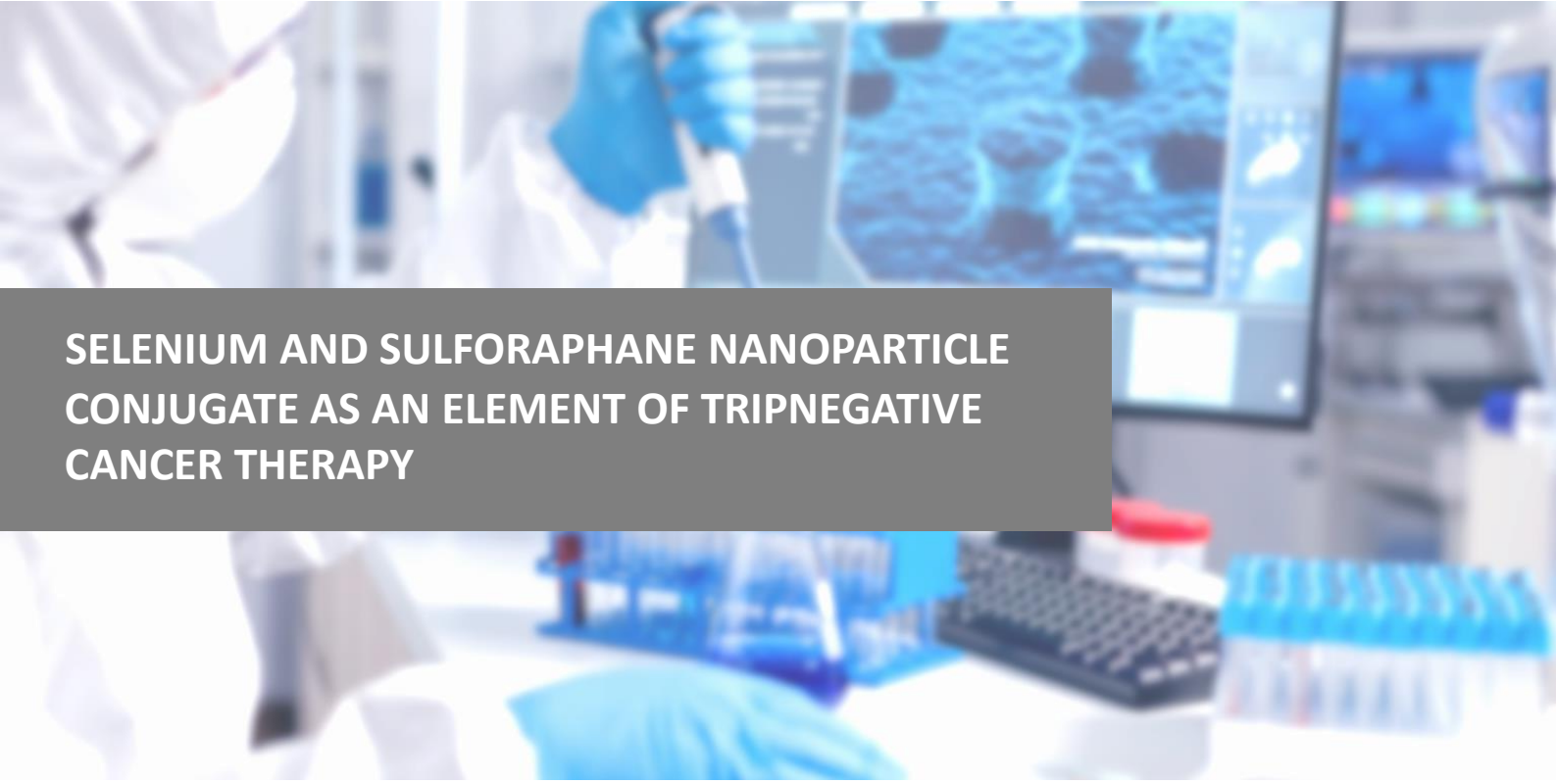

SELENIUM AND SULFORAPHANE NANOPARTICLE CONJUGATE AS AN ELEMENT OF TRIPNEGATIVE CANCER THERAPY

Market context

According to the WHO, breast cancer accounts for about 23-25% of all malignancies in women and is responsible for about 14% of deaths. It is estimated that approximately 2.3 million new cases of the disease are diagnosed each year. Triple-negative breast cancer (TNBC) is a type of cancer that lacks three hormone receptors: estrogen receptor (ER), progesterone receptor (PR) and growth factor receptor (HER2). Due to the lack of receptors that could be targeted by hormone therapy, treatment of TNBC is difficult. It is based on chemotherapy and radiotherapy, and in some cases surgery is necessary. Although it is a relatively rare type of cancer (according to the American Cancer Society, these varieties account for about 10-20% of all breast cancers), it is one of the most aggressive and difficult to treat varieties.

The modern challenge of medicine is to design therapies that would increase the effectiveness of treatment of TNBC and other types of cancer that do not present receptors that allow the use of targeted therapies. New methods of delivering drugs to patients are sought, which will allow the accumulation of strong active substances with higher concentrations, primarily in tumor cells, to eliminate side effects and not harm healthy cells of the body.

Innovation and potential application

The innovation is based on the method of producing a selenium nanoparticle (about 80nm) surrounded by a 1nm "coat" of isothiocyanate (sulforaphane) particles – with anticancer properties. *In vitro* studies have shown synergism – the obtained conjugate is characterized by increased anticancer activity with high selectivity towards colon and breast cancer cells. At the same time, the conjugate shows approximately 17-fold reduced cytotoxicity to normal colon CRL-1790 cells and MCF-10A breast (tested with MTT and CVS cytotoxicity assays) compared to cancer cell toxicity. The resulting conjugate can potentially be used in cancer therapies.The innovative selenium nanoparticle can potentially be a carrier of other drugs – not only sulforaphane.

Benefits:

- Chance to get targeted therapy for TNBC
- Demonstrated selective effect of nanoparticles on cancer cells
- Low cytotoxicity to healthy cells confirmed in *in vitro* studies
- The nanoparticle can potentially be a carrier of other drugs

Intellectual property:

Patent protection in the EU (EPO)

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