

Subject: [BDS] Editor Decision

Dear Kwartarini Murdiastuti, Andreas Tjandra, Ahmad Kusumaatmaja, Heni Susilowati:

Your submission An In Vitro Analysis of Titanium Aging Surface Optimization through Variations in UV-C Photofunctionalization and SLA: Impact on Titanium Disk Hydrophilicity to Brazilian Dental Science Journal, has been revised and according to reviewers' comments, there are questions to be addressed and/or points to be clarified/corrected.

Please answer the reviewers considerations point-by-point in a separate document and also please make all the corrections in the text highlighted in yellow.

Deadline: 30 days

Thank you for considering Brazilian Dental Science Journal for publishing your research.

We are looking forward the revised version of you manuscript.

Sincerely,

Reviewer A:

Recommendation: Revisions Required

Questionnaire

Does the manuscript contain new and significant information to justify publication?*

Yes

Does the Abstract (Summary) clearly and accurately describe the content of the article?

Yes

Is the problem significant and concisely stated?

Yes

Are the methods or research design described comprehensively? Is the statistical analysis adequate?

No

Are the interpretations and conclusions justified by the results?

Yes

Is adequate reference made to other work in the field?

Yes

Is the language acceptable?

Yes

Manuscript Structure

Length of article is:*

Adequate

Number of tables is:

Adequate

Number of figures is:

Adequate

Please state any conflict(s) of interest that you have in relation to the review of this paper (state “none” if this is not applicable).

None

Rating

Interest*

Average

Quality

Average

Originality

Average

Overall

Average

Recommendation

Major Revision

Comments

Comments to the Author

Reviewer Report

Dear Editor,

Thank you for the opportunity to review this manuscript entitled “An in Vitro Analysis of Titanium Aging Surface Optimization through Variations in UV-C Photofunctionalization and SLA: Impact on Titanium Disk Hydrophilicity.” The topic is relevant and of interest within the field of dental implant surface modification. The manuscript presents a structured experimental approach and addresses an important aspect of implant surface optimization. However, several methodological and analytical concerns should be addressed before the manuscript can be considered for publication.

Summary:

The study evaluates the effects of different UV-C irradiation durations and SLA surface treatment on the hydrophilicity of titanium disks. The use of multiple irradiation times and surface treatments provides useful comparative insight. While the general concept is valuable, improvements are needed in methodology, statistical analysis, and interpretation of results.

Strengths:

- * The topic is relevant and clinically significant in implant dentistry.
- * Evaluation of multiple UV-C irradiation durations enhances the comparative value of the study.
- * The inclusion of XPS analysis to assess carbon contamination is appropriate.
- * The results show a consistent and logical trend in hydrophilicity improvement.

Major Comments:

1. Statistical Analysis Concerns:

The statistical approach requires clarification. Although a two-way ANOVA was initially applied, the manuscript reports violations of normality and homogeneity assumptions. The subsequent use of a one-way Welch ANOVA focusing only on UV irradiation does not fully reflect the factorial design of the study. A more appropriate statistical model or clearer justification is required.

2. XPS Experimental Design:

The methodology involving subdivision of a single titanium disk into multiple UV exposure regions raises concerns regarding possible cross-contamination and interaction effects. This design may compromise the validity of the chemical composition analysis. Independent samples for each condition would improve reliability.

3. Clinical Relevance of UV Duration:

The use of a 48-hour UV-C irradiation period appears impractical for clinical applications. The authors should justify this duration and discuss its clinical feasibility and translational relevance.

4. Surface Characterization:

SEM observations are presented qualitatively without quantitative analysis. The inclusion of quantitative surface characterization (e.g., roughness correlation or image-based analysis) would strengthen the interpretation of results.

5. Sample Size and Experimental Power:

The sample size is relatively limited, and no power analysis or justification is provided. This limitation should be discussed more explicitly.

6. Depth of Discussion:

The discussion section tends to restate findings rather than providing deeper mechanistic insights. Further explanation of the physicochemical mechanisms underlying UV-induced hydrophilicity and the minimal effect of SLA is recommended.

Minor Comments:

- * Please clarify whether environmental conditions (temperature and humidity) were controlled during contact angle measurements.
- * The description of the contact angle measurement method should be expanded to improve reproducibility.
- * Ensure consistency in reporting UV irradiation durations (minutes vs hours).
- * There appears to be an inconsistency in the reported p-values in Table 3 and the corresponding text, which should be carefully revised.
- * Some statements in the discussion would benefit from stronger alignment with cited references to avoid potential overinterpretation.
- * Minor language editing is recommended to improve clarity and readability.

