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Fishing for G-quadruplexes and G-quadruplex-proximal proteins by virtue of the peroxidase properties

The powerful *in vitro* affinity observed between the ubiquitous cellular cofactor, hemin, and DNA or RNA G-quadruplexes, raises the intriguing possibility that this interaction also occurs *in vivo*. A further, intriguing possibility is that this affinity, and the notable peroxidase activity of the resulting G-quadruplex•hemin complexes, could be used to tag G-quadruplexes (and G-quadruplex-interacting and -proximal proteins) within living cells. Such investigations are in principle enabled by our long-time observation that hemin•G-quadruplex complexes are strongly enabled towards catalysis of 1- and 2-electron oxidative reactions, with phenolic compounds being especially outstanding substrates. We have recently reported that the use of biotinyl tyramide as a substrate for G-quadruplex•hemin peroxidases *in vitro* leads to the self-biotinylation of the G-quadruplexes themselves. Such self-biotinylation occurs with good efficiency and high discrimination, being entirely specific for G-quadruplexes and not, for instance, DNA duplexes. Furthermore, DNA biotinylated in this way remains amenable to polymerase chain reaction amplification, rendering it suitable for analysis by ChIP-Seq and related methodologies. We will present new data on this self-biotinylation methodology, that we anticipate will serve as a sensitive tool, orthogonal to existing ones, for identifying, labeling and pulling down cellular RNA and DNA G-quadruplexes as well as proteins either bound to or proximal to such quadruplexes.

Biography

Dipankar Sen was born in 1957 in Calcutta, India, and graduated with a BA (Hons.) from Cambridge University. He completed his PhD in Chemistry at Yale University, with Donald M Crothers and then did postdoctoral work with Walter Gilbert at Harvard University. He has been on the faculty at Simon Fraser University since 1991 and is currently Professor of Chemistry and Professor of Molecular Biology and Biochemistry. His research interests focus on the fundamental chemical and physical properties of DNA and RNA, nucleic acid catalysis, and G-quadruplexes.

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