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Scope and challenges of machine learning-based diagnosis and prognosis in clinical dentistry: A literature review

Lilian Toledo Reyes, Jessica Klöckner Knorst, Fernanda Ruffo Ortiz, Thiago Machado Ardenghi*

*Corresponding author
Thiago Machado Ardenghi
Faculdade de Odontologia da Universidade Federal de Santa Maria, Av. Roraima, 1000, Cidade Universitária - 26F, Departamento de Estomatologia, 97015-372, Santa Maria, RS, Brasil.

Handling editor:
Michal Heger
Department of Pharmaceutics, Utrecht University, the Netherlands
Department of Pharmaceutics, Jiaxing University Medical College, Zhejiang, China

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1st Editorial decision
18-Mar-2021

Ref.: Ms. No. JCTRes-D-21-00007
Scope and challenges of machine learning based diagnosis and prognosis in clinical Dentistry. A literature review
Journal of Clinical and Translational Research

Dear Mrs Knorst,

Reviewers have now commented on your paper. You will see that they are advising that you revise your manuscript. If you are prepared to undertake the work required, I would be pleased to reconsider my decision.

For your guidance, reviewers' comments are appended below.

If you decide to revise the work, please submit a list of changes or a rebuttal against each point which is being raised when you submit the revised manuscript. Also, please ensure that the track changes function is switched on when implementing the revisions. This enables the reviewers to rapidly verify all changes made.

Your revision is due by Apr 17, 2021.

To submit a revision, go to https://www.editorialmanager.com/jctres/ and log in as an Author. You will see a menu item call Submission Needing Revision. You will find your submission record there.

Yours sincerely

Michal Heger
Editor-in-Chief
Journal of Clinical and Translational Research

Reviewers' comments:

Reviewer #1: Dear authours;
This manuscript is an useful for journal readers but you can check new paper and you should be add these for improve your literature review. After that, it can be publish in this journal.
Sincerely...

Reviewer #2: This narrative review lacks a full dental focus, it remains far too general
table 1 is not useful, nor systematically structured. It might benefit to provide different tables, more categorically addressed
Results on accuracy, validity and clinical applicability are lacking
there are already a number of other papers out that have a more systematic approach, reaching a better address of the scientific evidence

Reviewer #3:

Comments to the authors:

Thank you for the opportunity to review the manuscript titled "Scope and challenges of machine learning based diagnosis and prognosis in clinical Dentistry. A literature review." I have carefully read and reviewed this manuscript, considering that this is a current and relevant topic. I do not have any potential conflict of interest to review this manuscript. The use of artificial intelligence tools is extremely promising in most of the fields of dentistry, as you discussed in the article.
Instead of focusing on the applicability of AI methods for each dentistry specialty, I believe that it would be more innovative to discuss the real contribution of AI for diagnosis and prediction of dental diseases, treatment planning, outcome prediction, and dental research. Furthermore, the article should have discussed, in a practical way, the necessary steps to design a study for the aforementioned purposes.
Below I pointed out some concerns related to this article:
* There are already several recent and good publications with a similar proposal and discussion compared to your manuscript, as follows:

* Schwendicke F, Samek W, Krois J. Artificial Intelligence in Dentistry: Chances and Challenges. J Dent Res. 2020 Jul;99(7):769-774. doi: 10.1177/0022034520915714. Epub

