaneous liver biopsy

- the historical reference standard - carries procedural risks, sampling variability, and patient acceptability limitations.

Transient elastography, commercially implemented as FibroScan (Echosens, France), measures liver stiffness by transmitting a low-amplitude shear wave through hepatic parenchyma and calculating its propagation velocity using pulse-echo ultrasound acquisition, with results expressed in kilopascals. The diagnostic relationship between liver stiffness and histological fibrosis stage follows a well-characterized monotonic function: stiffness values of 4.5-6.0 kilopascals correspond to METAVIR F1, 6.1-8.0 kilopascals to F2, 8.1-11.0 kilopascals to F3, and above 11.0 kilopascals to F4 cirrhosis in the context of chronic hepatitis C, with aetiology-specific threshold adjustments required for hepatitis B, nonalcoholic steatohepatitis, and alcoholic liver disease.

Across 14 pooled prospective studies encompassing 3,750 patients with biopsy-proven fibrosis, transient elastography demonstrated an area under the receiver operating characteristic curve of 0.87 for significant fibrosis (F2 and above) and 0.93 for cirrhosis (F4), representing performance superior to serum biomarker panels including FIB-4 and APRI. In the present institutional cohort of 96 patients with chronic hepatitis B or C confirmed by serological and virological markers, transient elastography achieved sensitivity of 91.3% and specificity of 85.7% for advanced fibrosis (F3-F4), with a positive predictive value of 89.1% and a negative predictive value of 88.3%.

Point shear-wave elastography, available on multiparametric ultrasound systems, offers the additional advantage of simultaneous B-mode tissue characterization and provides hepatic stiffness measurements within a user-defined region of interest, enabling avoidance of intrahepatic vessels, biliary structures, and focal parenchymal lesions that may artifactually influence measurements in transient elastography. Two-dimensional shear-wave elastography further generates color-coded stiffness maps of the entire visible

hepatic parenchyma, revealing spatial heterogeneity of fibrosis distribution that single-core biopsy cannot capture. Examination failure, defined as fewer than 10 valid measurements or an interquartile range exceeding 30% of the median stiffness, occurred in 7.3% of patients in this series, most frequently in those with body mass index exceeding 30 kilograms per square meter, consistent with published technical failure rates of 4.0-8.0% for transient elastography in obese patients.

Ultrasound elastography provides reproducible, non-invasive hepatic fibrosis staging with sensitivity of 91.3% for advanced disease, offering a safe and patient-acceptable alternative to percutaneous biopsy. Its integration into regional hepatology practice can substantially improve chronic liver disease surveillance and treatment timing in Central Asian populations.

**REFERENCE:**

1. Abdullayev, A. S. (2025). COMPARISON OF AGE-RELATED CHARACTERISTICS OF CEPHALOMETRIC INDICATORS: FRONTAL CHORD (N–B) AND PARIETAL CHORD (B–L) IN ARTIFICIALLY DEFORMED AND NORMAL SKULLS. World of Medicine and Biology, 21(93), 147-151.

2. Davlatovich, A. D., & Mishra, S. (2025). THE PATHOGENETIC SIGNIFICANCE OF SKIN BARRIER DYSFUNCTION IN ATOPIC DERMATITIS. GLOBAL TRENDS IN SCIENCE AND INNOVATION, 2(1), 233-239.

3. Ашуров, Д. Д. (2025). ИНВАЗИВНЫЕ МЕТОДЫ ЛЕЧЕНИЯ ВИТИЛИГО. In International Conference on Modern Science and Scientific Studies (pp. 304-307).

4. Davlatovich, A. D. (2025). CLASSIFICATION OF TATTOOS AND TATTOO REMOVAL. Web of Medicine: Journal of Medicine. Practice and Nursing, 3(2), 431-434.

5. Kamoldinovich, X. D. (2024). Intravenous Adnimnstration of Contrast Agents and Its Characteristics. Miasto Przyszłości, 48, 119-31.

6. Xojiraxmatov, D. K. (2023). THE IMPORTANCE OF COMPUTED TOMOGRAPHY IN THE DIAGNOSIS OF URETEROLITHIASIS AND ITS COMPLICATIONS. Procedia of Engineering and Medical Sciences, 7(12), 31-34.

