Controlled Radiation Capsule for Precision and Rapid Cancer Treatment

This research aims to transform cancer treatment through the optimization of brachytherapy, with a focus on reducing treatment duration, setup complexities, and financial burdens, all while emphasizing patient safety. Patients living at a distance from radiation clinics, particularly those undergoing extended Low Dose Radiation brachytherapy, often struggle with the formidable financial challenges associated with securing nearby accommodations. In response to these issues, the research introduces a radiation capsule designed to condense the conventional six-month treatment period to approximately just one week, thereby significantly reducing the duration of required accommodations. This capsule is especially relevant considering the construction cost of $40 million for a single-room proton therapy system, a financial hurdle that affects countless patients. The radiation capsule employs minimally invasive procedures, eliminating the need for invasive probing, marking a departure from conventional High Dose Radiation brachytherapy treatments. It harnesses wireless power transfer technology, ensuring seamless energy transfer from an external planar rectangular coil to an internal coil, both reinforced with Metglas sheets to amplify magnetic field strength. A built-in safety mechanism ensures the capsule automatically closes in the absence of current, thereby guaranteeing patient well-being. However, the most interesting aspect of this research is the introduction of Medium Dose Radiation (MDR), which bridges the treatment gap between High Dose Radiation (HDR) and Low Dose Radiation (LDR), significantly reducing radiation hazards while shortening treatment durations to a matter of days. This research introduces improvements in cancer treatment, enhancing accessibility, efficiency, and patient safety. By introducing MDR therapy, it not only eases the financial burdens of patients but also ensures shorter treatment times, making cancer treatment more efficient and patient centered.