

Radiological Protection in Ion Beam Radiotherapy: A Practical Guidance for Clinical Use of New Technology

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Recently introduced new technologies in radiotherapy have improved patients' clinical outcome significantly. Ion beam radiotherapy, including proton and carbon ion beams, provides excellent dose distributions in targeted tumours with small effects to the surrounding healthy tissues. On the other hand, careful treatment planning is required in order to maximise the treatment efficiency and minimise the dose to the normal tissues. Radiation exposure from secondary neutrons and photons, particle fragments, and photons from activated materials should also be considered for radiological protection of the patient and medical staff. Appropriate maintenance is needed for the equipment and the air in the treatment room, which may be activated by the particle beam and its secondary radiation. This new treatment requires complex procedures and careful adjustment of parameters for every patient. Therefore, education and training for the personnel involved in the procedure are essential for both effective treatment and patient protection. ICRP provided recommendations for radiological protection in ion beam radiotherapy in *Publication 127*. Medical staff should be aware of the possible risk resulting from inappropriate use and control of the equipment. They should also consider the necessary procedures for patient protection when new technologies are introduced in clinical practice.