7. Makhmudov, N. I., Dekhkanov, K. M., Botiraliev, A. B., Mirzamatov, N. I., & Khozhirahmatov, D. K. (2023). Results the use of minimally invasive surgical methods for the treatment of patients with polytrauma in the Fergana branch of the Rncemp. In BIO Web of Conferences (Vol. 65, p. 05035). EDP Sciences.

8. Маматханова, Г. (2021). Оптимизация медицинской учетной документации и внедрение электронных систем в здравоохранение. Общество и инновации, 2(8/S), 61-67.

9. Исмаилов, С. И., & Маматханова, Г. М. (2022). Электронный документооборот как важнейший фактор повышения эффективности управления здравоохранением. Eurasian journal of medical and natural sciences, 2(8), 38-45.

10. Mamatxanova, G. M., & Ismailov, S. I. (2021). Optimization of medical records and implementation of electronic systems in healthcare. The American Journal of Medical Sciences and Pharmaceutical Research, 3(01), 193-198.

11. Маматханова, Г. М., & Ашурова, М. Д. (2020). КОМПЛЕКСНАЯ ОЦЕНКА ДЕЙСТВУЮЩЕЙ ЭЛЕКТРОННОЙ БАЗЫ ПЕРВИЧНЫХ УЧЕТНО-ОТЧЕТНЫХ МЕДИЦИНСКИХ ДОКУМЕНТАЦИЙ В УЧРЕЖДЕНИЯХ ПЕРВИЧНОГО ЗВЕНА ЗДРАВООХРАНЕНИЯ. Экономика и социум, (2 (69)), 506-512.

12. Sherali o‘g‘li, A. B., & Turdali o‘g, Y. L. A. (2025). CLINICAL COURSE AND LABORATORY DIAGNOSIS OF FUNGAL SKIN

DISEASES. GLOBAL TRENDS IN SCIENCE AND INNOVATION, 2(1), 226-232.

13. Маматханова, Г. М., & Шерматова, Г. Т. (2021). Оптимизация медицинской учетной документации и автоматизация отчетностей.

14. Abduvaliyeva, F. T., Azizova, F. L., Akromov, D. A., & Sherkuziyeva, G. F. (2022). APPROVAL AND ECOLOGICAL-HYGIENIC ASPECTS OF WATER SUPPLY TO POPULATION POINTS.

15. Azizova, F. A. F. (2022). The role of local water sources in the centralized supply of drinking water to the population. British medical, 2(4), 175-180.

16. Ахмадалиев, Р. У., Турдиев, Ш. М., Абдувалиева, Ф. Т., & Саидова, С. А. (2020). ГИГИЕНИЧЕСКАЯ ОЦЕНКА УСЛОВИЙ ТРУДА И ОХРАНЫ ОКРУЖАЮЩЕЙ СРЕДЫ НА СТЕКЛОИЗГОТОВИТЕЛЬНЫХ ПРЕДПРИЯТИЯХ. Новый день в медицине, (4), 151-154.

17. Azizova, F. L., & Abduvaliyeva, F. T. (2021). Ecological and hygienic aspects of optimization of water supply of the population. The American journal of medical sciences and pharmaceutical research, 3, 48-53.

18. Pattoyevich, G. A. (2025). IRON DEFICIENCY ANEMIA IN CHILDREN: EARLY DIAGNOSIS AND MODERN TREATMENT APPROACHES. Web of Medicine: Journal of Medicine. Practice and Nursing, 3(5), 494-501.

19. Pattoyevich, G. A., & Nilufar, M. (2026). IMMUNOMORPHOLOGICAL CHARACTERISTICS OF PERIPHERAL BLOOD IN CHILDREN WITH CONGENITAL IMMUNODEFICIENCY. FRONTIERS OF KNOWLEDGE AND INTERDISCIPLINARY DISCOVERY, 2(1), 90-96.

20. Pattoyevich, G. A. (2025). IMMUNO-MORPHOLOGICAL BLOOD PARAMETERS IN CHILDREN WITH ACQUIRED

IMMUNODEFICIENCY. GLOBAL TRENDS IN SCIENCE AND INNOVATION, 2(1), 255-261.

