

## · 基础与临床研究 ·

## 纯钛表面溅射金涂层对两种瓷粉钛 - 瓷结合强度的影响

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**【摘要】目的** 探讨纯钛表面溅射金涂层处理对两种钛专用瓷粉结合强度的影响。**方法** 按 ISO 9693 要求制备纯钛标准试件 40 个, 根据烧结瓷粉的种类 (SP: Super Porcelain Ti-22; TC: Triceram) 和钛基底片是否溅射金涂层 (Au) 平均分为 4 组 (AuSP、AuTC、SP、TC 组), 每组 10 个试件。各组试件烤瓷后三点弯曲法测定钛 - 瓷结合强度, 使用 SPASS 20.0 软件进行统计学分析。体视显微镜观察试件瓷层剥脱后的界面并分析其断裂模式, 场发射扫描电镜观察钛 - 瓷结合界面形貌并进行能谱分析。**结果** AuSP 组结合强度为  $(36.32 \pm 1.36)$  MPa, 显著的高于 SP 组  $(28.91 \pm 3.80)$  MPa ( $P < 0.05$ ), 而 AuTC 组和 TC 组两组结合强度无统计学差异 ( $P > 0.05$ )。AuSP 组断裂模式主要为混合断裂模式, 其余各组均为界面断裂模式。场发射扫描电镜发现溅射金涂层组钛 - 瓷界面结合紧密, 能谱分析显示金涂层组氧元素和钛元素扩散深度均呈明显下降。**结论** 在本研究条件下, 预成纯钛表面溅射金涂层能够抑制氧和钛元素的扩散, 提高 SP 瓷粉的钛 - 瓷结合强度, 但是对 TC 瓷粉的钛 - 瓷结合强度未见明显效果。

**【关键词】** 钛 金涂层 瓷 结合强度

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## Effect of sputtering gold coating on the bonding strength between pure titanium and two low-fusing porcelains

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**【Abstract】Objective** To study the effect of sputtering gold coating on the bonding strength between pure titanium and two low-fusing porcelains according to the protocol of ISO 9693, and to characterize the titanium-porcelain interfaces. **Methods** Forty machined pure titanium samples were prepared according to the ISO 9693 protocol. Based on the type of sintering porcelains (SP: Super Porcelain Ti-22; TC: Triceram) and titanium base with or without sputtering gold (Au), forty titanium samples were divided equally into four groups (AuSP, AuTC, SP and TC group). Low-fusion dental porcelain was then sintered onto the titanium samples. Three-point bending test was performed to assess the bonding strength, and optical stereomicroscope was used to characterize the titanium-porcelain adhesion and determine the failure mode. The titanium-ceramic interface was examined by Field Emission Scanning Electron Microscope (FE-SEM) and Electron Microprobe Analysis (EMPA). **Results** The bonding strength of the AuSP groups was much higher than that of the SP groups ( $P < 0.05$ ), while no significant difference was found between AuTC group and TC group ( $P > 0.05$ ). The SP, AuTC and TC groups showed predominately adhesive fracture, whereas the failure mode of AuTC group was mixture of cohesive and adhesive, mainly

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