

Search for biomarkers in UV-induced NETosis

55th meeting of the PAC for Condensed Matter Physics

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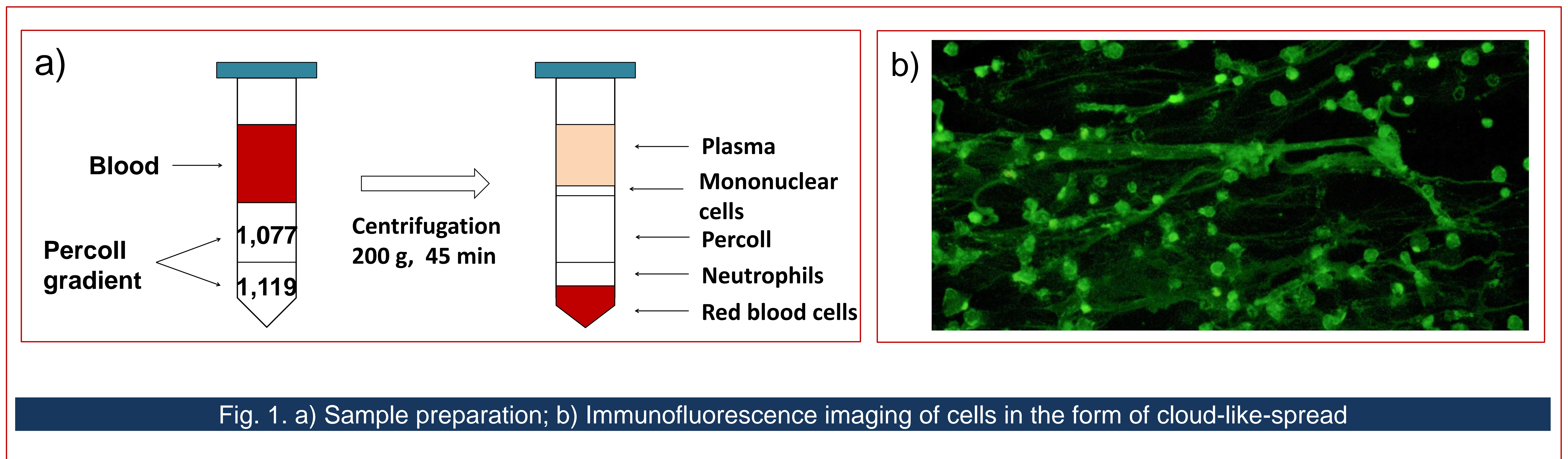
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Dubna, January 2022

NETosis

Neutrophil extracellular traps (NETs) are produced by neutrophilic granulocytes and consist of decondensed chromatin decorated with antimicrobial peptides (Fig. 1.). 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].



Results

Neutrophils activation: 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) and visible light (490 nm) irradiation (Fig. 2.).

