HA001 Targeted salivary peptides strategies against SARS-CoV-2 cell entry: a molecular docking driven screening and in vitro study

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Autodeclarado "Existe expectativa de criação de patente"

COVID-19 is related to ~500 million infections and ~6 million deaths worldwide. The receptor-binding domain (RBD) motif of Spike protein in SARS-CoV-2 interacts with angiotensin-converting enzyme 2 (ACE2) for viral entry and subsequent replication. Although saliva contains antiviral components, SARS-CoV-2 infection was confirmed in mucosae of oral cavity. We hypothesize that salivary peptides can interact with RBD in SARS-CoV-2 to prevent viral entry into host cells. Thus, the aim was to select salivary peptides driven to SARS-CoV-2 and to determine their antiviral activity to block viral entry. Based on 2193 salivary peptides sequences, we modeled a pipeline with 298 salivary peptides using BLASTp from Protein Data Bank and performed an in silico bioinformatic molecular docking against RBD-Spike using Hpepdock Server. The 4 salivary peptides with higher interaction on SARS-CoV-2 (-227 to -209 Kcal/Mol) were synthesized to assess blocking viral entry using in vitro VSV-eGFP-SARS-CoV-2 infected VERO cells. The salivary peptides Spep5, Spep4, Spep9, and Spep2 at 50ug/mL inhibit in vitro infection rates at 44%, 50%, 38%, and 68%, respectively, with cell viability of ~100%. The Spike-salivary peptides interaction blocked Spike/ACE2 docking and these effects were maintained (-12% to 16%) to Gamma, Delta, and Omicron variants.

Altogether, the application of naturally occurring salivary peptides Spep5, Spep4, Spep9, and Spep2 in oral antiviral delivery systems represents a potential alternative for preventing SARS-CoV-2 infection in COVID-19.

(Apoio: FAPs - FAPEMIG N° APQ-02148-21 | CAPES N° 23038.003950/2020-16)

HA002 Evaluation of flexural strength, antimicrobial activity and characterization of acrylic resins incorporated with α-Ag_2WO_4 and β-$AgVO_3$

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Não há conflito de interesse

The objective was to evaluate the flexural strength, antimicrobial activity and surface characterization of self-cured and heat-cured resins incorporated with silver tungstate (α-Ag_2WO_4) and silver vanadate (β-$AgVO_3$) at 0%, 0.5%, 1% and 3% concentrations. The nanomaterials were added to the resin powder to make the specimens: 65 x 10 x 3.3 mm for flexural strength, 6 x 10 mm for antimicrobial activity and 9x2 mm for SEM and EDS. The flexural strength (n=10) was evaluated with 20 Kgf/5 mm/min load. S. mutans and C. albicans biofilms (n=8) were formed for 48h on the specimens and CFU/mL was counted. SEM and EDS (n=1) were performed. ANOVA and bonferroni were applied ($p>0.05$). For flexural strength, self-cured resin showed no difference between groups with incorporation of the nanomaterials ($p>0.05$) and the heat-cured showed reduced flexural strength in the 3% α-Ag_2WO_4 and 1% and 3% β-$AgVO_3$ groups. For CFU, the incorporation of α-Ag_2WO_4 did not show efficacy for both resins, and for β-$AgVO_3$ the 3% group promoted reduction of CFU of S. mutans for both resins. For C. albicans the self-cured resin 3% showed reduction of CFU. The EDS analysis demonstrated the presence of the chemical elements of the nanomaterials and by SEM it was observed that the incorporation of β-$AgVO_3$ in the heat-cured resin promoted greater irregularity and pores on the surface.

It was concluded that the incorporation of nanomaterials promoted reduction of flexural strength for the heat-cured resin and the incorporation of β-$AgVO_3$ promoted antimicrobial activity, however more irregularity on the surface.

