

TRAD eleven

BOOK OF ABSTRACTS

**Eleventh International Conference on Radiation,
Natural Sciences, Medicine, Engineering, Technology and Ecology**

June 19 - 23, 2023 | Hunguest Hotel Sun Resort | Herceg Novi | Montenegro

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In vitro genotoxicity assessment of a monolacunary Wells-Dawson nanocluster as a promising contrast agent candidate

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<https://doi.org/10.21175/rad.abstr.book.2023.23.3>

Tungsten-based nanoparticles possess high density and capability to attenuate X-rays and thus have been studied as interesting candidates for the development of new-generation contrast-enhancing staining agents (CESAs) for computed tomography (CT). Polyoxotungstates, as polyoxoanions containing tungsten in its high oxidation state (W6+) were reported as promising CESA candidates to visualize long bones and kidney tissues. However, some polyoxotungstates induced side effects in toxicity studies in vivo, which could limit their clinical application. Thus, the aim of this study was to evaluate genotoxic effects in vitro of monolacunary Wells-Dawson polyoxotungstate, α_2 -K₁₀P₂W₁₇O₆₁·20H₂O (lacunary WD) that was found as a potential contrast agent for CT in our previous studies in situ and in vitro. Lacunary WD was synthesized by following the reported procedure. The genotoxicity evaluation was performed by using the standard procedure for the alkaline comet assay. Briefly, human whole blood samples were taken from healthy male and female donors and exposed to different lacunary WD concentrations within the range of 10⁻⁶-10⁻⁴ mol/L, for 4 and 24 h at 37 °C. Then, 5 μL of whole blood was embedded into an agarose matrix and subsequently lysed (2.5 M NaCl, 100 mM EDTANa₂, 10 mM Tris, 1% sodium sarcosinate, 1% Triton X-100, 10% DMSO, pH 10) overnight at 4 °C. After the lysis, the slides were placed into an alkaline solution (300 mM NaOH, 1 mM EDTANa₂, pH 13) for 20 min at 4 °C to allow DNA unwinding and subsequently electrophoresed for 20 min at 1 V/cm. Finally, the slides were neutralized in 0.4 M Tris buffer (pH 7.5) for 5 min 3 times, stained with ethidium bromide (10 μg/mL), and analyzed at 250× magnification using an epifluorescence microscope (Zeiss, Göttingen, Germany) connected through a camera to an image analysis system (Comet Assay II; Perceptive Instruments Ltd., Haverhill, Suffolk, UK). One hundred randomly captured comets from each slide were examined. Multiple comparisons between groups were done by means of ANOVA on log-transformed data. Post hoc analyses of the differences were done by the Scheffé test. The percentage of tail DNA was determined to evaluate the level of DNA damage and genotoxicity potential. The obtained results showed that lacunary WD did not induce a statistically significant relative increase of tail DNA compared to the corresponding control at all investigated concentrations, after both 4 and 24 h exposure. Accordingly, the investigated promising contrast agent candidate could be regarded in further studies as toxicologically safe for healthy human blood cells from a genotoxicity point of view.

TITLE: Book of Abstracts

EDITOR: Prof. Dr. Goran S. Ristić

TECHNICAL EDITING: Aleksandar Ristić, MD

COVER DESIGN: Vladan Nikolić, PhD

YEAR OF PUBLISHING: 2023

PUBLISHER: RAD Centre, Niš, Serbia

FOR THE PUBLISHER: Prof. Dr. Goran S. Ristić

CD BURNING AND COPYING: RAD Centre, Niš, Serbia

PRINT RUN: Electronic edition - 50 CDs (CD-R)

ISBN: 978-86-901150-6-8

www.rad-conference.org

CIP - Каталогизација у публикацији Народна библиотека Србије, Београд

539.16(048)(0.034.2)

57+61(048)(0.034.2)

**INTERNATIONAL Conference on Radiation, Natural Sciences,
Medicine, Engineering, Technology and Ecology (11 ; 2023 ; Herceg
Novi)**

Book of abstracts [Elektronski izvor] / Eleventh International Conference on Radiation, Natural Sciences, Medicine, Engineering, Technology and Ecology (RAD 2023) 19–23.06.2023, Herceg Novi ; [editor Goran S. Ristić]. – Electronic ed. - Niš : RAD Centre, 2023 (Niš : RAD Centre). - 1 elektronski optički disk (CD-ROM) ; 12 cm

Sistemski zahtevi: Nisu navedeni. - Nasl. sa naslovne strane dokumenta. - Tiraž 50.

ISBN 978-86-901150-6-8

a) Јонизујуће зрачење -- Дозиметрија -- Апстракти b) Биомедицина -- Апстракти

COBISS.SR-ID 121386249