Functional Imaging Detects Residual Disease in MRD-Negative Multiple Myeloma Patients who Subsequently Relapse

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INTRODUCTION

The novel agents have dramatically increased the rate of complete remission (CR) in patients with multiple myeloma (MM). As a result, the quality of CR is increasingly being assessed by molecular tests, such as multicolor flow cytometry (MFC). Achievement of minimal residual disease negativity (MRDneg) has been reported to be associated with favorable outcomes, and recently it has been included as an additional criterion in international myeloma working group (IMWG) response definition. Despite this, even MRDneg patients continue to relapse, probably due to residual disease at sites other than the one commonly investigated for MRD, the posterior iliac crest.

AIM OF THE STUDY

To determine whether functional imaging can be used to detect residual disease in MRDneg patients, and to address its value in the assessment of patients in CR.

METHODS

- Diffusion weighted MRI with background suppression (DWIBS): For DWIBS, a focal lesion was defined as a well delineated focal intensity above the surrounding background BM 3 cm in size and showing restriction on ADC maps.
- 18F-FDG Postion Emission Tomography: a focal lesion was defined as a circumscribed focus with increased FDG uptake compared to its surroundings.

MRD was assessed using 8 color MFC with a limit of detection of 10-5 (Figure 2). Usually, > 200000 events were recorded; if more than >20 plasma cells with an aberrant phenotype were detected, the patient was considered to be MRD positive.

RESULTS SUMMARY

1. Scenario 1: Both, FDG-PET and DWIBS are promising functional imaging modalities for the early assessment of response to therapy. Yet, DWIBS is less expensive and does not require any patient preparation.
2. Scenario 2: Functional imaging detects residual disease in MRD-negative patients.
3. Scenario 3: The sensitivity of DWIBS for detection of focal residual disease seems to be superior to PET-CT.
4. Scenario 4: The patchy character of MM bone marrow involvement increases after the first relapse, reducing the sensitivity of MRD diagnostics done exclusively on iliac crest samples.

CONCLUSIONS

- Functional imaging detects residual disease in MRD-negative patients
- The sensitivity of DWIBS for detection of focal residual disease seems to be superior to PET-CT.
- The patchy character of MM bone marrow involvement increases after the first relapse, reducing the sensitivity of MRD diagnostics done exclusively on iliac crest samples.