2020 Apr 21. PMID: 32315260; PMCID: PMC7309354.

* Hung K, Montalvao C, Tanaka R, Kawai T, Bornstein MM. The use and performance of artificial intelligence applications in dental and maxillofacial radiology: A systematic review. Dentomaxillofac Radiol. 2020 Jan;49(1):20190107. doi: 10.1259/dmfr.20190107.
* Vishwanathaiah S, Patil S, Baeshen HA, Sarode SC, Bhandi S. Developments, application, and performance of artificial intelligence in dentistry - A systematic review. J Dent Sci. 2021 Jan;16(1):508-522. doi: 10.1016/j.jds.2020.06.019.
* Park WJ, Park JB. History and application of artificial neural networks in dentistry. Eur J Dent. 2018 Oct-Dec;12(4):594-601. doi: 10.4103/ejd.ejd_325_18.
* Tandon D, Rajawat J. Present and future of artificial intelligence in dentistry. J Oral Biol Craniofac Res. 2020 Oct-Dec;10(4):391-396. doi: 10.1016/j.jobcr.2020.07.015. Epub 2020 Jul 24. PMID: 32775180; PMCID: PMC7394756.
* Pethani F. Promises and perils of artificial intelligence in dentistry. Aust Dent J. 2020 Dec 19. doi: 10.1111/adj.12812.

* From all the aforementioned references, there are two systematic reviews. I know that some of the cited articles focused on reviewing the use of dental images as an input for deep neural networks. On the other hand, this is one of the main applicability of this technology in dentistry.

* What are the similarities and differences of your work compared to previous?

* In my opinion, the authors spent a lot of time discussing the basic concepts related to artificial intelligence. Despite being extremely important, they have been exhaustively discussed in the previous articles. Therefore, the authors should avoid repeating it and add new content to the literature.

* As one of the objectives was to identify typical algorithms used in the studies, the authors should have exemplified how to select the best algorithm and method. For example, they should have added the discussion of when a classic machine learning method should be used and why a deep learning method should be applied for some tasks.

* The literature lacks an article that discusses in a practical way what steps are necessary to design a study with artificial intelligence tools applied for diagnosis, treatment plan and prognosis.
* The following points would be of paramount interest:
o How to select a "dental" dataset and split it into training, validation and testing set?
o What is the importance of each phase in a " dental artificial intelligence study"?
o How to select a reference standard (ground truth)? Please provide practical examples applied to dental studies (as you did in topic 3 for other subjects).
o Discuss more about internal and external validation in dental studies.
o Challenges for interpret the outputs (explainable AI) and to avoid considering it as a "black box".
o How to obtain confident, consistent and calibrated results?
o Examples of overfitting in dental studies and how to obtain generalizable models?
o How to transport some mathematical models/outcomes of dental researches to the clinical dental practice? Please state the clinical relevance and clinical applicability of different kind of algorithms.
Reviewer conclusion: I believe that this paper is suitable for publication only after a major

revision.

Reviewer #4: Artificial intelligence is a novel topic in recent years，especially in the medical field. This paper made a review based on "Scope and challenges of machine learning based diagnosis and prognosis in clinical Dentistry.". The point is good, but there are many problems in this review.
1.I would suggest the authors improve the fluency of the speech avoiding repetitions and to check for grammar errors, ensuring to use always the same verb tense, using properly the articles before nouns and paying attention to consistency with countable and uncountable nouns. Such as "The first reports of its applicability", " Machine learning. Definition and paradigms."
2. I don't think the second paragraph of section 1.1 is redundant.
3. This paper describes the applications and defects of ANN and SVM in several fields. But these algorithms are old in the AI field, you should introduce more new algorithms,such as CNN, RNN, and so on
4. I suggest the authors give more description of Section 2.6.

Reviewer #5: This is a review article about machine learning algorithms used in clinical dentistry. Keyword selections and the number of articles reviewed are appropriate and sufficient. In addition, the literature is up to date. Manuscript organization is well and it was fluently written. The advantages and challenges of using machine learning algorithms in branches of dentistry are objectively given. Consequently, I advise accepting this manuscript.

Ps: I would recommend that you use the term "feed forward process" instead of "forward propagation process". (page 9 , line 40)

There is additional documentation related to this decision letter. To access the file(s), please click the link below. You may also login to the system and click the 'View Attachments' link in the Action column.

Authors' response

Response to the Comments

The authors would like to thank the editor and all the reviewers for the relevant comments provided on previous manuscript version and also the motivating words and valuable suggestions. For ease of review, all changes made are highlighted in yellow in the new version of the manuscript.

