Enhancement of Radiation Sensitivity by Seleno-Methionine

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Abstract

Since selenium has been widely known for their anti-proliferative and anti-growth effect, we used selenium compounds to investigate their effect on cellular radiation response. First we used western blot analysis to screen for differential protein expression by selenium treatment. Expression of proteins involved in radiation response, cell cycle and cell proliferation showed significant change by selenium treatment. P53, a major mediator of radiation response, increased its protein level by treatment of cancer cell lines with selenium compound. Increased p53 protein was correlated with the higher activity as shown by reporter assay. Consistent with the increased expression and activity of p53, which causes anti-proliferative effect on cells, proteins involved in cell proliferation decreased. Akt and cyclin D1, cell proliferation related proteins, decreased significantly. Decreased Akt expression could be seen through all three isotypes. Increased expression of anti-proliferative, cell death-causing p53 proteins significantly reduced cell viability when the compound treatment and ionizing gamma irradiation were combined. The enhanced cell killing or reduced cell survival effect by combined treatment of cells with radiation and selenium compounds provides a paradigm where pretreatment of cells with cell death enhancing drugs and subsequent radiation could lead to a better radiation therapy.