

## ANSWERING REVIEWERS

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**Comentario 81.** A short running title of no more than 6 words should be provided. It should state the topic of the paper. For example, Losurdo G et al. Two-year follow-up of duodenal lymphocytosis. (no more than 6 words). Changes were made in **lines 8**.

**Comentario a2.** Please write a summary of less than 100 words to outline the most innovative and important arguments and core contents in your paper to attract readers. Changes were made in **lines 56-63 (Core tip)**.

**Comentario 83.** Please provide the decomposable figure of Figures, whose parts are movable and editable. So you can put the original pictures in **PPT** and submit it in the system. (**Files: Image File**). All figures, tables and legends should not be in the main text. They should be put at the end of this paper. Changes were made in **lines 130, (figure 1, lines 829-857)**.

**Comentario 84.** All figures, tables and legends should not be in the main text. They should be put at the end of this paper. Changes were made in **line 196 (table 1, line 860)**.

**Comentario 85.** All figures, tables and legends should not be in the main text. They should be put at the end of this paper. Changes were made in **line 199 (table 2, line 861)**.

**Comentario 86.** All figures, tables and legends should not be in the main text. They should be put at the end of this paper. Changes were made in line:  
**line 204 (table 3, line 863)**  
**line 206 (table 4, line 866)**  
**line 208 (table 5, line 867)**  
**line 212 (table 6, line 870)**

**Comentario 810.** All figures, tables and legends should not be in the main text. They should be put at the end of this paper.

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Changes were made in **line 212 (figura 2)**.

**Comentario 811.** All figures, tables and legends should not be in the main text. They should be put at the end of this paper.

Please provide the decomposable figure of Figures, whose parts are movable and editable. So you can put the original pictures in **PPT** and submit it in the system.

Changes were made in **lines 212 (figura 3)**.

**Comentario 812.** All figures, tables and legends should not be in the main text. They should be put at the end of this paper.

Changes were made in **lines 216 (table 7)**.

**Comentario 813.** All figures, tables and legends should not be in the main text. They should be put at the end of this paper.

Changes were made in **lines 219 (table 8)**.

**Comentario 814.** All figures, tables and legends should not be in the main text. They should be put at the end of this paper.

Changes were made in **lines 225 (table 9)**.

## **Article Highlights**

### **Comentario A15.**

#### ***Research background***

*The background, present status, and significance of the study should be described in detail.*

In Mexico, dental fluorosis is considered a common health issue, especially in desertic areas, due to the high mineral content in water coming from increasingly deeper underground wells. In the State of Chihuahua there is an increasing number of individuals affected with fluorotic enamel stains, which are conspicuous and affect socialization of young people; we could even say that the majority of them present some degree of dental fluorosis. Our main objective is to help society through research and for that reason we have directed our efforts at trying to provide a safe and effective treatment. In spite of conducting several clinical studies, we had not had the initiative to publish

the results and we believe that our experience, though modest when compared to other researchers, could help improving or setting guidelines for something better.

Changes were made in **lines 486-497**.

### ***Research motivation***

The background, present status, and significance of the study should be described in detail.

One of the main problems for fluorosis treatment in children and adolescents is the first choice treatment, which often is restorative instead of whitening or microabrasion and that later must be periodically changed. for that reason it is important to implement non-invasive treatment protocols for young individuals with stains compromising aesthetics.

On the other hand there are many microabrasion techniques with variations in materials and procedures, which we could unify to achieve an ideal treatment, through the research findings of such variables. One of the main motivations was observing there is a great difference between a manual technique and one with rotary instruments, so we decided to start with a manual technique, improve it and then compare it against one with rotary instruments. Thus the choice could be clearer to decide improvements on the techniques, and perhaps unification of criteria and techniques.

Changes were made in **lines 498-511**.

### ***Research objectives***

The main objectives, the objectives that were realized, and the significance of realizing these objectives for future research in this field should be described in detail.

Among the main objectives of this study was to show the effectiveness of the technique through a concept that includes taking into account the enamel loss caused by the technique against the benefit of effectiveness obtained to remove the stain, through the variation of the working time and taking into account the stain size. These variables were measured with simple techniques that can be done by any dentist, except for the effectiveness that could be measured with the initial and final pictures some other time, with the help of a Software.

Measurement of these variables can be done in any dental microabrasion technique, the idea is to draw a clinical proposal that allows comparison to other microabrasion techniques.

However, we believe that the manual microabrasion technique is less invasive than those techniques involving rotary instruments, which we tried to show in this study.

Changes were made in **lines 512-524**.

