

## Editorial

# Biological Function of G-Quadruplex Nucleic Acids and Potential Application in Medicinal Chemistry



**Z. S. Huang**

G-Quadruplexes are special secondary structures adopted in some guanine-rich DNA sequences. The highly prevalent putative existence of G-quadruplex and the influence on genomic stability, telomere maintenance and gene expression indicate that G-quadruplexes may play important roles in biological processes [1]. Many research findings have provided substantive evidence for potential applications of G-quadruplex nucleic acids as promising anticancer targets [2-5]. In this volume of *Current Topics in Medicinal Chemistry* (CTMC), we summarized recent research articles with special focus on the research progress for the biological function of G-quadruplex nucleic acids and potential application in medicinal chemistry, which covers several aspects of content including telomere G-quadruplex as target, RNA G-quadruplex as target, G-quadruplex small molecular probes for cellular imaging, G-quadruplex interactive proteins, and G-quadruplex as tool for biological target detection and drug delivery. In particular, this issue highlights the research fields that are rapidly growing on G-quadruplex in recent years, where six review articles were selected dealing with many different themes and illustrations that contribute to understanding the research status of the biological function of G-quadruplex nucleic acids and potential application in Medicinal Chemistry and Pharmaceutical Sciences.



**X. Zhou**

Below, we present six selected articles with a brief account of the contribution of each:

- *Telomere G-quadruplex as a potential target to accelerate telomere shortening by expanding the incomplete end-replication of telomere DNA* by Tan *et al.* – In this article, based on a mathematical modeling and experimental results, a hypothesis is proposed that the formation of G-quadruplex in telomere may contribute to the incomplete end-replication of telomere DNA during telomere replication. According to this, stabilization of telomere G-quadruplex by chemical ligand may promise to accelerate telomere shortening in proliferating cells.

- *RNA G-quadruplex: the new potential targets for therapy* by Ou *et al.* – In this article, the structures, the biological roles, and the potential to be as drug targets of RNA G-quadruplexes were addressed. The G-quadruplexes formed in RNA are involved in many biological process including telomere elongation, transcription regulate, pre-mRNA splicing and translation.

- *Recent development of G-quadruplex probes for cellular imaging* by Ma *et al.* – In this article, the significance for the development of specific probes for detecting and distinguishing G-quadruplex structures was addressed. It summarizes recent advances in the development of G-quadruplex probes over the past three years, with a particular emphasis on the detection and imaging of G-quadruplex structures within living cells.

- *A fluorescent anti-cancer agent, 3,6-bis(1-methyl-4-vinylpyridinium) carbazole diiodide (BMVC), stains G-quadruplexes in cells and inhibits tumor growth* by Chang *et al.* – In this article, the potential of the molecule BMVC, not only as a G-quadruplex fluorescent probe but also as an anticancer agent, was addressed. BMVC may become a useful tool to investigate several aspects of G-quadruplex nucleic acids.

- *Biological function and medicinal research significance of G-quadruplex interactive proteins* by Li *et al.* – In this article, the authors present a general summary of reported G-quadruplex binding proteins and their biological functions, with focus on those of medicinal research significance. It is pointed out the possibility for some of these G-quadruplex binding proteins and their complexes with G-quadruplexes as potential drug targets.

- *G-quadruplex's applications in biological target detection and drug delivery* by Zhou *et al.* – In this article, the application of G-quadruplex for biological target detection and drug delivery was addressed. The authors summarized some typical systems for various target detection by utilizing G-quadruplex as signal readout unit and also its use in drug delivery.



**Z. Tan**

In the context of this special issue, we would like to thank all authors of the chapters listed above and for their important contribution to this issue of *Current Topics in Medicinal Chemistry*. We believe that this volume will contribute to the literature beneficial to scientists of different research fields related to G-quadruplexes in Medicinal Chemistry and Pharmaceutical Sciences.

### CONFLICT OF INTEREST

The authors confirm that this editorial content has no conflicts of interest

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