
Session de perfectionnement : New Technologies for light ion beam therapy facilities

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Résumé

Introduction: The use of Light Ion Beam Therapy (LIBT) in the context of cancer treatment has been increasing over the past 25 years and the technology is still developing. The main areas of development include accelerator technology, gantries, beam delivery techniques, patient positioning and alignment systems, as well as medical software systems. While protons are becoming more and more available worldwide, carbon ion facilities are still seldom. Other type of ions such as Helium or Oxygen ions are also investigated at a research level, but were not considered in this presentation.

Methods: This presentation proposes an overview of the current technology available in LIBT facilities, as well the current trends and developments for the near future.

Results: While scattering techniques are still most used worldwide, active scanning techniques are considered to be the future of LIBT as they allow better tumor conformation, sparing of organs at risks and facilitate Intensity-Modulated Ion Therapy. Robotic Patient Positioning Systems (PPS) have been used since 1991 and allow very accurate and precise positioning of the patient. However, it is only since recently that IGRT capabilities similar to conventional radiation therapy are offered as a standard option by many vendors. A general trend is the reduction of the size and consequently the costs of the facilities, in order become more widely accessible. Compact single room proton therapy solutions are now proposed by many companies and include all necessary features for delivering high quality treatments (active scanning delivery, rotating gantries, robotic PPS and IGRT capabilities including CBCT). For carbon ions, the reduction of the size of the accelerators and gantries is still a challenge.

Conclusions: The technology used in LIBT is still under rapid development. Today the vendors are proposing more affordable proton solutions having fully equipped treatment rooms and including the latest technology in terms of beam delivery and imaging systems. Developments allowing carbon ions to become more widely affordable are more complex.

References:

PTCOG (www.ptcog.ch), Practical Implementation of Light Ion Beam Treatments, M. F. Moyers and S. M. Vatnitsky, mpp 2012

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