Anti-Cancer Drug Resistance in Lung Cancer Can Be Attributed to Its Ability To Develop Senescence

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For decades, lung cancer has been the leading cause of cancerous deaths worldwide. Much of lung cancer's lethality is attributed to its high incidence of tumor relapse and drug resistance. In recent years, studies have shown that some cells respond to stress induced by anticancer drugs by entering a state of senescence, in which their gene expression is altered to resist cellular death. The ability of different lung cancer cell lines to develop senescence after drug treatment was tested to better understand the relationship between senescent cells and drug resistance. It was hypothesized that cell lines with greater drug resistance would develop senescence more frequently. First, the half-maximal inhibitory concentration (IC50) of doxorubicin and etoposide, FDA-approved drugs commonly used to treat lung cancer, were determined through a MTT assay for the NCI-H460 (Caucasian) and NCI-H292 (African) cell lines. Then, the cells lines were treated with multiples of their respective IC50 concentrations of both drugs for six days and stained 24 hours later for beta galactosidase, an enzyme present in senescent cells. The results from the MTT assay supported that H460 had a higher IC50 than H292 for both doxorubicin and etoposide, indicating that the H460 cell line had greater drug resistance. Images of the stained cells further concluded that H460 cells stained positive for beta galactosidase more frequently than H292 cells, suggesting that anti-drug resistance is associated with senescent cells. In understanding the role of senescent cells in drug resistance, effective treatments can be developed to combat tumor relapse.