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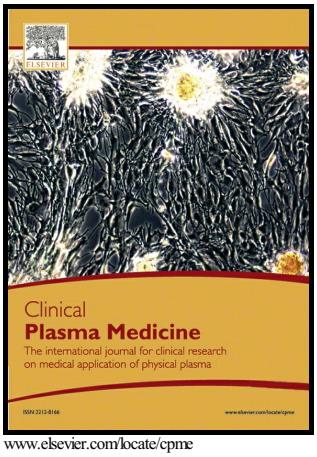

www.elsevier.com/locate/cpme

PII: S2212-8166(17)30020-3
DOI: https://doi.org/10.1016/j.cpme.2017.10.002
Reference: CPME65

To appear in: *Clinical Plasma Medicine*

Received date: 17 September 2017
Revised date: 31 October 2017
Accepted date: 31 October 2017

Cite this article as: T. Vasilieva, Aung Myat Hein, A. Vargin, E. Kudasova, E. Kochurova and M. Nekludova, The effect of polymeric denture modified in low-temperature glow discharge on human oral mucosa: Clinical case, *Clinical Plasma Medicine,* https://doi.org/10.1016/j.cpme.2017.10.002

The effect of polymeric denture modified in low-temperature glow discharge on human oral mucosa: clinical case

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Abstract. The modification hot curing poly(methyl methacrylate) (PMMA) denture base "Villacryl H Plus" in RF-discharge plasma is described The plasma chemical modification of PMMA plates in the oxygen RF-discharge (13.56 MHz) decreased the water contact angles by 1.5-2.5 times with respect to unmodified samples while their surface free energy increased up to 1.5 times due to the formation of additional oxygen containing polar chemical groups at the plasma-modified PMMA surfaces. Although the ageing effect of modified PMMA was observed, its wettability was still higher than that of the original PMMA at least after 7-day storage.
The technique has been successfully applied for the modification of removable PMMA denture, which was used in clinical practice for oral orthopedic rehabilitation of a patient after the treatment of buccal mucosa cancer. When using the non-modified denture the patient complained of discomfort and food chewing problems and the hypertrophic red flat oral lichen formed at the patient's cheek. The full regression of lichen nodules and associated inflammation was observed after the usage of the plasma modified denture for one week. Within six-month ware of the plasma modified denture no pathological elements or neoplasms were found on the patients' oral mucosa.

Key words: low-temperature plasma, glow discharge, prosthodontic rehabilitation, buccal mucosa cancer, biocompatibility

1. Introduction

Over the past decade, polymeric materials for clinical dental applications with excellent properties and various functionalities have been developed. Denture polymers should satisfy the following requirements: satisfactory fracture resistance, excellent antibacterial properties, radiodensity, and high color stability. Poly(methyl methacrylate) (PMMA), the primary family of acrylic resins, has many virtues, such as satisfactory aesthetics, ease of laboratory and clinical manipulation, favorable working characteristics, accurate fit, stability in an oral environment [1,2]. However, there still remain some clinical problems with PMMA as a denture base, e.g. inflammation provoked by degradation of materials and/or adhesion of micro-organisms [3,4]. These are mostly due to their low surface free energy, leading to poor wettability and poor adhesion and contacts with oral tissues [5]. To increase the PMMA hydrophilic properties and to improve its biocompatibility the modification of the polymer is needed.

In the field of polymeric surface fictionalization and engineering, various methods have been applied. These conventional methods include mechanical abrasion, wet chemical cleaning, etching, cross-linking and functionalization [6, 7].