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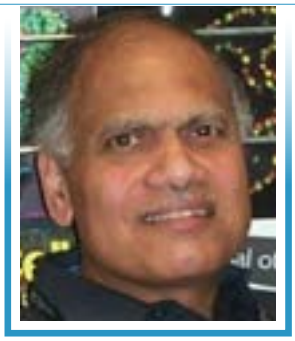

Mukund J Modak

The State University of New Jersey, USA

BIOGRAPHY

Mukund J Modak is professor in Department of Biochemistry and Molecular Biology. He has completed his BSc in 1963 in University of Poona in Maharashtra. He has completed his MSc in 1965 in University of Bombay, Haffkine Institute, India and also completed his PhD in 1965 from university of Bombay Haffkine Institute.

modak@njms.rutgers.edu

MOLECULAR INSIGHTS INTO STRAND DISPLACEMENT SYNTHESIS BY DNA POLYMERASE: DISTAL RRRY MOTIF AND TWO 3 HELIX BUNDLE STRUCTURES ARE REQUIRED FOR SDSD

Strand displacement synthesis of DNA (SDSD) is an important process that is required in the maturation of Okazaki fragments during the lagging strand DNA synthesis. Using prototype E.coli DNA polymerase I (pol I), we have shown that a structural motif consisting of three helix bundle in the fingers subdomain (FS) is required for SDSD. We now show that, in addition to FS, a distal motif consisting of a conserved RRYR sequence spanning positions 821-824, and located at the junction of polymerase and 3'-5' exonuclease domain of pol I, also participates in SDSD. The biochemical results showed that alanine mutations of individual residues reduce DNA binding affinity of enzyme by 5 – 35 – fold. We have previously reported that the Y821 of RRYR motif regulates the proof-reading activity of pol I suggesting at least two functions of RRYR motif. Furthermore, we have identified another 3-helix bundle structure in the 5'-nuclease domain of pol I. This motif is also necessary for efficient catalysis of SDSD. Hence, we conclude that SDSD by pol I requires structural elements from its all three domains. Interestingly, the 3 helix bundle resident tyrosine (Y215) is not required for the 5'-nuclease activity. We further demonstrate that in DNA polymerases, with active 3' exonuclease, further cleavage of displaced strand occurs in coordinated manner using intramolecular mode.