

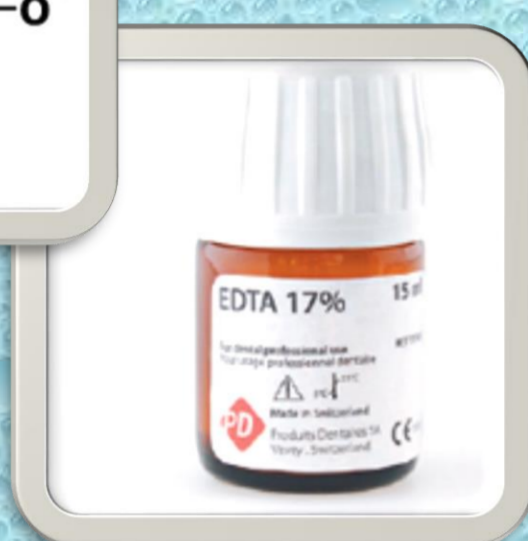
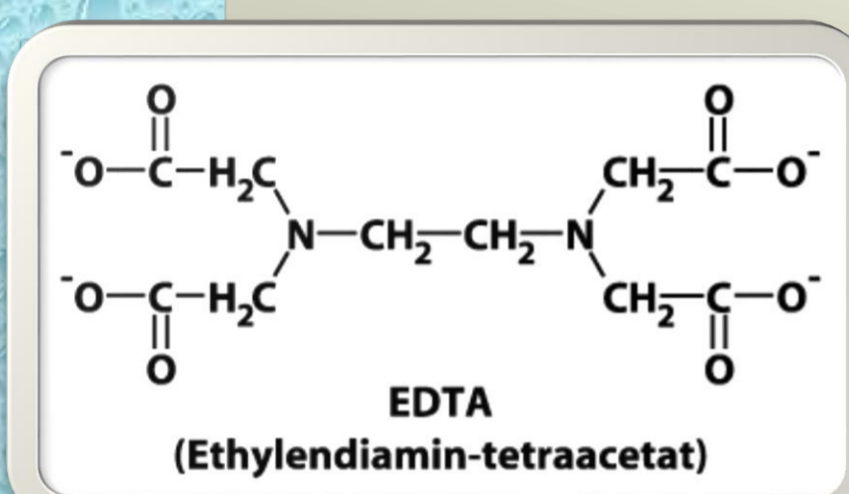


EVALUATION OF SMEAR LAYER REMOVING WITH CHEMICAL AND FIZICAL METHODS: SEM ANALYSIS

Kovacevska Ivona, Dimova C*, Panovska-Radeska A.*, Petrovski M* Georgiev Z**.*

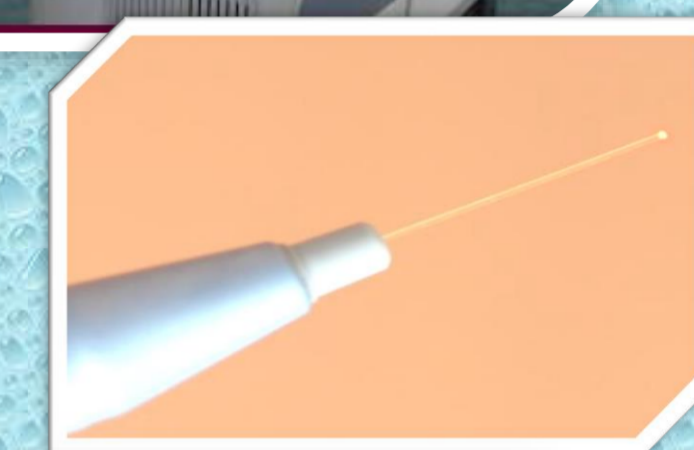
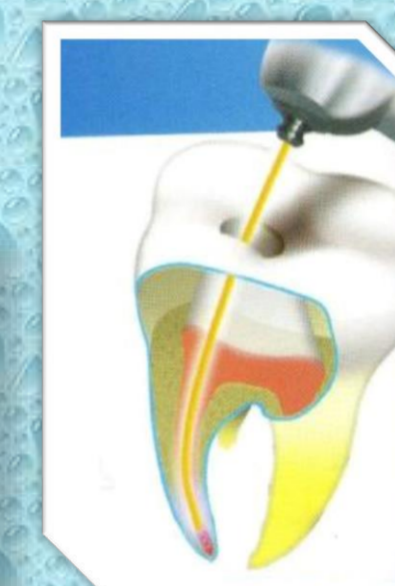
Introduction

