Isolation and Characterization of Radiation-resistant Lung Cancer D6-R Cell Line[1]

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Objective To isolate an isogenic radioresistant cancer cell line after fractioned X-ray radiation and characterize the resistant cells. **Methods** D6 cells were exposed to repeated X-ray irradiation, and after a total dose of 5200 cGy in 8 fractions, a radioresistant monoclone D6-R was obtained. The radiosensitivity and drug sensitivity of the novel radioresistant D6-R cells, together with their parent D6 cells, were measured using clonogenic assay and MTT assay respectively. Cell cycle distribution was analyzed by flow cytometry. Fluorescence microscopy and flow cytometry were applied for apoptosis detection. Comet assay was used for the detection of DNA damage and repair. **Results** D6-R cells showed higher and broader initial shoulder (D_0=2.08 Gy, Dq=1.64 Gy, N=2.20) than the parent D6 cells (D_0=1.84 Gy, Dq=0.34 Gy, N=1.20). They were 1.65-fold more radioresistant than D6 cells in terms of SF_2 (63% *vs* 38%) and were more resistant to ADM (3.15-fold) and 5-FU (3.86-fold) as compared with the latter. It was found that D6-R cells had higher fractions of cells in S phase (53.4% *vs* 37.8%) and lower fractions of cells in G_1 (44.1% *vs* 57.2%) and G_2-M phase (2.5% *vs* 5%). There was no difference in radiation-induced apoptosis between D6-R and D6 cells. D6-R cells showed less initial DNA damage and increased capacity in DNA repair after irradiation, as compared with the parent cells. **Conclusions** D6-R cells have been isolated by exposing the parental D6 cells to repeated irradiation. The difference in cell cycle pattern together with the induction and repair of DNA damage might, at least partially, explain the mechanism of the radioresistance.

Key words: Radiosensitivity; Chemosensitivity; Cell cycle; Apoptosis; DNA damage; DNA repair

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