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OPEN PEER REVIEW

Dual-energy Computed Tomography (DECT) Scan for Determination of Renal Stone Composition: A Phantom Study

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About this report

This open peer review (OPR) report shows the public comments made on this article during peer review, by the reviewers, the associate editor and the editor-in-chief, for every revision round, together with the authors' replies. Comments appear only with the consent of the people who wrote them. Reviewers who chose to sign their report are named; the others are shown as "Referee". Comments are edited for language only, and confidential remarks to the editors are not included.

More about open peer review: brieflands.com/knowledgebase/opr

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1 Original submission

4 comments · 16 Jan 2023 – 9 Feb 2023

Referee 1 Reviewer

MINOR REVISION 16 Jan 2023

Thanks to the authors for considering our journal for their submission.
Regarding this manuscript, there are some similar studies on this topic; moreover, other deficiencies should be addressed as follows:

A. General
1. The novelty and added value of the current study should be stated in the introduction.
2. The introduction in the full text isn't coherent and should be rewritten.
3. Sentences shouldn't start with a number.

B. Abstract
3. Objective: What do you mean by pathology results as the gold standard? I think that chemical analysis is a better term.
4. Methods: Statistical analysis and the significance level should be added as the last sentence.
5. Results: This section is very brief. It should contain descriptive findings and all the most important findings. This sentence "The results indicate that dual energy CT scans can be used effectively in detection of pure kidney stones" belongs in the discussion.
6. Results and conclusion: For appropriate evaluation of a diagnostic test, all measures such as sensitivity, specificity, and positive and negative predictive values should be assessed. Then, the conclusion should be based on all these indices.

C. Full-Text
7. The method is described very briefly and unclearly. It should be written with subheadings. The published paper entitled "Diagnostic validity of dual-energy CT in determination of urolithiasis chemical composition: In vivo analysis" can be used as a template to clarify the method.
8. The statistical analysis is inappropriate and outdated. First, descriptive analyses of patients and stones should be presented. Then, comparisons can be made among different types of stones. Finally, ROC analysis can be performed.
9. The presentation of the results is inappropriate and should be similar to that in the above-mentioned paper. ROC measures should be reported along with 95% confidence intervals.

Referee 2 Reviewer

ACCEPT 7 Feb 2023

Dear AE,
The article is acceptable.
Thanks

Associate Editor

MAJOR REVISION 8 Feb 2023

The manuscript needs Major Revision considering the reviewers' suggestions.

Editor-in-Chief MAJOR REVISION 9 Feb 2023

Dear authors,
Your article needs Major Revision.
Regards

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Revision 1

AUTHORS' RESPONSE TO REVIEWERS

Authors' reply to reviewers

The next pages contain the authors' point-by-point reply to the comments of this revision round, as submitted with the revised manuscript. It is published as the authors wrote it.

STEP BY STEP response to reviewers:

We appreciate very much the comprehensive reviews provided by the referees.
The comments and recommendations have helped us to improve the quality of this article substantially.
We have provided point-by-point responses to each of the referee's concerns.

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Reviewer 1:

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Thanks to the authors for considering our journal for their submission.
About this manuscript, it can be said that there are some similar studies on this topic; moreover, others defects should be revised as follows:

A. General
1. Novelty and added value of the current study should be added in the introduction of study.
Thanks for your comment. Actually, at first we have submitted this article as a "brief report" not an original article. Our team is planning to find the ways to determine the type of mixed stones by using CT images, and deep neural networks. This "brief report" was the first step in our comprehensive work.
We have added this part to the final part of the manuscript:
"Based on the results of this brief study, for accurate detection of the all pure, and mixed stones, some more analytical methods are necessary. In future work, we would like to extend our work to automatic material recognition of pure, and mixed renal stone types based on the deep neural networks."
However, with the changes that we made to the manuscript, we were asked to submit the revised version as the original article.

2. Full-text introduction isn't coherent and should be re-written.
Ok, corrected.

3. Sentences shouldn't be started with number.
OK, Corrected.

B. Abstract
3. Objective: what is your mean from pathology results as gold standard? I think that chemical analysis is a better term.
You are right. Corrected to biochemistry lab.

4. Methods: Statistical analysis and significance level should be added as last sentence.

Ok, corrected. We added some parts for statistical analysis to the article.

5. Results: it is very brief. It should be contain descriptive finding and all most important findings. This sentence "The results indicate that dual energy CT scans can be used effectively in detection of pure kidney stones" is discussion.

Ok, corrected. more figures and tables were added.

6. Results and conclusion: For appropriate evaluation of a diagnostic test, all measures like as sensitivity, specificity, positive and negative predictive values should be assessed. Then, conclusion should be made base on all these indices.

Ok, corrected.

