

# The study on the structure conversion of the human telomeric DNA sequence induced by the rate of $K^+/Na^+$ using SERS

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**Key Word:** telomeric DNA, G-quadruplex, **SERS**,  $K^+/Na^+$

**Abstract:** The human telomeric DNA sequence folding into the sodium basket form and the potassium hybrid form have been well known. The G-quadruplex structure changes of d[GGG(TTAGGG)<sub>3</sub>], d[AGGG(TTAGGG)<sub>3</sub>], d[AGGG(TTAGGG)<sub>3</sub>T] and d[AGGG(TTAGGG)<sub>3</sub>TT] with the different rate ( $K^+/Na^+$ ) were studied by surface-enhanced Raman spectroscopy (**SERS**) in this work. In Raman spectrum of four sequences, the intensities of the bands at 563 $cm^{-1}$ , 1146 $cm^{-1}$ , 1382 $cm^{-1}$  and 1513 $cm^{-1}$  from dA and dT were obviously improved with the increasing the rate ( $K^+/Na^+$ ) in solution. The band at 1382 $cm^{-1}$  has the greatest change in four signals. Due to the enhancement signal depends on decreasing the molecule-metal distance in **SERS**, it is confirmed that the more TTA loop exposed outside of the DNA molecule to bind silver colloid at higher the rate ( $K^+/Na^+$ ). The intensity of the band at 1382 $cm^{-1}$  in the normal rate ( $K^+/Na^+ = 10$ ) can be as a indicator to measure the rate ( $K^+/Na^+$ ) in vivo, which provides a new approach to detect whether the rate is on balance.

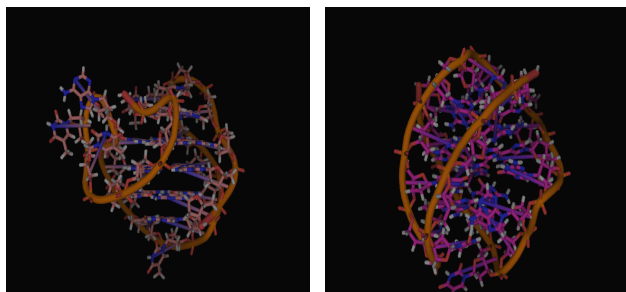


Fig1. Solution structures of the human telomeric repeat d[AG3(T2AG3)3] in  $K^+$ (PDB:2JSM) and in  $Na^+$ (PDB:143D)