Reviewer(s)' Comments to Author:

Referee: 1
Comments to the Author
1. This manuscript is an useful for journal readers but you can check new paper and you should be add these for improve your literature review.

Response: Thank you for your observation. Following your recommendation, an updated literature review was performed using the previously defined search strategy in PubMed/Medline database:

((((("artificial intelligence"[MeSH Terms]) OR "machine learning"[MeSH Terms]) OR "supervised machine learning"[MeSH Terms]) OR "unsupervised machine learning"[MeSH Terms]) OR "deep learning"[MeSH Terms]) AND ((("prognosis"[MeSH Terms]) OR "diagnosis"[MeSH Terms]) OR "treatment"[MeSH Terms])) AND ((((((((((((((("dentistry"[MeSH Terms]) OR "oral health"[MeSH Terms]) OR "teeth"[MeSH Terms]) OR "orthodontics"[MeSH Terms]) OR "periodontal diseases"[MeSH Terms]) OR "operative dentistry"[MeSH Terms]) OR "oral surgery"[MeSH Terms]) OR "prosthodontics"[MeSH Terms]) OR "endodontics"[MeSH Terms]) OR ("implants and prostheses"[MeSH Terms])) OR " dental implants"[MeSH Terms]) OR "pediatric dentistry"[MeSH Terms]) OR "dental radiography"[MeSH Terms]) OR "radiology"[MeSH Terms]) OR "forensic dentistry"[MeSH Terms]) OR "oral medicine"[MeSH Terms]) OR "maxillofacial surgery"[MeSH Terms]).

A total of 542 titles were compiled. After analysis of the abstracts of those studies that met the eligibility criteria, 62 articles were considered in the reviewed manuscript version. The distribution of articles by year of publication was as follows: 2010 (3), 2011 (1), 2012 (3), 2013 (2), 2014 (1), 2015 (2), 2016 (2), 2017 (6), 2018 (3)), 2019 (15), 2020 (23), 2021 (1). As can be seen, in the current version of the manuscript, 63% of the reviewed papers correspond to the last two years.

Referee: 2
Comments to the Author

1. **This narrative review lacks a full dental focus, it remains far too general Table 1 is not useful, nor systematically structured. It might benefit to provide different tables, more categorically addressed. Results on accuracy, validity and clinical applicability are lacking, there are already a number of other papers out that have a more systematic approach, reaching a better address of the scientific evidence**

Response: We appreciate your comment. It should be noted that the present study constitutes a narrative review and not a systematic review. Although the search strategy is explicitly presented to achieve greater transparency in the report, the focus was not to offer a systematic approach. The aim of the present study was to help the reader to better understand the scope and challenges of machine learning in today's dental practice based on the state of current research of this topic from a theoretical and contextual point of view. As such, a great heterogeneity prevails that prevents deepening the systematic approach. On the other hand, it is possible to have a more comprehensive vision of the actual use of these techniques within Dentistry, establishing guidelines and pointing out common issues in multiple sub-fields. Following your suggestions, Table 1 was split in several more categorically structured tables. Results on the performance of these technologies were also added to these tables.

We certainly agree that recently there has been an increase in publications on the subject, which denotes the interest of researchers in the area. However, several points raised in the sequence allude to the main differences of our study with previous reports.

- The present review shows a broad synthesis of current studies in the field of Dentistry, where 24 of the 62 included studies correspond to the last year.
- It is not limited to the area of radiology or performance of specific algorithms as some previous studies such as:

Hung K, Montalvao C, Tanaka R, Kawai T, Bornstein MM. The use and performance of artificial intelligence applications in dental and maxillofacial radiology: A systematic review. Dentomaxillofac Radiol. 2020 Jan;49(1):20190107. doi: 10.1259/dmfr.20190107

Park WJ, Park JB. History and application of artificial neural networks in dentistry. Eur J Dent. 2018 Oct-Dec;12(4):594-601. doi: 10.4103/ejd.ejd_325_18.

