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In the news

HOTAIR RISES: NEW ROLE FOR NON-CODING RNAs

Non-coding RNA (ncRNA) genes were thought to mediate only the expression of neighbouring genes. However, researchers from Stanford University School of Medicine now report in *Cell* that ncRNAs can influence patterns of gene expression at distant locations.

Having previously established that *HOX* genes serve as a sort of positioning system that tells fibroblast cells where they are in the body, John Rinn, Howard Chang and colleagues used a tiling array to map the boundaries of *HOXA–D* in order to examine the regulation of *HOX* gene expression. Within those boundaries, they found many previously unidentified ncRNA genes.

Surprisingly, depletion of the ncRNA HOTAIR, identified near *HOXC* on chromosome 12, affected the expression of *HOXD* on chromosome 2. As John Rinn explains, “this opens up the whole genome to potential regulation by ncRNAs” (*ScienceDaily*, 29 June 2007).

But the details of long-range regulation by ncRNAs still need to be resolved. Loss of HOTAIR releases *HOXD* gene silencing, and HOTAIR binds a group of Polycomb proteins that modify histones to affect chromatin packaging. So the researchers propose that HOTAIR regulates chromatin silencing *in trans*.

“We are really interested in how a ncRNA finds its putative target in the genome,” says Howard Chang. “There remains a whole level of biological complexity, including how HOTAIR knows where to go, how it talks to other factors and how it controls histones” (*ScienceDaily*, 29 June 2007).

As Polycomb proteins are sometimes abnormally regulated in cancer and given the role of *HOX* genes in stem-cell differentiation, further elucidation of how HOTAIR functions could lift cancer therapies and stem-cell research to new heights.

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