Reviewer's report

Title: Novel equation to determine the hepatic triglyceride concentration in humans by MRI: diagnosis and monitorization of NAFLD in obese patients before and after bariatric surgery

Version: 1
Date: 18 May 2014

Reviewer: Joost P Drenth

Reviewer's report:

The authors state that there is a quest for a novel non-invasive procedure to estimate hepatic triglyceride content as the current gold standard liver biopsy with histopathological examination of cross-liver sections and the semi-quantitative estimation of the percentage of macrovesicular fat is cumbersome. To some extent I agree, and the authors have attempted to address this issue by evaluate the potential of multi-echo MRI in an unique set of patients, those subjected to bariatric surgery.

Multi-echo MRI was performed in all patients and compared with a liver biopsy obtained at surgery. The novelty comes with the replication study where the evaluate their initial findings and ultimately the did a follow-up study in a sample from their cohort.

This is a fine paper, that addresses an important issue and deserves wider dissemination.

This article contributes to clinical advances in the diagnosis of NAFLD. Additionally, it contains an original equation to predict the hepatic triglyceride concentration. The methods of the study are elaborately described which makes a replication study possible. The conclusions based on the data are interesting and innovative. The article gives a detailed description of the performed study. However, it also raises some questions which I would like to present the authors.

Many of this issues that are discussed below could be dealt with by completeing the http://www.stard-statement.org/ STARD Statement STAndards for the Reporting of Diagnostic accuracy studies. As such this study is a diagnostic accuracy study (a study that evaluated the ability of a test to differentiate between patients who have the target condition and those who do not have the target condition). I suggest that the authors use this algorithm and complete the checklist.

The authors state in the methods section that “obese” patients are included that have a BMI > 40kg/m². However, these patients have to be considered “morbid obese”. Table 1 shows a mean BMI of 44.6±7.9 kg. This indicates that also patients are included in the “obese group” with a BMI < 40kg/m². Can the authors please elaborate on this?

When performing bariatric surgery the liver is manipulated to create a safe
working space and view when stapling the stomach to perform the gastroenterostomy in a RYGB and resection of 2/3 of the stomach in a sleeve gastrectomy. This can possibly affect the local anatomy and make interpretation of the MRI post surgery more difficult. The method section describes that the MRI-biopsy period was less than 24h. Are all MRIs performed prior to surgery, or also post surgery? If MRIs are performed after surgery, does this affect the outcome parameter?

The final paragraph of the “Patient selection and study design” in the methods section states that 56 of the 97 obese patients and 11 patients who underwent a liver resection, were monitored one year after the operation. Are the authors able to give the characteristics of the patients who were not monitored after one year. Were they lost to follow-up or did a selection of patients take place?

The multi-echo MRI is an interesting diagnostic method. However, this might be hard to interpret. This is an important issue as this determines how viable this method really is. How many people performed and interpret the results of the multi-echo MRI? Is every radiologist able to interpret these results or do they have a learning curve? Please elaborate on potential inter-observer differences in the MRI results.

Due to the invasiveness a Folch measurement is not ethical 12 months after surgery. However, this would be the gold standard for monitorization of decreasing NAFLD after bariatric surgery. Additionally, this would also be the best method to check the accuracy of the developed equation. This should be discussed in the article.

The conclusion of the authors states that multi-echo MRI may represent a low-cost non-invasive method to diagnose and monitor steatosis. Are the authors able to estimate the total costs of this method and compare it with Folch measurement?

The authors introduce an interesting line of thinking: I cite “These data, ....Folch and semi-quantitative measurement of steatosis by histopathological examinations indicated that the latter (histopathological examinations) is not an accurate method to determine the hepatic fat content, and Folch should be used as an appropriate gold standard for NAFLD”. Take a step back. The histopathology is the gold standard. This was used to validate the MRI and the FOLCH method and in the end the authors conclude that Folch is better than their gold standard. Am I missing something here? The gold standard is histology and everything that is compared will score less than 100%.

The text could be condensed to some extent. The article contains several paragraphs which repeat previous sections. The second paragraph of the discussion is a duplicate of the introduction. Additionally, the section “Our results from...estimated Folch values” in the discussion (page 12), is earlier stated in the first paragraph of the discussion. Finally, the section “Obese patients showed increased hepatic steatosis compared to controls by histopathological examination” contains the same information as the legend of figure 1. Please limit the repetitions.

Minor comments:
Monitorization is that a proper English term? Monitoring would be more appropriate

The legend of Figure 5 states “MIR” in stead of “MRI”

**Quality of written English:** Needs some language corrections before being published

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

No competing conflict of interest