



## **A Novel Topoisomerase 1 Binding Protein for Use in Cancer Diagnostics and Therapeutics** (*Eric H. Rubin, CINJ 01-46*) *Diagnostic/Therapeutic Target*

### **Background**

Topoisomerase 1 is a DNA binding protein that regulates DNA topology and is used as a target of antineoplastic agents camptothecins. Several other proteins are presumed to be necessary for top1 functions. Previous studies at UMDNJ have identified a novel topoisomerase 1 and p53 binding protein called topors. This protein was characterized to be a RING protein rich in serine and arginine domains. The RING domain was shown to be similar to SUMO and E3 ubiquitin ligases. Post-translational modification of proteins via covalent attachment of SUMO is known to be important in cell cycle progression, stress response and signal transduction. The present invention relates to further characterization of the novel topors protein and its uses in cancer diagnostics and therapeutics.

### **Description of the Technology**

Expression of topors protein is down-regulated in tumors from kidney, colon, endometrium and lung, as compared to normal tissue samples. Consistent with the protein data, endometrium and colon tumor tissue samples lacking topors protein did not reveal measurable mRNA levels. Furthermore, over-expression of Topors in cervical cancer cell lines leads to cell death. Thus, lack of topors in cancer cells appears to contribute to the selection and persistence of mutant phenotype and progression to tumorigenesis. Additionally, it has been shown that topors functions as an E3-type ubiquitin ligase and E3-type SUMO ligase for topoisomerase and p53. Thus, topors is a dual function ubiquitin and SUMO ligase. Collectively these data indicate that topors is a candidate tumor suppressor gene similar to p53 and the loss of topors SUMO ligase activity could lead to cancer. It is feasible that modulation of topors ubiquitin and/or SUMO ligase activities may be useful in diseases associated with alterations in ubiquitin or SUMO pathways, including cancer.

### **Applications**

- For screening of cancer tissues
- In gene therapy to re-introduce topors gene into cells lacking the gene
- For use in modulation of DNA repair process
- For development of small molecule inhibitors

### **Patent Status**

United States patent application filed

### **Contact Information**

Peter Golikov, MS, MBA

Director, Ventures and Licensing

University of Medicine and Dentistry of New Jersey

335 George Street, New Brunswick, NJ 08901

Direct Phone: (732)-235-9355 Office Phone: (732)-235-9350

[golikope@umdnj.edu](mailto:golikope@umdnj.edu)