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Including anatomical variations in robust optimization for head and neck proton therapy can reduce the need of adaptation

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1	Corrigendum to "Including anatomical variations in robust optimization for head and
2	neck proton therapy can reduce the need of adaptation" [Radiother. Oncol. 131 (2019)
3	127-134]
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The authors regret the occurrence of minor errors in the their published article [1]. The work compares the anatomical robustness of three different planning strategies for head and neck proton therapy by the analysis of weekly and total cumulative dose distribution considering anatomical changes throughout the treatment course by means of weekly control CTs.

It was stated in the original manuscript that the patient data were selected from 20 subsequent patients with locoregionally advanced HNSCC that received IMRT treatment at our institution between January and July 2016. The corrected description of patient data used in our in-silico study is that datasets from 20 locally advanced HNSCC patients were included, 17 of whom were treated with IMRT, 2 with double scattered (DS) proton radiotherapy and 1 with a mixed (IMRT/DS) treatment at our institution between August 2015 and July 2016. This changed patient data description does not affect the presented data.

It was written in the original manuscript that the PTV-based treatment plans (PTVb) could not account for anatomical changes in 10 cases. The number must be corrected to 12. This correction does not change the general rating of anatomical robustness of the three investigated planning approaches as the classical robust optimization (cRO) and the anatomical robust optimization (aRO) could not account for anatomical changes only in 5 cases and 1 case, respectively.

41 Within this corrigendum, the authors would furthermore like to clarify and correct some 42 misleading statements for the organ at risk (OAR) doses. (1) It was stated that doses to the 43 OARs remained below the constraints in the nominal plans. Actually, this is only correct for 44 the planning OARs, defined as the OAR volumes outside the CTV, but not for the total OAR 45 volumes whose dose statistics were given in Table 1. The authors would like to add for 46 clarification that the nominal plans could not meet the dosimetric constraints for the total OAR 47 volumes in several cases for the ipsilateral parotid gland (9×PTVb, 8×cRO, 8×aRO), the larynx 48 (8×PTVb, 9×cRO, 8×aRO) and the pharyngeal constrictor muscles (17×PTVb, 18×cRO, 49 18×aRO). (2) The original manuscript reported the increase of the larynx mean dose in the

50 cumulative dose distributions, and stated that the remaining OAR dose parameters presented 51 no major deviations between the nominal and cumulative doses. This statement referred just to 52 the change of the median values given in Table 1. The authors would like to specify that the 53 mean increase of the investigated dose parameter in the cumulative compared to the nominal 54 dose distribution was always < 1.3 Gy. However, major deviations with increases of more than 55 5 Gy occurred in individual cases for the mean dose of the larynx (2×PTVb, 2×cRO, 2×aRO), 56 the ipsilateral parotid gland (1×PTVb) and the esophagus inlet muscle (1×PTVb). The presented 57 original article focussed on the investigation of target coverage loss when analyzing the 58 anatomical robustness of the three planning approaches and the authors did not consider the 59 increase of OAR dose parameters as an indication for potential plan adaptation. Thus, the 60 reported corrections to the original manuscript do not change the major findings and drawn 61 conclusions.

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64 **References**

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