Abstract

Design of small interfering RNA (siRNA) is a basic step to successful RNA interference (RNAi). However, it is not trivial to design a suitable siRNA duplex at all, because there are some problematic areas like stability of siRNA duplexes in the presence of nucleases, efficiency of target mRNA elimination, sequence-specific elimination of non-target mRNAs, cytotoxicity and immunogenicity for example, which can influence the aliveness of siRNA duplexes and consequently also their utility in medicine and other fields. The understanding of the principles of siRNA duplexes function during RNAi is a necessary step to solution of the obstacles on the way to efficient drugs. The mean of optimisation of described troublesome properties is an alteration of siRNA duplexes design by use of different modifications. Phosphodiester backbone, bases and also ribose can be modified. Some modifications beneficial for siRNA duplexes and consequently RNA interference are known in every one of these groups. This work presents existing pieces of knowledge about some of the most known modifications, just like phosphorothioate substitution, 2′-deoxy-2′-fluoronucleotides, 2′-O-methyl ribonucleotides and LNA nucleotides are, as well as about a higher number of less known modifications like boranophosphate substitution, 4′-thioribonucleotides, 2′-O-methyl-phosphorodithioate modification and many others, which influence the attributes of siRNA duplexes.