

Abstract

G-quadruplexes are supersecondary structures that form in guanine-rich regions of DNA and RNA. These structures are extremely thermally stable, likely to form in ~750,000 locations in the human genome and are enriched in the promoter regions of proto-oncogenes and developmental genes, non-coding regions, and within telomeres. Due to the prevalence of these structures in key genomic locations, these structures are capable of regulating a large fraction of cellular processes. Within humans, the enzyme G4 Resolvase 1 (G4R1) is responsible for the majority of G-quadruplex resolving activity. This places G4R1 at the forefront of regulating all functions involved with G-quadruplexes. Despite regulating G-quadruplexes, a nearly ubiquitous structure throughout the human genome, G4R1 is relatively understudied. Within this thesis, I present a method for producing highly pure and selectively catalytically active samples of rG4R1 and discuss the potential involvement of G4R1 with the pathology of Amyotrophic Lateral Sclerosis.

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