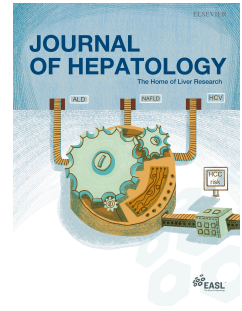


Journal Pre-proof



What references and what gold standard should be used to assess myosteatosis in chronic liver disease ?

Guillaume Henin, Nicolas Lanthier

PII: S0168-8278(24)02355-9

DOI: <https://doi.org/10.1016/j.jhep.2024.07.003>

Reference: JHEPAT 9702

To appear in: *Journal of Hepatology*

Received Date: 28 June 2024

Accepted Date: 2 July 2024

Please cite this article as: Henin G, Lanthier N, What references and what gold standard should be used to assess myosteatosis in chronic liver disease ?, *Journal of Hepatology*, <https://doi.org/10.1016/j.jhep.2024.07.003>.

This is a PDF file of an article that has undergone enhancements after acceptance, such as the addition of a cover page and metadata, and formatting for readability, but it is not yet the definitive version of record. This version will undergo additional copyediting, typesetting and review before it is published in its final form, but we are providing this version to give early visibility of the article. Please note that, during the production process, errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

© 2024 European Association for the Study of the Liver. Published by Elsevier B.V. All rights are reserved, including those for text and data mining, AI training, and similar technologies.

What references and what gold standard should be used to assess myosteatosis in chronic liver disease ?

Guillaume Henin¹⁻², Nicolas Lanthier¹⁻²

1. Service d'Hépatogastroentérologie, Cliniques universitaires Saint-Luc, UCLouvain, 1200 Brussels, Belgium.
2. Laboratory of Gastroenterology and Hepatology, Institut de Recherche Expérimentale et Clinique, UCLouvain, 1200 Brussels, Belgium.

Corresponding author :

Pr. Nicolas Lanthier

Service d'Hépatogastroentérologie

Cliniques universitaires Saint-Luc, UCLouvain

Avenue Hippocrate, 10

1200 Brussels

Belgium.

Phone : +32.2.764.28.22

Fax : +32.2.764.89.27

nicolas.lanthier@saintluc.uclouvain.be

Electronic word count: 466 words

Number of figures and tables : 0

Conflict of interest :

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Financial support :

NL has a mandate as a Clinical Researcher from the FNRS, Belgium.

Authors contribution :

Drafting of the manuscript, critical revision and approval of the final manuscript: GH, NL.

We read Simone Di Cola's recent manuscript [1] with interest. The authors use abdominal computed tomography (CT) scans to analyze muscle changes in cirrhotic patients [1]. This is a very interesting area of research [2,3]. The authors show that many patients have decreased muscle density and/or muscle surface area, which they call myosteatorsis and sarcopenia respectively [1].

However, in addition to the criticism of the cut-offs used, which has already been the subject of a comment [4], we have a few additional remarks which are important in order to make progress on the subject.

Firstly, the use of CT as a technique for assessing muscle lipid content can be imprecise and we do not find it normal for authors to present this technique in their discussion as a gold standard in this situation. Muscle attenuation correlates strongly with muscle fat in non-cirrhotic populations [5]. However, this may not be the case in decompensated cirrhosis due to water retention. The authors note ascites in 49.3% of patients [1]. Water-infiltrated muscles also show reduced muscle density, since the radiological density of water is lower than that of protein, the main component of muscle [6]. Consequently, the best assessment tool in this particular case would be magnetic resonance imaging and its quantitative sequences such as proton density fat fraction and proton magnetic resonance spectroscopy [7,8]. These non-invasive techniques can accurately measure the fat content of a solid organ, by suppressing the water signal [8].

