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Study of fruit fly microRNA unravels clues to aging process

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Diseases like Alzheimer's and Huntington's are often associated with aging, but the biological link between the two is less certain. Researchers at Rutgers University–Camden are seeking insight into this connection by studying very small RNA molecules in the common fruit fly.

"As the flies in our experiment age, we're able to detect specific patterns of microRNAs—which help to regulate genes—when they are bound to specific proteins," says Ammar Naqvi, a doctoral student in computational and integrative biology at Rutgers–Camden.

Naqvi, a Philadelphia resident, explains that microRNAs are connected to various developmental stages and disease states, and their proper modulation is required for the integrity and maintenance of cells.

The research is being done under the supervision of Andrey Grigoriev, a professor of biology at Rutgers–Camden, and in collaboration with a research team at the University of Pennsylvania. Computational and bioinformatics analysis for the project is performed at Rutgers–Camden.

In flies, microRNAs are "loaded" onto one of two protein complexes known as Ago1 or Ago2, which then guide it to repress gene expression. The team found that as fruit flies age, more microRNAs accumulate on the Ago2 protein complex, and therefore impact age-associated events in the flies.

"We were able to connect the two processes," Naqvi says. "Studies have

shown that there is some change in the microRNA population with age, but no one was sure how they were partitioned with the protein complexes. We observed such partitioning and also an increase in neurodegeneration, which resulted in a shorter lifespan for these flies."

Grigoriev explains, "Neurodegeneration and aging go hand-in-hand, but we are the first to have shown the details of this change in regulation with aging. This tells us that there are different mechanisms of regulation in different stages of development. Is aging a byproduct of development? I cannot tell you. It's possible that this could be relevant for other diseases. That's what we want to find out."

The study was recently published in a leading journal in the field, *Genes and Development*.

Naqvi, who is originally from Long Island, New York, received his bachelor's degree from Rochester Institute of Technology and his master's degree from George Mason University. He is the recipient of the prestigious Rutgers Presidential Fellowship, annually awarded to select doctoral students throughout the university to help fund research.

Grigoriev, a Medford (NJ) resident, earned his bachelor's and master's degrees in physics from the Moscow Engineering Physics Institute in Russia. He received his doctoral degree in molecular biology from the Institute of Genetics and Selection of Industrial Microorganisms in Russia.

Provided by Rutgers University