ABSTRACT

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Nowadays structures which negatively suppress some pathological processes in the organism have been revealed, for example small molecules - microRNAs. For various diseases, such as cancer or cardiac fibrosis, specific types of microRNAs, which participate in pathological growth of these affected tissues, have been discovered. MicroRNAs, as a hot issue, has resulted in focusing on the creation of inhibitors of these small structures in different stages of their genesis. For this work miR-21 occurring in some kinds of cancer and cardiovascular disease, mainly in cardiac fibrosis, has been used. The assays showed that the suppressing of miR-21 positively influences these pathological processes and 4-(2-phenylhydrazinyl)-*N*-prop-2-ynyl-benzamide was determined to be the appropriate inhibitor. This inhibitor contains azobenzene´s moiety which allows the compound to interconvert between two isomers upon irradiation. In this way, this compound can be considered a photoswitchable molecule.

The main goal of this work was to synthesize novel potential microRNA-21 inhibitors based on the structure of a known inhibitor in order to increase their stability and the conversion ratio between the two isomers after the exposure to the UV/Vis lights. The various groups in *ortho* and *para* positions allow to change the biological and photophysical properties of each compound. In the designed derivatives differences among EDG, EWG and bulky substituents in these positions were studied. External conditions in appropriate UV/Vis lights wavelengths were chosen for observing the changes in the behaviour of each compound.

The results show significant differences of properties of azobenzenes based on changes of the substituents at the benzene ring. Distinct synthetic-methods to obtain the final compounds have been tried and classified as successful/unsuccessful procedures. Varied substituents played a big portion of success in the synthetic pathways.