

Purpose: The RPM respiratory gating system (Varian, USA) establishes irradiation region using the amplitude-based or phase-based method. Although phase-based method is preferred because of the stability in the real treatment conditions, it has some limits to explain the exact correlation between the marker motion and organ motion. Even when the variation of amplitude which can introduce target motion considered as an error is produced, the phase-based method has the possibility to irradiate including the error positions. In this study, the error analysis program was developed for the verification of the tumor position's variation correlated with the variation of marker's amplitude which can be occurred during a phase-based respiratory gating treatment.

Method and Materials: The analyzed program was created with the IDL5.5 (Research Systems Inc., USA) in order to evaluate the errors based on the log files which were recorded during a respiratory gated radiation therapy with The analysis program was verified with a virtual treatment record file and with a record file using moving phantom which were modified considering the irregular amplitude's variation simulating the real clinical situations.

Results: In both cases, accurate discrimination of error points and error calculation were produced. When the treatment record files of a real patient were analyzed with the program, the accurate recognition and calculation of the error points were also verified.

Conclusion: The analysis program developed in this study can be evaluated as a useful tool for the analysis of errors due to the irregular variation of patients' respiration during the phase-base respiratory gating radiation treatment.