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Prospects for the use of surface plasmon resonance (SPR) assay for antiviral drug testing in cell cultures

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Viral outbreaks, re-emerging or emerging viral diseases, affecting human population are of particular public health risks. Currently, very few antiviral drugs have been approved for human use, since many of them have associated with high toxicity, low selectivity, and significant resistance. During the preclinical antiviral drug screening various cell culture-based assays are available and can be successfully applied to assess cell viability/cytotoxicity and to determine antiviral activity. Surface Plasmon Resonance (SPR) can be applied in the kinetic analysis of the early stages of viral infection of cells and the antiviral drug activity in the infected cells. The aim of this study was to prove that the cell-based SPR assay can be applied to evaluate the antiviral effectiveness of newly synthesized drugs and natural compounds. For this purpose, cells immobilized on the SPR slides were infected with human coronavirus HCoV-229E and treated with newly chalcones and antiviral drugs remdesivir and hydroxychloroquine. The SPR method was used to evaluate the antiviral effect of chalcones on the early stages of viral replication, and the virus-cell response was followed by the change in the viability of infected and treated cells, assessed by MTT assay. Based on the results obtained, it can be concluded that two of the tested chalcones exhibit promising anti-coronavirus activity in cell cultures. The study conducted is a pilot study and the results obtained will be used to develop and optimize a sophisticated methodology for assessing the "structure – antiviral activity" relationship.

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Biography

Petia Genova-Kalou received his MS degree in Molecular Biology from Sofia University "St. Kliment Ohridki", Bulgaria and PhD degree on SOCRATES-ERASMUS exchange program from Sofia University and University of Ioannina, Greece in the field of Virology. She has specialization of "Clinical Virology" in Medical University – Sofia. She has worked part-time at Hellenic Pasteur Institute Greece (2006 – 2007), at the National Hellenic Research Foundation, Greece (2007) and National Center of Infectious and Parasitic Diseases, Sofia, Bulgaria (currently). During this period P. Genova-Kalou was involved in study of antiviral effect of different newly synthesized and natural compounds in cell culture, diagnostic of herpes and oncogenic viruses, epidemiology and molecular study and diagnostics of rickettsiae. She is the author and co-author of over 70 scientific articles and over 200 reports.

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