“Surface Roughness, Mineral Content and Color Change of Resin Infiltrated and Remineralized Artificial Carious Enamel Lesions: An in Vitro Study“

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1. Fluoride = F.
2. Casein phosphopeptide amorphous calcium phosphate = CPP-ACP.
3. Volume = vol.
4. Weight = wt.
5. Micrometer = μm.
6. Millimeter = mm.
7. Hydroxyapatite = HAP.
8. White spot lesion = WSL.
9. Refractive index = RI.
10. International Caries Detection and Assessment System = ICDAS.
11. Fibre-optic transillumination = FOTI.
12. Digital version of fibre-optic transillumination = DIFOTI.
13. Electronic caries monitor = ECM.
14. Quantitative light-induced fluorescence = QLF.
15. Nanometer = nm.
16. Scanning electron microscope = SEM.
17. Deionized water = DW.
18. Amorphous calcium fluoride phosphate = ACFP.
19. Microcomputed tomography = μCT.
20. Hydrochloric = HCL.
21. Minute = min.
22. Second = s.
23. Atomic force microscopy = AFM.
24. Energy dispersive X-ray analysis = EDX.
25. Transverse microradiography = TMR.

Permanent teeth are created with natural defensive mechanisms enabling them to withstand a variety of challenges and last forever. The main intrinsic defense line is its outer enamel covering, the hardest tissue in human body. Unfortunately, enamel can lose its integrity because of many chemical, mechanical and physical challenges in its environment, inducing imbalance between remineralization and demineralization, while in function [15].

Early signs of enamel demineralization can take place as early as two weeks after biofilm accumulation on enamel surface, when enamel starts to lose its translucency and look more whitish, being so called white spot lesion (WSL) [1-5]. Enamel starts to lose its unique characteristics regarding the shape, surface structure, esthetic properties or even lead to its total loss. Any change in the appearance of teeth in the visible areas usually has an impact on patients considering self-satisfaction, self-esteem and psychological status with their esthetic impairment [15,16].

As in all medicine fields, a growing shift of focus is now dedicated to the more preventive treatment options that facilitates the systematic respect of the original tissue, ensuring carious lesions treatments on a high medical and esthetic level with minimal tissue loss. Due to the reversible nature of some white spots, less invasive treatment options like remineralization and resin infiltration should be applied, where the practical use of the presented materials will guarantee saving hard tooth structure as possible [1-4]. So, proper diagnosis of carious lesions according to its depth and causes, with complete awareness of the treatment protocols and their prognosis are the most critical ways in decision making and management of caries in each patient. So, the expected retreatment cycle associated with the conventional restorative dentistry, can be avoided [15,53].

Different remineralizing agents using fluoride (F) or casein phosphopeptide amorphous calcium phosphate (CPP-ACP) proved their efficacy being cariostatic and preventing further lesion development, so, protecting enamel from losing its normal mineral content, translucency and surface texture. However, their success in deeper enamel lesion scores of the International Caries Detection and Assessment System (ICDAS) is not well guaranteed, beside the uncertainty about the esthetics improvement [44,52].

Resin infiltration concept has gained so much fame, based on the caries infiltration philosophy aiming at obturating the paths for demineralizing acids and mechanical strengthening of the porous lesion too [1,44]. As a positive side effect, opaque enamel lesions lose their chalky white color and regain the genuine enamel translucency [53]. Results of clinical masking of WSLs with resin infiltration protocol are reported to be very acceptable. Still, some lesions respond only partly or not at all to the treatment according to the lesion depth [44,52].

It is challenging to precisely inform the concerned patients about the outcome of their WSLs' managements. So, it's no wonder that the need for a sensible management protocol treating WSLs is very crucial. Research has well defined the different lines of treatment that unfortunately sacrifice more tooth structure. Still, exact treatment guidelines using different remineralizing agents and/or resin infiltration in different lesion depths, and their influence on surface roughness, mineral content and color change, are still lacking.

Accordingly, this research was conducted to enlighten our look towards the use of resin infiltration and CPP-ACP based remineralizing agents, F and non-F containing, on different lesion depths of WSLs.