Reviewer's report

Title: Kyphosis and Paraspinal Muscle Composition in Older Men: A Cross-sectional Study for the Osteoporotic Fractures in Men (MrOS) Research Group

Version: 2
Date: 22 October 2013
Reviewer: Dennis Anderson

Reviewer's report:

Major Compulsory Revisions

1. The definitions used for muscle (0 to 100 HU) and IMAT (-190 to -30 HU) leave a ‘gap’ between muscle and IMAT (the range between -30 to 0 HU). As best I can tell, voxels within the fascial borders of the muscle that fell in this ‘gap’ were not included in the analyses in any way. As noted in the discussion (Discussion, second paragraph, lines 6-10), you used different definitions in your previous study, which it appears not have this ‘gap’. Perhaps I have misunderstood the methods, in which case please clarify what was done. However, given the different results between this and the Health ABC paper, I think it is important to investigate whether including the ‘gap’ voxels in the analyses would more closely match the previous results. It seems plausible to me that this could be important, as tissue in the ‘gap’ range of HU could represent a mixture of muscle and adipose tissues that, through partial volume effects, have an attenuation in between pure muscle and pure adipose. It should not be too difficult to re-analyze the data including these voxels; I would suggest simply incorporating the ‘gap’ into the muscle to match the previous definition. If you desire, this manuscript could present both approaches and whether or not the different definitions affect the results, which could be useful for future studies using muscle attenuation.

Minor Essential Revisions

1. Background, second paragraph, lines 2-3: This sentence incorrectly defines x-ray attenuation, and implies that fatty infiltration has a special significance for attenuation, which is not the case. In short, attenuation refers to the reduction of energy (not speed) in the x-ray beam as it passes through the tissue (that is, some energy is absorbed or scattered by the tissue, reducing the amount that passes through). All tissues attenuate the x-ray beam; bone more so than muscle, muscle more so than fat. Thus fatty infiltration means less attenuation. This sentence should be corrected to accurately convey this.

2. Background, third paragraph, lines 4-6: Anderson et al. (reference 9) did show greater paraspinal density in men than women, but did not show a larger decline with age in men. In fact there was no significant age x sex interaction.

3. Methods, muscle variables section: Please provide some clarification on muscle volume measurements. Were the muscle volume measures made
inclusive of the whole region scanned (mid-L3 to mid-L5)? How were mid-vertebral levels determined in the scanning protocol, and was there much variability in this that could have affected volume measurements?

4. Methods, muscle variables section, lines 14-15: It is stated that muscle density (HU) was obtained for both total volume and muscle only volume. However, only one density value is reported in Table 1, and it’s not clear which one it is. Were both variables used in the analyses?

5. Methods, vertebral fractures measurement section: It is unclear whether prevalent fracture was adjudicated by the physician reader, or morphometrically from the SpineAnalyzer measurements. Please clarify the roles of SpineAnalyzer and the physician. Depending on the protocol you used, perhaps the study of Kim et al (Osteoporos Int, 2011, 22(10):2677-88. doi: 10.1007/s00198-011-1530-4) is relevant and should be cited.

6. Figure 3: Please clarify in the figure caption that the psoas major is also highlighted, or alter figure to only highlight paraspinal muscles.

Minor issues not for publication:

7. Abstract, end of 5th line, missing word, “kyphosis in an analytic cohort”
8. Background, second paragraph, 4th line: insert a comma after “density of muscle”
9. Results, last paragraph, 5th line: change “association” to “associated”
10. Please update reference information for references 1 and 3

Discretionary Revisions

1. Background, second paragraph, 1st line: To me, it is overstating the matter to say that muscle composition is “traditionally assessed” with CT. Consider just stating that previous studies have done so.
2. Discussion, first paragraph, lines 5-7: This sentence is a little confusing. Consider restructuring it.

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

Quality of written English: Acceptable

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

Declaration of competing interests:

I declare that I have no competing interests