C. Full-Text

7. Method is very brief and unclear. It should be written with sub-headings. Published paper entitled as "Diagnostic validity of dual-energy CT in determination of urolithiasis chemical composition: In vivo analysis" can be used as template for clarification of method.

You are right. As the article was written as a "brief report", we tried to write it very briefly. But we have revised it to become clearer.

8. Statistical analysis is inappropriate and noncurrent. At first, descriptive analysis of patients, stones should be presented. Then, it can be made comparisons among different types of stones. Finally, it can be done ROC analysis.

The material and method, and the result section was rewritten accordingly.

9. Results presentation is inappropriate and it should be similar to above mentioned paper. ROC measures should be reported along with %95 confidence intervals.

The material and method, and the result section was rewritten accordingly.

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Reviewer 2:

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Dear AE,

The article is acceptable.

Thanks

A*: Thanks for positive response.*

****

Reviewer 3:

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Thanks for your manuscript

-As there is lots of similar study I want to know the novelty of this study in comparison with studies as Determination of renal stone composition with dual-energy CT

by G Hidas · 2010

Dual-Energy CT for Quantification of Urinary Stone ...
by S Leng · 2016

Determination of Renal Stone Composition with Dual-Energy ...
by R Eliahou · 2010

Thanks for your comment. Actually, at first we have submitted this article as a "brief report" not an original article. Our team is planning to find the ways to determine the type of mixed stones by using CT images, and deep neural networks. This "brief report" was the first step in our comprehensive work.

We have added this part to the final part of the manuscript:

'Based on the results of this brief study, for accurate detection of the all pure, and mixed stones, some more analytical methods are necessary. In future work, we would like to extend our work to automatic material recognition of pure, and mixed renal stone types based on the deep neural networks."

However, with the changes that we made to the manuscript, we were asked to submit the revised version as the original article.

-A native English review is needed for better quality.
A: OK, we have edited it.

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Reviewer 4:

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1) How can you justify the novelty and excellence of this research?
Due to the fact that many articles with the same title and the same working method and the same results have been published in this field and you have not paid attention to this matter.

Thanks for your comment. Actually, first we had submitted this article as a "brief report" not an "original research article".

However, Our team is planning to find the ways to determine the type of mixed stones by using CT images, and deep neural networks. This "brief report" is the first step in our comprehensive work.

2) According to similar articles, the DECT method is inefficient for mixed stones. Considering this issue, what is your scientific justification and requirement for writing this research?

Thanks for your comment. Actually, at first we have submitted this article as a "brief report" not an original article. Our team is planning to find the ways to determine the type of mixed stones by using CT images, and deep neural networks. This "brief report" was the first step in our comprehensive work.

We have added this part to the final part of the manuscript:

‘Based on the results of this brief study, for accurate detection of the all pure, and mixed stones, some more analytical methods are necessary. In future work, we would like to extend our work to automatic material recognition of pure, and mixed renal stone types based on the deep neural networks.”

However, with the changes that we made to the manuscript, we were asked to submit the revised version as the original article.

Introduction

a. In the introduction section of this article, it has been mentioned that “many studies have declared the usefulness of this research method”, but you have not provided a reliable source and reference to prove this claim.

A: OK, references were added.

b. Most of the contents that are given in the introduction do not have references that need to be added.

A: OK, references were added.

Method and material

In the method and material section, the following should be observed and corrected:

a. The method of calculating the sample size and criteria for selecting patients for kidney stone extraction and the size of the extracted stones should be added.

A: Actually, we did not choose the patients. The renal stones were prepared from the biochemistry lab. The only criteria was the size of the stone which should be about 1mm to 3mm in order to ce inserted in the holes of the rando phantom.

b. What were the criteria for choosing the radiation doses for the phantom?

A: we had not explained the method well. Actually, We did not apply any criteria for the radiation dose. Actually, we performed the routine CT imaging modalities for scanning kidney stones. An ultra-low dose scan for finding the location of the stone, and a DECT with small field of view for finding the stone type.

c. What is the standard reference for the diagnostic accuracy calculation formula in this article and why is it not provided?

A: OK, corrected. We defined the accuracy as Equation 2, we have added statistical analysis to the paper.

d. regarding the diagnostic test protocol, including how to perform 3D reconstruction in low-energy radiation scans and etc, No proper explanation was provided.

A: OK, it was added. As follows:

The ultra-low-dose scan of the abdomen is usually performed with a large field of view to find the exact location of the stone in the body. Then, single source-Dual energy fast Kvp-switching CT scans were performed for distinguishing the stone type.