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HA003 Physical, chemical, mechanical, and microbiological properties of TNZT and Ti-6Al-4V obtained by machining and additive manufacturing

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Não há conflito de interesse

The objective was to compare the physical, chemical, mechanical, and microbiological properties between disks (n=10) of Ti-6Al-4V and Ti-35Nb-7Zr-5Ta (TNZT) obtained by Machining (M) and additive manufacturing (AM) by Selective Laser Melting technique. The disks were analyzed by scanning electron microscopy (SEM), energy dispersive x-ray spectroscopy (EDX), x-ray diffraction (XRD), wettability, surface free energy, roughness by confocal laser microscopy, Vickers microhardness (VM), and colony-forming units (CFU) against S. aureus. Two-way ANOVA ($p<0.05$) was applied. Greater roughness and irregularity were observed in the AM discs. The chemical composition of the alloys by EDX was compatible with the expected concentrations. For TNZT, the manufacturing technique interfered in the phases according to the XRD. The wettability and surface free energy of TNZT was higher than Ti-6Al-4V and for the manufacturing techniques, there was no significant difference. Ti-6Al-4V showed higher hardness than TNZT and the M technique was higher than AM. There was no difference in S. aureus CFU between the groups.

It was concluded that the AM technique generated more irregular and rough surfaces, and lower hardness, without significant changes in relation to M in terms of chemical composition, wettability, surface free energy, and bacterial formation. The TNZT alloy showed higher hydrophilicity, surface free energy, and roughness, lower hardness, manufacturing techniques interfered in its phases, and no differences for CFU compared to Ti-6Al-4V.

(Apoio: FAPs - Fapesp N° 2020/05272-2)

HA004 Treatment effectiveness and systemic toxicity of a tissue conditioner modified with antifungals in a rat model of denture stomatitis

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Autodeclarado "As autoras Urban VM e Neppelenbroek KH são responsáveis pelo pedido de patente BR 10 2019 007452 3, que abrange a obtenção dos complexos de inclusão com β-ciclodextrina discutidos neste trabalho."

This study assessed the treatment effectiveness and systemic toxicity of a tissue conditioner modified with antifungals in a rat model of denture stomatitis. Healthy Wistar rats were randomly assigned to the groups: NC (negative control), SD (sterile device), DS (denture stomatitis), Soft (Softone), Nys (nystatin), Nys:βCD (nystatin:β-cyclodextrin), Chx (chlorhexidine), or Chx:βCD (chlorhexidine:β-cyclodextrin). Rats of all groups, except NC and SD, wore a palatal device contaminated with Candida albicans to develop denture stomatitis. Then, rats from the Soft, Nys, Nys:βCD, Chx, and Chx:βCD groups had their devices relined with a tissue conditioner modified (or not) with antifungals at their minimum inhibitory concentrations against C. albicans. After four days, treatment effectiveness was assessed by visual analysis, CFU/mL count, histological analysis, and through myeloperoxidase (MPO) and N-acetylglucosaminidase (NAG) assays. The rats also had their blood collected for biochemical analyses and had their liver, lungs, stomach, and kidneys removed for histopathological, MPO and NAG analyses. Groups Soft, Nys, Nys:βCD, and Chx presented a significant decrease in CFU values in comparison to the DS group. All experimental groups showed lower MPO and NAG activity in the palate compared to the DS group. No relevant renal, gastric, nor pulmonary changes were noticed. The Chx group presented a significantly higher MPO activity in the liver.

These findings suggest that this modified material could be a viable and safe treatment for denture stomatitis.

(Apoio: CAPES N° 001)

HA005 PM2.5 air pollution exposure intensifies periodontal disease

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Não há conflito de interesse

Air pollution is a modifiable risk factor for several diseases, although uncertainties remain about fine particulate matter (PM2.5) effects on health. There are no scientific reports that describe its effects in mouth, especially in periodontium and periodontitis occurrence. We investigated the relationship of ambient PM exposure (APM) with periodontal homeostasis alteration and immunoinflammatory periodontal disease. Forty mice were divided in 4 groups, allowing the evaluation of periodontal conditions on filtered or APM exposure. To evaluate APM impact on periodontium, histopathological analysis, quantification of cytokines, and evaluation of oxidative stress process were performed from maxillae samples, involving first upper molars region. Compared with filtered air groups, APM increased reactive oxygen species generation, and decreased antioxidant enzymes activity, provoking oxidative stress. APM also affected periodontal disease progression, potentiating the expression of genes associated with inflammation and bone loss, such as interleukin-1 beta and tumor necrosis factor alpha. Moreover, APM significantly increased mast cells recruitment and histamine production, demonstrating air pollution had malefic effects on experimental periodontitis, stimulating inflammation by unbalanced oxidative stress response and impaired alveolar bone metabolism.

The immune system, inflammation and alveolar bone loss are related to each other. APM altered immune response, triggering inflammatory process, and potentiated tissues damage.

(Apoio: FAPESP N° 2019/27272-7)