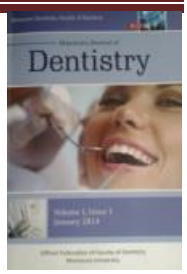

Evaluation of two remineralizing agents used for treatment of artificial caries lesions:

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Abstract:
Objectives : This study was conducted to evaluate the remineralizing effect of casein phosphopeptides -amorphous calcium phosphates (CPP-ACP) and tricalcium silicate using scanning electron microscope (SEM) ,Energy dispersive Xray (EDX) and laser induced fluorescence device(Diagnodent).
Materials and methods:
Thirty sound human maxillary incisors (n=30) that were extracted due to periodontal diseases and collected from Oral Surgery clinic at Faculty of Dentistry, Mansoura University, according to the regulation of the ethics committee The teeth were randomly divided into three groups (n=10) ; Group A: control group,Group B:CPP- ACP group and Group C :Tricalcium silicate group with 10 samples in each group(n=10). The specimens of control group were cut into two halves, one of them was used as negative sound control and the other section was subjected to demineralization process. All specimens of other remaining groups were subjected to the demineralization process, then subdivided into two subgroups by cutting the tooth longitudinally through the center of the tooth by carborundum bur. One half was left without any surface treatment, act as positive control group and the other received remineralizing treatment (test group). All specimens were measured by laser induced fluorescence device(Diagnodent pen, KAVO model 2095, Biberach, Germany) and prepared for elemental and morphological analysis by drying to ensure that the teeth moisture free. The tested groups were tested after 3 months,6months and 9months.They stored in artificial saliva that prepared in faculty of pharmacy Mansoura university
Results: The results of Kolmogorov–Smirnov and Shapiro Wilk tests revealed that all data following normal distribution. Therefore, a parametric Two-way analysis of variance test (ANOVA) was conducted. The outcomes of ANOVA test revealed that "type of remineralizing agent" and "storage time "significantly affected laser fluorescence and EDX mean values ($p<0.05$) . For laser induced fluorescence results ,at 3 and 9 months there was a significant difference between the two materials but at 6 months ,there was no statistically significant difference. For EDX outcome (calcium and phosphorus),no statistically significant difference between the two remineralizing agents at 3 and 6 months but, there was a significant difference at 9 months. These results showed that thetricalcium silicate showed the highest remineralizing potential , while CPP-ACP showed the least .
Conclusion: Under the limitation of this study, the outcomes reveled that tricalcium silicate performed better than CPP-ACP as remineralizing agent.
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Introduction

Caries formation and remineralization: Caries formation is an active process of sequential stages of demineralization/remineralization.[33]In dentistry, a white spot lesion can be described as a localized area of enamel porosity that is caused by tooth minerals loos from the deep layers of enamel while he surface is somehow sound .[97]The clinical appearance of white spot lesions can be noted as 2 weeks from the formation of the initial biofilm.[14].
Caries diagnosis and management have beenrecently improved due to advanced knowledge of caries formation.[33]
A carious lesion may progress ,revert or stay unchanged based on the stability between demineralization and remineralization.[33] Researchers develop the management of caries , moving it in the direction of minimal intervention dentistry (MID), which depend on biologic therapeutic approach rather than surgical approach.[33]
MID is the modern medical approach to the management of caries, utilizing caries risk assessment, and focusing on the early prevention and interception of disease. Moving the focus away from the restoration of teeth allows the dentist to achieve maximum intervention, with minimal invasive treatments. The four core principles of MID can be considered to be: (1). Recognition: Early identification and assessment of potential caries risk factors. (2). Reduction: To eliminate or minimize caries risk factors by altering diet and lifestyle habits and increasing the pH of the oral environment. (3). Regeneration: To arrest and reverse incipient lesions, using appropriate topical agents including fluorides and casein phosphopeptides-amorphous calcium phosphates (CPPACP). (4). Repair: When cavitation is present and surgical intervention is required, conservative caries removal is carried out to maximize the repair potential of the tooth and retain tooth structure
Considering the clinical significance of remineralization, a range of remineralizing agents including non-fluoridated products has been developed to enhance enamel remineralization. Recently, some products such as casein phosphopeptide amorphous calcium phosphate (CPP-ACP), tricalcium phosphate and resin infiltrant are widely used. [44]

Casein phospho-peptide amorphous calcium phosphate(CPP-ACP) is used in some remineralizing agents and its application significantly results in limiting the progression of early carious lesions.However , the application of CPP-ACP in a paste form , have shown controversial outcomes.Although, patients with milk protein allergies should not consume products containing CPP-ACP.[11]

Tricalcium silicate materials as mineral trioxide aggregate promote bioremineralizatio. [80]This materials have biocompatible properties showing antimicrobial activity.Some studies[95, 107] reported that calcium silicate based materials play an important role in hard tissue reparative regeneration because of its bioactivity and biocomptabilty ,also they are capable of inducing in vivo osseointegration.

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