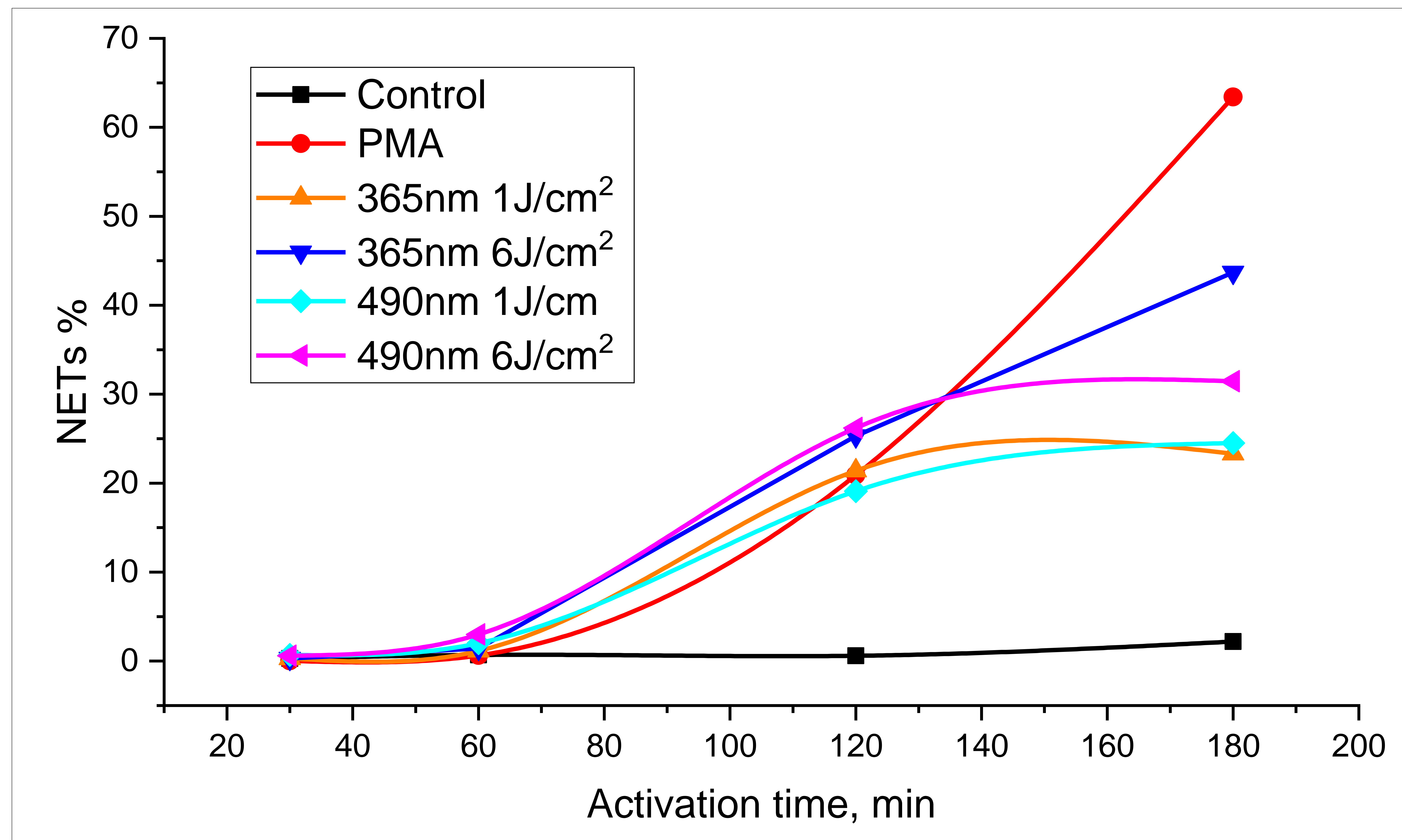


Fig. 2. UV-induced NETosis

Spectral biomarker: The main goal of this study was to reveal a possible spectral biomarker in neutrophil activation by measuring and comparing the Raman spectra of UV-induced/PMA activated and non-activated neutrophil granulocytes.

The low-frequency Raman spectrum of PMA-activated (180 min) neutrophils contains distinctive citrulline peaks (Fig. 3.), which indicates on the PAD4 mechanism, in which the process of histone citrullination is observed, while the NOX-dependent signaling pathway is realized under the UV radiation.

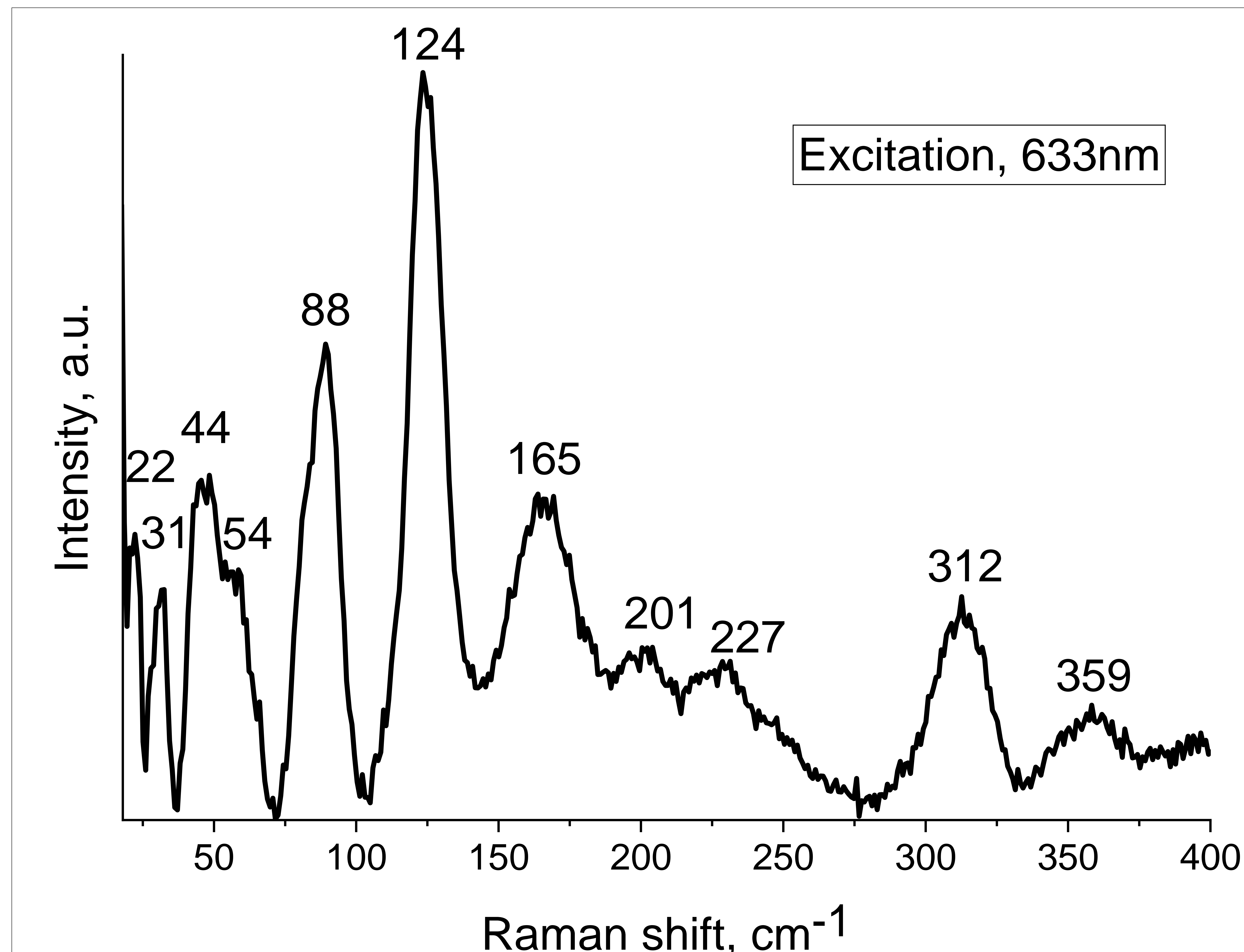


Fig. 3. Low frequency Raman spectra of chemical activated (PMA) neutrophils

Conclusion:

- **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-dependended signaling pathway under the UV radiation applied.**
- **This research is in progress, including study of low frequency range of Raman spectra of DNA backbone vibrations for the netotic cells.**

Thank you for your kind attention!