Validation of LIVERSTAT as a non-invasive test for risk stratification for patients with metabolic-dysfunction associated fatty liver disease (MAFLD): a single-centre study using liver biopsy as reference standard

Yong Wen Leow[1], Wah Loong Chan[1], Lee Lee Lai [1], Nik Raihan Nik Mustapha[2], Sanjiv Mahadeva[1], Ronald Quiambao[3], Mona Munteanu[3], Wah Kheong Chan[1]

[1]Gastroenterology and Hepatology Unit, Department of Medicine, Faculty of Medicine, University of Malaya, Kuala Lumpur, Malaysia
[2]Department of Pathology, Hospital Sultanah Bahiyah, Alor Setar, Kedah, Malaysia, [3]Medical Affairs, Fibronostics US Inc., Florida, United States

UNIVERSITI MALAYA
Faculty of Medicine

INTRODUCTION

- **LIVERSTAT** is an **AI-based non-invasive test**, devised to screen for and risk-stratify non-alcoholic fatty liver disease (NAFLD).
- It uses **simple blood biomarkers** and **anthropometric measurements**.
- The study aimed to **validate LIVERSTAT** in patients with metabolic dysfunction associated fatty liver disease (MAFLD) and to explore its role in **combination with other non-invasive tests** for the diagnosis of **advanced fibrosis.**

METHOD

- This is a retrospective study of data of MAFLD patients who underwent liver biopsy and patients with diabetes who had controlled attenuation parameter <248 dB/m and liver stiffness measurement (LSM) <5 kPa on transient elastography examination.
- The LIVERSTAT results were generated while being blinded to the histological and liver stiffness measurement results.
- LIVERSTAT has 4 diagnostic categories:
  - N0: no presumed fibrosis, no presumed steatosis
  - N1: no presumed fibrosis, presumed steatosis
  - N2: presumed mild/moderate fibrosis, any steatosis
  - N3: presumed severe fibrosis, any steatosis

Table 2. The misclassification rate, indeterminate results, sensitivity, specificity, positive predictive value and negative predictive value using different approaches to identify patients with advanced fibrosis

Misclassification, %	LIVERSTAT[a]	FIB4[b] (no indeterminate group)	FIB4[c]	Combination of LIVERSTAT and LSM[d]	Combination of FIB4 and LSM[e]
Indeterminate results, %	42	22	14	8	11
Sensitivity, %	0	0	22	14	6
Specificity, %	90	56	9	60	38
Positive predictive value, %	30	44	30	76	83
Negative predictive value, %	95	89	89	94	89

[a]For "LIVERSTAT" analysis, category N4 were considered as diagnostic of advanced liver fibrosis.
[b]For "FIB4 alone without indeterminate group" analysis, ≥1.3 and ≥ 2.0 were considered as diagnostics of advanced liver fibrosis for patients <65 years old and for patients ≥65 years old, respectively.
[c]For "FIB4 alone analysis, 1.3 − 2.67 and 2.0 − 2.67 were considered as indeterminate for patients <65 years old and for patients ≥65 years old, respectively; ≥2.67 was considered diagnostic of advanced liver fibrosis.
[d]For "Combination of LIVERSTAT and LSM" analysis, patients with LIVERSTAT "Advanced fibrosis, any steatosis" result underwent LSM.
[e]For "Combination of FIB4 and LSM" analysis, patients with indeterminate FIB4 result underwent LSM. Patients with LSM <10 kPa were considered unlikely to have advanced fibrosis, 10 kPa to 15 kPa may have advanced fibrosis and >15 kPa likely to have advanced fibrosis.

RESULT

- The data for 350 patients were analyzed (median age 55 years, 45% male, advanced fibrosis 22%).

Table 1. Histological diagnosis and LIVERSTAT categories

Histological diagnosis	LIVERSTAT Categories				
	N0	N1	N2	N3	Total
No steatosis and fibrosis	2	0	6	9	17
Steatosis only, no fibrosis	5	8	51	45	109
Mild or moderate fibrosis, any steatosis	0	6	64	86	156
Advanced fibrosis, any steatosis	0	0	7	61	68
Total	7	14	128	201	350

* Numbers in red indicates correct diagnosis by LIVERSTAT

DISCUSSION

- **LIVERSTAT** had a **higher negative predictive value for advanced fibrosis** compared with FIB4.
- LIVERSTAT had a **lower misclassification rate** when used as a **two-step approach in combination with LSM** to diagnose **advanced fibrosis** compared to FIB4 in combination with LSM.
- Two other studies observed that **LIVERSTAT** performed as good as FIB4 to diagnose advanced fibrosis. 1, 2
- One study suggested that **LIVERSTAT** was superior to FIB4 in males aged 65 years old and above to diagnose advanced fibrosis. 2
- Hence, **LIVERSTAT** can potentially be used as an **alternative marker to diagnose advanced fibrosis in MAFLD.**

REFERENCE

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CONTACT

Dr. Wah-Kheong Chan

Gastroenterology and Hepatology Unit, Department of Medicine, Faculty of Medicine University of Malaya

+60379492965 | wahkheong2003@hotmail.com

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