Schwendicke F, Golla T, Dreher M, Krois J. Convolutional neural networks for dental image diagnostics: A scoping review. Journal of dentistry. 2019 Dec 1;91:103226.

- We agree that most applications of these techniques in Dentistry has been in the area of images processing. However, other applications using different data sets are been conducting . We try to cover them in the present study.
- Unlike other reports with more systematic approach, some key points were discussed with the aim to contribute to the improvement of these technologies in dental practice.
- Several examples from different Dentistry disciplines were introduced for a better understanding of the aspects addressed

Additional elements on the main differences of our proposal with previous research can be found in the response to Referee 3 below.

Referee: 3
Comments to the Author

Thank you for the opportunity to review the manuscript titled "Scope and challenges of machine learning based diagnosis and prognosis in clinical Dentistry. A literature review." I have carefully read and reviewed this manuscript, considering that this is a current and relevant topic. I do not have any potential conflict of interest to review this manuscript. The use of artificial intelligence tools is extremely promising in most of the fields of dentistry, as you discussed in the article.
Instead of focusing on the applicability of AI methods for each dentistry specialty, I believe that it would be more innovative to discuss the real contribution of AI for diagnosis and prediction of dental diseases, treatment planning, outcome prediction, and dental research. Furthermore, the article should have discussed, in a practical way, the necessary steps to design a study for the aforementioned purposes.

Below I pointed out some concerns related to this article:

1.There are already several recent and good publications with a similar proposal and discussion compared to your manuscript, as follows:

*** Schwendicke F, Samek W, Krois J. Artificial Intelligence in Dentistry: Chances and Challenges. J Dent Res. 2020 Jul;99(7):769-774. doi: 10.1177/0022034520915714. Epub 2020 Apr 21. PMID: 32315260; PMCID: PMC7309354.**

*** Hung K, Montalvao C, Tanaka R, Kawai T, Bornstein MM. The use and performance of artificial intelligence applications in dental and maxillofacial radiology: A systematic review. Dentomaxillofac Radiol. 2020 Jan;49(1):20190107. doi: 10.1259/dmfr.20190107.**

*** Vishwanathaiah S, Patil S, Baeshen HA, Sarode SC, Bhandi S. Developments, application, and performance of artificial intelligence in dentistry - A systematic review. J Dent Sci. 2021 Jan;16(1):508-522. doi: 10.1016/j.jds.2020.06.019.**

*** Park WJ, Park JB. History and application of artificial neural networks in dentistry. Eur J Dent. 2018 Oct-Dec;12(4):594-601. doi: 10.4103/ejd.ejd_325_18.**

*** Tandon D, Rajawat J. Present and future of artificial intelligence in dentistry. J Oral Biol Craniofac Res. 2020 Oct-Dec;10(4):391-396. doi: 10.1016/j.jobcr.2020.07.015. Epub 2020 Jul 24. PMID: 32775180; PMCID: PMC7394756.**

*** Pethani F. Promises and perils of artificial intelligence in dentistry. Aust Dent J. 2020 Dec 19. doi: 10.1111/adj.12812.**

*** From all the aforementioned references, there are two systematic reviews. I know that some of the cited articles focused on reviewing the use of dental images as an input for deep neural networks. On the other hand, this is one of the main applicability of this technology in dentistry.**

*** What are the similarities and differences of your work compared to previous?**

Response: We appreciate your detailed review. In fact, there are several related studies and some bibliographic reviews that address specific aspects of the use of ML in Dentistry have already been published. As mentioned, this denotes the relevance of the topic and the need to provide new and comprehensive studies. In the sequence we highlight the main differences of our study with previous research:

- Although the focus of the survey was not to offer a guide with the steps necessary to design this type of study, following the recommendations of the reviewer, Section 3 now shows several key points that should be considered when implementing these technologies in clinical practice.
- Theoretical aspects related to ML techniques are linked to various sub-fields of dental practice using examples that allow a better understanding by professionals in these areas. Some of these sub-fields are not sufficiently represented in the previously pointed out reviews. For instance, following the recommendation of reviewer 4, in the new version of the manuscript we improve the analysis and elaborate on the growing use of ML in cariology (Section 2.6). Also, applications of these techniques in other areas in which Dentistry intervenes, such as forensic Dentistry, are analyzed (Section 2.4). In this way, all these analyzes are integrated into a single study.
- As stated before, in response to review 2, most of the surveyed papers (63%) are from the last 2 years. Of these 24 papers correspond to the last year (2020-2021). Which shows the rapid development of these techniques within Dentistry. Therefore, our proposal is an updated study with great representation of current research not considered in previous studies.

