Author's response to reviews

Title: Maintenance of bone mineral density after implantation of a femoral neck hip prosthesis

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Author's response to reviews: see over
Response to the referees reviewing manuscript:

Thank you very much for your helpful comments and suggestions. We hope that we were able to address all your other comments and suggestions to your satisfaction.

Major Compulsory Revisions of Reviewer 1:
The authors need to indicate and prove that this study has gone through an Ethics Committee Review process.
The study is part of an investigation about BMD-changes following cemented and cementless total hip replacement, which has been approved by the ethics commission of local university. We will send a (printed) copy of the confirmation to the editors of BMC MD.

Major Compulsory Revisions of Reviewer 2:
Background: In the background section, the authors should describe the demand for a short-neck implant. While it provides a more natural stress distribution, many clinicians claim that there is little or no need to modify the design of current implants. The authors should summarize rates of implant loosening and/or the percentage of implants required for younger patients.
We have tried to better explain the demand for the short-neck implant in the Background section of the manuscript by citing data of the Swedish Hip Arthroplasty Register of 2005. We are aware, that there is no clear clinical data supporting the advantages of alternative stems (or resurfacing, as the matter of fact). However, we hope that we made this clear in the Background and the Discussion sections of the manuscript.

Methods: The methods appear to be well-described and the clinical methods are repeatable. Based on the description of the statistical analysis, it appears that the authors are comparing the change in outcome as measured by the Harris Hip Score, WOMAC, and BMD change to the initial values.
Please describe the Harris Hip Score and WOMAC in more detail. What are the maximum values and typical values for patients prior to surgery?
The Harris Hip Score and the Western Ontario and McMaster Universities Osteoarthritis Index are frequently used tests in the assessment of Total Hip Replacement. We have described both tests shortly with a reference to the original publications in the Methods section of the manuscript (page 4).

Are there other studies that perform sub-segmental analyses of the BMD that can be cited to validate the technique? If not, it seems that there is substantial room for error depending on differences in femur size between patients and it should be quantified.
A number of studies have shown that DEXA measurements around total hip stems have reliable and precise results as long as the calibration is performed, the rotation of the leg strictly controlled and as long the change of BMD is measured not according to the other, unaffected side, but in a longitudinal evaluation. We have observed all these factors in the study on hand, and we have discussed these problems in the discussion. We have now cited three classic papers on this subject in the Methods section to clarify that we have been aware of possible errors.

Results: Please match the labels of the figure captions to those of the actual figures. The tables are complete, but it is difficult to assess the images due to their small size.
We are sorry that the online upload-process has led to some confusion here. It was impossible to upload the files as figure 2a and 2b. We have changed the labels of the figure captions accordingly (figure 2, 3 and 4). The size of the figures (and the resolution) and the tables are quite large in the original files that we uploaded. We contacted the Senior Assistant Editor of the Journal (Mrs. Sandra Le) about that problem. It was confirmed to us, that the tables and figures in the manuscript appeared fine to the editors. If this is not the opinion of the referee, could he please tell us exactly what he would like to have changed?

Discussion:
Line 5: “extend” should be “extent”
Line 5: “extend” has been changed to “extent”

In the discussion of the stress and strain distribution, the authors should consider the work of Joshi et al., (2000) Journal of Biomechanics.
Joshi, Advani, Miller and Santare used FEA to test an alternative stem design as an advancement to the short stemmed prosthesis that Munting and Verhelpen had implanted, which was discussed in the article. The virtual prosthesis used was utilizing wires around the greater trochanter. Since this was only an mathematical model, but there was no clinical data on this prosthesis, the authors primarily had chosen to focus on implants used clinically. We have now mentioned the work of Joshi and co-workers as suggested, but have added that this is only a model without any published clinical testing so far.

We have deleted the paragraph mentioned, since we do agree that the train of thoughts used here could not be backed up.

The most important feature of the work is the comparison of the authors’ results with those obtained for conventional implants. Unfortunately, there are no data provided for the convention implants. Ideally, the authors would have had the same surgeon implant 20 more traditional implants for comparison. In lieu of this, the authors should perform a meta-analysis to compare to other studies.
The authors do agree with the referee, that the best way to perform a study like this would be a randomized trail using conventional implants as a control group. However this has not been possible in the clinical setting for this study. Thus, we choose a prospective trail and controlled as much variables as possible. This is a setting in which a number of other papers have been published in the peer-reviewed literature, some with a rather high impact for an orthopaedic publication (see references). Published papers that have met the same high demands on the study design and the DEXA-measurements were discussed by us and compared to our results in table 3. However a complete meta-analysis would be far beyond the scope of a clinical paper like the one presented. For our comparison, we only selected studies that met the high criterions for the evaluation of periprosthetic bone mineral density changes (see also: Martini et al, Nishii et al, Cohen et al.) and have made that clear in the discussion. We have now added that we see a limitation in the design of the study by only comparing it to other published data in the last sentence of the first paragraph of the discussion.