CArG box is a highly conservative DNA motif found in Serum Response Element (SRE), which regulates expression of c-fos gene. In this thesis, short oligodeoxynucleotides containing CArG box were measured using nuclear magnetic resonance spectroscopy to evaluate their ability to preferentially form hairpin over duplex. 1H spectra were measured at temperature range (274-360) K. We acquired thermodynamic parameters of the transition between hairpin and single strand by fitting the temperature-dependent chemical shifts. The hairpin structure of our oligonucleotide samples was confirmed by non-B-DNA patterns in NOESY spectra, absence of concentration dependence of melting, and other pieces of evidence. Thus, occurrence of unusual DNA conformation of CArG box in native DNA, potentially even cruciform is highly possible. This could explain the high affinity between SRE and its transcription factor.