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The 6th International USERN Congress

and Prize Awarding Festival

November 6th-13th, 2021
Istanbul, Turkey

Oral Presentations on Integrated Science
Chairs: Şükrü Nail Güner & Öner Özdemir
10:30 – 12:00 GMT (13:30 – 15:00 Turkey Time)

10-min junior talk

Inflammation and immune markers in oral cavity of cigarette and e-cigarette smokers
Liudmyla Kryvenko, Ukraine

Oral Health Changes In Tobacco Smoking Orthodontic Patients
Kseniia Lepilina, Ukraine

Nano-Enzyme based biosensor Applications
Saboura Ashkevarian, Iran

Effectiveness of using intravenous ethambutol and isoniazid administration in patients with tuberculosis and HIV co-infection
Dmytro Butov, Ukraine

Effects of GdYVO4:Eu3+ nanoparticles on apoptosis of leukocytes in vitro
Anton Tkachenko, Ukraine

Closing Ceremony of USERN-IBB 2021
Chairs: Nima Rezaei (USERN), Ahmet Ozen (Marmara), Sevgi Keleş (Necmettin Erbakan University)

Concluding remarks

USERN-IBB 2021 prize for the best young investigator/junior scientist presentations

Anton Tkachenko

Effects of GdYVO4:Eu $^{3+}$ Nanoparticles on Apoptosis of Leukocytes in Vitro

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Nanomaterials are known to deliver chemotherapeutic, immunomodulatory and gene silencing agents to tumors tissues. In addition, they are used in the radiotherapy of cancer. GdYVO4:Eu3+ nanoparticles have been reported to be promising theranostic agents in cancer therapy. Thus, the evaluation of their safety is of huge importance. The aim of our research was to assess the ability of GdYVO4:Eu3+ nanoparticles to induce apoptosis of leukocytes in vitro.

Aliquots of blood collected from 9 adult WAG rats were incubated in RPMI 1640 and 5% fetal bovine serum with GdYVO4:Eu3+ nanoparticles (0-20-40-80 µg/ml) for 4 h. Leukocyte suspensions obtained from the incubated blood samples were stained with antibodies to CD45 (BD PharmingenTM APC-CyTM7 Mouse Anti-rat CD45, BD Biosciences, USA) to discriminate leukocytes and the mitochondrial membrane potential probe 5,5',6,6'-tetrachloro-1,1',3,3'-tetraethylbenzimidazolocarbo-cyanine iodide (JC-1, BD™ MitoScreen Kit, BD Pharmingen™, USA) to assess GdYVO4:Eu3+-induced leukocyte apoptosis. Data were acquired using BD FACSCanto™ II flow cytometer (BD, USA). Kruskal-Wallis and Dunn's tests were used for post-acquisition comparison of results.

The percentage of apoptotic cells, i.e. those with depolarized mitochondria that don't form J-aggregates, was not affected when low concentrations of nanoparticles (20 and 40 µg/ml) were used. However, this parameter was over 3-fold higher in the samples treated with 80 µg/ml GdYVO4:Eu3+ nanoparticles ($p<0.0001$) compared with controls. In addition, the mean fluorescence intensity of J-aggregates in leukocytes with active mitochondria was analyzed. The difference with the control samples was statistically insignificant for the concentrations of 20 and 40 µg/ml. As for 80 µg/ml, incubation with this concentration statistically significantly ($p<0.0001$) decreased MFI values by 30%.

In contrast to low concentrations of GdYVO4:Eu3+ nanoparticles (20 and 40 µg/ml), their high concentrations (80 µg/ml) induce apoptosis of leukocytes in vitro.