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Achievements and Challenges of Hadron Therapy

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The term "hadron therapy," which has entered the medical lexicon, refers to the therapeutic use of "hadrons," nuclear particles that were previously only known to be used in physics research facilities. The word "hadron" comes from the Greek word "hadrons," which means "strong" and describes the force that the quarks, which make up hadrons, interact with. Protons, which contain three quarks, carbon ions, which are made up of six protons and six neutrons and therefore contain 36 constituent quarks, and, most recently, helium ions, which are made up of two protons and two neutrons and therefore contain 12 quarks, are the hadrons currently used in hadron therapy facilities around the world. When the hadron beam reaches the body, the energy deposition per gram of matter (also known as the "dose") is minimal and is mostly concentrated near the end of the range. Slices of a tumour can be painted using a focussed beam with millimetric transverse dimensions that have been shifted by scanning magnets in the plane perpendicular to the beam direction. The current hadron therapy period officially began at the start of the 1990s, with centres devoted solely to therapeutic activities. The Loma Linda University Medical Centre in California was the first proton treatment centre. Three rooms include spinning magnetic systems (isocentric "gantries") with a mass of about 100 tons and a diameter of about ten meters that, for the first time, allow the patient's direction of incidence of the proton beam to be changed, as is customary in conventional radiotherapy.

The development of clinical proof is the challenge of hadron treatment. Particle treatment is safe and beneficial in a range of clinical settings, according to mounting research. High-level data explicitly contrasting proton therapy with current conventional radiotherapy methods are still lacking, nevertheless. The main driving force for the adoption of particle therapy is the decrease in exit and integral dosage when compared to photon plans, which results in a decrease in the dose to normal tissues. This should result in less acute and long-term toxicity and better quality of life following therapy. Only clinical research can accurately assess how particle treatment affects local tumour control (LC) or overall survival (OAS).

JOURNAL REFERENCE

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