



# A Revolutionary Approach to Fight Blood Cancer

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For Marco, a 62-year-old man, life changed unexpectedly when a vertebral fracture left him struggling to walk. Fatigue and recurrent infections followed, culminating in a diagnosis of multiple myeloma (MM), a serious and life-altering blood cancer. MM develops in the bone marrow, affecting the body's ability to fight infections, produce healthy blood cells, and maintain bone health. Every year, thousands of patients just like Marco face complications such as fractures, kidney damage, and anemia, making daily life a constant struggle. The disease progresses in stages, starting from an early, silent phase called MGUS, which in some cases evolves into smoldering multiple myeloma (SMM) before advancing to active MM. Many patients find themselves categorized in these preliminary categories without knowing if their condition will progress: finding new markers that serve as predictors for evolution can help provide answers to these patients and initiate treatment before irreversible damage sets in.

The project aims to uncover the triggers behind this progression. To do this, we

are using a cutting-edge technology called single-cell RNA sequencing (scRNA-seq). Imagine a room filled with people talking all at once, without individual microphones, it's impossible to know who is saying what. With scRNA-seq, we give each cell its own "microphone," allowing us to analyze them individually and identify which genes are driving the disease progression. By mapping how cancer cells differ from healthy ones and how they behave over time, we aim to find the key factors that push the disease from a silent stage to an active, dangerous state.

Our research could be a game-changer for patients like Marco. By identifying the unique behavior of cancer cells in each patient, we aim to develop personalized therapies. This approach could result in fewer side effects, longer remission periods, and improved quality of life. In the long run, this knowledge could help transform multiple myeloma from a life-threatening condition into a manageable condition, giving patients the chance to live longer, healthier lives surrounded by their loved ones.