IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 2, March 2022
Impact Factor: 6.252

Topoisomerase: An Overview

Anurag Warale, Amol Dighe
Department of **Pharmacy**
Pravara Rural College of Pharmacy, Pravaranagar, Maharashtra, India

Abstract: *The structure of DNA is a double-stranded helix, where the four bases are paired and stored in the center of this helix. The two strands of DNA are intertwined and this would require the two strands to be untwisted in order to access the information stored. Topoisomerases catalyze and guide the unknotting of DNA by creating transient breaks in the DNA using a conserved Tyrosine as the catalytic residue. Two classes of Topoisomerses are identified yet. Since the overall chemical composition and connectivity of the DNA does not change, the tangled and untangled DNAs are chemical isomers, differing only in their global topology, hence the enzymes are named as Topoisomerases. The insertion of viral DNA into chromosomes and other forms of recombination also require the action of topoisomerases. Topoisomerase inhibitors are agents designed to interfere with the action of topoisomerase enzymes, which control the changes in DNA structure by catalyzing the breaking and rejoining of the phosphodiester backbone of DNA strands during the normal cell cycle. Thus they are found to be important tools for treatment of cancer..*

Keywords: Cancer, DNA, Irinotecan, Topoisomerases

REFERENCES

[1]. JJ Champoux. "DNA topoisomerases: structure, function and mechanism". Annu. Rev. Biochem. 2001, 70: 369–413.
[2]. "National Academy of Sciences: NAS Award in Molecular Biology". National Academy of Science. Retrieved 2009-01-07.
[3]. JC Wang"DNA topoisomerases: why so many?". J. Biol. Chem. April 1991266 (11): 6659–62.
[4]. "Definition of topoisomerase inhibitor - NCI Dictionary of Cancer Terms".
[5]. "Dorlands Medical Dictionary:topoisomerase inhibitor".
[6]. LA Mitscher . "Bacterial topoisomerase inhibitors: quinolone and pyridone antibacterial agents". Chem. Rev. February 2005, 105 (2): 559–92.
[7]. LM Fisher XS Pan . "Methods to assay inhibitors of DNA gyrase and topoisomerase IV activities". Methods Mol. Med. 2008, 142: 11–23.
[8]. HM Robinson, S Thoresen Bratlie-, R Brown, "Chk1 is required for G2/M checkpoint response induced by the catalytic topoisomerase II inhibitor ICRF-193". Cell Cycle ,May 2007, 6 (10): 1265–7.
[9]. "Entrez Gene: TOP1 topoisomerase (DNA) I".
[10]. Y. Pommier, DNA Topoisomerases and their Inhibition by Anthracyclines, in "Anthracycline Antibiotics - New Analogues, Methods of Delivery and Mechanisms of Action", Ed. W Priebe, ACS Symposium Series 574, 1995, Chapter 12, 183-203
[11]. Xu, Lixin; Yang Lihong, Hashimoto Keiko anderson Melvin, Kohlhagen Glenda, Pommier Yves, D'Arpa Peter "Characterization of BTBD1 and BTBD2, two similar BTB-domain-containing Kelch-like proteins that interact with Topoisomerase I". BMC Genomics, 2002, 3 (1): 1.
[12]. C Gobert; A Skladanowski, A K Larsen. "The interaction between and DNA topoisomerase I is regulated differently in cells with wild-type and mutant ". Proc. Natl. Acad. Sci. Aug. 1999, 96 (18): 10355–60.
[13]. Mao, Yinghui; Mehl Issac R, "Subnuclear distribution of topoisomerase I is linked to ongoing transcription and status". Proc. Natl. Acad. Sci. Feb. 2002, 99 (3): 1235–40.
[14]. P Haluska ; A Saleem, T K Edwards, "Interaction between the N-terminus of human topoisomerase I and SV40 large T antigen". Nucleic Acids Res. Apr. 1998, 26 (7): 1841–7.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 2, March 2022
Impact Factor: 6.252

[15]. A K Bharti ; M O Olson, D W Kufe, "Identification of a nucleolin binding site in human topoisomerase I". J. Biol. Chem. Jan. 1996, 271 (4): 1993–7.

[16]. E Labourier; F Rossi, I E, "Interaction between the N-terminal domain of human DNA topoisomerase I and the arginine-serine domain of its substrate determines phosphorylation of SF2/ASF splicing factor". Nucleic Acids Res. Jun. 1998, 26 (12): 2955–62.

[17]. Andersen, F Félicie; T O Tange, "The RNA splicing factor ASF/SF2 inhibits human topoisomerase I mediated DNA relaxation". J. Mol. Biol. Sep. 2002, 322 (4): 677–86.

[18]. C A Johnson ; K Padget, C A Austin,. "Deacetylase activity associates with topoisomerase II and is necessary for etoposide-induced apoptosis". J. Biol. Chem. Feb. 2001, 276 (7): 4539–42.

[19]. P Ajuh ; B Kuster, K Panov, "Functional analysis of the human CDC5L complex and identification of its components by mass spectrometry". EMBO J. Dec. 2000, 19 (23): 6569–81.

[20]. Y Mao; S D Desai, L F Liu . "SUMO-1 conjugation to human DNA topoisomerase II isozymes". J. Biol. Chem. Aug. 2000, 275 (34): 26066–73.

[21]. E Willmore, S de Caux, Sunter, *et al.*. "A novel DNA-dependent protein kinase inhibitor, NU7026, potentiates the cytotoxicity of topoisomerase II poisons used in the treatment of leukemia". Blood, 2004,103 (12): 4659–65.

[22]. J.C.Wang, Cellular roles of DNA topoisomerases: a molecular perspective. *Nat Rev Mol Cell Biol.* 2002 Jun;3(6):430-40.

[23]. I G Cowell; A L Okorokov, S A Cutts, "Human topoisomerase IIalpha and IIbeta interact with the C-terminal region ". Exp. Cell Res. Feb. 2000, 255 (1): 86–94.

[24]. Y Mao; M Sun, S D Desai, Liu. "SUMO-1 conjugation to topoisomerase I: A possible repair response to topoisomerase-mediated DNA damage". Proc. Natl. Acad. Sci. U.S.A. 97 (8): 4046–51.

[25]. Lima, Wang and Mondragon, Nature 1994, Apr. 2000,14: 123-125.

[26]. Changela, DiGate and Mondragon, Nature 2001, 4: 222-225.

[27]. B. Taneja, A. Patel, A .Slesarev, Mondragón A. "Structure of the N-terminal fragment of topoisomerase V reveals a new family of topoisomerases". Embo J. January 2006,25 (2): 398–408.

[28]. Bhupesh Taneja, Bernhard Schnurr,, Alexei Slesarev, John F. Marko and Alfonso Mondragón, PNAS 2007, 12: 111-116.

[29]. K.D. Holen, L.B. Saltz, Lancet Oncology, 2001 May ,2(5):290-7, 1