

In vitro Validation of ROS Nanosensors in Renal Cancer Cells

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This research aims to synthesize and validate gold-based nanosensors that will be able to measure the concentration of hydrogen peroxide (H_2O_2) and thus differentiate renal cancer cells from normal cells. Non-fluorescent carboxy- H_2DCFDA , which becomes green fluorescent when it is oxidized, was conjugated to gold nanoparticles (AuNPs) to detect H_2O_2 . Therefore, it was hypothesized that: (1) carboxy- H_2DCFDA conjugated gold nanoparticles (carboxy-AuNPs) will be more sensitive in detecting H_2O_2 than carboxy- H_2DCFDA and (2) compared to normal cells, renal cancer cells treated with carboxy-AuNPs will show higher values of fluorescence intensity. The saturated concentration of carboxy- H_2DCFDA in 1mL of AuNPs was obtained to be $10\mu L/mL$ through the experiment performed with a spectrophotometer. The carboxy-AuNPs was tested its sensitivity in detecting 100mM of H_2O_2 with a fluorescence plate reader and it was 11.6 times more sensitive than carboxy- H_2DCFDA . The kidney cell line (293T) and the renal cancer cell lines (786-O and A498) were harvested and plated for the fluorescence intensity test. When applied to the cells, carboxy-AuNPs showed lower values of fluorescence intensity compared to carboxy- H_2DCFDA . Interestingly, however, carboxy- H_2DCFDA could differentiate normal cells from renal cancer cells based on their fluorescence intensity values. Therefore, this research suggests that carboxy- H_2DCFDA can be applied to cells to detect the presence of H_2O_2 and possibly differentiate the cancer cells from normal cells based on their fluorescence intensity values. It also suggests that the sensitivity of carboxy- H_2DCFDA in cells cannot be enhanced by the gold nanoparticles.