Retrotransposon Expression and Insertion During Aging in *Drosophila melanogaster*

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Background:

RT *de novo* Insertions Increase with Age

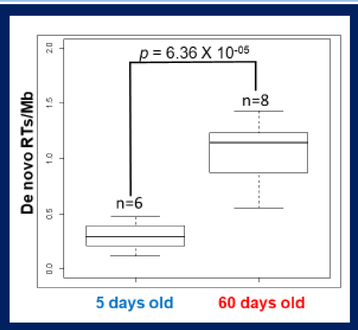


Figure 1. (Above) Number of *de novo* transposon insertions per megabase of the genome from single cell whole genome sequencing of female indirect flight muscles. t test.

Retrotransposons (RTs) are mobile, repetitive genetic elements. They are highly prevalent and dispersed throughout the genome. RT expression (RNA) has been shown to increase with age. The copy number/insertions (DNA) also increases with age, with a significant number of *de novo* RT insertions in older flies compared to young flies.

RTs (412) Are Prevalent and Dispersed Throughout the Genome

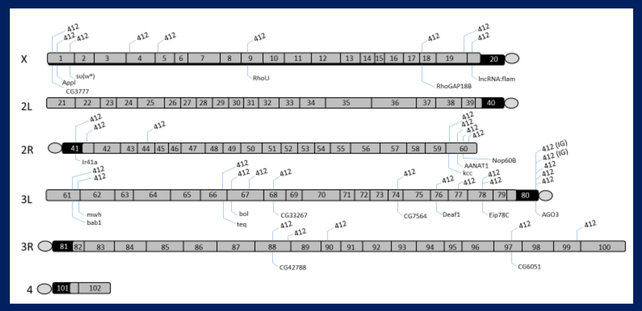
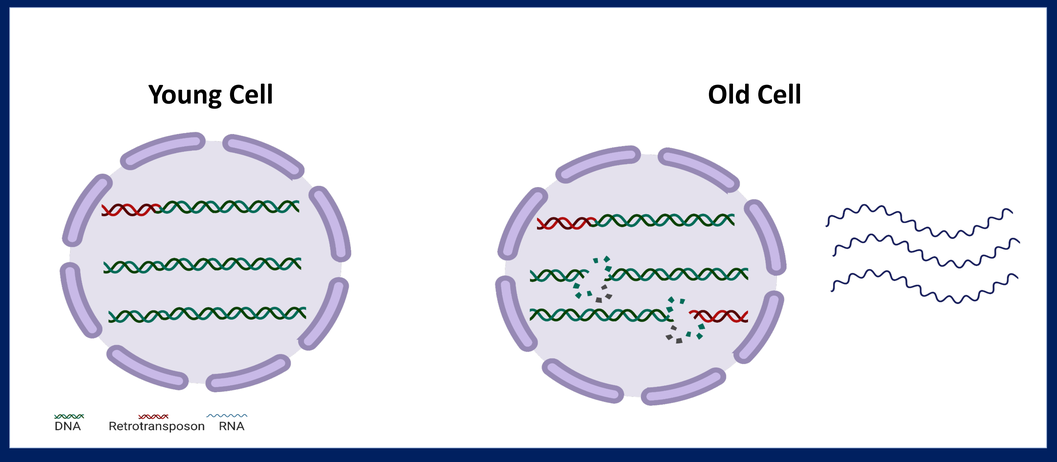


Figure 2. (Right) Schematic of one retrotransposon (412) characterized genomic locations.

Hypothesis:

The expression and/or mobilization of retrotransposons promote age associated phenotypes in *Drosophila*

Working Model and Conclusions:



Knocking down RT 412 increases lifespan and improves stress resistance with old age, perhaps through the reduction of DNA damage.
RT expression and insertion increase with age, causing mis-regulation of gene expression and the accumulation of DNA damage.

