Using Protease-activated Receptors (PARs) in Caenorhabditis elegans as a Potential Therapeutic Agent for Inflammatory Diseases

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Chronic Inflammatory diseases affect approximately 45 million people just in the United States. Specifically, inflammatory bowel disease (Crohn's disease) affects over 15 million people every year in the United States. However, there is a plausible end to this devastating and common tragedy that has been consuming the lives of many suffering from Crohn's disease. The solution is a protease-activated receptor (PAR), specifically PAR4. Protease-activated receptors (PARs) have become recognized as a possible option due to its ability to sense proteolytic activity. The enzymes in proteolytic activity can possibly be the regulators and modulators in the inflammatory response because they show signs of anti-inflammatory response. Predictably, when using 0.25 mm microneedles to scratch N2 wild type C. elegans and PAR-4 C. elegans, PAR-4 will be able to decrease inflammation and swelling due to the responsive nature of PAR-4. The C. elegans were cultured and housed until it surpassed its developmental time and reached adulthood. The thrust(movement) of C. elegans, calcium assay, lifespan, inflammation levels (with a motic camera), and Ketone levels were measured. The data showed that each null hypothesis was rejected, and the PAR4 data was statistically significant. The PAR4 C. elegans with the enzyme were able to optimize their lifespan by approximately 46%, and decrease swelling by approximately 54% when scratched compared to the N2 wild type C. elegans. The data collected from this research project can be utilized to increase life expectancy and mitigate the effects of inflammatory diseases in patients with Crohn's disease.

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