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Section of Public Affairs	Mi-Yeon Kim Section Chief (+82) 62-715-2020	Nayeong Lee Senior Administrator (+82) 62-715-2024
Contact Person for this Article	Dr. Sanghwa Lee, Senior Researcher Advanced Photonics Research Institute (+82) 62-715-3424	
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Dr. Sanghwa Lee's research team identifies the operating mechanism of topoisomerase II, a typical anti-cancer protein

☐ GIST (President Seung Hyeon Moon) – The research team led by Dr. Sanghwa Lee of the Advanced Photonics Research Institute (APRI) is the first to identify how topoisomerase II selects the location of DNA cleavage by examining the entire process with single-molecule fluorescence assays.

☐ Topoisomerase II is a protein involved in DNA transcription or replication and is an important enzyme in the division and proliferation of cancer cells. Therefore, the development of anti-cancer drugs has been actively carried out to curb the proliferation of cancer cells by hindering the activity of this enzyme.

◦ However, there is a lack of understanding about the molecular mechanism of topoisomerase II for the development of effective anticancer drugs with fewer side effects. Therefore, studies are required to learn in detail the mechanism of interaction between the topoisomerase II and the target DNA.

□ In this study, Dr. Sanghwa Lee's research team used single-molecule fluorescence imaging technology to observe in real time DNA-topoisomerase II to identify the minute mechanisms of the interaction's binding, bending, and cleaving.

  ◦ The bending step is a crucial step in choosing a DNA base sequence for topoisomerase II protein selection site, and researchers discovered that the bending that occurs at this time is caused by the interaction of protein and DNA and is not due to the intrinsic properties of the DNA string.

□ Dr. Sanghwa Lee said, "This study has identified the mechanism by which the topoisomerase II protein selects DNA cleavage sites at the molecular level and is expected to contribute to the development of novel chemotherapeutic agents targeting this protein in the future."

□ This research was led by Dr. Sanghwa Lee (corresponding author) of the Advanced Photonics Research Institute and was conducted with support from the National R&D Program for Cancer Control of Ministry for Health and Welfare of Korea, a National Research Foundation of Korea grant, and the GIST Research Institute. The research was published on January 31, 2019, in *Cell Chemical Biology* (IF: 5.592).

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