

**Development of an innovative radiotherapy technologies  
for the improvement of treatment outcomes of intractable cancers.**

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**【Outline of survey】**

Lung Cancer, malignant pleural mesothelioma (MPM), esophageal cancer and pancreatic cancer are still formidable diseases to treat despite intensive efforts. Better control of local disease progression using radiation therapy is necessary to improve the prognoses for those patients. However, respiratory motion of these tumors and the adjacent risk organs make it difficult to focus the optimal radiation dose to the targets with accuracy and safety by conventional radiation techniques. To overcome these problems, we developed a novel irradiation system (TM series) in collaboration with the company; Mitsubishi Heavy Industries Ltd., which has the potential to track moving tumors continuously depending on respiratory motion. This system has some characteristic structures not only to have the ability to construct a tumor tracking system, but also have the potential to create the innovative irradiation techniques which has never been recognized.

In this project, we are going to develop a 4-dimensional (4D) system for radiotherapy, which responds to respiratory motion of each tumor of the individual patient, and to lead the established 3D-systems to the next 4D generation.

**【Expected results】**

The accomplishment expected in this project is to establish the methods of planning for radiation therapy which allow for the organ motion and deformation during breathing and to construct the methods how to evaluate them. In addition, by developing the novel irradiation systems maximizing the abilities of TM series, it is expected that the prominent progression from 3D to 4D generation in treatment planning and radiotherapy will be achieved, which would lead to innovative treatment strategies in radiation therapy.

**【References by the principal investigator】**

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**【Term of project】** FY2008—2012

**【Budget allocation】**

**159,100,000 yen** (direct cost)

**【Homepage address】**

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