Synthetic small-molecule RNA ligands: scope and applications

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MicroRNAs (miRNAs) are a recently discovered category of small RNA molecules that regulate gene expression at the post-transcriptional level. Accumulating evidence indicates that miRNAs are aberrantly expressed in a variety of human cancers, thus being oncogenic and that the inhibition of oncogenic miRNAs (defined as the blocking of miRNAs' production or function) would find application in the therapy of different types of cancer in which these miRNAs are implicated.

Our work aims at the development of small-molecule drugs targeting specific oncogenic miRNAs production. Toward this aim, we perform the design and synthesis of new RNA ligands as well as the screening of compounds libraries. Both approaches are based on a high throughput *in vitro* assays and demonstrated to be successful in identifying compounds able to interfere with the biogenesis of oncogenic miRNAs in a selective manner at the intracellular level. Thanks to these works, we demonstrated that it is possible to inhibit miRNAs production using synthetic small molecules and that this kind of approach could be applied in future anticancer therapies. In this contex, we will show our recent results about the induction of cancer stem cells differentiation using miRNAs interfering agents. Noteworthy, these RNA ligands could find extremely important applications as chemical biology tools for the improvement of our understanding of miRNAs biological pathways.