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Cyclotron Production of Radionuclides for Nuclear Medicine at Academic Centers

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The increase in use of radioisotopes for medical imaging has led to the development of new accelerator targetry and separation techniques for isotope production. For example, the development of longer-lived position emitting radionuclides has been explored to allow for nuclear imaging agents based on peptides, antibodies and nanoparticles. These isotopes (64Cu, 89Zr, 86Y) are typically produced via irradiation of solid targets on smaller cyclotrons (10-25 MeV) at academic or hospital based facilities. Recent research has further expanded the toolbox of PET tracers to include additional isotopes such as 52Mn, 55Co, 76Br and others. The smaller scale of these types of facilities can enable the straightforward involvement of students, thus adding to the next generation of nuclear science leaders. Research pertaining to development of robust and larger scale production technologies including solid target systems and remote systems for transport and purification of these isotopes has enabled both preclinical and clinical imaging research for many diseases. In particular, our group has focused on the use of radiolabeled antibodies for imaging of receptor expression in preclinical models and in a clinical trial of metastatic breast cancer patients.