Results:

412 is Significantly Knocked Down Using RNAi

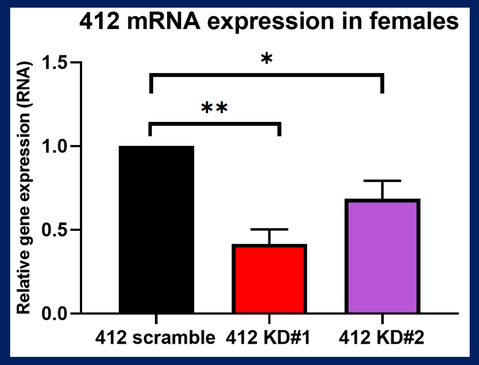


Figure 3 (Left) qRT-PCR validation of the 412 knockdown by checking 412 mRNA levels. Normalized to Rp49. Performed in triplicate with a pool of 5 flies per replicate. One way ANOVA.* p=0.0376. ** p=0.0011.

412 Knockdown Increases Female Lifespan

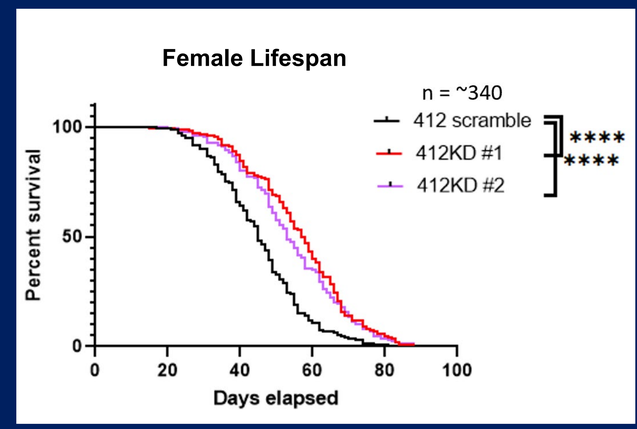


Figure 4. (Above) Survival curve for female flies when the RT 412 is knocked down using RNAi driven by Actin Gal4. Lifespan increases with 412 knockdown compared to the scramble control. Mantle Cox test. ****p<0.0001

412 Knockdown Increases Locomotor Activity in Repeatedly Tested (Stressed) Females

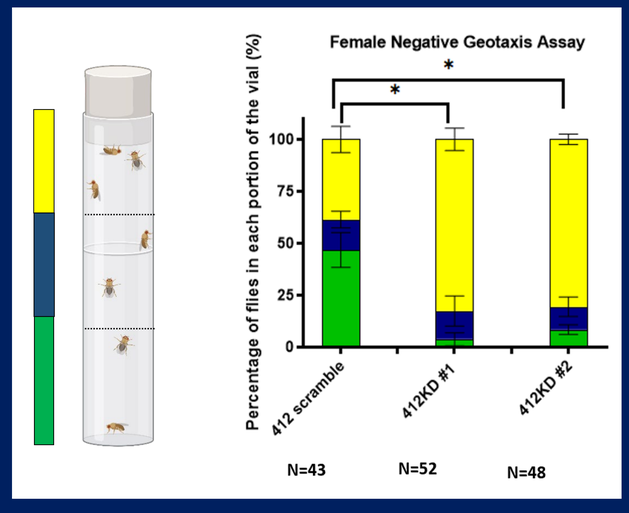
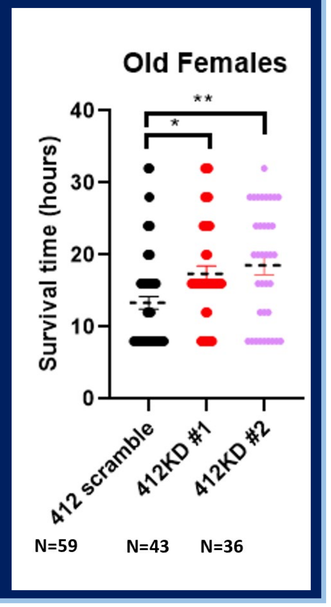


Figure 6 (Right)
Paraquat assay to measure oxidative stress resistance. Days of survival after oxidative stress was initiated at day 40. 412 knockdown show improved stress resistance . One way ANOVA. * p=0.0100. **p=0.0014

412 Knockdown Increases Resistance to Oxidative Stress in Old Females

Figure 5. (Left) Negative geotaxis assay to test locomotor ability. Females flies were tested repeated on the same individuals at 4 day intervals. Data shown is for day 18. and significate improvement in locomotor activity is seen in 412 knockdown flies. This experiment was performed in biological and technical triplicate. One way ANOVA. * p=0.03



Funding/Acknowledgments: This work was supported by the Nation Institute of Health under grant number 5R01AG053269-02 T32 GM007491 .