Treatment tolerance of particle therapy in pediatric patients.

Abstract:
Curative treatment of pediatric cancer not only focuses on long-term survival, but also on reducing treatment-related side effects. Advantages of particle therapy are mainly due to their physical ability of significantly reducing integral dose. Between January 2009 and December 2012, we treated 83 pediatric patients (aged 21 and younger) at the Heidelberg Ion Therapy Center at University Hospital of Heidelberg (HIT). In total 56 patients (67%) received proton irradiation, while 25 (30%) patients were treated with carbon ions (C12). Two patients received both treatments (3%). Treatment toxicity was analyzed retrospectively and documented according to the CTCAE/RTOG classification. In a second step, treatment toxicity from ion therapy was analyzed in comparison to treatment toxicity during photon irradiation of a comparable historical group of 19 pediatric patients. In all patients, particle therapy was tolerated well (median follow-up time 3.7 months), children (20 patients) with at least two follow-up visits showed a median follow-up time of 10.2 months. During the first two months patients mainly suffered from radiogenic skin reaction (63%), mucositis (30%), headache and dizziness (35%) as well as nausea and vomiting (13%). Severe toxicity reaction (grade II-IV) was only seen in patients who had intensive simultaneous chemotherapy or who had undergone several operations in the irradiated area before radiotherapy.
Treatment toxicity during ion therapy was comparable to treatment toxicity from photon irradiation of a historical group. In comparison to conventional therapy, patients with particle therapy do not suffer from increased acute treatment-related toxicity during the first months. More experience with particle therapy will be needed during the next years to help to thoroughly evaluate the high potential of ion therapy.