

# MRI-Defined Focal Lesions (MRI-FL) in Multiple Myeloma at Relapse are Often New Sites of Disease



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## Abstract (Abstract 156)

Observation of macrofocal lesions (FL) on MRI scans in the medullary space of patients with multiple myeloma commonly occurs. These MRI-FL present at baseline, as well as later, including at relapse. We evaluated MRI exams of 25 patients to determine if each MRI-FL present after remission of  $\geq 180$  days (CR or nCR based on M-protein response and bone marrow biopsy) represented FL present at baseline, new FL, or both. We also evaluated FL size at baseline vs. relapse to determine if size was related to persistence. All patients were enrolled in Total Therapy II (UARK 98-026). Baseline MRI examination (axial skeletal, including skull, vertebral column, pelvis, and proximal femora) and relapse MRI exam of the same regions within 2 weeks before to 4 weeks after relapse date were analyzed from patients who had  $\geq 1$  FL on relapse MRI. In terms of MRI FL, no patient achieved a normal MRI examination before relapse. On relapse, 17/25 (68%) had fewer number of FL, 5/25 (20%) had the same number of FL, and 3/25 (12%) had a greater number of FL on relapse compared to baseline exam. Despite the trend to fewer focal lesions on relapse, 11/25 (44%) had new FL at relapse. Importantly, FL size was not a determining factor, with max baseline size of resolved FL being 7.0 cm and max size of a new FL on relapse being 6.0 cm. Importantly, 4/25 (16%) presented with new extramedullary disease (EMD) at relapse. These data establish that despite a trend to fewer MRI-FL at relapse versus baseline, 44% of patients on relapse present with new areas of macrofocal disease not present at diagnosis.

## Introduction

Macrofocal lesions demonstrated on MRI examination (MRI-FL) in the medullary space of patients with multiple myeloma are frequent observations and connote active disease in the untreated condition (Figure 1). These MRI-FL present not only at baseline, but can be seen on relapse.

Figure 1

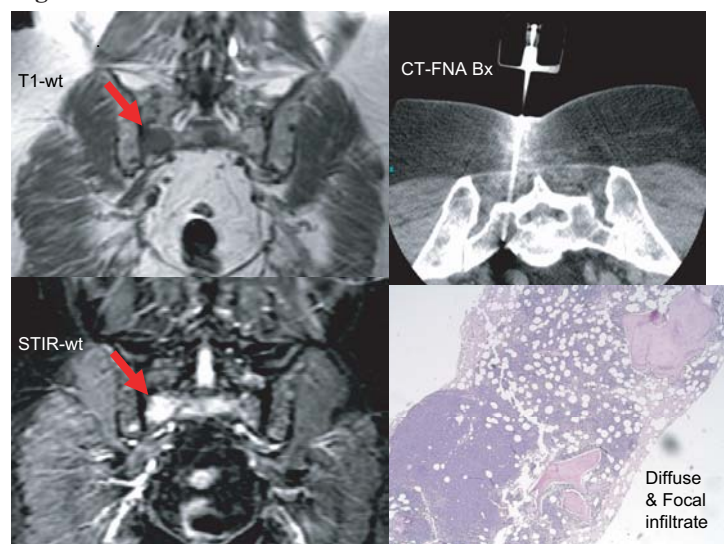


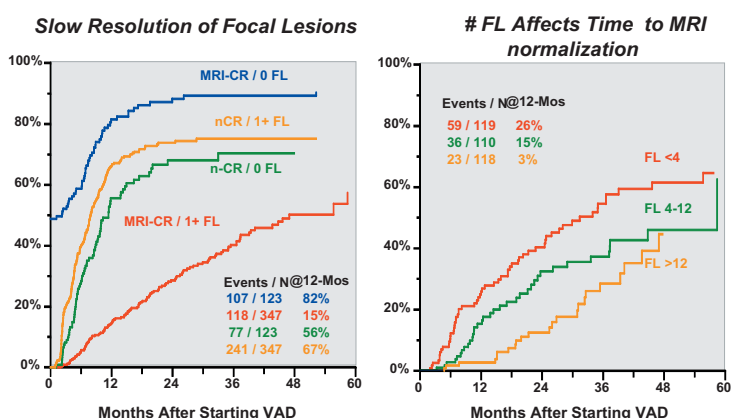
Figure 1: CT-guided fine needle aspiration biopsy (CT-FNA Bx, upper right) of an MRI-defined focal lesion (MRI-FL). An MRI-FL is seen in the right iliac wing on T1-weighted (T1-wt) and Short-tau Inversion Recovery (STIR-wt) images of the pelvis (arrows). Using MRI guidance provides a high-yield biopsy of active tumor at baseline. The photomicrograph (photographed at 200x) demonstrates both diffuse and micronodular plasma cell infiltrate.

