37.0±5.3 Gy for the peak-irradiations, respectively.

Values were 2.8±0.4 Gy for photons, 2.1±0.4 Gy for the plateau and 1.14, 1.19, 1.37, and 1.72 for the plateau- and 1.28, 1.42±0.02 for the plateau region. A significant fractionation effect was found only for the plateau. The clinically applied LEM-version correctly describes the main features although it generally underestimated the RBE in the Bragg-peak by about 25% (fig. 1). In contrast, a retrospective clinical study determined the biologically equivalent tolerance dose for 5% probability of MRI-detected temporal lobe reactions (D50) to be 68.8±3.3 GyE [2]. This value complies well with clinical experience from photon therapy and hence, there is no indication for a significant underestimation of the RBE in patients. Meanwhile, improved versions of the LEM (LEM II-IV) are available [3,4], which show good agreement with the measured RBE-values for the peak region. To clarify the relation between experimental, clinical and calculated RBEs, the clinical data have to be reanalyzed using LEM IV. Further work is ongoing to systematically determine RBE and α/β-values at several positions in an extended SOBP corresponding to different LET-values.

**Conclusions:**

Carbon ion irradiations of the spinal cord are significantly more effective in the Bragg-peak than in the plateau region. A significant fractionation effect was found only for the plateau. The clinically applied LEM-version correctly describes the main features although it generally underestimated the RBE in the Bragg-peak by about 25% (fig. 1). In contrast, a retrospective clinical study determined the biologically equivalent tolerance dose for 5% probability of MRI-detected temporal lobe reactions (D50) to be 68.8±3.3 GyE [2]. This value complies well with clinical experience from photon therapy and hence, there is no indication for a significant underestimation of the RBE in patients. Meanwhile, improved versions of the LEM (LEM II-IV) are available [3,4], which show good agreement with the measured RBE-values for the peak region. To clarify the relation between experimental, clinical and calculated RBEs, the clinical data have to be reanalyzed using LEM IV. Further work is ongoing to systematically determine RBE and α/β-values at several positions in an extended SOBP corresponding to different LET-values.

**PO-0902**

Effect of post radiation therapy chronic otitis media on dose parameters associated with sensory neural hearing loss

**Purpose/Objective:** Post radiation therapy (RT) chronic otitis media (COM) has been implicated with incidence of sensory neural hearing loss (SNHL) in head & neck cancer (HNCa) patients. The goal of this study is to examine the association and evaluate the effect of post-RT COM on the dose parameters associated with post-RT SNHL in head and neck cancer (HNCa) patients receiving RT ± chemotherapy (chemo) using logistic modeling.

**Materials and Methods:** Radiation oncology and otolaryngology records of 395 HNCa patients who received RT±Chemo were retrospectively reviewed to code incidence of post-RT COM and SNHL using air & bone conduction thresholds for high frequency hearing at 4 kHz. The criteria for SNHL was 10 dB increase in hearing threshold with respect to baseline evaluation. Median follow up was 5.7 Years (range: 0.5-30 years). Mean doses received by the middle ear and cochlea were estimated by treatment plan evaluation and used for analysis. A Fisher’s exact test used to determine association between post-RT COM and SNHL. A logistic function was used to describe the dose response for incidence of SNHL for patients treated with RT only and those with Chemo+RT. In each group the model was fitted first to all patients (including those with post RT COM) treated with the specific modality (RT only or RT-Chemo) and then to the subset of the patients treated with that modality who did not have occurrence of post-RT COM. Maximum likelihood method was used to optimize the fit.

**Results:** Post-RT COM was observed in 31.5% patients. Fisher’s exact test indicated that post-RT COM was significant in the incidence of SNHL (p <0.001). The estimated TDS & TDS for RT Only group were 34.3 Gy, 41.9 Gy when all the patients were included and those for subset of patients without post-RT COM were 37.1 Gy, 44.7 Gy. Those for Chemo+RT group were 39.8 Gy, 37.4 Gy when all patients included and those for subset of patients without post-RT COM were 38.1 Gy,

**Conclusions:**