Short Communication

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Does the 'Dynamic' bone model applicable for dentine?

Abstract

Nowadays, most of recent adhesive dentistry studies tried to show a great similarity between the 'dynamic' bone model and dentine. The main purpose of this short communication article is to advise the academic community to exert more efforts and direct more research money to conduct some controlled randomized clinical trials in this particular area. Also, to respect the clinical aspects, which is much more complicated compared to the 'simple' laboratory model performed under optimum conditions.

Keywords: dentine bonding, matrix metalloproteinases, cysteine cathepsins durability, clinical performance

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Introduction

Nowadays, most of recent adhesive dentistry studies tried to show a great similarity between the 'dynamic' bone model and dentine. Many authors attributed the dentine bonding degradation to the presence of an internal enzymatic activity; matrix metalloproteinases (MMPs) or cysteine cathepsins endopeptidases within the dentine.[1,2] Most of these studies neglected the great difference between the "bone" model and dentine. Bone is a highly vascular calcified connective tissue contains three types of cells; osteoblasts, osteocytes, and osteoclasts.[3] Despite of its solid appearance, bone is a highly dynamic organ that is continuously resorbed by osteoclasts and neoformed by osteoblasts.[3]

The current published manuscripts in the field of adhesive dentistry applied the bone-proteolytic systems on dentine without any strong evidence of osteoclystic-activity in dentine. Most of these studies attributed the degradation of resin/dentine interface to the proteolytic activity within the dentine.[4] Although, this activity may play a 'minor' role in the degradation, the principal role of clinical procedures is usually unconsidered.

Several current 'basic science' studies in adhesive dentistry neglected the long-term clinical success of adhesive restorations which is reported in many published clinical trials. The outcome of the randomized clinical trials (RCT) by Pallesen et al.[5,6] and Van Dijken et al.[7]showed that adhesive tooth-colored restorations had good clinical performance after 15, 27 and 30 years. Moreover, the results of the thirteen-year RCT by Peumans et al.[8] showed that two-step self-etch adhesives had good clinical performance in non-carious cervical lesions.

Based on the 'theoretical' outcome of 'basic science' laboratory studies, most of the adhesive restorations should fail after few years, however this is not clinically applicable. In fact, the majority of the current adhesive studies neglected some important clinical factors for creating successful restorations; isolation of operating field, tissue changes in caries-affected substrate,[9] the influence of caries removal method,[9] and clinician's errors during the application of dental adhesives. Also, the type of adhesive restorative materials and the polymerization process play great role on the long-term service of the restoration. The laboratory finding of the studies conducted on isolated collagen fibers assumed that all adhesive/collagen interfaces subjected to some 'theoretical' proteolytic process based on biological findings presented in bone models. Hence, the trend of contemporary adhesive research is to discover a new material for inhibition of the proteolytic activity in dentine.

The critical question is "*Can dentine proteolytic-activity-inhibitors separately solve the degradation problem and create long-lasting restorations*?" Therefore, the main purpose of this short communication article is to advise the academic community to exert more efforts and direct more research money to conduct some controlled randomized clinical trials in this particular area. Also, to respect the clinical aspects, which is much more complicated compared to the 'simple' laboratory model performed under optimum conditions.

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Conflicts of interest

Author declare that there is no conflict of interest.

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