
Preface

A square planar arrangement of four guanine bases was first proposed to explain the unusual property of guanosine to form gels. This G-quartet structure may have easily remained an odd curiosity, if it wasn't for the intriguing possibility that such interactions of guanosine bases have functions in biology. Chromosome termini in most eukaryotes are comprised of repetitive, G-rich DNA sequences that can form remarkably stable stacks of G-quartets, often referred to as G-quadruplexes. The observations that G-quadruplex structures form readily *in vitro* under physiological conditions and that suitable sequences are present at the ends of chromosomes of most eukaryotes have prompted much interest in the role of G-quartets in biology. Recent reports have provided experimental support for physiological functions of G-quartets not just as telomeres, but also in the control of gene expression and in mRNA maturation. The realization that the human genome harbors literally hundreds of thousands of potentially G-quartet-forming sequences has raised the exciting possibility that many biological functions of these structures remain to be discovered.

Recent work revealed that stabilizing G-quadruplexes in telomeric DNA inhibits telomerase activity, providing impetus for the development of G-quartet-interacting drugs. The therapeutic potential of G-quartets, however, goes far beyond telomerase inhibitors. G-quartet-containing oligonucleotides have been recognized as a potent class of aptamers effective against STAT3 and other transcription factors implicated in oncogenesis. Outside the realms of biology and therapeutics, G-quartets provide insights into molecular self-assembly and supramolecular chemistry and have recently found applications as sensors in nano-technology.

This book aims to present a collection of detailed methods and protocols for studying G-quartet formation, dynamics, and molecular recognition. We believe that this volume will be a useful resource for those familiar with G-quartets, as well as an easy entry point for those researchers from diverse fields who are just developing an interest in G-quadruplex DNA.

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G-Quadruplex DNA

Methods and Protocols

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