

EFFECT OF UVC RADIATION ON REGIONS OF THE SARS-COV-2 CORONAVIRUS GENOME ENCODING THE SYNTHESIS OF STRUCTURAL PROTEINS

Iurie Nica, Serghei Zavrajny

Technical University of Moldova, Institute of Electronic Engineering and Nanotechnologies,
Academiei str., 3/3, Chisinau, Moldova

We studied the inactivation of SARS - CoV - 2 viruses by annihilating the structural components of the viruses that are manifested in the amplification process in the PCR procedure. For irradiation we fabricated and applied an LED matrix emitting UVC with a power of 190 mW in a narrow range of wavelengths, close to 255 nm. Each individual portion of the biomaterial (sample) was irradiated with a certain dose. The dose was determined by the duration of irradiation with a constant power density on the sample surface of 4 mW/cm^2 . One of the samples was not exposed to radiation. Then, all samples, including the non-irradiated one, were analyzed using real-time PCR. The effect of irradiation on the virus was evaluated by comparing the data from the PCR analysis of the irradiated samples with the data for the non-irradiated sample. The data obtained during the experiments showed that irradiation of samples with 255 nm ultraviolet radiation with a power density of 4 mW/cm^2 for 70 seconds (280 mJ/cm^2) reduces the content of the gene capable of translating the E – protein by 100 times. To reduce the amount of this gene by ~ 1000 times, an exposure with a duration of 320 seconds (1.28 J/cm^2) is necessary, and exposure to radiation with the above characteristics for a time of about 400 seconds ($\sim 1.6 \text{ J / cm}^2$) will reduce the E – gene content by 10^4 times. Irradiation of the gene encoding the structure of the N-protein for ~ 270 seconds leads to a 100-fold decrease in the content of the analyzed code fragment. To reduce the number of the target code fragment by 1000 times, irradiation is necessary for ~ 530 seconds.

The current work, TEHMED COVID 20.70086.07/COV(70105), was supported by a grant from the ``ERAvsCORONA'' Action Plan part of the CG-ENI / 2017 / 386-980 EC "Financial Support for the participation of Republic of Moldova in the Framework Program of the European Union for research and innovation HORIZON 2020", and also of the Moldova State Program, Project «Nanostructures and advanced materials for implementation in spintronics, thermoelectricity and optoelectronics» No. 020201. We are thankful to Ion Rotari (Invitro Diagnostics SRL) for providing his support and access to PCR testing in his laboratory.

Corresponding author: Dr. Iurie Nica

UTM, Institute of Electronic Engineering and Nanotechnologies "D.GHITU"

Academiei 3/3, Chisinau MD2028 Moldova

e-mail: iunica1951 @gmail.com

ORCID: 0000-0002-7394-012X