IDEAL SELECTION OF COLOR. EFFECTIVENESS OF VISIONARY TECHNIQUE IN THE DENTAL PRACTICE

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Abstract

Introduction: *Aesthetic restorations also have a significant impact on the success of prosthetic treatment which recreates the proper functioning of the teeth. Suitable aesthetic effect is determined by the appropriate restoration of tooth shape and colour. Selecting the proper colour of artificial teeth is difficult and may suffer from many problems in everyday dentistry. In addition, visual assessment for the help of the unique is subjective and may give erroneous results. On the market there are auxiliary device for the instrumental assessment of the colour of teeth: spectrophotometers, calorimeters, colour analyzers computer. They are not commonly used in everyday medical practice.*

Goal: *The aim of the study is to assess the applicability of Sopro 717 intraoral camera in the correct assessment of the colour of teeth.*

Methods: *The study was conducted based on the evaluation of the natural tooth colour visually using the unique "Lumin - Vacuum" by the patient's dental and medical students in natural light and using the intraoral camera having their own source of light. The experiment involved 40 people aged 22-46 years. The study was conducted to assess the colour of the surface of the cheek teeth 11 or 21 and 32 Takes into account a number of factors affecting the proper assessment of the colour of teeth such as colour space, light intensity, eye fatigue investigator.*

Results: *The evaluation of the occurrence of differences in colour of the teeth within the two mentioned methods.*

Conclusions: *Intraoral camera helps us to choosing the right colour of the tooth. Although this is still a subjective method allows us to reduce the number of errors made in the selection of the proper shade of hard tissues of the tooth.*

Keywords: *selecting colour of teeth, intraoral camera, shade guide*

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PHYSIOCHEMICAL AND BIOLOGICAL EVALUATION OF THIN CNTS LAYERS

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Abstract

Carbon nanotubes are nanometric-sized materials which possess a set of interesting features that favor their applications in various fields of materials engineering, including biomedical applications. However, their usage as implants or in nanomedicine raises many questions, regarding their potential cytotoxicity, relative to their length, diameter, structure and functional groups, present on their outer walls. The given study presents a physiochemical and biological in vitro (in accordance with EN-ISO 10993-5) evaluation of thin carbon nanotubes films, deposited on the surface of titanium, by means of the EPD process. Experiments were carried out on commercially available, pre -functionalized with OH groups, multi-walled carbon nanotubes. The obtained material is proven to be biocompatible, with no cytotoxic effect on the human fetal osteoblast cell line. During the study, selectivity of the EPD process was proven - performed experiments revealed that the process favors deposition of CNTs with chosen set of features from the stock solution. Presented results point out that the EPD process can be successfully applied as a method for fractioning the CNTs, aimed to fabricate non-toxic layers that might be considered for various biomedical applications.

Keywords: *EPD, MWCNTs, thin layers, biocompability*

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Introduction

Due to their extremely high mechanical properties [1] and good electric and thermal conductivity [2], carbon nanotubes are nowadays a widely considered material for various applications – either as a reinforcing phase in composites or as electrodes for electrochemistry, supercapacitors and actuators. However, in terms of their biomedical application, a real potential lies within good biocompability and a possibility to promote growth and differentiation of various tissues. These promising features have already been proven by some of the scientists and published in numerous reports, which propose usage of the CNTs either in tissue engineering [3], in nanomedicine [4,5] or as implantable electrodes that would aid in treatment of assorted diseases [6].

Despite many promising results presented independently by scientists worldwide, a road towards actual biomedical application of the CNTs is still bumpy, due to many controversies regarding their potential cytotoxicity. In the literature, one can find many contradictory results, with some scientists pointing out adverse cytotoxic responses and others proving very good biocompability. We believe that the reason of such large discrepancy in the reported studies lies within heterogeneity of the studied materials, having different dimensions, type and amount of functional groups or level of structural perfection – all reported to be determinants of the outcome CNTs toxicity, both in vitro and in vivo [7]. What is more, in some of the cytotoxicity studies, very poor physiochemical evaluation is performed and no connection between the outcome cells response and properties is established.

The aim of the study was to fabricate thin layers of the MWCNTs on the surface of biocompatible titanium, study their physiochemical properties and perform cytotoxicity evaluation in order to establish some of the very basic correlations between physiochemistry and outcome cell's reaction. In the study, EPD process was used as a fractioning tool for obtaining dense layers of well adhered CNTs of uniform, strictly desired properties. The proposed method not only allows for fabrication of the CNTs layers of well-defined characteristics but also creates a vast possibility for further modifications of the properties.

Materials methods

In the study, physiochemical evaluation of the stock MWCNTs, modified with OH groups, provided by the NanoAmor (Stock#: 1249YJF), is performed by means of SEM, Raman, XPS and goniometer. Next, the as-received CNTs are used to create a stable suspension in ethanol and acetone (1:3), which is consecutively applied in the EPD process. Layers are obtained for two different times of deposition and their physiochemical properties are evaluated. Finally, a thicker layer, showing no titanium peaks in the XPS spectrum is used in the in vitro both indirect and direct contact cytotoxicity studies (in accordance with ISO 10993-5, using hFOB 1.19 cell line - normal human fetal osteoblasts), guaranteeing that only influence of the CNTs on cells is studied.

Results and discussions

Physiochemical evaluation of both stock MWCNTs and the obtained layers proves that the EPD process favors deposition of different kinds of tubes in the function of time. The preliminary in vitro study indicates that by means of the deposition, highly biocompatible material is obtained, with even less-pronounced indirect contact cytotoxicity than the negative control sample (PS of the culture well). During direct contact cytotoxicity evaluation, no dead cells on the surface of the material were observed, compared to very little on pure titanium.

Conclusion

The applied EPD method was proven to be a good fractioning tool for the CNTs containing different chemical species on their surface. Preliminary in vitro biocompatibility assessment revealed promising applicability of the method for fabricating nontoxic layers of strictly desired, potentially steerable properties, for various biomedical applications, including implantable electrodes or scaffolds for tissue engineering.

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