A Non-Invasive and Massively Parallel Imaging Device for Longitudinal Monitoring of Infection Progression in Fruit Flies

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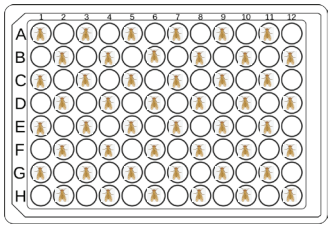
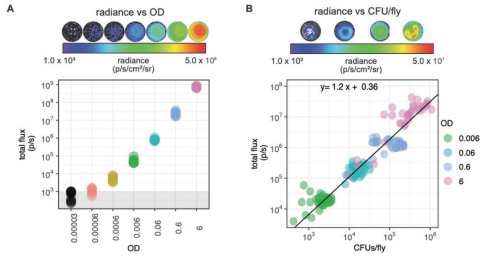
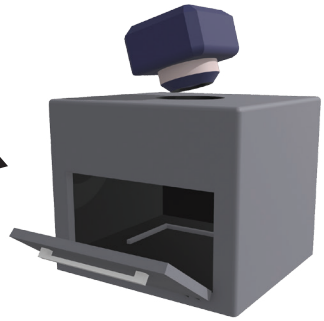
Practices such as in vivo bioluminescent imaging (BLi) are used to track disease progression in live subjects. Currently, most practices of bioluminescence imaging are performed on small mammals such as mice, although recent studies have shown that murine models do not accurately translate into human disease expression genes. Research shows Drosophila Melanogaster, otherwise known as the fruit fly, may be a better model for studying bacterial disease progression due to sharing approximately 75% of the disease expression genes humans have. Until recently, all tools used to characterize the infection in fruit fly models were destructive to either measure the bacterial pathogen load or host response. The Wunderlich Lab at Boston University is conducting research that combines bioluminescence disease tracking and the use of the fruit fly model to mitigate these limitations. A compact, cost effective, and robust bioluminescence imaging device will be prototyped. Through an iterative design process, the device will be capable of capturing raw data from bioluminescent injected fruit flies, process the data to determine pathogenic load in all fruit flies, and output a legible plot for visual aid. To correctly process the data, a team-scripted MATLAB code will be used for image processing to convert the number of photons to pathogenic load. Through longitudinal monitoring of induced diseases, research may uncover important turning points in disease development. Furthermore, this prototype is intended to make this research more feasible and accessible.

96-Well Plate Fruit Fly Configuration



Graphical Output of Logitudinal Pathogen Development





Prototyped Bioluminesense Imaging Device

MATLAB®

Image Processing Software