OPEN PEER REVIEW

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- More motivations for all involved roles in the review process
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- Education of both authors and new students
- Prevents reviewers from following their individual agendas and leading to the detection of reviewers' conflicts of interests

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Peer Review Report for "Assessment of the Effect of Nano-Composite Shield on Radiation Risk Prevention to Breast During Computed Tomography"

Author(s): Parinaz Mehnati, Reza Malekzadeh, Baharak Divband, Mohammad Yousefi Sooteh

Review Timeline:

Submit Date: 3 Jul 2019
Revised Date: 31 Dec 2019
Accepted Date: 11 Jan 2020

Revision (0)

Here, you can see the **Reviewers**, **Associate Editors** and **EICs'** comments from the beginning to the end of the revision process.

REFEREE: Reviewer | **Revision** (0) — 18 Jul 2019

Dear AE
Regards to the paper:
1- English writing is good
2- All structures are good
3- Although the research is valuable but; There is only one important defect around experimental research.
It is highly recommended to compare software simulation with real experiment.
With Best Regards

REFEREE: Reviewer | **Revision** (0) — 6 Aug 2019

Dear AE,

Comments for the authors:
1- Please add the abbreviations in full terms and abbreviation for the first time.
2- The authors have declared in conclusion of abstract: “The Nano bismuth composite shield with different ratios and thicknesses has potential for breast cancer prevention along with a significant reduction in the breast dose in the chest CT scan.” Conclusion of paper should begin with direct findings of paper not with later consequences of study. For example, they should write something like this: “The Nano bismuth composite shield with different ratios and thicknesses show significant dose reduction in breast. This could play a role in breast cancer prevention during chest CT scan”
3- Please add the data of SPSS manufacturer correctly in paper.
4- Please mention that the normality of data was checked before statistical tests.
5- It is unknown what is the number of tests performed in each thickness and percent of shields/ if the authors performed stat tests, they should implement dosimetries several times. Please explain in detail in this regard in paper.
6- It seems the authors should perform paired t tests or repeated measure ANOVA instead of t test. [repeated measure ANOVA is proposed as we want to compare three groups of no shield, 10% shield, and 15% shield simultaneously; in this case, pairwise comparisons should be performed considering bonferroni correction for comparison of each two groups together]. Please consider and correct.
7- The authors mentioned: “The statistical analysis showed that using 10% and 15% Nano bismuth shield with 0.5 mm thickness the increase in the noise was not statistically significant ($P \leq 0.084$)” this p value could be significant for example P=0.04 thats lower than 0.084 and is significant; in fact, the authors should mention lowest amount of P value not highest one. Please correct. Generally, it is better to mention the exact number of p values for each test.
8- It is unknown if the comparisons in table 2 are statistically significant or not? Please add p values for this part and comparisons.
Thanks.

REFEREE: Associate Editor | **Revision** (0) 15 Aug 2019

Dear EIC,
The manuscript needs major revision.
Best,

REFEREE: EIC | **Revision** (0) 17 Aug 2019

Dear Author,
The reviewers' comments are mentioned. Please correct the details as mentioned above carefully according to reviewers' request.
Thanks.

OPEN PEER REVIEW

Revision (1)

Reply to Reviewers

Ideally, the reviewing process can significantly improve the submitted manuscripts by allowing the authors to take into account the advice of reviewers. Author(s) must reply to all reviewers' comments in a separate Word file, point by point. A "**Reply to Reviewers**" document is submitted along with revised manuscript during submission of revised files, summarizing the changes that the authors made in response to the reviewers' comments. The responses to reviewers' comments specifies how the authors addressed each comment the reviewers made.

You can read the authors' responses to the reviewers' comments in the next page.

Dear editor

Thank you for reading and costly recommendations. We have carefully revised the reviewer's suggestions in text of manuscript and reply letter. It will send two files including reply to reviewers and corrected manuscript.

We hope there was acceptable for reviewers and editor of Iranian Journal of Radiology.

Yours faithfully,
Corresponding author.

