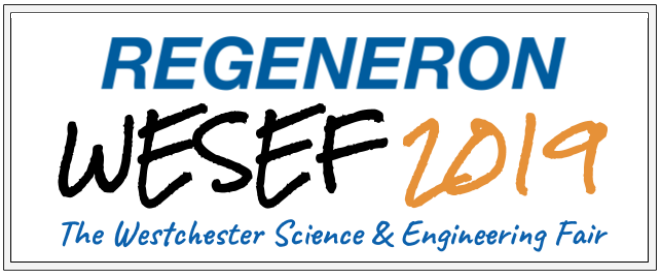

Finalist: **Kiera Megan Mallinson**

School: **Pelham Memorial High School**

Title: **Multiscale Statistical Analysis of Lung Cancer Tissue Using Backscattering of Polarized Light**

Abstract:

Lung cancer is the leading cause of death among cancer-related death, and with no official cure, early detection allows for the best chance of survival. Using linear polarization principles and stokes parameters, I was able to develop a system of lights and polarizers to capitalize upon the difference in light opacity between different stages of cancer along with necrosis. In this study, I will analyze the effects of cancer stains on the optical properties of tissue, range of angle measures required to minimize rotation while maximizing accuracy, and trends in measurements for different stages of lung cancer and necrosis. I saw that the staining process damaged the optical properties so that healthy tissue and cancerous tissues behave similarly when stained, one degree of rotation was chosen as the ideal rotation to minimize space required for the test, and mean, standard deviation, and entropy can serve as a three-way check of the diagnosis. This project is significant because it is the first to combine wavelet analysis with polarization principles, in addition to removing the need for the staining process in a diagnostic test. It is also societally significant because it allows for a quicker and cheaper screening method for lung cancer.