The treatment for multiple myeloma has evolved in recent years from traditional chemotherapy to newer therapies such as such as monoclonal antibodies, proteasome inhibitors, and immunomodulatory agents in addition to autologous stem cell transplant. While survival outcomes have generally improved, these new agents are also associated with additional toxicities and significant cost. The treatment of patients with cancer is fraught by a delicate balance of targeting the disease while avoiding treatment-related complications. Further complicating treatment decisions is that myeloma is a heterogeneous disease with great genetic diversity, thus while there is much data on the efficacy of particular anti-myeloma agents in large clinical trials, it is not typically clear how *individual* patients will respond to the different classes of therapy. "Personalized" or "precision" medicine approaches can ease this problem of finding the right treatment for the right patient regardless of tumor genetic complexity. Multiple myeloma epitomizes the struggle to balance treatment options and their complications, for it is an incurable disease afflicting a predominantly aged population, and treatment is administered on a continuous schedule with little or no breaks. Over the last two decades, advances in drug development have improved outcomes for younger, fit patients, but elderly and frail patients haven't realized the same benefit. This could be related to the benefits of three drug combinations which are recommended as initial therapy in myeloma, whereas frail patients can often tolerate only two drugs at a time due to excess toxicities. To address the unmet need for personalized medicine in myeloma, we developed a functional approach by profiling the sensitivity of individual patients' myeloma to clinically available drugs with an ex-vivo assay. We here present a patient's case and corresponding drug sensitivity profile to illustrate how personalized treatment may lead to an improved disease course. Personalized treatment could provide the greatest survival improvements to elderly patients with cancers, such as multiple myeloma, through avoiding undertreatment, limiting attrition through subsequent lines of therapy due to toxicity, reducing exposure to ineffective drugs, and streamlining the management of relapses through re-testing. Exploring these avenues is imperative to closing the gap in cancer-related mortality in the elderly and frail.