The Biological Function of Telomerase in the Discontinuation of Cancer Immortality

McCarthy, Anne

Park, Kristine

A cancer treatment based on the effects of telomerase on telomeres in cancer cells was investigated, targeting an enzyme that is both nearly exclusive to cancer cells and vital to their immortality. Ras, an oncogene, and hTERT, the active component of telomerase, were expressed in IMR90 fibroblast cells to simulate a premalignant cell. qPCR was then performed to calculate telomere expression, the length of telomeric DNA serving as evidence of the ramifications of telomerase on the cell's ability to survive indefinitely. The data supported the predicted outcome: cells with Ras and hTERT had an upregulation of telomere expression of 291.3%. The second method of experimentation was to treat HeLa cells with four concentrations of the chemical telomerase inhibitor BIBR1532. HeLa cells were stained and counted every four days to determine the effect of telomerase deactivation on cancer cell viability. The cells treated with the highest concentration of inhibitor had the highest cell death, 50% by day eight of inhibition, based on initial experimentation and qualitative observations. The second data set showed steadily decreasing cell death rates in all four inhibitor concentrations: in the highest concentration, cell death decreased from 36% to 13 % over the fifteen days of experimentation. These conflicting results suggest a more effective viable cell counting method is needed. The results elucidate that though oncogenes, such as Ras, are necessary to a cell becoming cancerous, without active telomerase cancer cells cannot remain immortal, suggesting that anti telomerase based therapies have great potential in future cancer treatment.

Awards Won: