

---

**S2-5****Preliminary Study of Neuronal Response to Dose Distribution of Radiation with MR Spectroscopy**Seung Do Ahn<sup>1\*</sup>, Byoung Young Yi<sup>1</sup>, Jung Hee Lee<sup>2</sup><sup>1</sup>Department of Radiation Oncology, Asan Medical Center, College of Medicine, University of Ulsan, <sup>2</sup>Asan Institute for Life science

The goal of radiation therapy is to maximize the tumor dose and to minimize the dose of normal tissue. In order to achieve this goal, the new radiation therapy techniques such as three dimensional conformal therapy or intensity modulated radiation therapy has been developed and tried to clinical application. The relationship between radiation dose and normal tissue response is an interesting subject in the radiation therapy field. Traditionally this research was based on skin change and animal study. However, the development of new technique asks us the more objective and quantitative analysis method for the radiation response of the normal cells.

MR spectroscopy has been regarded as one of the best tools for the research of the biological metabolism of tumor or normal cells, since mid-90's. Few reports about the relationship of radiation dose distribution and normal cells with MR spectroscopy could be found in the literature.

We studied the relationship of radiation dose distribution and normal neuronal response with 2 patients diagnosed as brain tumor. The immobilization was customized for each patient followed by CT-simulation and treatment planning for brain tumor. The three dimensional dose distribution was calculated. MR spectroscopy was used for evaluation of the change of neuron. MR spectroscopy was performed before radiation therapy and repeated during

radiation therapy and at 2, 4 months after the completion of treatment. The correlation between the degree of apoptosis, cell damage, recovery power and the radiation dose was analysed. Major metabolites assessed in this study are N-acetyl aspartate, choline, myoinositol, lactate and lipid. Two patients were treated with 4MV photon beam produced by linear accelerator. Daily fractionation was 1.8Gy, delivered five times a week and total dose was 59.4Gy. We selected three isodose distribution zones( 100%, 60%, 30%) and evaluated the neuronal response at each zone.

In 100% isodose zone, all metabolites decreased gradually after completion of radiation therapy. In 60% isodose zone, N-acetyl aspartate, choline, creatine level decreased less than in 100% isodose zone and showed lipid peak. In 30% isodose zone, all metabolites showed little change after completion of radiation therapy.

In this study, we concluded that in 60% isodose zone, lipid peak meant radiation induced apoptosis and it persisted more than 4 months after completion of radiation therapy and in 30% isodose zone, radiation had a little effect on normal neuron. We expected that MR spectroscopy should be an effective tool of evaluating normal neuronal response to radiation and the grade of normal cell damage in radiation therapy field.