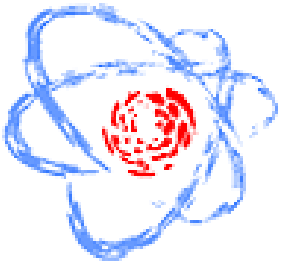

Contribution ID: **248** Type: **not specified**

Investigation for spectral biomarkers: chemical, UV and light induced NETosis.

Tuesday 7 June 2022 11:45 (10 minutes)

Neutrophil extracellular traps (NETs) are produced by neutrophilic granulocytes and consist of decondensed chromatin decorated with antimicrobial peptides. They defend the organism against intruders and are released upon various stimuli, including ultraviolet (UV) radiation. It's well known that extended exposure of the skin to UV leads to its damage and loss of protective properties. Many cells of the immune system, including neutrophils, are involved in the photoaging process [1]. In continuation of the initiated study on the activation of neutrophils by two approaches: biological (bacterial) and chemical (PMA) stimuli, we came over to examine the ability of neutrophils to realize NETs under the UVA (315-400 nm) irradiation. Human neutrophils were isolated from the whole blood obtained from healthy voluntary donor. Neutrophils unexposed to UV radiation were used as a negative control, while the positive control was represented by cells unexposed to UV radiation but stimulated with PMA (50 nM). We applied sensitive Raman spectroscopy and succeeded to register citrulline Raman band evaluation during the first hour of neutrophil cells activation [2]. In the novel set of the experiments we applied UVA radiation in a dose-depended manner. Proceed to the first series of NETosis experiment on UV, we took under advisement the fact that there is a contradictory proposition in the literature on signaling pathways leading to NETosis, which suggest either NOX-independent or NOX-dependent pathway. In the case of NOX-independent signaling pathway often has to realize peptidylarginine deiminase 4 (PAD4), which citrullinates histones contributing to chromatin decondensation. Also, in accordance with literature, neutrophil cells were treated with the calcium ionophore A23187 (A23) to activate NOX-independent NETosis resulting in the citrullination of histones. Data analysis was done implementing immunofluorescence microscopy and Raman spectroscopy. It was revealed that UV-induced activation undoubtedly leads to the formation of NETotic cells in the form of cloud-like-spread in the observed immunofluorescence imaging. Nevertheless, in contrast to NETosis activation with the calcium ionophore A23, the citrulline peak in Raman spectra has not observed. It is an evidence of the NOX-depended signaling pathway under the UV radiation applied. This research is in progress, including study of lowfrequency range of Raman spectra of DNA for the NETotic cells.

Summary

Presenter: Mr ARYNBEK, Yersultan (JINR, INP, KAZNU)

Session Classification: Sectional talks