

# Utilizing the Multi-leaf Collimator During On Call Procedures in Radiation Oncology

## Introduction/Problem

Treating a patient on call in an emergency situation is a stressful event. There are limited resources and different standards between each of the different groups in the Radiation Oncology department. Currently, the procedure used to treat these patients allows for rectangular fields with no blocking for organs at risk. The linear accelerators used to treat these patients have Multi-Leaf Collimators (MLCs). These MLCs are 0.5cm and 1.0cm wide pieces of tungsten used to block certain areas of the treatment field. In order to use the MLCs in an on call setting, the area of the block needs to be determined. Considering the infinite possible combinations and the difficulty establishing MLC positions within our treatment software, the current procedure does not allow MLCs to be used on call.

## Aim/Goal

Using MLCs in an on call environment will allow for less dose to be treated to areas that do not require treatment. Using standardized MLC patterns will allow for easier calculations of the blocked area and decrease the time it takes to treat the patient. Having pre-determined patterns that can easily be accessed by whomever is on call, will eliminate numerous steps and burden on everyone involved.

## The Team

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## The Interventions

- Gather data on the amount of times on call treatments are required throughout the year.
- Determine which treatment sites have organs at risk near the treatment area.
- Develop a treatment plan file that can easily be accessed in the treatment software.
- Determine the standardized MLC patterns and the area that is blocked by them.
- Test the standardized MLC pattern on previously treated patient data to compare how effectively the radiation prescription dose would be delivered.

## Results/Progress to Date

It has been determined that the most effective use for MLCs would be when the whole brain and lumbar sacral spine require treatment. The organs at risk during whole brain treatments include: the eyes, salivary glands, and oral cavity. The organs at risk during lumbar sacral treatments include kidneys, bowel, and gall bladder.

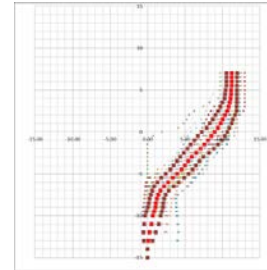


Figure 1: Leaf by Leaf MLC data for 50 patients who were treated using conventional planning for whole brain radiation

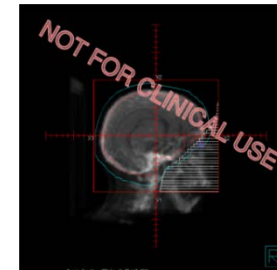


Figure 2: The standardized MLC data was placed on each patient and dose calculations performed

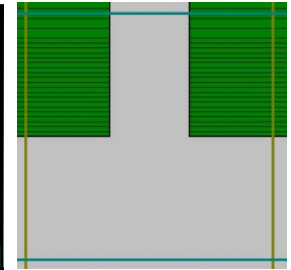


Figure 3: A standardized spade field with blocking for lumbar sacral spine treatments

## Lessons Learned

- In acquiring data about whole brain treatments, it was found that the radiation treatment fields for all the patients were remarkably similar. That allowed a standard MLC pattern to be created that will block out the organs at risk.
- There was still a lot of variation in which vertebral bodies needed to be treated with the lumbar sacral area. This meant that a single field size and treatment plan could not be used. A template was designed where half of the treatment area would be standardized at 8.0cm wide to accommodate the lumbar spine and the other half of the treatment area would be adjustable to include the sacral iliac joints. This will allow the kidneys and other parts of the abdomen to be spared.

## Next Steps

- The standardized MLC patterns will be stored as .RTP files on the desktops near the treatment machines. These .RTP files are a special type of file that is recognized by the treatment software.
- There will be an MSRT approved presentation demonstrating how to access and use the standard patterns.
- Other treatment areas will be discussed that may require blocking to reduce the toxicity to patients .

**For more information, contact:**

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