Root canal preparation and instrumentation which mean cleaning, shaping and disinfecting, of the root canal system, with manual or mechanical files produces smear layer on the dentinal surface of root canal. This smear layer is consist of organic particles, debris, pulp tissues, inorganic materials, toxins, bacteria and their by products.



Objective

The aim of the paper was to make evaluation of smear layer elimination with EDTA and Nd: YAG laser.



Materials and methods

60 single root human teeth extracted from prosthetic or orthodontic reasons were included in this study. After removal of the crowns of teeth endodontic treatment was realized.

According to the method of removing the smear layer teeth were divided into two groups: in the first group of 30 teeth, after the final irrigation we had used 17% EDTA for 2 minutes, and in the second group of 30 teeth the optic fiber, 300µm wide, from the pulsed Nd YAG laser was set in each canal and laser radiation with circular slow motions from the apex to the crown was applied 3 times, each period of 8 seconds.

After the elimination of smear layer, all examined teeth were longitudinally cut and prepared for SEM analysis, in coronary, middle and apical third of the root.

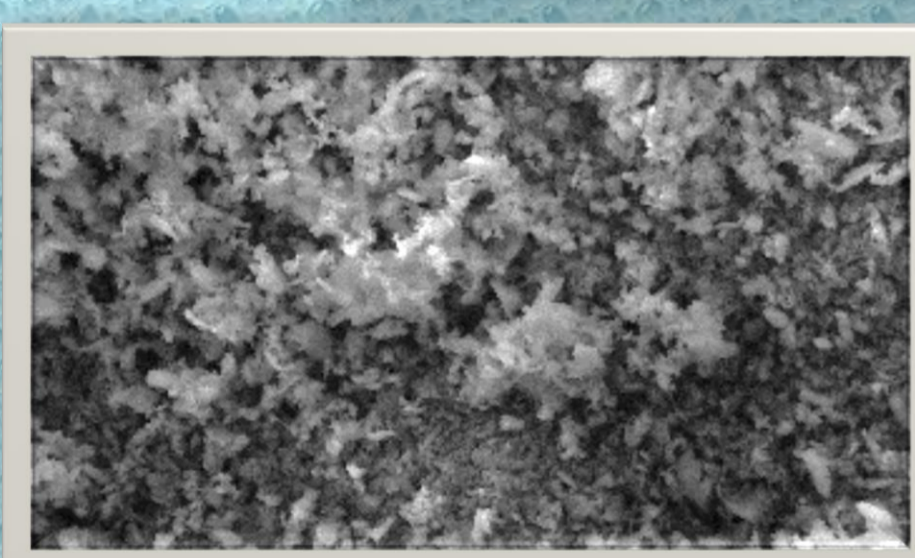
5 levels according Hulsman:

- Score 1: No smear layer, all dentinal tubules open
- Score 2: Small amount of smear layer, some dentinal tubules open
- Score 3: Homogenous amount of smear layer covering the root canal wall, few dentinal tubules open
- Score 4: Complete canal wall covered with homogenous smear layer, no opened dentinal tubules
- Score 5: Heavy homogenous smear layer covering the complete root canal wall