Secondly, an isolated reduced muscle surface with no muscle function data cannot be defined as sarcopenia. As the authors mention in the introduction, sarcopenia is the combination of the loss of muscle mass and strength [1,3]. And unfortunately, despite the prospective design of the study, muscle function data are only available in a subgroup of patients [1]. Analysis of function data in parallel with imaging data

therefore remains crucial, particularly in order to highlight the most robust muscle parameter associated with complications [9].

Thirdly, the underlying causes of liver disease can have a different impact on the muscle. We know, for example, that changes prior to the onset of cirrhosis are possible in metabolic dysfunction-associated steatotic liver disease (MASLD) [7]. The subject is less clear-cut for alcohol-associated liver disease (ALD) [10]. Here, the population is not clearly described. For example, the method used to diagnose the disease is not mentioned (histological diagnosis?) and while patients on the waiting list are excluded, 9.7% will nevertheless be transplanted [1].

In conclusion, it would be very interesting to evaluate muscle parameters with robust reference techniques (imaging and function) and disease classification according to recent guidelines. By comparing these continuous variables with healthy subjects matched for age, sex and BMI, we will be able to better define myosteatosis and make progress in understanding the muscle-liver axis in end-stage liver disease.

References

- [1] Di Cola S, D'Amico G, Caraceni P, et al. Myosteatorsis is closely associated with sarcopenia and significantly worse outcomes in patients with cirrhosis. *J Hepatol* 2024. <https://doi.org/10.1016/j.jhep.2024.05.020>.
- [2] Henin G, Lanthier N, Dahlqvist G. Pathophysiological changes of the liver-muscle axis in end-stage liver disease: what is the right target? *Acta Gastro Enterol Belgica* 2022;85:611–24. <https://doi.org/10.51821/85.4.10899>.
- [3] Goffaux A, Delorme A, Dahlqvist G, et al. Improving the prognosis before and after liver transplantation: Is muscle a game changer? *World J Gastroenterol* 2022;28:5807–17. <https://doi.org/10.3748/wjg.v28.i40.5807>.
- [4] Shan D, Zhang G, Du Z. Reevaluating Myosteatorsis Criteria in Cirrhosis: Fluid and Gender Considerations. *J Hepatol* 2024. <https://doi.org/10.1016/j.jhep.2024.06.005>.
- [5] Goodpaster BH, Kelley DE, Thaete FL, et al. Skeletal muscle attenuation determined by computed tomography is associated with skeletal muscle lipid content. *J Appl Physiol* 2000;89:104–10. <https://doi.org/10.1152/jappl.2000.89.1.104>.
- [6] Aubrey J, Esfandiari N, Baracos VE, et al. Measurement of skeletal muscle radiation attenuation and basis of its biological variation. *Acta Physiol* 2014;210:489–97. <https://doi.org/10.1111/apha.12224>.
- [7] Henin G, Loumaye A, Leclercq IA, et al. Myosteatorsis: Diagnosis, pathophysiology and consequences in metabolic dysfunction-associated steatotic liver disease. *JHEP Reports* 2024;6:100963.

<https://doi.org/10.1016/j.jhepr.2023.100963>.

- [8] Carlier PG, Marty B, Scheidegger O, et al. Skeletal Muscle Quantitative Nuclear Magnetic Resonance Imaging and Spectroscopy as an Outcome Measure for Clinical Trials. *J Neuromuscul Dis* 2016;3:1–28. <https://doi.org/10.3233/JND-160145>.
- [9] Lanthier N, Stärkel P, Dahlqvist G. Frailty, sarcopenia and mortality in cirrhosis: what is the best assessment, how to interpret the data correctly and what interventions are possible? *Clin Res Hepatol Gastroenterol* 2021;45:101661. <https://doi.org/10.1016/j.clinre.2021.101661>.
- [10] Declerck S, Henin G, Lanthier N. Alcohol Consumption and Skeletal Muscle: What We Know and What We Would Like to Know. *Calcif Tissue Int* 2023;113:354–6. <https://doi.org/10.1007/s00223-023-01113-z>.