Indian Journal of Experimental Biology
Vol. 56, April 2018, pp. 219-229

Anticancer activity of HMGA1 promoter targeting triplex forming oligonucleotide in HeLa cell line

Md. Zahid Akhter[#] & Moganty R Rajeswari*

Department of Biochemistry, All India Institute of Medical Sciences, New Delhi-110 029, India

Received 01 January 2016; revised 08 January 2017

High mobility group protein A1 (HMGA1) acts as an architectural transcription factor and regulates transcription of various genes. Upregulation of HMGA1 has been described in a large number of human malignancies and serves as a 'tumor marker'. Due to its role in neoplastic transformation and tumor progression, *hmga1* is considered as a promising therapeutic target. In the present study, we investigated the interaction of triplex forming oligonucleotide (TFO) of 18 bps targeted to *hmga1* promoter (−1917 to −1940) and its influence on the expression of HMGA1 in HeLa cells. Stability of DNA triplex was characterized using various biophysical and thermodynamic methods and was confirmed by gel retardation assay using γ-^{32}P [ATP]. Treatment of HeLa cells with *hmga1* specific TFO significantly downregulated HMGA1 expression at mRNA, protein levels (~48%) and inhibited cell proliferation as investigated by RT-PCR, Western blot and Flow cytometry. The findings of the study suggest that TFO-mediated inhibition of *hmga1* expression can be a promising strategy for modulation of gene expression and for inhibition of cancer cell proliferation. Moreover, DNA triplex-based therapeutic approaches hold promise in combating cancers associated with HMGA1 overexpression.

Keywords: Cancer, DNA triplex, Energetic, HMGA1 expression, Triplex forming oligonucleotide