

Antibiotic prophylaxis for dental procedures: do dental students know enough?

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ABSTRACT

Introduction: Nanoparticles (NPs) are a wide class of materials that include particulate substances sized less than 100 nm. Inorganic ZnO NPs have found applications in several industrial fields such as the optical, electronic, pharmaceutical and cosmetics [1]. However, in many specific fields the applications are limited, since the particles tend to aggregate/agglomerate due to the hydrophilic nature of the surface. For potential clinical applications, surface modification of ZnO plays a crucial role in the biocompatibility of ZnO NPs [2]. Using organosilane modifying agents, improved hydrophobicity of the resulting ZnO NPs, induced by the non-polar terminal groups, can be achieved, and thus, very small and highly dispersed particles can be obtained. ZnO silanes were found to have antibacterial activity against several pathogens [3]. The NP size highly influenced the antibacterial activity, which increase with decreasing size. The ZnO NPs may induce bacterial cell membrane damage, resulting in bacterial cell death. Motivated by these findings and others reporting anticancer activity for pristine ZnO NPs [4], the aim of this study was to investigate the anticancer activity and mechanism of cell death of silane-modified ZnO nanoparticles against A2780 ovarian cancer cells and evaluate if for the cancer cells a correlation between size and activity was also observed.

Materials and Methods: The silane modified ZnO NPs were prepared by the addition of (3-glycidyloxypropyl) trimethoxysilane (GPTMS) as a surface modifier at 0% (G0) and 10% (G3) molar ratio of Si/Zn. The obtained NPs were characterised by high resolution transmission electron microscopy (HRTEM), X-ray diffraction and UV-Vis spectrometry. The cytotoxic activity in ovarian cancer cells were assessed by the MTT colorimetric assay. The morphological cellular alterations were visualised by electron microscopy (TEM).

Results: The silane modified ZnO NPs exhibited significant cytotoxic activity against A2780 ovarian cancer cells. The NP size, *ca.* 13 nm for G0 and *ca.* 3 nm for G3, highly influenced the cytotoxic activity, which increased with decreasing particle size, IC_{50} : $\sim 100 \mu\text{g/mL}$ (G0) and $\sim 30 \mu\text{g/mL}$ (G3). The ZnO silanes affected the cellular integrity by the induction of organelle damage evidenced by TEM.

Discussion and conclusions: Although preliminary, results indicate that ZnO silanes are interesting platforms to explore as anticancer agents. Studies on the ultrastructural level (TEM/SEM) are needed to understand their cytotoxic mechanism and to give clues on their potential targets.

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ABSTRACT

Introduction: According to the American Heart Association (AHA) the cardiac conditions with the highest risk of infective endocarditis (IE) for which antibiotic prophylaxis (AP) is reasonable are: prosthetic cardiac valves, previous IE, congenital heart disease and cardiac transplantation recipients [1,2]. The aim of this study was to analyse the knowledge of AP in Dental Medicine students.

Materials and methods: A prospective and analytical study was conducted using a questionnaire designed to describe the knowledge of AP and covering issues such as: AP guidelines, dental procedures and medical conditions needing AP, and recommended antibiotics. A 0–10 score was attributed to the questionnaire and the correct answers were based on AHA guidelines. The questionnaire was applied to students of the two last curricular years (4th and 5th year) of a Master in Dental Medicine and to newly graduated trainees at a University Dental Clinic – both in the Greater Lisbon area. The questionnaire was authorised by the students through a declaration of informed consent. This study was authorised by the Clinical Director of CDEM and approved by Egas Moniz Ethics Committee.

Results: A total of 275 questionnaires were obtained with an answer rate of: 93.8%/4th year ($n = 135$), 84.5%/5th year ($n = 120$) year and 57.1%/trainees ($n = 20$). The median score of the questionnaire was 6.0, 6.4 and 6.8 for 4th and 5th year students and trainees, respectively. The results were more satisfactory regarding: guideline existence knowledge, high-risk conditions recommended for AP and antibiotic selection in non beta lactam allergic patients. Unsatisfactory answers were related to: dental procedures in need of AP, heart conditions associated with IE, and antibiotic selection in beta lactam allergic patients. Noteworthy, antibiotic selection and dental procedure knowledge was significantly better in postgraduates.

Discussion and conclusions: The knowledge of the undergraduates and newly graduates concerning AP for dental procedures was not totally satisfactory, however there was a positive evolution according to the academic degree. As pharmacology subjects are taught in the early years of the course, antibiotic therapeutics should be reinforced later during the study cycle, and students should be made aware of the importance of a rational and adequate use of antibiotics in dental practice. There is a need to improve the knowledge and communication over this topic not only among undergraduates but also regarding postgraduates, in order to encourage clearer and more homogeneous antibiotic prescription patterns.

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Assessment of the relationship between oral health-related quality of life (OHRQoL) and dental malocclusion in a Portuguese sample

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ABSTRACT

Introduction: The assessment of the oral health-related quality of life (OHRQoL) and dental malocclusion are described in the literature and the results indicate a decrease in OHRQoL when clinically determined dental malocclusion severity