

Suggestion of new strategies for battle against COVID-19

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Abstract

The main idea of the current study is directed to development of method about suppression of the replication of COVID-19, both in vitro and in vivo. In this aspect, the main goal is connected with RNA-interference of appropriate viral genes with appropriate siRNAs and/or activation of the production of appropriate microRNAs by the cells. Further intra- and extra-cellular interactions between different biological molecules (protein-protein, protein-RNA, protein-DNA, protein-lipid, protein-carbohydrate, DNA-DNA, DNA-RNA, RNA-RNA, DNA-DNA, etc.), underlining these processes, but also the intra-cellular protective mechanisms, should be investigated, for determination of the respective direct and/or indirect interactions of the membrane proteins with different cytoskeleton components, by cascade regulatory pathways. So, the main tasks are:

1. Inoculation of in vitro-incubated cells with viral strain with RNA-genome (if is possible, belonging to Coronaviridae family).
2. Treatment of the virus-inoculated cells with appropriate siRNAs (or appropriate cell-produced microRNAs) against viral RNA-genes, necessary about viral penetration in the cell and viral replication.
3. Evaluation on the in vivo-influence of the tested siRNAs and/or microRNAs on appropriate experimental animals, infected with the same RNA-viral strain.
4. Investigation of in vitro- and in vivo-anti-viral immunity, by Immunohistochemistry; Immuno-blot (Western-blot) assay; Immunofluorescent assay; Flow-Cytometry and/or Enzyme-Linked Immunosorbent Assay (ELISA); Polyacrylamide Gel Electrophoresis (PAGE) with subsequent pull-down and mass-spectrometry assay; Spectro-photometric assay; Nuclear-Magnetic Resonance (NMR) assay; laser irradiation; SEM, TEM, confocal microscopy assay in the presence of specific fluorochrome(s) or nano-particles, as well as immuno-staining procedures;
5. In addition, adequate immune reaction should also be provided. In this connection, studies on the established possibility for production of immunoglobulins/antibodies and membrane receptor glycoproteins from non-lymphoid and non-myeloid cellular types on the influence of appropriate internal (genetic), epigenetic and external factors, as well as of various combinations of factors, belonging to each one of the three categories, should be performed. Also, universal mechanisms, responsible about normal/non-malignant cell differentiation, support of adequate immune response, as well as prevention of malignant cell transformation on the one hand, but also cellular ageing and death on the other, should be influenced. In this connection, genes and proteins, influencing the functions of CRISPR/Cas universal biological systems should be activated. After performance of all steps, evaluation on the in vivo-influence of the tested siRNAs and/or microRNAs on patients/volunteers with COVID-19 infection (in the initial period of 24-48 hours post infection) could be performed.



БЪЛГАРСКА АКАДЕМИЯ НА НАУКИТЕ

Biography

The main goal of my work is directed to development of experimental models for balanced activity between oncogenes and tumor-suppressor genes, as well as between the protein products of both gene types, on cellular and organism levels. I graduated Bachelor-degree on Molecular Biology in 1997 at the Faculty of Biology to Sofia University "St. Kl. Ohridsky" in Sofia, Bulgaria, and Master-degree on Genetics in 1998 at the Department of Medical Cytogenetics to Sofia University hospital "Joanna Queen" in Sofia, Bulgaria, with a Diploma- work thesis "Structural and number chromosomal aberrations in patients with polygene diseases and disorders". My PhD-thesis was prepared at the Department of Oncovirology to the Institute of Experimental Pathology and Parasitology (IEPP) to Bulgarian Academy of Sciences (BAS) in Sofia, Bulgaria.