

Deoxyribonucleic acid (DNA) is an essential genetic molecule for life on our planet. Beyond that it is also one of few true *molecular superstars* being frequently in focus of TV, radio, electronic mass media and writers. It is due to the serendipitous discovery of the DNA double helix structure, genetic function encoded in DNA sequence and all possible consequences originating from the sequence modifications via genetic engineering or mutations. Another fascinating problems linked to DNA comprise its origin and evolution. Related to that, there is a question if other than DNA genetic polymers can exist in the Universe. To answer this question is impossible due to travel-space technical problems. Fortunately development in chemistry allow for synthesis of artificial nucleic acids (termed as xeno nucleic acids; XNA) in laboratories on Earth. Herein grant proposal focus on obtaining of new kinds of artificial XNA and investigation of their chemical and biological (*e.g.* toxicity against human cells, localization in human cells and anticancer activity) properties. This class of compounds share a common 1,2-propanediol core structure and is called functional glycol nucleic acids (*fun*-GNA).