Long non-coding RNAs can encode proteins after all

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Case Western Reserve School of Medicine scientists have made an extraordinary double discovery. First, they have identified thousands of novel long non-coding ribonucleic acid (lncRNA) transcripts. Second, they have learned that some of them defy conventional wisdom regarding lncRNA transcripts, because they actually do direct the synthesis of proteins in cells.

Both of the breakthroughs are detailed in the June 12 issue of *Cell Reports*.

Kristian E. Baker, PhD, assistant professor in the Center for RNA Molecular Biology, led the team that applied high throughput gene expression analysis to yield these impressive findings, which ultimately could lead to treatments for cancer and some genetic disorders.

"Our work establishes that lncRNAs in yeast can encode proteins, and we provide evidence that this is probably true also in mammals, including humans," Baker said. "Our investigation has expanded our knowledge of the genetic coding potential of already well-characterized genomes."

Collaborating with researchers including Case Western Reserve University graduate and undergraduate students, Baker analyzed yeast and mouse cells, which serve as model organisms because of their functional resemblance to human cells.

Previously, lncRNAs were thought to lack the information and capacity to encode for proteins, distinguishing them from the messenger RNAs that are expressed from known genes and act primarily as templates for the synthesis of proteins. Yet this team demonstrated that a subset of these lncRNAs is engaged by the translation machinery and can function to produce protein products.

In the future, Baker and fellow investigators will continue to look for novel RNA transcripts and also search for a function for these lncRNAs and their protein products in cells.

"Discovery of more transcripts equates to the discovery of new and novel genes," Baker said. "The significance of this work is that we have discovered evidence for the expression of previously undiscovered genes. Knowing that genes are expressed is the very first step in figuring out what they do in normal cellular function or in dysfunction and disease."

Provided by Case Western Reserve University