### ***Research methods***

The research methods (e.g., experiments, data analysis, surveys, and clinical trials) that were adopted to realize the objectives, as well as the characteristics and novelty of these research methods, should be described in detail.

Dental fluorosis is a line of research that we have developed for many years in the Autonomous University of Chihuahua. Before starting this research we conducted other projects that have shown the advantages and disadvantages of microabrasion. Through time we have experimented with different methodologies from patient selection, to the technique itself. We conducted a research study that compared the manual and rotary techniques, we started with the stain measurement and efficiency through geometric figures of which we determined the surface area through photographs with a ruler on the patient's chin.

Working time could be extended and it was especially hard to measure in the technique with rotary instruments, because several applications were made and it was difficult to measure the total time.

It took some time to design the acrylic guide to measure enamel loss, because there were several orifices around the stain and we averaged the results, we could realize our method was not reliable and we changed and perfected it.

We observed that when finishing the technique there were occasional diastemas in adjacent teeth and we decided to protect them.

We have evolved in our studies and we believe that we must continue improving and proposing alternatives for measurement, through our results and through publishing in order to receive criticism from experts.

Changes were made in **lines 525-544.**

### ***Research results***

The research findings, their contributions to the research in this field, and the problems that remain to be solved should be described in detail.

One of our main findings is the effectiveness of this technique, which was on average 90% despite the stain size in the fluorotic enamel and variations in working time.

We consider that it is a safe and minimally invasive treatment, since the manual technique provides greater enamel loss control, which was shown to be within a range of 250 microns; therefore it is a safe and conservative treatment.

Among the safety measures is the working time, because it is known that it is directly related to the enamel loss in any microabrasion technique; therefore it was limited to 6 minutes; in addition to this, in teeth where the stain was removed before this time, it was reduced to 1.65 minutes.

Changes were made in **lines 545-554.**

### ***Research conclusions***

The following questions should be briefly answered:

What are the new findings of this study?

The effectiveness of this technique is on average high, 90%, however we did not find statistical significance respect of the stain size, enamel loss and working time, but we did find an upward trend.

Working time and enamel loss obtained a lower average in small stains, but not a significant difference respect of the middle-sized and large stains.

The highest enamel loss occurs in large enamel stains, or those over 40% of the vestibular face, but without statistical significance.

Enamel loss was statistically significant when the working time was over 4 minutes, with an average of 234 microns, however the minimum and maximum values reached 450 microns, for the working time under and over 4 minutes.

Controlling the working time under 6 minutes with 16% HCL with manual technique causes an enamel loss within acceptable average range.

The reduction in the size of the enamel stain caused by fluorosis after microabrasion is related to the tooth surface percentage occupied by the stain.

### **NEW HYPOTHESES**

The mechanical microabrasion techniques with abrasives provoke greater loss of fluorotic enamel than the manual microabrasion techniques without abrasives.

The effectiveness of the microabrasion technique using software is different than the effectiveness perceived by the patient and their relatives.

Changes were made in **lines 555-574.**

### **What are the new methods that this study proposed?**

Technique for enamel loss measurement in in vivo studies.

Technique for effectiveness measurement through the ArchiCAD software to obtain a residual stain percentage through pictures before and after microabrasion treatment.

Changes were made in **lines 575-579.**

### **What are the appropriate summarizations of the current knowledge that this study provided?**

Some techniques called enamel microabrasion actually provoke enamel MACROABRASION and the operator is not aware of it.

Abrasives with acid substances should not be used, because this manual microabrasion technique has higher control over enamel loss and we verified that it is efficient without the use of abrasives or rotating instruments.

Working time control is important because it accumulates and repeating the technique or the number of applications must take into account enamel loss more than stain removal.

## **INSIGHTS**

All techniques have advantages and disadvantages, and they must be perfected through the results of new clinical research. The results of the effectiveness of our study were surprising, because this variable did not have significant differences, it was high independently of the stain size or enamel loss.

On the other hand, we believe that enamel loss was taken care of, by limiting working time; despite this we had significant differences between working times under and above 4 minutes.

The reflection left by this work is that it is not the best technique but it provides methodology that allows comparing with other techniques and searching for an ideal treatment for fluorotic teeth.

Changes were made in **lines 580-600**.

## **What are the original insights into the current knowledge that this study offered?**

Contact of acid with the adjacent tooth provoked a diastema between the 2 central superior teeth by the end of the treatment, therefore it was decided to protect adjacent teeth with insulating tape, thus preventing contact of acid with teeth which will not receive treatment for the time being.

Before starting this research we conducted a thesis investigation that measured enamel loss with a working time above 6 minutes and higher enamel loss and higher incidence of macroabrasion were reported. Such study was not published but it was very helpful to pilot changes to the techniques tested in this study. One of the changes was reducing HCL concentration from 18% to 16%.