Reviewer 1:

Q.1. Please add the abbreviations in full term and abbreviation for the first time.

Reply:

The abbreviations in full term were added to text including computed tomography (CT), bismuth oxide (Bi_2O_3), region of interests (ROI) and Hounsfield unit (HU).

Q. 2. The authors have declared in conclusion of abstract: “The Nano bismuth composite shield with different ratios and thicknesses has potential for breast cancer prevention along with a significant reduction in the breast dose in the chest CT scan.” Conclusion of paper should begin with direct findings of paper not with later consequences of study. For example, they should write something like this: “The Nano bismuth composite shield with different ratios and thicknesses show significant dose reduction in breast. This could play a role in breast cancer prevention during chest CT scan”.

Reply:

It is done. The reviewer sentences replaced.

Q. 3. Please add the data of SPSS manufacturer correctly in paper.

Reply:

SPSS software in detail was added. Statistical analysis of the results was calculated using SPSS version 16.0 (IBM Co, Armonk, NY, USA) software.

Q. 4. Please mention that the normality of data was checked before statistical tests.

Reply:

After consulting with the statistical consultant, the normality of data was checked and Wilcoxon non-parametric method was used for statistical analysis. This sentence was added to text.

Q. 5. It is unknown what is the number of tests performed in each thickness and percent of shields/ if the authors performed stat tests, they should implement dosimetries several times. Please explain in detail in this regard in paper.

Reply:

Every experiment repeated for three times. In the first time, with the presence of CT, the skin and glandular dose of normal and large breasts with and without the use of composite shields 10% and 15% 0.5 mm were evaluated.

The second experiment, the skin and glandular dose of normal and large breasts in the state with and without the use of composite shields 10% and 15% 1 mm were assessed. In the every session, to measure entrance skin dose at the level of the breast, four TLD chips were placed on each breast skin around the nipple. Also, to measure breast glandular dose, four TLDs were placed in the same position of the fourth layer of the large and normal breast phantoms. Therefore in addition, for each scan, sixteen TLDs were used. After reading each

TLD, the ECC (Element Correction Coefficient) was considered and the received dose of each TLD chip was obtained using the calibration curve. The average of the TLD doses was calculated and recorded.
This sentences were added to method part of text.

Q. 6. It seems the authors should perform paired t tests or repeated measure ANOVA instead of t test. [repeated measure ANOVA is proposed as we want to compare three groups of no shield, 10% shield and 15% shield simultaneously; in this case, pairwise comparisons should be perform considering bonferroni correction for comparison of each two groups together]. Please consider and correct.

Reply:

However it seems that paired t-test should perform but after consulting with statistical consultant, new and attentive statistical test named "Wilcoxon signed-rank test" was done for data. Wilcoxon test analysis is a non-parametric statistical test used to compare of groups. It can be used as an alternative to the paired t-test when the sample size is small and the population cannot be assumed to be normally distributed. P values were reported.
The results of the statistical analysis of the Wilcoxon signed-rank test was shown in following table. The p value was changed to new analysis result in the text.

	10% Bi 0.5 mm	10% Bi 1 mm	15% Bi 0.5 mm	15% Bi 1 mm
Without Shield	0.0460	0.0305	0.0251	0.0083
10% Bi 0.5 mm	-	0.1038	0.0277	0.0103
10% Bi 1 mm	-	-	0.0248	0.0227
15% Bi 0.5 mm	-	-	-	0.1112

Q. 7. The authors mentioned: “The statistical analysis showed that using 10% and 15% Nano bismuth shield with 0.5 mm thickness the increase in the noise was not statistically significant ($P \leq 0.084$)” this p value could be significant for example P=0.04 thas lower than 0.084 and is significant; in fact, the authors should mention lowest amount of P value not highest one. Please correct. Generally, it is better to mention exact number of p values for each test.

Reply:

Yes, it is correct. The exact numbers of p values for each test were added to Table 2.

