

Scientists discover tiny RNAs play a big role in controlling genes

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A study by researchers at the Yale Stem Cell Center for the first time demonstrates that piRNAs, a recently discovered class of tiny RNAs, play an important role in controlling gene function, it was reported this week in *Nature*.

Haifan Lin, director of the stem cell center and professor of cell biology at Yale School of Medicine, heads the laboratory that originally identified piRNAs. Derived mostly from so-called “junk DNA,” piRNAs had escaped the attention of generations of geneticists and molecular biologists until last year when Lin’s team discovered them in mammalian reproductive cells, and named them.

The lab’s current work suggests that piRNAs have crucial functions in controlling stem cell fate and other processes of tissue development.

In this study Lin and his Ph.D. student, Hang Yin, discovered more than 13,000 Piwi-associated piRNAs in fruit flies. One particular piRNA, they found, forms a complex with the protein known as Piwi, which then binds to chromatin, a strategic region in the genome that regulates the activity of the gene. Chromatin’s role is to package DNA so that it will fit into the cell, to strengthen the DNA to allow cell division, and to serve as a mechanism to control gene expression.

“This is important in maintaining self-renewal of stem cells,” Lin said. “These small RNAs might provide new tools to harness the behavior of stem cells and other biological processes related to diseases.”

“This finding revealed a surprisingly important role for piRNAs, as well as junk DNA, in stem cell division,” Lin said. “It calls upon biologists to look for answers beyond the one percent of the genome with protein coding capacity to the vast land of junk DNA, which constitutes 99 percent of the genome.”

Source: Yale University

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