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GENETIC ANALYSIS OF PLASMA CELLS OF MULTIPLE MYELOMA

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Cytogenetic alterations are the base of risk stratification for multiple myeloma (MM) and guiding the selection of therapy; however, current pathology assays performed on bone marrow samples can produce false negatives due to the unpredictable distribution and rarity of MM cells. Here, we report a microfluidic device to facilitate CD45 depletion for enhancing the detection of cytogenetic alterations in plasma cells. Bone marrow samples from 48 MM patients were each divided into two parts. One part was subjected to classic flow cytometry and fluorescent in situ hybridization (FISH). The other part was first undergoing CD45-cell depletion and then enriched by microfluidic size selection (MF-CD45-TACs). The enriched samples were then analyzed by flow cytometry and FISH and compared to those analyzed using the classic method. MF-CD45-TACs significantly increased the percentage of CD38+/CD138+ cells to 37.7%±20.4% (P<0.001) from 10.3%±8.5% in bone marrow. After the MF-CD45-TACs enrichment, the detection rate of IgH rearrangement, del(13q14), del(17p) and 1q21 gains rose to 56.3% (P<0.001), 37.5% (P<0.001), 22.9% (P<0.001) and 41.7% (P=0.001), respectively; all rates of detection were significantly increased compared to the classically analyzed samples. In this clinical trial, this microfluidic-assisted assay provided a precise defection of cytogenetic alterations in plasma cells (PCs) and improves the clinical outcomes.

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