# CANDIDACIDAL ACTIVITY OF SALIVA PREPARATION CONTAINING GOLD NANOPARTICLES

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## Introduction

The oral cavity is a specific ecosystem, where important function plays secretion of salivary glands called saliva. Natural saliva contains antibacterial factors and is characterized by specific protective mechanisms beneficial for oral balance. It provides optimal pH, which is dependent on electrolytes and buffer systems like phosphates, proteins and bicarbonates, protecting teeth against enamel demineralization [1]. However, in some pathological situations (depression, cancer treatment, medicaments ingestion), a large number of people suffer from impaired salivary functions, displaying symptoms of xerostomia. This process is characterized by a reduction or loss in salivary flow, often with a concurrent change in the composition of the saliva, resulting in dryness in the mouth. Disorders of human saliva secretion may lead to many pathological changes in oral cavity. One of them is candidosis of oral cavity mucous membrane, caused by *Candida albicans*.

Thus, there is a demand from patients for more effective and simultaneously safe products, which assist the normal processes occurred in oral cavity and give protection against sickness microorganisms. The saliva preparations available on the pharmaceutical market are characterized by different composition, texture, biological and chemical properties. However there is a lack of preparations which fulfil the requirements demanded of them [2]. This particularly pertains to new synthetic saliva additives that will reduce the growth of microbes and still will have an advantageous influence on the rheological properties of synthetic saliva compositions. In the context of such antimicrobial compounds, gold and silver are of great interest, particularly in form of nanoparticles. Additionally, as noble metals, they are not corrosive, which is of great significance when consider their contact with metal prostheses in oral cavity.

The main goal of this work was to prepare gold nanoparticles based saliva substitutes, which rheological and tribological properties are similar to natural saliva and were evaluated in previous works [3]. The utilitarian effect of this work is an evaluation of the influence of gold nanoparticles on *Candida albicans* cells adhesion to surface of biomaterial used in prosthetic dentistry.

## Materials and Methods

Biological analysis was performed using *Candida albicans* (PCM 1407). Tests of *Candida albicans* microorganisms adhesion to surface of widely used in stomatology and prosthetic dentistry material (Co-Cr-Mo alloy) with rough and smooth surfaces were tested in the present study. Chemical composition of tested solutions is presented in TABLE 1.

TABLE 1. Chemical composition of tested solutions.

| Environment | Chemical composition |
|---|---|
| Control | nutrient medium |
| A | PBS + mucin + xanthan gum |
| B | PBS + mucin + xanthan gum + gold nanoparticles |

## Results and Discussion

The microscopic observations results performed using confocal scanning laser microscopy (CSLM) shown that *Candida* cells adhered especially to rough surfaces.

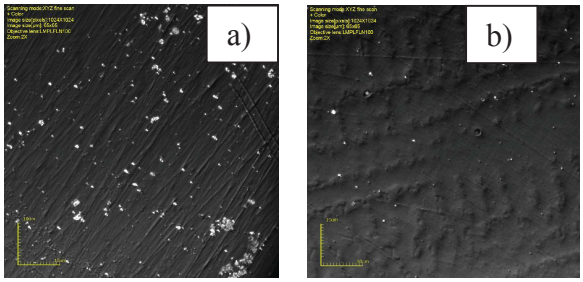


FIG. 1. CSLM micrographs of Co-Cr-Mo alloy after contact with nutrient medium (a) and preparation B (bght picture), bars, 10 μm.

Obtained results shown that *Candida albicans* adhesion on metal surfaces was observed in the case of control (nutrient medium) at the highest extent (FIG. 1a) Numerous single and colonies of *Candida* cells with gemmate signals were observed at tested surfaces. Similar results, although less intensive were obtained for cobalt alloy incubated in saliva preparation without addition of gold nanoparticles. In FIG. 1b is shown biomaterial surface after incubation in saliva substitute with addition of gold nanoparticles. It can be concluded that this preparation inhibited *Candida albicans* growth on CoCrMo alloy surface.

## Conclusions

In all tests it was observed that microbes adhesion was more intensive to rough surface in comparison to smooth one. Saliva preparation with gold nanoparticles addition inhibits growth of C*andida albicans* cells on tested biomaterial surface. These results confirmed that gold nanoparticles exhibit antifungal properties.

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