- We do not limit the body of evidence to applications in radiology or the use of a specific algorithm as previous studies. Although we agree that the application of most of these techniques in Dentistry has been turned to work with images, other applications, using different data sets have also been conducted. We cover them in our study. Notable examples are:

31. Liu L, Wu W, Zhang SY, Zhang KQ, Li J, Liu Y, Yin ZH. Dental Caries Prediction Based on a Survey of the Oral Health Epidemiology among the Geriatric Residents of Liaoning, China. BioMed research international. 2020 Dec 7;2020.
42. Papantonopoulos G, Takahashi K, Bountis T, Loos BG. Artificial neural networks for the diagnosis of aggressive periodontitis trained by immunologic parameters. PloS one. 2014 Mar 6;9(3):e89757.
28. Hung M, Voss MW, Rosales MN, Li W, Su W, Xu J, Bounsanga J, Ruiz-Negrón B, Lauren E, Licari FW. Application of machine learning for diagnostic prediction of root caries. Gerodontology. 2019 Dec;36(4):395-404.
63.Kebschull M, Guarnieri P, Demmer RT, Boulesteix AL, Pavlidis P, Papapanou PN. Molecular differences between chronic and aggressive periodontitis. Journal of dental research. 2013 Dec;92(12):1081-8.
64.Ozden FO, Ozgonenel O, Ozden B, Aydogdu A. Diagnosis of periodontal diseases using different classification algorithms: A preliminary study. Nigerian journal of clinical practice. 2015;18(3):416-21.
65. Feres M, Louzoun Y, Haber S, Faveri M, Figueiredo LC, Levin L. Support vector machine-based differentiation between aggressive and chronic periodontitis using microbial profiles. International dental journal. 2018 Feb;68(1):39-46.
67. Shimpi N, McRoy S, Zhao H, Wu M, Acharya A. Development of a periodontitis risk assessment model for primary care providers in an interdisciplinary setting. Technology and Health Care. 2020 Jan 1;28(2):143-54.
78. Stehrer R, Hingsammer L, Staudigl C, Hunger S, Malek M, Jacob M, Meier J. Machine learning based prediction of perioperative blood loss in orthognathic surgery. Journal of Cranio-Maxillofacial Surgery. 2019 Nov 1;47(11):1676-81.
100. Cui Q, Chen Q, Liu P, Liu D, Wen Z. Clinical decision support model for tooth extraction therapy derived from electronic dental records. The Journal of Prosthetic Dentistry. 2020 Jul 20.

- Regarding the cited systematic reviews, in addition to the notable dissimilarities in methodology and scope, some other differences already mentioned above can be raised. For instance in ([a]Vishwanathaiah et al., 2021) the aim was to identify the developments, application, and performance of AI in Dentistry. Although the authors showed applications in the area, they restricted the analysis to applications supported by a reduced number of algorithms; without delving into the key aspects for the introduction of these techniques in clinical practice, as if it was addressed in the new version of our manuscript following the recommendations of the reviewer. The systematic review of ([b]Hung et al., 2020), focuses on the field of Radiology and does not expand the analysis to other areas.
- Finally, some of the cited studies were published during the period in which the first version of this manuscript was completed and submitted for review. In the new version of the manuscript these studies are cited.

Reference:

[a]Vishwanathaiah S, Patil S, Baeshen HA, Sarode SC, Bhandi S. Developments, application, and performance of artificial intelligence in dentistry - A systematic review. J Dent Sci. 2021 Jan;16(1):508-522. doi: 10.1016/j.jds.2020.06.019.

