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2nd International Conference on

MOLECULAR BIOLOGY, NUCLEIC ACIDS & **MOLECULAR MEDICINE**

August 31-September 01, 2017 Philadelphia, USA

Structure-functional study of G-rich oligonucleotides

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ligonucleotides play many functional roles in cells. G-rich DNA and RNA sequences can form stable four-stranded structures termed G-quadruplexes, in which four guanine bases associate through Hoogsteen hydrogen bonding to form a square planar structure or guanine tetrad (G4). G4 motifs are evolutionarily conserved in certain regions and associated with a specific subset of the genome. Two or more guanine tetrads stack to form a G-quadruplex, which may differ in how the DNA strand(s) are folded. G4 DNA are found in telomeric sequences such as d(GGTTAG)n, and in the promoter regions of many other genes. Genome-wide search identify 370,000 potential quadruplex sequences in the human genome. It was suggested that G-quadruplex formation in a promoter may block transcription of the gene. It has also shown that RNAs also form G-quadruplex and play an important role in transcription and translation processes. We are interested in structure-functional study of G-quadruplex of DNA and RNA in human DNA replication initiation and related diseases. Our biochemical and structural study showed that human Cdc6 binds G4 DNA directly supporting a role for G4 DNA in the recruitment of Pre-RC to replication origins. In analyzing the structure of G4 DNA that Cdc6 binds, we revealed a novel structural fold of G-quadruplex of human telomeric DNA. We also investigated the role of G-rich RNA in latent DNA replication of Epstein-Barr virus. These mechanistic studies will provide insight on the molecular mechanism for origin selection in human and human viruses.



Biography

Guang Zhu is a Professor of Division of Life Science in Hong Kong University of Science and Technology. He has obtained his BSc and MSc in Physics. He has completed his PhD degree from University of Maryland and National Institutes of Health, USA, specialized in Biomolecular NMR Spectroscopy. Currently, his research focuses on structure-functional study of human and viral proteins in DNA replication initiation. He has published more than 79 peer-reviewed reports. He has served on the editorial boards of International Journal of Spectroscopy, Chinese Journal of Magnetic Resonance and Scientific Report.

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