Guanine quadruplexes are a class of unusual nucleic acids conformations based on stacked planar guanine tetrads stabilized via Hoogsteen pairing and cation coordination. They are implicated in numerous cellular processes including replication, recombination or transcription. Guanine quadruplexes are widespread within the human genome but their occurrence is highest in the single stranded guanine-rich regions at telomeres. Telomeric guanine quadruplexes are gaining growing interest due to their ability to inhibit the activity of the telomerase enzyme, which is responsible for the proliferation of tumor cells. Specifically, we investigated the conformational polymorphism of the human core telomeric sequence $G_3(TTAG_3)_3$ conditioned by the concentration of DNA, metal cations (K^+, Na^+) and/or annealing. Raman spectroscopy was employed as the primary method for this study because, unlike common spectroscopic methods, it allowed us to monitor the quadruplex structure at very high DNA concentrations mimicking molecular crowding conditions in the cell. We demonstrate that the $G_3(TTAG_3)_3$ quadruplex switch between the antiparallel and parallel strand alignment as a function of nucleoside and potassium concentration. In addition, we demonstrate that cationic porphyrins can be used as sensitive probes of the quadruplex conformation. Finally, we discuss possible dimerization of interesting guanine quadruplex known as thrombin binding aptamer.