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PURIFIED GLYCOGEN AS A NEW NANOCARRIER FOR SIRNA DELIVERY ON BREAST CANCER CELLS

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Purified Glycogen is a highly purified form of glycogen, characterized by a high solubility in water and a moderate increase in viscosity due to the hyperbranched structure of the molecule. This structure, properly functionalized, makes it a valid alternative to the current synthetic nanocarriers for the release of genes. The aim of this work is to synthesize and characterize Purified Glycogen Polycationic Derivatives (PGPDs) as new hyperbranched nanocarriers usable for nucleic acid complexation. The development of this new structure is obtained by derivatization of the purified glycogen with N,N-dialkyl halides. The samples were characterized in terms of chemical, morphological and biological interactions. The derivatives thus obtained were subsequently characterized in terms of their ability to bind siRNA and transport it to breast cancer cells (MDA-MB-231-luc2), in order to create a genetic silencing effect on the genes responsible for the evolution of the disease. PGPDs-siRNA complexes have been characterized by agarose gel electrophoresis, luminescence test and confocal microscopy. Images obtained from agarose gel electrophoresis showed that the best ratios to use are 1:2, 1:3 and 1:4 siRNA/PGPDs ratios, so the PGPDs-siRNA complexes were prepared with a final siRNA/PGPDs ratio of 1:3. The luminescence test was performed on a MDA-MB-231-luc2 cell line at incubation times of 24h, 48h and 72h. The luminescence test was performed to verify the actual efficacy of PGPDs as siRNA carriers within MDA-MB-231-luc2 cells. From the images obtained by confocal microscopy, we can see how the PGPDs-siRNA complexes can adequately cross cellular barriers and act on the nucleus. In addition, the complexation process must be improved by eliminating the polymer aggregation phenomena and increasing the Z-potential value of the complexes in order to trigger the proton sponge effect inside the cell and cause the release of siRNA.

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