

SOLUBLE BCMA MIRRORS BONE MARROW DISEASE BURDEN AND PREDICTS OUTCOME IN MULTIPLE MYELOMA PATIENTS

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Background: B-cell maturation antigen (BCMA) is highly expressed on plasma cells and represents a validated therapeutic target in multiple myeloma (MM). Its soluble form (sBCMA), released through γ -secretase-mediated cleavage, has emerged as a dynamic biomarker of disease burden and treatment response. However, the relationship between bone marrow (BM) and peripheral blood (PB) sBCMA levels and their association with clinical and biological features remain poorly defined.

Methods: sBCMA concentrations were quantified by ELISA in paired BM plasma and PB serum samples from 25 newly diagnosed MM patients. Correlations between sBCMA and disease parameters (ISS stage, β 2-microglobulin, cytogenetic risk, and BM plasma cell infiltration) were assessed using Spearman's and Kruskal-Wallis tests. Survival analyses were performed by Kaplan-Meier and Cox regression using median sBCMA as cutoff.

Results: sBCMA levels were strongly correlated between BM and PB compartments ($r = 0.99$, $p < 0.001$), supporting

their biological equivalence. Elevated sBCMA was associated with markers of tumor burden, including higher BM plasma cell infiltration ($p = 0.025$), advanced ISS stage ($p = 0.0087$), and increased β 2-microglobulin levels ($p = 0.002$). No significant association was observed with age, sex, cytogenetic abnormalities, isotype, or therapy type. Patients with high sBCMA (\geq median) displayed a trend toward inferior progression-free survival (median 574 days vs. not reached; log-rank $p = 0.17$). In Cox regression, high sBCMA was associated with a fourfold increased hazard of progression or death (HR = 4.02; 95% CI, 0.47-34.79; $p = 0.21$). Multivariable modeling adjusting for ISS, cytogenetic risk, and age confirmed the independent prognostic contribution of sBCMA, although statistical significance was not reached.

Conclusions: sBCMA levels in BM and PB strongly mirror myeloma disease burden and may provide complementary prognostic information. Peripheral sBCMA represents a reliable and minimally invasive biomarker suitable for disease monitoring and potential integration into risk-adapted stratification models in MM.