Sensitivity in young patients should be considered when executing any microabrasion or whitening technique, therefore we used sodium bicarbonate after rinsing HCL to neutralize any residue, and the results were that no patient who received treatment reported sensitivity.

Enamel loss is a variable that is difficult to measure clinically, so we implemented some techniques such as the microscope and the stereoscope that dentists do not often have in the dental clinic, so we search for a technique for

measuring enamel loss in in vivo studies, using a self-curing acrylic guide and a metal calibrator, with micron measurements, through the facial-lingual width of the tooth that receives the microabrasion technique. This technique is easy to implement by any clinician.

Aesthetic appreciation is subjective, therefore the criteria of the patient, relative or dentist is not reliable, therefore we proposed the use of ArchiCAD software to obtain an objective percentage of the residual stain through pictures before and after the microabrasion treatment.

In an unpublished prior study, we observed that not limiting the working time could bring macroabrasion losses; in order to make the technique safer, we decided to establish an upper limit of 6 minutes for the working time, to avoid unnecessary enamel loss.

Changes were made in **lines 601-628**.

### **What are the new phenomena that were found through experiments in this study?**

This technique is very sensitive so we found that:

There are possibilities in the operator that may change the results of the technique such as: the manual pressure applied, not measured in this study, which may be related to the mood of the operator; whether the patient is cooperative, whether the placement of the dam is easy, whether time is limited because there are patients waiting or any other possibilities for stress; we must search for a way to standardize manual pressure in clinical treatment.

Cotton ball size, amount of acid and cotton ball change.

Correct placement of the acrylic guide and the metal calibrator, because there must be stability for the initial and final measurements.

Changes were made in **lines 629-637**.

### **What are the hypotheses that were confirmed through experiments in this study?**

As the stain size is larger, working time is longer.

The effectiveness of enamel microabrasion technique depends on the stain size.

Working time is directly proportional to enamel loss.

Enamel loss is greater as the working time increases.

Changes were made in **lines 640-644**.

### **What are the implications of this study for clinical practice in the future?**

Enamel microabrasion is a technique that must be used with caution, it is simple and inexpensive, permanent and first-choice; but it requires some level

of skill from the operator. We believe that **implementing a device to measure enamel loss**, the criterion of whether to repeat the technique or not could be more objective, even the opinion of the patient or relatives, because when there is enamel loss that no longer corresponds to micro- but to MACROABRASION, care must be taken not to repeat the treatment and perhaps using a restoration. **Working time measurement and control** is important and is directly related to enamel loss; it is crucial to establish the upper limit. All research try to expose effectiveness in different ways, this is a proposal that may be conducted with the assistance of a **Software to measure effectiveness**, it can still be perfected.

Changes were made in **lines 645-656**.

### ***Research perspectives***

#### **What experiences and lessons can be learnt from this study?**

This study aimed originally to be the most conservative and to prove that it could really be called minimally invasive; however, after the treatment was put to practice we have learned the advantages and disadvantages of the manual technique with 16% HCL. We believe that rotary instruments and abrasive materials were harmful for the enamel and that instead of enamel microabrasion they cause MACROABRASION, reducing enamel thickness in young people. Therefore we decided first:

1. Decreasing working time.
2. Lowering HCL concentration from 18% to 16%.
3. Controlling enamel loss or at least getting an approximate of the loss.
4. Finding effectiveness from a system which does not depend on the opinions of the patient, relatives or the dentists themselves.
5. However, after the efforts, there are still situations that must be taken care of that continue being subjective, such as:
6. Assessing whether the stain is removed or not, to stop the working time.
7. Stain size measurement must continue improving clinically.
8. Cotton ball size is important, and also that it is imbued with HCL.

Manual pressure.

Changes were made in **lines 658-676**.



### **What is the direction of future research?**

The versatility of the microabrasion technique comprises a wide variety of different criteria and procedures such as: enamel loss measurement, materials, substances and concentrations used, working time and effectiveness measurement. Therefore, future research could involve a comparison of the current techniques, using the same method in order to measure effectiveness. Another variable that could be measured in general is the time of contact of substances with the tooth, because some techniques repeat applications. In general, the methodology should be improved in future studies and different techniques should be compared.

Changes were made in **lines 677-685.**

### **What is/are the best methods for the future research?**

Any microabrasion technique may implement enamel loss measurement, even improving our acrylic guide and we consider that measuring the initial and final stain percentage could be added to any investigation. In addition to this software is increasingly specialized and one could be developed specially tailored to dentists.

Changes were made in **lines 686-690.**