It should be noted that the Adaptive Iterative Dose Reconstruction 3D technique, AIDR 3D, is used by the Toshiba CT scanner to obtain the ultra-low- dose, while maintaining the image quality. This reconstruction method is known as a very important evolution in CT imaging by using Toshiba CT scanners.

e. What appropriate statistical methods have been used to check the significance or non-significance of the groups? It should be mentioned in the text of the article.
Ok, corrected.

Results
In your results section, cover the following:
a. Explain the repeatability or validity of the test.
A: OK, the results were revised.

b. The presented diagrams (Figure 2) are vague and do not correctly show the information and results. Also, there is no explanation for the index of the charts.
A: OK, It was corrected, a box plot was presented instead.

c. In the presented table, there is no information about radiations, the diameter of stones, and other necessary information.
A: The diameter of stones, and the X-Ray radiation were added in the text.

Discussion
a. In the discussion section, you have not presented the content correctly and completely.
It is necessary to discuss the analysis of the obtained results, clinical application of the results, generalizability, and comparison with the results of other research.
OK, Corrected.

b. Regarding referencing the materials used in this article, you must present the studies conducted according to the title of this article in the last five years.
A: Ok, Corrected.

c. The number of references provided is very small
A: As we applied this paper as a "brief report" More references were added.

2 Revision 1

4 comments · 27 Feb 2023 – 5 Mar 2023

Referee 1 Reviewer

MAJOR REVISION 27 Feb 2023

Thanks to the authors for incorporating the comments into the manuscript. However, the main problem with this manuscript is still the lack of innovation, and the authors' explanations are not convincing.
Furthermore, the following points should be considered:
1. The abstract should be written in a structured format.
2. A results section should be added to the abstract.
3. The term "predict" in all sentences such as "the DECT can predict the Uric Acide, Cystine, and Calcium-Oxalate pure stone types with high sensitivity" should be replaced with the word "diagnose".
4. Table 1 should be presented in the first section of the results. Moreover, the number of mixed stones should be added.
5. The numbering of the method subsections is incorrect.
6. The performance scoring section of the method should be deleted, and only these sentences, "After determination of the stone type using the DECT scanner, the performance of the DCET was checked by scoring the sensitivity, specificity, and the accuracy of the DECT results. The biochemical analysis results were used as the gold standard for scoring the ability of DECT in determining the type of renal stones", should be added as the last sentences of the statistical analysis section. Moreover, the terms "performance, and scoring" should be replaced with diagnostic value and estimation, respectively. Furthermore, the positive predictive value index should be calculated and reported in Table 2.
7. Check the accuracy values in Table 2, because accuracy is equal to the sum of the true positive and true negative cells divided by the total number of cells; therefore, it becomes 1 when both sensitivity and specificity are 1.

Referee 3 Reviewer

ACCEPT 4 Mar 2023

I agree to accept the article as a 'brief study' and not as an 'original article'.

Associate Editor

MAJOR REVISION 4 Mar 2023

Major revision, considering the reviewers' review of the manuscript.

Editor-in-Chief

MAJOR REVISION 5 Mar 2023

Dear authors,
Your article needs Major Revision.
Regards

3

Revision 2

AUTHORS' RESPONSE TO REVIEWERS

Authors' reply to reviewers

The next pages contain the authors' point-by-point reply to the comments of this revision round, as submitted with the revised manuscript. It is published as the authors wrote it.

Reviewer 1:
I agree to accept the article as a 'brief study' and not as an 'original article'.
Thanks.

Reviewer 2:
Thanks to the authors for applying comments in the manuscript. But still, the main problem of this manuscript is the lack of innovation and the explanations of the authors are not convincing. Furthermore, following points should be considered:
Thank you for all the good comments, based on the recommendations of the reviewers, we submit the manuscript as a “brief report”.

1. Abstract should be written in structured format.
OK, it is done.

2. Results section should be added to the abstract.
OK, it is done.

3. The term of "predict" in all sentences such as "the DECT can predict the Uric Acide, Cystine, and Calcium-Oxalate pure stone types with high sensitivity" should be replaced by diagnose word.
OK, it is done.

4. Table 1 should be presented in the first section of results. Moreover, mixed stones number should be added.
OK, it is done.

5. Sub-heading sections number of method is wrong.
OK, it is done.

6. Performance scoring section of method should be deleted and only this sentences "After determination of the stone type using the DECT scanner, the performance of the DCET was checked by scoring the sensitivity, specificity, and the accuracy of the DECT results. The biochemical analysis results were used as the gold standard for scoring the ability of DECT in determining the type of renal stones" should be added as last sentences of statistical analysis. Moreover, the terms of "performance, and scoring" should be replaced with diagnostic value and estimation, respectively. Furthermore, positive predictive value index should be calculated and reported in the table 2.
OK, it is done.

