Correlation between Whole Body MRI with MRD results in six adult patients with Acute Leukemia

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Introduction

Whole body MRI is a very sensitive radiology tool for detection of bone marrow infiltration. MRD "minimal residual disease" detection methods in acute leukemia still have many limitations. Whole body MRI assessment can be evaluated as an MRD assessment method.

Aim

Study Whole body Magnetic resonance imaging as an MRD detection method in Acute leukemia cases

Methods

The study include six acute leukemia patients. All patients evaluated after finish consolidation chemotherapy with multiparameter flow cytometry MFC as MRD detection method and underwent whole body MRI evaluation.

Results

Whole body MRI evaluation done for the 6 cases after confirmation of complete remission by BMA and MRD negativity by MCF.

Mild residual bone marrow infiltration detected in 5 cases and one case show extensive bone marrow infiltration.

Medullary relapse confirmed in 4 cases during the entire period of the study. 2 cases still in CR both were acute promyelocytic leukemia.

Data of six cases evaluated by whole body MRI after confirmed complete remission post consolidation.

Diagnosis	No	BMA and MRD Evaluation post consolidation	MRI finding	DFS
Biphenotypic	1	CR	Mild BM infiltration of both humeri, tibia and iliac bone	14month
AML M1	1	CR	Mild BM infiltration in clavicle &right tibia	8month
AML M2	1	CR	Extensive BM infiltration of all scanned bone	6month
AML M4-5	1	CR	Mild BM infiltration in spine and both iliac bone	6month
AML M3	2	CR	Mild BM infiltration in both iliac bone in 1st case and in spine in 2nd case	36 month

Summary

Whole body MRI evaluation post consolidation and correlation with bone marrow and MRD results is recommended for possibility of involving it in MRD evaluation based on its very high sensitivity in detecting bone marrow infiltration.

Discussion

MRD detection methods still have many limitations. Multi parameter flow cytometry (MFC) is less sensitive and depend on subjective analysis. Real-time quantitative PCR (RT-qPCR) has limited applicability. Next-generation sequencing (NGS) is technically challenging. Digital PCR (dPCR) need specific assay for every mutation and has limited sensitivity**(Teixeira et al., 2023).**

Whole-body MRI is a valuable tool for the assessment of BM infiltration which can currently be considered complementary to BMB, and can be used as a guide for BMB in suspected cases, preventing harmful false negative samplings **(Albano et al., 2017).**

In our research, we conducted whole-body MRI assessments for six cases following the verification of complete remission through bone marrow aspiration (BMA) and minimal residual disease (MRD) confirmation. We observed mild residual bone marrow infiltration in five cases, with one case exhibiting extensive infiltration. Throughout the study duration, medullary relapse was confirmed in four cases. Notably, two cases, both diagnosed as AML M3, remained in complete remission.

References

ALBANO et al, 2017 *Journal of Magnetic Resonance Imaging*, 45**,** 1082-1089.

TEIXEIRA et al, 2023 A Comprehensive Narrative Review. Cancers, 15, 1362.