4 - 58 Role of Diallyl Disulfide in Carbon Ion Beams–induced Cancer Cell Apoptosis*

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Cervical cancer represents the third most common cause of female mortality[1]. Radiotherapy remains the mainstay of treatment, especially in advanced cervical cancer. The patients' survival rate can be determined by their responsiveness to radiotherapeutic treatment[2−4]. Although conventional X-ray treatment is an effective modality for a wide variety of human cancers, poor results may sometimes occur. High linear energy transfer (LET) charged particle radiation has several potential advantages over the treatment with low-LET radiation, such as an inverted depth–dose distribution, a higher relative biological effectiveness, a reduction in oxygen enhancement ratio, and a lower cellular capability for repair of radiation injury, making it potentially superior to low-LET radiation, such as X-rays, in the treatment of malignant solid tumors. In spite of the extensive research studying the carcinogenesis and carbon ion beam therapy, there is still space to improve the radiosensitivity to cervical cancer. Therefore, the identification of new drugs or treatments for cervical cancer to improve the radiosensitivity is imperative.

Recently, significant attention has been focused on natural radiosensitive agent in vegetables and fruits[5]. Diallyl disulfide (DADS; *i.e*, CH2=CH-CH2-S-S-CH2-CH=CH2), an oil-soluble compound extracted from garlic (Allium sativum L.) documents as a potent compound to prevent cancer, genotoxicity, nephrotoxicity, and hepatotoxicity[6]. Although DADS has been reported to provide the anticancer activity in several cancer types by inhibiting cell cycle arrest and inducing apoptosis, the molecular effect of DADS on high-LET carbon beams-regulated proliferation, cell cycle arrest and cell death is currently unknown.

So far, little information is available on the relationship between p73 isoforms expression and DADS in HeLa cells exposed to high-LET carbon beams. Here, we present preliminary data which could help clarify the effect of DADS on the radiation-regulated cell viability, radiosensitivity, cycle arrest, cell apoptosis, pro-apoptotic Tap73, and anti-apoptotic ΔNp73, as well as alterations of crucial mediator of the apoptosis pathway in HeLa cells. These results suggested that DADS is a very promising candidate as radio sensitive agent for cervical cancer and the balance of pro-apoptotic protein Tap73 and anti-apoptotic proteins ΔNp73 might be a key point regulating radiation-induced apoptosis (Fig. 1).

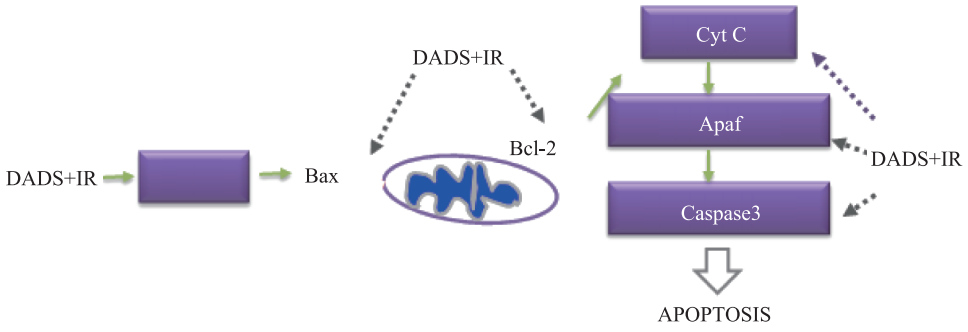

Fig. 1 (color online) Potential targets of DADS and carbon ion irradiation on cancer cell.

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