Reviewer’s report

Title: Prediction of fractures using low-frequency ultrasound - comparison with DXA-based BMD

Version: 1
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Reviewer: Guoqing Diao

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Title: Prediction of fractures using low-frequency ultrasound comparison with DXA-based BMD

General Comments:

In my understanding, the authors intended to evaluate the effects of ultrasound velocity (V_LF) on the risk of fracture and/or hip fracture in community-dwelling women with ages between 78 and 82 years old. However, this objective was not clearly stated in either the abstract or the Introduction section. In addition, this study involves both retrospectively and prospectively collected data. The V_LF data were measured in 2006 whereas data from 1997-2006 were retrospectively collected and the follow-up data from 2006 to 2010 were prospectively collected. It is important to distinguish these two different types of data in both the statistical analysis and the interpretation of the results. In addition, one needs to examine certain model assumptions to ensure the validity of the data analysis. Some interpretation of the results were not accurate. I list my detailed comments below.

1. Page 3, Background: If the objective is to study the ability of the low-frequency (LF) axial transmission ultrasound method to discriminate fracture cases from controls, then one needs to compare the ROC (or AUC) for classifying cases and controls with and without V_LF in the model.

2. Page 3, Results: Note that OR is different from relative risk (RR). An OR of 3 doesn't mean that RR is 3.

3. The analysis of the retrospectively collected data was questionable since the V_LF data were collected in 2006.
instead of the beginning of the study. It is not clear whether the difference in V_LF was caused by the difference in the status of fracture or vice versa.

4. Page 7, Statistical analysis: In my understanding, patients in group (c) also belong to group (b). Please clarify.

5. None was done to check the important model and distribution assumptions in the two-sample t-test and Cox proportional model. Violation of the model assumptions can lead to biased results.

6. Page 8, line 11: "using Cox regressions" ----> "using the Cox proportional hazards model".

7. Page 8, line 12: How did you handle those censored subjects due to death or loss of follow-up in the logistic regression analysis?,

8. Page 9, line 7: Is a difference of 0.4 years in age clinically meaningful?

9. Page 9, line 8: Were the ages at the time of measurement or at the baseline (i.e., 1997)?

10. Page 21, Table 5: The numbers of NF subjects do not add up. NF n=409, 429, and 360 from the periods of 1997-2006, 2006-2010, and 1997-2010, respectively. Why was the number of NF subjects only 360 from 1997 to 2010?

**Level of interest:** An article whose findings are important to those with closely related research interests

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

**Statistical review:** Yes, and I have assessed the statistics in my report.