Reviewer's report

Title: Gastric emptying and small intestinal transit time and motility assessed by a magnet tracking system

Version: 1 Date: 23 June 2011

Reviewer: Andreas Steingoetter

Reviewer's report:

This is an interesting and well performed study. Unfortunately, the manuscript has many shortcomings with regard to definition of used terms, completeness, data presentation and analysis and reference literature.

- Major Compulsory Revisions

The reviewer does not agree with many definitions and nomenclatures regarding gastrointestinal physiology used in this manuscript. Gastric emptying, gastric emptying time, motility index, contraction amplitude have been wrongly used in the manuscript.

This methodology assessed gastric and intestinal transit rather than gastric emptying. The term gastric emptying should be confined to the emptying of meals and macronutrients, however in this study no meal was ingested together with the pill. Furthermore, the authors should also differentiate between solid emptying (with the solid having a nutrient content), or the emptying of an indigestible solid (see Discussion). Please use gastric transit time and gastric transit instead of gastric emptying.

The term motility index is given in the attached tables, however has never been defined or mentioned in the manuscript text. This term has been defined and established based on the manometry data (e.g. see Hansen MB Physiol Res 2002) and should not simply be overwritten or newly defined to avoid confusion and allow for consistent parameter interpretation in future studies. Moreover, this parameter does not add any additional information to the tables or presented data. Please omit this term or provide a different term.

Analysis was partly based on the detected contraction amplitude. It is unclear to the reviewer how this contraction amplitude was derived from the presented data. How could the amplitude be separated from overlaying breathing movement?

No information on the applied statistical analysis methods is provided.

MRI has been proven to a valid tool for the noninvasive assessment of gastrointestinal function. Recently, fluorine MRI has been shown to be feasible for real time tracking of an ingested capsule and the assessment of small intestinal motility patterns (Hahn T. et al Magn Reson Med. 2011 Mar 4). The reviewer is highly surprised about no citation or mentioning of this versatile
imaging technique allowing concurrent determination of the underlying anatomical information in the manuscript.

Magnetic Marker Monitoring has been mentioned in the introduction, however no reference is provided to the most recent publication by Goodmann K et al. 2010 (Eur J Pharm Biopharm. 2010 Jan;74(1):84-92) showing the potential of this technique for the assessment intestinal motility. As general request, an update and optimization of the cited literature is of need.

Most of the presented figures have poor quality (especially Figure 1 and 3). Figure 3 is not readable.

Figure legend 4B. Regarding the statement “Most distance through the small intestine is covered during the period just after pyloric passage and during the period just before ileocecal passage. These two periods, separated by approximately 90 minutes, likely reflect phase III of the MMC.”

The conclusion of these observations should depend on the ingestion time point of the used meals, i.e. the study arm. It is unclear if this data is representative for all study arms, i.e. also for study arm 3, where the meal was ingested directly after pyloric passage?

The second last paragraph in the Discussion tries to highlight the underlying inaccuracy of the MTS-1 system. It would be of interest to get a rough idea on the accuracy of the derived parameters by the MTS-1 system considering the mentioned inaccuracy.

Please make sure to provide correct figure numbers and figure captions.

- Minor Essential Revisions

I very much appreciate the presentation of individual data in the tables. However, the authors should think about a more compact representation of the data. Namely, to skip depend parameters like progression and motility index, therefore including individual frequency and velocity. Showing the data agreement using Bland-Altman plots may be useful.

Page 9 please check wording in first paragraph

Please also provide the density of the applied magnetic pill, the PillCam and the magnet-PillCam

Figure 4 should be changed to a 3D surface plot for better visualization and understanding.

Could the authors please comment on the use of two different meals for study arms two and three?

Page 12. The last sentence of paragraph two includes 8 references but adds no additional information to the first sentence of this paragraph.
- Discretionary Revisions

Was the correction of the respiratory motion always accurate and successful?

The time window for StFT was always shifted by 10 samples, i.e. by 1 second correct?

**Level of interest:** An article of importance in its field

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

**Statistical review:** Yes, but I do not feel adequately qualified to assess the statistics.

**Declaration of competing interests:**

I assume that I have some non-financial (research based) competing interests in relation to this paper since I am using a different technique (MRI) for the assessment small intestinal motility.