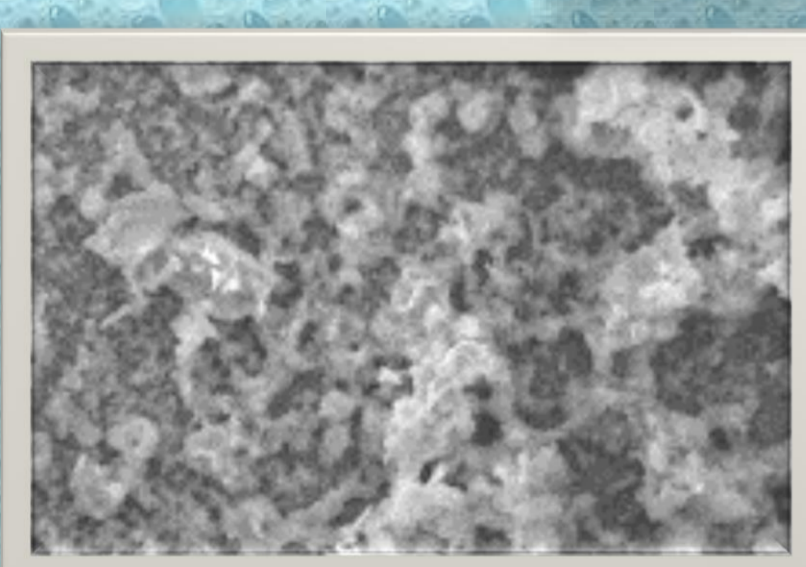
ENDODONTIC TREATMENT

- ⇒ the working length was established with a #10K file at 1mm from the apex
- ⇒ crown-down technique for root canal instrumentation
- ⇒ #40K, or #45K file depending on the canal's magnitude
- ⇒ 2 ml 1% sodium hypochlorite was used between each file change
- ⇒ final irrigation with 10 ml of distilled water in the first group
- ⇒ dried with paper points

