

## Invitro Study of Antibacterial Activity of Pro Root MTA, Iranian MTA and Portland Cement on Selective Periodontal Pocket's Bacteria

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**Background & Objectives:** Microorganisms are the main etiological factors in pulpitis, apical periodontitis and endodontic disease. As a result, their elimination during RCT by instrumentation, irrigation and intracanal medication is essential. However, even after these procedures, bacteria may still be found within the root canal system. One of the reasons for endodontic failure is inadequate obturation of the canal spaces. The presence of communication between the internal and external environments, such as a periodontal pocket, or remnants of residual bacteria due to inadequate cleaning and shaping can cause failure of the root treated tooth; therefore the antimicrobial activity of filling materials such as mineral trioxide aggregate (MTA), may play a vital role in the success rates of endodontic treatment. The purpose of this study was to evaluate the antibacterial effect of Pro Root MTA, Iranian MTA and Portland cement.

**Methods:** Broth dilution test and agar diffusion test against 3 of periodontal pocket microorganisms was used. *Actinobacillus actinomycetemcomitans* (Aa Bacilli), *F. nucleatum* and *P. gingivalis* were tested against Pro Root MTA (PRMTA), Iranian MTA (IMTA) and Portland Cement (PC) adjusted to 50mg/ml and clinical concentration (70mg/25 $\mu$ l). The agar diffusion Methods on Blood Agar with Hemin and Vitamin K was employed. The microorganisms were seeded by spreader. Wells were made by removing agar at equidistant points. PRMTA, IMTA and PC were placed into the wells immediately after manipulation. The plates incubated in the anaerobic atmosphere at 37 °C for 72 h and the zones of inhibition were measured. In the broth dilution test Contact times used were 0h, 1h, 3h, 48 h, and 72h.

**Results:** In the agar diffusion test PRMTA, and IMTA against Aa Bacilli and *F. nucleatum* showed zones of inhibition whereas PC had no antimicrobial activity against *F. nucleatum*. PRMTA, IMTA and PC did not demonstrate any antimicrobial inhibition against *P. gingivalis*. Analyzing the antimicrobial activity of PRMTA, IMTA and PC showed a statistically significance difference ( $p < 0.05$ ) between PRMTA, IMTA and PC. IMTA showed the largest zone of inhibition (2.9 mm) against Aa Bacilli. There was no difference in the zones of inhibition between the 48- and 72-h time periods. According to conventional standards, the borderline of antimicrobial effect was determined at 0.1% viable cells (99.9% reduction of CFU). In the broth dilution test results showed that the 50mg/ml and clinical concentration of PRMTA and IMTA was effective in the tested bacteria after 3h of contact. The 50mg/ml and clinical concentration of IMTA and PRMTA demonstrated antimicrobial

activity only for *Aa bacillai* ( $p < 0.05$ ) but they delayed or limited growth of *F. nucleatum* and *P. gingivalis*. For 50mg/ml and clinical concentration PC, only *Aa bacillai* was inhibited. No antimicrobial activity was detected for PC. After 3h of contact clinical concentration of IMTA and PRMTA showed greater effect than the 50mg/ml.

**Conclusion:** The inhibitory effect of anti-bacterial effect of IMTA against *Actinobacillus actinomycetemcomitans*, *F. nucleatum* and *P. gingivalis* is superior than PRMTA and Portland cement

**Keywords:** Antimicrobial Activity; Pro Root MTA (Mineral Trioxide Aggregate), Iranian MTA; Portland Cement; *A. Actinomycetemcomitans*; *F. Nucleatum*; *P. gingivalis*

