The University of Missouri Research Reactor (MURR®) Center
Curing Cancer and Other Diseases with Radiopharmaceuticals

For more than 50 years the University of Missouri Research Reactor (MURR) has promoted groundbreaking cancer research and supplied the active ingredient for life-saving radiopharmaceuticals that benefit people across the country and around the world. Researchers at MURR develop and produce diagnostic and therapeutic radiopharmaceuticals in cooperation with private industry and have successfully brought three FDA-approved drugs to market.

**TheraSphere®** - Jointly developed by scientists at Missouri S&T in Rolla, MU, and private industry, TheraSphere treats liver cancer using microscopic, radioactive glass beads that are injected into a patient’s artery. The beads lodge in the tumor capillaries and deliver large doses of short-ranged radiation to the cancer. The microspheres are irradiated at MU’s Research Reactor to generate the short-lived isotope yttrium-90, the drug’s active ingredient. TheraSphere is approved in Canada and the US for the treatment of liver cancer.

**Quadramet®** - Quadramet relieves the often excruciating pain associated with human metastatic bone cancer. Besides having collaborated to develop the drug with private industry, the MURR Center is the nation’s sole supplier of its active ingredient, the radioisotope samarium-153 (Sm-153). The drug significantly improves a patient’s quality of life, eliminating the need for, and side effects of, morphine or other opiates.

The benefits of the Sm-153 treatment are even greater for animals, with one out of every seven dogs being completely cured of the disease. MU’s Veterinary Hospital routinely uses it for dogs and sometimes for horses and cats. This collaborative effort is an outstanding example of how translational research such as the Veterinary College’s Comparative Oncology program at MU works to advance medical science and improve the quality of life.
Lutathera® - More than 20 years ago, scientists at the University of Missouri’s Research Reactor (MURR®) identified promising properties of the radioisotope lutetium-177 (Lu-177), which can be used to treat cancer. In 2018 the U.S. Food and Drug Administration approved Lutathera® (lutetium Lu 177 dotatate), a Lu-177 based drug, to treat certain types of tumors that can occur in the gastrointestinal tract and pancreas. MURR is currently the sole U.S. supplier of Lu-177 for use in Lutathera.

Iodine-131 - MURR has recently started providing I-131 for patient use. According to the American Cancer Society, thyroid cancer is “the most rapidly increasing cancer in the U.S.,” with diagnoses tripling in the last three decades. There will be an estimated 53,990 new cases of thyroid cancer in the U.S. in 2018 with an estimated 2,060 deaths from the disease, according to the National Cancer Institute.

A domestic supply of Iodine-131 (I-131), a critical radioisotope widely used for diagnosing and treating thyroid cancer and hyperthyroidism, is vital due to increasing demand and the isotope’s short shelf-life. MURR shipped its first batch of Iodine-131 in June, 2018 and is currently the only supplier of I-131 in the United States and the first U.S. supplier of the radioisotope since the 1980s.

I-131 sodium iodide became the first FDA-approved radiopharmaceutical in 1951 and is one of the most widely used radiopharmaceuticals in the United States. The isotope’s unique properties enable both diagnostic imaging and treatment of cancer and hyperthyroidism and since the thyroid gland naturally absorbs iodine, I-131 can be targeted directly to thyroid tumors to destroy cancerous tissue and treat the disease.

Researchers at MURR continue to work in cooperation with other campus resources including the forthcoming Translational Precision Medicine Complex to develop new therapeutic and diagnostic agents to improve patient health.