Searching for Potential New Anti-Cancer Compound(s) Against Human Glioblastoma Cancer Cells from British Columbia Wild Mushrooms

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Annual Report

During the summer of 2015 I aimed for and successfully achieved the first two objectives of my experiment, which were to (i) assess the crude chemical fractions from BC wild mushrooms for growth inhibitory activity against U87MG human glioblastoma cancer cells and (ii) to assess the bioactive fractions against a panel of human glioblastoma cancer cell lines.

Of the crude mushroom fractions I had available to me, I found two mushroom species that had a significant anti-proliferative effect against the glioblastoma cancer cell lines. Although I cannot disclose the name of the species involved, one was a basidiomycete and the other was a tree fungus. A 5% NaOH extraction of the basidiomycete had on average 60% growth inhibition of the glioblastoma cells as compared to control. A 50% methanol extract of the tree fungus had on average 80% growth inhibition on the glioblastoma cells as compared to control.

Additionally, I ran each crude fraction through a gel filtration column in attempt to separate the compounds according to size. I then tested these fractions again on the cell lines. The basidiomycete activity elutes out in earlier fractions, indicating that it is a relatively larger compound. Anti-proliferative compounds of large size from other studies have been demonstrated to be polysaccharides or proteins. The tree fungus activity came out in a later fraction indicating, meaning that it is of a relatively lower molecular weight. Growth inhibitory compounds from literature that are of low molecular weight can be of a vast range including alkaloids, quinones, terpenoids, etc.

Next summer I will focus on the third objective of my experiment which is to further purify and identify the bioactive molecules of interest from both of these species. I will utilize several chromatographic techniques in order to sequentially purify the compounds. I will employ different stationary phases or resins, and development different solvent systems in order to separate the compounds based on chemical differences. For example I can use a silica column to separate the compounds based on polarity, or ion exchange chromatography to separate compounds based on charge. After each purification step I will test the resulting fractions on the glioblastoma cancer cell lines again in order to actively track down the activity. Once I obtain relatively pure fractions for both species I will send them to the Chemistry Facility at the University of Alberta for further detailed HLPC-MS (High Performance Liquid Chromatography-Mass Spectrometry) and NMR (Nuclear Magnetic Resonance) analysis for further compound identification and structural elucidation.