Recommendation: Major Revision

Sincerely,

Reviewer B:

Recommendation: Resubmit for Review

Questionnaire

Does the manuscript contain new and significant information to justify publication?*

Yes

Does the Abstract (Summary) clearly and accurately describe the content of the article?

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Yes

Are the methods or research design described comprehensively? Is the statistical analysis adequate?

No

Are the interpretations and conclusions justified by the results?

No

Is adequate reference made to other work in the field?

Yes

Is the language acceptable?

No

Manuscript Structure

Length of article is:*

Adequate

Number of tables is:

Adequate

Number of figures is:

Adequate

Please state any conflict(s) of interest that you have in relation to the review of this paper (state “none” if this is not applicable).

None

Rating

Interest*

Good

Quality

Below Average

Originality

Average

Overall

Below Average

Recommendation

Major Revision

Comments

Comments to the Author

This manuscript addresses a relevant topic in implant surface science and presents a potentially meaningful finding, namely that UV-C irradiation reduces the water contact angle of aged titanium disks in a time-dependent manner. The study is of potential interest to readers in dental biomaterials. However, several methodological and reporting issues should be addressed before the manuscript can be considered for publication.

Major comments

1. There appears to be a potential inconsistency between Figure 2 and Table 1. Table 1 reports the highest mean water contact angle in the non-SLA/non-UV group as $73.14 \pm 4.78^\circ$, whereas the representative non-UV image in Figure 2 appears to show a substantially larger contact angle, visually closer to $\sim 107^\circ$ based on the provided measurement image. The authors should verify the raw data, figure labeling, and whether the representative images directly correspond to the summarized values presented in Table 1. This point is important because it affects the clarity and credibility of the primary outcome.
2. The statistical analysis is not sufficiently justified for the factorial design used. The study includes two factors, namely UV irradiation duration and surface treatment (SLA/non-SLA). However, the manuscript reports violations of homogeneity of variances and non-normality in the SLA group, while still presenting a conventional two-way ANOVA. The subsequent use of one-way Welch ANOVA only for UV duration does not fully address the factorial structure of the experiment. The statistical strategy should therefore be clarified and justified more rigorously, or alternatively revised using an approach more appropriate for factorial data when assumptions are violated.
3. The sample structure should be described more clearly. The manuscript states that 24 disks were used, divided into SLA and non-SLA

groups and then further subdivided into four UV-duration conditions. However, the exact sample size per subgroup should be stated explicitly in both the Methods and Results sections. In addition, the authors should clarify whether the contact angle value for each disk was based on a single measurement or on the average of repeated measurements.

4. The XPS results are underreported.

The manuscript states that carbon contamination decreased with increasing UV exposure in both SLA and non-SLA groups, but these findings are presented only descriptively and without a dedicated table or figure. Because the mechanistic interpretation relies heavily on carbon removal, the XPS data should be reported in a more complete and transparent manner, including the number of measurements performed and whether any statistical analysis was conducted.

5. The roughness analysis is insufficiently integrated into the Results section.

Surface roughness testing is described in the Methods, but the corresponding findings are not adequately presented in the Results. Since roughness is part of the rationale for comparing SLA and non-SLA groups, the quantitative outcomes should be explicitly reported and discussed.

6. The SEM analysis is descriptive and limited in scope.

The SEM images suggest no obvious topographic damage after UV-C treatment, which is a useful observation. However, the figure legend indicates that the images correspond to non-SLA disks only, so the SEM data do not adequately support comparison between SLA and non-SLA surfaces. This limitation should be acknowledged more clearly.

7. The conclusions are stronger than the evidence directly supports.

The present data support the conclusion that UV-C irradiation reduces the water contact angle of aged titanium disks in a time-dependent manner. However, the manuscript repeatedly links this finding to improved long-term osseointegration, although no biological assay or in vivo evaluation was performed. The conclusions should therefore be restricted to hydrophilicity/wettability rather than extrapolated to clinical osseointegration outcomes.

Minor comments

1. The manuscript would benefit from substantial English-language revision, as several sentences are grammatically incorrect or stylistically awkward.

2. The Abstract is too long and should be condensed.

3. The Introduction is somewhat lengthy and should be focused more directly on the study rationale and knowledge gap.

4. The phrase “chemical resistance is reduced due to the UV-C treatment” in the description of Figure 2 is unclear and should be revised.
5. The authors should standardize terminology throughout the manuscript, including hydrophilicity, wettability, contact angle, and photofunctionalization.
6. The legend of Figure 2 should clearly indicate whether the images are representative examples or directly correspond to the values summarized in Table 1.