[b]*Hung K, Montalvao C, Tanaka R, Kawai T, Bornstein MM. The use and performance of artificial intelligence applications in dental and maxillofacial radiology: A systematic review. Dentomaxillofac Radiol. 2020 Jan;49(1):20190107. doi: 10.1259/dmfr.20190107.*

2. In my opinion, the authors spent a lot of time discussing the basic concepts related to artificial intelligence. Despite being extremely important, they have been exhaustively discussed in the previous articles. Therefore, the authors should avoid repeating it and add new content to the literature.

Response: We appreciate your comment. In the spirit of reducing the discussion of basic elements related to AI, in the current manuscript several paragraphs of the text were eliminated. Likewise, we expect that a more objective analysis of these concepts has been achieved by adding some examples from dental practice. Also, in Section 3, new points of interest were added aimed to provide key aspect on the implementation of these technologies in dental practice.

3. As one of the objectives was to identify typical algorithms used in the studies, the authors should have exemplified how to select the best algorithm and method. For example, they should have added the discussion of when a classic machine learning method should be used and why a deep learning method should be applied for some tasks.

Response: Thanks for your comment. In the new version of the manuscript we provide several examples regarding the criteria for choosing the appropriated algorithms and methods in Dentistry. Specifically in relation to the use of deep learning, in accordance with the above, the following was added to Subsection 2.1, page 8-9:

"These deep learning algorithms are a priority in complex tasks where there is a large amount of unstructured data, as would be the case of the classification of dental images, where their effectiveness has already been commented. These classifiers have the ability to recognize hidden relationships between interdependent variables, estimating decision rules. These are preferred when the priority is precision. However, classical algorithms are more useful for simple tasks, when there is no unstructured data and it is intended to prioritize the interpretability of the results. [22, 35, 41]."

4. The literature lacks an article that discusses in a practical way what steps are necessary to design a study with artificial intelligence tools applied for diagnosis, treatment plan and prognosis.
*** The following points would be of paramount interest:**
o How to select a "dental" dataset and split it into training, validation and testing set?
o What is the importance of each phase in a " dental artificial intelligence study"?
o How to select a reference standard (ground truth)? Please provide practical examples applied to dental studies (as you did in topic 3 for other subjects).
o Discuss more about internal and external validation in dental studies.
o Challenges for interpret the outputs (explainable AI) and to avoid considering it as a "black box".
o How to obtain confident, consistent and calibrated results?
o Examples of overfitting in dental studies and how to obtain generalizable models?
o How to transport some mathematical models/outcomes of dental researches to the

clinical dental practice? Please state the clinical relevance and clinical applicability of different kind of algorithms.

Response: Thanks for your comment. Although the focus of the proposal was not to offer a detailed guide with the steps necessary to design this type of study, following the recommendations of the reviewer, Section 3 was rewritten and key points that should be considered when implementing these technologies in clinical practice are discussed. Changes are highlighted in yellow.

Referee: 4
Comments to the Author

Artificial intelligence is a novel topic in recent years，especially in the medical field. This paper made a review based on "Scope and challenges of machine learning based diagnosis and prognosis in clinical Dentistry.". The point is good, but there are many problems in this review.

1. I would suggest the authors improve the fluency of the speech avoiding repetitions and to check for grammar errors, ensuring to use always the same verb tense, using properly the articles before nouns and paying attention to consistency with countable and uncountable nouns. Such as "The first reports of its applicability", " Machine learning. Definition and paradigms." I don't think the second paragraph of section 1.1 is redundant.

Response:
Thanks for your observation. To comply with this valuable comment, improvements were made in the text of the revised version of the manuscript. The whole text was exhaustively revised for better quality and readability.