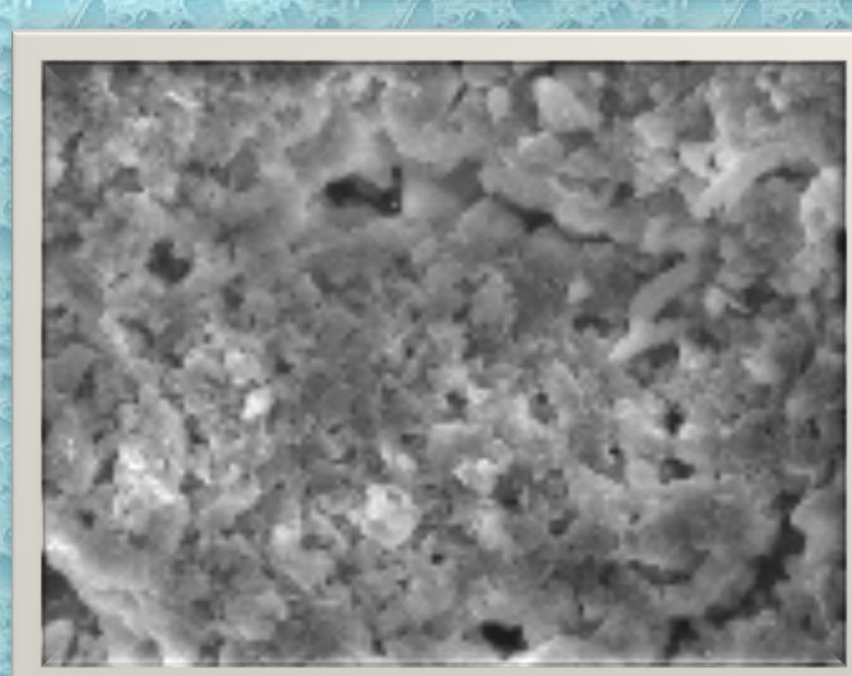
EDTA



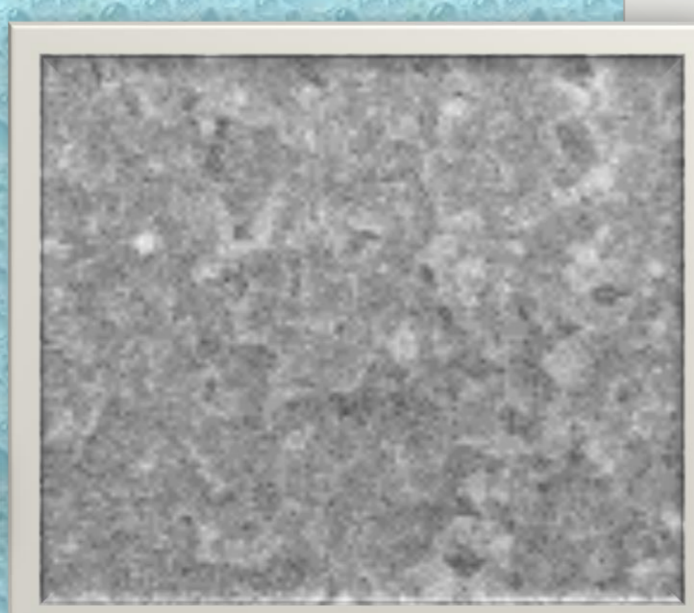
coronal third



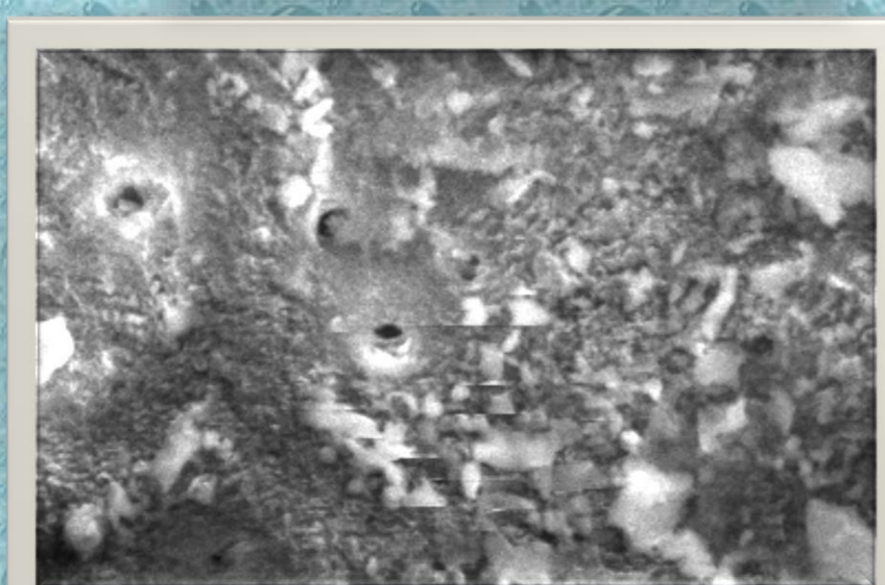
middle third



apical third



middle third



apical third

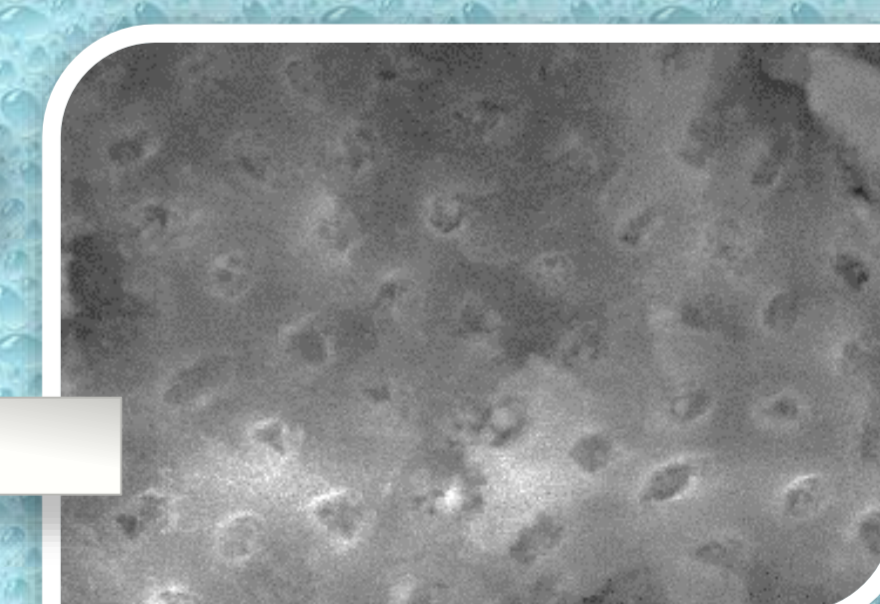
Results

The results of our research showed that both methodologies are effective for smear layer elimination.

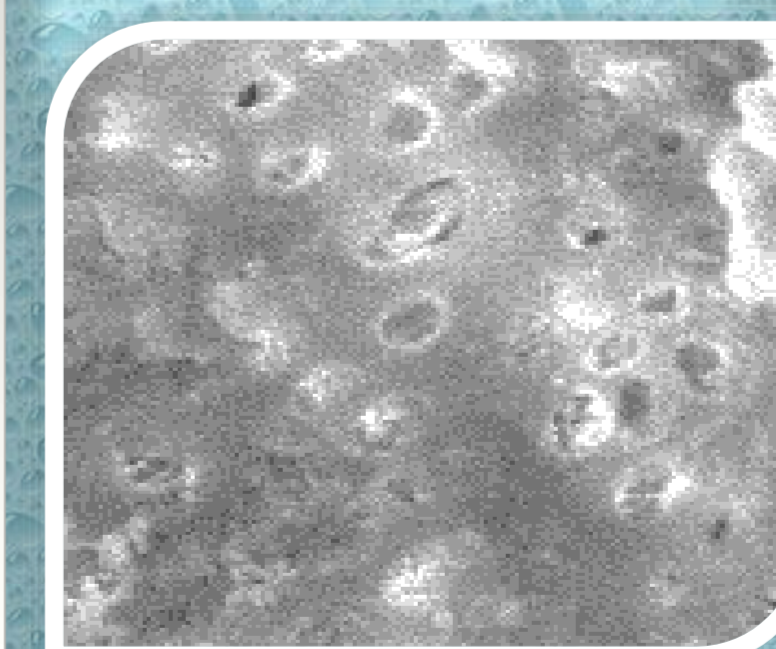
EDTA solution efficiently and simpler in combination with irrigation less successfully eliminates smear layer compared with Nd:YAG laser.

Nd: YAG laser is more successful method for smear layer removing and sterilization of root canal space, but requires specific equipment.

