

## The synergism effect of external beam radiation and cisplatin on clonogenic survival in cervical cancer cell line

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### Abstract

Cervical cancer is the third most common cause of cancer-related death in females worldwide. Current treatments for cervical cancer include radiotherapy or platinum-based chemotherapy. Recent discoveries in cancer biology have suggested that cancer stem cells are responsible for tumors recurrence after radiation therapy. Although these cells must be eliminated for a successful treatment, but evidence suggests that these cells may be inherently radio-resistant which may lead to tumor relapse. It may be possible to design a combination strategy to increase the sensitivity of cervical cancer cells to radiation therapy. In order to understand the therapeutic potential of radiation, it is very important to ensure that the therapeutic effects which have been demonstrated in vitro experiments and preclinical studies are relevant for the radiation doses which will be used in clinical schedules. In this study, 3 different concentrations of cisplatin (in two treatment times) with 4 different doses of 6 MV linear accelerator radiation were used to describe the changes in the effectiveness of treatment schedule on cervical cancer cell line (HeLa) in vitro. We studied radiation effects by evaluation of colony forming efficiency in order to determine the effect of each treatment alone and the synergism effect of both treatments on survival rate of HeLa cells. After treatments, cells were counted and plated into 6 well plate for 10-14 days. Then, the colonies which have been stained with Giemsa were counted to calculate the plating efficiency and survival fraction to obtain the survival curve. Statistical analyses of colony assay results and survival fraction showed that there is significant synergism between cisplatin in two treatment times and all doses of radiation. Current treatments for cervical cancer include radiotherapy or platinum-based chemotherapy. A great challenge in cervical cancer therapy methods is the resistance of cancer stem cells to radiation therapy which lead to failure of treatment and tumor relapse. In this study, we examined the synergism effect of external beam radiation and cisplatin drug on clonogenic survival in HeLa cervical cancer cell line. According to colony assay results and statistical analyses, we showed the combination of platinum-based drugs chemotherapy and appropriate doses of radiation can increase therapeutic efficiency and may lead to improving therapeutic index in patients who suffer from cervical cancer.

Keywords: Synergism Effects, Cancer Stem Cell, Radiation Therapy, Platinum-based Chemotherapy, Cervical Cancer

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