



Figure 1. Scatterplot of ranks of the liver magnetic resonance imaging (MRI) and histologic (Perls-Scheuer) classifications in 11 hemodialysis patients. To allow a formal comparison between the MRI scale according to Rennes University (4 categories) and its Perls counterpart according to Scheuer, we combined categories 0 and 1 of the Scheuer classification, which relate to normal liver iron; this category is referred to as category 1. According to Rostoker *et al.*³

Spearman coefficient).³ The absolute liver iron concentrations on MRI also correlated strongly with the Deugnier-Turlin histological score ($\rho = 0.841$, $P = 0.0033$, Spearman coefficient).³ We think these recent findings in the field of dialysis-related iron overload warrant the attention of the broad readership of *Kidney International Reports*.

1. Coyne DW. Iron overload in dialysis patients: rust or bust? *Kidney Int Rep.* 2017;2:995–997.
2. Issad B, Ghali N, Beaudreuil S, et al. Hepatic iron load at magnetic resonance imaging is normal in most patients receiving peritoneal dialysis. *Kidney Int Rep.* 2017;2: 1219–1222.
3. Rostoker G, Laroudie M, Blanc R, et al. Signal-intensity-ratio MRI accurately estimates hepatic iron load in hemodialysis patients. *Heliyon.* 2017;3:e00226.

Guy Rostoker¹, Mireille Griuncelli¹ and Yves Cohen²

¹Division of Nephrology and Dialysis, RAMSAY-Générale de Santé, Hôpital Privé Claude Galien, Quincy-sous-Sénart, France;

and ²Division of Radiology, RAMSAY-Générale de Santé, Hôpital Privé Claude Galien, Quincy-sous-Sénart, France

Correspondence: Guy Rostoker, Collège de Médecine des Hôpitaux de Paris and Division of Nephrology and Dialysis, RAMSAY-Générale de Santé, Hôpital Privé Claude Galien, 91480 Quincy-sous-Sénart, France. E-mail: rostotom@orange.fr

Received 11 October 2017; revised 25 October 2017; accepted 30 October 2017; published online 21 November 2017

Kidney Int Rep (2018) 3, 217–218; <https://doi.org/10.1016/j.ekir.2017.10.018>

© 2017 International Society of Nephrology. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

The Author Replies: Rostoker and colleagues¹ do not contest my conclusion that applying the ratio of magnetic resonance imaging (MRI) estimate of liver iron content (LIC) to total body iron observed in hereditary and transfusional overload overestimates total body iron by a factor of 3 to 6 in dialysis patients.² Unfortunately,



this letter title states MRI-LIC is accurate for “evaluating iron load in dialysis patients.”¹ A high MRI-LIC score is not the same as iron overload in dialysis patients.^{1,2} Based on the rate of decline in high MRI-LIC scores after halting iron therapy, most dialysis patients appear to have normal or mildly elevated total body iron.²

In this letter, Rostoker *et al.* contend the MRI-LIC estimates are validated against liver biopsy-based LIC by pointing to their January 2017 publication in *Heliyon Journal*, which they did not reference in their *Kidney International Reports* article.^{1,3} There are major problems with this study, including all patients had hepatitis C, and you recategorized 45% of patients' results.³ Although you compare MRI-based LIC scores to semiquantitative histological assessments, you do not measure iron content per gram of liver dry weight, which is “considered as the reference method for quantifying iron in the liver” according to Deugnier and Turlin.⁴ Determination of LIC “on deparaffinized tissue should be the rule,” as iron distribution may be “heterogeneous as in the cirrhotic liver.”⁴

The choice of patients with hepatitis C is problematic, as chronic hepatitis, especially hepatitis C-related injury, results in hepatic iron deposition in 35% to 56% of patients, and this is not reflective of total body iron overload.⁴ The brief pathologic description suggests iron was a bystander in at least 9 and possibly all 11 patients.³

Although you highlight a strong relationship of MRI-LIC estimates to the semiquantitative methods, you lowered the MRI-LIC result in 3 patients by 53.7 to 107.4 $\mu\text{mol/g}$ of dry liver based on the time between scan and liver biopsy, which aligned the MRI-LIC score with the histological estimate.³ You justify this by stating you observed this degree of decline in other patients.³ I think this is speculative at best and, in my opinion, improper. Two other patients had their histological scores altered from group 0 (possibly no iron present) to group 1 (normal iron content), which effectively aligned the histology result with the MRI-LIC result.³ In these 5 patients, without adjustment, the MRI-LIC appears to have overestimated liver iron content. Although there is undoubtedly a good relationship of MRI-LIC to histological semiquantitative and quantitative LIC, there is a degree of miscategorization into higher categories, such as the patient I highlighted in my commentary, and as others have noted.^{2,5,6}

I disagree that research-related liver biopsy is contraindicated, as you are claiming that some dialysis patients have severe iron overload. There is a clinical and research need to know, hemochromatosis is an

indication for liver biopsy for staging, and the risks of liver biopsy appear overstated according to the position paper by the American Association for the Study of Liver Diseases.⁷

In the *Heliyon* article, the authors refer to a controversies conference on iron use in dialysis, and a Dialysis Advisory Group of the American Society of Nephrology commentary on iron use in dialysis.^{3,8} I was a participant in the conference and a coauthor on the commentary. In neither was there agreement that iron overload in dialysis patients is a significant problem. Rather, we raised fundamental issues with the claims, including overestimating the actual total body iron, and lack of proof of consequent disease or end-organ damage, and therefore called for further research.

1. Rostoker G, Griuncelli M, Cohen Y. Re: Further evidence supporting the accuracy of quantitative magnetic resonance imaging for evaluating iron load in dialysis patients. *Kidney Int Rep.* 2018;3:217–218.
2. Coyne DW. Iron overload in dialysis patients: rust or bust? *Kidney Int Rep.* 2017;2:995–997.
3. Rostoker G, Laroudie M, Blanc R, et al. Signal-intensity-ratio magnetic resonance imaging accurately estimates hepatic iron load in hemodialysis patients. *Heliyon.* 2017;3:e00226.
4. Deugnier Y, Turlin B. Pathology of hepatic iron overload. *World J Gastroenterol.* 2007;13:4755–4760.
5. Issad B, Ghali N, Beaudreuil S, et al. Hepatic iron load at magnetic resonance imaging is normal in most patients receiving peritoneal dialysis. *Kidney Int Rep.* 2017;2:1219–1222.
6. Alustiza Echeverria JM, Castiella A, Emparanza JI. Quantification of iron concentration in the liver by MRI. *Insights Imaging.* 2012;3:173–180.
7. Rockey DC, Caldwell SH, Goodman ZD, et al. Liver biopsy. *Hepatology.* 2009;49:1017–1044.
8. Charytan DM, Pai AB, Chan CT, et al. Considerations and challenges in defining optimal iron utilization in hemodialysis. *J Am Soc Nephrol.* 2015;26:1238–1247.

Daniel W. Coyne¹

¹Division of Nephrology, Washington University, St. Louis, Missouri, USA

Correspondence: Daniel W. Coyne, Division of Nephrology, Washington University, St. Louis, MO 63110-1093, USA. E-mail: dcoyne@dom.wustl.edu

Received 6 November 2017; accepted 13 November 2017; published online 21 November 2017

Kidney Int Rep (2018) 3, 218–219; <https://doi.org/10.1016/j.ekir.2017.11.007>

© 2017 International Society of Nephrology. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).