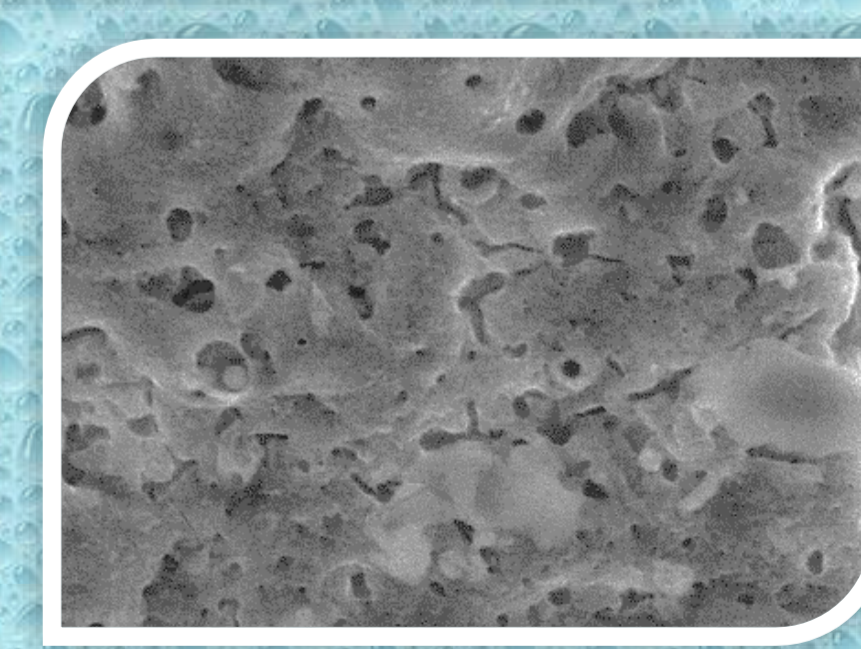
Nd : YAG laser



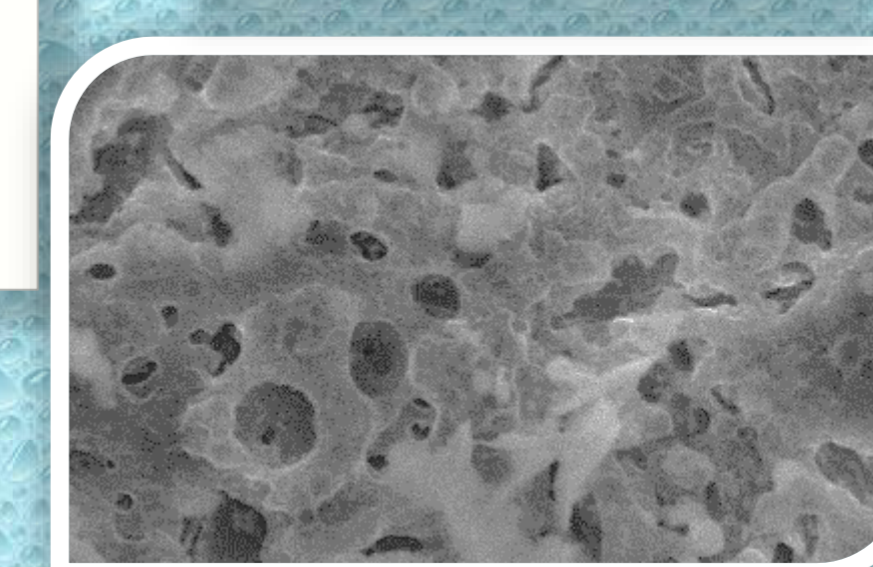
coronal third



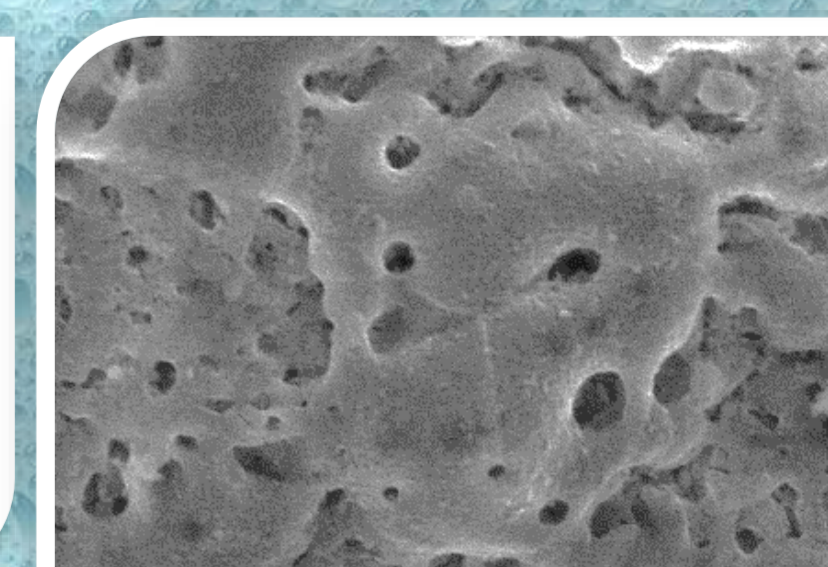
middle third



apical third



middle third



apical third

Conclusions :

The elimination of smear layer is an important procedure in the endodontic therapy and multiple methods can be used for that.

Both methods, EDTA and Nd:YAG laser are effective for removing smear layer but the choice still depends from the pulp disease, the endodontic treatment itself and from the selection and the decision of the therapist.