Abstract

CGGBP1 is a 20kD protein which mainly binds to 5'-d(CGG)-3' repeats in the genome. The protein can bind to CGG repeats present in the regulatory and telomeric regions inside the nucleus. The extranuclear presence of CGGBP1 is detected as well. The protein acts as a transcriptional regulator and it is involved in a wide range of cytoprotective functions like DNA damage repair, prevention of telomeric fusions and maintenance of genomic integrity. CGG repeats can often fold into secondary structures like hairpin and tetraplex structures in the DNA and also G-quadruplexes in RNA. G-quadruplexes are secondary structures in DNA or RNA containing G-rich repeats and formed through noncanonical Hoogsteen base-pairing between guanine residues. These structures can be found mostly in repeat containing and 5' upstream regions of a gene. G-quadruplexes take part in gene regulation and it is also involved in the telomeric end protection. The possibility of CGG repeats forming G-quadruplex structures in DNA is very likely. Hence, there is an indication that CGGBP1 might be an interacting factor of G-quadruplex and this led us to finding the role of CGGBP1 in the formation and stability of G-quadruplexes.

In order to perform the experiments with G-quadruplex and CGGBP1, a system which can form G-quadruplex (G4) as a positive control and does not form G4 (G4*) as a negative control is established. Templates containing single-stranded G4 and non-G4 forming sequences were provided proper G4 forming condition and the detection and quantification of the G-quadruplexes were performed using a novel, nonradioactive, biochemical method involving quantitative PCR. Further, recombinant CGGBP1 was introduced in the previously established system and the G4-formation was quantified. It is observed that, in the presence of CGGBP1, even in the poor G4 forming conditions the results are reminiscent of the stable formation of G4s - implying that CGGBP1 has an effect in stabilising the poorly formed, less stable G-quadruplexes or it simply binds to the G4-forming sequences in vitro.