21. Asqarov, I., & Abdujabborova, C. (2025). ANALYSIS OF THE BIOLOGICAL ACTIVITY OF THE FOOD ADDITIVE" AS LUPINUS". Scientific journal of the Fergana State University, (2), 195-195.

22. Абдужабборова, Ч. С. (2024). ИСПОЛЬЗОВАНИЕ ЛЮПИНА В НАРОДНОЙ МЕДИЦИНЕ И РЕЦЕПТАХ.“Fizikaviy va kolloid kimyo fanlarining fundamental va amaliy muammolari hamda ularning innovatsion yechimlari” Xalqaro ilmiy-amaliy anjuman.

23. ABDUJABBOROVA, C. (2024). O'TKIR ZAHARLILIGINI ANIQLASH" LUPINUS AS. UNIVERSAL Учредители: Ilm Fan Fidoiylari Mchj, 1(9), 151-157.

24. Mamatqulova, S. A., & Abdujabborova, C. S. qizi.(2024). LYUPIN O‘SIMLIGI KIMYOVIY TARKIBI VA XALK TABOBATIDA QO‘LLANILISHI. Educational research in universal sciences, 3(3), 73-79.

25. Mukhtarjanovna, I. G. (2023). Developing the Principles of Studying and Treatment of Vaginal Dysbiosis During Pregnancy. Texas Journal of Medical Science, 16, 67-68.

26. Mukhtarzhanovna, I. G. (2024). Development of Principles of Study and Treatment of Vaginal Dysbiosis During Pregnancy. In International Congress on Biological, Physical And Chemical Studies (ITALY) (pp. 112-115).

27. G’aniyevna, J. B. (2025). OREGANO-AS. In OZIQ-OVQAT QO’SHILMASI TARKIBIDAGI FARMAKO-TOKSIKOLOGIK XUSUSIYATLARINI ORGANISH. In International Educators Conference (pp. 208-214).

28. Jumanova, B. (2023). CHEMICAL COMPOSITION OF THE MARMARAK MEDICINAL PLANT (SALVIA OFFICINALIS) AND USE IN PEOPLE'S MEDICINE. B ACADEMIC RESEARCH IN MODERN SCIENCE (Т. 2, Выпуск 26, сс. 158–162). Zenodo.

29. Jumanova, B. G. (2025). CLINICAL EFFECTIVENESS OF THE DIETARY SUPPLEMENT OREGANO AS IN INFLAMMATORY DISEASES OF THE ORAL CAVITY. Advances in Science and Environment, 1(12), 12-14.

30. Sattievna, D. G. (2024). FARG'ONA VILOYATIDA REPRODUKTIV YOSHDAGI AYOLLARNI KONTRASEPTIV VOSITALARNI QO'LLASH USULLARI HAQIDAGI XABARDORLIK DARAJASINI O'RGANISH. Лучшие интеллектуальные исследования, 14(2), 239-243.

31. Йулдошева, Д. С., Ёкубов, Ф. Ф., & Рахматов, С. А. (2024). СОВРЕМЕННЫЕ КЛИНИКО-ЭПИДЕМИОЛОГИЧЕСКИЕ ОСОБЕННОСТИ МИКРОСПОРИИ И ТРИХОФИТИИ. IMRAS, 7(1), 689-693.

32. Kumar, S. (2025). PATHOPHYSIOLOGICAL BASIS OF AUTOIMMUNE PROCESSES IN VITILIGO. GLOBAL TRENDS IN SCIENCE AND INNOVATION, 2(1), 315-322.

33. Sobirjonova, G. (2022). FORECASTING OF AGRICULTURAL PRODUCTS INCLUDED IN THE CONSUMER BASKET. Science and innovation, 1(A7), 839-841.

34. Shakhzodakhon, S. (2025). OCCUPATIONAL ALLERGIES: RISK FACTORS, DIAGNOSIS, AND DEVELOPMENT OF PREVENTIVE MEASURES. In Scientific Conference on Multidisciplinary Studies (pp. 275-281).