Reviewer's report

Title: Dissolved molecular hydrogen (H2) in Peritoneal Dialysis (PD) solution preserve mesothelial cells and peritoneal membrane integrity

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Reviewer: Carl Öberg

Reviewer's report:

In this manuscript the effects of using a PD solution with dissolved hydrogen gas (H2) are studied in Sprague-Dawley rats in order to investigate effects on peritoneal histology and gene expression assessed by RT-PCR. Additionally, the effects of adding FeCl3 to the dialysis fluid are examined in order to evaluate tentative effects of dissolved H2 treatment on oxidative stress. This is an important subject with clinical relevance. The methods appear to be appropriate. The conclusions are however not supported by the results and should be stated much more carefully.

A key issue in histological studies is the lack of quantitative measurements. Differences that may appear striking visually can be due to chance or be difficult to quantitate. From the current quantifiable measurements, there were no differences between the PD group and the H2PD group except for the effects on infiltrating M1/M2 macrophage sub-populations. Thus, in my opinion, the main finding is not that H2 ameliorates injury caused by the PD fluid alone (which is the clinically relevant comparison) but rather that H2 ameliorates injuries caused by 5 uM FeCl3. While this latter finding is interesting, it cannot be used to draw the conclusion that dissolved H2 ameliorates injury in conventional PD treatment. Lastly, the risks of using highly flammable and explosive hydrogen gas in the clinic must be addressed.

Title: Should be changed to e.g. "Peritoneal dialysis fluid with dissolved hydrogen gas (H2) ameliorates oxidative stress caused by FeCl3"

Abstract: The abstract must be revised to reflect the main findings vide supra. Also replace "maintenance therapy" with e.g. "renal replacement therapy".
The Methods section is well written and the statistical procedure is appropriate although the authors should consider doing non-parametric tests due to the low number of animals in each group.

Background, results an discussion are mostly well-written but must undergo revision to reflect the actual findings in your study.

Minor comments:

My copy of the ms was not paginated.

Fig. 3 and Fig. 6: Immunohistochemistry misspelled.

**Are the methods appropriate and well described?**
If not, please specify which controls are required in your comments to the authors.
Yes

**Does the work include the necessary controls?**
If not, please specify which controls are required in your comments to the authors.
Yes

**Are the conclusions drawn adequately supported by the data shown?**
If not, please explain in your comments to the authors.
No

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