7. Check the accuracy values in Table 2. Because accuracy is equal to the sum of true positives and true negative cells divided by the total number of cells; and so, it becomes 1 when both sensitivity and specificity are 1.
I hope that I have gotten the point, and understood what you mean by this question.
The value of the sensitivity, and specificity of any of the stones, does not equal to 1, simultaneously.
It should be noted that the numbers in table 2, are the average of performing the DECT scans several times, not the results of a single experiment.

3 Revision 2

3 comments · 11 Mar 2023 – 24 Mar 2023

Referee 1 Reviewer

ACCEPT 11 Mar 2023

Thanks to the authors for the revision.
Currently, this manuscript is acceptable for publication in the IJR.

Associate Editor

ACCEPT 11 Mar 2023

Accept

Editor-in-Chief

MINOR REVISION 24 Mar 2023

Dear authors,
Your article needs Minor Revision.
Regards

4

Revision 3

AUTHORS' RESPONSE TO REVIEWERS

Authors' reply to reviewers

The next pages contain the authors' point-by-point reply to the comments of this revision round, as submitted with the revised manuscript. It is published as the authors wrote it.

Associate Editor 1:
Accept
Associate Editor 2:
thank to authors for sending their paper to IJR.
1-please add objective part to the abstract according to journal format.

Ok, Corrected.
2-the authors mentioned in abstract: "The purpose of this study is to determine the efficacy of DECT in the determination of renal stones when compared with the biochemical analysis results as the gold standard." I think it should be corrected as: "The purpose of this study is to determine the efficacy of DECT in the determination of renal stones type and composition when compared with the biochemical analysis results as the gold standard."

Ok, Corrected.
3-please add full term of abbreviations in first usage in abstract, for example UA, Ca-Ox, …

Ok, Corrected.
4-in line 4 abstract, please correct: Dual-energy CT scans (DECTs). In line 23: Uric Acid (UA)

Ok, Corrected.
5-sentence in lines 25 26 is written wrong. it seems they should write: ".…….for stone analysis that are infrared, ……"

Ok, Corrected.
6-please correct in lines 34 and 35: " …..benefits of DECT in identification…." When you have introduced an abbreviation, in next usages, please use abbreviation. [please follow this comment in all paper]

Ok, Corrected.
7-in line 35 the authors mentioned "identification of renal stones" is it correct or they should write "identification of renal stones type" or "identification of renal stones composition"?

Ok, Corrected.

8-please add objective part to paper according to journal format.

Ok, Corrected.
9-in line 83, the equation is 1 not 3. Why did the authors begin numbering from 3?

Ok, Corrected.
10-in line 98, please correct: "…. the performance of the DECT in stone type classification"

Ok, Corrected.
11-in line 101, please change: "scoring the ability" to: "determining diagnostic efficacy of"

Ok, Corrected.
12-please change table 2 legend as: "Table 2: Diagnostic indices of DECT in determining the stone type and their 95% confidence interval"

Ok, Corrected.

13-please add full term of abbreviations in tables 2 and 3 as footnote for example UA, Ca-Ox, Cys.

Ok, Corrected.

14-in lines 130-3, the 95% CI of AUC contains numbers greater than 1 that seems wrong. [Maximum AUC is 1]

Ok, Corrected.

15-in line 160, what is precession? [Precision?]

Ok, Corrected., (deleted)

16-what is precision in line 160? The authors did not calculate precision. They calculated sensitivity, specificity, accuracy and PPV. Please clarify or correct.

It was corrected

17-please follow journal format in references, for example, journal names should be abbreviated.

Ok, Corrected.

18-please change title 4 to discussion [delete conclusion]

Ok, Corrected.

4 Revision 3

1 comment · 11 Apr 2023

Editor-in-Chief

MINOR REVISION 11 Apr 2023

Dear authors,
Your article needs Minor Revision.
Regards

5

Revision 4

AUTHORS' RESPONSE TO REVIEWERS

Authors' reply to reviewers

The next pages contain the authors' point-by-point reply to the comments of this revision round, as submitted with the revised manuscript. It is published as the authors wrote it.

> Reviewers' Comments:

Associate Editor's Comments:

Associate Editor 1:
the authors have responded most of questions. there is only one consideration in paper. I think the phrase "renal stone type" is not appropriate as the renal stones could be classified in different aspects. the authors have used this phrase in many parts of paper. I think better version for this concept could be "renal stone chemical composition subtype" or something like this [especially, i think we should mention the field of classification that is on the matter chemical composition. in addition, i think subtype is better than type]. please consider this point and correct all of the relevant parts used the phrase "stone type" in different parts of paper.

Ok, corrected

5 Revision 4

1 comment · 3 May 2023

Editor-in-Chief

ACCEPT 3 May 2023

Dear authors,
Your article is acceptable for publication in IJR.
Regards