

Image-guided radiotherapy for cancer treatment: recent developments and future innovations

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Cancer treatment with radiation therapy has experienced significant innovations in the last two decades, leading to highly precise and personalized treatments today, allowing to deposit high energy doses in the tumor while sparing critical healthy tissue as much as possible.

Modern high-precision radiation treatments are delivered using image-guided radiotherapy systems. During this presentation, an overview of recently developed hybrid systems for online image-guided radiotherapy will be given, including CT-adaptive radiotherapy, magnetic resonance-guided radiotherapy and also image-guided particle therapy approaches. In addition to an introduction to the technical and physical realization of the hardware systems, potential and challenges related to radiation dose deposition in tissue, dosimetry and assessment of biological tissue properties will be highlighted. Moreover, current and future innovations aiming at real-time adaptation of radiotherapy treatment beams for moving targets will be discussed.

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