

# Bio 345 - topic paper

[Science](#), [Biology](#)



## Non-coding RNA and Cancer s :

Long coding RNAs or lnc RNAs are extremely important functional genes.

Recently, after the entire human genome was sequenced successfully, the lncRNAs emerged as one of the main focus of cancer biology study. Research has shown that lncRNAs have the ability to guide protein complexes that are responsible for the regulation of chromatin modification and transcription. Therefore, these genes have also been associated with several diseases including cancer (Khalil et al, 2009).

In their article "The long noncoding RNA SPRY4-IT1 increases the proliferation of human breast cancer cells by upregulating ZNF703 expression", Yongguo et al (2015) target an lncRNA SPRY-4-IT1 which has a close association with cancer. SPRY-4-IT1 or SPRY-4 intronic transcript 1 is almost 708 basepair long non-coding RNA which is present on a locus in chromosome 5. The lncRNA SPRY-4-IT1 was studied thoroughly and it was seen that this particular product was highly expressed in melanoma cells. To understand the role of this gene and the association of the gene with breast cancer, Yongguo et al conducted a clinical study. The tissue to be studied was collected from 48 patients who had undergone surgical breast cancer resection Second Affiliated Hospital of Nanjing Medical, China between 2012- 2013. The 48 different breast cancer cell lines were taken, RNA was extracted from them and quantitative reverse transcriptase PCR was performed on each of samples collected. Gain and loss of functions methodology was adopted to understand the role of the gene in-vitro. Using microarray bioinformatics analysis of the potential targets was computed. These results were further verified using other methods such as rescue

experiments, western blotting and quantitative reverse transcriptase polymerase chain reaction methods.

The results show that up regulation of the SPRY4-IT1 occurs which was far above that in the normal breast tissues. The researchers also found a close association between the expression of the gene and the size of the tumor. Pathologically, it was seen that the gene was also expressed in advance cases of breast cancer. The researchers noticed that when this particular gene was knocked down, the proliferation of the malignant breast cells was drastically reduced and apoptosis in the cancerous cells was also induced. Using computational methods and other wet laboratory methods the target of the gene was recognized to be ZNF703 gene.

ZNF703 is a breast cancer oncogene which helps in the regulation of normal cell division in the cells and controls the process at various checkpoints. The study established that the long non-coding RNA down regulated this ZNF703 gene which subsequently lead to formation of cancer in the breast.

The researchers also suggested future use of SPRY-IT1 gene as a biomarker for breast cancer.

## References

Khalil A. M., et al.(2009). Many human large intergenic noncoding RNAs associate with chromatin-modifying complexes and affect gene expression. Proc. Natl. Acad. Sci, 106 : 11667–11672.

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