**Investigating the formation dynamics between non-canonical DNA structures at different cell cycle stages in breast cancer**

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**Abstract**

DNA can adopt alternative secondary structures in addition to the ubiquitous double helix. Certain guanine (G)- and cytosine (C)-rich sequences can form four-stranded structures termed G-quadruplexes (G4) and Intercalated Motifs (iM) respectively (Rhodes *et al.* 2015; Abou Assi *et al.* 2018). Both G4 and iM secondary structures occur in the human genome and sequences that can form these structures are over-represented in gene regulatory regions, such as oncogene promoters. Most G4s identified to date have been classified as transcriptional suppressors, in contrast, there is increasing evidence that iM structures may play the opposite role in gene regulation and may be involved in activation of gene expression. Given these G- and C-rich sequences occur in complimentary strands of duplex DNA, understanding G4 and iM dynamics relative to each other is crucial for developing targeted therapies. Whether G4/iM formation at specific loci is mutually exclusive, dependent or independent is still a matter of scientific debate and how this relationship differs with cell cycle progression is currently unknown. Herein, we conducted flow cytometry and immunohistochemistry with G4-specific and iM-specific antibodies to visualise and quantify the occurrence of G4 and iM foci in a human breast cancer cell line synchronised at specific cell cycle stages. As formation of these structures are quite dynamic, we utilized G4-stabilizing and iMab-stabilizing ligands to determine what affect enhancing formation of one structure has on formation of the other and whether these affects are cell cycle dependent.

**References**

1. Abou Assi H, Garavís M, González C, Damha MJ (2018). i-Motif DNA: structural features and significance to cell biology. Nucleic acids research. 46, 8038-8056.
2. Rhodes D, Lipps HJ (2015). G-quadruplexes and their regulatory roles in biology. Nucleic acids research. 43, 8627-8637.