POSTER 31

DEVELOPMENT OF HIGH THROUGHPUT TISSUE ANALYSIS LABORATORY

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Boron neutron capture therapy (BNCT) is a promising binary radiation therapy for the treatment of cancer and other diseases. In order for this therapy to succeed, non-toxic compounds carrying boron-10 must be successfully transported into tumor cells. In a second step, the tumor is irradiated with low-energy neutrons, which are captured by boron-10 and result in a nuclear fission reaction. The products of this reaction, an alpha particle and lithium nuclei, travel a distance of less than 10 micrometers in tissue. In principle this therapy is highly targeted and specific, whereby the high-LET radiation created by the boron-neutron capture reaction is contained within the volume of a single cell.

Current research within our institute is the development of compounds which selectively deliver boron-10 to tumor tissue. Biodistribution studies in small tumor-bearing animals are conducted to optimize the performance of boron agents resulting in the requirement to analyze many tissue samples for composition. To support this research, we have developed a high-throughput tissue analysis laboratory at MU. This laboratory utilizes an automated digestion microwave capable of digesting up to 120 tissue samples per hour. After digestion samples are analyzed using an automated inductively coupled plasma atomic emission spectrometer (ICP-AES) capable of measuring the elemental composition for approximately 80 percent of the periodic table. Analytical techniques have been optimized to allow for the efficient digestion and analysis of 17 different tissue types. By reducing the time required for sample analysis, we contribute significantly towards the development of this new noninvasive cancer treatment.