



CALIFORNIA STATE SCIENCE FAIR 2017 PROJECT SUMMARY

Name(s) Julia Situ	Project Number S0524
Project Title Role of Circular RNAs in Drosophila Innate Immunity	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Circular RNAs (circRNAs) constitute a class of relatively unstudied RNAs whose function is unknown. Recently, studies have shown that circRNAs are more abundant than previously recorded. There is no current established relationship between circRNAs and the Drosophila IMD innate immunity pathway, which is highly conserved between Drosophila and humans. The goal of this project is to determine if select circRNAs play a role in the Drosophila IMD pathway to gain insights on the possible function of circRNAs in humans, and to better understand the underlying molecular mechanism of the innate immune system.</p> <p>Methods/Materials CircRNA candidates were first validated using PCR, gel electrophoresis, and Sanger sequencing. Next, qPCR was utilized to compare circRNA levels in cells that were treated and untreated by peptidoglycan(PGN) in order to study the expression of circRNAs in a unique context. Then, transfections were conducted to knock-down or overexpress individual circRNAs in cells that were PGN-treated and -untreated, and a luciferase reporter assay was used to measure the IMD pathway activity in each group. Finally, qPCR was used to confirm that circRNAs were successfully knocked-down or overexpressed.</p> <p>Results 14 of 15 original circRNA candidates were validated. Additionally, luciferase reporter assays indicated that the knockdown and overexpression of circ_1709 and knockdown of circ_2465 caused significant changes in IMD pathway activity level for both PGN-induced and non-induced cells, with fold changes greater than 1. Finally, qPCR confirmed the significant overexpression of circ_1709 in transfected cells and insignificant change in the linear_1709 levels.</p> <p>Conclusions/Discussion Significant change in IMD pathway activity level resulting from the mis-expression of circ_1709 and circ_2465 indicates that the two circRNAs play a role in the IMD pathway of Drosophila. Confirmed overexpression of circ_1709 with unaffected linear_1709 levels implicates that circ_1709, and not its linear sibling lin_1709, affects the IMD pathway.</p>	
Summary Statement I discovered two novel circular RNAs that have an impact on the IMD innate immunity pathway in Drosophila, which may shed light on the underlying molecular mechanism of the human innate immune system.	
Help Received I received initial training from my mentor Dr. Rui Zhou regarding basic lab technique, equipment handling and data analysis. I then independently conducted my experiments using materials, equipment and lab space from my mentor's facility at Sanford Burnham Prebys Medical Discovery Institute.	