No such thing as 'junk RNA,' say Pitt researchers

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Tiny strands of RNA previously dismissed as cellular junk are actually very stable molecules that may play significant roles in cellular processes, according to researchers at the University of Pittsburgh School of Medicine and the University of Pittsburgh Cancer Institute (UPCI).

The findings, published last week in the online version of the Journal of Virology, represent the first examination of very small RNA products termed unusually small RNAs (usRNAs). Further study of these usRNAs, which are present in the thousands but until now have been neglected, could lead to new types of biomarkers for diagnosis and prognosis, and new therapeutic targets.

In recent years, scientists have recognized the importance of small RNAs that generally contain more than 20 molecular units called nucleotides, said senior author Bino John, Ph.D., assistant professor, Department of Computational Biology, Pitt School of Medicine.

"But until we did our experiments, we didn't realize that RNAs as small as 15 nucleotides, which we thought were simply cell waste, are surprisingly stable, and are repeatedly, reproducibly, and accurately produced across different tissue types." Dr. John said. "We have dubbed these as usRNAs, and we have identified thousands of them, present in a diversity that far exceeds all other longer RNAs found in our study."

The team's experiments began with the observation that the Kaposi

sarcoma-associated herpesvirus produces a usRNA that can control the production of a human protein. Detailed studies using both computational and experimental tools revealed a surprisingly large world of approximately 15 nucleotide-long usRNAs with intriguing characteristics. Many usRNAs interact with proteins already known to be involved in small RNA regulatory pathways. Some also share highly specific nucleotide patterns at one end. The researchers wrote that the existence of several different patterns in usRNAs reflects the diverse pathways in which the RNAs participate.

"These findings suggest that usRNAs are involved in biological processes, and we should investigate them further," Dr. John noted. "They may be valuable tools to diagnose diseases, or perhaps they could present new drug targets."

In addition to exploring biomarker potential, he and his colleagues plan to better characterize the various subclasses of usRNAs, identify their protein partners and study how they are made in the cell.

Source: University of Pittsburgh