

Regulatory molecule for tumor formation or suppression identified

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One of the small regulatory molecules, named microRNA-125b, is a novel regulator of p53, an important protein that safeguards cells against cancers, Singapore and U.S. scientists report in the March 17, 2009 issue of the journal *Genes & Development*.

The scientists found that during embryonic development, this microRNA keeps the level of [p53](#) low to avoid excessive cell death.

But, if the DNA is damaged, the microRNA level is reduced to allow an increase in p53, which eliminates damaged [cells](#) and thus prevents tumor formation.

The research was conducted with zebrafish.

"Interestingly, this microRNA is elevated in many types of human cancers, suggesting that it may contribute to the formation of tumours by suppressing the p53 [protein](#)," said Bing Lim, M.D., Ph.D., lead author and senior group leader at the Genome Institute of Singapore (GIS), a research institute under the Agency for Science, Technology and Research (A*STAR).

"Hence, our findings have important implications in the diagnosis and treatment of cancers," he added. "The significance of this finding, of course, once again emphasizes the relevance and importance of research linking microRNAs to many subspecialties of human medicine, including [cancer](#) and regenerative medicine."

Harvard Medical School's Judy Lieberman, M.D., Ph.D., said, "This important study provides an elegant and beautifully worked out example of the role of microRNAs in master-minding how a cell responds to environmental cues and developmental signals.

"The implication of this study is that these small molecules might be mimicked or antagonized as drugs to treat serious diseases for which no effective treatment exists at present," added Dr. Lieberman, senior investigator at the Immune Disease Institute, and Professor of Pediatrics and Director of the Division of AIDS at Harvard. She is not a co-author of the paper.

Professor of Cell Biology at the Harvard Medical School, Frank McKeon, Ph.D., commented, "This is an elegant use of zebrafish models to uncover how a single microRNA can regulate the p53 tumor suppressor gene. The strength of this regulation suggests that we will hear more about the microRNA-125b in specific human cancers in the near future." Dr. McKeon also is not a co-author of the paper

MicroRNA-125b is a member of the microRNA family of small regulatory molecules that have evolved in nature to regulate tightly the quantity of protein produced by each messenger RNA (mRNA), which generates the group of proteins that determine the unique characteristics of every cell type.

MicroRNAs play complex roles in the simultaneous fine-tuning of many [genes](#) in each cell - a role not yet well understood by biologists. It is a complicated, delicate balance that can be profoundly disturbed if just a few microRNAs go awry.

Recent research reveals that microRNAs are abundant in the cell, and that they play important roles in development and in many diseases.

More information: The research findings are in the March 17, 2009 online issue of *Genes & Development* in an article titled, "MicroRNA-125b is a novel negative regulator of p53."

Source: Agency for Science, Technology and Research (A*STAR), Singapore

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