Q. 8. It is unknown if the comparisons in Table 2 are statistically significant or not? Please add p values for this part and comparisons.

Reply:

It is done. P values of Wilcoxon signed-rank test was added to Table 2.

Reviewer 2:

Q.1. Although the research is valuable but; there is only one important defect around experimental research. It is highly recommended to compare software simulation with real experiment.

Reply:

The simulated data was presented in our newly published article (reference number 14). This references has been added to text.

Malekzadeh R, Mehnati P, Sooteh MY, Mesbahi A, *Influence of the size of nano-and microparticles and photon energy on mass attenuation coefficients of bismuth–silicon shields in diagnostic radiology.* Radiological physics and technology. 2019, 12(3), 1-10.

OPEN PEER REVIEW

Revision (1)

Here, you can see the **Reviewers**, **Associate Editors** and **EICs'** comments from the beginning to the end of the revision process.

Madjid Shakiba: Reviewer | **Revision** (1) — 5 Oct 2019

Dear AE,
The study is reviewed carefully. According to comments and revisions by the author, this manuscript is accepted.
Thanks

REFEREE: Associate Editor | **Revision** (1) — 17 Dec 2019

Dear EIC
Based on the authors' answers to the reviewers' comments, the reviewer(s) have recommended publication.
Kind regards.

Mehranoosh Dolatshahi: Associate Editor | **Revision** (1) — 30 Dec 2019

Dear EIC
The reviewer(s) have recommended publication, but also suggest some minor revisions to the manuscript. Therefore, I invite the author to respond to the reviewer(s)' comments and revise his manuscript.
Kind regards,

Kavous Firouznia: EIC | **Revision** (1) — 31 Dec 2019

Dear authors,
Your article needs Minor Revision.
Regards

OPEN PEER REVIEW

Revision (2)

Reply to Reviewers

Ideally, the reviewing process can significantly improve the submitted manuscripts by allowing the authors to take into account the advice of reviewers. Author(s) must reply to all reviewers' comments in a separate Word file, point by point. A "**Reply to Reviewers**" document is submitted along with revised manuscript during submission of revised files, summarizing the changes that the authors made in response to the reviewers' comments. The responses to reviewers' comments specifies how the authors addressed each comment the reviewers made.

You can read the authors' responses to the reviewers' comments in the next page.

Dear editor

Thank you for reading and costly recommendations. We have carefully revised the reviewer's suggestions in text of manuscript and reply to reviewer letter. It will send two files including reply to reviewer and highlighted manuscript.

We hope there was acceptable for reviewers and editor of Iranian Journal of Radiology.

Yours faithfully,
Corresponding author.

Reviewer 1:

Q. 1. Is the spelling of “sole” correct? Please clarify.

Reply:

Thanks for your consideration, our mean was "solution". "sole" is changed to "solution" in the manuscript.

Q. 2. What does SEM-MAP stand for? Please clarify.

Reply:

SEM-MAP or in some references has been called SEM-EDS (Energy Dispersive Spectroscopy) is using to evaluate the element compositions and distribution of particles in polymer based composites. It is a fast method to obtain a qualitative assessment of the elemental composition and homogeneity of our sample at the scale of the scanning area in an SEM. Therefore, a mapping by SEM gives us the distribution in different colors of chemical elements that constitute the analyzed sample using EDS.

It is necessary in construction of radiation composite shield to have homogenous distribution of nanoparticles in composite. So we used SEM- MAP technique to approve and to show how much our homemade composited are made correctly.

OPEN PEER REVIEW

Revision (2)

Here, you can see the **Reviewers**, **Associate Editors** and **EICs'** comments from the beginning to the end of the revision process.

Mehranoosh Dolatshahi: Associate Editor | **Revision** (2) 11 Jan 2020

Dear EIC
Based on the authors' answers to the reviewers' comments, the reviewer(s) have recommended publication.
Kind regards.

Kavous Firouznia: EIC | **Revision** (2) 11 Jan 2020

Dear authors,
Your article is acceptable for the publication.
Regards