

Format for ANSWERING REVIEWERS

February 11, 2014

Dear Editor,



Please find enclosed the edited manuscript in Word format (file name: manusprpt8409_review.docx).

Title: Bone mineral density in cone beam computed tomography: only a few shades of gray

Author: Marcio José da Silva Campos, Thainara Salgueiro de Souza, Sérgio Luiz Mota Júnior, Marcelo Reis Fraga, Robert Willer Farinazzo Vitral

Name of Journal: *World Journal of Radiology*

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The manuscript has been improved according to the suggestions of reviewers:

1 Format has been updated

2 Revision has been made according to the suggestions of the reviewer

Reviewer #1

1. It will be very valuable if the authors could include from the reviewed publications the errors detected in the CBCT grey values. A summary of these results would be very useful to the readers who are concerned about bone mineral density assessment for orthodontic procedures.

The quantitative determination of the errors associated with the density values obtained in CBCT is not possible, because the studies that questioned the reliability of these numbers used different reference values, evaluating the presence of image imperfections or using physical principles as base for the acquisition of CBCT images.

2. Various factors affecting the consistency of the grey values in CBCT were briefly discussed. Some diagrams/images would improve the readability of this portion of the paper. For example, the size and position of the FOV with respect to the object evaluated was found to have an impact on the grey values. A diagram/image illustrating this factor will be very helpful for explanation.

A short table of contents was included describing the factors that influence the grey values identified by the cited papers.

3. The manuscript will be better organized with the inclusion of a Summary/Conclusion section. The last paragraph may be placed under this section.

It was included in the conclusion section.

4. A total of 52 papers were reviewed in this survey. But it seemed that Ref[29] was a work related to Health Physics issues. Is this publication relevant to the review on mineral density estimation using the CBCT?

Yes, because we found pertinent the information given by the study.

Reviewer #2

1. The title is unclear, please make it more comprehensive.

The title chosen, specifically the sentence cited, has the purpose of calling attention of the readers of WJR for the fact that in CBCT examination only a few shades of grey can be obtained, and not specific or standardized units as can be found in other CT modalities.

2. Throughout the text, "Dentistry" should not start with capital letter.

The word has been altered in the text.

3. Section of "Cone beam computed tomography" is too long. Please consider segmentation with headings.

This section was not subdivided into topics, but the paragraphs refer to specific subjects, all of which related to the determination of density in CBCT.

Reviewer #3

1. The authors needs to be loyal to the main objective of the article (CBCT grey values to determinate bone mineral density). Please explore more and deeply this subject.

The authors tried to be faithful to the main purpose of the paper, to raise the problems cited by other authors on the determination of mineral density in CBCT.

2. Insert more article about the subjective and dicuss more (e.g. Silva IM, Freitas DQ, Ambrosano GM, Bóscolo FN, Almeida SM. Bone density: comparative evaluation of Hounsfield units in multislice and cone-beam computed tomography. Braz Oral Res. 2012 Nov-Dec;26(6):550-6.)

To date, the number of publications on this matter is enormous, being almost impossible to cite all of them in just one study. We believe the papers cites in our study are the most relevant and have enough information to sustain the conclusion of the paper.

3. What the authors think about the use of grey values to determinate the bone mineral density? Can I use or not? Please discuss the findings in the literature and expose your point of view.

This is not the purpose of the study. We assumed that grey values are used in conventional CT with good reproducibility and accuracy, and it was our objective to review the variations presented by these values in different the CBCT studies.

4. If possible, could you insert images in the article? About the artifacts, grey measurement... it will be easier for the non-radiologists readers.

This study is based on a literature review, therefore, no CBCT examination was undertaken. Images showing the artifacts can be found in the papers cited in the reference section.

5. In the last paragraph you wrote about exomass. This factor has influence in the grey values? Explain better

The influence of the exomass in grey values was explained on the 12th paragraph of the "cone beam computed tomography" section, describing its relationship with FOV sizes and projection data discontinuity.

6. The literature review of bone mineral density is a little bit poor. Please explain more this topic. Specially the methods to determinate the bone mineral density. Are they better or worst the CT? What are the advantages and disadvantages? Go deep in this topic.

Our study made a general review on mineral density, which includes osseous tissue mineral density as well. Once grey values are affected by the several factors described in the text, the determination of osseous mineral density is also affected.

7. What is the influence of the artifacts in the grey values measurements?

The 3rd paragraph of the “cone beam computed tomography” was altered in order to explain the reason for this influence.

8. In what cases in Dentistry I need to measure the grey values? What is the importance of this?

In all cases with the need for mineral density evaluation of a certain structure, for instance, the planning for dental implants, orthodontic skeletal anchorage, tooth movement or evaluation of pathological alterations. In these cases, the dentist should have in mind that CBCT examinations have inconsistent grey values

9. What is the conclusion of the article?

Conclusion is in the last paragraph of the text.

Reviewer #4

1. A personal touch/interpretation on this information is missing.

Since this is a review article, the authors have merely described and associated the information from other studies on the topic, including a brief interpretation of the data shown in the conclusion. A personal touch has an important role in original articles, but not in literature review papers.

2. Introduction of figures (examples of artefacts) would also help the paper.

This study is based on a literature review, therefore, no CBCT examination was undertaken. Images showing the artifacts can be found in the papers cited in the reference section.

Reviewer #5

1. In this work, the studies available to date on this topic were reviewed. It would be valuable if selected key contributions are summarized in a table for better appreciation.

A short table of contents was included describing the factors that influence the grey values identified by the cited papers.

2. In this work, the reliability of CBCT to determine bone mineral density was discussed; however, no quantitative details are given in this review. It would be helpful to provide quantitative information on errors and/or uncertainties on determination of bone mineral density using CBCT.

The quantitative determination of the errors associated with the density values obtained in CBCT is not possible, because the studies that questioned the reliability of these numbers used different reference values (density values obtained with DEXA, MSCT or CBCT or coefficient of attenuation of materials), evaluating the presence of image imperfections or using physical principles as base for the acquisition of CBCT images.

3. Several sources of artifacts were described and discussed. It would be useful to illustrate and

demonstrate these artifacts with intuitive images.

This study is based on a literature review, therefore, no CBCT examination was undertaken. Images showing the artifacts can be found in the papers cited in the reference section.

4. The title of the manuscript was not clear and specific. It would be good to remove “only a few shades of gray” and add more specific details.

The title chosen, specifically the sentence cited, has the purpose of calling attention of the readers of WJR for the fact that in CBCT examination only a few shades of grey can be obtained, and not specific or standardized units as can be found in other CT modalities.

5. The work reviewed the studies available to date, and suggested that “CBCT should not be considered the examination of choice for the determination of bone mineral density”. Given the possibility that technical advance may greatly improve CBCT in the future, it might be good to emphasize that CBCT should not be considered as the examination of choice at the current stage.

This information was corrected in the text.

6. On page 3, the authors stated that CBCT is “a less complex device that produces better resolution images with little artifact incidence and lower dose of radiation [4]”. The statement might cause potential confusion since it implies that CBCT provides better resolution images with little artifact incidence than multislice CT. It is commonly known that image quality of multislice CT is generally superior over that of CBCT. It would be helpful to revise the paragraph or clarify the potential confusion.

This information was corrected in the text.

3 Typesetting was corrected

Thank you again for publishing our manuscript in the *World Journal of Radiology*.

Sincerely yours,



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