



INSTITUTO
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PhD in Dental Materials

Research Area: Systems Stickers

Title: Development of metalloproteinase inhibitors and their influence on adhesive strategies.

In this project we aim to create a molecularly tailored adhesive interface that can prevent restoration failure by inhibiting MMP, chemically reinforcing collagen fibers, and control nanoinfiltration.

This project has three tasks that are sequentially related:

Task 1: Design and syntheses of novel MMP inhibitors

We will start with design and conformational analysis of novel MMP inhibitors. Using computational docking software we can predict the quantitative affinity and geometric arrangement of the inhibitor around the active site of MMPs.

Task 2: Testing MMP inhibitors monomers

The biochemical activity/inhibition tests are crucial to determine the inhibitor in vitro efficacy. Biochemical tests are done with comparison with well-established inhibitors. Different types of MMP enzymes are tested in. This reveals valuable specificity of towards different MMPs.

Task 3: 'Resin-Inhibitor-Tooth' composite biomaterial evaluation

A limited number of selected inhibitors chosen by Task 1 and 2 will be applied in the resin-inhibitor-tooth composite assemblies. After ageing, the samples micro-tensile strength determination, and fracture analysis will characterize their mechanical resistance. Electron Microscopy (SEM,TEM) is essential to characterize the fracture event of the prepared specimen. Additionally SEM-EDS silver contrast will be used to determine nanoinfiltration in the hybrid layer, influenced by the inhibitor/monomer, and critical for the dental restoration. In this project we expect to create a new compound(s) compatible with commercial tooth restoration resins and ready for clinical applications.

Keywords: Inhibitors of MMPs, CHX, *etch-and-rinse*, *self-etch*

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Start Year: 2015