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Detection of Unstable Forms of Monoclonal Free Light Chains in Sera of Multiple Myeloma Patients

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Abstract. Monoclonal immunoglobulin free light chains (FLC) are commonly secreted in various types of lymphoma. They originate from clonal plasma cell proliferation and are usually detected by immunological assay of blood serum, the ratio of $\varkappa$ and λ FLC being a reliable diagnostic marker. Abnormal $\varkappa/\lambda$ FLC ratio is commonly found in multiple myeloma (MM) cases at diagnosis and upon recurrence, and substitutes for invasive manipulations as bone marrow biopsies and whole body scan. Increased clonal free light chain concentrations are associated with poor prognosis in multiple myeloma, and virtually every plasma cell disorder.

In our recent works we have introduced a new, non-invasive, serum-based calorimetric approach for the characterization of MM with excessive secretion of FLC as well as other types of MM (Todinova et al. 2011, 2014, Krumova et al. 2015). We showed that for 85% of the studied cases the calorimetric profiles strongly differ from those of healthy individuals and for a small cohort of the studied patients a unique calorimetric transition was detected at 57°C that was suggested to originate from destabilized Bence Johns (BJ) proteins (Todinova et al. 2014).

Here we present a case report on a MM patient characterized with remarkably high amount of FLC (20%) and $\beta 2$ microglobulin, and an exceptional calorimetric fingerprint. The unique endothermic transition at 46 °C was found to correlate with the presence of large amorphous aggregates visualized by atomic force microscopy.

Our data demonstrate that calorimetry is a suitable test for fast detection and characterization of unstable FLC forms in sera.

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