Cytotoxic and antiviral properties of fullerene C60 in the culture of animal cells

Zinaida Klestova, Dr., Ph.D.*, Yuriy Prylutskiy, Dr., Ph.D.,** Marina Marchenko Ph.D. Student ***

*State Scientific-Control Institute of Biotechnology and Strains of Microorganisms (Donetskaya St, 30,Kyiv-151, Ukraine);
**National Taras Shevchenko National University of Kyiv, Volodymyrska Str. 64, 01601 Kyiv, Ukraine
***The Institute of Veterinary Medicine of NAAS (Donetskaya St. 30, Kyiv-151, Ukraine)

One of the urgent problems of modern veterinary biotechnology is to solve the complex task that lies at the intersection of chemistry, physics, materials science, biology, veterinary medicine is focused design, synthesis and study of the functional properties of nanomaterials which characterized by high bioavailability and biocompatibility, low toxicity and high specific biological activity.

In our studies, was used C60 fullerene - fullerene in water-soluble form. This compound molecule is nearly spherical, with a diameter of 0.72 nm , the surface of which consists of 60 carbon atoms connected by single or double chemical called " links. Considered that C60-fullerenes are potential pharmaceutical compounds. However, along with a broad perspective on the use of such substances for the prevention and treatment of diseases, there are certain precautions, particularly with regard to the possible toxic effects on biological objects, including on cell.

Therefore, our research started with the determination of cytotoxic properties of C60 fullerene - on cell line BHK -21, which is continuous line origin from Syrian hamster and which is used in many medical and biological researches.

In experiments used at least ten holes in plates with cell culture for each drug dilution in culture medium. The plates with cell culture incubated at +37˚ C with 5% CO_2 for 96 hours.

Thus, we have found the maximum cytotoxic concentration of compound that was 0,0375 ±0,003 mg/ml (n=3,).

Determined the antiviral activity of C60 - fullerene, using as a biological model coronovirus (virus of transmissible gastroenteritis of swine). Coronoviruses affect both animals and humans, leading in many cases to a high degree of mortality. Investigation of antiviral activity of fullerene on transmissible gastroenteritis virus of swine in the system in vitro, n = 5 (each concentration: 0,15 , 0,075, 0,0375, 0,019, 0,009, 0,005 was tested in 10 holes).

We found that C60-fullerene reduced the infectious properties of the virus by 2.0 TCID 50/ml which is a significant result.

Therefore, preliminary data suggest recommend this compound for further preclinical and clinical studies.