2. This paper describes the applications and defects of ANN and SVM in several fields. But these algorithms are old in the AI field, you should introduce more new algorithms, such as CNN, RNN, and so on

Response:
Thanks for your comment. Indeed algorithms like CNN and RNN are being widely used in Dentistry applications. More specifications on this algorithms were added in the tables and new content was incorporated to the discussion in Section 2.1, page 8-9. Also the use of RNN was added and discussed in Section 2.6, page 13.

4. I suggest the authors give more description of Section 2.6.

Response:

1. Thanks for your comment. Following your recommendation, the bibliographic search was updated as can be seen in Table 5. New content, regarding Cariology applications, was added in the revised version of the manuscript in Section 2.6. Changes are highlighted in yellow.

Referee: 5
Comments to the Author

This is a review article about machine learning algorithms used in clinical dentistry. Keyword selections and the number of articles reviewed are appropriate and sufficient. In addition, the literature is up to date. Manuscript organization is well and it was fluently written. The advantages and challenges of using machine learning algorithms in branches of dentistry are objectively given. Consequently, I advise accepting this manuscript.

1. I would recommend that you use the term "feed forward process" instead of "forward propagation process". (page 9 , line 40).

Response: Thank you for your positive feedback and kind comments. In the revised version of the manuscript the paragraph that contained the term **"forward propagation process"** was removed.

2nd Editorial decision
10-May-2021

Ref.: Ms. No. JCTRes-D-21-00007R1
Scope and challenges of machine learning based diagnosis and prognosis in clinical Dentistry. A literature review
Journal of Clinical and Translational Research

Dear author(s),

Reviewers have submitted their critical appraisal of your paper. The reviewers' comments are appended below. Based on their comments and evaluation by the editorial board, your work was FOUND SUITABLE FOR PUBLICATION AFTER MINOR REVISION.

If you decide to revise the work, please itemize the reviewers' comments and provide a point-by-point response to every comment. An exemplary rebuttal letter can be found on at http://www.jctres.com/en/author-guidelines/ under "Manuscript preparation." Also, please use the track changes function in the original document so that the reviewers can easily verify your responses.

Your revision is due by Jun 09, 2021.

To submit a revision, go to https://www.editorialmanager.com/jctres/ and log in as an Author. You will see a menu item call Submission Needing Revision. You will find your submission record there.

Yours sincerely,

Michal Heger
Editor-in-Chief
Journal of Clinical and Translational Research

Reviewers' comments:

Reviewer #3: I have carefully revised the new version of your manuscript. Your modifications have significantly improved the manuscript. Therefore, I consider this manuscript suitable for

publication in this journal.

Editor:

Before we can definitively your article for publication, I kindly ask you to proofread the manuscript with the help of a native speaker. There are many errors in grammar and spelling, particularly in the use of commas and capitalization. Thank you.

Authors' response

Response to the Comments

Reviewers' comments:

Reviewer #3: I have carefully revised the new version of your manuscript. Your modifications have significantly improved the manuscript. Therefore, I consider this manuscript suitable for publication in this journal.

Response: Thank you for your comment and manuscript appreciation.

Editor:

Before we can definitively your article for publication, I kindly ask you to proofread the manuscript with the help of a native speaker. There are many errors in grammar and spelling, particularly in the use of commas and capitalization. Thank you.

Response: Thank you for your comment. The text was subjected to a detailed grammar review, and the certificate by a native speaker is in the attached document. Major changes are highlighted in red in the revised version of the manuscript, apart from minor grammar or spelling issues.

3rd Editorial decision
24-May-2021

Ref.: Ms. No. JCTRes-D-21-00007R2
Scope and challenges of machine learning based diagnosis and prognosis in clinical Dentistry: A literature review
Journal of Clinical and Translational Research

Dear authors,

I am pleased to inform you that your manuscript has been accepted for publication in the Journal of Clinical and Translational Research.

You will receive the proofs of your article shortly, which we kindly ask you to thoroughly review for any errors.

Thank you for submitting your work to JCTR.

Kindest regards,

Michal Heger
Editor-in-Chief
Journal of Clinical and Translational Research

Comments from the editors and reviewers: