Purpose: There are two collimation systems associated with the CyberKnife system, the fixed cone collimator and the Iris collimator. The Iris collimator is used more frequently because of its superior flexibility. However, sometimes treatments have to be canceled or postponed due to Iris collimator mechanical failures. The purpose of this study is to investigate the feasibility of switching collimation systems without replanning.

Methods: We first performed Monte Carlo simulations on 10 clinical cases using the Iris collimator and the fixed cone collimator. The conformality index (CI), target volume coverage and the maximum, minimum and mean doses to the critical structures from the iris and fixed plans were compared to determine the feasibility of switching between collimator types without replanning.

Results: Our results showed that the two types of collimators deliver similar dose distributions. The average target doses for the fixed plans were 1% to 6% higher than those for the Iris plans. The average CI for the fixed plans was 1.36 compared to 1.28 for the Iris plans. Thus, we adjusted the Iris sizes with a scale factor of 1.024 to achieve a better dose match with the fixed collimators. Doses for the 10 cases were then recalculated. Once this correction was made, the difference between the average target doses for the two collimator plans was reduced to less than 2% and the CIs became almost identical.

Conclusions: Small target dose differences were found between plans using different collimation systems, which may be compensated for by adjusting the Iris collimator sizes to ensure similar dose distributions. The differences in the doses to the critical structures between the collimation systems were insignificant. After adjusting the Iris collimator sizes and re-commissioning the planning system, patients can be safely switched from the Iris collimator to the fixed cone collimator without replanning.