In this talk, I will discuss how recent advances in isotope separation will impact medicine. The promise of targeted radiotherapy for cancer relies on the combination of a radio-isotope that can deliver a high-energy beta or alpha particle dose to a small volume, together with an effective delivery system such as a monoclonal antibody. This therapy is still far from reaching its full potential due to the very limited isotopes available and their extreme cost. The commercial availability of a new generation of radio-isotopes will enable a breakthrough in targeted radiotherapy. The key is a new method of isotope separation.

Over the past few years, my research group at UT Austin has focused on developing general methods for controlling the motion of atoms in gas phase as an alternative to laser cooling. The successful realization of these methods uses lasers to control the magnetic state of each atom, followed by magnetic manipulation. We have shown that the above methods for controlling the motion of atoms can also be used for efficient isotope separation. This method, Magnetically Activated and Guided Isotope Separation (MAGIS) was experimentally demonstrated in our laboratory, and is now moving to production of key isotopes for medicine at a non-profit entity, the Pointsman Foundation. Since its formation in 2014, the Pointsman Foundation was approved as a 501(c)(3) non-profit by the IRS. It was awarded a continuing grant from the Smart Family Foundation, and is awaiting several pending applications for funding which will enable hiring of scientific staff and production of isotopes. I will conclude with a discussion of new and promising applications of isotopes in medicine.