## Materials and Methods

We evaluated MRI exams of 25 patients to determine if each MRI-FL present after remission of  $\geq 180$  days represented MRI-FL present at baseline, new MRI-FL, or both. CR or nCR was based on M-protein response and bone marrow biopsy since MRI-FL resolution lags behind clinical response inversely related to the number and size of the focal lesion (Figure 2).

Patients who had MRI-FL present on both baseline and relapse MRI examinations were selected. No patient in this series achieved a completely normal MRI examination of the entire body. Each MRI-FL on relapse was compared to the baseline MRI examination for size and location of each MRI-defined focal lesion.

Figure 2: Resolution of MRI-FL lags behind M protein response



We also evaluated FL size at baseline vs. relapse to determine if size was related to persistence. All patients were enrolled in Total Therapy II (UARK 98-026). Baseline MRI examination (axial skeleton, including skull, vertebral column, pelvis, and proximal femora) and relapse MRI exam of the same regions within 2 weeks before to 4 weeks after relapse date were analyzed from patients who had  $\geq 1$  FL on relapse MRI (Figure 3).

## Results

On relapse, 17/25 (68%) had fewer number of MRI-FL, 5/25 (20%) had the same number of MRI-FL, and 3/25 (12%) had a greater number of MRI-FL on relapse compared to baseline exam (Table 1).

Despite the trend to fewer MRI-FL on relapse, 11/25 (44%) had new MRI-FL at relapse. Importantly, MRI-FL size was not a determining factor, with max baseline size of resolved FL being 7.0 cm and max size of a new FL on relapse being 6.0 cm. Additionally, 4/25 (16%) presented with new extramedullary disease (EMD) at relapse (Tables 2-3, Figure 3).

Table 1: MRI-FL at Time of Relapse (n=25)

	n	% of patients
Fewer number FL at Relapse	17	68%
Same number FL at Relapse	5	20%
Greater number FL at Relapse	3	12%
New FL at Relapse	11	44%
Same number FL, Same Sites	2	9%
Fewer number FL, Same Sites	5	23%

Table 2: Size of MRI-FL not Reflective of Recurrence vs. New MRI-FL on Relapse

	Max Size (cm)
Max Size Resolved MRI-FL at Relapse	7.0
Max Size New MRI-FL at Relapse	6.0
New Extramedullary disease at Relapse	4/25 (16%)

Table 3: Size vs. Persistence of MRI-FL from Baseline to Relapse (n=25)

Size (cm)	Number MRI-FL of Baseline MRI-FL Persistent at Relapse	% of Baseline FL Present at Relapse
< 0.5	1/2	50%
0.5 - 1.0	8/10	80%
1.1 - 2.0	13/18	72%
> 2.0	10/16	63%
All Sizes	26/36	72%

Figure 3: STIR-weighted MRI images of the Lumbar Spine with MRI-FL (arrows)

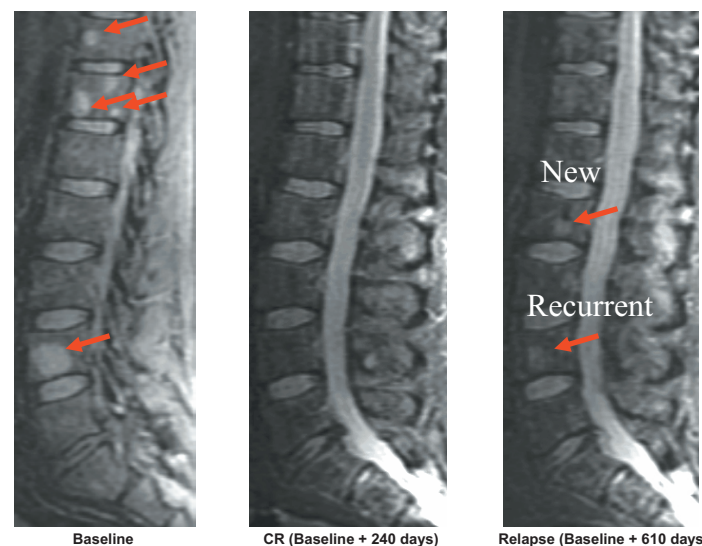


Figure 3: A series of sagittal Short-tau Inversion Recovery-weighted (STIR-wt) images of the lumbar spine from a patient with multiple myeloma is shown. The baseline examination (left) demonstrates MRI-FL (arrows) which resolve at CR (center). At relapse (right), the lower MRI-FL is seen to be recurrent while the upper MRI-FL is seen to be new. Additionally, the number of MRI-FL at relapse is fewer than the number seen on baseline examination.

## Conclusion

These data establish that there is a trend to fewer MRI-FL at relapse compared to baseline examination and that most MRI-FL at relapse are recurrent rather than new. Nonetheless, about 44% of MRI-FL present at relapse present with new areas of macrofocal disease not present at diagnosis.